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## Knowledge, attitudes and practices towards COVID-19: A cross-sectional study in the resident cape-verdean population

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### ARTICLE INFO

**Keywords:**  
Knowledge  
Attitudes  
Practices  
COVID-19  
Cabo Verde

### ABSTRACT

**Context:** The first case of COVID-19 in Cabo Verde was confirmed on March 19, 2020. Since the beginning of the pandemic in the country, the government and health authorities have adopted restrictive measures to prevent the spread of SARS-CoV-2 and well as defined risk communication and community involvement strategies. The present study aimed at assessing the knowledge, attitudes, and practices of the Cape Verdean resident population towards COVID-19, to support the government and the national health system in the definition of public health policies related to COVID-19.

**Method:** A cross-sectional study was conducted among 1996 participants aged 16 years old and above. Data collected from April 5 to April 12, 2020, via an online self-reporting questionnaire adapted from a Chinese study. Descriptive statistics, chi-square tests, simple and multiple linear regression analyses were performed to determine factors associated with knowledge, attitudes, and practices towards COVID-19.

**Results:** The overall correct answer rate related to the knowledge about COVID-19 was 82% (9/11 \* 100), 1970 (98.70%) of the participants declared they had stayed at home in recent days, 1926 (96.49%) had not attended parties, funerals or crowded places and 1860 (93.19%) confirmed changes in daily routines due to COVID-19. The majority of the participants, 1797 (90.26%), preferred receiving information about COVID-19 in Portuguese and trusted information transmitted by health professionals. Furthermore, television, radio, and newspapers were the preferred means of transmitting information about COVID-19. Participants' knowledge influenced COVID-19 prevention and control practices ( $\rho = 0.119$ ;  $p = 0.000$ ).

**Conclusions:** These findings showed that the resident population had a good level of knowledge about COVID-19; however, there is a need to use more effective strategies to improve attitudes and practices towards COVID-19 to attain better results in controlling the pandemic in Cabo Verde.

### 1. Introduction

This article reports the knowledge, attitudes, and practices of the Cabo Verdean population concerning COVID-19 at the beginning of the pandemic in the country. COVID-19 is an emerging respiratory disease

caused by the new coronavirus SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2), after a set of cases of viral pneumonia of unknown origin first reported in December 2019 in the city of Wuhan, China, and quickly spread to other continents (World Health Organization, 2020b). Following the global evolution of the infection,

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<https://doi.org/10.1016/j.ssoho.2021.100184>

Received 18 January 2021; Received in revised form 29 June 2021; Accepted 30 June 2021

Available online 10 July 2021

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COVID-19 was declared a public health emergency of international concern by the World Health Organization (WHO) on January 30, 2020, and a pandemic on March 11, 2020 (World Health Organization, 2020a).

Despite the unprecedented measures adopted by the WHO and authorities worldwide, COVID-19 continues affecting thousands of people every day around the world. The COVID-19 fatality rate remains high globally. Currently (June 21, 2021), COVID-19 has already affected 178 million people. Over three million of these (3,864, 180) have died from the disease (World Health Organization, 2020b).

### 1.1. Characterization and background of COVID-19

COVID-19 effects do not limit to those infected by the virus. It affects society as the virus has significant implications for people's lives in general (Roy et al., 2020). Therefore, since the COVID-19 emergence in Wuhan city, China, in 2019, there has been an intense mobilization of the scientific community to understand the virus better and develop effective treatments and/or vaccine to curb the evolution of the pandemic and achieve the long-awaited return to normality (Paiva, 2020).

Most people who contract the disease have mild to moderate symptoms and recover without needing special treatment. However, some people affected by the SARS-CoV-2 virus do not develop symptoms of COVID-19 disease and are thus called asymptomatic cases. Severe cases may progress with breathing difficulty or shortness of breath, chest pain, loss of speech or movement (World Health Organization, 2020b). People with chronic comorbidities, immunocompromised individuals, and older adults are part of the risk groups, which are more likely to develop severe cases of the disease (Abate et al., 2020).

Coronaviruses (CoV) are a large viral family known since the mid-1960s that cause respiratory infections in humans and animals. According to the WHO, most people have been infected with common coronaviruses throughout their lives, with young children most likely to be infected by this virus (World Health Organization, 2020a). Coronavirus infections usually cause mild to moderate respiratory illnesses, similar to a common cold, however, some coronaviruses can cause severe respiratory syndromes, such as the Severe Acute Respiratory Syndrome (SARS), first reported in China in 2002, and further spread to over a dozen countries in North America, South America, Europe, and Asia (World Health Organization, 2020a).

In 2012 another new coronavirus different from the one that caused SARS in the early 2000s was isolated. The disease then called Middle East Respiratory Syndrome (MERS), and the new virus causing it, the MERS-associated coronavirus (MERS-CoV), was unknown until their identification in Saudi Arabia (World Health Organization, 2020a).

### 1.2. Reservoir, mode of transmission, prevention, and treatment of COVID-19

In general, coronaviruses can remain viable (i.e., maintain their infectivity) for a few days in the environment. This period depends on different factors, such as environmental temperature or exposure to ultraviolet radiation (World Health Organization, 2020b). Signs and symptoms of COVID-19 infection appear after an incubation period of approximately 2–14 days, depending on the age and immune system of the affected individual (Rothan & byrareddy, 2020).

Studies have shown that the disease transmission occurs between infected humans (from person to person) through droplets expelled from the mouth or nose when infected people speak, cough, or sneeze (Peeri et al., 2020; World Health Organization, 2020b). Once someone is infected, the virus multiplies in the individual's airways, which becomes infectious and can transmit the virus to other people, regardless of the presence of symptoms or not.

