

Chronic Diseases: Chronic Diseases and Development 4



Prevention and management of chronic disease: a litmus test for health-systems strengthening in low-income and middle-income countries

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National health systems need strengthening if they are to meet the growing challenge of chronic diseases in low-income and middle-income countries. By application of an accepted health-systems framework to the evidence, we report that the factors that limit countries' capacity to implement proven strategies for chronic diseases relate to the way in which health systems are designed and function. Substantial constraints are apparent across each of the six key health-systems components of health financing, governance, health workforce, health information, medical products and technologies, and health-service delivery. These constraints have become more evident as development partners have accelerated efforts to respond to HIV, tuberculosis, malaria, and vaccine-preventable diseases. A new global agenda for health-systems strengthening is arising from the urgent need to scale up and sustain these priority interventions. Most chronic diseases are neglected in this dialogue about health systems, despite the fact that non-communicable diseases (most of which are chronic) will account for 69% of all global deaths by 2030 with 80% of these deaths in low-income and middle-income countries. At the same time, advocates for action against chronic diseases are not paying enough attention to health systems as part of an effective response. Efforts to scale up interventions for management of common chronic diseases in these countries tend to focus on one disease and its causes, and are often fragmented and vertical. Evidence is emerging that chronic disease interventions could contribute to strengthening the capacity of health systems to deliver a comprehensive range of services—provided that such investments are planned to include these broad objectives. Because effective chronic disease programmes are highly dependent on well-functioning national health systems, chronic diseases should be a litmus test for health-systems strengthening.

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This is the fourth in a *Series* of five papers about chronic diseases

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Introduction

The burden of disease attributable to chronic disorders, such as cardiovascular disease, diabetes, cancers, and respiratory disease, is higher in low-income and middle-income countries than it is in high-income countries, and continues to rise.¹ Non-communicable diseases (most of which are chronic) will account for 69% of all global deaths by 2030 with 80% of these deaths in these countries.² This mirrors the globalisation of risk factors such as tobacco, the combination of increased calorie intake and reduced exercise, and the ageing of populations.^{3–5}

The chronic characteristics of non-communicable diseases contrast with the predominantly acute nature of infectious diseases (although inevitably there are exceptions, such as HIV, tuberculosis, and leprosy). Chronic illness demands a complex health-systems response that needs to be sustained across a continuum of care. Evidence-based interventions should be delivered by health professionals with diverse skills. Appropriate technologies, dependable pharmaceutical supplies, and clean, accessible health facilities need to be brought together over a sustained period. These efforts should also be complemented by effective public policies to tackle major risk factors. Such interventions are possible only with a functioning health system, which can deliver disease prevention and

Key messages

- Many cost-effective interventions exist to address the growing burden of chronic diseases in low-income and middle-income countries; however, weak national health systems often make it impossible to deliver and sustain interventions effectively and equitably.
- Constraints on the capacity of countries to respond to the challenge of chronic diseases exist across each of the six key health-systems components of health financing, governance, health workforce, health information, medical products and technologies, and health service delivery.
- Efforts to scale-up interventions for chronic diseases in low-income and middle-income countries tend to focus on one disease and its causes, and are often fragmented and vertical. These efforts represent missed opportunities to leverage the health-system reforms that are needed.
- Global dialogue about health-systems strengthening neglects most chronic diseases.
- Advocates for action on chronic diseases are not paying enough attention to the interface between chronic disease responses and health systems. Increased focus and understanding on the dimensions of health systems is needed if countries are to address the challenge of chronic diseases.
- Interventions for responding to chronic diseases can lead to overall improvements in health systems in low-income and middle-income countries, provided that such investments are planned to include these broad objectives from the outset.
- Chronic disease interventions depend on well-functioning national health systems since long-term coordinated and intersectoral responses are needed across a continuum of care. Reduction of mortality and morbidity that is associated with chronic diseases will be an important measure for assessment of efforts to strengthen health systems.

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education services alongside integrated care and intersectoral collaboration that extends beyond the health sector.⁶

However, most low-income and middle-income countries have fragile health systems that are under-resourced and in need of structural and policy reform.⁷ The rapid transition in disease burden to chronic diseases is an enormous challenge for these weak systems. Cost-effective interventions to address chronic diseases exist, although progress is being stalled by shortfalls in the ability of health systems to ensure the effective and equitable delivery of these interventions.

We aim to assess the challenges involved in the delivery of services for chronic diseases in low-income and middle-income countries from a health-systems perspective; explore whether interventions to address chronic conditions can contribute to improving the capacity of health systems to deliver comprehensive health services; and assess whether the rapid emergence of a global agenda for health-systems strengthening, focused mainly on specific infectious diseases, is taking account of the growing need for services that can meet the challenge of chronic diseases in these countries.

Methods

We undertook an extensive review of published work from the past 10 years (1999 to present) in the Cochrane and PubMed databases. The search was done to identify health-systems aspects of prevention, diagnosis, treatment, monitoring, and management of chronic diseases in low-income and middle-income countries. Key search terms were: “chronic disease”, “developing country”, “low-income”, “health system”, “monitoring”, “prevention”, “screening”, “risk assess*”, “diagnosis”, “medical test”, “diagnostic”, “treatment”, “drug therapy”, “behavioral therapy”, “management”, “lifestyle modifications”, and “developing world”. We also searched for reports that addressed staff and physician training, technology development, patient education and counselling, patient records management, surveillance and monitoring systems, and access to care. We included prevention, diagnosis, treatment, monitoring, and management of chronic diseases in low-income and middle-income countries as related terms to health systems. We excluded evidence-based strategies from high-income countries that could be extended to low-income and middle-income countries (eg, blood pressure management guidelines).

