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Stroke in Rural Communities: A Need for Continued Surveillance

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In recent years, communicable and maternal health disease rates have declined throughout the world [1]. On the heels of this accomplishment, the developing world faces an ever-increasing burden of chronic disease, such as diabetes, heart disease and stroke. This rise in chronic disease is driven in part by changing lifestyles and modernization in rural parts of the world that bring less healthy food choices, smoking and other possible links to disease such as air pollution. Because it is the leading cause of disability, an unchecked increase in stroke prevalence may hinder social and economic progress in much of the world.

Worldwide stroke mortality declined from 2010 to 2013; however, overall prevalence is increasing [2]. This prevalence is especially increasing in adults aged 20–64, a trend that is even more pronounced in the developing world. This trend reflects an increase in survival from stroke as well as increasing incidence in certain geographic areas. Despite improvements in mortality rates, stroke still represents the second leading cause of death worldwide [3]. Stroke incidence is especially increasing in India, and it has nearly doubled since 2010 [4]. Because of the disparity in stroke incidence that exists between developed and less-developed nations, there is an urgent need to understand the factors that drive stroke prevalence.

In this issue of *Neuroepidemiology*, Kalkonde et al. [5] highlight the stroke prevalence in Gadchiroli, a region in rural central India. In this well-designed study, they report an age-standardized prevalence rate of 535.58/100,000 residents. Stroke in Gadchiroli is also increased relative to surveillance efforts that were taken 20 years ago, when the prevalence was only 50% of what it is today. This increased prevalence cannot probably be explained by the ‘graying’ of the population, as the average age of stroke patients was 60.9 (SD 14.7). This prevalence is more than the reported stroke prevalence from other studies in rural India and is higher than the prevalence rate in low and middle-income countries. In fact, prevalence rates have been increasing in a linear fashion since the 1980s. The reasons for this trend are not known.

A fundamental question in stroke prevalence estimates is whether increases are because of increasing survival rates (i.e. de-

creased mortality) or increasing incidence of stroke. Making this distinction has important implications. The former may indicate improved care of stroke patients resulting in the survival of increasing numbers of patients with some disability. If mortality is decreased, resources should be dedicated to reducing disability after stroke. The latter would indicate a need to understand reasons for increasing incidence. If incidence is increased, efforts should focus on primary prevention. These efforts would involve the identification and treatment of risk factors. Determining stroke incidence rates in Gadchiroli combined with prevalence estimates would enable a complete understanding of stroke trends.

Understanding disease prevalence is vitally important for resource distribution. Given the high prevalence, it is important to reflect on how resources are distributed in Gadchiroli. Better than many regions of the world, Gadchiroli has neurologic expertise. Like many other regions, a majority of stroke patients in this region do not receive imaging with CT or MRI. The proportion of patients who receive care in the hospital system during the acute phase of stroke is not reported. More funding, either government or private, for the hospital system and stroke surveillance network will occur only if the scope of the problem is understood.

A major strength of this report is the use of trained community health workers who conducted door-to-door surveys in the local language. This step was important to gain community trust and encourage accurate reporting. Verification through a cohort using imaging or pathological confirmation would re-affirm diagnostic accuracy, although this is not feasible in many settings. A potential limitation is that minor strokes may go unreported especially if the diagnosis was not confirmed at the time of symptoms. There is no simple method to address underreporting, although more frequent surveillance may trigger improved recollection of symptoms by patients. Finally, it is important to recognize, as has been done in other epidemiological studies, that more extreme rates of incidence and prevalence are common in smaller geographic areas. These results need to be confirmed in other similar locations and if they are not reproduced, we should understand why they manifest in Gadchiroli.

This study highlights the need for continued surveillance systems for stroke, especially in regions where there is low hospital utilization. It is surprising that previous studies in this area were conducted more than 20 years ago. What must follow the assessment of careful prevalence estimates is an understanding of incidence. Following this work, targeted interventions can be designed to reduce stroke burden. Such interventions could occur at the policy or community level. Examples of policy level interventions are smoking bans in public spaces, tax incentives that favor purchase of healthy foods, or public spaces available for exercise. Community-level interventions could include blood pressure screenings, programs to allow diabetes and hypertension medica-

tions to be available at minimal cost, or nutrition education. Stroke is largely preventable and low-cost simple approaches could save many lives and years of disability. The first step toward prevention is identification of stroke trends.

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References

- 1 Lozano R, Naghavi M, Foreman K, et al: Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380:2095–2128.
- 2 Krishnamurthi RV, Feigin VL, Forouzanfar MH, et al: Global and regional burden of first-ever ischaemic and haemorrhagic stroke during 1990–2010: findings from the Global Burden of Disease Study 2010. *Lancet Glob Health* 2013;1:e259–e281.
- 3 Feigin VL, Forouzanfar MH, Krishnamurthi R, et al: Global and regional burden of stroke during 1990–2010: findings from the Global Burden of Disease Study 2010. *Lancet* 2014;383:245–254.
- 4 Das A, Botticello AL, Wylie GR, Radhakrishnan K: Neurologic disability: a hidden epidemic for India. *Neurology* 2012;79:2146–2147.
- 5 Kalkonde YV, Sahane V, Deshmukh MD, Nila S, Mandava P, Bang A: High prevalence of stroke in rural Gadchiroli, India: a community-based study. *Neuroepidemiology* 2016;46:235–239.