

# Health transition in Africa: practical policy proposals for primary care

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**Abstract** Sub-Saharan Africa is undergoing health transition as increased globalization and accompanying urbanization are causing a double burden of communicable and noncommunicable diseases. Rates of communicable diseases such as HIV/AIDS, tuberculosis and malaria in Africa are the highest in the world. The impact of noncommunicable diseases is also increasing. For example, age-standardized mortality from cardiovascular disease may be up to three times higher in some African than in some European countries. As the entry point into the health service for most people, primary care plays a key role in delivering communicable disease prevention and care interventions. This role could be extended to focus on noncommunicable diseases as well, within the context of efforts to strengthen health systems by improving primary-care delivery. We put forward practical policy proposals to improve the primary-care response to the problems posed by health transition: (i) improving data on communicable and noncommunicable diseases; (ii) implementing a structured approach to the improved delivery of primary care; (iii) putting the spotlight on quality of clinical care; (iv) aligning the response to health transition with health system strengthening; and (v) capitalizing on a favourable global policy environment. Although these proposals are aimed at primary care in sub-Saharan Africa, they may well be relevant to other regions also facing the challenges of health transition. Implementing these proposals requires action by national and international alliances in mobilizing the necessary investments for improved health of people in developing countries in Africa undergoing health transition.

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## Introduction

In this era of globalization, health systems in sub-Saharan Africa face challenges posed by health transition, i.e. a double burden of communicable and non-communicable diseases (NCDs). One of the challenges is how to equip primary care to respond effectively to this double burden. In this paper, we provide practical policy proposals for ways that primary care can respond to health transition. These proposals reflect the authors' perspectives and experiences in disciplines relevant to primary care: field research and national policy-making and implementation. We first describe the background to globalization and health transition in Africa and review the current status of health transition in the region, outlining the importance of primary care in addressing the problems. We suggest practical policy proposals aimed at harnessing the potential for primary care in preventing and treating NCDs in tandem with its key role regarding communicable diseases. We conclude by considering the role national and international alliances can play in implementing these proposals and improving the health of people in developing countries in Africa undergoing health transition.

## Health transition

Globalization is a process in which regions are becoming increasingly interconnected through the movement of people, goods, capital and ideas – a process that has both beneficial and harmful implications for health.<sup>1</sup> With rapidly increasing globalization and accompanying urbanization,<sup>2</sup> trends towards unhealthy diets, obesity, sedentary lifestyles and unhealthy habits are resulting in an increased worldwide burden of chronic NCDs

(e.g. diabetes, cardiovascular and lung diseases, cancer and psychiatric disorders) and their associated risk factors (e.g. smoking, alcohol, hypertension and obesity), that includes developing countries (Box 1).

The current average annual growth of the urban population in sub-Saharan Africa is 4.5%.<sup>3</sup> Urbanization in sub-Saharan Africa, as well as in other less-developed parts of the world, is strongly associated with increased levels of obesity, diabetes and cardiovascular disease.<sup>9</sup> Sub-Saharan Africa therefore faces particular challenges. While all low- and middle-income regions face the challenge of NCDs as increasingly important health problems, sub-Saharan Africa faces the unique double burden of increasing NCDs and of continuing high – and even increasing – morbidity and mortality from communicable diseases. In addition, the consequences of global climate change are likely to be most severe in developing countries, with the associated health risks increasing in vulnerable regions and poorly-resourced populations, even though these countries have contributed least to the problem.<sup>10</sup>

An increasing disease burden arises from interactions between communicable diseases and NCDs,<sup>11</sup> e.g. between tuberculosis and poor nutritional status, diabetes and infection (with diabetes predisposing to infections which often exacerbate hyperglycaemia). Common NCDs arising from the current high burden of chronic communicable diseases in Africa include cervical cancer linked to human papilloma virus infection and hepatoma linked to hepatitis B virus infection. The burden of chronic NCDs is likely to be further uncovered as scaled-up programmes of antiretroviral treatment of HIV-infected people reduce mortality but increase morbidity related to chronic HIV infection and treatment. Increasing numbers of people in Africa

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are therefore at risk of possible metabolic side-effects resulting from life-long antiretroviral treatment,<sup>12</sup> e.g. diabetes, lipodystrophy and dyslipidaemia. These overlaps between communicable diseases and NCDs present opportunities for synergistic care, strengthening the case for an improved primary care response.

