

# Noncommunicable diseases in sub-Saharan Africa: where do they feature in the health research agenda?

Nigel Unwin,<sup>1</sup> Philip Setel,<sup>2</sup> Seif Rashid,<sup>3</sup> Ferdinand Mugusi,<sup>4</sup> Jean-Claude Mbanya,<sup>5</sup> Henry Kitange,<sup>6</sup> Louise Hayes,<sup>7</sup> Richard Edwards,<sup>8</sup> Terry Aspray,<sup>9</sup> & K.G.M.M. Alberti<sup>10</sup>

**Abstract** There is no doubt that communicable diseases will remain the predominant health problem for the populations in sub-Saharan Africa, including adults, for the next 10–20 years. Concern has been expressed that the available resources to deal with this problem would be reduced by increasing the emphasis on noncommunicable diseases. The latter, however, already present a substantial burden because their overall age-specific rates are currently higher in adults in sub-Saharan Africa than in populations in Established Market Economies. There is also evidence that the prevalence of certain noncommunicable diseases, such as diabetes and hypertension, is increasing rapidly, particularly in the urban areas, and that significant demands are being made on the health services by patients with these diseases. To ignore the noncommunicable diseases would inevitably lead to an increase in their burden; the provision of health services for them would be largely undirected by issues of clinical and cost effectiveness, and their treatment and prevention would be left to the mercy of local and global commercial interests. Improved surveillance of all diseases within sub-Saharan Africa is needed in order to place noncommunicable diseases properly within the context of the overall burden of disease. Research is needed to guide improvements in the clinical and cost effectiveness of resources currently committed to the care of patients with noncommunicable diseases, and to direct and evaluate preventive measures.

**Keywords** Chronic disease/economics/epidemiology/therapy; Cost of illness; Primary prevention; Health services research; Health priorities; Africa South of the Sahara (*source: MeSH*).

**Mots clés** Maladie chronique/économie/épidémiologie/thérapeutique; Coût maladie; Prévention; Recherche en santé publique; Priorités en santé; Afrique subsaharienne (*source: INSERM*).

**Palabras clave** Enfermedad crónica/economía/epidemiología/terapia; Costo de la enfermedad; Prevención primaria; Investigación sobre servicios de salud; Prioridades en salud; África del Sur del Sahara (*fuentes: BIREME*).

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## Noncommunicable diseases in sub-Saharan Africa: not a priority?

At present, conventional wisdom states that non-communicable diseases are not a high priority area for

health research and development in the countries of sub-Saharan Africa. The estimates in the 1990 Global

<sup>1</sup> Senior Lecturer, Department of Diabetes and Department of Epidemiology and Public Health, University of Newcastle, Medical School, England. Correspondence should be addressed to Dr Nigel Unwin, Department of Diabetes, Medical School, Newcastle upon Tyne NE2 4HH, England (email: n.c.unwin@newcastle.ac.uk).

<sup>2</sup> Principal Research Associate, Department of Diabetes, University of Newcastle, Medical School, England; and Adult Morbidity and Mortality Project, Dar es Salaam, United Republic of Tanzania.

<sup>3</sup> Public Health Physician, Ilala District Health Authority, Dar es Salaam, United Republic of Tanzania.

<sup>4</sup> Senior Lecturer, Muhimbili University College of Medical Sciences, Dar es Salaam, United Republic of Tanzania.

<sup>5</sup> Professor, Department of Internal Medicine, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon.

<sup>6</sup> Public Health Physician, Morogoro Regional Hospital, Morogoro; and Adult Morbidity and Mortality Project, Dar es Salaam, United Republic of Tanzania.

<sup>7</sup> Research Associate, Department of Diabetes and Department of Epidemiology and Public Health, University of Newcastle, Medical School, Newcastle upon Tyne, England.

<sup>8</sup> Lecturer, Department of Epidemiology and Public Health, University of Newcastle, Medical School, Newcastle upon Tyne, England.

<sup>9</sup> Consultant Physician, Department of Diabetes, University of Newcastle, Medical School, Newcastle upon Tyne, England.

