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Assessment of the Knowledge and Medicinal Plants Used Against COVID-19 by the Local Population of the East Region of Cameroon

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Abstract

The population of the East Region of Cameroon lives around the forest and shares precious knowledge about the medicinal plants they possess against diseases such as COVID-19 as the role of ethno-medicine may have favored resilience against the Covid-19 pandemic in Africa. The objective of this study was to identify medicinal plants used against Covid-19 by the local population through their knowledge of COVID-19 in the East Region of Cameroon. The sociodemographic profile, information on COVID-19, the medicinal plants used against COVID-19 and the symptoms were determined. An ethnobotanical survey was conducted from November 2025 to February 2026 across twenty-five (25) villages on 500 respondents. Demographically, a large proportion of the population were men (61.6%), most of whom were non-workers (70.2%), with a dominant age group of 41 to 50 years (35%). Seventy-one percent of the population claimed to know the means of transmission, with "shaking hands with an infected person" being the most cited (41%). Meanwhile, 67% claimed to know the symptoms, with "cough" being the most mentioned (47.4%). Regarding prevention, 68.4% knew of modern prevention methods, with 24.4% favoring social distancing. 52% of the surveyed population stated they had not contracted Covid-19 (with or without testing confirmation). Majority of the population preferred traditional medicine for their health care but only 20.6% of the respondents mentioned traditional treatments against COVID-19 which may be due to the fact that only 28.6% of the respondents had a good knowledge about COVID-19. *Alstonia boonei* De Wild. emerged as the most used medicinal plant in traditional Covid-19 treatments by the local population, with a citation frequency of 9%. This study sheds light on how local populations perceive, adopt, and adhere to public health crisis measures.

Keywords: COVID, ethnobotany, local population, medicinal plants, Pandermic.

1.0 INTRODUCTION

COVID-19 is a highly contagious viral respiratory and zonal infectious disease caused by the coronavirus, which can be fatal to humans (Abdel *et al.,* 2024). Transmission can occur through the inhalation of respiratory droplets from a patient while coughing or sneezing at an average distance of ≤ 1m, or through contact with contaminated surfaces and objects (direct transmission) (Camara, 2022). There is also mucosal, oral, or nasal contact with the infectious respiratory or oral secretions of a patient or an asymptomatic carrier via hand-to-surface transfer or other means (indirect transmission) (Camara, 2022). The most common symptoms of COVID-19 are fever (83–98%), cough (59–82%), shortness of breath (19–55%), and muscle fatigue (11–44%) (Bouiadjra and Berrabah, 2021). Some patients may experience a sore throat, rhinorrhea, headache, and confusion a few days before the onset of fever (Tu *et al.,* 2020). The global spread of COVID-19 reached approximately 11,200,000 confirmed cases by July 3, 2020, affecting 213 countries with nearly 530,000 deaths (World Health Organization (WHO), 2023 and African Union (AU), 2023). By 2020, Cameroon was the second most affected country in Sub-Saharan Africa, behind South Africa, with 509 infected people and 8 deaths according to authorities. Subsequently, it recorded 730 cases, 60 recoveries, and 10 deaths by April

7, 2020 (Ministry of Public Health of Cameroon, 2020). The most recent toll of the epidemic was on January 14, 2024, where 125,248 cases were confirmed, 123,273 cases were treated, and 1,974 deaths were recorded (Ministry of Public Health of Cameroon, 2020). Faced with this situation, governments implemented a wide range of precautionary, preventive, and containment measures regarding personal and public health to help break the chains of transmission, contain the spread of the disease, and manage infection cases. Despite these measures, the number of cases and deaths continued to rise worldwide (WHO, 2021) and still to date, published data on the Knowledge, Attitudes, and Practices (KAP) regarding COVID-19 are limited in Sub-Saharan Africa in general and in Cameroon in particular (Letu *et al.,* 2022). This study seeks to fill that research gap by gathering data in Cameroon, thereby offering a more comprehensive understanding of KAP regarding COVID-19 and informing future health strategies.

Global disparity exists in access to essential vaccines. Limited supply and unequal distribution means that low-income countries constantly struggle to access essential vaccines that are in high demand by wealthier nations (WHO, 2022). The availability and distribution of vaccines can significantly reduce the severity of diseases. However, no vaccine offers absolute protection against strains of SARS-CoV-2 (Abdel *et al.,* 2024). Also concerns about Africa's healthcare systems remain, as they are often under-resourced and weakened (Ekpenyong *et al.,* 2022). Africa is one of the continents that recorded the fewest deaths, with approximately 37,000 fatalities (AIP, 2020) due to their ability to mitigate the virus's impact through medicinal plants. It has been well-recognized for several decades that more than 80% of the rural population relies on traditional methods for their healthcare (Ngene *et al.,* 2015). The role of African ethnomedicine may have been very decisive in the development of several plant-based medicines addressing COVID-19 symptoms, including Apivirine, Fagaricin, Covid Elixir, and Covid Adsak ; which explains Africa's resilience to COVID-19 (Abdel *et al.,* 2024).

Central African forests cover an area of approximately 241 million hectares (Food and Agriculture Organization (FAO), 2003), more than half of which represents the Congo Basin, which constitutes the world's second-largest dense humid forest cover after the Amazon, or 12% of tropical forest cover (FAO, 2003). Added to this dimensional importance there is an exceptional biological diversity (Tchatat et Ndoye, 2006) as Gabon, Cameroon, and the Democratic Republic of Congo have 6,551, 8,260, and 11,000 different plant species, respectively (Tchatat et Ndoye, 2006). Particularly, the East Region of Cameroon, where the forest covers two-thirds of the land area (Engamba, 2025) is dominated by large trees and identifies nearly 1,500 plant species (Anonymous, 2013). The rich biodiversity present in these ecosystems plays a crucial role in maintaining the livelihoods of indigenous peoples and local communities (Abdel *et al.,* 2024).

Despite the economic activities like agriculture, logging, and artisanal mining taking place, the East Region is suffering from a significant developmental delay due to; under-population of approximately 7.1 inhabitants/km², the region's marginalization in terms of lack of modern social infrastructures like hospitals, and schools, and the inaccessibility of the Region (Mengue, 2004; Engamba, 2025). This results in the difficult integration of villages into modern life (Mengue, 2004) as their income is low (Rural Sector Development Strategy (2016). These constraints faced by rural areas can lead to their dependence on the forest for medicine. Plant traditional medicine can be beneficial to the majority of the population because it is the principal and the only source of health care for about 80% of the population of Africa (Abdel *et al.,* 2024).

This plant diversity consists of a significant portion of Non-timber Forest Products (NTFPs) used for traditional medicine (Tchatat et Ndoye, 2006). The use of traditional medicine and pharmacopoeia has been a common and ancestral practice for a long time by herbalists, traditional healers, and villagers, who possess valuable knowledge of medicinal plants and utilize this expertise transmitted orally from generation to generation (Betti, 2004). Nevertheless, anthropogenic activities carried out by the population on plant-based NTFPs, specifically those for medicinal use, lead to the vulnerability of these species and resources (Zima, 2018). The objective of this study was to identify potential medicinal plants used against Covid-19 by the local population through their knowledge of COVID-19 in the East Region of Cameroon. Specifically, we analysed the socio-demographic profile, the KAP of the local population had on COVID-19 and the medicinal plants used by the local population against COVID-19.

2.0 MATERIALS AND METHODS

2.1 Study site

The study area was located in the East Region of Cameroon, specifically within twenty-five (25) villages situated in four sub-divisions: Moloundou, Salapoumbé, Gari Gombo, and Ndéléle, which are all located within the Boumba-et-Ngoko Department and the Kadey Department. The East Region of Cameroon occupies the southeastern part of the Republic of Cameroon. This Region has a surface area of 109,011 km² and extends between latitudes 3°49’59” N and 14°0’10” E. It is bordered to the east by the Central African Republic, to the south by the Republic of the Congo, to the north by the Adamawa Region, and to the west by the Centre and South Regions of Cameroon (Anonymous, 2013) (Figure 1).