With only 12% of the world's population, the African region has 31% of the global burden of tuberculosis cases,<sup>13</sup> 62% of HIV infections<sup>14</sup> and 70% of *Plasmodium falciparum* malaria infections.<sup>15</sup> Health transition (a double burden of communicable diseases and NCDs) is thus increasingly recognized in Africa<sup>16</sup> as in other regions. Although many people are familiar with the impact of communicable diseases in Africa, they may be surprised to find out that NCDs also have a high impact in many countries in the region.<sup>17</sup> For example, the estimated age-standardized mortality from cardiovascular disease may be up to three times higher in some countries in Africa than in some European countries (Table 1).<sup>18</sup>

Communicable diseases impose not only heavy human costs in terms of suffering and death, but also heavy financial costs on poor households.<sup>19</sup> As NCDs rapidly become leading causes of morbidity and mortality in developing countries, especially in Africa, they also incur high costs both to the individual and national economies.<sup>20</sup> Chronic NCDs have a huge negative economic impact<sup>21</sup> and represent a significant impediment to human development in low- and middle-income countries.<sup>22</sup> Health transition therefore represents an enormous challenge to Africa as it is the region with the least resources for an effective response to the double burden of communicable diseases and NCDs. Uganda is an example of a developing country undergoing this epidemiological transition (Box 2).

## The role of primary care

The importance of a strong health system led by primary care is receiving renewed attention.<sup>28</sup> Primary-care providers include those in the government services (Ministry of Health, social-security, prisons, military) and non-government services (nongovernmental organizations and private practitioners). In practice, secondary and tertiary care institutions often also provide primary care in addition to playing a referral role. Primary-care delivery in sub-Saharan Africa has shortcomings; it may be

### Box 1. Global burden of chronic noncommunicable diseases

In 2007, it was estimated that there were 246 million people living with diabetes mellitus, 6 million new cases and 3.5 million deaths, with 70% of these patients living in the developing world.<sup>3</sup> In 2000, there were an estimated 972 million people with hypertension, 65% of whom lived in the developing world, with the number predicted to grow to 1.5 billion by 2025.<sup>4</sup> Chronic obstructive pulmonary disease similarly affects large numbers of people with an estimated 300 million people with asthma<sup>5</sup> and 61 million with chronic airflow obstruction,<sup>6</sup> with three-quarters of the patients living in Asia and Africa. The World Health Organization predicts that NCD deaths will increase by 17% over the next decade, with the greatest increase in the African region (27%).<sup>7</sup>

Table 1. Age-standardized death rates for cardiovascular disease and ischaemic heart disease for selected countries in Africa and Europe, 2004<sup>18</sup>

Country	Population in 2004 (1000s)	Age-standardized death rate for CVD per 100 000	Age-standardized death rate for IHD per 100 000
France	61 000	123	38
Italy	58 000	155	62
Kenya	35 000	344	104
Netherlands	16 000	154	54
Nigeria	138 000	417	124
Rwanda	9 000	409	120
South Africa	48 000	389	114
Uganda	28 000	368	111
United Kingdom of Great Britain and Northern Ireland	60 000	175	90
United Republic of Tanzania	37 000	395	118

CVD, cardiovascular disease; IHD, ischaemic heart disease.

### Box 2. Health transition in Uganda

Uganda has a predominantly agricultural economy with increasing urbanization and a rapidly growing population.<sup>18</sup> Communicable diseases such as HIV, tuberculosis and malaria are all common in Uganda. The estimated national prevalence of HIV in adults aged 15–49 years in 2007 was 5.4%,<sup>23</sup> estimated annual tuberculosis incidence (all forms) in 2007 was 330 cases per 100 000 population,<sup>24</sup> and Uganda has the world's highest malaria incidence, with a rate of 478 cases per 1000 population per year.<sup>25</sup> Recent evidence suggests a rise in NCDs. For example, the estimated national prevalence of diabetes was 98 000 in 2000 and expected to rise to 328 000 by 2030.<sup>26</sup> The prevalence of diabetes is particularly high in urban areas, for example estimates suggest that as many as 8% of the residents of the capital, Kampala, might have type 2 diabetes.<sup>26</sup> The estimated number of deaths in 2004 due to cardiovascular disease in Uganda was around 34 000, of which about 10 000 were attributable to ischaemic heart disease and around 12 000 to cerebrovascular disease.<sup>27</sup>