<sup>10</sup> Professor, Department of Diabetes, University of Newcastle, Medical School, Newcastle upon Tyne, England.

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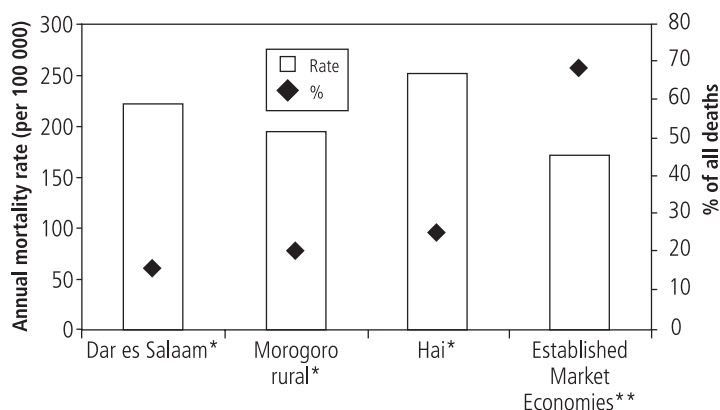
Burden of Disease study suggested that noncommunicable diseases accounted for only 14% of the total burden in sub-Saharan Africa, and for just under a third in adults aged 15–59 years (1). Nonetheless, in absolute terms the estimates also suggested that the probability of death from noncommunicable diseases is higher in sub-Saharan Africa than in Established Market Economies. Because of the lack of reliable mortality and morbidity data from sub-Saharan Africa, these estimates are heavily based on assumptions and extrapolations (2). However, this picture of a high probability of death from noncommunicable diseases with a low contribution of these conditions to the overall burden of disease is supported by real data. Fig. 1 and Fig. 2 present age-adjusted mortality rates from the Tanzanian demographic surveillance system of the Adult Morbidity and Mortality Project (3, 4). The histogram blocks in Fig. 1 and Fig. 2 show that in at least three areas of United Republic of Tanzania, one of Africa's poorest countries, the

probabilities of death from noncommunicable diseases are indeed higher than in Established Market Economies. Additionally, among adults, the age-specific death rates from noncommunicable diseases are substantially higher in all age groups (i.e. 15–29 years, 30–44 years, and 45–59 years) in these three areas of the country than in the Established Market Economies. On the other hand, noncommunicable diseases account for 15–25% of all adult deaths (i.e. in persons aged 15–59 years) in the Tanzanian areas covered by the demographic surveillance system, a much smaller proportion than the 67% (men) to 80% (women) in the Established Market Economies.

Using data from the Global Burden of Disease study, Gwatkin et al. have argued that, irrespective of the high absolute death rates from noncommunicable diseases, to increase the priority given to them (and thus lower the priority accorded to communicable diseases, given the limited resources) would work to the disadvantage of the world's poorest 20%, a quarter of whom live in sub-Saharan Africa (5). This conclusion and its basis have been criticized for several reasons. These include the validity of comparing noncommunicable diseases, which are strongly age related, between populations with very different age structures and life expectancy; and the fact that these analyses were based on the richest and poorest 20% of the world's population, when most of the intervening 60% live in low- and middle-income countries (6). Nonetheless, the paper by Gwatkin et al. helped to enunciate a widely held view that shifting the priority to noncommunicable diseases in low income countries would work to the disadvantage of persons who are most in need. In addition, estimates of the cost-effectiveness of treating noncommunicable diseases are substantially lower than those for many infectious diseases. For example, out of 40 health interventions evaluated in Guinea (7) the most cost-effective treatment for a noncommunicable disease was estimated to be aspirin for pre-existing heart disease, at US\$ 257 per year of life saved. This was ranked 31st out of the list of 40, and contrasts with interventions such as treatment of pneumonia in children, vaccination, and short-course treatment for tuberculosis, all of which were estimated to cost less than US\$ 50 per year of life saved. Similarly, even though cheap and effective drugs exist for the treatment of hypertension, and the potential benefits of its treatment in terms of avoidable mortality are likely to be greater in sub-Saharan Africa than in the Established Market Economies (8), it was ranked last out of the 40 interventions considered, at US\$ 2281 per year of life saved. However, the same study also considered preventive measures, and estimated that tobacco control measures (through legislation and health warnings) were much more cost effective, being ranked 20th at US\$ 77 per year of life saved.