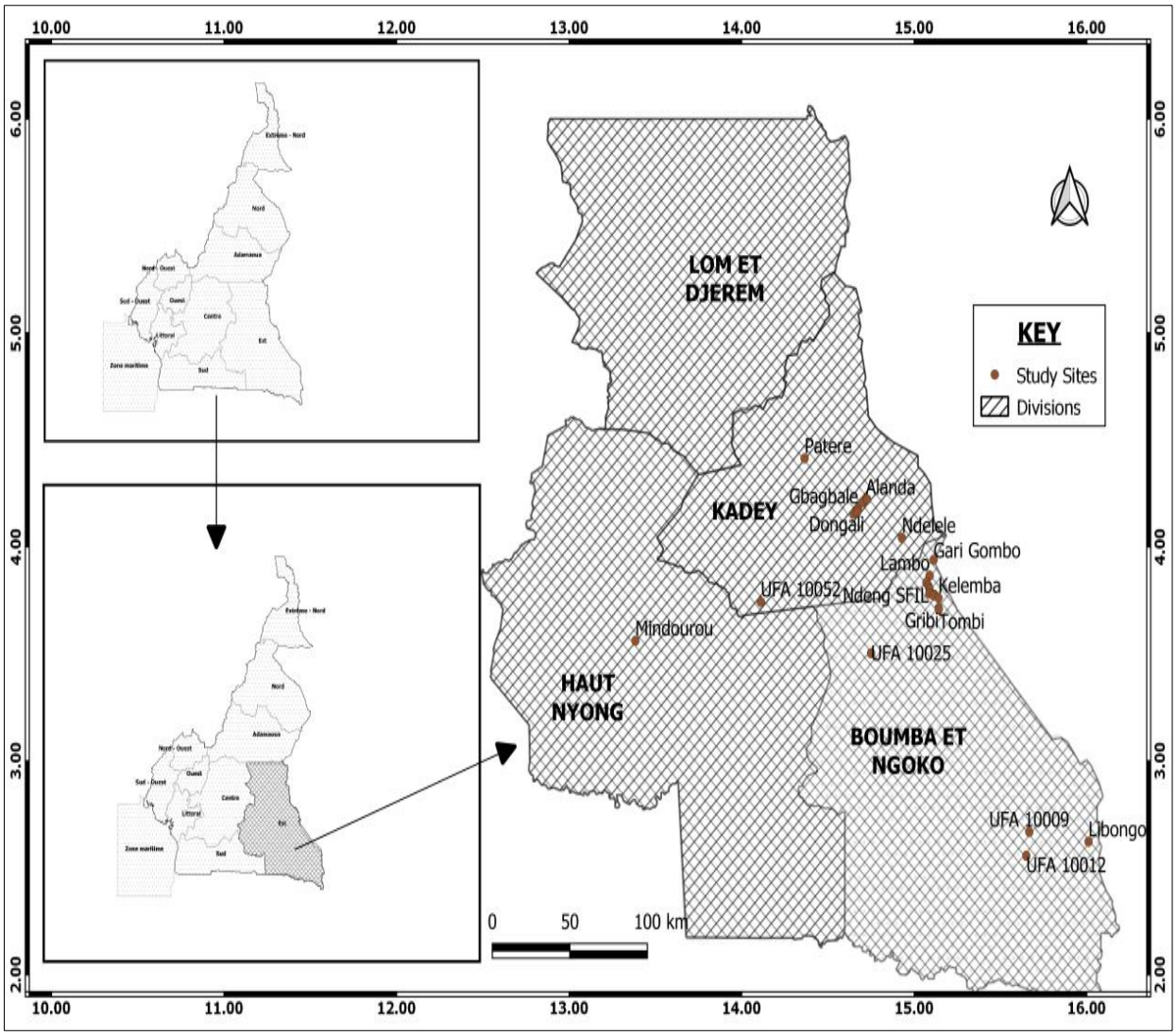

Figure 1: Study site in the East Region of Cameroon

The biophysical environment of the Region is characterized by a relief dominated by the vast South Cameroon plateau or forest peneplain, where the altitude decreases from the Northwest toward the Southeast (from 700m to 300–400m). The soil is ferallitic and red in color (Anonymous, 2013). The climate is of the Guineo-Sudanian type; consequently, a decrease in rainfall is observed from north to south, and the average temperature is relatively low due to the altitude. This heavy rainfall and constant humidity favor the dense forest dominated by dense, evergreen equatorial forest (Anonymous, 2013). The human population of this Region is characterized by a low population density of approximately 7.1 inhabitants/km² (Engamba, 2025). This Region is populated by a mosaic of ethnic groups, notably the Pygmies (Baka); the Maka-Djem group (Maka, Biké, Badjoue, Djem, Dzimou, Boman, Konabembé, Mbombo, Bidjouki, Mpymo, Essel, Bangantou, and Medjiné); the Kaka group (Kaka, Bakoun, and Pol); the Beti-Bulu-Fang group (Bamvélé, Babilés, and Omvang); the Mbum group; and the Ubangian group (Gbaya, Yanguré, Bangando) (Engamba, 2025). In addition to this ethnic diversity, it hosts a large number of refugees (from CAR, Congo, and Chad). The geographical position of the East Region favors economic exchanges. Agricultural and pastoral activities are well-suited to its physical environment and climate. Livestock farming is also present, practiced essentially in its northern part, particularly in the Kadey and Lom-et-Djérem Departments, while the Boumba-et-Ngoko and Haut-Nyong Departments are areas of major agricultural production and, above all, logging (Kamdem, 2016).

2.2 Data collection

Ethnobotanical Survey

An ethnobotanical survey was carried out between November 2025 to February 2026 on five hundred (500) respondents in twenty-five (25) villages surrounding Forest Management Units (FMUs) 10009, 10012, 10025, and 10052 in the East Region of Cameroon. The target population for this survey consisted of forestry company workers in villages such as those from the Société d'Exploitation Forestière et Agricole du Cameroun (SEFAC) and the Société Forestière et Industrielle de la Lokoundje (SFIL), non-

workers from the villages of SEFAC and SFIL and the neighboring villages. Participants included both sexes, aged 18 to over 60, who were capable of providing information regarding their knowledge of COVID-19.

Sampling size

The sample size was calculated based on the proportion of patients familiar with the preventive measures in a study. This size was calculated using the Schwartz (1960) formula:

$$\mathbf{n = z^2 * p * q / i^2}$$

Where n = minimum sample size; Z = standard normal deviate, which is **1.96** for a margin of error (alpha) of **5%** (0.05). p = the proportion of patients familiar with preventive measures; q = 1 - p, the proportion of patients unfamiliar with preventive measures; i = desired precision (where i = 0.05).

$$n = \frac{(1,96)^2 * (0,478) * (0,522)}{(0.05)2} = 383,41 \text{ soit } 384$$

To account for incomplete information, we will add **10%** to our sample size, thus:

n = 383 + (383*10%) = 421 patients

Data collection was carried out in a semi-structured interview through door-to-door visits in homes, Baka camps, and within the companies where individual and collective interviews were held. The method consisted of interviewing in French and/or local languages (Baka, kako, Mpiemo etc), the population about popular use of medicinal plants. The interview focused on two main areas: sociodemographic characteristics and information on COVID-19. The COVID-19 information was structured using parameters of knowledge, attitudes and practices (KAP) of the local population toward COVID-19 (Leye *et al.,* 2020; Camara, 2022). Specifically, knowledge is related to COVID-19, includes cultural beliefs, the recognition of signs and symptoms, at-risk individuals, and conditions influencing transmission (location, site, manner). Attitudes and practices on the other hand included the modern and traditional means of prevention (Camara, 2022). In this study we looked at the medicinal plants used to prevent and/or treat COVID-19.