impoverishing, fragmented, unsafe or misdirected.<sup>29</sup> However, a key strength of primary care is that it is the main entry point into health services for most people. It has played a successful role in the delivery of prevention and care interventions for communicable diseases, such as tuberculosis, HIV and malaria. Building on this success, primary care could play a crucial role in the response to NCDs in terms of health promotion and disease prevention and treatment. An improved primary-care response to

the joint problems posed by health transition is therefore a priority. Practical policy proposals to improve the primary care response include: (i) improving data on communicable diseases and NCDs; (ii) implementing a structured approach to improved primary-care delivery; (iii) putting the spotlight on the quality of clinical care; (iv) aligning the response to health transition with health system strengthening; and (v) capitalizing on a favourable global policy environment.

## Practical policy proposals

### Improving data

Information on the baseline and future trends in burden of diseases and related risk factors is needed for planning and monitoring local, national and international primary-care responses. A lack of high quality health information is one of the major obstacles in developing appropriate disease prevention strategies at the national level.<sup>30</sup> While there is always scope for improvement, many countries in Africa have well established information systems for communicable diseases. However, in general, the burden of chronic NCDs is not as well documented. For example, information on diabetes prevalence in sub-Saharan Africa is limited to only four countries and is mostly more than 10 years old.<sup>31</sup> Estimates of the burden of chronic NCDs and projections of future trends are based on limited data from a small number and type of settings, and there is little, if any, systematic collection of data on patients' use of primary care and their management and outcomes. There is an urgent need for good quality comparable data on NCD burden and risk, as well as on communicable diseases, to aid planning and implementation of prevention and control strategies at primary-care level in countries undergoing health transition.

### A structured approach

The increase in NCDs requires changes to primary-care systems, which were often established with a focus on communicable diseases, through clinical management of patients and provision of preventative programmes such as immunization. Consequently they are often less oriented towards dealing with chronic NCDs than with communicable diseases. The primary care approach to NCDs is often unstructured, lacks systematic follow-up and monitoring of chronic clinical care, and provides little information about morbidity or mortality.<sup>32</sup> Moreover, access to essential supplies is often limited and expensive.<sup>33</sup> The proposed framework for a programmatic, public health approach to primary care of people with NCDs<sup>34</sup> builds on experience gained in rolling out large-scale interventions for chronic communicable diseases, namely tuberculosis<sup>35</sup> and HIV/AIDS.<sup>36</sup> The development of the framework reflects recommendations including:

(i) the integration of the management of chronic NCDs with that of chronic communicable diseases;<sup>37</sup> (ii) the development of chronic care services that cut across conventional categories of communicable and noncommunicable disease;<sup>38</sup> and (iii) the incorporation of indicators of programme performance and access to services.<sup>39</sup> The key elements of the framework include: (i) the use of standard diagnostic protocols for NCD case-finding among patients presenting to the local health facilities; (ii) the provision of standardized treatment; and (iii) the use of a data collection system for standardized monitoring and evaluation of outcomes.<sup>34</sup> The use of simple standard protocols for health promotion (e.g. addressing modifiable NCD risk factors), diagnosis, standardized treatment, follow-up and, when necessary, referral of patients with common NCDs can ensure a structured approach to delivering quality care.