Clearly the priority that should be afforded to noncommunicable diseases is relevant to many parts of the world where communicable diseases still exact a heavy toll, but none more so than in sub-Saharan

Fig. 1. Mortality rates from chronic disease in three areas of the United Republic of Tanzania and Established Market Economies and percentages of total deaths due to chronic disease, for men aged 15–59 years (rates adjusted to the New World population)

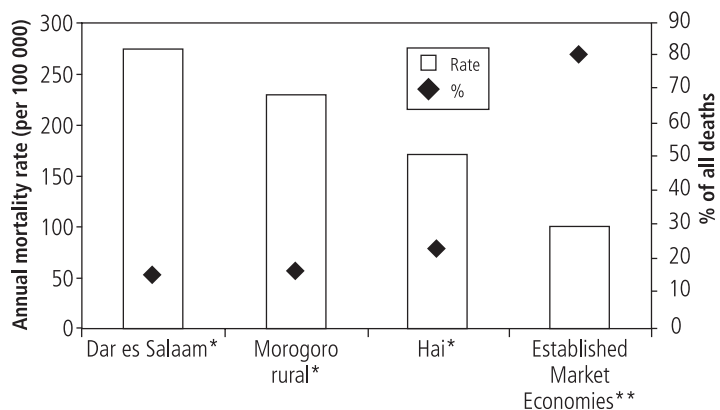


\* Data from Adult Morbidity and Mortality Project.

\*\* Data from ref. 1.

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Fig. 2. Mortality rates from chronic disease in three areas of the United Republic of Tanzania and Established Market Economies and percentages of total deaths due to chronic disease, for women aged 15–59 years (rates adjusted to the New World population)



\* Data from Adult Morbidity and Mortality Project.

\*\* Data from ref. 1.

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Africa. Given the very scarce health care resources available (memorably described as being about the cost of “a meal at McDonald’s” per head of population per year (9)) it is pertinent to ask whether noncommunicable diseases should currently have a place on the research agenda for sub-Saharan Africa at all? And whether the resources for research and development devoted to sub-Saharan Africa should be devoted solely to maximizing the capacity to prevent and treat communicable disease?

### Current and future demands on health care resources from noncommunicable diseases

Whatever the merits of the arguments outlined above, there are several good reasons why noncommunicable diseases must remain on the health research and policy agenda for sub-Saharan Africa.

The burden of noncommunicable diseases in sub-Saharan Africa is already substantial, and patients with these conditions make significant demands on health care resources. Epidemiological data from at least two African countries suggest that in some areas, predominantly urban, the prevalences of diabetes and hypertension have increased markedly over the past 5–10 years. Thus, recent estimates indicate that 5–8% of urban adult populations in Dar es Salaam (United Republic of Tanzania) and in South African townships are affected with diabetes, while 20–33% have hypertension (based on blood pressure levels of  $\geq 160/95$  mmHg) (10–13). At the weekly diabetes clinic in Ilala District Hospital in Dar es Salaam, a government hospital serving a total population of around 500 000, 525 new patients with diabetes attended between 1996 and 1998, with over 5000 clinic consultations for diabetes over this period — roughly 30 patients per clinic. In addition to highlighting the numbers of people affected, it should also be noted that these conditions tend to affect economically active adults, on whom young and old members of the population are often dependent.

This burden of noncommunicable diseases is likely to increase hugely over the coming decades. The projections from the Global Burden of Disease study suggest that by the year 2020 the proportion of the overall burden in sub-Saharan Africa due to noncommunicable diseases will increase to somewhere between 26% and 34%, and among adults aged 15–59 years to between 37% and 42% (1). The authors of the study noted that the methodology used in these projections might have given too much weight to communicable disease. All this projected increase is due to demographic change leading to older populations. However, for some conditions, such as diabetes and hypertension, age-specific rates are likely to increase with urbanization (14) and attendant changes in health-related behaviours (15, 16).