Plant Identification

Simultaneously, the identification and collection of medicinal plants used against COVID-19 was carried out using the "Walk-in-the-woods" method (Kouakou *et al.,* 2024). This consists of walking with a companion or guide (prospectors from host forestry companies, traditional practitioners, or villagers) and a botanist to identify plants *in situ* or to preserve them as voucher specimens for identification or confirmation in the Plant Biology Laboratory of the University of Douala. The goal of the Walk-in-the-Woods method was to learn about the plants, their local names, their uses in the treatment of COVID-19. The confirmation of local plant names cited in Zimé, Baka, Kako, or other local languages was carried out using the compendium of plant names in the ethnic languages of Cameroon by Onana and Mezili, 2018 and Vivien and Faure, 1985. This operation could be repeated with different guides to cross-reference essential information such as local plant names.

2.3 Assessment of use value and cultural significance

i) Data analyses

Absolute and Relative Frequency

The purpose of this is to evaluate the socio-demographic characteristics of the population, as well as the Knowledge, Attitudes, and Practices (KAP) parameters of the population regarding COVID-19. This involves determining the frequency of the population with knowledge of COVID-19, identifying patients' specific knowledge about COVID-19, and highlighting the attitudes and practices of patients toward COVID-19. The frequencies used are calculated as follows:

Absolute Frequency = Number of people who mentioned the information

Relative Frequency

$$= \frac{\text{Number of people who mentioned the information}}{\text{Total number of informants}} X\,100$$

To evaluate knowledge of COVID-19, a score of one to three (1-3) points was assigned to individuals providing a correct answer, and a score of zero (0) was assigned for an incorrect answer or no response regarding the various knowledge parameters, such as the definition of COVID-19, symptoms of COVID-19, means of transmission, and means of prevention. The scale used for COVID-19 knowledge was the Skills scale, involving the calculation of a knowledge score where a value greater than 50% is considered "good knowledge" and a value lower than 50% is considered "poor or no knowledge" (Leye, 2020).

Citation Frequency (CF)

The citation frequency (CF) helps determine which species are most commonly used in the treatment of COVID-19 by the population. It is calculated by dividing the number of times a species used to treat a specific disease is mentioned by a respondent by the total number of respondents (Abdel *et al.,* 2024):

$$CF = \frac{\text{Number of citations of a species}}{\text{Total number of respondents}} X\,100$$

Spatial Use Convergence Index (SUC)

The Spatial Use Convergence Index (SUC) proposed by Betti, 2001 and Afiong *et al.,* 2024 is used to assess similarities in the use of plants for the same health problem. A plant is confirmed for its use in traditional medicine when it is cited by at least two people in the treatment of the same condition. This confirmation is even more important when these people are based in different regions (Betti, 200, Afiong *et al.,* 2024). SUC is determined by a scale ranging from 0 to 1 where: SUC = 0 when the importance of the plant species

is low and cited by only one person; SUC = 0.5 when the importance is medium and plant is cited by at least two people in the same site; SUC = 0.75 when the importance is high and plant is cited in two different sites; and SUC = 1 when the importance is very high and plant is mentioned in all three sites.

ii) Statistical analyses

To carry out this study, Excel 2013 software was used for the descriptive statistical analysis of the survey data and for the construction of graphs. The survey data was placed in the Excel spreadsheet in the form of citations. These data were edited allowing the calculation of frequencies in the number of citations.

3.0 RESULTS

3.1 Socio-demographic profile of the respondents in the East Region of Cameroon

Out of 500 respondents, 39% resided in the Moloundou, 27.8% in the Gari Gombo, 22.2% in the Ndélélé, and 11% in the Salapoumbé Sub-division. Men represented more than half of the respondents at 61.6%, as compared to women at 38.4%. The most represented ethnic group was the Ubangian group (including the Gbaya, Yanguré, Bangando, and Kako) at 32%, followed by the Maka-Djem group (including the Maka and Mpiémo) at 21.6%, Pygmy group (Baka) represented 13%, followed by Bantu at 3.4%, individuals from the Centre Region at 3%, Central Africans at 2.6%, and the least represented were the Toupouri at 0.2%. During the survey, the 40–50 age group was the most represented at 35%, followed by the 30–40 age group at 32.8%, and the 50–60 age group at 14%. The least represented age group were those > 60 years old at 10% and the 20–30 age group at 8.2%. Most of the respondents were married (82.4%), followed by single individuals (14.2%), widows (2.8%), and divorcees (0.6%). Regarding the education level, those with no formal education were the most represented at 40.6%, followed by respondents with a primary school level (36.8%) and a secondary school level (20%); only 2.6% had reached higher education level. Non-workers were the majority at 70.2%, while workers represented 29.8% (Table 1).

Table 1: Socio-demographic characteristics of the respondents in the East Region of Cameroon

Variable	Absolute frequency	Percentage (%)
Sub-divison		
Gari Gombo	139	27,8
Moloundou	195	**39**
Ndelélé	111	22,2
Salapoumbe	55	11
Sex		
F	192	38,4
M	308	**61,6**
Age group		
20-30	41	8,2
30-40	164	32,8
40-50	175	**35**
50-60	70	14
>60	50	10
Marital status		
Single	71	14,2
Divorced	3	0,6
Maried	412	**82,4**
Widow	14	2,8
Level of education		
Illiterates	203	**40,6**
Primary	184	36,8
Secondary	100	20
University	13	2,6
Profession		
Non workers	351	**70,2**
workers	149	29,8
Ethnic groups		
Bamiléké	7	1,4
Banduie	2	0,4
Bantou	17	3,4
Centrafricans	13	2,6
Douala	3	0,6
Fulbé	6	1,2

Variable	Absolute frequency	Percentage (%)
Group of the East	5	1
Group of Pygmis	65	13
Group of Centre	15	3
Group Maka-Djem	108	21,6
Group Oubangui	160	**32**
Haussa	3	0,6
mbamoun	2	0,4
Toupouri	1	0,2
Von-Von	2	0,4
-	91	18,2

- means no answer was given for that question. Figures in bold are the highest.

3.2 Information on COVID-19 in the East Region of Cameroon

i) Knowledge on COVID-19

Among the workers surveyed at SEFAC (18.4%) and SFIL (10.8%) had heard about the disease while 0.4% at SEFAC and 0.2% at SFIL had not heard of the disease. Among the non-workers in the SEFAC, 21.4% and 23.2% in SFIL had heard of the disease and 15.8% in SEFAC and 15.8% in SFIL had not had heard of the disease. During the survey, 11.8% of SEFAC and 7.8% of SFIL workers believed in the existence of the disease and 7.8% of SEFAC and 3.2% of SFIL did not believe in the existence of the disease. Conversely, among non-workers in the SEFAC, 13% and 4.2% in SFIL believed in the disease and 18.2% in SEFAC and 34.8% in SFIL did not in the disease (Table 2). Only 28.6% of the population had a good knowledge of COVID-19, while 71.4% had poor knowledge or no knowledge of the disease. Most of the respondents defined COVID-19 as being a "Western disease" (16%), while only 2.8% defined it as a"serious and fatal disease" (2.8%). 26.4% of those surveyed had no definition for COVID-19 (Table 3). However, 13.8% indicated that it is a disease caused by the corona virus (Table 3).

Table 2: Knowledge of COVID-19 by the population of the East Region of Cameroon

Timber company	Category	Question	Absolute Frequency	Percentage (%)
SEFAC	Workers	**Have you heard about Covid-19**		
		Yes	92	**18,4**
		No	2	0,4
		Total	94	18,8
	Non workers	Yes	107	**21,4**
		No	49	9,8
		Total	156	31,2
SFIL	Workers	Yes	54	**10,8**
		No	1	0,2
		Total	55	11
	Non workers	Yes	116	**23,2**
		No	76	15,8
		Total	195	39
SEFAC	Workers	**Do you believe Covid-19 exists**		
		Yes	59	**11,8**
		No	35	7
		Total	94	18,8
	Non workers	Yes	65	13
		No	91	**18,2**
		Total	156	31,2
SFIL	Workers	Yes	39	**7,8**
		No	16	3,2
		Total	55	11
	Non workers	Yes	21	4,2
		No	174	**34,8**
		Total	195	39

Figures in bold indicates the highest.