Likewise, according to the WHO, transmission can also occur when contaminated hands after contact with surfaces containing viral particles touch the mouth, eyes, or nose (World Health Organization, 2020b). Due to the lack of specific treatment, the WHO recommends preventive measures to reduce the spread of the virus. Physical distancing, avoiding crowds of people, restraining from sharing personal objects, practicing "respiratory etiquette or hygiene" measures, washing hands regularly and correctly with soap and water and applying alcohol gel, and respecting the containment measures adopted by governments are the appropriate means for the prevention of COVID-19 (World Health Organization, 2020b).

Despite experts' efforts, no specific antiviral drugs to combat COVID-19 infection have been developed so far (Li et al., 2020; Rothan & byrareddy, 2020). However, some therapeutic options have shown promising results for specific cases.

Due to the dedication and commitment of the international scientific community, at the end of 2020, some vaccines considered effective for the immunization of the world population against the SARS-CoV-2 virus were approved. According to the WHO, there are currently 284 candidate vaccines in development, 102 of which have already been tested in humans (World Health Organization, 2021). Mass vaccination of the population is considered one of the most economic measures to control the pandemic and reduce impacts on health, the economy, and the social level (World Health Organization, 2021). With the approval of some vaccines by national regulatory authorities in different territories, several countries have started mass vaccination through selected groups in the first quarter of 2021 (World Health Organization, 2020c; Freund, 2020).

### 1.3. COVID-19 in Cabo Verde

The first case of COVID-19 in Cabo Verde was confirmed on March 19, 2020, in an English tourist, on the island of Boa Vista. While the first Cape Verdean citizen was diagnosed on March 25, 2020, in the city of Praia and was also an imported case (Ministério da Saúde e da Segurança Social, 2020b).

Since the declaration of the pandemic, the Cabo Verdean government and health authorities had adopted several restrictive measures and risk communication strategies that were aimed at encouraging the implementation of preventive measures. These include social (physical) distancing, hand, and environmental hygiene, the use of masks, respiratory etiquette, among other means of individual and collective protection to combat the spread of the pandemic (Ministério da Saúde e da Segurança Social, 2020a).

The adoption of restrictive measures such as the declaration of a state of emergency (Presidential Decree No. 06/2020), which was in effect from March 28 to May 29, 2020, with three successive extensions, helped control the rapid spread of COVID-19 in the initial stages of the pandemic (Presidência da República, 2020). The implementation of these unprecedented national measures helped avoid the healthcare services' overloading and allowed for their reorganization.

Despite health authorities' efforts to curb the virus propagation, COVID-19 has already spread to all the islands of the Cabo Verde archipelago, with significant social and economic implications for the country. According to WHO, Cabo Verde was one of the African Portuguese-speaking countries (PALOP) most affected by COVID-19 (World Health Organization, 2020d).

The COVID-19 pandemic in Cabo Verde has evolved at a moderate pace, with a slight increase in the number of cases after lifting the lockdown measures on May 29, 2020. The epicenter of the infection has often alternated between islands, and the most affected islands have been Boa Vista, Santiago, Sal, São Vicente, Fogo, and Santo Antão. As of June 21, 2021, of the country has confirmed 32076 cases of COVID-19, 31194 recovered cases and 238 deaths (Ministério da Saúde e da

Segurança Social, 2020b).

#### 1.4. Relevance of the study knowledge, attitudes and practices towards COVID-19 in the resident Cabo Verdean population

Since the beginning of the pandemic, Cabo Verdean authorities have implemented several measures to control the spread of the disease in the country. Some strategies to control the spread of the virus include and/or are based on educational campaigns. However, adherence has been inconsistent over the course of the pandemic and variable across islands. Education and sensitization of the population are considered some essential measures in controlling diseases and epidemics, as observed in the SARS epidemic in 2003 (Bell et al., 2003). From the perspective of Zhong et al. (2020), people's adherence to prevention and control measures can be largely affected by the knowledge, attitudes, and practices of the population regarding COVID-19.

CAP studies consist of surveys applied to population samples to assess their level of knowledge, attitudes, and practices concerning a particular social phenomenon (Austrian et al., 2020). The methodology dates back to the early 1950s, initially applied to the area of family planning. They are studies with a simple design that are easy to apply and interpret, capable of producing generalizable quantitative data in short periods. These data, in turn, can serve as a starting point for exploratory qualitative analyzes of social norms and other determinants of behavior (Austrian et al., 2020).

To delineate strategies aimed at the cognitive and behavioral realities of the population, it is necessary to carry out KAP studies aiming to understand them (Zhong et al., 2020). The author above argues that to combat this pandemic and minimize its impact on public health and socioeconomic, it is crucial that local populations adopt the prevention and control measures oriented by local authorities (Zhong et al., 2020).

To effectively introduce COVID-19 prevention and control measures, it is necessary that people are aware of the basic principles of hygiene and the means of transmission and spread of infection by SARS-CoV-2. Thus, to successfully win the fight against COVID-19 in Cabo Verde, the resident population must be committed to preventing and controlling the disease.

Due to their advantages, CAP studies have been widely used to assess populations' level of knowledge, attitudes, and practices during epidemics. Since the beginning of the COVID-19 pandemic, this research modality has been carried out in several countries (Akalu et al., 2020; Al-Hanawi et al., 2020; Austrian et al., 2020; Azlan et al., 2020; Clements, 2020; Erfani et al., 2020; Goumenou et al., 2020; Hussain et al., 2020; Lau et al., 2020; Manjate et al., 2020; Olapegba et al., 2020; Rahman & Sathi, 2020; Reuben et al., 2020; Rios-González, 2020; Zhong et al., 2020).

