

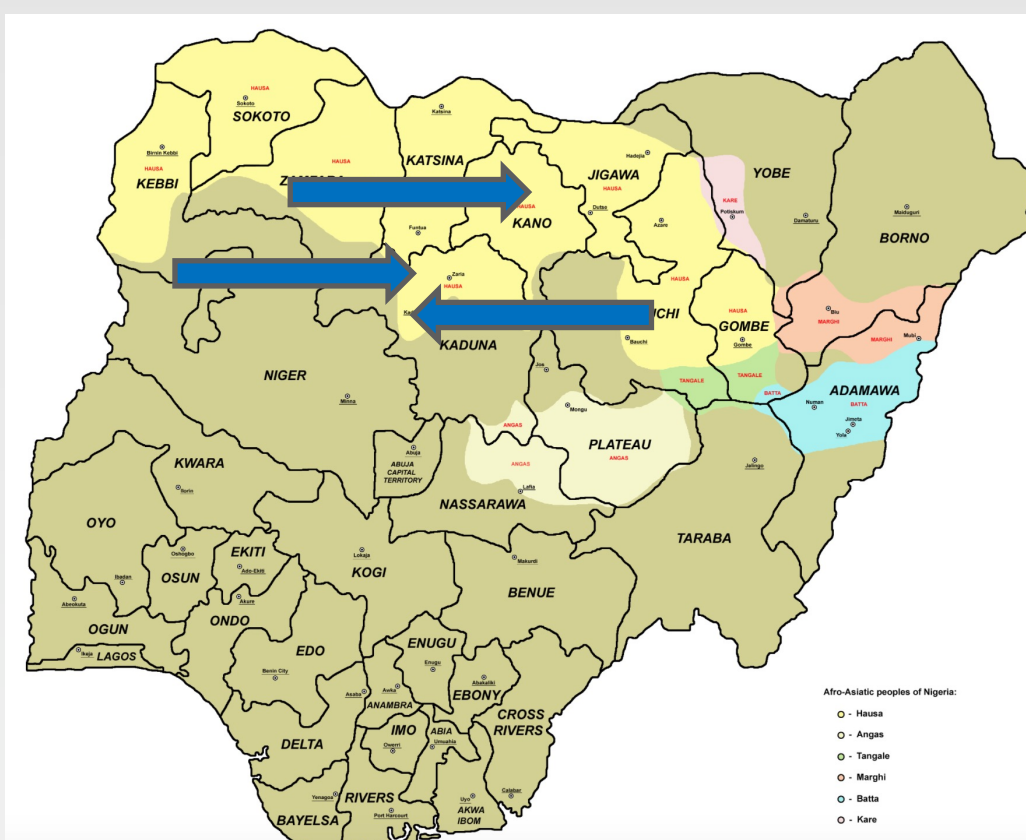
## Abstract

**Objective:** Determine the prevalence of active epilepsy among children in northern Nigeria.

**Methods:** Epilepsy trained community health workers (CHWs) screened children, ages 6 months to < 17 years, door-to-door for epilepsy using a Hausa language validated epilepsy screening tool designed to detect convulsive and non-convulsive epilepsies. Sampling of houses screened in Zaria, Kaduna, and Kano metropolitan areas was performed using a random walk method developed by the World Health Organization. Children who screened positive were evaluated by physicians and CHWs; final diagnosis of epilepsy was made by physicians with epilepsy expertise. The screening data and all other data in the BRIDGE studies were entered directly into a REDCap database and transmitted to the BRIDGE office in Kano, and the data coordinating center at Vanderbilt Institute for Global Health

**Results:** 1197 of 30,579 children who were screened door-to-door using the Hausa language epilepsy screening tool screened positive; final epilepsy diagnoses were verified by physicians with expertise in epilepsy in 1181 of these children. The prevalence of active epilepsy was 38.7 per 1000 (95% CI = 36.5, 40.8).

