

# The Lancet Public Health

## KNOWLEDGE, ATTITUDES AND PRACTICES OF INHABITANTS OF EASTERN DEMOCRATIC REPUBLIC OF THE CONGO ON THE ONGOING EBOLA --Manuscript Draft--

<b>Manuscript Number:</b>	thelancetpublichealth-D-20-00422
<b>Article Type:</b>	Article (Original Research)
<b>Keywords:</b>	KAP, EVD, inhabitants, eastern DRC, war-torn, investigation.
<b>Corresponding Author:</b>	Larrey Kasereka Kamabu, Master in Neurosurgery Makerere University School of Medicine KAMAPALA, CONGO, THE DEMOCRATIC REPUBLIC OF THE
<b>First Author:</b>	Larrey Kasereka Kamabu, Master in Neurosurgery
<b>Order of Authors:</b>	Larrey Kasereka Kamabu, Master in Neurosurgery FIDELE LUNGU BEST, BACHELOR OF NURSING BIENVENU MUHINDO KASUSULA, MEDICAL DOCTOR LOUANGE MAHA KATHAKA, MEDICAL DOCTOR MATHIEU KASEREKA MANZEKELE, BACHELOR OF BIOLOGY AND CHEMESTRY ERIC SADIKI BUTALA, MEDICAL DOCTOR Thaddée Katembo Kambere, PhD IN PUBLIC HEALTH
<b>Manuscript Region of Origin:</b>	CONGO, THE DEMOCRATIC REPUBLIC OF THE
<b>Abstract:</b>	<p>Background</p> <p>Despite the control strategies instituted for 21 months, the revival of old homes after a period of lull is becoming more and more worrying. The objectives of this study were to assess Knowledge, Attitudes, Practices (KAP) and to identify the factors influencing the KAP of the inhabitants of eastern DRC on EVD.</p> <p>Methods</p> <p>We used a cross-sectional descriptive study. Data analysis was carried out in SPSS 16.0 for windows(SPSS). Statistical analysis mainly used frequencies, proportions and means on the descriptive level. The Pearson correlation coefficient <math>r</math>, the student <math>t</math> test and ANOVA were used to test the relationship and the difference between the variables and the groups at the 0.05 threshold.</p> <p>Results</p> <p>It emerges from this study that most heads of households had good knowledge, attitudes and practices on EVD with the respective general averages of: <math>(0.7354 \pm 0.21007)</math>, <math>(2.3921 \pm 0.27009)</math> and <math>(2, 4841 \pm 0.47438)</math>.</p> <p>The likely factors for the sustainability of EVD identified were the factors of self- esteem in playing a role in EVD prevention and management and self-efficacy, negligence and lack of awareness with the respective averages <math>(M = 1.7966 \pm 0.76861)</math>, <math>(2.5508 \pm 0.45787)</math> and <math>(2.2542 \pm 0.65615)</math>.</p> <p>Conclusions</p> <p>The lack of self-esteem, negligence, and insufficient awareness have been identified as determinants of KAP. These results incite to change strategies of the response and organize training and information sessions for the masses on EVD focused on these factors identified above.</p>

## KNOWLEDGE, ATTITUDES AND PRACTICES OF INHABITANTS ON THE ONGOING EBOLA

Larrey Kasereka Kamabu, M.D., M.M.E.N.<sup>1,2\*</sup>, Fidèle Lungu Best, B.N.S.<sup>3</sup>, Bienvenu Muhindo Kasusula, M.D.<sup>4</sup>, Louange Maha Kathaka, M.D.<sup>5</sup>, Mathieu Katembo Manzekele, B.B.S.,<sup>6</sup> Eric Sadiki Butala, M.D.<sup>7</sup>, Thaddée Katembo Kambere, R.N.D., M.P.H., Dr.PH.<sup>8</sup>, for the tenth epidemic of Ebola virus disease Investigating and Research Team.

<sup>1</sup> Department of Surgery, Faculty of Medicine, Université Catholique du Graben, Butembo, DRC.

