

# Community-Based Surveillance: Knowledge and skills of Community Health Workers in epidemics setting in Ganjuwa LGA, Nigeria

André Izacar Gaël BITA<sup>1</sup>, Nyenty Agbor Agbornkwai<sup>2</sup>, Dieudonné Kagaike Tcholai<sup>3</sup>, Benjamin Gandi<sup>4</sup>

## Affiliation

<sup>1</sup>ICT University, Department of public health, Yaounde, Cameroon

<sup>2</sup>Family Health International 360, Bafoussam, Cameroon

<sup>3</sup>IEDA Relief, Ouagadougou, Burkina Faso

<sup>4</sup>Federal Ministry of Health, Bauchi state, Nigeria

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## Abstract

**Introduction:** Community-based surveillance (CBS) is essential for early detection and prompt response to epidemic-prone diseases (EPD). Community Health Workers (CHWs), trained in basic healthcare services, can play a vital role in this process. Like many Local government Areas (LGA) in Nigeria, between January and September 2023, Ganjuwa LGA in Bauchi state was facing a simultaneous outbreak of measles, pertussis, Diphtheria, and Lassa Fever.

**Methods:** Descriptive cross-sectional study among the CHWs in the Ganjuwa LGA to assess their knowledge and skills in CBS of EPD by using a questionnaire. Exhaustive sampling of CHWs implicated in CBS in Ganjuwa LGA and who gave verbal consent were included. Stata 16.0 software was used for analysis. The final score of knowledge of CHWs on CBS was calculated with the rate of the total best answers given by the CHWs based on five questions fixed.

**Results:** The study enrolled 71 CHWs with a majority being male (61.97%) and an average age of 27 years. The education level of the CHWs varied, with 61.97% having completed secondary school, 29.58% having a university education, and 8.45% having completed primary school. In terms of experience, the majority of CHWs had 1 year of experience (73.24%), followed by 2 years (15.49%). The findings revealed that only a small percentage of CHWs (23.94%) recognized that Ganjuwa LGA was affected by four outbreaks, and 35.21% were aware that EPD could be transmitted through various means in communities. The overall knowledge score of the CHWs was relatively low, with a mean score of 0.4 (ranging from 0 to 1). Most CHWs had a score of 0.2, while only 5.63% achieved a score of 1. On the positive side, a significant majority of CHWs felt comfortable conducting home visits to identify suspected cases of EPD (76.06%) and expressed confidence in their ability to educate community members about disease surveillance and reporting (71.83%). Additionally, a majority of CHWs were familiar with the process of collecting and recording data related to EPD at the community level (64.79%). Most CHWs also expressed willingness to undergo additional training to improve their knowledge and skills in CBS (64.79%) and reported working well with local health facilities and authorities for information sharing and collaboration on disease surveillance efforts (73.24%).

**Conclusion:** Overall, these findings highlight both strengths and areas for improvement in the knowledge, skills, and attitudes of CHWs regarding disease surveillance and reporting in the community. Targeted training interventions can help address the gaps identified and further enhance the effectiveness of CHWs in their roles.

## 1. Background

Epidemic-prone diseases are infectious diseases that have the potential to rapidly spread and cause outbreaks within communities. Diseases such as malaria, diarrheal diseases, acute respiratory infections, and vaccine-preventable diseases (VPDs) account for at least 90% of childhood morbidity and mortality and other childhood health problems in Nigeria. Other diseases like Lassa fever, Cerebrospinal Meningitis (CSM), and measles continue to occur with increased frequency in epidemic proportions and produce the highest case fatality rate [1]. Disease surveillance is critical in helping countries monitor and evaluate emerging patterns and trends of disease. Community-based surveillance (CBS) plays a crucial role in detecting and responding to epidemic-prone diseases, especially in resource-limited settings like Nigeria. Community Health Workers (CHWs) are globally recognized as crucial members of healthcare systems in low and middle-income countries.