Table 3: Various definitions given to COVID-19 in the East Region of Cameroon

Definition of COVID-19	No of respondents	Percentage (%)
It is a virus	3	0,6
A virus that makes the patient to have a cold	3	0,6
It is a sickness	76	15,2
It is a sickness caused by corona virus	69	13,8
It is a sickness caused by corona virus that is contagious and deadly	4	0,8
It is a sickness caused by the cold	2	0,4
It is a sickness of cold	4	0,8
It is a contagious disease	28	5,6
It is a contagious disease caused by the corona virus	20	4
It is a worldly contagious disease	2	0,4
It is a dangerous disease	1	0,2
It is a dangerously deadly disease	14	2,8
It is a disease of the western world	80	**16**
It is a deadly disease of the western world	1	0,2
It is a disease that makes the patient to have fever	3	0,6
It is a disease that makes the patient to have cold	4	0,8
It is a disease that makes the patient to have respiratory problems.	4	0,8
It is a deadly viral disease	4	0,8
It is a viral disease	7	1,4
It is a contagious viral disease	28	5,6
It is a viral disease that makes the patient to have a cold and cough	7	1,4
Don't know	132	26,4

Figures in bold indicates the highest.

When the respondents were questioned on their knowledge of COVID-19 symptoms, the majority identified coughing (47.4%), followed by fever (45.4%), respiratory problems (27.2%), nasal discharge (15%), fatigue (15%), sore throat (14.4%), sneezing (9.6%), headache (7.8%), colds (5.6%), body aches (5%), abdominal pain (0.6%), malaria (0.4%), chills (0.2%), and the flu (0.2%); the remaining 14.6% of respondents had no suggestions regarding the symptoms of the disease (Figure 2).

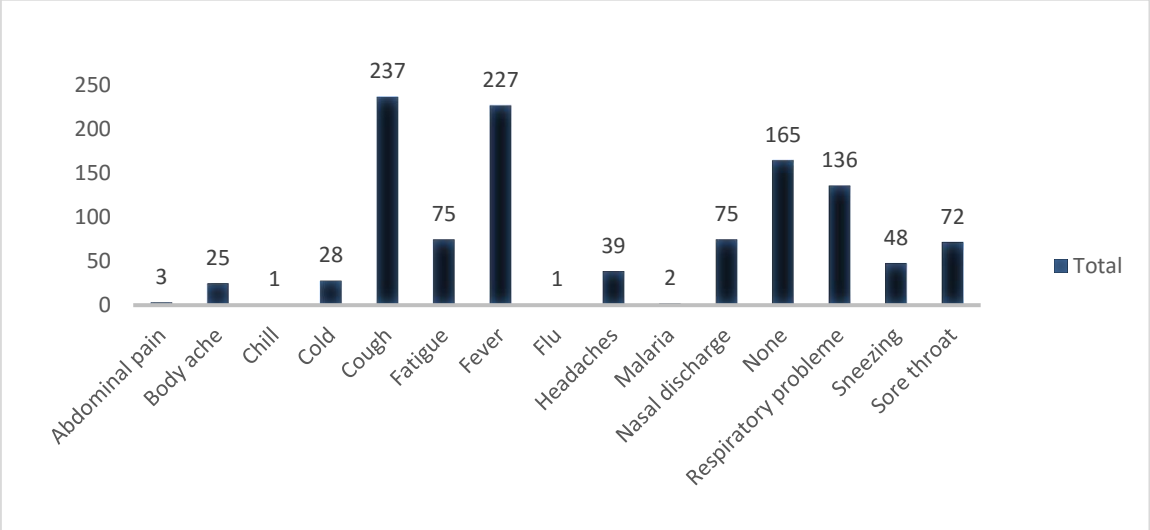

Figure 2: Respondents knowledge on the symptoms of COVID-19 in the East Region of Cameroon

During the survey, on a scale of 100%, the most cited means of transmission was shaking of hands with an infected person at 41%, followed by being in physical contact with an infected person (33.4%), exposure to the coughing and sneezing of an infected person (13.8%), contact with an infected surface (13.6%), not using a mask (11.2%), touching one's face with their hands (7.4%), exposure to the secretions of an infected person (6.8%), not disinfecting hands (4.4%), sharing the same objects as an infected person (1.6%), and contact with infected objects (1.4%); the remaining 28.4% of respondents did not answer the question (Figure 3).

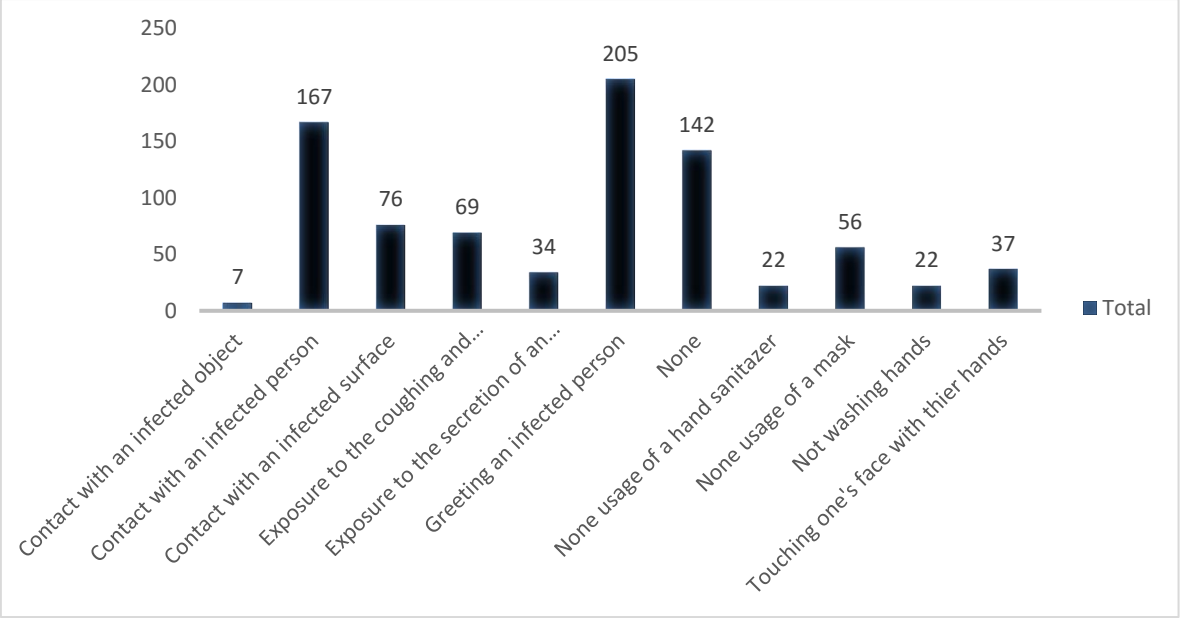

Figure 3: Knowledge on the means of transmission of COVID-19 in the East Region of Cameroon

On a scale of 100% regarding the sources of information through which the respondents discovered the disease, 38.4% had heard about the disease through word of mouth, 26.6% through local health authorities, 21% through social media, 11.1% through traditional media, 17.2% through company administrative authorities, 12% through village authorities, and 12% through traditional medicine practitioners; out of 500 respondents, 128 (or 25.6%) had no source of information (Figure 4).