<sup>2</sup> Department of Surgery, Neurosurgery, School of Medicine, Makerere University, Kampala, Uganda

3. Ebola Infection Prevention and Control Supervisor, Masereka Health Zone

<sup>4</sup> Department of Internal medicine, Matanda hospital, Butembo, DRC

<sup>5</sup> Doctor Team Leader vaccination against Ebola virus disease and follow-up of pregnant women and children in the post vaccination, Butembo, DRC

<sup>6</sup> Medical Student, Faculty of medicine, Université Catholique du Graben

7. Department of Obstetrics and Gynecology, Consolata Hospital Mathari, Nyeri town, Kenya.

<sup>8</sup> Professor of Public health sciences, Faculty of Medicine, Adventist University of Lukanga, Lukanga, DRC.

### Authors' emails:

LKK: [kamabularry@gmail.com](mailto:kamabularry@gmail.com)

FLB: [fbestlungu@gmail.com](mailto:fbestlungu@gmail.com)

BMK: [biveskasmusula@gmail.com](mailto:biveskasmusula@gmail.com)

LMK: [katakamaha@gmail.com](mailto:katakamaha@gmail.com)

MKM: [mathieumk1@gmail.com](mailto:mathieumk1@gmail.com)

ESB: [dr.ericbutala@gmail.com](mailto:dr.ericbutala@gmail.com)

TKK: [kathaddee@gmail.com](mailto:kathaddee@gmail.com)

\* **Corresponding Author: LARREY KASEREKA KAMABU** MBChB (UCG), MMED  
(Neurosurgery MAK)

Phone : +243 998753321, +243 998123602, +256 702844578

Twitter: @DrLarrey

## ABSTRACT

**Background:** Despite the control strategies instituted for 21 months, the revival of old homes after a period of lull is becoming more and more worrying. The objectives of this study were to assess Knowledge, Attitudes, Practices (KAP) and to identify the factors influencing the KAP of the inhabitants of eastern DRC on EVD.

**Methods:** We used a cross-sectional descriptive study. Data analysis was carried out in SPSS 16.0 for windows(SPSS). Statistical analysis mainly used frequencies, proportions and means on the descriptive level. The Pearson correlation coefficient  $r$ , the student  $t$  test and ANOVA were used to test the relationship and the difference between the variables and the groups at the 0.05 threshold.

**Results:** It emerges from this study that most heads of households had good knowledge, attitudes and practices on EVD with the respective general averages of:  $(0.7354 \pm 0.21007)$ ,  $(2.3921 \pm 0.27009)$  and  $(2, 4841 \pm 0.47438)$ .

The likely factors for the sustainability of EVD identified were the factors of self- esteem in playing a role in EVD prevention and management and self-efficacy, negligence and lack of awareness with the respective averages  $(M = 1.7966 \pm 0.76861)$ ,  $(2.5508 \pm 0.45787)$  and  $(2.2542 \pm 0.65615)$ .

**Conclusions:** The lack of self-esteem, negligence, and insufficient awareness have been identified as determinants of KAP. These results incite to change strategies of the response and organize training and information sessions for the masses on EVD focused on these factors identified above.

**Keywords:** KAP, EVD, inhabitants, eastern DRC, war-torn, investigation.

## INTRODUCTION

The world has never witnessed an epidemic of Ebola virus in a war zone. This tenth ongoing epidemic in eastern DRC of Ebola virus disease (EVD) is the first in this region, remains the second deadliest epidemic of EVD in history, after that which occurred in West Africa in 2014 [1-3,6-13].

From August 2018 until February 25th, 2020, North Kivu has already notified a total of 3,444 cases of EVD, including 3,310 confirmed and 134 probable cases, of which 2,264 cases died (overall case fatality ratio 66%) [3,4].