**Conclusion:** The prevalence of active epilepsy in a door-to-door survey in the local language, using a screening tool designed to ascertain convulsive and non-convulsive epilepsy (e.g., focal onset with altered awareness, absence), administered by epilepsy-trained CHWs was higher than prior estimates in northern Nigeria. The burden of epilepsy in these communities may have been significantly under-estimated by previous studies.



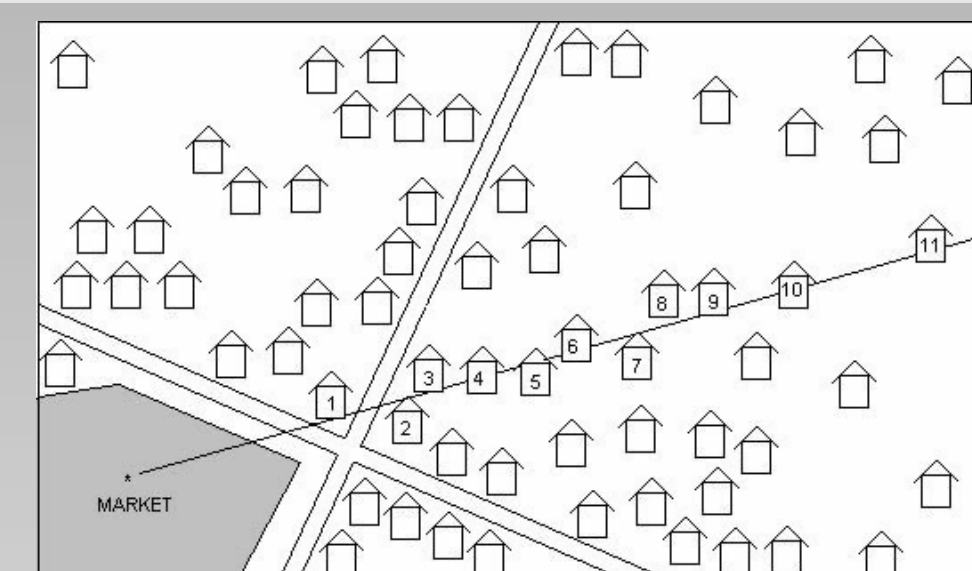
**Fig 1:** Yellow= Hausa-speaking areas. Arrows= study areas.

**Table 1. Epilepsy Screening Tool**

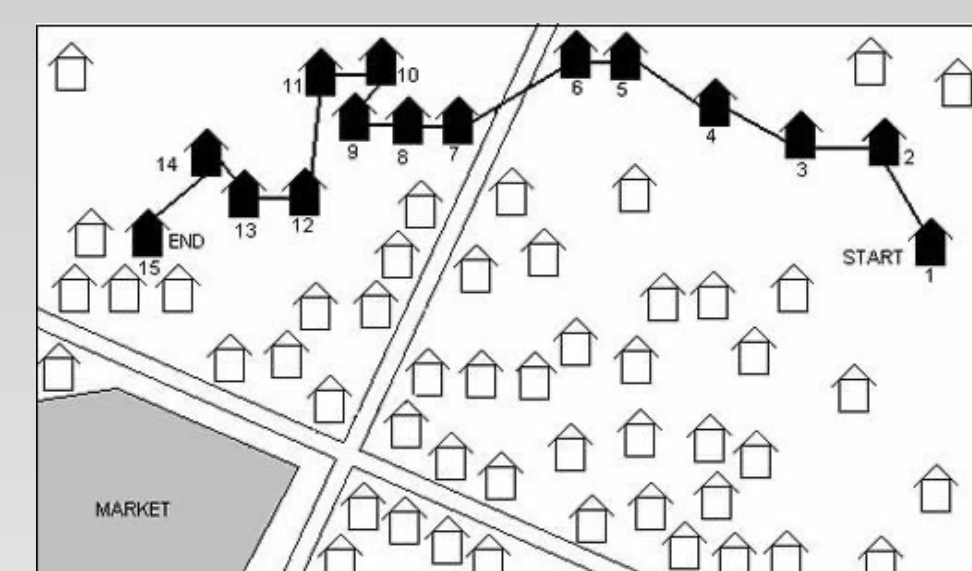
1. Has (name) ever had a seizure, fit, or convulsion?
  - a) ? 2 or more episodes
  - b) ? without a fever
  - c) ? alteration of awareness.
2. Has (name) ever had episodes of altered awareness?
3. Does (name) have clusters of sudden head drops, nodding, with/without arms extending/elevating, with/without unexplained falls?