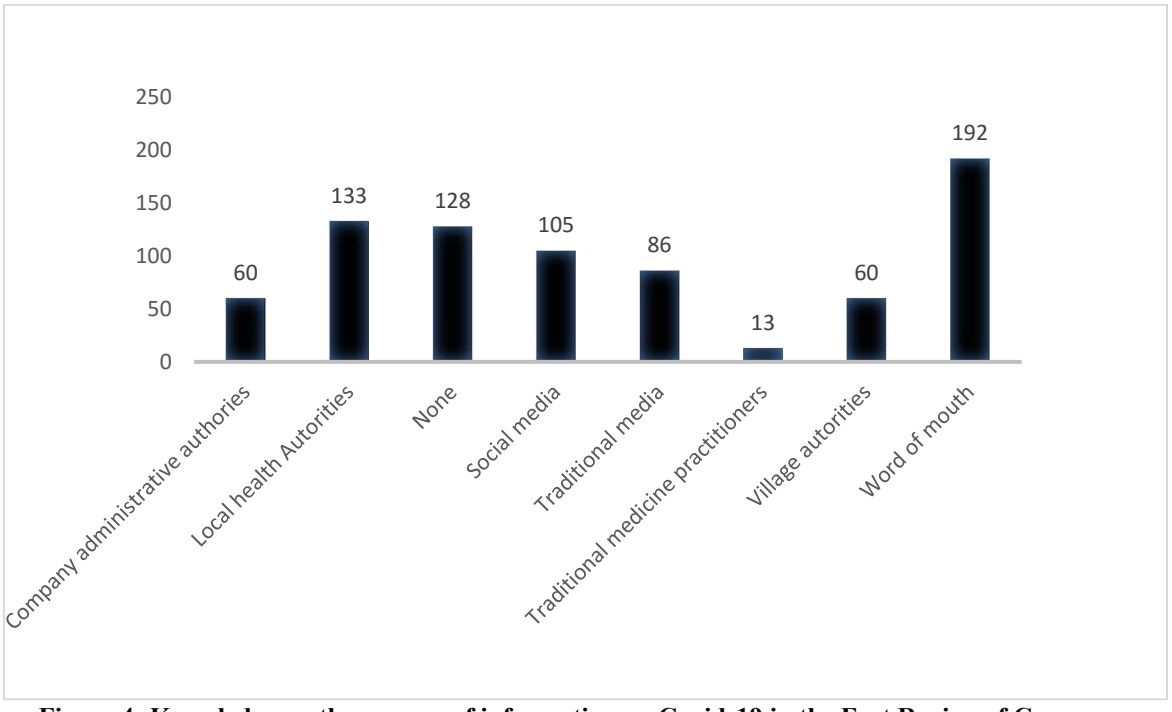

Figure 4: Knowledge on the sources of information on Covid-19 in the East Region of Cameroon

ii) Attitudes and practices of Covid-19

On a scale of 100%, 31.6% of those surveyed had no suggestions regarding prevention measures against COVID-19. The most frequently mentioned prevention methods were respecting social distancing (24.4%), wearing masks (23.2%), avoiding gatherings (15.6%), hand washing (13.8%), vaccination (9.6%), the use of hand sanitizer (5.6%), not touching one's face with their hands (3.6%), and staying at home (2.4%) (Figure 5).

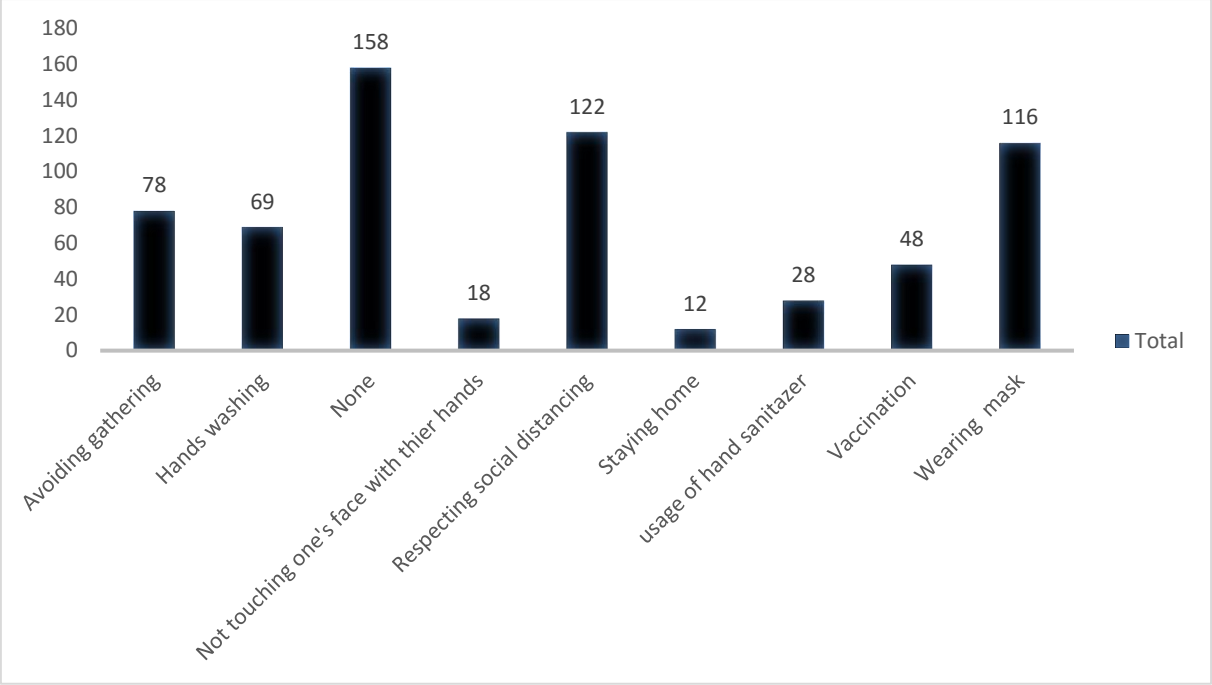

Figure 5: Knowledge on the preventive measures against Covid-19 in the East Region of Cameroon

Among the 500 people surveyed, 240 individuals (or 48%) did not know if they had contracted the disease or not and had not been tested. 159 people (or 31.8%) had not contracted the disease, as confirmed by a test. On the other hand, 101 people (or 20.2%) believed they had not contracted the disease without the confirmation of a test.

On a scale of 100% regarding the choice of medicine and the reasons for that choice, the most requested option was traditional medicine at 60.2%. The most cited reason was its effectiveness (23.9%), followed by its lower cost (16.9%) and its accessibility (11.5%); the least cited reasons were lack of trust and the perceived safety of traditional medicine at 0.1% each. The second most popular proposal was the choice of both medicines, with modern medicine as the first choice at 21.5%. The primary reason mentioned was that it "allows one to know the disease" (6.4%), followed by "it depends on the severity of the disease" (3.7%), and "it allows for justification of absence from work" (2.9%). Among the least mentioned reasons were "trust in modern medicine, modernization", and "it depends on the disease," at 0.1% each. The third proposal was the choice of both medicines, with traditional medicine as the first choice at 10.3%. The majority reason was lower cost (4.6%), followed by "it allows for initial symptom relief" (2.2%); the least cited were the accessibility of traditional medicine and allergies to certain modern drugs at 0.1% each. The fourth proposal was the choice of modern medicine alone at 7.5%, with effectiveness (3.2%) and precision (1.8%) as the main reasons. The least requested reasons were plant toxicity, knowledge of modern medicine, knowing the disease, and the husband's will at 0.1% each. The final and least requested proposal was the choice of both medicines without a specific preference at 0.5%, citing reasons such as "it depends on the disease" (0.3%), lower cost, and effectiveness (0.1% each) (Table 4). Among the 500 individuals surveyed, 57% of respondents did not know which age groups were most at risk for the disease. Conversely, 26% identified people over 60 years old as being at risk, followed by 8% who identified people over 40, 6% who stated that people of all ages were at risk, and 3% who identified people aged 40 to 60 as being at risk (Table 5).