The establishment of multidisciplinary chronic disease clinics using standardized approaches to patient management could bring efficiency gains, especially in providing continuity of care, long-term adherence support and social support, and may help to decrease the stigma often associated with HIV/AIDS and tuberculosis. The development of integrated NCD clinics can draw on the experience of integrated approaches to the management of HIV/AIDS infection with sexual and reproductive health problems, and with tuberculosis. Replacing the current unstructured approach with this programmatic framework requires multidisciplinary health system research that includes an initial needs assessment, stakeholder involvement, training, intervention delivery and evaluation.<sup>40</sup> Successful implementation of the framework with improved primary-care delivery has the potential to address the problems with the current approach to health-care delivery: the burden of long-term care on health systems and budgets, the costs that push households into further poverty, and the need for prevention when risk factors are beyond the direct control of the health sector.<sup>20</sup>

### Quality of clinical care

The public health approach to expanding access to antiretroviral treatment<sup>41</sup> has been successful. By the end of 2007, approximately 2.1 million people in sub-

Saharan Africa were receiving antiretroviral treatment (about 30% of the 7 million people estimated to be in need).<sup>42</sup> However urgent attention is needed to address the problems with quality of HIV/AIDS care that result in suboptimal treatment outcomes.<sup>43</sup> The lessons learnt by examining problems with the quality of HIV/AIDS care are applicable to promoting quality care for people with NCDs. Putting the spotlight on the quality of clinical care highlights the elements needed to bridge the gap between the current and desired standard of primary care for people with communicable diseases and NCDs: the right numbers of health staff of different cadres, performing at a good professional level, in a safe and well equipped health care environment, with good diagnostic and patient evaluation support and reliable drug supply, under conditions of routine monitoring of patient outcomes and clinician performance.<sup>43</sup>

### Health system strengthening

Health system strengthening has the potential to improve primary-care delivery across the wide range of health problems encountered in health transition. The successful expansion in services for HIV/AIDS, tuberculosis and malaria has highlighted the inadequacy of existing services to deliver interventions for other health needs. The question arises as to how to expand the delivery of primary care in countries undergoing health transition. Should it be through disease-specific programmes or through health system strengthening? The long-running debate about the relative merits of these two different approaches is vigorous. The latest development arises from a study that collated the evidence on the impact on health systems of global health initiatives, which promote disease-specific programmes, and found that there was little evidence that this approach caused problems at the health service delivery level. However, it suggested the need to take a "diagonal" approach by seizing opportunities for greater synergy.<sup>44,45</sup> This compromise enables both camps to work towards an improved understanding of the challenges of integrated delivery of effective health services and build a stronger primary-care system.<sup>29</sup> Aligning the response to health transition with health system strengthening may facilitate the integration of services that deal with the problems of health transition. This strategic direction will potentially enable access to funds for an improved response to health

transition through applications for health system strengthening to the Global Health Initiatives, e.g. GAVI Alliance and the Global Fund to Fight AIDS, Tuberculosis and Malaria.

### Favourable global policy

Advocates for improved primary care in countries undergoing health transition should take advantage of the current favourable global policy environment. The Director-General of the World Health Organization has recently highlighted the importance of strengthening health systems based on primary care as “the route to greater efficiency and fairness in health care and greater security in the health sector and beyond”.<sup>46</sup> This vision of primary care must encompass improved delivery of interventions for NCDs in line with international policies. For example,

in July 2009 the World Health Organization launched a global network to focus on ways to tackle this group of diseases.<sup>47</sup> Research aimed at an improved primary-care response to NCDs<sup>48</sup> is in line with global recommendations<sup>49</sup> and the World Health Organization’s “Action plan for the global strategy for the prevention and control of NCDs”<sup>7</sup> provides an enabling environment for research to deliver the proposed downstream interventions at primary-care level. There is growing discussion about how funds such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (which has approved more than US\$ 15 billion in funding for disease programmes since it was established in 2001) can be used to drive broad improvements in general health systems. Such a policy development could also include a focus on NCDs.<sup>45</sup>

### Conclusion

Although these proposals are aimed at primary care in sub-Saharan Africa, they may well be relevant to other regions also facing the challenges of health transition. Primary care is well placed to offer a coherent response to the problems of both communicable and noncommunicable diseases. Investment in an improved primary-care response to both problems would avoid creating competition for resources. National and international alliances (such as the Global Alliance for Chronic Diseases)<sup>50</sup> have a key role to play in mobilizing the necessary investments<sup>51</sup> for an effective health system response, including an effective primary-care response to the challenges of health transition in Africa as well as in other regions. ■

