

A HEART-HEALTHY AND “STROKE-FREE” WORLD THROUGH POLICY DEVELOPMENT, SYSTEMS CHANGE, AND ENVIRONMENTAL SUPPORTS: A 2020 VISION FOR SUB-SAHARAN AFRICA

The vision of a heart-healthy and “stroke-free” world is achievable through the aggressive prevention and control of cardiovascular risk factors. In sub-Saharan Africa, a region plagued by infectious and parasitic diseases, nutritional deficiencies, and excessive maternal and perinatal morbidity and mortality, the prevention of cardiovascular diseases (CVD) and risk factors is rarely on the public health agenda. In Africa, however, as recently documented by the World Health Organization’s Africa Regional Office, CVD and other chronic non-communicable diseases are on the increase and already represent a significant burden on public health services. Age-specific mortality and morbidity associated with CVD and chronic diseases are higher in sub-Saharan Africa than in established market economies. Correspondingly, adverse trends in risk factor profile are beginning to appear especially in many urban centers in sub-Saharan Africa. Addressing and reversing these trends will take more than just targeting individuals and their behaviors and lifestyle choices. More importantly, to support heart-healthy choices, emphasis must be placed on policy development, systems changes, and issues in the social environment factors such as the need to strengthen legislation and regulatory mechanisms, which control the leading risk factors (eg, tobacco, physical inactivity, and poor nutrition). We must develop and conduct heart-healthy and “stroke-free” initiatives to take place in diverse community settings: schools, worksites, communities, and healthcare systems. In addition, public health capacity and infrastructure must be strengthened to provide adequate surveillance and the assurance that best practices are implemented. Action is needed to integrate health promotion, risk factor control and disease prevention within the primary healthcare setting. Above all, population-based approaches must be used to promote education and awareness of the importance of CVD risk factors. In sub-Saharan Africa, where most people have no more than one CVD risk factor, a unique opportunity exists for primordial prevention, ie, preventing the development of risk factors in the first place. The policy and environmental change strategies discussed provide a road map to a heart-healthy and “stroke-free” future. (*Ethn Dis.* 2003; 13[suppl2]:S2-4–S2-12)

Key Words: Heart Disease, Stroke, Risk Factors, Non-communicable Diseases, Developing Countries, Sub-Saharan Africa, Policy Development, Systems Change, Environmental Support

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THE GLOBAL BURDEN OF CARDIOVASCULAR DISEASES

Cardiovascular disease (CVD) is the leading cause of mortality worldwide.^{1–7} The principal forms of CVD, ischemic heart disease and stroke, ranked first and second among the 15 leading causes of death in 1990 and are expected to maintain these ranks in 2020.⁷ The Global Burden of Disease Study has estimated that CVD accounts for 30% of global mortality with most of the deaths occurring in low- to middle-income countries.^{5,8,9} In fact, in 1998 alone, CVD accounted for 30.9% of total deaths and 10.3% of the disability adjusted life year (DALY) loss.⁹ Of this burden, 78% of the CVD attributable mortality and 86.3% of CVD attributable DALY loss came from low- and middle-income countries.⁹ Although infectious and parasitic diseases remain the leading cause of death in developing countries (with 9.17 million deaths in 1990), CVD ranks a close second (with 9.08 million deaths in 1990), thus illustrating the double burden of communicable and non-communicable dis-

eases (NCD) that developing countries face.⁵ Based on these findings, CVD should no longer be considered rare or unimportant for purposes of clinical and public health planning in developing countries.

THE BURDEN OF DISEASE IN SUB-SAHARAN AFRICA

In sub-Saharan Africa, CVD is not yet a leading killer. As can be determined from Table 1, CVD accounts for only 9.2% of the mortality estimate for 2001 (11% in the “high child-high adult mortality” stratum, and 8% for the “high child-very high adult mortality” stratum).¹⁰ What then, is the basis for the concern over an “impending pandemic” of CVD in developing countries and the emphasis on preventing a CVD epidemic in sub-Saharan Africa?¹¹ A brief review of the global trends in CVD over the last century and the emerging evidence of adverse trends in CVD risk factors and mortality from sub-Saharan Africa provide compelling evidence for concern.^{11–19}

In the late 19th century and early 20th century, the leading cause of death worldwide was infectious disease stemming from overcrowding, poverty, inadequate housing, unsafe water, and poor sanitation and hygiene.^{20,21} In these settings, pneumonia, tuberculosis, diphtheria, typhoid fever, and dysentery flourished. In the United States, for example, the 3 leading causes of death in 1900 were pneumonia, tuberculosis, and diarrhea/enteritis, which (together with diphtheria) caused one third of all

