

ARTICLE

Knowledge, perceptions and practices of COVID19 among the came-roonian population

SYLVAIN RAOUL SIMENI NJONNOU¹⁻³, ESTHER ASTRID MBOÑO SAMBA ELOUMBA^{4,5}, EDWIGE MEN-DO^{6,7}, RAISSA MANUELA EWALA MBOULE⁸, ANNE JULIETTE FLORE SANGO^{5,9}, FERNANDO KEMTA LEKPA^{1,3,10}, MARIE-JOSIANE NTSAMA ESSOMBA^{5,6}, ERIC VOUNSIA BALTI^{1,3,11}, CHRISTIAN NGONGANG OUANKOU^{1,3,12}, JUSTIN DJOTAH¹³, CEDRIC FRITZGERALD EYENGA BANGBANG⁸, MARTIN SANOU SOB-ZE^{3,8} and SIMEON PIERRE CHOUKEM^{1,3,10,14}

¹Department of Internal Medicine and specialties, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang; ²Dschang Regional Hospital Annex; ³The University of Dschang Taskforce for The Elimination of COVID19 (UNITED#COVID19), Dschang; ⁴Department of Biochemistry, Faculty of Medicine and Biomedical Sciences; ⁵Yaounde Central Hospital; ⁶Departement of Internal Medicine and Specialties, Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde; ⁷Ebolowa Regional Hospital, Ebolowa; ⁸Department of Public Health, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang; ⁹Department of Internal Medicine and Pediatrics, Faculty of Health Sciences, Medicine and Biomedical Scienc-es, University of Buea, Buea; ¹⁰Department of Internal Medicine, Douala General Hospital, Douala, Cameroon

DOI: 10.4081/jphia.2024.2718

Abstract. COVID19 is an emerging infectious disease that has spread all over the world and became a pandemic. Cameroon is the 7th most affected country in Africa, with most of the cases in metropolises. The main objective was to assess the knowledge, perceptions and practices of the Cameroonian populations about COVID19 infection. A cross-sectional study was conducted from May 15th to July 15th, 2020; targeting all Cameroonians over 15 years old living in Cameroon. A standard Google Forms® questionnaire was submitted via social media (WhatsApp and Facebook particularly). The sampling was consecutive and not exhaustive. The data were processed on Excel 2016 and analyzed through EPI info 3.5. The questionnaire included knowledge, perceptions and practices about the disease's existence, its functional signs, prevention and control. Knowledge, perceptions and practices were considered good for a response score $\geq 75\%$ and poor for a score $\leq 25\%$. Intermediate scores were considered average and insufficient. Univariate and multivariate analyzes were

performed to identify the factors associated with a significance level ($P < 0.05$). Of the 996 (507 males) participants, the median age was 26 ± 8 years. Health workers represented 20.8% of participants. A large proportion of the population (78.6%) had good knowledge, while more than half (56.5%) had good perceptions, but only (23.1%) had good practices. Having reached higher education ($P = 0.007$), and being a health worker ($P = 0.0008$) were associated with a good level of knowledge. High school education ($P = 0.040$) and being a health worker ($P = 0.049$) were associated with positive perceptions. Being employed ($P = 0.003$) and having secondary education level ($P = 0.033$) were associated with good practices. Knowledge and perceptions were good among the study population, but the practice level is still insufficient to effectively fight the COVID19 pandemic. Educational level, being employed or being healthcare workers were associated with good knowledge, perceptions and practices.

Introduction

The new coronavirus disease (COVID19) is currently a global health threat and emergency of international concern (1,2). In Cameroon, the first case of COVID19 was reported on the 5th of March 2020 (3,4). The transition to a pandemic state, on March 11th of the same year, forced the Cameroonian state to take preventive measures against this new disease. These measures included the following: the systematic closure of bars, restaurants and places of entertainment from 18 h, the prohibition of gatherings of more than fifty (50) people, the prohibition of overloading in buses, cabs and motorcycle cabs, the restriction of urban and interurban travel, the regulation

Correspondence to: Dr Sylvain Raoul Simeni Njonou, Department of Internal Medicine and Specialties, Faculty of Medicine and Pharmaceutical Sciences, University of Dschang, Dschang, Cameroon
E-mail: raoulsims@yahoo.fr

Key words: knowledge, perceptions, practices, coronavirus disease 19 (COVID19), came-roon

of consumer flows in markets, compliance with the rules of hygiene and social distancing measures enacted by the World Health Organization (5). All these recommendations are taken into account and communicated to the population through several channels. Despite this, the disease continues to grow, from the main urban centres (Yaounde and Douala) to the other regions according to the Ministry of Public Health (MINSANTE) in its 'Situation Report N-35 in response to COVID19 in Cameroon on June 11-13, 2020, new cases are confirmed (a total of 7572 cases as of June 13) (6). However data were controversial on the use of social distancing for protecting of COVID19 infection (7,8). This exponential evolution across the country, but especially the progressive invasion of remote areas sheltering the most vulnerable people, leads us to question the effectiveness of the respect of recommended measures and even more the perception of this threatening disease by the Cameroonian population.

This is why we proposed to conduct this study to evaluate the knowledge, perceptions and practices of the Cameroonian population regarding COVID-19.

