



Int.J.Adv.Stud.Res.Africa. 2021, 10 (1): 06-16
ISSN: 1920-860X (online/Électronique)
ISSN: 1920-8693 (print/Papier)
©AfricaScienceNetwork, MMXXI



Check for updates

ORIGINAL RESEARCH PAPER / ARTICLE ORIGINAL

COVID-19 IN CONTEXT: EPIDEMIO-CLINICAL INSIGHTS AND CHALLENGES IN RURAL AREA (NKONDJOCK-CAMEROON)

NGUENDO YONGSI HB

Institute for Population Studies (IFORD), University of Yaounde II (Cameroon)

Reçu/Received on: 15-December-2020; Évalué/Revised on: 30-January-2021; Accepté/Accepted on: 08-March-2021;
Publié/Published on: 30-June-2021

Corresponding author: nquendoyongsi@gmail.com

RESUME

Contexte: La maladie à coronavirus (COVID-19) est causée par le SRAS-COV2 et représente l'agent causal d'une maladie potentiellement mortelle qui est un grand problème de santé publique mondiale. Alors que les médicaments efficaces contre les coronavirus sont en cours, plusieurs interventions pharmacologiques et non pharmacologiques ont été adaptées pour gérer les symptômes et réduire l'effet du virus afin de prévenir une morbidité et une mortalité croissantes. Cependant, il existe des défis persistants pour atténuer le COVID-19 dans les zones rurales. Objectifs: Cet article vise à fournir un aperçu de la pathogenèse et de la dynamique de transmission du CoVID-19 ainsi que des stratégies d'intervention pharmacologiques et non pharmacologiques pour atténuer le virus au Cameroun, et à évaluer les défis existants du CoVID-19 dans les zones rurales, en termes du respect des directives de prévention et de contrôle recommandées pour le covid-19. Méthodes: Une enquête transversale a été menée, en utilisant une procédure d'échantillonnage aléatoire stratifié en deux étapes. Résultats: La majorité des répondants, soit 47.2%, étaient des adultes âgés de 35 ans et plus. Plus de 81% sont impliqués dans des activités agricoles et d'élevage, et environ 51% avaient une mauvaise connaissance des caractéristiques cliniques et de la dynamique de transmission du COVID-19, tandis que seulement 12.4% avaient de bonnes connaissances. Conclusion: Des interventions visant à améliorer les connaissances, les attitudes et les pratiques de la population rurale devraient être entreprises afin de renforcer l'adhésion aux directives de prévention et de contrôle du COVID-19.

Mots Clés : Covid-19, Santé de la population, caractéristiques cliniques, pharmacopées, milieu rural, adhésion, Connaissances et attitudes, Nkondjock.

ABSTRACT

Background : Coronavirus disease (COVID-19) is caused by SARS-COV2 and represents the causative agent of a potentially fatal disease that is of great global public health concern. While the effective coronavirus disease specific drugs are under trials, several pharmacological and non-pharmacological interventions have been adapted to manage symptoms and curtailing the effect of virus. However, there are persisting challenges of mitigating CoVID-19 in rural areas. Objectives : This paper aims to provide insight on the pathogenesis and the transmission dynamics of CoVID-19 along with pharmacological and non-pharmacological intervention strategies to mitigate the virus in Cameroon, and to assess existing challenges of CoVID-19 in rural areas. Methods : A cross sectional survey was conducted, using a two stages stratified random sampling procedure. Investigated inhabitants were requested to answer simple semi-structured questions, assessing their demographic characteristics, perception, attitude, and practice toward COVID-19 prevention and control. Results : Majority of the respondents, that is 47.2% were adults aged 35 years and more. More than 81% are involved in agriculture and livestock activities, and about 51% had poor knowledge of COVID-19