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Table 1. Deaths by cause and mortality stratum within the WHO Africa region, estimates for 2001*

	High Child and High Adult Mortality Stratum (in thousands)	High Child and Very High Adult Mortality Stratum (in thousands)
Total population	301,878	353,598
Total number of deaths	4,365	6,316
A. Deaths due to communicable diseases, maternal & perinatal conditions, and nutritional deficiencies	2,968	4,615
—HIV/AIDS	404	1,793
—Respiratory infections	455	584
—Malaria	492	471
—Childhood diseases	403	292
—Others	1,214	1,475
B. Deaths due to non-communicable diseases	1,098	1,264
—Cardiovascular diseases	482	503
—Malignant neoplasms	241	303
—Others	375	458
C. Deaths due to Injuries	298	437

* These estimates were produced by WHO using the best available evidence. They are not necessarily the official statistics of Member States.¹⁰



Fig 1. Map of Africa depicting the 48 countries (white areas) of the sub-Saharan African region

deaths that year.²² Today, life expectancy has increased and can be attributable to the control of infectious diseases, more widespread vaccination, improved sanitation and hygiene, and provision of safe water.^{22,23} However, concomitant with the decrease in infectious disease are demographic changes coupled with social, cultural, and behavioral changes that have led to an increase in prevalence of CVD and risk factors.

The environment and conditions within the United States in the early 1900s are not very different from existing conditions in most of sub-Saharan Africa today. Figure 1 shows the 48 countries that are known as sub-Saharan Africa. Together, these nations comprise about 10% of the world's population. Poverty, undernutrition, unsafe water, and poor sanitation are rampant in this region. Childhood and maternal undernutrition alone accounts for 23% and 20% of deaths in females and males respectively.¹⁴ Similarly, environmental risks (predominantly unsafe water, sanitation and hygiene) account for 12% and 11% deaths in females and males, respectively.¹⁴ Thus, one third of mortality is caused by undernutrition and environmental conditions closely linked to poverty. Unsafe sexual practices and the HIV/AIDS epidemic contribute an additional 9%–10% of mortality, and contribute to alarming rates of disability. Together, maternal and child undernutrition, environmental risks, and unsafe sex account for approximately 40%–45% of the deaths in sub-Saharan Africa.¹⁴ Given the magnitude of this burden, it is not surprising that policy makers would pay less attention to CVD.

In reality, sub-Saharan Africa bears a double burden of disease.^{2,24,25} As recently documented by the World Health Organization's Africa Regional Office, CVD and other chronic NCDs are on the increase and already represent a significant burden on public health services.²⁶ CVD and the other major chronic NCDs caused 28% of morbidity and

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35% of mortality in the region in 1990.²⁶ If current programs to address communicable disease are effective, the toll from NCDs will increase to 60% of morbidity and 65% of mortality by 2020.²⁶ In fact, age-specific mortality and morbidity associated with CVD and some chronic diseases are already higher in sub-Saharan Africa than in established-market economies as shown by Walker et al.²⁷ This report estimated that, among 15–64 year olds in an urban area in Tanzania, the yearly age-adjusted mortality rate per 100,000 was 65 (95% CI; 39–90) for men, and 88 (95% CI; 48–128) for women. For a similar age group in England and Wales, the 1993 rates were 10.8 (95% CI; 10.0–11.6) for men and 8.6 (95% CI; 7.9–9.3) for women. This comparison reflects a 6- to 10-fold greater age-specific mortality rate in Tanzania compared to the United Kingdom. Adverse patterns in risk factor profile are beginning to appear, especially in many urban centers in sub-Saharan Africa.^{13–15,28} Current evidence suggests that significant population groups in sub-Saharan Africa have already made the epidemiological transition to NCDs, including an increasing number of CVDs. One important difference is that the epidemiologic transition is happening at a much faster rate than ever witnessed in other regions of the world. If targeted interventions are not put in place to prevent the development of CVD risk factors in sub-Saharan Africa, the public health picture at 2020 and beyond may

appear no different than what is seen in the rest of the world today.