Methods

Study setting. This was a cross-sectional study that took place in Cameroon from May 15 to July 15, 2020, targeting any Cameroonian citizen over the age of 15 years and residing in Cameroon. A closed-ended, bilingual (French, English) and anonymous questionnaire, self-administered online and hosted by Google Forms®, was submitted via social media (especially WhatsApp and Facebook). The sampling was consecutive and exhaustive. Data were recorded using Excel 2016 software and analyzed using EPI info 3.5. Categorical variables were estimated as proportions with a 95% confidence interval and continuous quantitative variables as median \pm standard deviation. This study was approved by the institutional board of the Faculty of Medicine and Pharmaceutical Sciences of the University of Dschang and the National Ethics Committee.

Study population. This study targeted the general population of Cameroon. The source is any person of Cameroonian nationality over the age of 15 years residing in Cameroon at the time of the study. The questionnaire was broadly shared on social media (especially WhatsApp and Facebook) by each author, the focal points in all the ten regions and community agents). Our sample is made up of any person from the source population, present on social networks as well as volunteers contacted in urban, semi-urban and rural communities with a digital tool (Smartphone-Tablet-PC...) and access to the internet. Clear information was given to all participants about the study purpose, adequate filling of questionnaires and participation modalities. All participants who responded to the questionnaire were included. Informed consent was obtained from all study participants and the study protocol was implemented according to the recommendations of the latest revision of the Helsinki declaration.

Procedures. The data collection tool was designed on Google Form® (Alphabet Inc., California, USA), using an anonymous online survey administered in both official languages (French and English) in 3 pages. The data were in accordance with

the terms and conditions of Google Forms. As a first step, we conducted a pilot survey to optimize the data collection forms. Responses to the pilot survey were excluded. The closed-ended, bilingual and anonymous online self-administered questionnaire was submitted via social networks (WhatsApp and Facebook in particular) to the general public for completion and sharing from person to person. We worked in collaboration with different focal points in the ten regions of Cameroon working in hospitals, pharmacies, health delegations, community agents and recruited interviewers, which allowed us to reach a sample of 996 respondents included after data processing. Data collection was conducted from May 15 to July 15, 2020, so two months.

Variables. Using a standard questionnaire, data were collected on the following variables: socio-demographic characteristics (gender, age, marital status, level of education, activity, health status, area of residence and region of residence), knowledge (of corona infection in general, transmission, symptoms, prevention measures and government barrier measures), perceptions (of the disease, transmission, prevention measures, government barrier measures and treatment), and practices (of prevention measures, sources of information, and actions in case of suspected COVID19).

Statistical analysis. Data were generated by Microsoft Excel 2016 and analyzed using EPI Info 3.5 software. The results were presented in tables and figures. We compared the different variables of individuals with the correct knowledge, perceptions, and practices to those with insufficient or/non-optimal sociodemographic knowledge, perceptions, and practices. Qualitative variables were expressed as proportions with a 95% confidence interval. Quantitative (continuous) variables were expressed as means \pm standard deviation. To assess knowledge, we used the following classification: poor (score <25% of points); insufficient (score <[25-50%] of points); average (score=[50-75%] of points) and good (score >75% of points). For the perceptions of this disease and the different governmental measures by these populations, the analysis grid emphasized the qualification in 4 criteria: good (score >75% of the points); approximate (score <75% of the points), erroneous (score <50% of the points), harmful (score <25% of the points). The practices were poor (score <25% of points), insufficient (score <[25-50%] of points), average (score=[50-75%] of points), and good (score >75% of points) (9).

Results

Sociodemographic characteristics of the study population. A total of 996 participants (507 males) were included. The median age was 26.0 \pm 8.8 years. The 15-29 years age group was the most represented (63.2%) with more than ¾ of this study population being single. More than 90% of this population had a university grade. More than 40% of this population had a relationship with health (working or studying in a health-related domain). Almost half of the participants (48.9%) were unemployed while 38% were employed and 12.4% worked in the informal sector. A big part of the participants (68.6%) lived in an urban area while

Table I. Sociodemographic characteristics of the study population.

Characteristics	Results N=996
Median age	26.0±8.8
Gender n	
Female	489 (48.9)
Male	507 (50.9)
Marital status (n=988)	
Married	227 (22.8)
Single	750 (75)
Separated	11 (1.1)
Study level (n=994)	
University	897 (90.2)
High school	91 (9.2)
Primary	6 (0.6)
Professional status (n=996)	
Healthcare workers	227 (20.8)
Students	208 (20.9)
Nun health-related profession	546 (54.8)
Not precized	15 (1.5)
Economic status n (%)	
Income-generating activities	488 (48.9)
Employee	180 (38)
Informal sector	124 (12.4)
Residence area (n=992)	
Urban	261 (26.3)
Semi-urban	685 (69.1)
Rural	46 (4.6)

only 3.4% stayed in a rural area. The participants originated from the Center Region (35%) followed by the Littoral and Western Regions (21.7% for each one). The East and North Regions were the less represented with respectively 1.3 and 2.4%. Table I presents the sociodemographic characteristics of the study population.

Participants knowledge. A good level of knowledge was found in 783 (78.6%) participants while an average level was found in 212 (21.3%) and a poor level in 0.2%.