We assessed evidence by applying a conceptual framework, adapted from that developed by the WHO, which identifies distinct components of health systems.⁸ This health-systems framework enabled an analysis of performance demands and related challenges in the areas of health financing, governance, health workforce, health information, medical products and technologies, and health-service delivery. We did an extensive search of recent government and non-government resolutions and

statements about chronic diseases, and of those about health-systems strengthening. The list was built up by the authors who verified that most global resolutions or statements were identified. Initially, the search terms “chronic disease”, “non-communicable disease”, and “health systems” were used, and subsequently each resolution or statement was explored in detail to achieve a two-fold objective: first, to identify how much the burden of chronic diseases is recognised and addressed within high-level political discourse related to health-systems strengthening; and second, to establish whether the need for strengthening is sufficiently emphasised by global advocacy for chronic diseases.

We adopted WHO’s definition of health systems as all organisations, people, and actions whose main intent is to promote, restore, or maintain health. This definition includes efforts to address the determinants of health and direct activities to improve health. A health system is therefore “more than a pyramid of publicly owned facilities that deliver personal health services” (figure).⁸

A well functioning health system is one that allows any person wherever they live and whatever their social and economic circumstances to access appropriate, good quality primary-care services, with referral to secondary and tertiary care when needed, without the risk of financial hardship.

We focus on chronic diseases—ie, those that cause chronic ill health. Not all chronic diseases are non-communicable and not all non-communicable diseases are necessarily chronic.

Health systems constraints to delivery of chronic disease services

Background

The prevention, treatment, and management of chronic diseases, whether in low-income, middle-income, or high-income countries, entails a core range of interventions—ie, primary prevention, proactive case finding (eg, assessment of risk factors and screening), education of both the public and health-care workers, efficient referrals, pharmacological and psychosocial interventions, long-term surveillance, and monitoring and assessment of quality of care.⁶ Although such interventions might be the same, substantial differences exist between low-income and middle-income countries and high-income countries in the type and scale of the barriers to implementation—most notably, strategies are conditioned by resource availability. Constraints also arise in relation to the ways in which national health systems are designed and function. These systemic constraints are the focus of our analysis. Health systems of many low-income and middle-income countries share many features such that they can be discussed as one group for the purposes of this analysis. Importantly, health systems are complex and context specific with some substantial variations between countries and regions. The overall approach

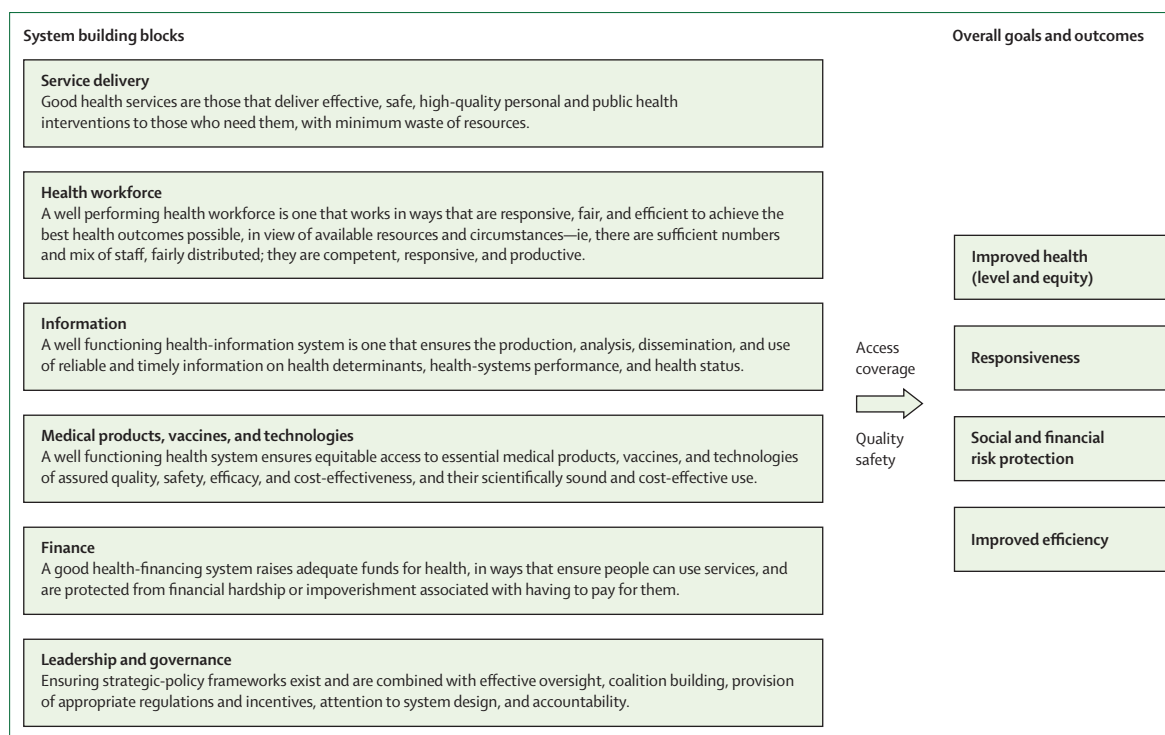


Figure: What is a health system?
Adapted from the WHO health-system framework.⁹

here is to attempt a general description and interpretation of the challenges facing many low-income and middle-income countries.