A UNIQUE OPPORTUNITY FOR PRIMORDIAL PREVENTION IN SUB-SAHARAN AFRICA

The conditions that will propel CVD to epidemic proportions in sub-Saharan Africa include: 1) improvements in the prevention and control of HIV/AIDS and other infectious and parasitic conditions; 2) improvements in maternal and child undernutrition; 3) increased life-expectancy and concomitant aging of the population; and 4) increasing prevalence of adverse behaviors and lifestyles, which will lead to greater prevalences of high blood pressure, high blood cholesterol, tobacco use, physical inactivity, overweight, obesity and type 2 diabetes (Figure 2).^{38–44} These first 3 conditions are desirable; we must facilitate their success in sub-Saharan Africa. The fourth condition is undesirable, yet provides a unique opportunity for primordial prevention in sub-Saharan Africa.^{29,30} Although the trends for increasing prevalence of CVD risk factors is worrisome,^{31–33} in general, the overall prevalence of the major risk factors are relatively low,³⁴ except for hypertension and cigarette smoking in males. The challenge is to identify the overall mechanisms that will prevent the development of CVD risk factors and thus avert the CVD epidemic in sub-Saharan Africa.

Lessons learned from CVD prevention and control in developed countries offer 2 complementary approaches: “population-based” and “high-risk.”^{35–37} The population-based approach uses community-wide interventions. The interventions are designed to shift the risk factor distribution in the population and reduce the average levels of risk factors. Because the interventions target a large number, even small changes in risk factor levels translate into substantial

gains in CVD events prevented. The high-risk approach targets individuals with high levels of established risk factors. The goal for this approach is to reduce risk factor levels among the high-risk population and to increase the rate of individuals with controlled risk factors. Although large reductions in risk factors can be achieved for an individual in the high-risk approach, the cumulative population gains tend to be relatively small because comparatively few individuals are targeted.^{35,38} With this in mind, the population-based approach must remain the fundamental strategy for CVD prevention in this setting, and is particularly important in sub-Saharan Africa where up to two thirds of the population have not yet established CVD risk factors and only 5% have 2 or more established risk factors.³⁴ Within this paper, we explore strategies for policy, system, and environmental changes that can be incorporated into a population-based approach to CVD prevention.

POLICY DEVELOPMENT AND POLICY CHANGE

The notion that individual health choices and personal behaviors are the most important determinants of susceptibility to NCDs is an idea whose time has come and gone.^{44–47} Although individual choices are important, it is highly unlikely that the impending pandemic of CVD can be averted solely through programs that predominantly target individuals and the choices they make. Instead, a comprehensive approach that addresses the social, cultural, and environmental determinants of health, as well as individual lifestyles and behaviors is more likely to be successful. Such an ecological model assumes individual changes also can result from interventions directed at the social, cultural, and environmental factors which support and maintain unhealthy behaviors.^{44,46,47} Very often, these interventions require

development of new policies to foster heart-healthy behaviors or change of existing policies that maintain unhealthy behaviors.^{39,44,46-62}

Public health policies, developed and overseen by national and local governments, as well as non-government organizations (NGOs) include: laws, regulations, ordinances, and formal, as well as informal, rules.^{46,47} Key areas for government involvement for policy development and policy change include: tobacco control; food and nutrition; availability and affordability of essential drugs; and activities that affect health in schools. Several important publications provide a useful resource for planning policy interventions in the areas of tobacco control^{51,58,63-66}; food and nutrition^{52,64,65,67-69}; availability of essential drugs^{59,70-84}; school health;^{60,63,85} and work sites.^{85,116} Table 2 lists specific environmental interventions known to be effective in enabling and supporting CVH promotion and the prevention and control of CVD. Additional guidance and examples are provided in the Catalonia Declaration to assist countries and the appropriate institutions, coalitions, and governmental bodies to design and implement policy interventions.⁸⁵

ENVIRONMENTAL AND SYSTEMS CHANGE FOR CARDIOVASCULAR HEALTH PROMOTION AND CVD PREVENTION

Changes in the economic, social, and physical environments⁴⁷ are important in the overall scheme of health promotion and disease prevention. Preventive strategies are most likely to be successful when undertaken in the setting of supportive and enabling environments created by interventions that specifically target the economic, social, and physical environment.^{47,55,56} In the sub-Saharan African context, urbanization is a major contributor that leads to adverse