IJASRA-Canada Article published by



and available on line from <http://www.africasciencenetwork.org>

Freedom to research

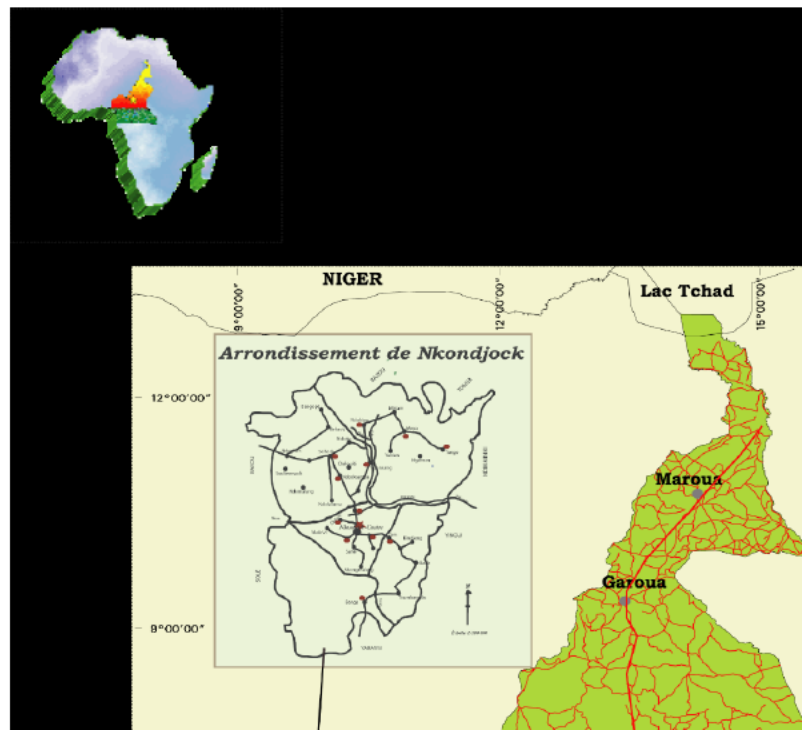
clinical characteristics and transmission dynamics, while only 12.4 % had good knowledge. Conclusion : Interventions aimed at improving the knowledge, attitudes and practices of the rural population should be undertaken. **Keys words:** Covid-19, population health, clinical characteristics, pharmacotherapies, rural area, adherence, knowledge and attitude, Nkondjock.

[I] INTRODUCTION

Coronavirus is one of the major pathogens that primarily targets the human respiratory system. Previous outbreaks of coronaviruses (CoVs) include the severe acute respiratory syndrome (SARS)-CoV and the Middle East respiratory syndrome (MERS)-CoV which have been previously characterized as agents that are a great public health threat. In late December 2019, a cluster of patients was admitted to hospitals with an initial diagnosis of pneumonia of an unknown etiology. These patients were epidemiologically linked to a seafood and wet animal wholesale market in Wuhan, Hubei Province, China (Bagosh et al., 2020; Lu et al. 2020). Early reports predicted the onset of a potential Coronavirus outbreak given the estimate of a reproduction number which was deemed to be significantly larger than 1 (ranges from 2.24 to 3.58). This coronavirus, was initially named as the 2019-novel coronavirus (2019-nCoV) on 12 January 2020 by World Health Organization (WHO). WHO officially named the disease as coronavirus disease 2019 (COVID-19) and Coronavirus Study Group (CSG) of the International Committee proposed to name the new coronavirus as SARS-CoV-2 (WHO, 2019). The WHO first declared COVID-19 to be a public health emergency of international concern on 30 January 2020 and subsequently declared it a pandemic on March 11, 2020. Since then, recent advances in understanding the pathological progression and transmission of coronavirus disease has contributed to efforts towards development of pharmacological and non-pharmacological strategies. Although, coronaviruses (CoVs) have been initially contemplated to be a cause of multi-faceted diseases in mammals and birds with its origin in bats, the evolution of this virus has resulted in its increased pathogenicity in humans (Fehr and Perlman, 2015). Given their high pathogenicity in humans and the extent of global impact caused by the HCoV outbreaks in the past two decades, it has been a topic of great interest, hence, the mechanistic action of this virus is being thoroughly investigated by the researchers. The causative agent of the current pandemic presenting as a viral pneumonia, SARS-CoV-2 is a group of large enveloped RNA viruses under the Coronaviridae family, classified specifically under the Nidovirales order (Cheng et al., 2020). The aggressive growth in numbers of emerging cases suggests the rapid

spread of the virus in ingenious population and improvement in diagnostic capability during this CoVID-19 outbreak. However, there is an increasing evidence of epidemiological disparity in disease burden between urban and rural areas. The differences in the urban and rural areas can highly determine the influence of a viral pandemic, in terms of viral transmission, morbidity and mortality (Sundaram et al., 2014). These differences mainly arise from the socio-economic factors, access to healthcare and pandemic preparedness. Besides, adherence is likely to be influenced by the public's knowledge and attitude and practice towards COVID-19. Evidence shows that public knowledge is important in tackling pandemics (Chirwa, 2020). By assessing public awareness and knowledge about the corona virus, deeper insights into existing public perception and practices can be gained, thereby helping to identify attributes that influence the public in adopting healthy practices and responsive behavior (Podder et al., 2019). The first confirmed case in Cameroon was reported on March 06, 2020 and the government imposed a lockdown over the whole country in the same month (Minsante, 2020). However and till now, it is unclear to what extent COVID-19 has affected the rural population in Cameroon. We thus, conducted this study with the overall objectives to provide an insight on the clinical characteristics persistent with the virus, and to assess the challenges of the CoVID-19 pandemic in a rural setting based on adherence to the COVID-19 prevention and control guidelines?