While the team of Professor Jean-Jacques Muyembe Tamfun intended to declare the imminent end of the tenth epidemic, the EVD resurfaced with several cases of importation of the old focus in Ituri (Aloya epicenter). A total of 12 new confirmed cases were reported from January 1 to 7 in the current outbreak of Ebola virus disease in the provinces of North Kivu and Ituri. In addition to that of Beni, confirmed cases were reported in nine health areas in four different health districts, in particular in two major outbreaks: Butembo (5 cases) and Mambasa (4 cases). There were also two cases in Mangina [5].

In the past twenty-one days (5 to 25 February, 2020), 4 cases of EDV were reported from two health districts in North Kivu Province [4].

It has been one of the longest epidemic that could be explained by a lot of factors ranging from ignorance, attitude and practices of both community members and health providers as well in addition to the way the response strategies are implemented.

Considering some related studies on the knowledge level related to EVD, the study of Ndiaye (2015) in the regions of Kedougou, Kolda, Ziguinchor, Tambacounda and Sedhiou (Senegal), reported that 19.8% had never heard of EVD. For the 80.2% of people who have heard about it, 64.9% of them declared having learned it through the radio, 37.6% through television, 19.2% through word of mouth and the rest between 14% and 15%, from the community intermediaries or health workers [6].

Regarding attitude, a study carried out in the Republic of Mali by Batcho (2015) on the nursing staff at CHU Kati in the face of the Ebola epidemic shown that among nursing staff, 31.9% thought being safe from EVD. This could translate into the highly cultural and social side of the country.

Communion, sharing in African societies are still very sentimental. Relationships that bind people impose a number of standards, greeting someone with a hand is important enough for communities. From a personal perspective, 8.8% of caregivers were against isolation if they were accidentally infected by a patient. This could translate into fear of stigma after isolation.

With regard to practice, the nursing staff took the patients' temperature at the entrance with a frequency of 79.41%. Among healthcare workers, 3.3% did not wear gloves before touching patients. According to its survey, doctors represented the occupational category that wore the least gloves with 91.7%. This could be explained by notorious negligence or the lack of regular supply of gloves [7].

Control strategy efforts could be improved with knowledge, attitude, and practice (KAP) data in populations affected by Ebola virus disease [2, 6, 8, 9,10-13,16-17,19,21-24].

Through this study, the main goal being to contribute in the implementation of effective epidemic control measures to save lives, researchers specifically aimed to: (1) assess the level of knowledge, attitude and practices of the head of house hold on the EVD in the health area of Lukanga; (2) determine some influencing factors and some sociodemographic characteristics of this KAP .

## **METHODOLOGY**

### **II 1. Study design**

This cross-sectional and correctional descriptive study population was conducted in Lukanga health area located in Masereka Health Zone, Eastern DRC. A sample of 118 households, representing 5% of 2,352 households distributed in 12 villages based on the 2020 health assessment were non-randomly selected, using the close to close method also called the Politz method [28, 29].

A self-constructed interview schedule developed by the researcher for gathering pertinent data was designed in French and simultaneously translated in Kiswahili and Kinande during its administration to the heads of household. This tool was validated by the Integrated Multidisciplinary Research Center (IMRC) of the Adventist University of Lukanga before the data gathering. Ethical approval was provided by the North Kivu Ethics Committee (Site Horizon, Butembo, DR Congo).

In total, 64 variables were explored and divided into five categories: Profiles of respondents, Level of knowledge, Level of attitude, level of practices, and determinants of KAP.

Statistical analysis utilized SPSS 16.0 for windows for encoding, statistical treatment and analysis of the data. Frequencies and percentages described the characteristics of the sample, while means and standard deviations described levels of knowledge, attitudes and practices. Hypothesis tests were the Pearson correlation coefficient  $r$  for covariation while the difference in means were tested by the Student's  $t$  test or ANOVA at the threshold of 0.05.

## RESULTS

### Characteristics of the respondents

For the age group, gender, education level and marital status, the most represented was the age 21 to 30 years old; 50.5% were female against 49.2% male; 22.9% were respectively of primary level not completed and primary completed against 8.5% of secondary level completed; 48.3% were living together and 38.1% were Adventists.