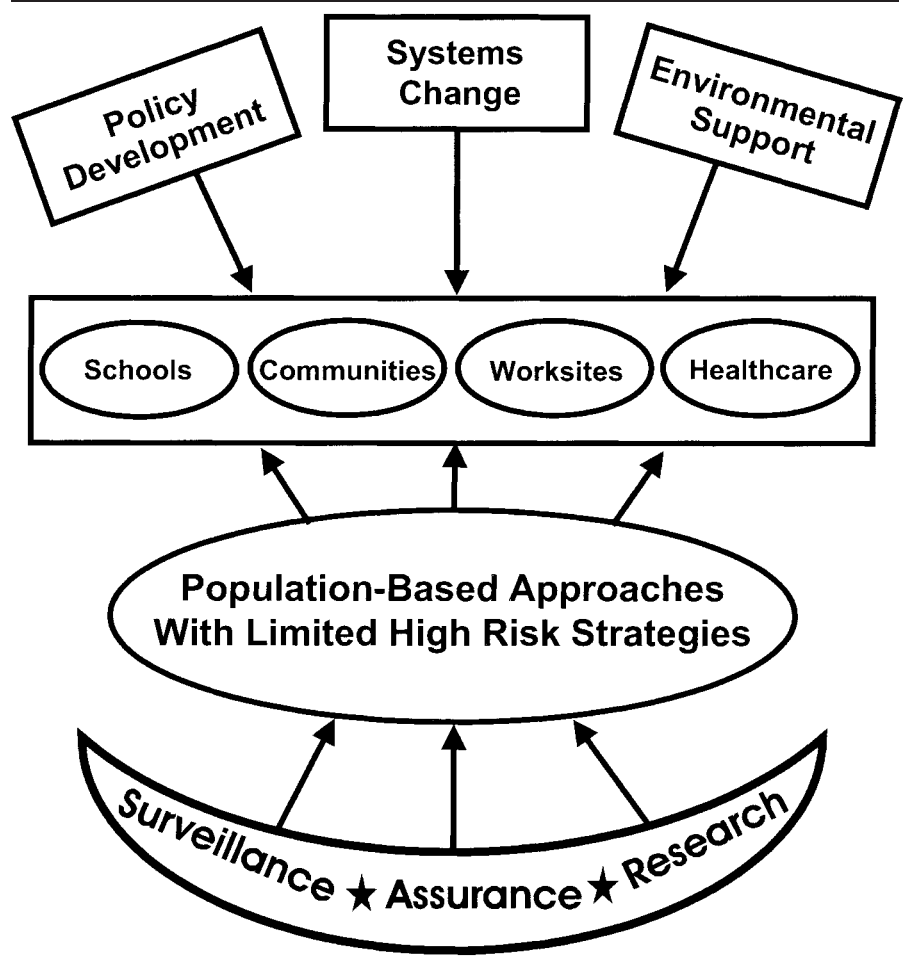


Fig 2. A model for cardiovascular health promotion and disease prevention using policy development, systems change, and environmental supports in concert with population-based strategies in schools, communities, work sites, and healthcare settings

trends in cardiovascular risk factors,^{19,86-94} many of which were amenable to appropriate environmental changes.

With urbanization comes changes in the indigenous way of life, increased reliance on motor vehicles, decreased physical activity, increased intake of calorie-dense “fast foods” and their high-saturated fat content, and increased prevalence of obesity and type 2 diabetes.^{17,19,87,92,94-98} Careful attention to urban planning can ameliorate these unhealthy behaviors. In this regard, the program of the WHO’s Africa Regional Office, “Environment and Promotion of Health,” has made a good start.⁹⁹ This program assists member countries in the

implementation of environmental health policies designed to promote healthy living.⁹⁹ It recognizes the need for intersectoral action for sustainable health development and therefore works to promote comprehensive and partnership-based approaches to systematically address environmental health concerns at the local level. It concentrates on activities linked to healthy cities, healthy schools, healthy villages, healthy markets.⁹⁹ Table 3 shows the African cities that have initiated typical “Healthy Cities Projects.”