However, if almost all knew the definition of COVID19 and the fact that they were some cases in Cameroon at that time, less than half of them (44%) had a good knowledge of the clinical signs of COVID19. The knowledge of preventive strategies was quite good (99.2%), particularly on the gestures such as washing hands more frequently with water and soap (99.1%) or hydroalcoholic solution (98.4%), coughing into a handkerchief or the elbow (98.1%), avoiding crowds (97.8%), and avoiding handshake (96.7%). Furthermore, most of them (64.9) knew that there was no curative treatment for this disease. Table II summarizes the knowledge answers.

Participants perceptions. More than half (56.5%) of the participants had good perceptions of the disease. However,

perceptions from 41.5% were approximate and those from 2% were wrong.

From the data analysis, it emerged that almost all of our participants (97.6% of participants) think that COVID-19 is a danger to Cameroonians. Similarly, 99.1% of them believe in its existence, while 96.6% believe that COVID-19 can not only make them sick but also their loved ones and 93.5% believe that COVID19 can cause their death and that of their loved ones. Less than half (42.7%) of participants believe that a special condition (God/state of health/youth/shielding) particularly protects them from disease. Likewise, 92.6% of them think that they can play a role in limiting the spread of the virus step by step. Almost $\frac{3}{4}$ (74.7%) of them think they can apply all the individual preventive measures against COVID-19. However, half of them (50.0%) think that the thoughts/behaviors/attitudes of their entourage can influence their perceptions of the disease while 40.4% think that the prevention conditions of COVID19 are still compelling and difficult to apply and are not ready to accept them. Similarly, 82.4% of participants think that government measures are useful for their health while 89.7% of them think that confinement is a useful measure to limit the spread of the virus, and finally, 84.1% would be ready to agree to stay in confinement at home to limit the spread of the virus. Table III presents the participants' perceptions.

Population practices. Practices of the study population were correct for 23.1% of the participants, average for 41.3% of them, insufficient for 26.0% and wrong for 6.2% of the study population.

Preventive strategies practices were correct for more than half of the study population (58.1%). The most frequent practices were: frequent handwashing (94.9%), avoiding handshaking (88.9%), the use of hand sanitizer (87.0%), avoiding physical contact (77.3%), avoiding crowd (74.2%) and the travel restriction (Fig. 1). For a case of suspicion of COVID-19 in the community, only 794 (79.7%) participants had correct practices. The most common were: calling a toll-free number and waiting for the medical team (91.1%), and going to the hospital in a private car (49.7%) (Fig. 2). The information sources were correct for 452 (45.3%) participants. The most frequent were: local TV information (81.3%), social media (67.6%), official accounts of international health organisms such as the World Health Organization, CDC, (63.9%) and international media information (62.6%) (Fig. 3).

Factors associated with poor knowledge, perceptions and practices in the population. In univariate analysis, only being students (OR: 1.7, 95% CI [1.13-2.55]; P=0.011) or an health-worker (OR: 0.46, 95% CI [0.3-0.72]; P<0.001) were associated with poor knowledge, although being an health-worker was protective (Table V). Otherwise, having a higher educational level (OR: 0.56, 95% CI [0.35-0.89]; P=0.014) and working in an informal sector (OR: 0.61, 95% CI [0.42-0.89]; P=0.011) were associated with incorrect perceptions (Table VI). Participants that did not precise their professional status and those working in the informal sector were having a lesser risk of inappropriate practices (OR: 0.32 [0.1-0.94]; P=0.039) and (OR: 0.64, 95% CI [0.42-0.98]; P=0.042) respectively, while being health worker (OR: 1.52,

Table II. Knowledge of COVID19 among the Cameroonian population.

Variables (n=996)	Number (percentage) n (%)	
	Correct answer	Wrong answers
Have you ever heard of COVID19 ?	995 (99.9)	1 (0.1)
What is the new coronavirus infection?	956 (95.9)	40 (4.0)
Do you think there are cases of COVID19 in Cameroon?	976 (97.9)	20 (2.0)
Which of the following signs might make you suspect a case of COVID19	439 (44.0)	557 (55.9)
What are the recommended measures to prevent the spread of the virus?	988 (99.2)	8 (0.8)
What is the definition of coronavirus infection?	646 (64.9)	350 (35.0)

Table III. Perceptions of COVID19 among the Cameroonian population.

Variables (n=996)	Number (percentage) n (%)	
	Correct answers	Wrong answers
1) Do you believe in the existence of COVID19?	973 (97.6)	23 (2.3)
2) Do you think COVID19 can make you or a loved one sick?	987 (99.1)	9 (0.9)
3) Do you think that COVID19 can cause you or a loved one to die?	963 (96.6)	33 (3.3)
4) Do you think any special condition (God/health/y/youth/armor) particularly protects you from COVID19?	932 (93.5)	64 (6.4)
5) As an individual, do you think you play a key role in limiting the spread of the virus from person to person?	426 (42.7)	570 (57.2)
6) Do you think you can implement all individual prevention measures related to COVID19?	923 (92.6)	73 (7.3)
7) Do you think that the thoughts/behaviors/attitudes of those around you regarding COVID19 may influence your perception of the disease?	744 (74.7)	252 (25.3)
8) Do you think that the prevention requirements for COVID19 are still restrictive and difficult to implement?	498 (50)	498 (50)
9) Are there people infected with COVID19 in Cameroon?	402 (40.4)	593 (59.6)
10) Do you think that the prevention measures taken by the Cameroonian government are useful for your health?	821 (82.4)	175 (15.5)
11) Do you think that containment would help limit the spread of the virus?	897 (90.0)	99 (9.9)
12) Would you be willing to accept to stay in confinement at home to limit the spread of the Virus?	838 (84.1)	153 (15.8)

Table IV. Classification of practices within the population.