### General knowledge of the inhabitants of eastern DRC on EVD.

The results in Table 1 show that residents of the eastern DRC health area have good knowledge of EVD.

**Table 1:** General knowledge of the inhabitants of eastern DRC on EVD

Items	Average	Standard Deviation	VI
Knowledge of the causative agent of EVD	0.3814	0.47895	BK
Knowledge of the reservoir or source of the EVD agent	0.5678	0.49749	GK
Knowledge of the modes of transmission of EVD	0.8008	0.23584	GK
Knowledge on the entry route to the human body	0.5657	0.40487	GK
Knowledge of the incubation period of EVD	0.7119	0.45483	GK
Knowledge of the signs or symptoms of EVD	0.9746	0.07588	GK
Knowledge of diseases with similar signs	0.9661	0.15647	GK
Knowledge of the prevention measures	0.9153	0.17813	GK
Overall average	0.7354	0.21007	GK

*Note: Average <0.5 = Bad Knowledge (BK); average = 0.5 average knowledge; average > 0.5 = Good Knowledge; A = Average, SD = Standard deviation and VI = Verbal interpretation*

### Attitudes of respondents to Ebola virus disease

Compared to the attitude of the respondents on EVD, Table 2 showed us that the respondents had a general average of  $2.3921 \pm 0.27009$  interpreted as a positive attitude. In other words, the respondents had good attitudes towards EVD.

**Table 2:** Relationship between KAP and socio-demographic characteristics

<b>Items</b>	<b>A</b>	<b>SD</b>	<b>VI</b>
I am convinced that Ebola virus disease exists	2.0763	0.82852	PA
I am confident that I can get EVD	2.1949	0.68261	PA
I am convinced that body fluids transmit EVD	2.2797	0.65222	PA
I do not accept isolation for fear of stigma	2.2966	0.65775	PA
Shaking hands during an Ebola outbreak is not dangerous for me	2.4237	0.74429	PA
I accept that EVD is a serious and contagious disease	2.3136	0.9205	PA
I do not accept the response team	2.3729	0.74875	PA
Ebola is a politicians creation	2.5424	0.75836	PA
Those who are declared dead from Ebola are either poisoned or bewitched	2.2881	0.65505	PA
We must be allowed to bury our dead by ourselves even without protection	2.2373	0.60874	PA
Washing hands several times bothers me	2.3983	0.58675	PA
I can hide a patient with Ebola in my house	2.5000	0.59557	PA
I can participate in the unsafe burial of an Ebola patient	2.7373	0.51354	PA
I accept taking the temperature at the barrier or at the entrance to the hospital	2.4661	0.80258	PA
Ebola vaccine kills or will kill later	2.6271	0.71368	PA
Ebola vaccine has serious health consequences	2.5085	0.79255	PA
I support the Ebola vaccine	2.3898	0.84766	PA
I accept that we are told about Ebola in the church	2.3729	0.83509	PA

Burial of the response team is against our culture	2.4237	0.79965	PA
Overall average	2.3921	0.27009	PA

*Note: Score > 1.5 = Positive; equal to 1.5 = Neutral and < 1.5 Unfavorable; PA = Positive attitude*

### **Respondent practices on EVD.**

The results of Table 3 summarizing practices on EVD, the general average was  $2.4841 \pm 0.47438$  which is interpreted as a good practice.

**Table 3: Practices of EVD respondents**

<b>Items</b>	<b>Average</b>	<b>Standard Deviation</b>	<b>VI</b>
I wash my hands frequently with clean water and soap or ash	2.5678	0.64687	GP
I do not touch or handle unprotected sick or deceased Ebola patients	2.5678	0.59166	GP
I do not touch a sick or dead animal in the bush	2.5763	0.70900	GP
I'm not touching the effects of the Ebola patient without protection	2.5593	0.63438	GP
I don't touch the dead body of a suspected Ebola case even Even if it is your beloved's one	2.4322	0.65995	GP
I am already vaccinated against Ebola	2.3898	0.72835	GP
I share my knowledge about EVD in my family	2.3136	0.79205	GP
I share my knowledge on EVD with friends	2.4661	0.85417	GP
Overall average	2.4841	0.47438	GP