CHWs are globally recognized as crucial members of healthcare systems. They serve as a bridge between the community and the healthcare system, contributing to early detection, reporting, and response to disease outbreaks. CHWs are trained to identify and monitor symptoms, collect data, and report suspected cases to the appropriate authorities. They also educate community members about disease prevention and control measures and other public health issues. In the context of the cholera epidemic in Haiti, CHWs were engaged in prevention and treatment activities, which included surveillance efforts [2]. The concept of CHWs as agents of change and service extenders has been recognized since the adoption of Primary Health Care as a health policy by the World Health Organization (WHO) in 1978 [3]. CHWs have been instrumental in reaching underserved rural areas and promoting health in Lesotho, where they have contributed to increased access to healthcare services and reduced mortality rates [4]. CHWs are particularly important in impoverished countries where there may be a shortage of healthcare professionals. They provide basic medical education, care, and support to communities, filling the gap in human resources [5]. However, the effectiveness and sustainability of CHW programs depend on factors such as adequate training, compensation, and supervision within the health system [5].

In Nigeria, where healthcare infrastructure may be limited in certain areas, CBS becomes essential for early detection and prompt response to these diseases. CHWs, who are community members trained in basic healthcare services, play a vital role in this process. Between January and September 2023, as in many areas in Nigeria, Ganjuwa Local Government Area (LGA) in Bauchi state was facing simultaneous outbreaks reported, like measles, pertussis, and Diphtheria [6] [7], and Lassa Fever [8] [9]. Many CHWs worked with MoH, and other partners in the communities to detect, record, and notify early all suspected cases of epidemic-prone diseases and other events from the community to the health authorities (health facility). We thought it appropriate to evaluate the knowledge and skills of CHW on the CBS of epidemic-prone disease to describe the situation and produce data for the MoH and partners involved in the epidemic response in Bauchi state, Nigeria.

## 2. Materials and methods

### 2.1. Study design

It was a descriptive cross-sectional study among the CHWs in the Ganjuwa LGA to assess their knowledge and skills in CBS of epidemic-prone diseases by using a questionnaire.

### 2.2. Period and population study

The study was implemented in Ganjuwa LGA on the 14<sup>th</sup> of September 2023. Ganjuwa is a LGA of Bauchi State in Nigeria. It was carved out from the Darazo LGA in September 1991, and it's bordered by Jigawa State from the North and Gombe State from the Southeast. The LGA also shares borders with the following Local Governments: Bauchi Local Government from the South, Toro Local Government from the West, Ningi LGA from the Northwest, Darazo LGA from the North Southeast, and Kirfi LGA from the East. Based on the 2006 Population Census figure, the Local Government has 280,486 population with numerous tribes/languages, but prominent among them are Gerawa, Denawa, Miyawa, Kariyawa, Hausawa, and Fulanis among others. Ganjuwa LGA now has one District, eight Village Areas, and 122 Hamlets [10]. According to the MoH (2023), the population size of Ganjuwa was 495,145 persons in 2023 (52.1% males and 47.9% females); 99,029 under-five children, and 24,757 pregnant women.

### 2.3. Sampling methods

It was an exhaustive sampling of all CHWs implicated on CBS of epidemic-prone diseases with the Ministry of Health and other partners in Ganjuwa LGA between January and September 2023 and who agreed to participate in the study. A total of 80 CHWs were invited from 16 wards, but 71 were accepted and all gave verbal consent to be included in the study.

### 2.4. Data collection and tools

We used a questionnaire to assess the knowledge and skills of CHWs. The questionnaire was read by the interviewer in English and translated into Hausa for those who could not read and listen to English. The questions were multiple choice, and participants had to tick the correct answers.

### 2.5. Data analysis

The data collected by questionnaires were reviewed and filled in an Excel 2010 sheet by the investigator. The database of participants was analyzed with Stata 16.0 to calculate the frequencies and confidence interval (CI) of 95% and P-value of 5% were used. The final score of knowledge of CHWs on CBS was calculated with the rate of the total best answers given by the CHWs based on five questions fixed (the mark of each question was 1).

$$\text{Score} = \frac{\text{Total of best responses provided by CHW}}{5}$$

## 2.6. Ethical aspects

To ensure the protection and confidentiality of the participant's data, personal information that could identify the participants was not collected. Only people who had freely agreed to participate in the study were enrolled. The collection forms were anonymous. Once the data had been coded, entered, and stored in a computer, access to the database was password-protected and access was limited to those responsible for the research.