**Competing interests:** None declared.

### ملخص

#### المرحلة الصحية الانتقالية في أفريقيا: مقترحات عملية لسياسات الرعاية الأولية

تحسين تقديم الرعاية الأولية. ويقدم الباحثون مقترحات لسياسات عملية تسعى لتحسين استجابة الرعاية الأولية لمشاكل المرحلة الصحية الانتقالية عن طريق: (1) تحسين البيانات حول الأمراض السارية وغير السارية؛ (2) تطبيق أسلوب منهجي لتحسين تقديم الرعاية الأولية؛ (3) إيلاء الاهتمام بوجود الرعاية السريرية؛ (4) دعم الاستجابة للمرحلة الصحية الانتقالية مع تعزيز النظام الصحي؛ (5) تعظيم الاستفادة من بيئة السياسات العالمية الملائمة. وبالرغم من أن هذه المقترحات تستهدف الرعاية الأولية في البلدان الأفريقية الواقعة جنوب الصحراء الكبرى، إلا أنها تلائم سائر الأقاليم التي تواجه تحديات المرحلة الصحية الانتقالية. ويتطلب تطبيق هذه المقترحات عملاً من التحالفات الوطنية والدولية لحشد الاستثمارات اللازمة لتحسين صحة السكان في البلدان النامية في أفريقيا التي تمر بمرحلة صحية انتقالية.

تمر الدول الأفريقية الواقعة جنوب الصحراء الكبرى بمرحلة صحية انتقالية حيث يؤدي زيادة العولمة والتحضّر المصاحب لها إلى مضاعفة عبء الأمراض السارية وغير السارية. وتُعد معدلات الأمراض السارية في أفريقيا مثل العدوى بفيروس العوز المناعي البشري والإيدز، والسل، والملاريا هي الأعلى في العالم، كما يتفاقم فيها عبء الأمراض غير السارية. فعلى سبيل المثال، تصل معدلات الوفيات المقيّسة بالعمر الناجمة عن الأمراض القلبية الوعائية في بعض البلدان الأفريقية إلى ثلاثة أضعاف المعدلات في بعض البلدان الأوروبية. وعند نقاط وصول غالبية الناس إلى الخدمات الصحية، يكون للرعاية الأولية دور رئيسي في تقديم التدخلات الوقائية والعلاجية للأمراض السارية، وبالإمكان توسيع نطاق هذا الدور للتركيز على الأمراض غير السارية أيضاً، وذلك ضمن سياق الجهود المبذولة لتقوية النظم الصحية عن طريق

### Resumé

#### Transition sanitaire en Afrique: propositions politiques pratiques en matière de soins de santé primaires

L'Afrique subsaharienne subit une transition sanitaire alors que la globalisation croissante et l'urbanisation qui l'accompagne engendrent le double fléau des maladies transmissibles et non transmissibles. En Afrique, les taux des maladies transmissibles, comme le VIH/SIDA, la tuberculose et la malaria, sont les plus élevés au monde. L'impact des maladies non transmissibles enregistre également une augmentation. À titre d'exemple, la mortalité standardisée par âge, due à une maladie cardiovasculaire, peut être trois fois plus élevée dans certains pays africains que dans certains pays européens. Les soins de santé primaires étant le point d'entrée dans un service de santé pour la plupart des Africains, ils jouent un rôle clé dans la prévention des maladies transmissibles et dans les interventions sanitaires. Ce rôle pourrait être étendu afin de s'orienter également sur les maladies non transmissibles, dans le cadre d'efforts réalisés pour renforcer les systèmes de santé en améliorant l'offre de soins primaires. Nous émettons des propositions politiques pratiques visant à

améliorer la réponse des soins de santé primaires aux problèmes que pose la transition sanitaire: (i) optimisation des données sur les maladies transmissibles et non transmissibles; (ii) mise en œuvre d'une approche structurée de l'offre améliorée des soins de santé primaires; (iii) mise en lumière de la qualité des soins cliniques; (iv) alignement de la réponse sur la transition sanitaire et du renforcement du système de santé; et (v) capitalisation sur un environnement politique global favorable. Bien que ces propositions soient axées sur les soins de santé primaires en Afrique subsaharienne, elles peuvent également s'appliquer aux autres régions devant elles aussi relever les défis de la transition sanitaire. La mise en œuvre de ces propositions nécessite une action des alliances nationales et internationales en termes de mobilisation des investissements nécessaires à l'amélioration de la santé des habitants des pays africains en voie de développement qui font face à une transition sanitaire.