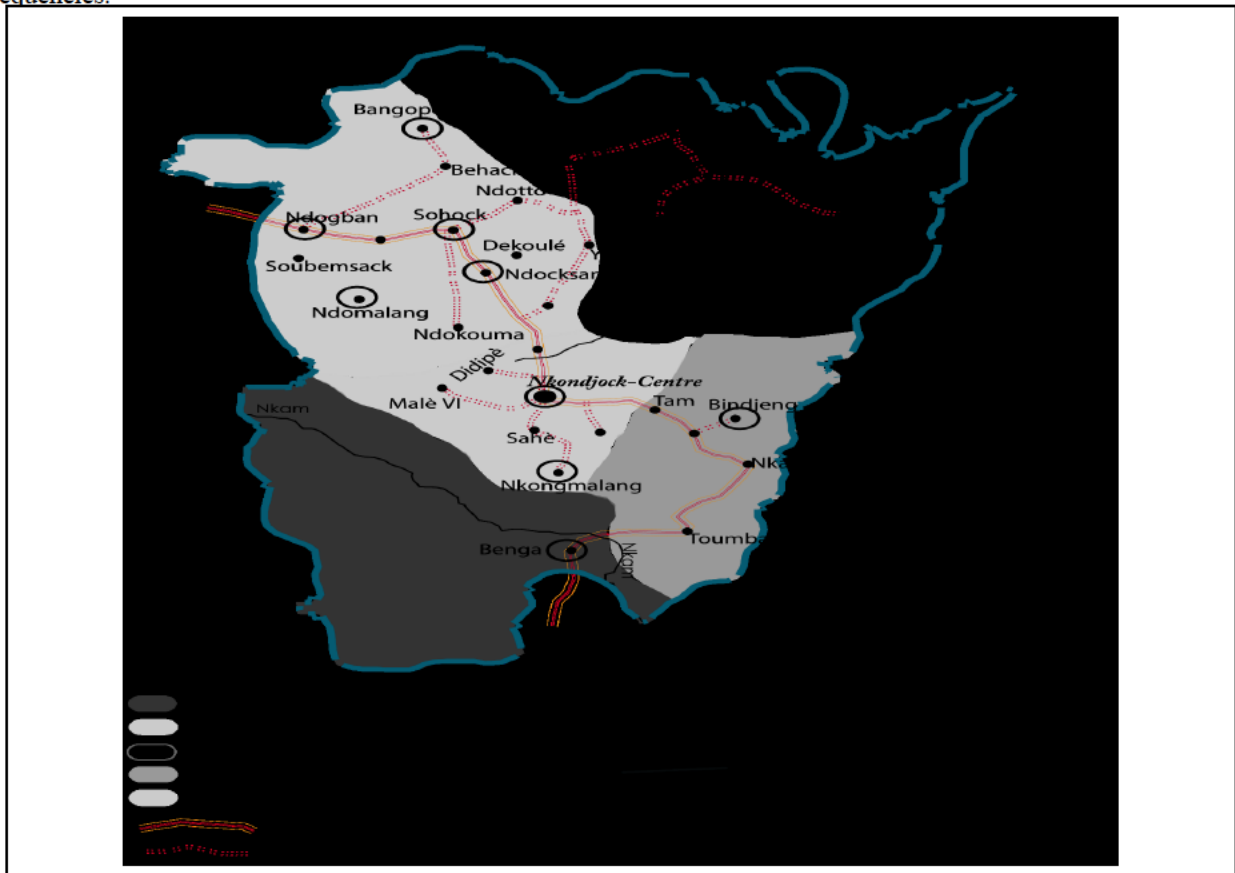
[II] MATERIAL AND METHODS



activities of the majority are agriculture, domestic breeding, hunting and fishing; the minority consisting of public officials (Bucrep, 2016).

Data collection and analysis: Data used here derive from a cross-sectional survey design conducted in the area from June to August 2020. The survey covered

villages in Nkondjock, and used a two stages stratified random sampling procedure. First, 12 villages were selected out of the 31 that make up the subdivision (Fig 2). Second and in order to meet the second objective of this study (perception and attitudes), a sample size of 161 was calculated using Krejcie and Morgan tables for sample size determination. Two types of survey methods were used: (a) the qualitative investigation through participant observation, and (b) the quantitative methods through structured questionnaires developed according to Centers for Disease Control and guidelines (CDC, 2020), and drawn up to respond to the second dimension of this study, ie perception, attitude and practices towards COVID-19. To verify the fidelity of the questionnaire, the coefficient of internal consistency Alpha Cronbach was calculated based on the scores obtained by subjects in the administered questionnaire, its value being 0.896. The data obtained were processed by individual analysis of each item, the occurrence frequencies.



[III] RESULTS AND COMMENTS

I - Respondents' background information

Out of the 161 investigated inhabitants, 19.8% were adolescents whereas 47.2 % were in the age group of 35 years and above (Table 1). More than half of those women (51.6%) were educated up to primary level, which showed a low level of educational status of the subdivision. More than half of the respondents (56.5%) were dependent on agriculture particularly coffee, cocoa, fruits, vegetables and cereals cultivation as a source of income and livelihood, followed by 24.2 % who were dependent on both agriculture and livestock. Public officials here consist of educators, gendarmes, health workers and representatives of the different public administrations. A total of 73.3 % of the respondents were in low income category, that is, 10 to 20 US dollars per month, followed by 16.2 percent in medium income category 20 to 40 US dollars per month, and by high income category i.e. 40 US dollars and above per month.