## 3. Results

### 3.1. Demographic data

A total of 71 community health workers (CHWs) were enrolled in the study, and 61.97% were males and 38.03% females. The mean age was 27-year-old with a minimum of 19-year-old and a maximum of 40-year-old. The CHWs came from 16 wards of Ganjuwa LGA's (n=71), and the most came from Kafin Madaki A (16.90%); Kafin Madaki B (11.27%) and 11.27% from Nassarawa A (Figure 1). According to the level of education of CHWs, 61.97% had secondary school; 29.58% university, and 8.45% primary school. According to the level of experience (by year), 73.24% declared one year of experience; 15.49% two years; 9.86% less than one year, and 1.41% three years of experience.

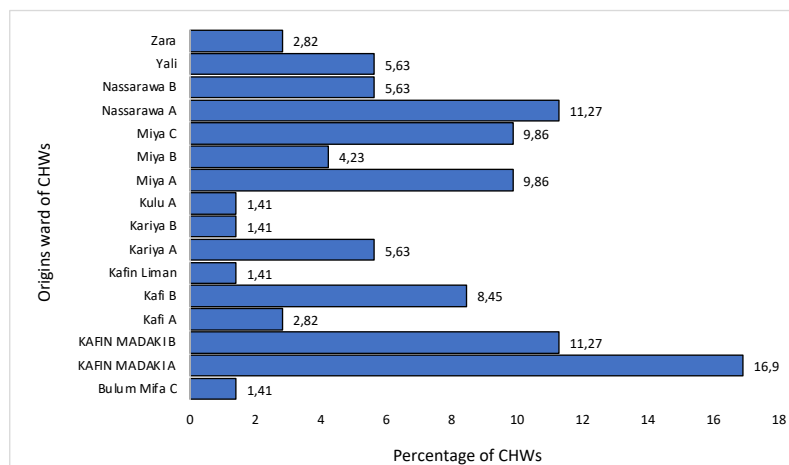


Figure 1. Distribution of CHW by origin ward of Ganjuwa LGA's (n=71)

### 3.2. Knowledge of CHW on the community-based surveillance of epidemic-prone disease

According to the CHWs, the most common epidemic-prone disease in Ganjuwa communities was Diphtheria (39.44%), followed by measles (28.17%); Lassa Fever, and Pertussis with 4.23% each disease. However, only 17 (23.94%) of CHWs recognize that Ganjuwa LGA is affected by all four epidemic-prone diseases (Diphtheria, Measles, Lassa Fever, Pertussis).

The knowledge of CHWs about the mode of transmission of epidemic-prone disease was poor. In general, 35.21% of CHWs know that epidemic diseases can be transmitted through various means in communities as direct contact with an infected person,

contaminated food and water, respiratory droplets, and vectors like mosquitoes or ticks (“all above”, who were the best response). Another major part of CHWs (35.21%) cited direct contact with an infected person as the main mode of transmission of epidemic disease, followed by respiratory droplets (12.68%); contaminated food and water vectors like mosquitoes or ticks with 8.45% each mode (Table 1).

Measle was selected by randomization among the Diphtheria, Measles, Lassa Fever, and Pertussis, and asked to the CHWs were to give the common symptoms of measles. Most CHWs (71.81%) gave the true response and mentioned fever and rash as the common symptom; 16.90% Cough and runny nose; 2.82% sore throat and difficulty swallowing and 8.45% muscle aches and fatigue (Table 1).

We asked CHWs to identify how CBS can help in detecting epidemic diseases and 40.85% knew that CBS can help by monitoring and reporting unusual disease patterns or outbreaks, providing early warning signs of potential epidemics, and facilitating prompt response and control measures (“all above”, who was the best response). And 49.30% thought only by monitoring and reporting unusual disease patterns or outbreaks and 9.86% only by providing early warning signs of potential epidemics (Table 1).

