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**ORIGINAL ARTICLE**

# Determinants of knowledge on Lassa hemorrhagic fever among medical students at the Faculty of Health Sciences at Cotonou in Benin

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Abstract

**Background:** Since 2014, Benin has experienced five epidemics of Lassa Hemorrhagic Fever (LHF), all of them have been fatal both in the community and in hospitals, in a context of inadequate health care safety and late diagnosis. The present research aimed to study the level of knowledge of medical students at the Faculty of Health Sciences in Cotonou on Lassa Hemorrhagic Fever.

**Methods:** This was an analytical cross-sectional study of medical students, selected by stratified sampling. Data collected by self-administered questionnaire were processed by Epi Info version 7.1.4.0 and analyzed in STATA/SE 11.2. The level of knowledge was assessed by scores, at a threshold of 65%, considered as the limit between good and bad knowledge. Multivariate logistic regression was used to identify the determinants of the level of knowledge obtained.

**Results:** Out of 303 students surveyed, 25.38% (CI95%: 0.05; 0.46) had good knowledge of LHF. The epidemiology of this zoonosis was known by 30.94%, the diagnostic approach by 66.05%, the control measures by 28.67% and 10% of them knew that there was an effective curative treatment based on ribavirin if this is administered early. Training on LHF as a source of information was the only factor associated with the level of knowledge OR: 3.96 (CI95%: 1.41; 11.13).

**Conclusion:** Given the low level of knowledge of students about LHF, there is a need for more emphasis on Viral Hemorrhagic Fevers in medical training programmes tailored to the different grades.

Keywords: Determinants of knowledge, Lassa Hemorrhagic Fever, Medical students, Benin

## 1 | INTRODUCTION

Lassa Hemorrhagic Fever (LHF) is a zoonosis caused by an arenavirus (Lassa virus) that appeared in the 1950s and was isolated in 1969 in the United States during an epidemic of nosocomial infections in a nurse who had been repatriated to New York from the town of Lassa (Nigeria), and who herself had been contaminated by a midwife who had died on the spot [1; 2]. According to the Centers for Disease Control and Prevention (CDC) Atlanta, 350,000 people are infected with LHF each year worldwide, including 300,000 in West Africa, resulting in over 5,000 deaths [3]. According to the World Health Organization (WHO), Edo State in Nigeria has recorded 365 confirmed cases of LHF with 45 deaths and 16 infected health workers with four deaths in 2018 [2].

From January 21 to February 16, 2016, Benin had recorded 71 cases of LHF (six confirmed), seven health workers with two deaths. In 2017, there were two cases, all of which died, and in 2018, 24 cases, including one probable case of a medical student, and nine deaths, i.e. a case fatality rate of 37.5% [4]. Although early diagnosis and treatment with ribavirin contribute significantly to survival, this case fatality was due to poor knowledge of the clinical features of the disease [1].

In the absence of preventive drugs or vaccines, WHO proposes several strategies, including: training of health workers, awareness of risk factors and strict application of Infection Prevention and Control (IPC) measures in health care facilities by health care workers regardless of the patient's presumed diagnosis [5]. These same recommendations were implemented during the various epidemics in Benin, but strict and rigorous application remains precarious [4; 6], due to poor medical practices, untimed diagnosis and inappropriate treatment due to lack of knowledge [7]. Exposure to this zoonosis therefore extends to medical students who, as part of their training, are often in contact with patients. They should therefore be predisposed to a better application of preventive and curative measures. But what is their level of knowledge of LHF?

In the absence of a previous study on this issue, the present research was initiated and conducted from March to July 2019 in order to assess the level of knowledge of medical students on LHF and to identify the factors influencing it. The results will contribute to improving the response strategies to LHF in Benin.

## 2 | MATERIAL AND METHODS

This was a cross-sectional study with an analytical purpose conducted from 25 March to 19 April 2019, on medical students at the Faculty of Health Sciences (FHS) in Cotonou in 2019. The students were selected by stratified random sampling, with the years of study as strata. In each stratum, students were selected by simple random selection from the list of students in that year of study. The sample size calculated by the Krejcie and Morgan formula, with a prevalence of knowledge level of 50% (in the absence of previous study), was increased by 10%. The independent variables were: age, gender, religion, ethnicity, source of information on LHF (internet, hospital, Lassa training, media, friends), social representation of LHF, actions taken by the FHS during epidemics, classroom teaching on ICP, classroom teaching on LHF.The dependent variable was the level of knowledge, consisting of 19 items classified into minor and major criteria and grouped into epidemiological aspects, diagnostic approaches and control measures for LHF. The data were collected using a self-administered, pre-tested questionnaire. The minor and major criteria were respectively scored at 1 and 2 points if met, and 0 points if not. The expected overall score was 31 points, of which 65% was used as a threshold for assessing the level of knowledge, with reference to the standard assessment scores for the level of knowledge among health

**Supplementary information** The online version of this article (https://doi.org/10.52845/MCRR/2021-4-11-2) contains supplementary material, which is available to authorized users.