Variables (n=996)	Number (percentage) n (%)	
	Yes	No
Poor practices	62 (6.2)	934 (93.7)
Insufficient practices	259 (26.0)	737 (73.7)
Average practices	411 (41.3)	585 (59.6)
Good practices	231 (23.1)	765 (76.8)

95% CI [1.03-2.23]; P=0.034) or an employee (OR: 2.43, 95% CI [1.38-4.28]; P=0.002) were associated with inappropriate practices (Table VII).

Discussion

The objective of our study was to assess the knowledge, perceptions and practices of the Cameroonian population regarding COVID19 via an online survey using a predefined questionnaire. Knowledge was good in the study population (78.7%), perceptions were approximate (56.5%) and practices were insufficient (23.1%). Significant associations were found between poor knowledge, perceptions and practices and factors such as level of education, wage activity and being a health care worker and related.

These results are similar to those carried out in the United States (USA) and Great Britain by Geldsetzer *et al* who highlighted that in both countries participants recognized fever, cough and breathing difficulties as frequent symptoms of COVID19 (10). A total of 92.6% of U.S. participants and

Table V. Factors associated with poor knowledge.

Variables	All n (%)	Other knowledge level n (%)	Poor knowledge n (%)	cOR (IC à 95%)	P	aOR (IC à 95%)	P
Age groups							
≥60	12 (1.2)	11 (1.1)	1 (2.5)	1			
15-29	6.12 (63.45)	499 (63.7)	133 (62.4)	1.06 (0.77-1.45)	0.729		
30-44	302 (30.32)	241 (30.8)	61 (28.6)	1.11 (0.79-1.55)	0.547		
45-59	50 (5.0)	48 (5.0)	2 (5.0)	0.70 (0.18-2.72)	0.609		
Gender							
Female	489 (49.1)	388 (49.6)	101 (47.4)	1			
Male	507 (50.9)	395 (50.4)	112 (52.6)	0.92 (0.68-1.24)	0.581		
Level of education							
Primary	6 (0.6)	5 (0.5)	1 (2.5)	1			
Without level	2 (0.2)	2 (0.2)	0 (0.0)	NA	NA		
High School	91 (9.14)	66 (8.4)	25 (11.7)	0.69 (0.43-1.13)	0.139		
Higher Education	897 (90.06)	714 (91.2)	183 (85.9)	1.7 (1.07-2.68)	0.024	1.38 (0.86-2.22)	0.183
Profession							
Students	227 (22.79)	190 (24.3)	37 (17.4)	1.52 (1.03-2.25)	0.034	1.7 (1.13-2.55)	0.011
Health workers	206 (20.68)	178 (22.7)	28 (13.1)	1.94 (1.26-2.99)	0.003	0.46 (0.3-0.72)	0.001
Uripreccized	128 (12.85)	120 (1.8)	8 (0.62)	0.33 (0.04-2.62)	0.299		
No health-related work	435 (43.67)	369 (47.1)	66 (31)	3.86 (0.5-29.52)	0.193		
Activity							
Employee	381 (38.25)	310 (39.6)	71 (33.3)	0.76 (0.55-1.05)	0.096		
No activity	488 (49)	383 (48.9)	105 (49.3)	0.98 (1.73-1.33)	1.921		
Informal sector	127 (12.75)	90 (11.5)	37 (17.4)	0.62 (0.41-0.94)	0.024	0.72 (0.47-1.11)	0.137

Distribution of the population according to the prevention measures practiced

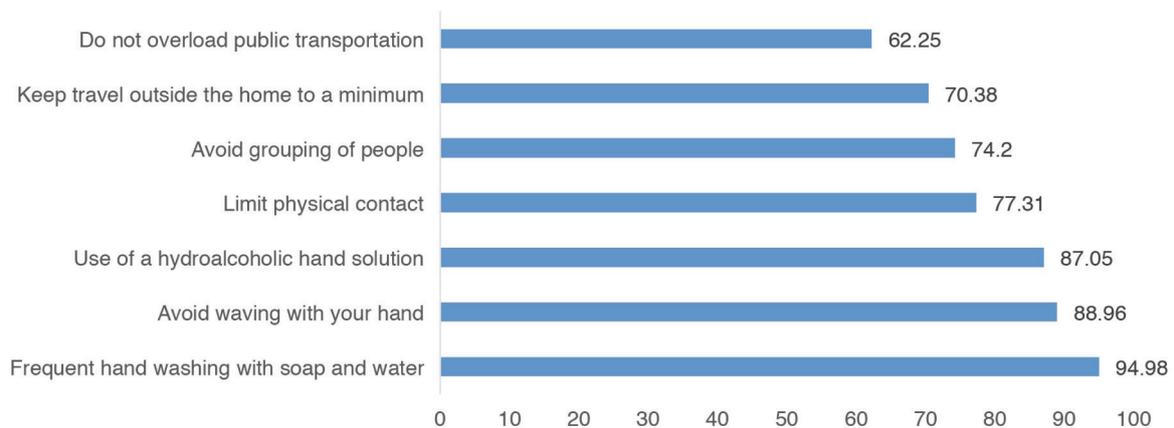


Figure 1. Distribution of the population according to the prevention measures practiced.