## Resumen

**La transición sanitaria en África: propuestas de normas prácticas para la atención primaria**

En el África subsahariana se está produciendo una transición sanitaria, a medida que la globalización creciente y la correspondiente urbanización generan una doble carga de enfermedades transmisibles y no transmisibles. África registra las tasas más altas del mundo de enfermedades transmisibles como el VIH/SIDA, la tuberculosis y la malaria. El impacto de las enfermedades no transmisibles también va en aumento. Por ejemplo, el índice de mortalidad normalizada según la edad debida a enfermedades cardiovasculares puede ser en algunos países de África hasta tres veces mayor que en algunos países europeos. La atención primaria desempeña un papel clave en la prevención y en las intervenciones asistenciales de las enfermedades transmisibles, al ser la puerta de acceso al sistema sanitario para la mayoría de las personas. Esta función se podría ampliar a la atención de las enfermedades no contagiosas, dentro del contexto de los esfuerzos realizados para consolidar los sistemas sanitarios, mejorando las prestaciones de la

atención primaria. Hemos presentado propuestas de normas prácticas para mejorar la respuesta de la atención primaria ante los problemas planteados por la transición sanitaria: (a) mejorar los datos sobre las enfermedades contagiosas y no contagiosas; (b) aplicar un enfoque estructurado para una prestación mejorada de la atención primaria; (c) centrar la atención en la calidad de la asistencia clínica; (d) alinear la respuesta a la transición sanitaria con la consolidación del sistema sanitario; y (e) aprovechar la situación política mundial favorable. Aunque estas propuestas están dirigidas a la atención primaria en el África subsahariana, bien podrían resultar adecuadas para otras regiones que también se enfrenten a los desafíos de la transición sanitaria. La aplicación de estas propuestas requiere la acción de las alianzas nacionales e internacionales movilizándolo las inversiones necesarias para mejorar la salud de la población de los países africanos en desarrollo que se encuentren inmersos en un proceso de transición sanitaria