Financing

Financial responses are needed to implement low-cost but complex public policies (eg, national taxes on tobacco), sustained population-wide primary-care interventions (eg, screening), acute high-cost interventions (eg, bypass surgery), and sustained high-cost interventions (eg, kidney dialysis). Therefore, effective delivery of a comprehensive package of chronic disease interventions is highly dependent on a good health-financing system that can raise adequate funds in ways that ensure people can access services and are protected from impoverishment as a result of having to pay for them. Achievement of an effective, efficient, and equitable system will depend on a balance between the collection of revenues, the pooling of prepaid revenues in ways that allow risks to be shared, and the selection and purchase of interventions.⁸

In low-income and middle-income countries, most health care is financed through private payment by service users at the point of delivery. Such out-of-pocket payments account for 60% of health financing in low-income countries, compared with only 20% in high-income countries).⁹⁻¹¹ When financial protection is provided it is often limited to costs related to hospital admissions, and excludes any compensation for drugs

prescribed as an outpatient.¹² Limitation of financial protection, combined with the long-term nature of chronic disorders, puts patients and their families at especially high risk of incurring catastrophic health-care costs, especially those who are already poor.¹³ Such impoverishment is probably disproportionately linked to efforts to access care for chronic disease as opposed to other health services.¹⁴ The prospect of impoverishment is a disincentive to health-seeking behaviour and contributes to poor treatment adherence—eg, 63% of patients in Nigeria failed to adhere to chemotherapy for cancer because, at least in part, of the cost of the drugs.¹⁵

In some countries, public subsidies have been increased for the care of selected diseases, allowing treatment that is free at the point of delivery. But there is no evidence that such progressive approaches have been promoted beyond the diseases targeted by global disease-specific initiatives.¹¹

There are also substantial financial barriers in relation to the total amount of funding available for health in low-income and middle-income countries, including the amount of domestic and external resources. Globally, there has been pronounced growth in official development assistance for health over the past decade. However, many of these resources have been targeted at specific diseases such as HIV, tuberculosis, and malaria. Total development assistance for health in 2007 was US\$21.8 billion. Of the \$14.5 billion for

which project information is available, 46% was for these three diseases.¹⁶

Despite the fact that non-communicable diseases accounted for 50% of the disease burden in low-income and middle-income countries in 2005,² donor funding for these conditions is negligible. Chronic diseases are not identified as a distinct entity in tracking systems that monitor global health expenditure, which has made difficult the identification of donor spending on chronic diseases as a proportion of global health spending. However, new estimates show that only 2.3% (\$503 million) of overall development assistance for health in 2007 was dedicated to non-communicable diseases.¹⁷ Such disparity is present in the resources committed by WHO to different disease groups, in which the disconnection between resources and disease burden is largely driven by extra-budgetary funds from donors.¹⁸ In the absence of external resources, funding for most chronic diseases has been dependent on domestic resources for health, which are often very scarce. Moreover, recent analyses have shown that the increase in external funding has, in some cases, exerted a downward effect on the total domestic resources that are allocated for health.¹⁹ A substantial growth trend in the private health-care sector in many African countries has been identified, with most spending in this sector for treatment and care of chronic disease.²⁰

Governance

Our analysis identified aspects of governance that suggest substantial constraints to implementation of an effective response to chronic diseases. Globally, the past decade has seen the establishment of several governing bodies to guide the allocation of development aid for health, and prioritise health actions. These governing bodies mostly oversee specific global health initiatives and partnerships. This has had the unintended but inevitable consequence of focusing the attention of global health leadership on the health interventions that are prioritised by the global health initiatives. Among those initiatives, few focus on non-communicable diseases.²¹

Nationally there are substantial weaknesses in governance processes and structures in many low-income and middle-income countries. Strong national health-sector plans and policies are often absent. Poor coordination with other sectors, insufficient regulatory functions, and inadequate bureaucracy for budgeting and auditing expenditure are common problems.^{7,21} In response to such pre-existing weaknesses, development partners have contributed to a proliferation of new governing bodies that often have a particular focus on specific health priorities—eg, the Global Fund's country coordinating mechanism or the Global Alliance for Vaccines and Immunisation (GAVI) interagency coordinating committee.²¹ No evidence exists of a similar expansion of arrangements for the governance of non-communicable disease programmes. New national

bodies implemented by global health initiatives are not intended to replace the essential functions of ministries of health in terms of providing policy guidance and coordination. Nevertheless, the pre-existing weaknesses in the governance of national health systems have meant that parallel coordination and planning processes might have further undermined health-system design, accountability, intelligence and oversight, and collaboration and coalition building.^{21,22}

Health-system design that devolves decision-making power locally is a key factor in promoting effective decentralisation of health care. Evidence shows that appropriate decentralisation of health management, and democratisation of health through the active participation of the community and of service users, has a positive effect on access to and uptake of health services, especially for poor, rural populations.^{6,23–28} For the control of chronic diseases, decentralised service delivery can help with early detection and monitoring of risk factors, provision of care over a long time, a sustained supply of drugs, and psychosocial interventions.⁶ However, these measures must be backed by sufficient resources and balanced by effective governance of the functions that are best undertaken centrally, such as drug procurement, technology assessment, and guideline development—which are all areas of weakness in many low-income and middle-income countries.