## Materials and Methods

Door-to-door screening for childhood epilepsy was performed in communities served by 60 randomly-selected primary healthcare centers (PHCs) in Kano (30 communities), Zaria (15 communities, and Kaduna (15 communities; fig 1). Sampling for door-to-door screening was performed using the “random walk” developed by WHO. Standing at a central community landmark (mosque, market, PHC), the CHW spun a pencil in the air, falling to the ground. Then the CHW walked in the direction indicated by the point of the pencil (fig 2). The number of houses between the starting point and the boundary of the community was counted, and then a random number would be selected (e.g., 11). The walk started at the randomly selected and a different “random” path was taken back to the landmark (fig 3). The process was continued in each community until there was sufficient enrollment in the BRIDGE clinical trial. The Hausa language epilepsy screening



**Fig 2:** Random Walk Start.



**Fig 3:** Selecting the Houses

consisted of three initial questions (table 1). “Yes” to question 1a and 1b, and/or question 2, and/or question 3 was a positive screen. Epilepsy-trained CHWs were trained to answer questions regarding these specific questions from mothers. Mothers of children who screened positive first were asked an additional 15 questions designed to help clinicians classify seizure types and epilepsy syndromes. Then children who screened positive underwent epilepsy evaluations with final diagnoses of epilepsy made by physicians with expertise in epilepsy. Epilepsy-trained CHWs each had secure password protected android tablet computers with all study materials. Case report forms (CRFs) with all screening and diagnostic evaluations were completed directly into REDCap, with all data transmitted electronically to the BRIDGE data coordinating center. The community screening was preceded by a community engagement program with community leaders and community epilepsy education programs broadcasted on local radio. Consent was obtained prior to screening. The study was approved by the Vanderbilt IRB and by Ethics Committee at Aminu Kano Teaching Hospital, with approval by appropriate government agencies.

## Results

30,579 children (15,460 female; 50.6%) were screened for epilepsy using the random walk door-to-door methods, of which 1197 (screened positive, and 1128 received a final diagnosis of active epilepsy by physicians. The overall prevalence of active epilepsy was 38.7 per 1000 children (95% CI = 36.5, 40.8). 430 of 15,460 (2.8%) females screened positive for epilepsy compared to 767 of 14,336 (5.1%) of males who screened positive for epilepsy. 16 of 30,579 children (0.52 %) screened, all of whom screened negative for epilepsy, had unknown or unspecified gender.

## Results, continued

2.6% (402 of 15,460) of females screened had a final diagnosis of active epilepsy compared to 4.8% (728 of 15,103) of males screened who had a final diagnosis of epilepsy. Less than 1% of eligible households did not consent to epilepsy screening and/or diagnostic evaluations.

## Conclusions

- This active childhood epilepsy prevalence in northern Nigeria is higher than most previous prior estimates.
- The relatively low prevalence in girls is unexplained. Possible explanations include the following:
  - Children ascertained with epilepsy may represent a survival cohort -more females with epilepsy dying prior to screening.
  - Some etiologies of epilepsy in northern Nigeria may be more common in males (e.g., trauma).
- The publicity and recruitment into the BRIDGE clinical trial may have brought more children into the screening area of the door-to-door sample causing an over-estimate of the active epilepsy prevalence.
- Given our previously reported epilepsy treatment gap in the BRIDGE study (>95%), the estimated prevalence of childhood epilepsy of 38.7 per 1000, and the estimated childhood population in northern Nigeria of about 55 million, there many children with untreated epilepsy in northern Nigeria.
- Rigorous epilepsy incidence and prevalence studies are needed in northern Nigeria.

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