86.0% of U.K. participants had an adequate response to the prevention measures of handwashing, avoiding contact with infected persons, and avoiding touching the nose and mouth with dirty hands. Almost all participants in both countries disagreed that only adults can be infected with SARS-CoV-2 (96.5% in the US and 97.1% in Great Britain) (10). In Peru, only a quarter of the sample could correctly identify the symptoms of the disease, the most frequent being fever

(94.7%), fatigue (62.2%), and dry cough (88.9%) (11). Preventive measures were known by almost all of the population (99.2%). This can be explained by the frequency of dissemination of prevention messages in the media since the beginning of the pandemic. The most frequently mentioned were frequent hand washing, use of the hydroalcoholic solution, wearing a mask, avoiding groups and public transport. For 646 (64.9%), there is no treatment for COVID19, and

Table VI. Factors associated with incorrect perceptions.

Variables	All n (%)	Other perceptions n (%)	Incorrect perceptions n (%)	cOR (95% CI)	P value	aOR (95% CI)	P value
Age groups							
≥60	12 (1.2)	10 (1.8)	2 (0.5)	1			
15-29	632 (63.45)	343 (61)	289 (66.6)	0.79 (0.6-1.02)	0.071		
30-44	302 (30.32)	178 (31.7)	124 (28.6)	1.16 (0.88-1.52)	0.291		
45-59	50 (5.0)	31 (5.5)	19 (4.4)	3.06 (0.61-15.51)	0.176		
Gender							
Woman	489 (40.1)	291 (51.8)	198 (45.6)	1			
Man	507 (50.0)	271 (48.2)	236 (54.4)	0.78 (0.61-1)	0.054		
Level of education							
Primary	6 (0.6)	4 (0.7)	2 (0.5)	1			
Without level	2 (0.2)	2 (0.4)	0 (0.0)	NA	NA		
High School	897 (90.06)	497 (88.4)	400 (92.2)	0.65 (0.42-1)	0.052		
Higher Educational	91 (9.14)	61 (10.9)	30 (6.9)	1.64 (1.04-2.59)	0.034	0.56 (0.35-0.89)	0.014
Profession							
Students	227 (22.79)	123 (21.9)	104 (24)	0.89 (0.66-1.2)	0.439		
Health workers	206 (20.68)	128 (22.8)	78 (18)	1.35 (0.98-1.84)	0.064		
Unprecited	128 (12.85)	94 (2)	34 (0.9)	0.80 (0.006-9.87)	0.609		
No health-related work	435 (43.67)	252 (44.8)	183 (42.2)	2.15 (0.68-6.79)	0.194		
Activity							
Employee	381 (38.25)	225 (40)	156 (35.9)	1.19 (0.92-1.54)	0.188		
No activity	488 (49)	277 (49.3)	211 (48.6)	1.03 (0.8-1.32)	0.834		
Informal sector	127 (12.75)	60 (10.7)	67 (15.4)	0.65 (0.45-0.95)	0.026	0.61 (0.42-0.89)	0.011

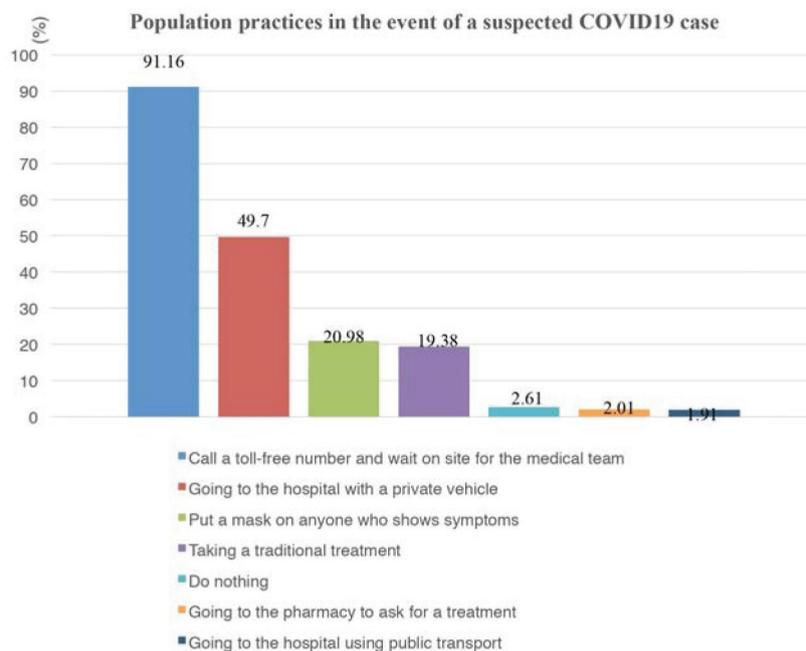


Figure 2. Population practices in the event of a suspected COVID19 case.

children can also be infected and/or both. In Peru, the authors found inadequate levels of knowledge about preventive

measures, although hand washing (98.2%), was recognized as more effective followed by personal hygiene (97.3%) than

Table VII. Factors associated with inappropriate practices.