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workers [8]. The data were entered into Epi Info version 7.1.4.0 and analyzed in STATA/SE 11.2. The determinants of the level of knowledge about LHF were identified by bivariate and multivariate analysis. In the bivariate analysis, the Chi2 test was performed, at the 5% significance level. The multivariate analysis was performed with units weighted by year of study, using stepwise logistic regression at the 5% significance level. Variables with a $p < 20\%$ in the bivariate analysis were included in the initial model.

Informed consent was obtained from the students after they were informed of the objectives of the study. The study protocol was approved by the scientific committee of the Regional Institute of Public Health of Ouidah (Benin).

## 3 | RESULTS

A total of 303 students were surveyed, with a mean age of $21.4 \pm 0.90$ years. Eighty-seven and a half percent were Christian and 11.22% were Muslim. The majority were Fon (38.21%) and Goun (20.43%). The sources of information on LHF were the media (94.73%), the hospital (47.23%), the internet (23.07%), friends (22.61%) and training on LHF (9.83%), without taking into account the teaching on LHFin the medical school.

**Factors related to the training environment**

Of the 28.05% who had already taken the classroom course on LHF, 34.12% had a good knowledge of LHF compared to 22.06% of those who had not yet taken the course. The course on ICP measures was given in the 2nd year of medicine and no action on LHF had been carried out for the students.

**Level of knowledge about LHF**

Out of 303 respondents, 25.38% had a good overall knowledge of LHF. The mean score for knowledge of the epidemiology of LHF was $11.28 \pm 0.44$ out of 19 and 30.94% had good knowledge. The majority (88.71%) knew that it is a viral disease and 25.61% knew the incubation period. 79.86% identified fever (temperature above 38°C) as the main symptom (see Table I). Consumption of food soiled with host urine or feces was the most reported host-to-human transmission (70.53%) and the most reported route of human-to-human transmission (80.06%) was contact with blood and urine of an infected person (Figure 1). Nosocomial transmission was not reported. The mean score for knowledge of the diagnostic process was $3.59 \pm 0.44$ out of 6 and 65.05% had good knowledge of it.

The average score for knowledge of control measures was $2.45 \pm 0.25$ out of 6 and 28.67% had good knowledge of them. Preventive measures were known by 76.61%, compared to 10.17% who knew that ribavirin-based curative treatment was available.

Factors associated with the level of knowledge

(Table II) Bivariate analysis showed a statically significant relationship between year of study, attendance at the LHF course and level of knowledge about LHF. In the multivariate analysis, LHF training (other than classroom instruction at FHS) as a source of LHF information was the only associated factor OR: 3.96 (CI95%: 1.41; 11.13).

## 4 | DISCUSSION

The quality and validity of the data was ensured by the sampling method and technique used for the selection of targets, the WHO references used as a basis for assessing the level of knowledge of LHF, the pre-testing of the data collection tool and the statistical tests performed. However, social desirability bias could be induced by the self-administration of the questionnaire and constitute a limitation of the study. However, this does not affect the quality of the results, given the low proportion of good knowledge obtained.

Unlike Ekuma et al. who recorded 55.85% good knowledge in Nigeria in 2017 [9], less than 30% of the respondents had good overall knowledge about LHF. This difference in result could be explained by their small sample size (79) compared to ours (303) but also by the fact that the epidemic was reported in Benin only from 2014 while it was known in Nigeria for decades. The level of knowledge in the present study is also lower than that of Penaere et al (98.8%) in Benin City, Nigeria in 2018 [10].

that study had targeted students from four disciplines (pharmacy, medicine, dentistry and optometry), who had benefited from lectures on LHF, while in Benin, the FHS had not conducted any action towards students despite the country being in epidemic. The same reason could justify the low awareness of the existence of a curative treatment based on ribavirin. Given that students are exposed to LHF and that 30 days after a lecture the content is likely to be a distant memory [11], information sessions on LHF for students should be organizedas complement to the curriculum.

The overall lack of knowledge among students should therefore be of concern to those involved in the fight against LHF. Indeed, these students are on the one hand channels of communication about LFV in the population and on the other hand risk factors for the spread of the disease, given the possible contact they might have with suspected LFV cases during their practical training in hospitals.

The good knowledge on the viral nature of LFH (88.71%) corroborates with the results of several studies including that of Ekuma et al. in 2017 in Nigeria [10] and could be justified by the role of the media during the various LFH epidemics in Benin (source of information for 94.73% of the respondents).

The ignorance of nosocomial transmission of the virus by students in Benin compared to less than 50% of doctors in 2017 in Nigeria [12] could be the result of the low importance given to this aspect and the poor dissemination of this information by the media.