Improvements in the delivery of essential preventive services for promoting cardiovascular health and preventing

Table 2. Examples of population-based interventions and strategies effective in promoting cardiovascular health and preventing the development of heart disease and stroke

Settings/Authorities and Goals	Recommended Interventions and Strategies
National Governments	
<ul style="list-style-type: none"> Promote a heart-healthy and “stroke-free” nation Limit tobacco use and exposure to environmental tobacco smoke Monitor tobacco-related disease burden Develop and promote heart-healthy nutrition policies 	<ul style="list-style-type: none"> Develop a public health action plan to fight heart disease and stroke Increase access to preventive health services within an integrated primary healthcare system Promote national observances of heart disease, stroke, and high blood pressure awareness months Support surveillance of high blood pressure and other CVD risk factors Support public health capacity to assess tobacco use and burden of tobacco-related disease Support and enforce international treaties that ban advertising and promotion of tobacco products Use mass media to counter tobacco advertising; ban smoking in public places Set high tobacco prices through taxation
Local Governments	
<ul style="list-style-type: none"> Promote environments supportive of heart-healthy lifestyles Assure best practices for community-based interventions in risk reduction Improve access to essential preventive services 	<ul style="list-style-type: none"> Support WHO’s “Healthy Cities Projects” and adopt the activities linked to healthy cities, villages, schools, and markets Increase the availability of and access to land for recreation and physical activity Increase access to screening for high blood pressure in healthcare settings Develop or enforce policies that limit tobacco access by minors and ban tobacco use in all public places
Communities	
<ul style="list-style-type: none"> Promote health education and advocacy for heart-healthy policies Promote awareness of signs and symptoms of heart disease and stroke 	<ul style="list-style-type: none"> Promote grassroots advocacy for policies and environmental changes supportive of heart-healthy living Create opportunities for persons of all ages to become involved in community activities for CVD and stroke prevention Identify and support community organizations that provide services to heart disease and stroke Support culturally appropriate heart-healthy nutritional alternatives
Schools	
<ul style="list-style-type: none"> Increase heart-healthy behaviors in youth and adolescents Increase knowledge of CVD signs and symptoms and skills in basic CPR Promote schools as models of heart-healthy environments for teachers, other school employees, and students 	<ul style="list-style-type: none"> Include age-appropriate CVH education and health promotion in school curricula Teach the signs and symptoms of heart disease and stroke and the importance of reducing risk factors and eliminating adverse lifestyles Adopt and enforce policies requiring regular physical activity in schools Ban smoking in schools and promotion of tobacco products at sporting events Increase access to screening and counseling for high blood pressure and other CVD risk factors for students, teachers and other school employees Promote nutritious food choices in schools
Work Sites	
<ul style="list-style-type: none"> Increase proportion of employees who adopt heart-healthy lifestyles Promote work sites as models of heart-healthy environments 	<ul style="list-style-type: none"> Discourage smoking at the work site by restricting smoking to designated areas Increase access to and support of smoking cessation programs Teach the warning signs of heart attack and stroke Provide incentives for employees to adopt heart-healthy lifestyles
Health Care	
<ul style="list-style-type: none"> Assure implementation of best practices in CVD prevention Integrate essential preventive services into primary care for all persons 	<ul style="list-style-type: none"> Integrate health promotion, risk factor control and disease prevention within the primary healthcare setting Evaluate and implement cost-effective packages for treatment and control of hypertension and other risk factors such as the WHO model for low-resource settings Promote use of simple reminder systems for healthcare providers

CPR: cardiopulmonary resuscitation; CVD: cardiovascular disease; CVH: cardiovascular health; WHO: World Health Organization

CVD will benefit significantly from improved governance and systems redesign.^{100–105} Investment in a skilled public health workforce, information management systems, improved bureaucracy, and a commitment to a seamless inte-

gration of preventive services within primary health care will be crucial. At all levels, these changes must reflect the underlying ecological model with its emphasis on population-based interventions.

POPULATION-BASED APPROACHES IN MULTIPLE SETTINGS ARE NEEDED

For population-based strategies to succeed in averting the CVD epidemic,

the appropriate preventive dose must be delivered in multiple settings. Four of the most important settings include schools, communities, work sites and healthcare settings. Of these, the school setting is often overlooked. Because CVD begins in youth, schools must be targeted with effective media campaigns for health promotion and effective policies against active smoking and passive exposure to environmental tobacco smoke. Similarly, effective policies on heart-healthy nutrition and physical activity in schools are essential. Specific policies, environmental supports, and other population-based strategies known to be effective at work sites and the healthcare setting must be promoted. In all communities, public health efforts must ensure that heart-healthy choices are easy, fun, and popular.