*Note: < 1.5 = Poor Practice (PP); > 1.5 = Good Practice (GP); equal to 1.5 = Average Practice (AP); VI = Verbal interpretation and SD = Standard deviation*

## Some determinants of KAP.

### *Factors influencing the KAP of the inhabitants of Eastern DRC on EVD.*

From Table 4, it appears that the factors of self-esteem and self-efficacy ( $A = 1.7966 \pm 0.76861$ ), neglect ( $2.5508 \pm 0.45787$ ), lack of awareness ( $2.2542 \pm 0.65615$ ) are likely factors.

**Table 4:** Factors acting on the KAP of the inhabitants of eastern DRC on EVD

Items	Average	Standard Deviation	VI
Self-esteem and efficiency			
<b>I am not able to prevent virus disease</b>	<b>1.7966</b>	<b>0.76861</b>	<b>PF</b>
Overall average	1.7966	0.76861	PF
Negligence			
<b>I neglect to wash my hands</b>	<b>2.5169</b>	<b>0.65022</b>	<b>PF</b>
Overall average	2.5508	0.45787	PF
Lack of awareness			
<b>I lack awareness of EVD</b>	<b>2,2542</b>	<b>0.65615</b>	<b>PF</b>
Overall average	2,2542	0.65615	PF

*Note: <1.5 = Unlikely factor (ULF); > 1.5 = Probable factor (PF); equal to 1.5 = Intermediate factor (IF); VI = Verbal interpretation and SD = Standard deviation*

### **Relationship between the KAP and the socio-demographic characteristics**

Table 5 shows that the socio-demographic characteristics had no statistically significant relationship with the KAP.

**Table 5:** Relationship between KAPs and socio-demographic characteristics

Socio-demographic characteristics	Knowledge			Attitudes			Practice		
	<i>r</i>	<i>p</i>	VI	<i>r</i>	<i>p</i>	VI	<i>r</i>	<i>p</i>	VI
Age	<b>0.027</b>	<b>0.773</b>	NS	<b>0.018</b>	<b>0.844</b>	NS	<b>-0.073</b>	<b>0.430</b>	NS
Gender	<b>-0.050</b>	<b>0.594</b>	NS	<b>0.013</b>	<b>0.888</b>	NS	<b>-0.115</b>	<b>0.215</b>	NS
Education level	<b>0.143</b>	<b>0.122</b>	NS	<b>-0.078</b>	<b>0.402</b>	NS	<b>-0.089</b>	<b>0.340</b>	NS

Marital status	<b>-0.103</b>	<b>0.269</b>	NS	<b>0.139</b>	<b>0.132</b>	NS	<b>0.028</b>	<b>0.759</b>	NS
Religious denominations	<b>0.133</b>	<b>0.152</b>	NS	<b>-0.125</b>	<b>0.178</b>	NS	<b>0.099</b>	<b>0.287</b>	NS

*Note: VI = Verbal interpretation; r = Pearson correlation coefficient and p = Threshold of significance, S = significant and NS = not significant*

## DISCUSSION OF RESULTS

### Level of knowledge about EVD

It emerged from the self-report collected that the inhabitants of eastern DRC, had a good overall knowledge with a general average of  $0.7354 \pm 0.21007$  (Table 1). This partially corroborates the study carried out by the Masumbuko et al., which found that more than 60% of those interviewed knew that EVD would be prevented by eviction from handling the remains of anyone who died from EVD; eviction from coming into contact with biological fluids and secretions; early treatment in the Ebola treatment center would increase the chance of survival [1]. Since our respondents had poor knowledge of the causative agent of EVD, the outreach team should strengthen the knowledge of the inhabitants of eastern DRC on the name of the causative agent of EVD and of the origin of this name which is the name of a river passing near the town of Yambuku in the Democratic Republic of Congo: it was at Yambuku hospital that the filovirus was first identified in 1976 [14-17].