Community-based interventions and self-management are crucial components of effective and sustainable primary-level chronic disease programmes, partly because the health-care provider–patient interaction is heavily intertwined in the treatment of chronic diseases. Such interventions are also important because of the need for long-term management of chronic conditions, which is delivered outside the sphere of formal care. The degree of community involvement in planning and implementation of services is therefore an important factor for success. Establishment of community links and provision of education for support and extended care is essential.⁶ However, we find that some health systems in low-income and middle-income countries tend to be hierarchical and over-centralised. Many of these countries have few social networks and little meaningful community participation and empowerment.^{29–31}

Health workforce

A sufficient, well trained, and appropriately deployed health workforce is essential for the effective implementation of any health programme.³² Comprehensive chronic disease prevention, care, and management make especially heavy demands on the health workforce due to the range of interventions and extended duration of contact with services. Primary health-care workers are needed to bring care close to the community and play a part in early detection and support for long-term self-management and home-based care. Public health specialists who can deliver

intersectoral prevention strategies are also needed, as are highly specialist tertiary-care professionals. This diverse workforce should be deployed appropriately to ensure sufficient and equitable access to services, especially for rural and marginalised populations. These health workers must be retained by acceptable pay and working conditions, and supported by well functioning supervision and referral systems and a reliable supply of necessary commodities.

Low-income and middle-income countries have acute shortages of skilled health workers, with over-concentration in urban areas and poor retention rates due to insufficient pay, unfavourable working conditions, and ill health.³³ The existing health workforce does not have the skills that are needed to meet the emerging health needs of the communities they serve. Shortages and deficiencies in education and training for the detection and treatment of chronic diseases prevent a successful response. For example, training in screening, interventions, and identification of behavioural changes is often needed. Incomplete use or complete failure to use guidelines is another area of weakness. Poor patient-provider interaction has also led to inadequate understanding of illness on both sides, and further constraints relate to issues of low productivity.^{8,22,28,34}

There have been new commitments to training for health workers. However, these efforts have been driven by the urgent need to scale up access to disease-specific services and have therefore focused mainly on in-service training for HIV/AIDS, tuberculosis, malaria, and vaccine-preventable diseases. Little evidence exists of similar investments for non-communicable diseases.³⁵ Emphasis on in-service training has not been matched by support for long-term measures, such as the education of new doctors, nurses, and other clinicians with the appropriate skills to serve the full range of population-health needs.²¹

Efforts towards meeting the commitments of the Millennium Development Goals (MDGs) to combat priority diseases, reduce child mortality, and improve maternal health have contributed to rising demand for health care and have increased the pressures on overstretched human resources for health.^{21,33} Difficulties related to workforce distribution have been exacerbated in cases in which public-sector health workers have left their jobs to take advantage of improved pay and conditions offered by non-state providers.³³

Health information

Responses to chronic disease have been hampered by shortcomings in health information.^{6,36–39} The constraints relate to the amount of resources invested in health information, the appropriateness of the health indicators, the sources of data available, the way in which data are managed and converted into information products, and the dissemination and use of health

information.⁴⁰ There is insufficient investment in health information systems from either domestic or external resources.⁴¹ During the past decade, global health initiatives have stimulated demand for improved health information and have invested in the improvement of information systems.⁴² These investments have led to better availability and accuracy of some data. However, the tendency has been to focus on gathering data for the coverage of specific services and surveillance for specific diseases, often for the purposes of ensuring accountability. Similar improvements or increased investment have not been evident in relation to the state of services for chronic diseases or health in general. Moreover, these improvements have generated burdens of reporting on the health workforce, possibly at the expense of good monitoring and reporting for general health assessments.^{21,22}

Combination of data sources, both periodic and continual, including but not limited to population surveys, civil registration, individual records, management information systems, and registries, provide the reliable information needed for designing health policies for chronic diseases. Most low-income and middle-income countries do not have integrated health-information systems that can pull together information from such a range of sources, or link the various care providers to assist coordination along the care pathway.

Additionally, data systems that exist might not be configured to the needs for a response to chronic diseases. For example, many facility-information systems do not include indicators relevant to chronic diseases, and many countries do not have nationally representative cancer or stroke registries. Weaknesses in national capacities for information management and information production contribute to a failure in the effective use of data generated for planning and implementation of chronic disease interventions, and more generally, mean that low-income and middle-income countries assign low value to health information and make little demand for improvement.²¹

Many of the information needs for chronic disease interventions could be met by expanding platforms for generic health information, such as vital registration and cause of death. Currently, more than a third of the world's 128 million births a year, and two-thirds of its 57 million deaths are not registered.⁴³ Other needs could be met by household surveys and facility-information or management-information surveys. But in low-income and middle-income countries these data-gathering mechanisms will need substantial improvement and modification.

Our review identified some evidence of efforts by countries to improve health-information systems to support programmes for the care and management of chronic diseases. For example, electronic reporting systems for asthma care are being developed in Malawi⁴⁴ and an occupational-health surveillance system has been developed in Guangzhou (China), which records

conditions such as lead poisoning and noise-induced hearing loss.⁴⁵ However, these isolated, disease-specific efforts are indicative of a wide tendency for chronic disease groups to advocate for dedicated registry systems for individual diseases. The development of many different stand-alone systems for monitoring and surveillance of different chronic diseases risks further fragmentation, high costs, and inefficiencies of health-information systems, and might even undermine efforts to invest in enhanced national frameworks for common data. Generally, surveillance for chronic diseases has not been integrated successfully into national health-information systems in low-income and middle-income countries.