For the present study, a literature review was carried out in the prominent international health journals and repositories (Pub-Med, PMC, JMIR), Google Academic, official sites (WHO, Government), and digital journals. Scientific articles, full texts in PDF or HTML were searched, without language restriction, using the terms « knowledge, attitudes, and practices regarding COVID-19», «infection by the new coronavirus», «cross-sectional studies», «COVID pandemic –19».

From the literature review, several articles were found on the subject under study. We found CAP COVID-19 studies from several countries, from Asia, America, Europe, and Africa. However, we came across fewer CAP studies from the African continent, particularly from Portuguese-speaking African Countries (PALOP). Among the pertinent studies identified, the KAP study by Zhong et al. (2020) stands out as one of the primary KAP studies on the topic.

Despite the various KAP studies carried out globally, there is no validated questionnaire for conducting KAP studies concerning COVID-

19. Therefore, the questionnaire from the study by Zhong et al. has been adapted to studies in other countries. Similar to the present study, most KAP studies on COVID-19 identified were carried out through virtual platforms (Clements, 2020; Erfani et al., 2020; Zhong et al., 2020).

Considering the theory that adherence to health policies is strongly influenced by the knowledge, attitudes, and practices of a population, the National Institute of Public Health of Cabo Verde designed the present study at the beginning of the pandemic, a week after the declaration of the state of emergency. Its objective was to understand and analyze the knowledge, attitudes, and practices of the Cabo Verdean resident population towards COVID-19.

More specifically, the present COVID-19 KAP study aimed to analyze the degree of knowledge of the resident Cape Verdean population about the signs, symptoms and forms of transmission of COVID-19; describe the attitudes of the population living in Cape Verde regarding the country's capacity to combat the COVID-19 pandemic; to identify the practices of the population living in Cape Verde in the prevention and control of COVID-19, to identify approaches and means of communication considered credible for the transmission of information about COVID-19; determine the correct response rates of knowledge of the population residing in Cape Verde about COVID-19; relate the socio-demographic variables with the correct responses of knowledge, positive attitudes and assertive practices of prevention and control of COVID-19; relate knowledge and attitudes towards COVID-19 prevention and control practices and analyze the influence of sociodemographic variables (gender, age group, marital status, level of education and profession/occupation) on the knowledge scores of the resident population about COVID -19.

## 2. Materials and methods

### 2.1. Study design

This is a descriptive cross-sectional, observational, quantitative, and analytic study.

#### 2.1.1. Study location

The data were collected on the nine islands of the Cabo Verde.

#### 2.1.2. Participants

Due to the country's situation at the time of data collection (State of Emergency), it was not possible to conduct a study with a representative sample of the resident population. Thus, data were collected online, in a convenience sample (non-probabilistic) of citizens residing in Cape Verde (Cape Verdeans or not), of both sexes, aged 16 or over, who made themselves available to answer the self-administered questionnaire by signing an informed consent form.

The study was conducted among 1996 Cabo Verdean citizens residing in the country, aged 16 or older.

#### 2.1.3. Eligibility criteria

Persons aged 16 or over and citizens residing in Cabo Verde were eligible for participation in the study. Data were collected from 2200 resident citizens. A total of 204 participants were rejected; this included minors less than 16 years of age and those who refused to fill out the informed consent online forms.

### 2.2. Data collection procedures

The data were collected online on the Google forms platform from April 5 to 12. A survey questionnaire and a call to participate in the study were made through social media and short message service (SMS).

2.3. Data collection instrument

The 23-question KAP questionnaire was adapted from the KAP study conducted in China (Zhong et al., 2020). The questionnaire consisted of two parts: sociodemographic data and questions about knowledge, attitudes, and practices towards COVID-19. The second part of the questionnaire included 11 questions on clinical symptoms and modes of transmission of COVID-19; three questions assessed attitudes towards the disease; five questions were related to behaviors concerning prevention and control. Lastly, four questions inquired on information and communication. Participants were given response options of “True,” “False,” or “I Do Not Know,” “Agree,” “Disagree” or “I Do Not Know” as well as “Yes”, “No” or “I Do Not Know” to questions regarding knowledge, attitudes, and practices, respectively. Knowledge questions were assigned one (1) point for each correct answer, and 0 (zero) points for incorrect and/or uncertain answers. The score ranged from 0 to 11, with the highest score indicating better knowledge of COVID-19.

2.4. Statistical analysis

In this study, the data were analyzed using the software Statistical Package for the Social Sciences (SPSS, v. 26). Descriptive analysis of the data and determination of the correct response rates was performed based on the frequencies of the correct responses. Chi-square test was used to determine the association between sex, age, marital status, education level, profession and correct response rates regarding knowledge, positive attitudes and assertive practices; Poisson correlation model was used to analyze the influence of sociodemographic variables on the knowledge. Finally, the Spearman correlation test was performed to verify any correlation between knowledge, attitudes, and practices. The level of statistical significance was 0.05.

2.5. Ethical approval and data protection

The National Data Protection Commission of Cabo Verde approved the study protocol through authorization document No. 90/2020. Participants who consented to participate voluntarily in the study clicked on the «Accept » button, filled in their names, and were directed to complete the self-reporting questionnaire.

3. Results

3.1. Sociodemographic characteristics

A total of 1996 residents participated in the study; the majority of them lived in the islands of Santiago (54.51%), São Vicente (21.69%), and Sal (8.87%). Most of the participants, 1009 (50.58%), were women, 970 (53.27%) declared they held a university degree, and 618 (31.91%) affirmed that their professional category could be classified as “Experts in Scientific and Intellectual Activities” in accordance with the National Classification of the Professions of Cape Verde (INE, 2010). Detailed demographic characteristics are described in (Appendix A p. 30).