Table 1: Background information of the respondents

Variables	Modalities	Frequency and %
1. Age	Adolescents (\leq 18 years)	32 (19.8)
	Young adults(>18and \leq 35 years)	53 (33.0)
	Adults (> 35 years)	76 (47.2)
2. Education	Primary level	83 (51.6)
	Secondary level	60 (37.4)
	University level	18 (11.9)
3. Family size	Small (2 - 5 members)	72 (44.7)
	Large (> 5 members)	89 (55.3)
4. occupational status	Agriculture only	91 (56.5)
	Agriculture and livestock	39 (24.2)
	Public officials (state agents)	31 (19.3)
5. Income	Low	118 (73.3)
	Medium	26 (16.2)
	High	17 (10.5)

Source: Field investigations, 2020

II - Epidemiological, clinical, and therapeutic insights into CoVID-19

Epidemiology (Geographic distribution and case counts): Since the first reports of cases from Wuhan-China at the

end of 2019, cases have been reported in all continents, except for Antarctica. The reported case counts underestimate the overall burden of COVID-19, as only a fraction of acute infections are diagnosed and reported. However, globally and as of August 31 2020, about 28,042,679 confirmed cases of COVID-19 have been reported, with 914,029 deaths, and 17,138,341 recoveries (worldometer, 2020). The top five countries hit by the diseases include USA (6,354,807 cases), Brazil (3,974,176 cases), India (3,731,754 cases), Russia (1,103,189 cases), and South Africa (813,017 confirmed cases).

Covid-19 pathogenesis (a synthesis): CoVs normally causes enteric diseases in several animal species and affects the respiratory tract, and lead to mild to severe respiratory tract infections. Studies report five major protein regions for HCoVs, such as replicase complex, spike, envelope, membrane, and nucleocapsid proteins, that function in viral structure assembly and replications. The overlapping open reading frames (ORFs) of replicase complex, ORF1a and ORF1b, encodes 16 non-structural proteins (nsp) of viral RNA synthesis complex through proteolytic processing (Kirchdoerfer and Ward, 2019). A recent study showed that CoVID-19 is able to utilize same membrane-bound ACE2 as an entry receptor in ACE2-expressing cells with higher affinity than SARS-CoV and does not use other coronavirus receptors. ACE2 is highly expressed in the mouth and tongue, facilitating viral entry in the host and in lungs it is expressed in lower lungs on type I and II alveolar epithelial cells. After infection, SARS-CoV-2 entry starts with the binding of the spike glycoprotein expressed on the viral envelope to ACE2 on the alveolar surface. The binding of SARS-CoV-2 to ACE2 stimulates the clathrin-dependent endocytosis of the whole SARS-CoV-2 and ACE2 complex, inducing fusion at the cell membrane. The membrane fusion and endosomal cell entry is facilitated by the low pH in the cellular environment and pH-dependent endosomal cysteine protease cathepsins. Once inside the cells, SARS-CoV-2 exploits the endogenous transcriptional machinery of alveolar cells to replicate itself and spreads through the entire lung. The nucleocapsid helps for packaging the viral genome through protein oligomerization. As the infection progresses, it deleteriously affect the normal activity of most of the ciliated cells in the alveoli that clear the airways, with a consequent progressive accumulation of debris and fluids in the lungs and eventually leads to acute respiratory distress syndrome (ARDS). In addition to the alveolar cells in the lungs, ACE2 expression has been reported in other organs, including the kidney, the heart and the gut, which supports the commonly reported comorbidities of CoVID-19, such as acute kidney injury

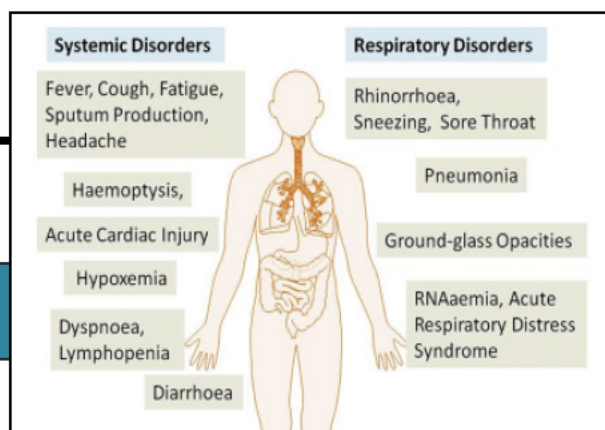
(AKI), cardiac damage and abdominal pain. The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury (Zhang and Liu, 2020).