In making the prediction of a “huge increase” in noncommunicable diseases over the coming decades, we need to acknowledge the uncertainties posed by the human immunodeficiency virus (HIV)

epidemic in sub-Saharan Africa. Estimates indicate that in the year 2000 there were 3.8 million new cases of HIV infection in sub-Saharan Africa, contributing to the estimated 25.3 million cases prevalent in this region, and that overall 8.8% of adults aged 15–49 years were infected (17). In high prevalence countries, such as South Africa and Botswana, it is estimated that economic growth over the next 10 years will be 17–20% lower than it would have been without HIV (17). HIV infection tends to occur at a younger age than the onset of noncommunicable diseases, such as diabetes and cardiovascular disease. In high-prevalence countries the diminished survival of young adults to middle age is likely to result in a lower burden of noncommunicable disease than would otherwise have occurred. This latter point has recently been illustrated for diabetes prevalence in South Africa (18). However, the current prevalences of HIV infection in individual countries in sub-Saharan Africa differ greatly and the unfolding of the epidemic has confounded the predictions. In our view, the uncertain impact of HIV on the noncommunicable disease burden in sub-Saharan Africa is an argument in favour of the need for surveillance of noncommunicable disease and risk factor prevalence, as discussed below. The fact that noncommunicable diseases and HIV-related disease both tend to affect economically active adults is an argument for tackling both.

Finally, not taking action on noncommunicable diseases in sub-Saharan Africa would mean that the development of effective measures for preventing and managing these diseases will be compromised. In effect, public health policy on their risk factors would be abdicated to the market and, in particular, would be open to those promoting the use of health-damaging products such as tobacco. A “no-priority” position in relation to noncommunicable disease would also allow the continued growth in clinical services for noncommunicable diseases, both public and private, to be largely undirected by issues of clinical- and cost-effectiveness, and would ignore the issue of equity in providing care for people with these conditions. Such a position could thus be argued to breach the ethical principal of nonmaleficence or doing no harm, by allowing potentially harmful medical practices to go unchallenged and unchecked.

### Developing a research agenda: a three-pronged approach

The above considerations suggest three broad areas that should be at the top of a research agenda for sub-Saharan Africa on noncommunicable disease.

#### *Surveillance: addressing the need for better data.*

The lack of reliable data on the overall burden and causes of disease in sub-Saharan Africa is well known. Apart from South Africa, coverage of vital registration systems is far too low in all countries to provide useful data. This lack of data needs to be addressed so that the priority given to different health interventions within a population will take into account the

relative burden of diseases. A major challenge is to do this within the available resources, both local and from external agencies. Longitudinal studies of representative communities provide one approach to filling the data gap (19). An example of a project that is specifically designed to provide such data is the Adult Morbidity and Mortality Project in the United Republic of Tanzania (3, 4). The Tanzanian Ministry of Health, with support from the United Kingdom Department for International Development (DFID), is planning a limited expansion of the project's demographic surveillance system with a view to providing data for health care planning that is representative of all health districts. These data will also be used to guide policy-making by the Ministry of Health, including that on noncommunicable diseases. However, a major, but inescapable, limitation of this approach is its heavy reliance on verbal autopsy for attributing the causes of death (20).

The infrastructure provided by the Adult Morbidity and Mortality Project's demographic surveillance system greatly facilitates the conduct of other surveillance activities. Those directly relevant to noncommunicable diseases include the measurement of the prevalence of major risk factors, such as obesity, hypertension, and smoking that can be used to guide and monitor preventive efforts, as well as provide insight into the possible future burden.