3.2. Evaluation of knowledge

Eleven (11) questions were used to measure the knowledge of the resident Cape Verdean population about the signs, symptoms, and modes of transmission of COVID-19. The median knowledge score for participants was 9 (RANGE: 0–11), suggesting an overall correct answer rate of 82% (9/11 \* 100), and the range of the correct answer rate of the participants concerning the 11 knowledge questions varies from 26.3% to 99.2% (Table 1).

Table 1

The correct answer rate of study participants for Knowledge Questions on COVID19 (N=1996).

Questions	Options	%
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, myalgias (muscular pain in any part of the body).	True False I Do Not Know	91.00%
K2. Currently, there is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	True False I Do Not Know	94.10%
K3. Not all persons with COVID-19 will develop severe cases.	True False I Do Not Know	92.30%
K4. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases.	True False I Do Not Know	48.20%
K5. Contact with wild animals would result in the infection by the novel coronavirus (SARS-CoV-2).	True False I Do Not Know	63.00%
K6. The novel coronavirus (SARS-CoV-2) spreads via respiratory droplets of infected individuals.	True False I Do Not Know	95.80%
K7. Ordinary residents must wear masks to prevent the infection by the novel coronavirus (SARS-CoV-2).	True False I Do Not Know	26.30%
K8. It is not necessary for children and young adults to take measures to prevent the infection by the new coronavirus (SARS-CoV-2).	True False I Do Not Know	97.00%
K9. To prevent the infection by the new coronavirus (SARS-CoV-2), individuals must wash their hands regularly and avoid going to crowded places such as supermarkets, bars, restaurants and taking public transportation, among other preventive measures.	True False I Do Not Know	99.20%
K10. Isolation and treatment of people who are infected with the new coronavirus (SARS-CoV-2) are effective ways to reduce the spread of the virus.	True False I Do Not Know	98.60%
K11. People who have contact with someone infected with the new coronavirus (SARS-CoV-2), must be immediately isolated in a proper place and observed for a period of 2–14 days.	True False I Do Not Know	97.40%

Source: National Institute of Public Health, April 2020 - N = 1996.

The majority of the participants, 1979 (99.15%) reported that to avoid infection by the new coronavirus (SARS-CoV-2), individuals should wash their hands frequently and avoid going to crowded places, and 1968 (98.6%) affirmed that isolation and treatment of people infected with the SARS-CoV-2 virus are effective ways to reduce the spread of the disease. Only 524 (26.3%) of the respondents affirmed that people should wear masks to prevent infection by the new coronavirus and 961 (48.17%) of the participants stated that only elderly people, with chronic illnesses and the obese, are more likely to develop severe cases of COVID-19 (Table 2).

The Chi-Square results showed that the knowledge scores were significantly different across gender, age groups, marital status, educational level, and profession/occupation. (Appendix B p. 31).

Poisson’s regression model showed that age 16 to 44 (OR = 0.956, p = 0.000), education level pedagogical institute or secondary school (OR = 0.935, p = 0.000), occupation student (OR = 0.951, p = 0.000) were significantly associated with lower scores of knowledge of COVID-19

**Table 2**  
Knowledge of study participants on symptoms and modes of transmission of COVID-19 (N=1996).

Questions	Options	N	%
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, myalgias (muscular pain in any part of the body).	True	1815	90.93
	False	155	7.77
	I Do Not	26	1.3
	Know		
K2. Currently, there is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	True	1878	94.09
	False	36	1.8
	I Do Not	82	4.11
	Know		
K3. Not all persons with COVID-19 will develop severe cases.	True	1841	92.23
	False	54	2.71
	I Do Not	101	5.06
	Know		
K4. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases.	True	909	45.56
	False	961	48.17
	I Do Not	125	6.27
	Know		
K5. Contact with wild animals would result in the infection by the new coronavirus (SARS-CoV-2).	True	234	11.72
	False	1257	62.98
	I Do Not	505	25.3
	Know		
K6. The new coronavirus (SARS-CoV-2) spreads via respiratory droplets of infected individuals.	True	1912	95.79
	False	46	2.3
	I Do Not	38	1.9
	Know		
K7. Ordinary residents must wear masks to prevent the infection by the new coronavirus (SARS-CoV-2).	True	524	26.25
	False	1228	61.52
	I Do Not	244	12.22
	Know		
K8. It is not necessary for children and young adults to take measures to prevent the infection by the new coronavirus (SARS-CoV-2).	True	41	2.05
	False	1936	96.99
	I Do Not	19	0.95
	Know		
K9. To prevent the infection by the new coronavirus (SARS-CoV-2), individuals must wash their hands regularly and avoid going to crowded places such as supermarkets, bars, restaurants and taking public transportation among other preventive measures.	True	1979	99.15
	False	11	0.55
	I Do Not	6	0.3
	Know		
K10. Isolation and treatment of people who are infected with the new coronavirus (SARS-CoV-2) are effective ways to reduce the spread of the virus.	True	1968	98.6
	False	14	0.7
	I Do Not	14	0.7
	Know		
K11. People who have contact with someone infected with the new coronavirus (SARS-CoV-2), must be immediately isolated in a proper place and must be observed for a period of 2-14 days.	True	1943	97.34
	False	37	1.85
	I Do Not	16	0.8
	Know		

Source: National Institute of Public Health, April 2020 - N = 1996.

compared to the reference groups.