We asked the CHWs to identify the key components of CBS. Only 36.62% of CHWs recognized that training community health workers on disease surveillance, establishing a reporting system for suspected cases, conducting regular data collection and analysis, and collaborating with local health facilities and authorities (“all above”, who was the best response) are the key components. However, most CHWs (43.66%) thought that the key component of CBS is to train community health workers on disease surveillance (Table 1).

According to the final score of knowledge of CHWs based on the five questions accessed (table 1), the main score was 0.4 ranging from 0 to 1. The most CHWs had 0.2 (32.62%) which was lower than the main, and 5.63% had a score of 1 (Figure 2).

Subject	Number (n=71)	Percentage (%)
<b>What are the main epidemics in Ganjuwa LGA according to CHWs?</b>		
Diphtheria	28	39.44%
Lassa Fever	3	4.23%
Measles	20	28.17%
Pertussis/ Whooping cough	3	4.23%
All above	17	23.94%
<b>How are epidemic diseases transmitted?</b>		
Through direct contact with an infected person	25	35.21%
Through contaminated food and water	6	8.45%
Through respiratory droplets	9	12.68%
Through vectors like mosquitoes or ticks	6	8.45%
All the above	25	35.21%
<b>What are the common symptoms of measles?</b>		
Fever and rash	51	71.83%
Cough and runny nose	12	16.90%
Sore throat and difficulty swallowing	2	2.82%
Muscle aches and fatigue	6	8.45%

Subject	Number (n=71)	Percentage (%)
<b>How can community-based surveillance help in detecting epidemic diseases?</b>		
By monitoring and reporting unusual disease patterns or outbreaks	35	49.30%
By providing early warning signs of potential epidemics	7	9.86%
By facilitating prompt response and control measures	0	0.00%
All of the above	29	40.85%
<b>What are the key components of community-based surveillance?</b>		
Training community health workers on disease surveillance	31	43.66%
Establishing a reporting system for suspected cases	9	12.68%
Conducting regular data collection and analysis	4	5.63%
Collaborating with local health facilities and authorities	1	1.41%
All the above	26	36.62%

Table 1. Knowledge assessment of CHW on Community-Based Surveillance, Ganjuwa LGA, Nigeria

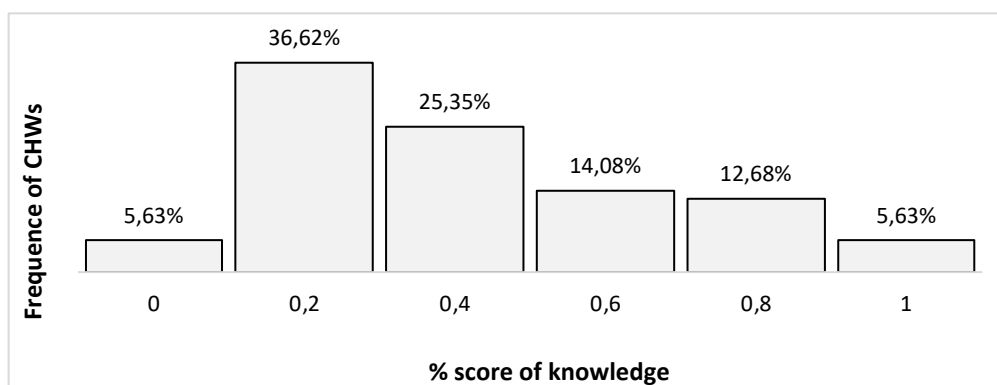


Figure 2. Final score of knowledge of CHWs on CBS in Ganjuwa LGA's (n=71)