This study also differs from that of Ndiaye (2015) who found in his study, 77.8% had limited knowledge of EVD, 20.9% had average knowledge and barely 1.3% knew EVD well. [7].

### The attitude level on EVD

Table 2 showed that people in eastern DRC had a general average of  $0.9153 \pm 0.17813$  interpreted as a positive attitude. In other words, the respondents had good attitudes towards EVD.

Our data would resemble that of Masumbuko which found more than 80% of these respondents who feared EVD and the level of acceptance of vaccines was high in its survey (82% willing to accept vaccines for family members). Which could also be interpreted as a good attitude towards EVD[1].

However, our study differs from that of Batcho (2015) who showed that 31.9% of the nursing staff believed that they were safe from EVD.[7].

### **The level of practice on EVD**

Based on the results of table 3 which summarized the practices of respondents on EVD, the general average was  $2.4841 \pm 0.47438$  which is interpreted as a good practice.

Compared to practice, the result of Masumbuko corroborates with our data in that more than 60% of its respondents declared that washing their hands frequently, avoiding shaking hands and coming into physical contact with other people was practiced as a means of prevention against EVD when more than 30 were convinced that avoiding going to the Church as avoiding going to public events would prevent against EVD [1].

This study is different from that of Batcho (2015) who had found that communion and sharing in African societies are still very sentimental. Relationships that bind people impose a number of standards, greeting someone with a hand is important enough for communities. [9].

### **Determinant and socio-demographic characteristics related to the KAP**

It appears that the factors of self-esteem and self-efficacy ( $M = 1.7966 \pm 0.76861$ ), neglect ( $2.5508 \pm 0.45787$ ) and lack of awareness ( $2.2542 \pm 0.65615$ ) (Table 4) constitute probable factors of the perpetuation of the EVD in our environment which were communicated to the local health authorities and integrated into the public health strategy in order to eradicate definitively the EVD in the East of the DRC.

In addition, there is nothing more destructive than an individual who does not believe in his personal ability to fight danger. The new strategy for combating EVD should boost hope, self-esteem and self-efficacy in an extraordinarily desperate situation, one that a whole people seemingly can do nothing about. This attitude of lack of self-esteem and lack of self-efficacy is said to be a consequence of the war, the rapes, and the killings that have long mourned the inhabitants of eastern DRC. The world has never witnessed an Ebola outbreak in a war zone. Armed rebel militias in eastern DR Congo pose a palpable threat to locals as well as personnel

fighting epidemics. The complex humanitarian crisis in eastern DR Congo is further characterized by a large number of internally displaced persons, displaced from their native lands by violent conflict [1,2,4,23,30]. All of this traumatizes the population of eastern DRC with the serious consequence of lack of self-confidence. Hence psychological support in this region of the country.

### **Relationship between the KAP and the socio-demographic characteristics.**

Table 5 shows that the socio-demographic characteristics had no statistically significant relationship with the KAP.

There is none evidence that socio-demographic characteristics predict subsequent KAP of EVD [2, 6, 8, 9,10-13,16-27]. Results however are not unequivocal [8], Ndiaye et al. found that children and women were the groups with less knowledge of EVD.

## **CONCLUSION AND SUGGESTION**

In conclusion, in our cross-sectional and correctional descriptive study, self-esteem, self-efficacy, neglect and, lack of awareness have been identified as probable factors for the sustainability of EVD in eastern DRC.

In view of the above, we suggest:

- The response team to look for other strategies for the population that must boost hope, self-esteem and self-efficacy
- The political and administrative authorities to continue with the mobilization of the population
- It is up to the population to understand, practice and take control measures because the disease is so deadly.