On the other hand, females (OR = 1.013, p = 0.024), marital status (OR = 1.456, p = 0.000) and others (OR = 1.576, p = 0.000), and intermediate and intellectual professional categories (OR = 1.042, p = 0.000) were significantly associated with the highest COVID-19 knowledge scores, when compared to the reference groups (Table 3).

Spearman's correlation analysis between knowledge and attitudes with practices indicates that the level of knowledge has a significant positive correlation with COVID-19 prevention and control practices (rho = 0.119; p = 0.000) and that attitudes are not correlated with practices (Table 4).

**Table 3**  
Correlation between knowledge score and sociodemographic variables (N = 1996).

Variables	OR	95% IC	p-value
Sex			
Female	1.013	(1.002-1.025)	0.024
Male	1		
<b>Age group</b>			
16-44 years old	0.956	(0.945-0.967)	0.000
45 and over	1		
<b>Marital status</b>			
Married	1.456	(1.311-1.617)	0.000
Others <sup>1</sup>	1.576	(1.311-1.894)	0.000
Never Married*	1		
<b>Education level</b>			
Higher education	1.011	(0.991-1.031)	0.289
Pedagogical institute or secondary school	0.935	(0.913-0.957)	0.000
Others <sup>2*</sup>	1		
<b>Profession/Occupation</b>			
Intermediate and intellectual professional	1.042	(1.026-1.059)	0.000
Student	0.951	(0.927-0.976)	0.000
Unemployed	0.984	(0.949-1.021)	0.394
Others <sup>3*</sup>	1		

Source: National Institute of Public Health, April 2020 - N = 1996.

\* reference category.

1 separated/divorced and widowed; 2 Pedagogical Institute, High School and Professional Training; 3 placed in other professional categories.

**Table 4**  
Spearman correlation analysis between knowledge, attitudes and practices.

	Practices
<b>Knowledge</b>	0.119** (p = 0.000)
<b>Attitudes</b>	- 0,005 (p = 0.00.816)

Source: National Institute of Public Health, April 2020 - N = 1996.  
\*\*The correlation is significant at the 0.01 level (2-tailed).

**Table 5**  
Evaluation of participants attitudes towards COVID-19.

Questions	Options	N	%
A1. Do you agree that COVID-19 will finally be successfully controlled?	Agree	1520	76.15
	Disagree	70	3.51
	I Do Not	406	20.34
	Know		
A2. Do you have confidence that Cabo Verde can win the battle against the pandemic COVID-19?	Agree	1746	87.47
	Disagree	36	1.80
	I Do Not	214	10.72
	Know		

Source: National Institute of Public Health, April 2020 - N = 1996.

### 3.3. Evaluation of attitudes

The results indicate that the majority of subjects, 1520 (76.15%), were confident that the new coronavirus would successfully be controlled, and 1746 (87.48%) were sure that Cabo Verde could win the fight against COVID-19, while about 250 (12.52%) of the respondents were not confident in the country's success in the fight against the COVID-19 pandemic. (Table 5).

Participants who disagreed or reported not knowing whether the country could win the fight against the COVID-19 pandemic affirmed that this could be possible if there were: maximum involvement of the population in complying with the rules implemented during the state of emergency, such as social distancing and other restrictive measures for the prevention and control of the disease. Furthermore, there had to be

**Table 6**  
Evaluation of participants' practices towards COVID-19 (N = 1996).

Questions	Options	N	%
P1. In recent days, did you change your daily routine due to COVID-19?	Yes	1860	93.19
	No	133	6.66
	I Do Not Know	3	0.15
P2. In recent days, have you tried to stay home most of the time?	Yes	1970	98.70
	No	26	1.30
P3. In recent days, have you been to a party, funeral or any crowded place?	Yes	70	3.51
	No	1926	96.49
P4. In recent days, have you worn a mask and/or gloves when leaving home?	Yes	272	13.63
	No	1724	86.37

Source: National Institute of Public Health, April 2020 - N = 1996.

an increase in the number of screening tests for suspected cases and clarity in the definition of individual protection and safety measures, for example, the mandatory use of masks and the reinforcement of hygiene care in public places with large crowds.

The positive attitude regarding successfully controlling the COVID-19 pandemic was significantly associated with age groups, marital status, and profession. Respondents most confident that the pandemic could be controlled were over 44 years of age, married, and unemployed (Appendix C p. 31).

### 3.4. Evaluation of practices

From the results obtained, it was found that 1970 (98.70%) of the subjects declared to have stayed at home in recent days; 96.49% (1926) did not attend parties, funerals, or crowded places, and 1860 (93.19%) confirmed changes in daily routines due to COVID-19. Regarding the use of gloves and masks, 272 (13.63%) of the subjects claimed to have used gloves or masks when leaving home in recent days (Table 6).

Results showed that sociodemographic characteristics and prevention and control practices towards COVID-19 were significantly associated with age groups, marital status, educational level, and professions. Participants aged 44 or over, separated/divorced or widowed, with higher education, intermediate level and intellectual professionals reported that they stayed at home most of the time and avoided places with large crowds (Appendix D p. 31).

### 3.5. Evaluation of communication and information

Healthcare professionals were identified as the most suitable people/professionals to transmit information about COVID-19, 1805 (90.98%). Television 1643 (82.56%), radio 405 (20.35%) and newspapers 333 (16.73%) are the preferred and most reliable means of receiving information about the disease by the population and the vast majority, 1797 (90.26%) of the subjects preferred receiving information in Portuguese (Appendix E p. 31–32).