Variables	All n (%)	Other practices n (%)	Inappropriate practices n (%)	cOR (95% CI)	P value	aOR (95% CI)	P value
Age groups							
≥60	12 (1.2)	2 (0.9)	10 (1.3)	1			
15-29	632 (63.45)	121 (52.4)	511 (66.8)	0.55 (0.41-0.74)	0.000	1.04 (0.53-2.07)	0.905
30-44	302 (30.32)	94 (40.7)	208 (27.2)	1.84 (1.35-2.5)	0.000	1.37 (0.71-2.65)	0.351
45-59	50 (5.0)	14 (6.0)	36 (4.7)	0.51 (0.1-2.64)	0.4268		
Gender							
Female	489 (49.1)	110 (47.6)	379 (49.5)	1			
Male	507 (50.9)	121 (52.4)	(0.5)	1.08 (0.8-1.45)	0.608		
Level of education							
Primary	6 (0.6)	2 (0.9)	4 (0.5)	1			
Without level	2 (0.2)	0 (0.0)	2 (0.3)	NA	NA		
Hitm School	91 (9.14)	30 (6.9)	61 (8)	1.72 (1.08-2.74)	0.022	1.13 (0.2-6.31)	0.888
Higher Education	897 (90.06)	497 (88.4)	400 (92.2)	0.65 (0.42-1)	0.052		
Profession							
Students	227 (22.79)	41 (17.7)	186 (24.3)	0.67 (0.46-0.98)	0.038	1.1 (0.71-1.7)	0.673
Health workers	206 (20.68)	69 (29.9)	137 (17.9)	1.95 (1.39-2.73)	0.000	1.52 (1.03-2.23)	0.034
Unprecized	128 (1.50)	60 (3.0)	68 (1.0)	0.25 (0.086-0.72)	0.011	0.32 (0.1-0.94)	0.039
No health-related work	435 (43.67)	110 (47.6)	325 (42.5)	2.96 (1.06-8.24)	0.038	2.65 (0.91-7.72)	0.075
Activity							
Employee	381 (38.25)	121 (52.4)	260 (34)	2.14 (1.59-2.88)	0.000	2.43 (1.38-4.28)	0.002
No activity	488 (49)	91 (39.4)	397 (51.9)	0.6 (0.45-0.81)	0.001	1.56 (0.88-2.77)	0.132
Informal sector	127 (12.75)	19 (8.2)	108 (14.1)	0.55 (0.33-0.91)	0.02	0.64 (0.42-0.98)	0.042

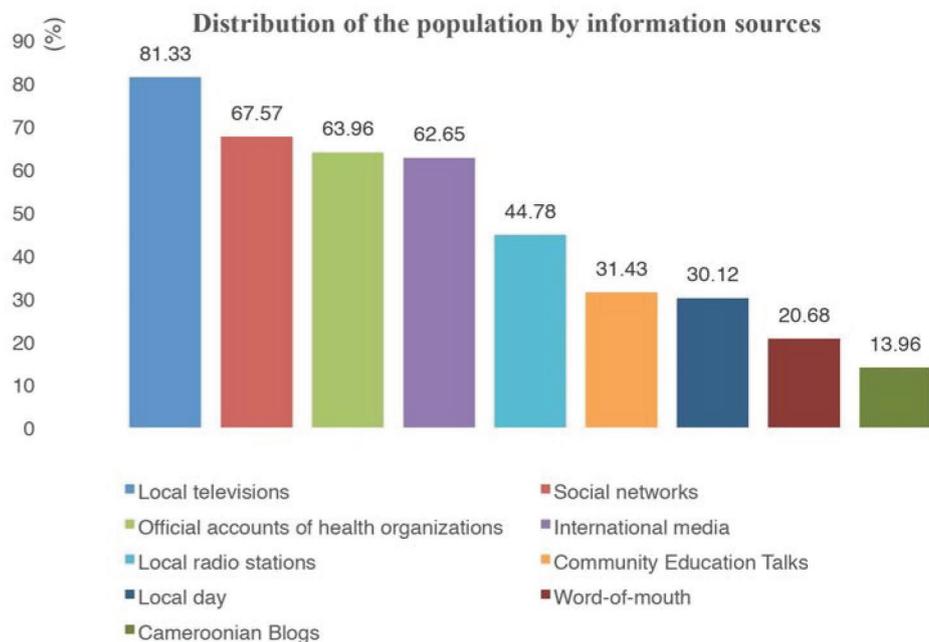


Figure 3. Population practices in the event of a suspected COVID19 case.

wearing a mask, even though it is recommended in combination with hand-washing by the WHO (11). There are also gaps in the knowledge of health care workers themselves.