### **Limitations**

In time, our study covered the period from 2<sup>nd</sup> January 2020 to 28<sup>th</sup> February, starting from the documentary review to the writing of the final work report. In space, the study concerned only the inhabitants, starting from 18 years old in the Health Area of Lukanga in the Health Zone of Masereka, territory of Lubero, province of North Kivu in the DRC. In its content, this work also concerned self-assessment assessments of the knowledge, attitudes and practices of residents of the Lukanga health area on EVD in terms of: clinical signs, favorable factors and means of prevention; assessment of the attitude in terms of: screening, risk factors and means of prevention; assess their practices as preventive measures in terms of: primary and primary prevention measures together with sharing of information with others.

The biggest limitation of this work was that we had not covered all the criteria of knowledge as well as the possible factors which could influence the KAP on EVD and that we had also not had the possibility to check the self-practices reported by respondents.

#### **Future studies**

This study provides a framework for future EVD studies. Future studies will be able to cover all the knowledge criteria as well as the possible factors that can influence KAP on EVD and to verify self-reported practices by respondents.

#### **Ethics approval and consent to participate:**

Ethical approval was provided by the North Kivu Ethics Committee (Site Horizon, Butembo, DR Congo).

#### **Consent for publication:**

Individual informed consent was undertaken.

#### **Competing interests:**

The authors declare no competing interest.

#### **Funding Statement:**

This work was supported by the Authors' team.

#### **Authors' contributions**

LKK conceived and designed the study. FLB undertook the data collection, did the statistical analysis and wrote the first draft of the manuscript. LKK, BMK, LMK and MKM, ESB and LKK did the manuscript correction, review of the final manuscript and TTK did the supervision of the work.

All authors contributed in intellectual content and approved the final manuscript. All authors have read and agreed to the final manuscript.

### **Acknowledgements**

The authors would like to thank all respondents for their voluntary participation and cooperation in this study.

### **References**

1. Masumbuko KC, Unterschultz J, Hawkes MT, Ebola virus epidemic in war-torn eastern DR Congo, *The Lancet*. 392 October 20, 2018 Available from [http://dx.doi.org/10.1016/S0140-6736\(18\)32419-X](http://dx.doi.org/10.1016/S0140-6736(18)32419-X)
2. Kalenga OI, Moeti M, Sparrow A, et al., The ongoing Ebola epidemic in the Democratic Republic of Congo, 2018–2019, *N. Engl. J. Med.* 381 (2019) 373–383.
3. World Health Organization, Ebola Virus Disease - Fact Sheet, WHO, Geneva, 2020 Available from <http://www.who.int/mediacentre/factsheets/fs103/en/>
4. World Health Organization. Ebola virus disease — Democratic Republic of the Congo. Disease outbreak news. Available from <https://www.who.int/csr/don/27-february-2020-ebola-drc/en/>
5. Iliyasu G, Ogoina D, Otu AA, et al. A multi-site knowledge attitude and practice survey of Ebola Virus Disease in Nigeria. *PLoS One* 2015; 10: e0135955.5
6. Kobayashi M, Beer KD, Bjork A, et al. Community knowledge, attitudes, and practices regarding Ebola Virus Disease—five counties, Liberia, September–October, 2014. *MMWR Morb Mortal Wkly Rep* 2015; 64: 714–18.6Buli BG,
7. <https://news.un.org/fr/story/2020/01/1059651>.