## 4. Discussion

This is the first study on Knowledge, Attitudes, and Practices towards COVID-19 conducted in Cabo Verde. Following our literature review, it is the second among the African Portuguese-speaking countries (PALOP). Apart from the present study, only Mozambique has carried out a KAP COVID-19 study. Due to the context in which the study took

place and the online format of the questionnaire, of the 1996 participants aged 16–65 years old or over (median age 39), more than half (53,27%) declared to have a degree. In general, these data are similar to other KAP studies carried out elsewhere, where most respondents claimed to belong to age groups of young people and young adults (Zong et al., 2020, Clements, 2020; Erfani et al., 2020; Rahman & Sathi, 2020). However, this study participants' level of education was not representative of the resident Cabo Verdean population. According to data from the 2018 statistical yearbook, 9.5% of the resident Cabo Verdean population had higher education, the literacy rate was 40.1%, and the illiteracy rate was 7.7% (INE, 2018).

The fact that the majority of respondents claim to have higher education (Bachelor's, Master's, and Ph.D.) suggests that these participants were individuals with greater ease in the use of information and communication technologies (internet, mobile phones, computers, and others) and, therefore, were more likely to search for information (self-knowledge). Data from the Continuous Multi-Objective Survey (CMS) of the National Institute of Statistics revealed that in 2020, 67% of Cape Verdean households had internet access at home and that cellphones were the main means of accessing the internet in households (Ribeiro, 2020).

Considering that this was the first experience of the resident Cape Verdean population with the SARS-CoV-2 virus, the results showed that the population had a high level of knowledge about the signs, symptoms, and modes of transmission of COVID-19. However, the population's knowledge has little influence on COVID-19 prevention and control practices ( $\rho = 0.119$ ;  $p = 0.000$ ) and none on attitudes ( $\rho = -0.005$ ;  $p = 0.816$ ).

The median knowledge score of the resident Cape Verdean population on the signs and symptoms and modes of transmission of COVID-19 was nine (9) (Range 0–11) and had an overall correct answer rate of 82% ( $9-11 * 100$ ).

In general, the levels of knowledge concerning COVID-19 in the different KAP studies analyzed were good. The knowledge correct answer scores of the present study (82%) are superior to a Thailand KAP study (Rahman & Sathi, 2020), which reported an overall knowledge rate among Thais of 73.4%. They are also higher than the knowledge rate founded in a study from the United States of America (80%) among US citizens (Clements, 2020). However, the Cabo Verdean knowledge score is below the Iranian (Erfani et al., 2020) and Chinese study (Zhong et al., 2020), which reported an overall correct answer rate of 85% and 90%, respectively.

Despite the slight fluctuations in the overall correct answer rates, the results of the studies mentioned above are close to those of the Cabo Verdean CAP study. Zhong et al. (2020) stated that the data showed that most Chinese residents of high socioeconomic status, particularly women, are knowledgeable about COVID-19, maintain optimistic attitudes, and have adequate practices concerning COVID-19. Our study results indicate that greater knowledge is significantly associated with females, persons aged 44 or over, married and others (separated/divorced and widowed), with higher education and others (Pedagogical Institute, Secondary Course, Professional Training), belonging to the class of intermediate and intellectual level professionals.

Similarly, data from the KAP study in Iran showed a significant correlation between female gender, older age, and higher education with knowledge, attitude, and practice. The multiple linear regression analysis showed that male participants, non-health-related professions, single people, and lower educational levels were significantly associated with lower knowledge scores. These data are close to our study's results, which revealed that those in the male group, never married, under 44 years of age, with a low level of education (primary and secondary) have low levels of knowledge regarding COVID-19.

Even though the correct answer rate was high, it was found that participants had poor knowledge about the need for the use of masks by regular members of the public 524 (26.25%) and the likelihood of developing severe cases among the elderly, obese, and chronically ill 961 (48.17%).

The low rate of correct answers on the use of masks as one of the prevention and control measures against the infection caused by SARS-CoV-2 could be associated with information conveyed in the initial stages of the COVID-19 pandemic by WHO (Neves, 2020) and recommendations adopted by the country at the time.

These recommendations suggested that masks should only be used by specific groups such as healthcare professionals, patients with COVID-19, and those with symptoms similar to COVID-19. At the time of data collection, the official guidelines on the mandatory use of masks had not been issued. Subsequently, by decree n°47 of April 25, the Cape Verdean government imposed the mandatory use of masks in closed places (Assembleia Nacional, 2020; Agência Lusa, 2020).

The low rate of masks used as a personal protection measure has also been reported in a United States of America study. The author stated that only 24% of americans said they had used masks when leaving home in the last five days (Clements, 2020). On the other hand, the study by Zhong et al. (2020) reported that only 2% of Chinese citizens claimed not to wear masks in public at the time of data collection, one week after the start of the COVID-19 pandemic in that Asian country. It is noteworthy that in Asia, especially in China, Chinese authorities have determined the use of masks as mandatory since the beginning of the pandemic.

Based on the literature, one notes that, although people are generally aware of infection prevention and control measures, they cannot always adequately comply with them. The literature analyzed suggests that, although the belief in the possibility of controlling the virus is high, the overall score for practices is moderate.

In the present study, most participants showed positive attitudes towards overcoming COVID-19 and the country's ability to win the fight against the pandemic. As a result, most participants stated that they had complied with prevention and control measures for COVID-19, such as staying at home, avoiding places with large crowds, and changing daily routines.

The vast majority, 1797 (90.26%), of the subjects prefer to receive information about COVID-19 in Portuguese, by healthcare professionals 1805 (90.98%), transmitted by television 1643 (82.56%), radio 405 (20.35%) and newspapers 333 (16.73%). These findings are similar, in part, to those of the Iranian study (Erfani et al., 2020), where the author reported that 82.9% of Iranians chose social and media networks as the most credible means of information. In the present study, even though social media platforms are widely used, the participants did not choose them as credible means to obtain information about COVID-19.