Although the type of longitudinal study described above is relatively inexpensive (estimated cost for the Adult Morbidity and Mortality Project is less than US\$ 3 per person under surveillance per year) compared to other approaches for collecting similar data, it is still a substantial investment for any country in sub-Saharan Africa. Examination of the trends in proportionate mortality at health facilities (21) provides a less expensive but potentially biased approach to assessing the changing importance of different causes of death. Finally, it should be noted that useful data on the current burden (disease prevalence) and likely future burden of major noncommunicable diseases (prevalence of risk factors) can be collected with limited financial resources. WHO is currently developing a stepwise approach to noncommunicable disease surveillance to enable surveys of variable levels of complexity to be carried out — from simple questionnaire-based surveys to comprehensive field surveys (22). The intention is that the vast majority of countries will be able to collect data at the most basic level, while allowing for more sophisticated data to be collected as resources allow.

**Treatment: improving the efficiency and effectiveness of currently expended resources.** In some parts of sub-Saharan Africa, mainly the urban areas, substantial demands are already being made on the health systems by patients with noncommunicable diseases such as hypertension and diabetes. The limited systematic evidence available on the quality of the care and more general anecdotal evidence suggest that there is much room for improvement (13, 23, 24). The application of health services research

methods is crucial if resources that are currently committed to the treatment of these conditions are to be used in the most efficient and effective way possible. A framework for considering this, based on a Global Forum for Health Research publication (25), is suggested in Fig. 3. The heavy-lined outer box represents the burden of a particular condition, such as hypertension; level 1, the burden of disease that is currently being effectively treated; level 2, the burden of that disease that could be effectively treated if current resources were better used; level 3, what could be achieved with a greater input of resources; and level X that for which there are currently no known effective interventions. The imperative, particularly in resource poor environments, is to use the resources currently committed in the most effective and efficient way.

The types of research activities needed to move from level 1 to level 2 include those outlined below.

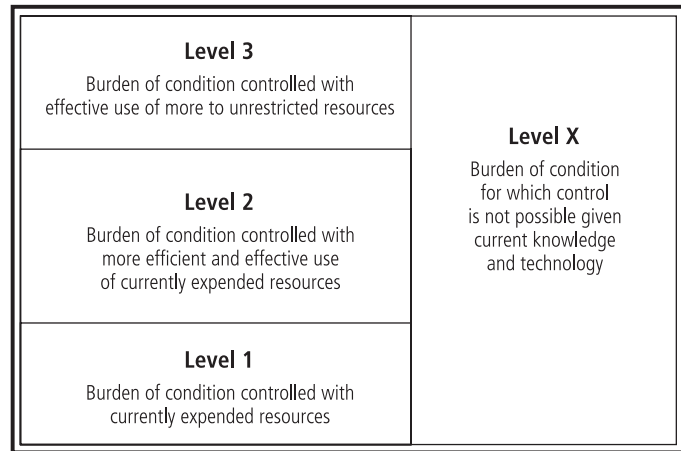
- 1) Collection of data on the current coverage, place, level and quality of health care, both public and private, so that the resources currently used on ineffective and inefficient practices can be identified and used more effectively and efficiently. As an example, we have developed methods for the rapid evaluation of the quality of care for asthma, diabetes, epilepsy, and hypertension in order to provide useful information to health care planners and policy-makers. Examples of similar work in Africa include investigations of the quality of care for diabetes in South Africa (26, 27).
- 2) Study of factors, such as health beliefs and the social and economic well-being of the community, which influence the patients' use of effective health care and the concordance with effective treatment.
- 3) Study of structural and process factors within the health system, including the beliefs and attitudes of health care providers, which influence the ability of clients and patients to access health care and their experience of receiving such care.
- 4) The robust design, implementation, and evaluation of interventions would help make more effective and efficient use of current resources. Possibilities include the implementation of locally appropriate treatment guidelines and training of staff at primary health care level. Such approaches have been tried in parts of South Africa (28), and some of the challenges of improving care have been described (29). One particular challenge posed by noncommunicable diseases to health systems is the difficulty of providing continuity of care. The highest incidence of noncommunicable diseases associated with economic development tends to occur in urban areas where population mobility is often extremely high.
- 5) Evaluation of treatment efficacy for agents for which this not been done for populations of African origin. For example, in North America common anti-hypertensive agents differ in their efficacy when used in patients of European or West African origin (30). With the occasional exception (31), few trials of efficacy for the treatment of noncommunicable diseases have been performed in Africa.