For example, a survey of health care workers in the United Arab Emirates by Bhagavathula *et al* revealed suboptimal knowledge of disease transmission (61.0%) and symptoms

(63%). The majority of respondents (85.6%) stated that maintaining hand hygiene, covering the nose and mouth when coughing, and avoiding contact with infected persons can help pre-vent transmission of the virus. Thus, for 84% of physicians, COVID19 can lead to pneumonia, respiratory distress and death (12). The low level of knowledge of the signs and symptoms of COVID-19 can be explained by the fact that awareness campaigns are generally globalized, non-standardized and restricted to certain areas due to the climate of crisis that prevails in some regions of the country. This is the case in the South-West Region of Cameroon, where Tedongfor *et al* found that 21.9% of the population to have good knowledge (13). In addition, there are barriers to self-detection of symptoms due to the confusion about what can be considered as functional signs of COVID19 and other symptoms, notably cough, influenza and malaria fever in tropical areas. Perceptions were approximate, including 56.5% good perceptions in the study population. While almost all (96.6%) of the participants thought that COVID19 is a deadly disease, half (50%) thought that governmental prevention measures are restrictive and difficult to implement. And less than half (42.7%) of the population thinks that a special condition (God/healthy/young/armor) protects them from the disease. In the Littoral region, Akwa *et al* found that 18.5% of participants thought that COVID19 was a punishment from God (14). In Buea, for Tedongfor *et al* participants, if they are sick, 6% go to prayer, 49.6% use traditional Cameroonian medicine and 25.8% self-medicate (13). In neighboring Nigeria, Reuben *et al* showed that 52.1% of people in northcentral Nigeria believe that the government is not doing enough to fight the disease (15). This may be explained by poor knowledge or lack of government action in that country. This is probably replicated in our country because of insufficient or ineffective support by state institutions. In Ethiopia, Kebede *et al* found that 207 (83.8%) of the visitors felt that COVID19 was a stigmatized disease (16). In the United Arab Emirates, more than 78% of health care workers showed a fair perception of COVID19. However, the majority of them believed that vaccination was not sufficient to prevent COVID19 and that COVID19 was not fatal (12). In Peru, similarly, also about 59.1% of the population considers that there is a stigma about COVID19 (11). Otherwise, Fouogue *et al*, in Cameroon, found a high rate of unfavorable perceptions among the staff of the Bafoussam Regional Hospital during the first wave of the COVID19 pandemic (17).

In our country, the stigmatization of the sick and deceased may also influence perceptions and induce denial of the condition. In addition, there is a strong predominance of beliefs, street medicine and African and Cameroonian medicine in particular. This could explain the tendency to pray, to self-medicate, to armor and other potions.

Practices, in general, were good for only 231 participants (23.1%), while 259 (26.0%) had practices considered insufficient. The practice of preventive measures was good for 58.1% of participants. Of these, the most common were washing hands with soap and water and avoiding hand-waving. Fouogue *et al* found better practices of preventive measures among the staff of the Bafoussam Regional Hospital (17). These results are similar to those of Kebede *et al* in Ethiopia

where visitors to Jimma University Medical Center were mainly engaged in frequent hand washing with soap and water (77.3%), stopping shaking hands when greeting each other (53.8%), avoiding physical proximity (33.6%) and going to crowded places (33.2%), to protect themselves from COVID19 (16). These good practices probably reflect some effectiveness of awareness campaigns relayed by the media or various social networks at the local or institutional level in this country. In case of a suspected case of COVID19, 91.1% call the toll-free number and wait for the medical team on site, 49.7% go to the hospital by private vehicle. The most used sources of information were social networks (67.5%), and local television (81.3%). In Nigeria, Reuben *et al* showed that 57.5 and 27.5% used social networks and televisions, respectively, to get information about COVID19 (15). About 30% of the participants according to Bhagavathula *et al* used news media (TV/video, magazines, newspapers and radio) and social networks (Facebook, Twitter, WhatsApp, YouTube, Instagram, Snapchat) to get information about COVID19 (12). In addition, almost 40% of the participants sometimes discussed COVID19-related topics with family and buddies (12). From the above, we can see that the proportion of people using these sources decreases with the economic level of the country, probably because these sources are easily accessible and less expensive than reliable sources such as international newspapers and health agency sources whose information is sometimes restricted to a certain category of people directly involved in the fight against the disease.

Significant association were found between poor knowledge and being a student in our study, while the health workers had a lesser risk of poor knowledge. The association between being student and having a poor knowledge is likely related to the level of access to information from more appropriate and verifiable sources. A multivariate analysis conducted in Peru by Zegarra Valdivia *et al* showed that knowledge had a small but significant correlation with education, occupation and age (11).

Having a high educational level and working in the informal sector were associated with a lesser risk of incorrect perceptions of COVID19. Unlike knowledge, which may be conditioned by the individual's education and economic level, perceptions are unique to everyone. Paradoxically in our study, the risk of incorrect perceptions was lower among men, individuals aged from 15 to 29 years, with secondary education than among those with other levels of education. In Ethiopia, factors such as age and occupation were associated with poor perceptions of COVID19 (16).

Religious affiliations, gender, and perceived self-efficacy of respondents showed no significant differences. Perceived self-efficacy to combat COVID19 showed no significant difference in socio-demographic variables in a study conducted in Mexico (18).

Practices, on the other hand, were influenced by profession and activity in our study. Employees and health workers were paradoxically having a higher risk of inappropriate practices than other population groups. This is probably due to the fact that these two population groups were the most exposed to anti-covid19 measures during the peak of the pandemic and this was without government support.