Symptoms and clinical characteristics: Based on current epidemiological investigation, the incubation period is 1–14 days, mostly 3–7 days; and the period from the onset of COVID-19 symptoms to death ranged from 6 to 41 days with a median of 14 days (Li et al., 2020). The COVID-19 is contagious during the latency period. It is highly transmissible in humans, especially in the elderly and people with underlying diseases. The median age of patients is 47–59 years, and 41.9–45.7% of patients were females. The incubation period is dependent on the age of the patient and status of the patient's immune system. It was shorter among patients >70-years old compared with those under the age of 70 (Dutoit, 2020). Symptoms of COVID-19 include systemic disorders and respiratory disorders and can vary from person to person (Figure 3). Symptoms may also vary in different age groups. Some of the more commonly reported symptoms include: new or worsening cough, shortness of breath or difficulty breathing, temperature equal to or over 38°C, feeling feverish, chills, fatigue or weakness, muscle or body aches, new loss of smell or taste, headache, gastrointestinal symptoms (abdominal pain, diarrhea, vomiting), feeling very unwell. Children have been more commonly reported to have abdominal symptoms, skin changes or rashes, haemoptysis, and lymphopenia (Huang et al., 2020; Carlos et al., 2020). In severe cases, infection can lead to death. Evidence indicates that the virus can be transmitted to others from someone who is infected but not showing symptoms. This includes people who have not yet developed symptoms (pre-symptomatic), and those who never develop symptoms (asymptomatic). Clinical features revealed by a chest CT scan presented as pneumonia, however, there were abnormal features such as RNAemia, acute respiratory distress syndrome, acute cardiac injury, and incidence of grand-glass opacities that led to death. In some cases, the multiple peripheral ground-glass opacities are observed in subpleural regions of both lungs that likely induced both systemic and localized immune response that led to increased inflammation (Hui et al., 2020).

Figure 3: The systemic and respiratory disorders caused by COVID-19 infection. (source: Rothan et al., 2020)

Transmission dynamics of CoVID-19: As the first cases of the CoVID-19 were linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan, China, animal-to-human transmission was initially presumed. However, subsequent cases revealed the scope of human-to-human transmission through the individuals in the incubation stage or showing symptoms and that the epidemic have been gradually growing in recent weeks, becoming a global pandemic. Transmission is mainly through the inhalation of respiratory droplets from coughing and sneezing and the contact of infected surfaces, then mediating the infection through the mouth, nose or eyes. Studies show that infectious viruses can survive for long periods outside of its host organism, increasing the opportunity for transmission via touch. Transmission via the inhalation of exhaled respiratory droplets may occur as the aerosol droplets that can survive for prolonged periods, mediating long-range human-to-human transmission via air movement. Inhalation of virus-laden fine particles could transport the virus into deeper alveolar and tracheobronchial regions, which could increase the chance of infective transmission and oxidant pollutants in air can impair the immune function and attenuate the efficiency of the lung to clear the virus in lungs. Pro-inflammation, injury, and fibrosis from inhaled airborne particulate matters combined with an immune response or cytokine storm induced by SARS-CoV-2 infection could enhance the infection severity.

Therapeutics/treatment options: Currently, there is no validated treatment for COVID-19. The main strategies are symptomatic and supportive care, such as keeping vital signs, maintaining oxygen saturation and blood pressure, and treating complications, such as secondary



and available on line from <http://www.africasciencenetwork.org> to research

infections or organs failure. Because of the potential mortality of COVID-19, many investigational treatments are underway:

- Remdesivir: It is an unapproved antiviral drug being developed for Ebola and SARS. In a case report on the first case of Covid-19 in the United States administering remdesivir for compassionate use on day 11 after illness resulted in decreasing viral loads in nasopharyngeal and oropharyngeal samples and the patient’s clinical condition improved (Beigel et al., 2020). However, randomized controlled trials are needed to determine its safety and efficacy.
- Convalescent therapies (plasma from recovered COVID-19 patients): This strategy had been used to support passive immunization. Based on the studies from MERS, the therapeutic agents with potential benefits include convalescent plasma, interferon-beta/ribavirin combination therapy, and lopinavir (Duan et al., 2020). However, there are no current experience on COVID-19 and no randomized controlled clinical trials for this management.
- Antiviral drugs: lopinavir/ritonavir and ribavirin had been tried to treat SARS disease with apparent favorable clinical response. However, Further randomized controlled trials in patients with COVID-19 are mandatory.
- Vaccine: There is currently no vaccine available for preventing 2019-nCoV infection. The spike protein may serve as a vaccine candidate, but the effect to human requires further evaluation.

III - Challenges in Rural Population

While several strategies have been adopted to prevent the spread in urban populations, preventing the transmission dynamics and the spread of CoVID-19 in rural regions have received limited attention. Although rural regions have limited human mobility and relatively lower population densities than urban settings, the extent of morbidity and mortality might be significantly higher in the viral inflicted rural population, making the containment and mitigation of viral transmission unmanageable. The effectiveness of CoVID-19 pandemic mitigation primarily requires a high level of participation from each citizen, such as having adequate knowledge of the viral transmission, engaging in appropriate self-care, following self-hygiene guidelines and social distancing, which are fundamental in avoiding preventable hospitalizations. Table 2 below gives an overview on knowledge, perception, and

attitudes towards Covid-19 in the rural setting of Nkondjock.