8. Ndiaye M, Survey on knowledge, attitudes and practices regarding hygiene and Ebola virus disease in the regions of Kédougou, Kolda, Ziguinchor, Tambacounda and Sedhiou. Catholic Relief Service. Save the children 2015 (In French.).
9. Batcho A, Knowledge, attitudes and practices of nursing staff at Kati University Hospital in the face of the Ebola epidemic. BAMAKO University of Science and Technology. Republic of Mali. 2015 (In French.).
10. Buli BG, Mayigane LN, Oketta JK, et al., Misconceptions about Ebola seriously affect the prevention efforts: KAP related to Ebola prevention and treatment in Kouroussa Prefecture, Guinea. *Pan Afr Med J* 2015; 22 (suppl 1): 11
11. Mayigane LN, Oketta JF, et al. Misconceptions about Ebola seriously affect the prevention efforts: KAP related to Ebola prevention and treatment in Kouroussa Prefecture, Guinea. *Pan Afr Med J* 2015; 22 (suppl 1): 11.7
12. Jalloh MF, Robinson SJ, Corker J, et al. Knowledge, attitudes, and practices related to Ebola Virus Disease at the end of a national epidemic—Guinea, August 2015.
13. Diallo B, Sissoko D, Loman NJ, et al., Resurgence of Ebola virus disease in Guinea linked to a survivor with virus persistence in seminal fluid for more than 500 days, *Clin. Infect. Dis.* 63 (2016) 1353–1356.
14. Gauzère B A, Ebola virus Disease: News 2019. Paris, France: Médecine tropicale. 2019. Available from <http://medecinetropicale.free.fr/cours/ebola.pdf> (In French.).
15. Geisbert T et al. (2012). Ebola haemorrhagic fever. 1059651 Available from <https://WWW.ncbi.nlm.nih.gov/pmc/articles/PMC3406178/>.
16. Centers for Disease Control and Prevention. 2014 Ebola outbreak in west Africa. 2016. <https://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html> (accessed Aug 13, 2018).
17. Mbuyi A, Knowledge of UPN students on the factors favoring Ebola virus infection and its means of prevention. National Pedagogical University, DRC. 2015 Available from <https://WWW.memoireonline.com/10/18/1./> (In French.).
18. National Institut for Communicable Disease, Laboratory guidelines of testing of Ebola virus diseases. Division of the national health laboratory service. 2014.

19. Jalloh MF, Corker J, et al. Attitudes about vaccines to prevent Ebola virus disease in Guinea at the end of a large Ebola epidemic: results of a national household survey. *Vaccine* 2017; 35: 6915–23.10
20. Jalloh MF, Sengeh P, Monasch R, et al. National survey of Ebola-related knowledge, attitudes and practices before the outbreak peak in Sierra Leone: August 2014. *BMJ Glob Health* 2017; 2: e000285.11
21. Wilkinson A, Fairhead J. Comparison of social resistance to Ebola response in Sierra Leone and Guinea suggests explanations lie in political configurations not culture. *Crit Public Health* 2017; 27: 14–27.12
22. Ministère de la Santé de la République Démocratique du Congo. EBOLA DRC — evolution of the response to the Ebola outbreak in the provinces of North Kivu and Ituri on Wednesday, May 8, 2019 (<https://us13.campaign-archive.com/?u=89e5755d2cca4840b1af93176&id=fc0c005f0b>) (In French.).
23. Nguyen V-K. An epidemic of suspicion — Ebola and violence in the DRC. *N Engl J Med* 2019; 380: 1298-9.
24. Médecins Sans Frontières. DRC Ebola outbreak crisis update. April 18, 2019 (<https://www.msf.org/drc-2018-ebola-outbreak-crisis-update>).
25. WHO Director-General reiterates commitment to Ebola response despite another attack. March 9, 2019 (<https://www.who.int/news-room/detail/09-03-2019-who-director-general-reiterates-commitment-to-ebola-response-despite-another-attack>).
26. European Centre for Disease Prevention and Control, ECDC Fact Sheet: Ebola and Marburg Fever, ECDC, Stockholm, 2015 Available from <https://ecdc.europa.eu/en/ebola-and-marburg-fevers/facts/factsheet>.
27. Ebola Reservoir Study, Accessible in <https://www.cdc.gov/ncezid/stories-features/global-stories/ebola-reservoir-study.html>.
28. Kish L. Sampling organizations and groups of unequal sizes. *American sociological review*. 1965 :564-72.
29. Loubet del Bayle JL, Introduction to social science methods. Paris-Montréal. L’Harmattan, Éditeur, 2000, 272 pp. (In French.).
30. G.K. Bunduki, Community resistance to Ebola response teams in north-Kivu, DR Congo, *J. Infect. Dis. Prev. Med.* 6 (2018) 185.