

Hygiene Practices in a Nigerian rural Community during Lassa Fever Epidemic

Lassa fever is a viral hemorrhagic fever generally transmitted to humans through contact with excreta of infected *Mastomys* rats. Person-to-person transmission occurs when a healthy individual comes into contact with tissue, blood or other body fluids of an infected person.^[1] In 2018, Nigeria had its largest ever Lassa fever outbreak, classified by the World Health Organization as a Grade 2 public health emergency.^[2] Between January 1 and December 31, 2018, the outbreak spread across 93 local government areas in 23 of the 36 states in Nigeria, resulting in 3498 suspected cases, 633 laboratory-confirmed cases and 171 deaths, with a case fatality rate of 27%.^[3]

Since January 2019, another Lassa fever epidemic has occurred, and based on the number of cases recorded as of March 2019, it could be one of the worst recorded Lassa fever outbreaks.^[4] Between January 1 and March 17, 2019, the outbreak had spread across 73 local government areas in 21 states with 1801 suspected cases, 495 confirmed cases and 114 deaths with a case fatality ratio of 23%.^[4] Apart from Nigeria, Lassa fever is also endemic in some West African countries such as Benin, Ghana, Guinea, Liberia, Mali and Sierra Leone. In these endemic countries, an estimated 300,000–500,000 cases of Lassa fever occur each year resulting in >3000 deaths.^[1,2]

Mastomys rats are usually found in households and farm settlements and areas where food is stored and processed.^[1] Foodstuff and other objects contaminated with rat droppings or urine are the most common routes of disease transmission. Person-to-person transmission is commonly seen at a community level and in health-care facilities.^[1] After an incubation period of 6–21 days, patients with mild, early Lassa fever present with nonspecific symptoms similar to that of common febrile illnesses such as malaria, shigellosis, enteric fevers and yellow fever.^[5] This makes it difficult to clinically distinguish Lassa fever from these endemic febrile illnesses and thus delays its diagnosis in settings where laboratory support in clinical care is poor.^[5] Therefore, by the time patients present with disease-specific severe symptoms such as mucosal bleeding, difficulty in breathing, recurrent vomiting, facial edema and shock, it is likely that the disease would already have been transmitted to family caregivers and frontline health-care workers.

Lassa fever affects people of all age groups, and living condition that increases chances of contact with *Mastomys* rats or its droppings is a recognized risk factor.^[1] In addition, health-care workers in contact with patients infected at a community level are also at an increased risk of contracting this disease, especially if they do not adhere to basic infection control measures during patient care.^[5] Despite the increasing burden in endemic areas and documented evidence of international spread, there is currently no approved vaccine against Lassa fever and it yet remains a global health threat.^[2]

A common practice known to promote contamination and thus transmission of the infection is open drying of farm products (occasionally along road sideways).^[6] This practice is not restricted to only Nigeria and is also common among rural farmers of other West African countries.^[7] Other risk factors and practices associated with the disease include poor community awareness and education, poor housing conditions, changing farming practices and unsafe food processing and storage. Therefore, the prevention and control of Lassa fever at the grassroots level mainly depend on implementing good community hygiene measures that discourage contact with rats, their urine or droppings. These measures include storage of foodstuffs in rodent-proof containers, disposal of garbage at a distance away from the home, maintenance of clean households and keeping cats as pets.^[1]

Evidence shows that effective implementation of good community hygiene measures could help drastically reduce both local and international spread of this disease.^[1] Therefore, to assess community hygiene practices against Lassa fever and its determinants, the authors conducted a study among residents of Gangara, a rural agrarian community in Giwa local government area, Kaduna State, North West Nigeria, from May 2 to 5, 2016. The community has an estimated population of 8284. The sample size was calculated using the formula for cross-sectional studies: $n = (Z_{\alpha/2})^2 pq/d^2 = (1.96)^2 \times 0.49 \times 0.51 / (0.04)^2 = 600$. Considering a nonresponse of 10% and after adjusting for the finite population correction factor, the final sample size was calculated to be 614.

Ethical clearance for the study (ABUTHZ/HREC/B09/2016) was obtained from The Health Research

Ethics Committee of Ahmadu Bello University Teaching Hospital, Zaria, Kaduna State, Nigeria. After obtaining the appropriate entry permission from the community leaders, 614 adults were selected through a systematic random sampling technique. Of these, 556 (females = 53%; mean age = 37 ± 15.2 years) agreed to participate (response rate = ~91%) after providing their informed verbal consent. Data were collected using a structured interviewer-administered questionnaire with closed- and open-ended questions eliciting information on the sociodemographic profile of respondents, knowledge of Lassa fever and practices regarding its prevention.

In this predominantly Hausa community (84%), about half (49%) of the residents had a formal education. The leading sources of information about Lassa fever in the community were jingles in electronic mass media such as radio and television. The practice of community hygiene measures for the prevention of Lassa fever was found to be generally low. Only about 26% of the respondents said that they avoided rodent consumption for food, and 37% tried to improve the standard of their house. Nonetheless, 42% and 57% stored food safely and maintained a clean environment, respectively.

The practice of safe food storage was significantly higher among respondents who had no formal education, were unemployed or students and/or had excellent knowledge of Lassa fever. After controlling for confounders at the multivariate level using logistic regression, educational attainment remained significantly associated with safe food storage (adjusted odds ratio [aOR] = 1.31, 95% confidence interval [CI]: 1.10–1.54, $P = 0.002$) and avoidance of rodent consumption (aOR = 1.24, 95% CI: 1.03–1.50, $P = 0.023$). Factors found to be independently associated with practice of environmental sanitation were educational attainment (aOR = 1.22, 95% CI: 1.04–1.45, $P = 0.018$) and marital status (aOR = 0.32, 95% CI: 0.10–0.99, $P = 0.049$). Good knowledge of Lassa fever was also a significant predictor of maintaining good housing standards at the multivariate level (aOR = 3.73, 95% CI: 1.09–12.80, $P = 0.036$).

The finding of a poor practice of Lassa fever prevention among majority of the respondents in this study is consistent with the findings of two studies from Nigeria (in Ebhodiza, Edo State, South South Nigeria, and Ile Ife, Osun State, South West Nigeria) and one from Liberia.^[5,8,9] In the first study from Nigeria, only about 28% of the respondents carried out specific measures to control rats in their households,^[9] whereas in the second study, about 49% exhibited good overall Lassa fever prevention practices.^[8] In

the study from Liberia, which involved an environmental assessment of residence of those with Lassa fever in 2016, it was found that waste disposal and food preparation areas were accessible to rodents, and food was not covered or stored in rodent-proof containers.^[5]

In this study, the predictors of community hygiene practice varied for different measures. However, having no formal education was a predictor of practice in three of the four assessed measures. A possible explanation is that those without a formal education listen to radio – a major source of information in rural areas – more often. Educational attainment and being married were significant predictors of maintaining a clean environment, while good knowledge of Lassa fever was independently associated with maintaining good housing standards. This is possible because housewives conduct the environmental sanitation at homes, and having a formal education enables them to take preventive measures necessary for good health.

The results of this study indicated that the practice of preventive measures against Lassa fever was poor. It also indicated that the practice of each preventive measure was determined by sociodemographic factors, which invariably means a multisectoral approach will be needed to strengthen the practice of preventive measures. Based on these findings, the authors recommended interventions including investment in human capital (especially in female education), continuous health education awareness campaigns and introduction of context-appropriate food processing and storage techniques.^[7] Effective implementation of these interventions will require more commitment in the provision of needed resources.^[10]

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Conflicts of interest

There are no conflicts of interest.

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