### 3.3. Skills of CHWs in the community-based surveillance of epidemic-prone disease

We asked the CHWs at which level they were comfortable conducting home visits to identify suspected cases of EPD, and the analysis showed that 76.06% were very comfortable; 18.31% somewhat comfortable and 5.63% were not comfortable. At the same time, the majority of CHWs (71.83%) said that they were confident in their ability to educate community members about the importance of disease surveillance and reporting and, 4.23% were not confident. The majority of CHWs were very familiar (64.79%) with the process of collecting and recording data related to EPD at the community level and 2.80% were not familiar with this process. Most of the CHWs (64.79%) said “yes definitely” they would be willing to undergo additional training to improve their knowledge and skills in CBS. However, 2.82% were not interested in attempting additional training on CBS and 32.39% said that this may depend on the time committed to training. Of 71 CHWs, 73.24% said that they worked very well with local health facilities and authorities to share information and collaborate on disease surveillance efforts (Table 2).

Subject	Number (n=71)	Percentage (%)
<b>As a community health worker, how comfortable are you with conducting home visits to identify suspected cases of epidemic diseases?</b>		
Very comfortable	54	76.06
Somewhat comfortable	13	18.31
Not comfortable	4	5.63
<b>How confident are you in your ability to educate community members about the importance of disease surveillance and reporting?</b>		
Very confident	51	71.83
Somewhat confident	17	23.94
Not confident	3	4.23
<b>How familiar are you with the process of collecting and recording data related to epidemic diseases?</b>		
Very family	46	64.79
Somewhat family	23	32.39
Not family	2	2.82
<b>Are you willing to undergo additional training to enhance your knowledge and skills in community-based surveillance?</b>		
Yes, definitely	46	64.79
Maybe, depending on the time commitment	23	32.39
No, not interested	2	2.82
<b>How well do you work with local health facilities and authorities to share information and collaborate on disease surveillance efforts?</b>		
Very well	52	73.24
Somewhat well	17	23.94
Not well	2	2.82
Total	71	100.0

Table 2. Skills assessment of CHWs on community-based surveillance, Ganjuwa LGA, Nigeria

#### 4. Discussion

This study aimed to evaluate the knowledge and skills of CHWs in an epidemic setting in Ganjuwa, an LGA of Bauchi state of Nigeria. Since the beginning of 2023, Nigeria has continued to face many epidemic diseases across the country. According to the WHO, Nigeria experienced a large outbreak of Lassa fever in 2023 [11]. And Bauchi State government confirmed the outbreak of Diphtheria and yellow fever in the state [12]. In the same period, the state notified Measles, and pertussis (Whooping cough) [6] [7].

Our study showed that the most common epidemic-prone disease mentioned by CHWs was Diphtheria (39.44%). This may be explained by the fact that Diphtheria was the epidemic of focus for the Bauchi state during the study period. And added to the post-campaign social mobilization carried out by the MoH in the same period. The fact that measles comes second (28.17%) could be explained by the fact that Ganjuwa has reported measles cases throughout the year (every epidemiological week), so it could be a disease well-known to the community [6]. However, only 17 (23.94%) of CHWs recognize that Ganjuwa LGA is affected by all four epidemic-prone diseases (Diphtheria, Measles, Lassa Fever, Pertussis). This could be an indication of the weakness of the capacity of community members to carry out surveillance activities within their communities. A systematic review of the drivers of success of community-based surveillance systems for the detection and reporting of infectious disease-related events found that some success

factors of the CBS system included: strong supervision and training, a strong sense of responsibility for community health, effective engagement of community informants, proximity of surveillance workers to communities, the use of simple and adaptable case definitions, quality assurance, effective use of technology, and the use of data for real-time decision-making [13]. Our study did not assess these other factors, which may explain the low rate (23.94%) of recognition by CHWs of the simultaneous incidence of four epidemics in the locality.

Our study was carried out before the CHWs were trained or retrained (for some of them) in CBS, so this could explain why the minority of 28.19% couldn't find the right answer about the major symptoms of measles. Nevertheless, the majority of CHWs gave the right answer, which could be explained by the fact that most CHWs had a least 1-year experience as a CHW (90.14%) and that measles is widespread in the communities [6].