Our findings indicate that most inhabitants have poor knowledge about COVID-19. Only a small proportion (12.4%) of the participants was aware of the transmission, prevention, signs and symptoms of the disease. This might be so because the government has failed to conduct a real intensive COVID-19 awareness campaign via print media, television and mostly via various vernacular radio stations in order to reach these inhabitants whose background education show a low level of educational status. Conversely, there is significant number of inhabitants with moderate and good knowledge towards prevention and control of COVID-19. In fact, they are aware of those measures thanks to their relatives settled in urban areas and who provide them with information via mobile devices. It should be noted that though Nkondjock is a remote rural area, several inhabitants are connected to social media, namely whatsapp, through which they maintain connection with loved ones. However, among the few who follow the Covid-19 health crisis via mass media, most find that seriousness of the Covid-19 phenomenon is exaggerated, compared to the extent of damages caused by HIV/SIDA, malaria and river blindness. Their statements vary from one individual to another:

"Obviously, it's a contagious virus, but a it seems media worsen the general state of panic among citizens. The online promotes countless fake-news that further alarms the whole society" (Inhabitant T.K)

"Mass Media tends to dramatize the situation and cause panic for people who do not know or can not be informed from official, accredited sources, to obtain a high rating... In this village, deaths occur daily and due to other conditions, but now we are required to believe that the death occurred because of this virus" (Inhabitant C.L)

Table 2 : Domain wise knowledge, perception, attitudes and practices to

Items	Modalities	Count
1. Knowledge of clinical characteristics and transmission dynamics	▪ Poor	82
	▪ Moderate	59
	▪ Good	20
2. Knowledge of prevention and control measures in the country	▪ Poor	43
	▪ Moderate	76
	▪ Good	42
3. seriousness of the Covid-19 phenomenon according to the mass media (TV, radio)	▪ underestimate	44
	▪ Correct	39
	▪ Exagerate	78
4. In this period of Covid-19 crisis, will you attend mass events such as meetings, church, funerals, etc?	▪ Likely I will not	33
	▪ Probably I will not	46
	▪ Definitely I will, regardless	82

From the perspective of those who find that seriousness of Covid-19 is correct, they have the opportunity to have access, via mobile phones, to information on what is happening in China and European countries, where the epidemic started several months ago. They then think

the media presents the gravity of the situation at the level where they are, but people do not have enough of a good education to understand. Very few of the respondents considered that the severity of the phenomenon is underestimated, this being due to the fact that they do not realize the gravity since figures released by health authorities are in aggregated form and mostly refereed to main cities like Doula, Yaoundé, and Bafoussam. So according to them, Covid-19 might affect cities only (Muggah and Katz, 2020; Allam and Jones, 2020). It is doubtless for that reason that most of the inhabitants are probably and definitely about to attend mass events, regardless the consequences. Talking of mass events, we allude going to church and funeral organization because religion and commemorations play an important role in people's lives; as well as attendance to "Ndjangui" meetings which are weekly organized to strengthen the bonds or ties of solidarity among villagers. In relation to this, we understand why it is difficult for most of them (76.2%) to avoid social gatherings such as visiting close friends and receiving visits at home. In fact, livelihood in most African villages south of Sahara lies on a community based. Social affiliation here is confirmed through physical contacts, ie the strong feeling of belonging to the group derives from visiting its neighbors and receiving them. Even with the advent and introduction of social networks (facebook and whatsapp) in villages, this traditional practice hasn't changed.

The government is mainly relying on public health guideline measures issued by WHO to prevent and control the spread of the disease. This indicates the necessity of all citizens to adhere to preventive and control guidelines. In Nkondjock, good rationing has been identified at the level of the investigated population, highlighting the way of thinking and reporting to their situations. Most of the inhabitants have adhered by: staying home as much as possible (cases of administrative officials, students and teachers), using mask and disinfectant when leaving the house (cases of small retailers and gendarmes), avoiding contact with neighbours and foreign people as much as possible (cases of farmers and hunters who have voluntarily decided to isolate themselves by living in their farms or hunting and fishing territories for several weeks. However, a considerable number of inhabitants (37.8%) haven't taken specific measures. In this study, it was the case of some farmers who spend all their daytime in their farms, as they leave for their farms early in the morning, usually at 5:00 am, and return to their homes until late evening, usually at 6:00 pm. They are saying that since they don't meet anyone during the whole day, there's no need to adopt specific protective health measures. But, some have alleged economic costs

associated to those measures, case for inhabitants with low living standards who argue that they don't have sufficient income that allow them to pay for masks or hand sanitizers.