Medical products and technologies

Steady supply chains that can ensure the efficient distribution of specific medical products and technologies to health facilities or consumers, over an extended period of time, are essential for the effective treatment and management of chronic diseases. In many low-income and middle-income countries, supply-management systems are weak, even when commodities are available. National policies, standards, guidelines, and regulations are often deficient. Procurement, supply, storage, and distribution systems are often inefficient and wasteful. As a result of weak supply management and budgetary constraints, stock interruptions of essential drugs occur frequently and present a barrier to mounting a sustained and effective programme for chronic disease control.⁶ For example, a study in Mozambique and Zambia about access to care for patients with insulin-requiring diabetes identified that insulin was available in sufficient quantities in these countries. Nevertheless, weaknesses in the supply-management systems in both countries, along with other systems constraints—such as insufficient training for health-care workers—meant that the insulin alone did not improve the prognosis for patients with diabetes.⁴⁶

Drug costs make up a substantial part of the direct costs of programmes for chronic diseases. Thus, the success of such programmes is heavily dependent on national drug policies and on quality, rational use, and access to drugs. Essential medicines needed for implementation of core primary-care interventions to address chronic diseases in low-resource settings have been identified by WHO,⁴⁷ and are included in WHO's model list.⁴⁸ Studies of affordability and availability of essential medicines for chronic conditions in low-income and middle-income countries have shown that access to cost-effective interventions is often limited by the high costs of medicines, especially in settings where services are funded through out-of-pocket expenditure.⁴⁹ A study of affordability and availability of medicines in six low-income and middle-income countries found that, in Malawi, 1 month of combination treatment for coronary

heart disease cost 18·4 days' wages for the lowest-paid government worker.⁴⁹ Government systems for procurement are generally able to obtain prices similar to international reference prices. Despite this ability, prices charged for medicines tend to be high compared with procurement costs and, public-sector-procurement systems cannot ensure adequate availability of essential medicines for chronic diseases.

Private-sector service providers can do so, but charge prices that are several times higher than the international reference price. Taxes and duties levied, and the mark-ups applied, especially by dispensing doctors, increase prices and often exceed the purchase price charged by the manufacturers. Government regulation could usefully be applied to control these types of additional costs.^{49,50} Procurement and distribution of specific categories of commodities, such as antiretroviral therapy for the treatment of HIV/AIDS and vaccines, has improved in some countries.^{51,52} Other commodities, are frequently out of stock.⁶ The situation is especially bad for people with type 1 diabetes, although there is also substantial undertreatment of other common conditions, such as hypertension.^{53,54}

Health-service delivery

Delivery of health services that are accessible, equitable, safe, and responsive to the needs of users is essential if any proven strategy for chronic disease control is to have an effect on improving population-health outcomes. However, in many low-income and middle-income countries, evidence shows that those with chronic conditions often fail to receive adequate care because of a combination of insufficient access and poor quality of health services.^{28,34}

Prevention of chronic diseases needs strategies that are coordinated across sectors to promote health and wellbeing. Chronic diseases need early detection and monitoring of risk factors, increased integration, care provided over a longer period than is needed for acute conditions, and care that combines both drugs and psychosocial interventions; these all place heavy demands on weak service-delivery systems.⁶

Inappropriate models for service delivery, such as over-centralisation and weak referral systems, have substantial implications for the detection of chronic diseases and, consequently, for treatment outcomes. Findings from a study in Nairobi reported delays in cancer diagnosis due to multiple referrals, which meant that cancer was at a more severe stage at diagnosis and treatment was less effective.⁵⁵ Late detection is also linked to poor colorectal cancer survival in Mumbai, India.⁵⁶ In South Africa, insufficient services lead to unnecessary referral, and poor provider-patient understanding often delays diagnosis, treatment, and care.³⁴ Furthermore, a combination of weaknesses in staffing, supplies, guidelines, and governance adversely affected the care of people with diabetes in several

former Soviet countries.^{57,58} Different models of care might prove effective, dependent on the context. Since there is a possibility that an individual with chronic disease might have multiple conditions, integrated care has been shown to be effective in some cases.^{59,60} However, efficient and effective integration of care is only possible if there is strong coordination and planning and adequate monitoring and information sharing, which are often scarce in low-income and middle-income countries.

Approaches to chronic disease care that empower service users to take responsibility for specific aspects of their own care through self-management programmes can achieve improved health outcomes.^{61,62} Evidence shows that people living with chronic conditions can contribute to the care and support of others through counselling, adherence support, and other services.⁶³ However, the success of these progressive models is linked to the democratisation and decentralisation of health-care provision, and needs effective education, support, referral, and coordination across the continuum of care.^{6,63}

The risk of developing many chronic diseases is strongly determined by social factors.⁶⁴ Efforts to address these factors need an inter-sectoral response that can engage partners outside the health sector, such as the ministries of education, finance, housing, and labour. Such efforts also involve engaging with the private sector, either to seek allies in the struggle against chronic diseases, or to tackle those that are the cause of the problem (eg, the tobacco industry). Yet, engagement with other sectors, essential for assistance to national planning processes, is often weak.²¹ Low-cost interventions—eg, strategies to reduce salt intake and control tobacco use—are effective in low-income and middle-income countries.⁶⁵ Nevertheless, the response of the global scientific community to chronic diseases has tended to focus on highly technical, curative interventions, which need high-cost tertiary care. Demand for these specialist services in low-income and middle-income countries is being met by a growing private health-care sector. These services are accessible only to those who can afford to pay.²⁰

Global political commitments to chronic diseases and to health-systems strengthening

The political priority that is afforded to different aspects of global public health is communicated through the wide range of political commitments that are made by national health leadership and by development partners.⁶⁶ Such commitments are formally expressed through resolutions and other statements of intent from relevant bodies and organisations. We did a wide search of the recent documentation of resolutions and statements about chronic diseases, and about health-systems strengthening. Our search aimed to identify to what extent the burden of chronic disease is being

Panel 1: Global commitments to health-systems strengthening—review of resolutions and statements

Commission on Social Determinants of Health⁶⁴

The report acknowledges that “while the poorest countries have a high burden of communicable disease as well as non-communicable disease and injury, in all other regions of the world non-communicable diseases predominate”. Also that “health care can do much more than treat disease when it happens. Research shows how a significant proportion of the global burden of both communicable and non-communicable disease could be reduced through improved preventive action”. In relation to the goals and targets for health equity, the Commission acknowledged that “extending beyond the current focus of the MDGs and their timeline of 2015, the Commission concerns itself certainly with the health inequity between countries, but also with the social gradient in health within high-, middle-, and low-income countries, and with the impact on adult mortality due to communicable and non-communicable diseases and violence/injury”.

