# Prevalence and Risk Factors for Stroke in an Adult Population in a Rural Community in the Niger Delta, South-South Nigeria

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Sub-Saharan Africa is experiencing an epidemiologic transition with stroke contributing to the disease burden. However, community-based stroke prevalence studies are sparse. This study aimed to determine the prevalence of stroke in a rural population in the Niger Delta region in south–south Nigeria and to describe known risk factors for stroke among them. A door-to-door stroke prevalence study was conducted in 2008 among randomly selected adults of 18 years or older in rural Kegbara-Dere community in Rivers State, south–south Nigeria. We administered a modified screening tool by the World Health Organization, a stroke-specific questionnaire, and conducted a physical/neurological examination (on persons screening positive) in 3 stages of assessments. The crude prevalence of stroke was 8.51/1000 (95% confidence interval [CI] = 3.9-16.1) representing 9 of 1057 participants. The age-adjusted prevalence was 12.3/1000 using the US Population 2000. Men had higher unadjusted prevalence than women (12.9/1000 versus 5.1/1000) but were not at more risk (unadjusted relative risk = .99; 95% CI = .98-1.00). Stroke prevalence increased with age (Mantel–Haenszel $\chi^2$ $P$ = .00). Hypertension (blood pressure ≥140/90 mm Hg) was present in all stroke cases and diabetes mellitus (fasting blood sugar >126 mg/dL) in 1 person, but none had hypercholesterolemia, obesity (body mass index >30 kg/m$^2$), or a history of alcohol intake or smoking. Stroke prevalence was found to be high, commoner among men and the elderly population, and likely to be predisposed by hypertension, in rural south–south Nigeria. The need to conduct follow-up studies on the burden and outcomes of stroke among this study population is acknowledged. **Key Words:** Stroke—prevalence—rural population—Niger Delta—Nigeria.


## Introduction

Developing countries carry about 90% of the global disease burden.[1] Of these, cerebrovascular disease (stroke) ranks fourth after perinatal conditions, respiratory infection, and ischemic heart disease.[2] Many countries in sub-Saharan Africa (sSA), including Nigeria, are experiencing an epidemiological transition of disease burden, from communicable to noncommunicable diseases (NCDs), with stroke being the forerunner. Most often, the threat posed by the emergence of NCDs is underestimated and often denied.[3,4] Typically, communities in resource-constraint settings struggle to cope with the direct effects of poverty, ethnoreligious conflicts, fragile social and economic structures, and HIV/AIDS.[4] Meanwhile, the impact of NCDs appears insidious and less direct, but little reliable evidence is available.[3]

A rural, community-based study of neurological disorders in southwest Nigeria, which was conducted about 3 decades ago, reported a stroke prevalence of .58/1000.[5] More recently, a stroke prevalence study in an urban,

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mixed-income community in Lagos, also in the southwest, gave a prevalence rate of 1.14/1000.[6] However, the current status of stroke is unknown in rural populations in the Niger Delta region in south–south Nigeria. Population differences in the prevalence of stroke usually follow sociocultural and geographical distinctions, and are important to highlight, in view of conducting focused interventions. Such information guides resource allocation and the development of local plans for strategies to address the problem of stroke. Apparent shifts in population characteristics are what account for the epidemiological transition being experienced by the third world communities such as those in Nigeria.[3,4]

The Center for Disease Control report on the prevalence of stroke in the United States in 2005 showed that a substantial difference existed in the prevalence of stroke among States and by areas of residence.[7] For instance, many States with high estimates were concentrated in the southeast of United States and corresponded with high rate of stroke mortality in the region that has been traditionally called the "stroke belt."[7,8] Similarly, in India, stroke in Calcutta showed a low prevalence rate of 1.5/1000,[9] whereas it was substantially high at a prevalence rate of 8.4/1000 in Parsis, Mumbai.[10] These divergent rates could be because of innate factors such as widely different age composition, differences in the prevalence of stroke risk factors, or ethnicity.[4,8,11] It could also be possibly because of extrinsic factors such as variation in the amount of trace elements in the environment,[12] migration patterns, or inaccuracy of records owing to weak health systems.[11]

This study aimed to determine the prevalence of stroke in a rural population in the Niger Delta region in south–south Nigeria and to describe known risk factors for stroke among them.

## Materials and Methods

A cross-sectional study of the prevalence of stroke and its risk factors among adults aged 18 years and older was conducted in Kegbara-Dere (K-Dere) community in July 2008, along with a study of hypertension prevalence.[13] Both were part of an annual door-to-door community enumeration of health status indicators that was organized by the Department of Preventive and Social Medicine, University of Port Harcourt, Port Harcourt. K-Dere is a rural farming settlement in Ogoniland of an estimated 19,968 people[14] and about 40 km distance from Port Harcourt, the capital city of Rivers State in the Niger Delta region, south–south Nigeria.

Details of sample size determination and sampling of 500 households, based on the survey of hypertension prevalence, have been previously reported.[13] The research team comprised the authors, field clinicians, and field assistants. The clinicians participated in conducting neurologic examination of study participants, whereas the field assistants, who were final-year medical students, administered the questionnaires/checklists after undergoing training.

### *Study Procedure*

The study featured 3 stages of assessment. The first stage involved the use of a general interviewer–administered, structured questionnaire that was developed for the enumeration of household demographic/health status indicators. For the stroke study component, a stroke-screening tool was included and administered to all adults aged 18 years and older in the selected households. The stroke-screening tool was adopted from a modified World Health Organization protocol for epidemiologic studies of Neurological Disorders.[6]

The second tool for the next stage of screening was a stroke-specific questionnaire developed by Danesi et al[6] and administered to only the individuals who screened positive for stroke from the first stage. The third and final stage of screening was conducted 5 months later. This involved the physical and neurological examination of only those who had screened positive from the second stage. These participants were visited individually in their homes and invited to the Primary Health Care Center within the community for general medical, neurological, and laboratory examination. The measurements included blood pressure, body mass index (BMI), blood sugar, and serum cholesterol; a history of alcohol use and cigarette smoking was also taken. The examination was at no cost to the participants and none declined. Onwuchekwa, A.C. and another neurologist (Asekomeh, E.G.) examined the participants for a period of 3 days. The diagnosis of stroke was based on the World Health Organization definition.[15,16]

### *Data Management and Analysis*

All data were entered and analyzed in Epi-Info version 6.04 d. The chief outcome variable was the proportion of study participants diagnosed with stroke. Crude- and age-adjusted prevalence of stroke were calculated; the age-adjusted analysis was by direct standardization method using the Year 2000 US population as the reference.[17] Two-way frequency distributions were computed for crude prevalence rates of stroke by age and sex. Rates and means were presented with 95% confidence intervals (CIs) and compared for differences using chi-square ($\chi^2$), Fisher exact, and Student $t$ tests as appropriate. The level of significance was set at a $P$ value less than .05. Relative risks (RRs; with 95% CIs of RRs) were calculated as prevalence ratios to demonstrate relationship between variables. Mantel–Haenszel chi-square test for linear trend was used for the comparison of unadjusted rate across the age groups.

### *Ethical Considerations*

Verbal consent was obtained from all the study participants at each stage of the survey. The Department of