As a complement to the previous issue, we find that, through the answers received, most of the respondents stated that their quality of life is affected, as can attest the value of the t test of 23.12 at a significance threshold of .001. This is also evidenced by the arguments expressed in this regard by the study participants:

"The children don't go to school and they are affected and worried. And like any parent, I am worry. Also, it gives me a feeling of anxiety; I feel that I am no longer my own arbiter of life and that I am controlled by others and I am forced to do or not to do things" (A.P, a parent)

"It is a little difficult for me to adapt to the new conditions, being used to a different style, frequent outings and meetings with students and colleagues. I manage to connect with friends through various social platforms, but it is not the same when we use to meet physically to enjoy life by eating smoked meat and drinking alcohol " (N.A, Teacher)

"The panic of those around me, the fear of coming in contact, the uncertain future social, and mostly economic uncertainty of my business" (M.T, small shop retailer).

The question "If the Government requires a mandatory 14-day self-quarantine for anyone exposed to coronavirus" highlights the seriousness of the crisis. But, only 27.3% of the respondents are in favor if such a lockdown could contribute to control the spread of the virus and healing the population. The fact that 72.7% of the participants aren't willing to a lockdown is not surprising, given the level of poverty in the country. Measures to address COVID-19 could have adverse effects on rural communities with potential of endangering more lives than they were meant to save. Most of those rural poor rely on their agricultural and hunting products to earn money for their basic needs particularly food requirements and children's schooling. If such people are asked to stay at home with no access to their major source of livelihood and no financial support from the state, risk of food insecurity leading to hunger increases which may also increase risk of being infected by other diseases. People are living in poverty and do not have the resources to stock up food and need to go out and work daily to survive. In addition, the weak, fragile, and strained health care systems in the country, may lead to more challenges in providing



treatment for people affected by COVID-19 when compared to Europe or Asia with better health delivery systems (Stacey and Richards, 2020). In short, rural people are in a deprivation trap in which powerlessness, vulnerability, physical weakness, poverty, and isolation combine.

[IV] CONCLUSION

The viral outbreak of CoVID-19, declared as a global pandemic, continues to overwhelm healthcare system with increasing number of patients presenting with clinical symptoms of this coronavirus. This increasing rate of incidence of this contagion presents with its own challenges, burdening healthcare institutions, national and local economy, impacting physical and mental health of people nationwide. Although several strategies have been adopted by the central government to mitigate the effects of this viral outbreak, rural communities have been largely ignored, despite the high risks of morbidity and mortality among these population. This paper has provided epidemiologic insight into the outbreak of CoVID-19, outlining the pathogenesis, transmission dynamics and clinical characteristics so far identified. This paper has also outlined the challenges and implications of CoVID-19 in rural population, given that a large population in rural setting are frail individuals who are at higher risk of morbidity. Considering their main socio-professional activities, they cannot adhere to preventive health measures and social distancing measures adopted by the government. While lockdowns may be a helpful strategy for containing the spread of pandemics, in some cases, they may cause huge disruption, and distress to lives, particularly in economically disadvantaged rural residents. Unless, like in wealthy countries such as Canada and UK, the government plans large fiscal packages to expand health-care provision, protect payrolls, provide unemployment insurance, and help households survive the crisis.

[V] REFERENCES

Allam Z., Jones D.S. (2020). On the Coronavirus (COVID-19) Outbreak and the Smart City Network: Universal Data Sharing Standards Coupled with Artificial Intelligence (AI) to Benefit Urban Health Monitoring and Management. *Healthcare*, 8(1) : 46-56. <https://doi.org/10.3390/healthcare8010046>

Beigel JH, Tomashek KM, Dodd LE, Mehta AK, Zingman BS, Kalil AC, Hohmann E, Chu HY, Luetkemeyer A, Kline S, Lopez de Castilla D, Finberg

RW, ACTT-1 Study Group Members. 2020. Remdesivir for the treatment of Covid-19—preliminary report. *N Engl J Med* doi:10.1056/NEJMoa2007764. [CrossRefPubMedGoogle Scholar](https://pubmed.ncbi.nlm.nih.gov/32307793/)

Bogoch, A. Watts, A. Thomas-Bachli, C. Huber, M.U.G. Kraemer, K. Khan. (2020). Pneumonia of unknown etiology in wuhan, China: potential for international spread via commercial air travel *J. Trav. Med.* (2020),

Bucrep- Bureau Central pour le Recensement de la Population. (2016). Projections démographiques et estimations des cibles prioritaires des différents programmes et interventions de santé. Yaoundé, 144 p.

Carlos W.G., C.S. Dela Cruz, B. Cao, S. Pasnick, S. Jamil. (2020). Novel wuhan (2019-nCoV) coronavirus. *Am. J. Respir. Crit. Care Med.*, 201 (4) (2020), pp. 7-8

CDC-Centers for Disease Control and Prevention. (2020). Corona virus (COVID- 19) 2020. Available online at: <https://www.cdc.gov/coronavirus/2019-nCoV/index.html> (Accessed 24 May, 2020).

Cheng, VC, Lau, SK, Woo, PC, Yuen, KY. (2020). Severe acute respiratory syndrome coronavirus as an agent of 307 emerging and reemerging infection. *Clin Microbiol Rev*, 20: 660-694, 2007.