Table 4: Knowledge of the choice of medicine used and the reasons in the East Region of Cameroon

Variable	Absolute frequency	Relative frequency (%)
Modern medicine	**55**	**7,45**
Because of plant toxicity	1	0,14
Trusts this medicine	2	0,27
Has knowledge of this medicine	1	0,14
It is less expensive	3	0,41
It is easily accessible	24	3,25
It is precise	13	**1,76**
Religion forbids	5	0,67
Can pay after treatment at the health center	4	0,54

Variable	Absolute frequency	Relative frequency (%)
Depends on the husband's will	1	0,14
Allows one to know the disease	1	0,14
Traditional medicine	**444**	**60,16**
Trusts this medicine	1	0,14
Has knowledge of this medicine	37	5,01
It is less expensive x	125	16,94
It is effective	176	**23,85**
It is easily accessible	85	11,52
It is precise	5	0,68
It is safe	1	0,14
Distance from the health center	13	1,76
Allows for justification of absence from work	1	0,14
Both medicines	**4**	**0,54**
It is less expensive	1	0,14
It is effective	1	0,14
Depends on the disease	2	0,27
Both Medicines, Modern Medicine as first choice	**159**	**21,54**
Trust this medicine	1	0,14
Has knowledge on this medicine	3	0,41
It is less costly	12	1,63
It is effective	15	2,03
It is precise	14	1,90
It is sure	3	0,41
Because modern times favor modernization	1	0,14
Can pay after treatment at the health center	5	0,68
Has less knowledge of traditional medicine	5	0,68
Depends on the severity of the disease	27	3,66
Depends on the disease	1	0,14
Depends on husbands will	3	0,41
Allows one to know the disease	47	6,37
Allows for justification of absence from work	22	2,98
Both Medicines, Traditional Medicine as first choice	**76**	**10,30**
Has knowledge of the medicine	8	1,08
It is less expensive	34	4,61
It is effective	7	0,95
It is easily accessible	1	0,14
It is precise	3	0,41
Allergic to certain modern medications	1	0,14
Depends on the disease	2	0,27
Allows for justification of absence from work	4	0,54
Allows for initial symptom relief	16	2,17

Figures in Bold are the highest.

Table 5: Knowledge of the age group at risk to contact COVID-19 in East Region of Cameroon.

Age group at risk	Frequency absolute	Frequency relative (%)
>40	40	8
41-60	15	3
>60	130	**26**
Does not know	285	57
All ages	30	6

Figures in bold are the highest

iii) Medicinal plants used against COVID-19

Forty-eight (48) species were recorded and identified for use against COVID-19. These species belonged to 30 families and 47 genera. The most represented family was Apocynaceae (60 species), followed by Ebenaceae (21 species), Sapotaceae (20 species), Rubiaceae (16 species), and Solanaceae (12 species). *Alstonia boonei* De Wild. was the medicinal

plant most frequently cited by the population (Fc = 9), followed by *Diospyros ebenum* J.Koenig ex Retz. (Fc = 4.2), *Gambeya locourtiana* (De Wild.) Aubrév. & Pellegr. (Fc = 4), *Picralima nitida* (Stapf) T.Durand & H.Durand (Fc = 3), *Citrus limon* (L.) Burm.f. (Fc = 2.6), *Massularia acuminata* (G.Don) Bullock ex Hoyle (Fc = 2.2), and *Zingiber officinale* Roscoe (Fc = 2.2). The highest values in spatial use convergence are found for the following species. two species are cited in all four sub-divisions (SUC = 1). Which are: *Alstonia boonei* and *Diospyros ebenum*. Eight (8) species are in three divisions SUC = 0.75): *Capsicum frutescens, Cymbopogon citratus, Detarium macrocarpus, Entadrophragma cylindricum, Gambeya locourtiana, Gmelina arborea, Massularia acuminata*. Eleven (11) species are in two divisions (SUC = 0.5): *Allium sativum, Annickia chlorantha, Artemisia annua, Carica papaya, Citrus limon, Combretum micranthum, Copaifera milbraedi, Musa paradisiaca, Schumamniophyton magnificum, Terminalia superba,* and *Zingiber officinale*. The remaining twenty-seven (27) species are cited by at least two people in the same village (SUC = 0.25). Among them: *Alchornea cordifolia, Ananas comosus, Bobgunnia fistuloides, Ocimum gratissimu.*

Diversity indices (Table 8) indicate an overall high diversity. Gari Gombo had the highest Shanon Weaver diversity level (2.38) followed by Salapoumbe with a diversity level (2.30). For the diversity of Pielou (E), Ndelélé had the highest value of this diversity. Finally, the diversity of Simpson was higher in Moloundou (0.97) compare to the other divisions.

Table 8: Result on the diversity indices of the medicinal plants in the four Sub-divisions

Diversity parameters	Gari Gombo	Moloundou	Ndelélé	Salapoumbé
Number of informants (N)	18	54	6	21
Number of citations (ni)	7	17	7	6
Shanon (H)	2,38	1,31	2,25	2,30
Pielou (E)	0,84	0,32	0,97	0,89
Simpson (D)	0,76	0,97	0,78	0,77

The most frequently used plant part was the bark (164 citations, or 25.31%), followed by leaves (35 citations, or 5.40%), fruits (30 citations, or 4.63%), rhizomes (11 citations, or 1.70%), bulbs (3 citations, or 0.47%), and seeds (2 citations, or 0.31%) (Figure 6). Roots, sap, and stems each had one citation, representing 0.15% each. Decoction was the most common preparation method with 121 citations (18.67%), followed by maceration (77 citations, or 11.88%), squeezing/expression (32 citations, or 4.94%), raw consumption (9 citations, or 1.39%), and infusion (9 citations, or 1.39%) (Figure 7).

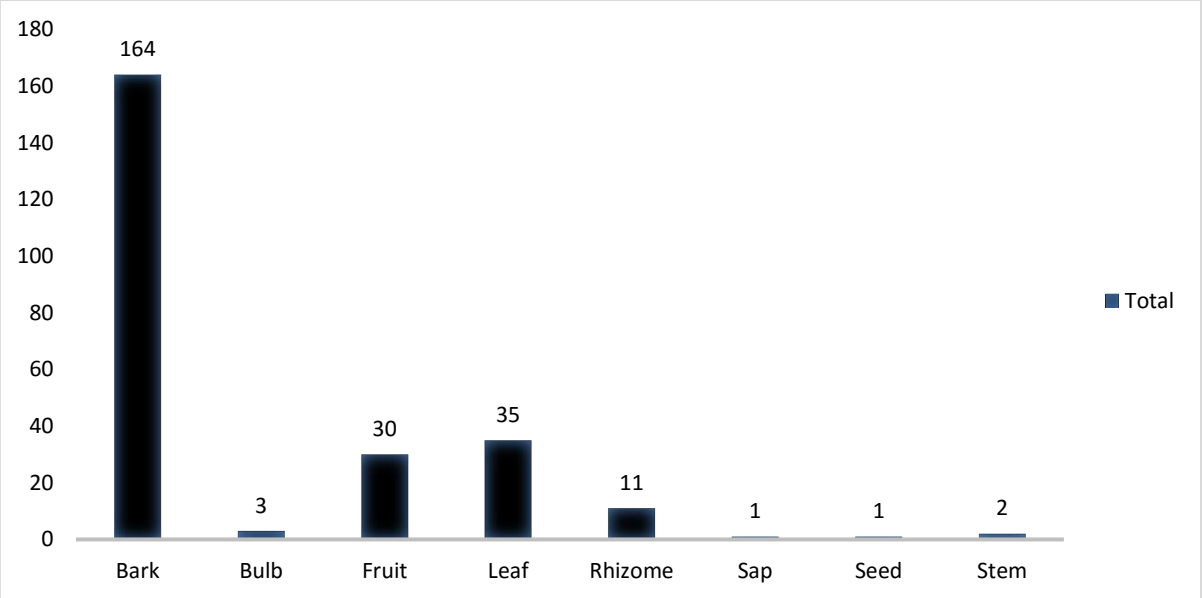

Figure 6: Plant part used for the treatment of COVID-19 in the East Region of Cameroon