The study showed that only 36.62% of CHWs recognized training community health workers, establishing a reporting system for suspected cases, regular data collection and analysis, and collaborating with local health facilities and authorities. CHWs are volunteers from the community, often with different profiles. Their roles and tasks must be explained to them by the MoH authorities or other partners such as health organizations. This low proportion of CHWs able to easily recognize the major key components of CBS could be explained by the insufficiency of training and supervision of CHWs in the locality.

The study showed poor knowledge of CHWs on the CBS based on the five questions accessed. Most CHWs had 0.2 (36.2%) which was lower than the main (0.4), and 5.63% had a score of 1. These results confirm those published by Feldman M et al., (2021) for other diseases like malaria. The authors examined the knowledge, attitudes, and practices of CHWs in Nigeria regarding malaria case management and the study found that CHWs had inadequate knowledge of malaria case management, which could negatively impact their ability to provide effective care [14]. Olateju Z et al, (2022) underline the importance of addressing the weaknesses and knowledge gaps among CHWs to ensure that they can perform their duties effectively by providing adequate training and resources [15].

The study showed that most of the CHWs (76.06%) were very comfortable with conducting home visits to identify suspected cases of EPD. According to the WHO (2020), CHWs are trained to provide health services at the community level and in the home [16]. The fact that the majority of CHWs are comfortable with home visits could be explained by the high proportion (90.14%) of CHWs with at least one year's experience as a CHW, compared with 7.86% with less than one year's experience. This could also lead to a need for capacity building on CBS and the role of CHWs.

CHWs are frontline health workers who build individual and community capacity by increasing knowledge and self-sufficiency through outreach, health education, informal counseling, social support, and advocacy. The confidence level of CHWs may vary depending on their training, experience, and the specific epidemic-prone disease they are dealing with [17]. In our study, the majority of CHWs (71.83%) were confident in their ability to educate community members about the importance of disease surveillance and reporting. This could be explained by the high proportion (90.14%) of CHWs with at least one year's experience as a CHW and level of education with 91.55% having at least secondary or university education. The process of data collection and recording is an essential part of the work of the CHWs. The experience and level of education of CHWs



in our study could explain the fact that major CHWs were very family (64.79%) with the process of collecting and recording data related to CBS.

Most of the CHWs (64.79%) expressed their need for additional training to improve their knowledge and skills in CBS. Some CHWs are new, and others were certainly trained months or even years ago, with no local supervision, contrary to what is recommended [13]. The need for capacity building is therefore considerable. According to Onyekachi Ifudu (2021), to improve the effectiveness of community-based surveillance, continuous training of primary healthcare workers is essential [18]. Well-trained CHWs could improve community knowledge. According to Boyce MR, & Katz R (2019), the programs run by the community relays help to improve the knowledge and awareness of communities, encouraging them to report EPD [19].

## Conclusions

The study found that CHWs in Ganjuwa communities have strengths and areas for improvement in their knowledge, skills, and attitudes regarding disease surveillance and reporting. While most CHWs correctly identified Diphtheria as the most common EPD in their area, their knowledge of other diseases such as Measles, Lassa Fever, and Pertussis was limited. Additionally, their understanding of the mode of transmission of these diseases was poor. However, CHWs showed a good understanding of how CBS can help in detecting epidemic diseases. They recognized the importance of CBS in monitoring and reporting unusual disease patterns or outbreaks, providing early warning signs of potential epidemics, and facilitating prompt response and control measures. Although CHWs had some knowledge gaps, they expressed confidence in conducting home visits to identify suspected cases of EPD and were comfortable educating community members about disease surveillance and reporting. The study highlights the need for targeted training interventions to improve the knowledge and skills of CHWs in disease surveillance and reporting. By addressing the identified knowledge gaps and providing ongoing training and support, CHWs can play a vital role in detecting and responding to epidemic-prone diseases effectively.

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## Conflicts of interest

The authors declare no conflicts of interest.

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**Corresponding author:**

André Izacar Gaël BITA  
ICT University, Yaounde, Cameroon;  
Email: bitagael@gmail.com