Chirwa G.C. (2020). “Who knows more, and why?” Explaining socio economic related inequality in knowledge about HIV in Malawi. *Sci African*. (2020) 7:e00213. doi: 10.1016/j.sciaf.2019.e00213 (Accessed on 9th June 2020).

Chirwa G.C. (2020). Socio-economic Inequality in Comprehensive Knowledge about HIV in Malawi. *Malawi Med J.* (2019) 31:104–11. doi: 10.4314/mmj.v31i2.1 (Accessed on 9th June 2020).

Duan K, Liu B, Li C, Zhang H, Yu T, Qu J, Zhou M, Chen L, Meng S, et al., (2020). Effectiveness of convalescent plasma therapy in severe COVID-19 patients. *Proc Natl Acad Sci U S A* 117:9490–9496. doi:10.1073/pnas.2004168117. [Abstract/FREE Full TextGoogle Scholar](https://pubmed.ncbi.nlm.nih.gov/32307793/)

Du Toit. A. (2020). Outbreak of a novel coronavirus *Nat. Rev. Microbiol.*, 18 (123) (2020),

Fehr, AR, Perlman, S. (2015). Coronaviruses: an overview of their replication and pathogenesis. *Methods Mol Biol*, 305 1282: 1-23, 2015.



- Huang C, Y. Wang, X. Li, L. Ren, J. Zhao, Y. Hu, et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*, 395 (10223) (2020), pp. 497-506
- Hui D.S., E. IA, T.A. Madani, F. Ntoumi, R. Kock, O. Dar, et al. (2020). The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - the latest 2019 novel coronavirus outbreak in Wuhan, China. *Int. J. Infect. Dis.*, 91 (2020), pp. 264-266
- Kirchdoerfer, RN, Ward, AB. (2019). Structure of the SARS-CoV nsp12 polymerase bound to nsp7 and nsp8 co-factors. *319 Nat Commun*, 10: 2342.
- Li Qi, X. Guan, P. Wu, X. Wang, L. Zhou, Y. Tong, et al. Early transmission dynamics in wuhan, China, of novel coronavirus-infected pneumonia. *N. Engl. J. Med.* (2020),
- Lu H, C.W. Stratton, Y.W. Tang. (2020). Outbreak of pneumonia of unknown etiology in wuhan China: the mystery and the miracle. *J. Med. Virol.*, 92 (4) (2020), pp. 401-402
- Minsante-Ministère de la santé publique. (2020). Rapport de situation : Préparation à une éventuelle importation du 2019-nCoV au Cameroun. N°01. Yaoundé, CNOUSP, 7 p.
- Muggah R., Katz R. (2020). How cities around the world are handling COVID-19 - and why we need to measure their preparedness. Geneva, The World Economic Forum COVID Action Platform. Accessed online <https://www.weforum.org/agenda/2020/03/how-should-cities-prepare-for-coronavirus-pandemics/> (consulted August 25, 2020)
- Podder D, Paul B, Dasgupta A, Bandyopadhyay L, Pal A, Roy S. (2019) Community perception and risk reduction practices toward malaria and dengue: a mixed method study in slums of Chetla, Kolkata. *Ind J Public Health*. 63:178. doi: 10.4103/ijph.IJPH_321_19 (Accessed 24 May, 2020).
- Rothana H.A, Siddappa N., Byrareddy. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity*, Volume 109, 102433
- Stacey, S. Richards, G.A., 2020. Coronavirus epidemic: A South African Perspective. *Wits Journal of Clinical Medicine*, 2(1), pp.1-4.
- Sundaram, N, Schaetti, C, Purohit, V, Kudale, A, Weiss, MG. (2014). Cultural epidemiology of pandemic influenza in 313 urban and rural Pune, India: a cross-sectional, mixed-methods study. *BMJ Open*, 4: e006350, 2014.
- WHO. (2019). Coronavirus disease 2019 (COVID-19) Situation Report - 38. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200227-sitrep-38-covid-19.pdf?sfvrsn=9f98940c_2 (Accessed on 23th July 2020).
- Zhang, L, Liu, Y. (2020). Potential interventions for novel coronavirus in China: A systematic review. *J Med Virol*, 92: 448 479-490, 2020.

A PROPOS DE L'AUTEUR

HB NGUENDO-YONGSI est titulaire d'un PhD en géographie de la santé de l'Université Paris-X (France). Il est Professeur titulaire à l'IFORD, et Professeur Associé à l'École des Sciences de la santé (ESS) de l'université Catholique d'Afrique centrale.



[Publish with Africa Science Network](#)

and every scientist working in your field can read your article.

Your paper will be:

- Available to your entire community
- Of little downloading charge
- Fairly and quickly peer reviewed

<http://www.africasciencenetwork.org>

In collaboration with the

[Editor-In-Chief: H. Blaise Nguendo Yongsi](#)