## References

- Unwin NC, Alberti KG. Diabetes and the good, the bad and the ugly of globalization. *International Diabetes Monitor* 2007;19:6–11.
- An overview of urbanization, internal migration, population distribution and development in the world*. New York: United Nations Population Division; 2008.
- The Chennai call for action*. Lyngby: World Diabetes Foundation; 2008. Available from: [http://www.worlddiabetesfoundation.org/media\(6697,1033\)/Chennai\\_Declaration\\_08.pdf](http://www.worlddiabetesfoundation.org/media(6697,1033)/Chennai_Declaration_08.pdf) [accessed 27 October 2010].
- The Lancet. Hypertension: uncontrolled and conquering the world. *Lancet* 2007;370:539. doi:10.1016/S0140-6736(07)61265-3 PMID:17707728
- Masoli M, Fabian D, Holt S, Beasley R. *Global burden of asthma*. Global Initiative for Asthma; 2004. Available from: <http://www.ginasthma.com> [accessed 27 October 2010].
- World health report 2002: reducing risks, promoting healthy life*. Geneva: World Health Organization; 2002. Available from: [www.who.int/whr/2002](http://www.who.int/whr/2002) [accessed 27 October 2010].
- 2008–2013 action plan for the global strategy for the prevention and control of noncommunicable diseases*. Geneva: World Health Organization; 2008.
- State of the world's cities: trends in sub-Saharan Africa*. Nairobi: UN-HABITAT; 2004.
- Unwin N, Alberti KG. Chronic non-communicable diseases. *Ann Trop Med Parasitol* 2006;100:455–64. doi:10.1179/136485906X97453 PMID:16899148
- Climate change* [internet site]. Geneva: World Health Organization. Available from: <http://www.who.int/topics/climate/en/index.html> [accessed 27 October 2010].
- Young F, Critchley JA, Johnstone LK, Unwin NC. A review of co-morbidity between infectious and chronic disease in Sub Saharan Africa: TB and diabetes mellitus, HIV and metabolic syndrome, and the impact of globalization. *Global Health* 2009;5:9. doi:10.1186/1744-8603-5-9 PMID:19751503
- Towards universal access: scaling up priority HIV/AIDS interventions in the health sector: progress report 2009*. Geneva: World Health Organization; 2009.
- Global tuberculosis control: surveillance, planning, financing: WHO report 2008*. Geneva: World Health Organization; 2008.
- AIDS epidemic update*. Geneva: Joint United Nations Programme on HIV/AIDS; 2006.
- World malaria report 2004*. Geneva: World Health Organization; 2005.
- The world health report 2004: changing history*. Geneva: World Health Organization; 2004.
- Beaglehole R, Yach D. Globalisation and the prevention and control of non-communicable disease: the neglected chronic diseases of adults. *Lancet* 2003;362:903–8. doi:10.1016/S0140-6736(03)14335-8 PMID:13678979
- Disease and injury country estimates*. Geneva: World Health Organization; 2010. Available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/estimates\\_country/en/](http://www.who.int/healthinfo/global_burden_disease/estimates_country/en/) [accessed 27 October 2010].
- Russell S. The economic burden of illness for households in developing countries: a review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. *Am J Trop Med Hyg* 2004;71(Suppl):147–55. PMID:15331831
- Abegunde DO, Mathers CD, Adam T, Ortegon M, Strong K. The burden and costs of chronic diseases in low-income and middle-income countries. *Lancet* 2007;370:1929–38. doi:10.1016/S0140-6736(07)61696-1 PMID:18063029
- Suhrcke M, Nugent RA, Stuckler D, Rocco L. *Chronic disease: an economic perspective*. London: Oxford Health Alliance; 2006.
- Adeyi O, Smith O, Robles S. *Public policy and the challenge of chronic non-communicable diseases*. Washington: World Bank; 2002.
- Epidemiological fact sheets on HIV and AIDS*. Geneva: Joint United Nations Programme on AIDS; 2008. Available from: <http://apps.who.int/globalatlas/default.asp> [accessed 27 October 2010].
- Global tuberculosis control: epidemiology, strategy, financing: WHO report 2009*. Geneva: World Health Organization; 2009.
- World malaria report 2005*. Geneva: World Health Organization; 2006.
- Diabetes programme: WHO African Region*. Geneva: World Health Organization; 2010. Available from: [http://www.who.int/diabetes/facts/world\\_figures/en/index1.html](http://www.who.int/diabetes/facts/world_figures/en/index1.html) [accessed 27 October 2010].
- Lasky D, Becerra E, Boto W, Otim M, Ntambi J. Obesity and gender differences in the risk of type 2 diabetes mellitus in Uganda. *Nutrition* 2002;18:417–21. PMID:11985948
- Rawaf S, De Maeseneer J, Starfield B. From Alma-Ata to Almaty: a new start for primary health care. *Lancet* 2008;372:1365–7. doi:10.1016/S0140-6736(08)61524-X PMID:18922572
- The world health report 2008: primary health care, now more than ever*. Geneva: World Health Organization; 2008.
- Beaglehole R, Ebrahim S, Reddy S, Voûte J, Leeder S; Chronic Disease Action Group. Prevention of chronic diseases: a call to action. *Lancet* 2007;370:2152–7. doi:10.1016/S0140-6736(07)61700-0 PMID:18063026
- Diabetes Atlas, fourth edition*. Brussels: International Diabetes Federation; 2010.
- Wilkinson D, Wilkinson NF. Organisation of non-communicable disease care. In: Parry E, Godfrey R, Mabey D, Gill G, editors. *Principles of medicine in Africa, third edition*. Cambridge: Cambridge University Press; 2004.
- Ait-Khaled N, Auregan G, Bencharif N, Camara LM, Dagli E, Djankine K et al. Affordability of inhaled corticosteroids as a potential barrier to treatment of asthma in some developing countries. *Int J Tuberc Lung Dis* 2000;4:268–71. PMID:10751075