**Prevention: the research challenges of primordial and primary prevention.** In considering the research needs for prevention of a disease or condition it is helpful to consider the following broad areas: the main determinants or risk factors for the disease must be established, and groups or populations with them must be known; evidence is required to guide activities to prevent the determinants or risk factors from emerging (primordial prevention) or to reduce them (primary prevention); and finally it must be assessed whether the prevention activities are working.

The primary question in relation to prevention is how transferable to African populations (or indeed to any other population) is our knowledge of the determinants and risk factors from predominantly European origin and male populations (on whom the vast majority of noncommunicable disease research has been conducted)? The short answer is that there is no reason to believe that the major risk factors for conditions such as cardiovascular disease, chronic lung disease, and diabetes differ. However, the social, cultural, and economic conditions (i.e. the broader determinants) that produce the risk factors most certainly do differ in different populations. In addition it is likely that there will be differences in genetic susceptibility to some conditions. Also, it must be noted that even in populations of European origin the major risk factors are unable to explain the majority of the variation in the incidence of some conditions. For example, the major risk factors for coronary heart disease are thought to explain only about half the variance in its incidence (32, 33), and differences between some ethnic groups do not appear to be due to differences in these risk factors (34). Further research into the determinants and risk factors is therefore desirable, and indeed is being advocated for cardiovascular disease in developing country populations (35). However, current preventive efforts can only be based on the best evidence from “established” major determinants and risk factors.

If the transferability of evidence on determinants from one population to another is questionable, even more so is such evidence on changing them, particularly those related to lifestyle. There are no “off-the-shelf” interventions for changing lifestyle that can be assumed to be effective within sub-Saharan Africa, or indeed any other low- or middle-income countries, when implemented. This is for at least two reasons. First, even within Western Europe and North America, where most of the evidence has been gathered, the evidence base on how to effectively change lifestyle risk factors is very limited (36–38). Second, lifestyles reflect the local cultural, social, and economic circumstances, and effective interventions in an Established Market Economy setting, such as North America, are unlikely to be directly transferable to sub-Saharan Africa. In short, all interventions need to be developed and evaluated robustly. Within the constraints of the scarce resources and infrastructure in sub-Saharan Africa, intensive client-based interventions of the type

Fig. 3. Simple schema for considering the health research needs to improve the control of a particular disease or condition (the outer heavy-lined box represents the total burden of the condition)



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common in North America and Western Europe are unlikely to be appropriate. Indeed it has been argued that to “export” such approaches to low-income countries is to export failure, and that efforts should focus on creating conducive environments, fiscal, and taxation policies (39). We endorse this view and suggest that research efforts should be devoted to evaluating their effectiveness. For example, in other settings legislative and policy measures on foods have been related to favourable dietary changes (40, 41), and the cost-effectiveness of fiscal and legislative measures aimed at tobacco control have been laid out by the World Bank (42); in Guinea, similar measures were estimated to compare favourably to other health interventions (7).

## Conclusions

There is little doubt that for the next 10–20 years communicable diseases will continue to be the predominant health problem for the majority of populations in sub-Saharan Africa, including adults. Equally, there is little doubt that noncommunicable diseases already contribute substantially to the burden of disease and are a significant source of demand on the health sector, particularly in urban areas. Their contribution to the burden of disease and to demands on the health sector in the future (short-to-medium term) is set to rise. Two opposing views have therefore arisen on the priority that should be given to them. One asserts that a near exclusive focus on combating infectious diseases in the twenty-first century will offer the greatest health gains. Alternatively, the rapidly growing burden of noncommunicable diseases is used to argue for priority to be given to their prevention now. Many of the arguments in this paper could also be applied to other low-income regions of the world. We have focused on sub-Saharan Africa because it is estimated that noncommunicable diseases will emerge there as

the main health problem many years later than any other region, and because this is the region we have most experience of.