Ouagadougou declaration on primary health care and health systems in Africa⁶⁷

Refers to non-communicable disease targets as being central to the MDGs in its call to action: “The Ouagadougou declaration calls on Members States to update their national health policies and plans according to the Primary Health Care approach, with a view to strengthening health systems in order to achieve the Millennium Development Goals, specifically those related to communicable and non-communicable diseases, including HIV/AIDS, tuberculosis and malaria; child health; maternal health; trauma; and the emerging burden of chronic diseases”.

The Kampala declaration and agenda for global action⁶⁸

Recognises complex interrelations between diseases and systems, and emphasises the importance of the double burden of disease: “recognizing the devastating impact that HIV/AIDS has on health systems and the health workforce, which has compounded the effects of the already heavy global burden of communicable and non-communicable diseases, accidents and injuries and other health problems, and delayed progress in achieving the health-related Millennium Development Goals”.

Frameworks that do not adopt a disease-focused approach and do not mention chronic diseases

Venice statement,⁶⁹ joint learning initiative report,⁷⁰ Montreux challenge,⁷¹ Bamako ministerial declaration,⁷² Tallinn charter,⁷³ Paris declaration on aid effectiveness,⁷⁴ Accra agenda.⁷⁵

Frameworks that do not mention non-communicable diseases, but pay attention to maternal, neonatal, and child health and infectious diseases

Toyako framework⁷⁶

Frameworks that do not have chronic non-communicable diseases in their mandate

Health Metrics Network,⁷⁷ International Health Partnership,⁷⁸ Global Alliance for Vaccines and Immunisation—health systems strengthening,⁷⁹ Rockefeller Foundation,⁸⁰ Global Fund to Fight AIDS, Tuberculosis and Malaria; national strategy application.⁸¹

recognised and addressed within the high-level political discourse pertaining to health-systems strengthening (panel 1). We also aimed to establish whether the need for strengthened health systems is being sufficiently emphasised in global advocacy for chronic diseases (panel 2).

Only three of 16 resolutions and statements on health-systems strengthening make any reference to the need for a response to the rising burden of chronic diseases in low-income and middle-income countries. The

Panel 2: Global commitments relevant to chronic diseases—review of resolutions and statements

Address of permanent mission of Qatar to the UN president of the economic and social council⁸²

Excerpt from the address: “premature death, disability and the burden on health systems resulting from [non-communicable diseases] and injuries undermined development efforts and impacted economic growth in the region...Public policy makers need to ensure that the responses to [non-communicable diseases] are placed at the forefront of efforts to strengthen health systems”, urging Member States in the region to “enable health systems to respond more effectively and equitably to the health-care needs of poor people with [non-communicable diseases] and injuries in low-income and middle-income countries”.

World Health Assembly document—prevention and control of non-communicable diseases: implementation of the global strategy⁸³

The importance of health systems was emphasised; “strengthening health care for people with non-communicable diseases by developing evidence based norms, standards and guidelines for cost-effective interventions and by reorienting health systems to respond to the need for effective management of diseases of a chronic nature”. The objectives of the document, and the proposed actions for member states, the secretariat, and international partners underscored the centrality of health systems.

2010 Global risks report of the World Economic Forum⁸⁴

This report recognises chronic diseases not only as a serious health risk but also as an inherent risk, deeply interconnected with others in the global-risk landscape. Particularly, and with respect to the chronic disease health-systems interface, the report acknowledges that information and innovation are essential to prevention.

Public policy and the challenge of chronic non-communicable diseases; the World Bank⁸⁵

The World Bank’s approach to chronic disease control will be guided by the World Bank strategy for health, nutrition, and population. The preliminary recommendations underpinning the strategy underline several areas, including strengthening health-system knowledge creation, policy, and technical advice in areas in which the bank has a comparative advantage, and ensuring synergy between health system and single-priority disease control approaches in low-income countries.

Global Non-Communicable Disease Network (NCDnet)⁸⁶

Through an emphasis on integration of the prevention of non-communicable diseases and accidental injuries into the national and global-development agendas, the global non-communicable disease network prioritises action on systems.

Statement of the heads of CARICOM⁸⁷

The statement acknowledges the importance of delivery systems.

Programmes that do not include health systems

Global Alliance for Chronic Diseases,⁸⁸ Oxford Health Alliance,⁸⁹ Ovations,⁹⁰ recommendations of the committee on the US commitment to global health.⁹¹

Commission on Social Determinants of Health⁶⁴ acknowledges the importance of chronic diseases as a proportion of the global burden of disease, and envisages a need for the Commission to address both communicable and non-communicable diseases beyond the current focus of the MDGs. The Ouagadougou declaration⁶⁷ refers explicitly to the need to strengthen health systems to address the emerging burden of chronic diseases. In its preamble, the Kampala

declaration recognises complex inter-relations between diseases and systems, and in doing so, emphasises the importance of the double burden of disease.⁶⁸ Chronic diseases have not been mentioned in the Montreux challenge on making health systems work,⁷¹ the Bamako call to action,⁷² the Tallinn charter,⁷³ which was the outcome of the WHO European ministerial conference on health systems, and the Paris declaration on aid effectiveness.⁷⁴ However, the absence of chronic diseases from such resolutions and statements is understandable since they do not specify disease groups, but instead emphasise the importance of addressing health in general. The Toyako framework for action on global health, which was the product of the G8 Health Experts Group,⁷⁶ does not include chronic non-communicable diseases.