34. Maher D, Harries AD, Zachariah R, Enarson D. A global framework for action to improve the primary care response to chronic non-communicable diseases: a solution to a neglected problem. *BMC Public Health* 2009;9:355. doi:10.1186/1471-2458-9-355 PMID:19772598
35. Progress towards the 2005 international targets for tuberculosis control. *Wkly Epidemiol Rec* 2007;82:169–78. PMID:17508438
36. *Towards universal access: scaling up priority HIV/AIDS interventions in the health sector: progress report 2008*. Geneva: World Health Organization; 2008. Available from: <http://www.who.int/hiv/mediacentre/2008progressreport/en/index.html> [accessed 27 October 2010].
37. Coovadia H, Bland R. From Alma-Ata to Agincourt: primary health care in AIDS. *Lancet* 2008;372:866–8. doi:10.1016/S0140-6736(08)61373-2 PMID:18790293
38. Setel PW, Saker L, Unwin NC, Hemed Y, Whiting DR, Kitange H. Is it time to reassess the categorization of disease burdens in low-income countries? *Am J Public Health* 2004;94:384–8. doi:10.2105/AJPH.94.3.384 PMID:14998800
39. Harries AD, Zachariah R, Kapur A, Jahn A, Enarson DA. The vital signs of chronic disease management. *Trans R Soc Trop Med Hyg* 2009;103:537–40. doi:10.1016/j.trstmh.2008.12.008 PMID:19155031
40. Craig P, Dieppe P, Macintyre S, Mitchie S, Nazareth I, Petticrew M.. Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 2008;337:a1655.
41. *Antiretroviral therapy for HIV infection in adults and adolescents: recommendations for a public health approach, 2006 revision*. Geneva: World Health Organization; 2006.
42. Atun RA, Gurol-Urganci I, McKee M. Health systems and older people with HIV and AIDS. Lessons can be learnt from the extensive experience in other chronic disorders [editorial]. *BMJ* 2009;339:308–9.
43. Maher D, Harries AD. Quality care: a link between clinical and public health approaches to HIV infection in developing countries. *Trop Med Int Health* 2010;15:391–5. PMID:20180935
44. Samb B, Evans T, Dybul M, Atun R, Moatti JP, Nishtar S et al.; World Health Organization Maximizing Positive Synergies Collaborative Group. An assessment of interactions between global health initiatives and country health systems. *Lancet* 2009;373:2137–69. doi:10.1016/S0140-6736(09)60919-3 PMID:19541040
45. Ooms G, Van Damme W, Baker BK, Zeitz P, Schrecker T. The 'diagonal' approach to Global Fund financing: a cure for the broader malaise of health systems? *Global Health* 2008;4:6. doi:10.1186/1744-8603-4-6 PMID:18364048
46. Chan M. Primary health care as a route to health security. *Lancet* 2009;373:1586–7. doi:10.1016/S0140-6736(09)60003-9 PMID:19150127
47. Zarocostas J. Non-communicable diseases must have greater priority, says WHO [news]. *BMJ* 2009;339:b2857. doi:10.1136/bmj.b2857
48. Maher D, Sekajugo J, Harries AD, Grosskurth H. Research needs for an improved primary care response to chronic non-communicable diseases in Africa. *Trop Med Int Health* 2010;15:176–81. doi:10.1111/j.1365-3156.2009.02438.x PMID:20002618
49. Daar AS, Singer PA, Persad D, Prammings SK, Matthews DR, Beaglehole R et al. Grand challenges in chronic non-communicable diseases. *Nature* 2007;450:494–6. doi:10.1038/450494a PMID:18033288
50. The Lancet. The global alliance for chronic diseases. *Lancet* 2009;373:2084. doi:10.1016/S0140-6736(09)61129-6 PMID:19541021
51. Nugent RA, Yach D, Feigl AB. Non-communicable diseases and the Paris Declaration. *Lancet* 2009;374:784–5. doi:10.1016/S0140-6736(09)61589-0 PMID:19733778