NECESSARY CAPACITY IN SURVEILLANCE, ASSURANCE, AND PROGRAM-RELEVANT RESEARCH

Without the appropriate infrastructure, a public health workforce with diverse skills,¹⁰⁶ and adequate capacity for the core public health functions,¹⁰⁷⁻¹⁰⁹ no amount of determination can help avert the impending CVD epidemic. However, several models exist for replication.¹¹⁰⁻¹¹³ In particular, the Singapore Declaration provides an extensive discussion of the importance of building capacity and calls on all relevant agencies, organizations, and constituencies “to join forces to . . . eliminate this modern epidemic.”¹¹⁴ It provides examples and guidance on how to build capacity by: 1) developing a heart-health infrastructure at the international, national, and local levels; 2) identifying leadership, policy, economic, scientific, technical, and physical aspects of this infrastructure at each level; and 3) creating individual, organizational, and political will to carry out the implemen-

Table 3. African cities implementing Healthy Cities Projects

Brazzaville, Congo
Accra, Ghana
Ivory Coast: Abidjan and Port Bouet
Blantyre, Malawi
Bamako, Mali
Windhoek, Namibia
Niger: Dosso and Niamey
Ibadan, Nigeria
Senegal: Dakar-Medina and Rufisque
South Africa: Cape Town and Johannesburg
Dar es Salaam, Tanzania
Mbale, Uganda
Kampala, Uganda
Harare, Zimbabwe
Bangui, Central African Republic
Ethiopia: Addis Ababa, Ambo, Hossahina, Burhan, Maichew, Mekele, Assahita, Harara, Assela, Bohardar, Awassa
Libreville, Gabon
Luanda, Angola
Mauritius
Mbabane, Swaziland

Source: World Health Organization Regional Office for Africa.⁹⁹ Available at: http://www.afro.who.int/eph/healthy_cities_project.html. Accessed March 1, 2003.

tation of an appropriate infrastructure for heart health.¹¹⁴ The partnership with international heart health organizations will be invaluable to the sub-Saharan African region in building the necessary capacity for preventing the CVD epidemic.

A ROAD MAP FOR A HEART-HEALTHY AND “STROKE-FREE” FUTURE

The double burden that sub-Saharan Africa bears compels the region to have, as a minimum, a two-prong approach to CVD prevention. As the region increases the commitment to conquer HIV/AIDS, malaria and other communicable diseases, it must also develop the infrastructure for the prevention and control of chronic diseases, especially heart disease and stroke. The key ingredients in the strategy to achieve a heart-healthy and “stroke-free” world in sub-Saharan Africa should include:

1) developing a genuine commitment to population-based strategies as

the cornerstone for programming, and when necessary and economically feasible, utilizing high-risk individual strategies;

2) building adequate capacity, in a stepwise fashion, for CVD and risk factor surveillance at the regional, national, and local levels;

3) investing in a skilled public health workforce and an improved public health infrastructure;

4) promoting health education in schools, especially with regard to the importance of heart-healthy lifestyles and behaviors, as well as the importance and significance of established risk factors and their relation to heart disease and stroke;

5) supporting primordial and primary prevention (beginning in schools but extending to entire villages, towns, communities, work sites, and the healthcare settings);

6) providing effective multi-channel campaigns on the importance of knowing the signs and symptoms of heart disease and stroke and seeking early intervention to prevent death and disability;

7) assuring an effective primary care service that also supports implementation of essential preventive services;

8) supporting grassroots, community-level organizations and partnerships for health;

9) making policy development, policy change and improved healthcare governance a major priority; and

10) investing in program-relevant research.

CONCLUSIONS

The vision of a heart-healthy and a “stroke-free” world is achievable. There is ample evidence that we have the scientific knowledge to prevent and control most cardiovascular diseases.¹¹⁵ Knowledge alone however, is not enough. We must act to mobilize political will, appropriate infrastructure, and a genuine commitment of all govern-

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ments to facilitate the translation of knowledge into practice for the benefit of all persons.¹¹⁴ In sub-Saharan Africa, where CVDs are not yet the leading killers, we have a unique opportunity to prevent heart disease and stroke from becoming the first and second leading causes of death as seen in most other regions of the world. Strategies to help achieve this objective must address policy development, systems change, and environmental supports. Above all, however, the fundamental public health imperative must include a dedication to population-based preventive strategies, complemented by high risk approaches when relevant and resources permit.

These approaches will be supported with an appropriate public health infrastructure, adequate capacity for program-relevant public health research, and long-lasting partnerships with international organizations for the prevention of heart disease and stroke. These steps will go a long way in ensuring that, as we approach 2020 and beyond, heart disease and stroke will not be the leading killers in sub-Saharan Africa and that the region may even become a model for heart-healthy and “stroke-free” communities.

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