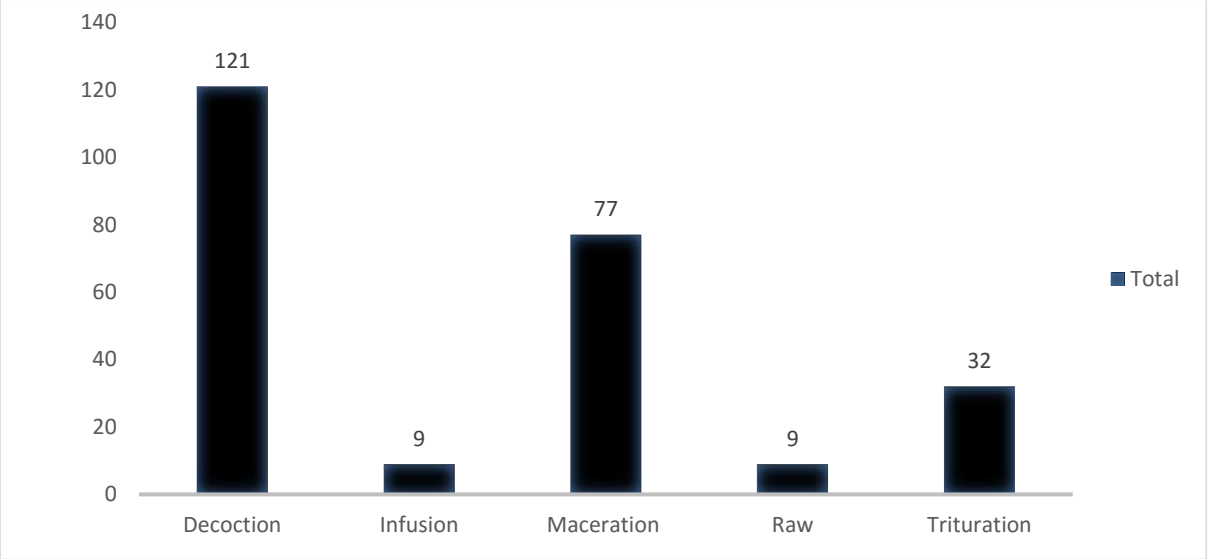

Figure 7: Preparation method of traditional medicine against COVID-19 in the East Region of Cameroon

4.0 DISCUSSION

The objective of this work was to evaluate the knowledge of the local population and the medicinal plants used in the East Region regarding COVID-19, which remains a current epidemic.

1) Socio-demography of the respondents of the East Region of Cameroon

Socio-demographic analysis shows that men participated more (61.6%) in the survey. This result is evident because the majority of participants are heads of households (Abdel *et al.,* 2024) and due to the massive arrival of young people and adults seeking employment (SEFAC, 2015; SFIL, 2009). Also, Kouakou, (2019) pointed out that men are more willing to provide information on the use of NTFP source species than women. This result is similar to those of comparable to those of Abdel *et al.,* 2024 where the proportion of men was 62.5%. The most represented age group was the age-group 41–50 (35%) similar to the forest management report for SEFAC's FMU 10010, where the adult proportion ranging from 15 to 65 years old was most represented at 56.2%. this is similar to the results of Nguimfack *et al.,* 2022 who found the age group 41-60 to be the second largest group of correspondents in the Pouma and Dibombari localities. Furthermore, 29.8% of the population are workers in local forestry companies, while 70.2% are non-workers. The high proportion of non-workers in the population is linked to activities such as agriculture, hunting, gathering, fishing, and trade, intended to alleviate family burdens (SEFAC, 2015). This result aligns with the 2015 SEFAC report on the FMU 10010 management plan, which shows high non-forestry activities (80%) as compared to forestry activities (20%). The high level of workers than non-workers is due to the fact that most people come to reside in these sites because of employment; bringing along their families most of whom are involved in other activities. However, some workers come alone without their families thus increasing the number of workers. Finally, with an overall literacy rate of 59.4% and 40.6% of illiteracy rate, indicates a very high school dropout rate; moreover, the likelihood of reaching the secondary cycle is minimal for young students (SEFAC, 2015). This is justified by the movement of youths towards other activities such as agriculture, hunting, trade etc…. (SEFAC, 2015; SFIL, 2009). These results correlate with those obtained by SEFAC in 2015, where the literacy level was 72% and the illiteracy level was 9%, which indicates a decrease in literacy level and increase in illiteracy level in those communities.

2) Information on COVID-19 by the population of the East Region of Cameroon

In our study, 73.8% had already heard of the disease, with the majority receiving information through word of mouth (38.4%). These results are similar to those obtained by Momo, 2025 (62.3%); Letu *et al.,* 2022 (97.7%) and Camara, 2022, (94.4%) who had heard of the existence of COVID-19. The discrepancies in results could be explained by the fact that only 2.6% of those surveyed had a higher education level, thus indicating a high level of illiteracy. However, only 36.8% believed in the existence of COVID-19, and 16% defined it as a "Western disease." These results are significantly lower than those of Camara, 2022, who found that 94% believed in the disease and the majority were informed by radio and television. These discrepancies could be explained by the fact that the current study area is marginalized, resulting in the difficult integration of villages into modern life such as electricity and television (Mengue, 2004) and a high level of precariousness in their living environment (Rural Sector Development Strategy, 2016). These shortcomings, in this specific case, are demonstrated by a high lack of belief in the disease (63.2%). Seventy-one percent (71.6%) of the population declared knowing the transmission methods of COVID-19, the most cited method was shaking hands with an infected person (41%) and 67% of the respondents declared knowing

about the symptoms of COVID 19, the most cited symptoms where cough (47,4%). This may be due to the fact that majority of the respondents heard about the sickness by word of mouth. These results are lower than those of Camara, 2024 who noted that 97.9% declared to know that COVID-19 is transmissible and 95.59% declared to know about COVID 19 symptoms.

Regarding attitudes and practices against COVID-19, 68.4% of the respondents cited social distancing (24.4%) as the most preventive measure against COVID-19. This method must have been effective due to the fact that most of the information was by word of mouth. Other preventive measures require modern technology to know them. This may also be the reason why the population did not believe in the disease. Lack of reliable information decreased their believe in this study. This is contrary to the results of Leye *et al.,* 2020 in the region of Dakar where the population had reliable information from the media and thus believed in the existence of the disease. This further confirms the fact that most of the respondents do not know if they had contacted COVID-19. The most requested choice of medicine was traditional medicine at 60.2%, due to its effectiveness. In Sub-Saharan African countries, the advent of modern medicine has not reduced the trust placed in traditional medicine by rural populations (Vroh, 2020). Nguimfack *et al.,* 2022 in the Dibombari and Pouma localities and Nnanga *et al.,* (2017) in of Yabassi and Mouanko localities indicated that non-Timber Forest Products were used for traditional medicine. The work of Hadonou-Yovo *et al.,* (2019) have also been pointed out that the populations of the Mono Biosphere Reserve (Benin) exploit NTFPs for the treatment of pathologies (malaria, anaemia, cough, jaundice, cardiovascular diseases). This is because the local population turns to traditional remedies to relieve daily suffering, and these remedies are mostly inherited from ancestors (Merazga and Ben Ayache, 2024). This result is similar to that of Merazga and Ben Ayache (2024), where 84.3% of the population uses traditional medicine compared to 15.7% using modern medicine.

3) Medicinal plants used against COVID-19 in the East Region of Cameroon

Only 20.6% of the respondents provided traditional treatments for COVID-19. This may be because most of the population did not have a good knowledge of the disease. 48 species were recorded and identified as preventive or curative means. These species belong to 30 families and 47 genera. This highlights the ethnobotanical heterogeneity and indicates the floral richness and diversity of the study area (Abdel *et al.,* 2024; Mvogo Ottou *et al.,* 2022). This is confirmed by the high diversity indices we had in this study. These results are consistent with previous research in Cameroon on traditional COVID-19 treatments. For instance, Abdel *et al.,* (2024) recorded 43 species across 39 genera and 28 families, and Inimbock *et al.,* (2021) identified 48 forest species from 22 families. Among the 30 represented families, Apocynaceae was the most cited, followed by Ebenaceae, Sapotaceae, Rubiaceae, and Solanaceae. The predominance of these families shows that the study area belongs to semi-deciduous rainforests (Mvogo Ottou *et al.,* 2025). According to Afiong *et al.,* (2024), the use of these families in health issues is explained by their richness in secondary metabolites (alkaloids, terpenes, and flavonoids). This correlates with the work of Ottou *et al.,* 2025 on medicinal plants in Gribé (East Cameroon), which identified Euphorbiaceae, Fabaceae, Annonaceae, Moraceae, Rubiaceae, Apocynaceae, and Zingiberaceae as the most represented families in descending order.