Considering that the country has never experienced a similar situation, the positive results of the present study, such as the high rate of correct responses regarding the signs and symptoms of COVID-19, the positive attitude towards the country's ability to win the fight against COVID-19, and assertive behavior in controlling the disease may be associated with the adoption of assertive measures by the Cabo Verdean authorities.

Based on the significant positive association between knowledge and practices, findings of this study suggest that health education programs, mainly targeting individuals with less knowledge about COVID-19, are essential to encourage positive attitudes and maintain safe practices. Health education is an essential public health tool in combating emerging diseases, such as infection by the new coronavirus (Clements, 2020).

## 5. Study limitations

Being an online study, the sample population used is not representative of the resident Cape Verdean population. As a result, the sample may not have included subjects in older age groups, with low education levels and those who do not have access to the internet. In addition to this, the questionnaire was made available online for only one week, which may have limited the number of participants. Hence, a new study is needed with a stratified sample representative of the resident Cape Verdean population.

## 6. Conclusions

This study brought valid contributions to the formulation of public health policies aimed at controlling and eliminating the COVID-19 pandemic in Cabo Verde. The results of the present study, in particular, the high levels of knowledge about the main clinical symptoms, forms of prevention, and control of COVID-19 in the resident Cabo Verdean population may be helpful for comparison purposes with other KAP COVID-19 studies at the global level, particularly on the African continent. They can also be an important aid in understanding the phenomenon of COVID-19, in addition to helping in planning public health interventions, in formulating and implementing policies. Although knowledge related to COVID-19 among the study participants was high, the results show the utmost need to increase knowledge about COVID-19 in the resident Cape Verdean population through health literacy, which can also result in improvements in the attitudes and practices of the population regarding the pandemic. Additionally, these findings suggest that health authorities should provide updated information about the disease, in Portuguese, transmitted by television, radio, and newspapers to the resident population to promote and reinforce responsible social behavior to support the prevention and control measures against COVID-19.

## CRedit authorship contribution statement

**Maria de Fátima Carvalho Alves:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, were responsible for the statistical analysis and design of the tables and figures, coordinated the project, leading the operationalization of the study, from the collection, treatment of data and writing of the manuscript, All authors contributed to the drafting of the article and agreed with the decision to publish this study. **Maria da Luz Lima Mendonça:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, All authors contributed to the drafting of the article and agreed with the decision to publish this study. **Janice de Jesus Xavier Soares:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, were responsible for the statistical analysis and design of the tables and figures. **Silvânia Da Veiga Leal:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, All authors contributed to the drafting of the article and agreed with the decision to publish this study. **Menilita dos Santos:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, All authors contributed to the drafting of the article and agreed with the decision to publish this study. **Júlio Monteiro Rodrigues:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, All authors contributed to the drafting of the article and agreed with the decision to publish this study. **Edna Duarte Lopes:** were responsible for the conception, study design and adaptation of the questionnaire and data collection, were responsible for the statistical analysis and design of



the tables and figures, All authors contributed to the drafting of the article and agreed with the decision to publish this study.

### Declaration of competing interest

No funding was obtained for this study. The authors declare that they have no financial and/or personal conflicts of interest in the design and implementation of this study.

## APPENDIX

### Appendix A

Demographic Characteristics of Participants(N = 1996)

Variables	N	%
<b>Sex/Gender</b>		
Male	986	49,42
Female	1009	50,58
<b>Age Group</b>		
16–24	230	11,52
25–44	1329	66,58
45–64	405	20,29
65 e +	32	1,61
Mean ± Standard Deviation: (39 ± 0,607)		
<b>Marital Status</b>		
Not married	1244	62,33
Married	491	24,6
Separated/Divorced	111	5,56
Married in fact (de facto)	138	6,91
Widower	12	0,6
<b>Education level</b>		
Basic education	54	2,97
Secondary school	480	26,36
Vocational training	116	6,37
University degree	970	53,27
Master degree	147	8,07
Doctorate	29	1,59
Baccalaureate	21	1,15
Pedagogical Institute	4	0,22
<b>Profession</b>		
Specific military professions	9	0,46
Representatives of the legislative and executive branches, directors and executive managers	107	5,52
Specialists in intellectual and scientific activities	618	31,91
Intermediate technicians and professionals	340	17,55
Administrative staff	194	10,02
Personal service personnel, security and safety personnel and sales	173	8,93
Farmers and skilled workers in agriculture, fisheries and forestry	6	0,31
Workers, craftsmen and similar workers	45	2,32
Plant and machine operators and assembly workers	25	1,29
Elementary professions	45	2,32
Students	200	10,33
Retired	52	2,68
Business people	40	2,07
Unemployed	83	4,29
<b>Island of residence</b>		
Santo Antão	98	4,9
São Vicente	433	21,7
São Nicolau	22	1,1
Sal	177	8,9
Boavista	61	3,1
Maio	21	1,1
Santiago	1088	54,5
Fogo	83	4,2
Brava	13	0,7

Source: National Institute of Public Health, April 2020 - N = 1996.

### Acknowledgements

The authors would like to thank all participants who voluntarily agreed to participate in this study. And would also like to thank Dr. Ngibo Mubeta Fernandes for the translation of the original manuscript. Likewise, we thank Dr. Janilza Silva for her contributions to supporting the translation of the manuscript and formatting the bibliographic references.