While Benin declared the end of its last LHF epidemic in the month we collected our data for this study, only a quarter of the students knew the incubation period of LHF in humans. Although Nigeria is highly endemic for LHF, Olowookere et al. in 2014 found 57.1% of doctors (52% correct knowledge threshold) [13] and Tobin et al. in 2013 found 31.3% (75% correct knowledge threshold) of health workers (doctors, nurses, laboratory staff) correctly stating the incubation period [14]. These results best explain the lack of knowledge of the severity of LHF among health personnel (doctors, nurses, laboratory staff and medical students).

The determinants of students' level of knowledge about LHF identified in Nigeria in 2017 (personal reading) [12] and in the present study (training received on LHF outside the curriculum) suggest that students and doctors are engaging in personal research/culture to learn about LHF. This self-documentation is encouraging, but if not reliably sourced, could be detrimental to the response. Indeed, the information may be partial, erroneous or contrary to the guidelines of the response. In the context of the epidemic, the health authorities needed to help improve students' knowledge of LHF to enable them to relay information to the community.

The year of study was not identified as a determinant of the level of knowledge of medical students, as was the case in Kinshasa in 2015 [16] and in Nigeria in 2018 [17] with Ebola virus disease. Indeed, in the present study, it was identified in the bivariate analysis but not in the multivariate analysis because the variable "year of study", which was used for stratification, was no longer considered for the logistic regression.

## 5 | CONCLUSION

The low level of knowledge of medical students on LHF can be considered as an insufficiency of the organization of the response to the various LHF epidemics in Benin. It is desirable to evaluate the communication plan for the response to these epidemics, with a view to confirming or refuting this inadequacy and, if necessary, correcting it in the future.

It is also important to analyse the medical training programmes adapted to the different years of study.

Conflicts of interests:

The authors declare that they have no conflicts of interest.

Authors' contributions:

All authors contributed to this work.

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**TABLE 1: Dispatching of medical students surveyed at the FHS ofCotonou in Benin in 2019 according to their knowledge on the epidemiology of LHF(n=303).**

| Variables | Frequency | Weight % |
|---|---|---|
| Origin of ``Lassa'' | | |
| Village in Nigeria | 78 | 25,67 |
| - I don't know | 225 | 74,33 |
| Infectious agents causing HFV | | |
| Viruses | 269 | 88,71 |
| I don't know (Bacteria, Fungi) | 34 | 11,29 |
| Natural reservoir of lassa virus | | |
| Rat | 196 | 64,82 |
| - I don't know | 107 | 35,18 |
| Typical Lassa virus host species | | |
| Mastomys SP | 30 | 9,87 |
| - I don't know | 273 | 90,13 |
| Incubation period of LHF | | |
| 2 to 21 days | 78 | 25,61 |
| - I don't know | 225 | 74,39 |
| Countries reporting the first case of LHF in the world | | |
| Nigeria | 97 | 31,94 |
| - Don't know (Other country) | 206 | 68,06 |
| - | | |
| Factors favoring the spread of the virus | | |
| Presence of rats in homes | 188 | 62,21 |
| Dry season | 32 | 10,44 |
| Bush fires | 38 | 12,57 |
| Lack of hygiene | 203 | 66,87 |
| Non-compliance with ICP measures | 212 | 69,83 |
| - I don't know | 34 | 11,25 |

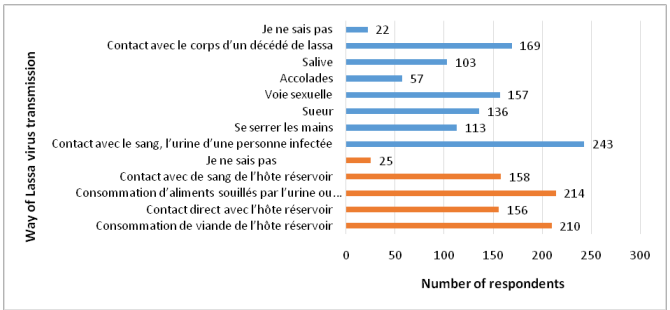


**FIGURE 1: Distribution of respondents according to the choice of the mode of Lassa virus transmission**

| Variables | Modalities | OR | 95% CI | p-value |
|---|---|---|---|---|
| Age (Years) | 17 – 21 | 0,286 | [0,066– 1,246] | 0,083 |
| | 22 - 27 | 1 | - | - |
| Sex | Female | 1 | - | - |
| | Male | 1,101 | [0,551 – 2,198] | 0,745 |
| Training on HVF | No | 1 | - | - |
| | Yes | 3,96 | [1,41 - 11,13] | 0,017 |

**TABLE 2: Factors associated with the level of knowledge about LHF of medical students at the FHS of Cotonou in 2019 (n=303).**

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