Alstonia boonei De Wild and *Diospyros ebenum* J.Koenig ex Retz, were widely cited with a frequency of citation 9 and 4.2 respectively. These values are confirmed by their high value in Spatial Use Convergence index (SUC = 1) (Appendix 1). The wide usage of *Alstonia boonei* can be explained by it active phytochemical components such as alkaloides, flavoinoids, phenolics, tannis, saponins, anthraquinones and terpeniods, (Afiong, 2024). These results aligned with that of Afiong and al., 2024 and Mvogo *et al.,* 2025 who had *Alstonia boonei* as the most requested species and with the highest Spatial convergence indices. The most used plant part was the bark (25.31%), followed by leaves (5.40%) and fruits (4.63%). Bark is an ideal organ for storing bioactive components, and its non-seasonal nature makes it always available compared to fruits and flowers (Mvogo Ottou *et al.,* 2025). The use of leaves and fruits may be linked to the accumulation of antioxidants, vitamins, inulins, tannins, and other alkaloids (Vroh, 2020). this is similar to the results of Nguimfack *et al.,* 2022 who indicated the use of leaves in the Pouma and Dibombari localities. Decoction was the most common preparation method (18.67%), as it allows for the collection of maximum active principles and reduces toxic effects (Merazga and Ben Ayache, 2024). These results are similar to those of Vroh (2020) and Merazga and Ben Ayache (2024).

CONCLUSION

In evaluating the level of knowledge of COVID-19 among the local population of the East Region of Cameroon, it is demonstrated that the majority of respondents did not believe in COVID-19. This resulted in a low proportion of vaccinated respondents and a significant proportion who did not know if they had contracted the disease and had not been tested. Nevertheless, the large proportion of respondents who had heard of and believed in COVID-19 possessed knowledge of the primary transmission modes, symptoms, and prevention methods. It should be noted that the beliefs, perceptions, and attitudes of our respondents are not static; they are open and constantly evolving, adjusting when confronted with new experiences and contexts. Understanding this study is essential for the effective prevention of global health

crises, shaping future public health demands, and improving community resilience during pandemics.

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Appendix 1: Medicinal plants identified among the local population of the East Region of Cameroon used against COVID-19

Scientific Names	Local Names	Family	Fc	CUS	Organe	Préparation
Alchornea cordifolia (Schumach. & Thonn.) Mull.Arg.	Kokoriko	Euphorbiaceae	0,6	0,25	Le	De, Ma
Allium sativum L.	Ail	Amaryllidaceae	0,6	0,5	Bu	De, Tr
Alstonia boonei De Wild.	Ekouk, emien, guga, lombo	Apocynaceae	9	1	Ba	De, Ma
Ananas comosus (L.) Merr.	Ananas	Bromeliaceae	0,2	O,25	Fr	De
Annickia chlorantha Oliv.	Korme, moambe jaune	Annonaceae	0,4	0,5	Ba	De
Artemisia annua L.	Artemesia	Asteraceae	0,2	0,5	Le	In
Bobgunnia fistuloides (Harms) J.H.Kirkbr. & Wiersema	Pao rosa	Fabaceae	0,2	0,25	Ba	De
Canarium schweinfurthii Engl.	Sénè	Burseraceae	0,2	0,25	Ba	De
Capsicum frutescencs L.	Petit piment	Solanaceae	1,6	0,75	Fr	De, Tr
Carica papaya L.	papayer	Caricaceae	0,6	0,5	Le	De, Tr
Citrus limon (L.) Burm.fil.	Citron	Rutaceae	2,6	0,5	Le, Fr	De, Tr, In
Combretum micranthum G. Don	Arbre de l'ecorce jaune, ecorce jaune, kinkeliba	Combretaceae	1	0,5	Ba	De, Ma
Copaifera mildbraedii Harms	Etimoe	Fabaceae	0,4	0,5	Ba	De
Cymbopogon citratus (Dc.) Stapf	Citronelle	Poaceae	0,8	0,75	Le	De
Detarium macrocarpum Harms	Mamboed, mamboed, mambodee	Fabaceae	0,8	0,75	Ba	Ma
Diospyros ebenum J.Koenig ex Retz.	Ebene	Ebenaceae	4,2	1	Ba	De, Ma
Duguetia staudtii (Engl. & Diels) Chatrou	Ntoma	Annonaceae	0,2	0,25	Ba	De
Elaeis guineensis Jacq.	Palmier	Arecaceae	0,2	0,25	Sa	Ra
Entadrophragma cylindricum Sprague	Sapelli	Meliaceae	1,6	0,75	Ba	De, Ma
Gambeya africana (A.DC.) Pierre	Mamboc	Sapotaceae	0,2	0,25	Ba	Ma
Gambeya locourtiana (De Wild.) Aubrév. & Pellegr.	Abam, mambo, mamboc, mbambo	Sapotaceae	4	0,75	Ba, Fr, Se	Ra, De, Ma
Garcinia kola Heckel	Bitter cola, kola du lion	Clusiaceae	0,8	0,25	Fr	Ra, Ma
Gmelina arborea Roxb. Ex Sm.	Ndole en corde	Lamiaceae	1,6	0,75	Le	De, Tr
Keayodendron bridelioides Leandri	Bondo, mbondo	Phyllanthaceae	0,4	0,25	Ba	De
khaya sp	Accajou	Fabaceae	0,2	0,25	Ba	De
Mangifera indica L.	Manguier	Anacardiaceae	0,4	0,25	Le	De
Massularia acuminata (G.Don) Bullock ex Hoyle	Generale, mindo	Rubiaceae	2,2	0,75	Ba	De, Ma
Milicia excelsa (Welw.) C.C.Berg	Iroko	Moraceae	0,2	0,25	Ba	De
Musa paradisiaca L.	Bananier	Musaceae	0,4	0,5	Le	De
Ocimum gratissimum L.	Massep	Lamiaceae	0,6	0,25	Le	Tr
Parinari excelsa Sabine	Parinari	Chrysobalanaceae	0,2	0,25	Ba	De
Pentaclethra macrophylla Benth.	Balaka	Fabaceae	0,2	0,25	Ba	De
Pericopsis elata (Harms) Meeuwen	Assamela	Fabaceae	0,2	0,25	Ba	De
Picralima nitida (Stapf) T.Durand & H.Durand	Ebam, mudanga	Apocynaceae	3	0,75	Ba	De, Ma

Piper nigrum L.	Piovre noire	Piperaceae	0,2	0,25	Se	Tr
Piptadeniastrum africanum (Hook.f.) Brenan	Dabema	Meliaceae	0,2	0,25	Ba	De
Psidium guajava L.	Goyavier	Myrtaceae	0,2	0,25	Le	De
Pterocarpus sp	Padouk	Fabaceae	0,2	0,25	Ba	De
Pycnanthus angolensis (Welw.) Warb.	Solobo	Myristicaceae	0,2	0,25	Ba	De
Saccharum officinarum L.	Canne sauvage	Poaceae	0,2	0,25	St	De
Schumanniophyton magnifiaum (K.Schum). Harms	Arbre à 3 feuilles, stitmode, arbre à mille maladies	Rubiaceae	1	0,5	Ba	De
solanum melongena L.	casimango	Solanaceae	0,8	0,25	Fr	De
Spondias dulcis Sol. Ex G.Forst.	Bossiko	Anacardiaceae	0,2	0,25	Le	De
Strombosiopsis tetrandra Engl.	Frake golu	Strombosiaceae	0,2	0,25	Ba	De
Terminalia superba Engl. & Diels	Marguerite	Combretaceae	1,2	0,5	Ba	De, Ma
Tithonia diversifolia (Hemsl.) A. Gray	Marguerite	Asteraceae	0,2	0,25	Le	De
Xylopia hypolampra Mildbr. & Diels	Musa	Annonaceae	0,2	0,25	Ba	De
Zingiber oficinale Roscoe	Ginger, gingimbre	Zingiberaceae	2,2	0,5	Rh	Ra, De, Tr, In