## Appendix B. Correlation between sociodemographic variables and participants'knowledge score related to COVID-19 (N = 1996)

Variables	Sex (n, %)				Age (n, %)				Marital Status					Education (n, %)					Profession					
	Male	Female	$\chi^2$	P	16-44	44 e +	$\chi^2$	P	Married	Never Married	Other	$\chi^2$	P	Basic and Secondary	Higher Education	Other	$\chi^2$	P	Unemployed	Student	Intermediate level and intellectual professionals	Other	$\chi^2$	P
<b>C1-correct</b>	900	915	0.214388085557975	.643	1397	418	15.118	.000*	460	1238	117	10.198	.006*	467	1066	132	15.338	.000*	74	154	1181	354	55.622	.000*
	91.3%	90.7%			89.6%	95.7%			93.7%	89.6%	95.1%			87.5%	93.0%	93.6%			89.2%	77.0%	93.1%	91.7%		
<b>C2-correct</b>	927	950	.017	.897	1458	420	4.111	.043*	473	1292	113	6.436	.040*	478	1103	137	33.237	.000*	76	177	1214	358	20.011	.000*
	94.0%	94.2%			93.5%	96.1%			96.3%	93.5%	91.9%			89.5%	96.2%	97.2%			91.6%	88.5%	95.7%	92.7%		
<b>C3-correct</b>	906	934	.322	.570	1420	421	13.158	.000*	470	1254	117	14.095	.001*	459	1092	129	44.542	.000*	72	172	1202	339	36.068	.000*
	91.9%	92.6%			91.1%	96.3%			95.7%	90.7%	95.1%			86.0%	95.3%	91.5%			86.7%	86.0%	94.8%	87.8%		
<b>C4-correct</b>	449	512	5.413	.020*	725	236	7.691	.006*	234	657	70	4.035	.133	214	593	71	20.150	.000*	34	73	648	173	18.700	.000*
	45.5%	50.7%			46.5%	54.0%			47.7%	47.5%	56.9%			40.1%	51.7%	50.4%			41.0%	36.5%	51.1%	44.8%		
<b>C5-correct</b>	585	671	10.996	.001*	972	285	1.206	.272	334	839	84	9.904	.007*	264	778	98	56.073	.000*	50	106	849	210	29.447	.000*
	59.3%	66.5%			62.3%	65.2%			68.0%	60.7%	68.3%			49.4%	67.9%	69.5%			60.2%	53.0%	67.0%	54.4%		
<b>C6-correct</b>	948	963	.615	.433	1482	430	9.430	.002*	474	1316	122	5.299	.071	498	1113	131	15.884	.000*	77	181	1234	364	25.384	.000*
	96.1%	95.4%			95.1%	98.4%			96.5%	95.2%	99.2%			93.3%	97.1%	92.9%			92.8%	90.5%	97.3%	94.3%		
<b>C7-correct</b>	266	257	.585	.444	375	149	17.779	.000*	144	336	44	10.843	.004*	112	327	38	10.815	.004*	19	38	348	102	6.862	.076
	27.0%	25.5%			24.1%	34.1%			29.3%	24.3%	35.8%			21.0%	28.5%	27.0%			22.9%	19.0%	27.4%	26.4%		
<b>C8-correct</b>	955	980	.125	.724	1511	425	.130	.719	481	1335	120	2.457	.293	502	1124	139	21.679	.000*	78	191	1244	365	17.129	.001*
	96.9%	97.1%			96.9%	97.3%			98.0%	96.6%	97.6%			94.0%	98.1%	98.6%			94.0%	95.5%	98.1%	94.6%		
<b>C9-correct</b>	976	1002	.606	.436	1543	436	2.571	.109	490	1368	121	3.741	.154	528	1139	140	1.263	.532	81	198	1260	382	3.412	.332
	99.0%	99.3%			99.0%	99.8%			99.8%	99.0%	98.4%			98.9%	99.4%	99.3%			97.6%	99.0%	99.4%	99.0%		
<b>C10-correct</b>	972	995	.004	.951	1532	436	5.575	.018*	491	1354	123	12.617	.002*	522	1135	138	4.821	.090	81	194	1254	381	5.179	.159
	98.6%	98.6%			98.3%	99.8%			100.0%	98.0%	100.0%			97.8%	99.0%	97.9%			97.6%	97.0%	98.9%	98.7%		
<b>C11-correct</b>	956	986	1.123	.289	1515	428	.768	.381	482	1344	117	3.683	.159	518	1121	136	1.628	.443	79	195	1233	379	2.653	.448
	97.0%	97.7%			97.2%	97.9%			98.2%	97.3%	95.1%			97.0%	97.8%	96.5%			95.2%	97.5%	97.2%	98.2%		

Source: National Institute of Public Health, April 2020.



## Appendix E

Evaluation of reliable means of communication and information related to COVID-19 by study participants (N = 1996).

Variables	N	%
Members of the family	39	1.97
Friends	7	0.35
<b>Healthcare professionals</b>	<b>1805</b>	<b>90.98</b>
Community leaders	10	0.5
Religious leaders	3	0.15
Community health workers	42	2.12
Government representatives	47	2.37
WHO Representatives	18	0.91
International scientists	13	0.65
Languages		
English	32	1.61
<b>Portuguese</b>	<b>1797</b>	<b>90.26</b>
Creole	153	7.68
French	9	0.45
Conferences/Presentations	176	8.84
Community dialogue	5	0.25
Schools	4	0.20
<b>Newspapers</b>	<b>333</b>	<b>16.73</b>
Social Media	99	4.97
Other community interventions	4	0.20
<b>Radio</b>	<b>405</b>	<b>20.35</b>
<b>Television</b>	<b>1643</b>	<b>82.56</b>

Source: National Institute of Public Health, April 2020 - N = 1996.

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