In our view, for the African and international health research community not to address non-communicable diseases would be irresponsible and unethical. It would leave the emergence and prevention of risk factors to the market, and the running and growth of health services for noncommunicable diseases to be largely undirected by issues of clinical and cost effectiveness. A research agenda for sub-Saharan Africa that includes noncommunicable diseases in the ways we have outlined here would support appropriate programmes of preventive and clinical interventions within the context of the overall disease burden and the continuing pre-eminence of communicable diseases. Finding the right balance between competing demands is the role of national policy-makers and the people they represent, supported by expertise and resources from local and international research institutions. ■

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### Résumé

#### Maladies non transmissibles en Afrique subsaharienne : où se situent-elles sur l'agenda de la recherche en santé ?

Il ne fait aucun doute que les maladies transmissibles resteront le principal problème de santé publique pour les populations d'Afrique subsaharienne, y compris les adultes, dans les 10 à 20 prochaines années. Des craintes ont été exprimées quant à la réduction des ressources qui peuvent leur être consacrées du fait de l'importance croissante accordée aux maladies non transmissibles. Ces dernières représentent certes déjà un fardeau non négligeable car globalement leurs taux par âge sont plus élevés chez les adultes d'Afrique subsaharienne que parmi les populations des économies de marché bien établies. Il apparaît également que la prévalence de certaines maladies non transmissibles, comme le diabète et l'hypertension, augmente rapidement, surtout dans les zones urbaines, et que les patients atteints de ces maladies font peser une charge importante sur les services de santé. Ne pas tenir

compte des maladies non transmissibles conduirait inévitablement à en augmenter le fardeau; les prestations des services de santé qui les concernent ne seraient plus guidées par des considérations d'efficacité clinique et de rapport coût-efficacité, et leur traitement ainsi que leur prévention seraient livrés aux intérêts commerciaux locaux voire mondiaux. Une meilleure surveillance de toutes les maladies en Afrique subsaharienne est nécessaire pour replacer correctement les maladies non transmissibles dans le contexte de la charge générale de morbidité. Il est de même nécessaire d'entreprendre des recherches qui contribueront à améliorer l'efficacité clinique et le rapport coût-efficacité des ressources actuellement consacrées à la prise en charge des maladies non transmissibles, et qui serviront également à orienter et évaluer les mesures préventives.

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### Resumen

#### Enfermedades no transmisibles en el África subsahariana: ¿qué lugar ocupan en el programa de investigación sanitaria?

No cabe duda de que las enfermedades transmisibles seguirán siendo el principal problema de salud de las poblaciones del África subsahariana, en particular de los adultos, durante los próximos 10 a 20 años. Se teme que los recursos disponibles para abordar este problema puedan verse mermados por el creciente énfasis en las enfermedades no transmisibles. Estas últimas, sin embargo, suponen ya una carga sustancial, ya que sus

tasas globales por edades son actualmente mayores en los adultos del África subsahariana que en las poblaciones de las economías de mercado establecidas. Hay también signos de que la prevalencia de determinadas enfermedades no transmisibles, como la diabetes y la hipertensión, está aumentando rápidamente, sobre todo en las zonas urbanas, y de que tales enfermedades están exigiendo recursos importantes de los servicios de

salud. Ignorar las enfermedades no transmisibles conduciría inevitablemente a un aumento de la carga de morbilidad por esa causa; la provisión de servicios de salud para atender esa demanda dejaría en gran medida de establecerse a partir de consideraciones sobre la eficacia clínica y económica, y su tratamiento y prevención podrían quedar a merced de los intereses comerciales, locales y globales. Es necesario mejorar la

vigilancia de todas las enfermedades en el África subsahariana a fin de ubicar debidamente las enfermedades no transmisibles en el marco de la carga global de morbilidad. Se requieren investigaciones que permitan mejorar la eficacia clínica y económica de los recursos actualmente dedicados a atender a los pacientes aquejados de esas enfermedades, así como dirigir y evaluar las medidas preventivas correspondientes.

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