Panel 2 summarises a review of ten global resolutions and statements^{82–91} on the management of chronic diseases. The World Health Assembly document on prevention and control of non-communicable diseases notes the need to reorient health systems for effective management of chronic diseases and urges member states to ensure that provision of health care for chronic diseases is dealt with in the context of overall health systems strengthening.⁸⁶ The World Economic Forum,⁸⁷ the World Bank,⁸⁸ and the Global Non-communicable Disease Network⁸⁹ have also each identified the need to strengthen health systems in low-income and middle-income countries to respond to chronic diseases. Health systems per se are not within the remit of several new initiatives that focus on chronic diseases—namely the Global Alliance for Chronic Diseases,⁸⁸ the Oxford Health Alliance,⁸⁹ or the Ovations partnership for chronic diseases.⁹⁰ Nevertheless, these initiatives do provide important entry points for increased focus on the interface between improvements in systems functioning and chronic disease prevention and control.

Emerging issues

Our analysis shows many recurring themes. First is that chronic disease programmes are highly dependent on well functioning and equitable health systems—arguably more so than some other population-health interventions. Such a dependency results from the need for long-term and sustained coordination between sectors and at all levels across a continuum of prevention and care. Therefore, delivery of a comprehensive package of interventions for chronic diseases places substantial operational demands on the health systems of low-income and middle-income countries, and exposes weaknesses in the six key system components—finance, governance, health workforce, health information, medical products and technologies, and service delivery. Also noteworthy is the interdependence of each of these health-system components. The weakest links might vary between countries. However, wherever substantial deficiencies are evident in one component, the health

system as a whole fails to function well enough to support a comprehensive response to chronic diseases. Therefore, although there might be country-specific areas of need for health-systems strengthening, there can be no a-priori prioritisation between the different health-system components.

Despite the dependence on strong systems for an effective response to chronic disease, there is still a failure to place health-systems strengthening consistently at the centre of either global advocacy or national programming efforts to respond to the growing burden of chronic diseases in low-income and middle-income countries. Responses to chronic diseases focus mostly on single diseases, with little evidence of efforts to ensure a coordinated approach for the prevention and management of all common chronic diseases. Furthermore, the emphasis within chronic disease care continues to be on predominantly specialist, curative, and tertiary care rather than on population-based interventions, which demand a health-systems response.

The second theme is the low priority that is given to chronic non-communicable diseases as compared with other pressing health issues, both globally and nationally.⁶⁶ Absence of political commitment can be explained in part by the nature of chronic disease prevention, treatment, and care. An effective response to chronic diseases demands long-term planning, inter-sectoral responses, and consistent investment that can be sustained over a long time. Returns on such investment, in terms of population-health outcomes, are generally not seen in the short term, which has been a factor in the failure to mobilise resources and to build coalitions with those working in many other areas of development. Moreover, chronic diseases are often seen incorrectly as the result of individual choices, with too little recognition of underlying social determinants. An emphasis on highly technical and specialist, curative interventions for chronic conditions, which need high-cost tertiary care, combined with scarce public resources for health care, has contributed to a predominantly private-sector response to chronic disease in low-income and middle-income countries, despite the availability of low-cost and cost-effective interventions.

A further factor seems to relate to a failure to define and identify chronic diseases as a coherent group for advocacy and accountability and to generate robust data for the implications of such diseases as a subset of overall public health needs—as seen in the fragmentation of programmes for chronic diseases. Although there has been concerted action on specific conditions such as diabetes, cancers, or cardiovascular disease in many countries, there are very few examples of an integrated response. Scarce data for chronic diseases have also hindered understanding of the profound economic consequences of chronic disease-related premature death and disability. One exception is in countries from the former Soviet Union, where those seeking to promote

economic growth have recognised the importance of investment in population health, including chronic disease prevention, treatment, and care.⁹² As a result of

Panel 3: Interventions for chronic conditions as a potential platform to strengthen national health systems in low-income and middle-income countries—the case of HIV/AIDS

In our analysis of the constraints to the expansion of chronic disease interventions in low-income and middle-income countries, many of the health-systems constraints we have identified match those that have been identified by countries and development partners in their efforts to scale up the response to the HIV/AIDS epidemic.⁹³

With the availability of antiretroviral drugs growing in resource-constrained countries, partly related to a dynamic movement of social activism, HIV is becoming a chronic condition in these settings. The main strategies for prevention, treatment, and care of HIV/AIDS—ie, early detection and monitoring of risk factors, population-based interventions, continuing care, regular monitoring of treatment adherence, and psychosocial interventions—are strategies for chronic care.^{6,94}

Evidence shows that efforts to meet disease-specific targets with selective interventions have, in some cases, increased the pressures on already fragile health systems.²³ However, when the needs of health systems have been identified, and broader systemic benefits intentionally planned from the outset, disease-specific investments have been shown to contribute to sustainable health-systems strengthening and to generalised improvements in population health.^{21,95,96} For example, in the Central Plateau of Haiti, a broad partnership between the Haitian Ministry of Health and development partners was designed, from the outset, to build a robust health system through the integration of HIV services. The initiative was planned to deliver HIV services within a primary health-care framework that would also increase access to a wide range of other health services at the community level in some of the most hard-to-reach populations. Results have shown increases in antenatal visits and attended births, improvement in vaccination rates, and improved uptake of contraceptive services.²¹