Conclusions

From our study that focused on a predominantly young, male, single, low-income, higher education level, and health-related occupation population, it emerges that: The level of knowledge was good for most; the set of perceptions that revolved around the disease were approximate for more than half; the level of practices was insufficient in the population; significant associations were found between poor knowledge, incorrect perceptions and inappropriate practices on the one hand, and the occupation and the income-generating activity on the other hand. Even if the level of knowledge was good, the perceptions good in the general population, the communication strategies should be reviewed to improve the practices that were so far insufficient to fight effectively against the coronavirus pandemic.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Contributions

Concept and study design: SRSN, EAMSE, EM; Data collection: SRSN, EAMSE, EM, RMEM, AFJS, JD; Data analysis: SRSN, MSS, EVB; Writing of the manuscript: SRSN, RMEM; Manuscript revision for intellectual content: EAMSE, CNO, EVB, MJNE, EM, FKL, JD, SPC. All authors read and approved the final version of the manuscript.

Ethics approval and consent to participate

The study was approved by the institutional board of the University of Dschang and the Faculty of Medicine and Pharmaceutical Science. All study participants provided informed consent. The study protocol was implemented according to the recommendations of the Helsinki Declaration as revised in 2013 (<https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>, accessed on July 28, 2021).

Consent or publication

Not applicable.

Competing interests

There is no conflict of interest to declare.

Received for publication: 27 August 2023; accepted for publication: 7 December 2023; published: 27 December 2023.

References

1. Wang C, Horby PW, Hayden FG and Gao GF: A novel coronavirus outbreak of global health concern. *Lancet Lond Engl* 395: 470-473, 2020.
2. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, *et al*: A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 382: 727-733, 2020.
3. Communiqué de presse confirmation premier cas de Covid 19 au Cameroun! MINSANTE. Available from: <https://www.min-sante.cm/site/?q=en/content/communiqu%C3%A9-de-presse-confirmation-premier-cas-de-covid-19-au-cameroun>.
4. Simeni Njonjou SR, Kemta Lekpa F, Ngongang Ouankou C, Vounsia Balti E and Choukem SP: The challenge of COVID-19 case identification and ascertainment in sub-Saharan Africa: The case of Cameroon. *Pan Afr Med J* 35: 84, 2020.
5. Le Cameroun prend sept nouvelles mesures pour lutter contre le Covid-19 sur son territoire [Internet]. *Journal du Cameroun*. 2020. Available from: <https://www.journalducameroun.com/le-cameroun-prend-sept-nouvelles-mesures-pour-lutter-contre-le-covid-19-sur-son-territoire/>.
6. Rapports de Situation Covid-19 [Internet]. CCOUSP. [cited 2023 Jun 7]. Available from: <https://www.ccousp.cm/documentation/rapports-de-situation-covid-19/>.
7. Koo JR, Cook AR, Park M, Sun Y, Sun H, Lim JT, Tam C and Dickens BL: Interventions to mitigate early spread of SARS-CoV-2 in Singapore: A modelling study. *Lancet Infect Dis* 20: 678-688, 2020.
8. Lewnard JA and Lo NC: Scientific and ethical basis for social-distancing interventions against COVID-19. *Lancet Infect Dis*. Elsevier 20: 631-633, 2020.
9. Essi MJ and Njoya O: L'enquête CAP en recherche médicale. *Health Sci Dis* 14, 2013.
10. Geldsetzer P: Knowledge and perceptions of COVID-19 among the general public in the United States and the United Kingdom: A cross-sectional online survey. *Ann Intern Med* 173: 157-160, 2020.
11. Zegarra-Valdivia J, Chino Vilca BN, Ames-Guerrero RJ and Paredes-Manrique C: Knowledge, perception and attitudes during the COVID-19 pandemic in peruvian population. *Behav Sci (Basel)* 13: 807, 2023.
12. Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA and Bandari DK: Knowledge and perceptions of COVID-19 among health care workers: Cross-sectional study. *JMIR Public Health Surveill* 6: e19160, 2020.
13. Nicholas T, Mandaah FV, Esemu SN, Vanessa ABT, Gilchrist KTD, Vanessa LF and Shey ND: COVID-19 knowledge, attitudes and practices in a conflict affected area of the South West region of Cameroon. *Pan Afr Med J* 35 (Suppl 2): 34, 2020.
14. Akwa TE, Ning TR and Maingi JM: Assessing the perceptions and awareness of COVID-19 (Coronavirus) in Cameroon. *Eur J Med Educ Technol*. 2020;13: em2007.
15. Reuben RC, Danladi MMA, Saleh DA and Ejembi PE: Knowledge, Attitudes and Practices Towards COVID-19: An epidemiological survey in North-Central Nigeria. *J Community Health* 46: 457-470, 2021.
16. Kebede Y, Yitayih Y, Birhanu Z, Mekonen S and Ambelu A: Knowledge, perceptions and preventive practices towards COVID-19 early in the outbreak among Jimma university medical center visitors, Southwest Ethiopia. *Tu WJ*, editor. *PLoS One* 15: e0233744, 2020.
17. Fouogue JT, Noubom M, Kenfack B, Dongmo NT, Tabeu M, Megozeu L, Alima JM, Fogang YF, Nyam LCRA, Fouelifack FY, *et al*: Poor knowledge of COVID-19 and unfavourable perception of the response to the pandemic by healthcare workers at the Bafoussam Regional Hospital (West Region-Cameroon). *Pan Afr Med J* 37: (Suppl 1): 19, 2020.
18. Villarreal-Benavides ME: COVID-19 in Mexico: Perception and knowledge of the pandemic in the Mexican population through the application of online surveys. (Preprint) [Internet]. *Journal of Medical Internet Research*; 2020. Available from: <http://preprints.jmir.org/preprint/19654>.