In Rwanda, strong country-led processes and national coordination have ensured that external resources for HIV/AIDS have brought wide benefits to the national health-care system. Findings from a study of the expanded HIV programme show substantial improvements in health infrastructure and increases in other areas of health provision, especially in antenatal care.⁹⁷

In other cases, there have been efforts to address specific health-systems bottlenecks for the delivery of HIV services, especially the need for more health workers. For example, several countries have adopted a task-shifting approach to strengthen and expand the health workforce rapidly for the delivery of HIV services. Task shifting is the process whereby work is done by the most appropriate type of health worker; this includes the transfer of some specific tasks to health workers with less training and fewer qualifications. Reorganisation of the workforce by task shifting can make efficient use of existing human resources and ease bottlenecks in service delivery. Task shifting might also involve the delegation of some clearly delineated tasks to newly created types of health workers, or to expert patients, who receive specific, competency-based training. For example, in Malawi, Ethiopia, and elsewhere, there has been rapid recruitment and deployment of additional health workers, which has also helped to bring services closer to patients—an important factor in the prevention and management of chronic diseases.^{6,98} People from low-income and middle-income countries living with HIV are being trained to act as tutors for other patients in expert-patient programmes.⁶³ In Ethiopia and Uganda, people living with HIV/AIDS are contributing to the delivery of HIV services in a range of roles, including the training of health workers.⁹⁸ These various interventions, implemented in the context of efforts to rapidly expand access to HIV services, have thus had wider implications for health-systems strengthening in many countries.

Panel 4: Meeting the challenge—five areas for action

The challenge is to inject new energy into a response to chronic disease that is oriented towards system strengthening. Urgent action is needed and our assessment points to five key areas. Each area will need concomitant action by international partners, national policy makers, programme managers, and researchers.

Area 1: embed the discourse on chronic diseases in the emerging agenda for health-systems strengthening and promote the needs of health systems to chronic disease advocates.

- Improve understanding of the interface between chronic diseases and health systems through joint learning and information sharing.
- Review policies and plans (including global, national, and subnational policies and plans) that have been developed to strengthen health systems, and those that address chronic diseases, and revise these as necessary to show the synergies between the two.
- Strengthen the advocacy capacity of researchers and research institutions so that research findings are communicated effectively to policy makers and other stakeholders in public health.

Area 2: avoid fragmentation of the response to chronic disease (by single condition or subgroup).

- Coordinate advocacy efforts around different chronic conditions to allow for heightened political commitment and action on chronic diseases as a unified cause.
- Bring together different data for chronic diseases, and for other population-health conditions, into one national information system.
- Increase the extent to which funding for chronic diseases from different sources flows through comprehensive national health plans.

Area 3: agree on targets for measurement of progress in health-systems strengthening using criteria related to chronic diseases as key indicators.

- Seek consensus on a shortlist of targets for responses to chronic disease against which health-systems performance can be measured.
- Devise and implement approved metrics for tracking the performance of health systems, including metrics specifically associated with chronic diseases.

Area 4: broaden ownership of responses to chronic disease and of health-systems strengthening.

- Implement measures to improve collaboration and joint planning between ministries of health and other sectors—such as finance, education, social services, and labour.
- Mobilise communities to play an active part in advocacy for chronic diseases and health systems, and empower service users to participate in planning and implementation of health programmes.
- Engage non-state providers, including the private sector, systematically in the planning and implementation of programmes for chronic diseases and health-systems strengthening.

Area 5: increase funding for health that is oriented towards a health-systems response to the growing burden of chronic diseases.

- Commit to increase the amount of predictable external and domestic funding for short-term, medium-term, and long-term investment that can facilitate improved planning for strengthening health systems and for long-term population-health interventions.
- Focus investment on strategies, such as primary health care, that place the emphasis on a comprehensive approach to population health and are responsive to the context-specific needs of communities.

these factors, there has been a failure to create a social movement that can draw attention to the neglect of chronic diseases. The effect of chronic diseases as a whole

has not had a sufficiently motivating effect on public opinion or on global or national political leadership.⁶⁶

The third theme of our findings is the extent to which the urgency of an agenda for tackling specific diseases such as HIV/AIDS, tuberculosis, malaria, and vaccine-preventable diseases has exacerbated previously existing pressures in each of the six health-system components. A global agenda for health-systems strengthening is now emerging, but this movement has been born out of recognition of the need for more robust national health systems to achieve disease-specific targets and meet the MDGs. Some interventions to address the chronic aspects of HIV/AIDS management and care have provided an entry point for improvements in access and uptake of a range of other health services in some resource-constrained settings (panel 3). These interventions suggest the potential for responses to chronic disease, which place the emphasis on primary care, expanded access, participation, accountability, and intersectoral responses, to advance substantial and broad improvements in national health systems and, ultimately, in overall population health.

Finally, these findings suggest that there is a poor understanding of the health-systems perspective by many different people working in global public health. Such shortcomings derive from the fact that health systems are complex and context specific, and because there are still few appropriate methods or sufficient incentives to fully investigate health-systems aspects that relate to different health interventions. Serious efforts have to be made to address this, including national and international research that is well connected with government efforts to provide necessary education; panel 4 presents five areas for action.

Conclusion

Every effort must now be made to embed the discourse on chronic diseases firmly within the emerging agenda for health-systems strengthening, and to promote the needs of health systems to chronic disease advocates. A shared agenda will aim, from the outset, to build national health systems which can respond to the full spectrum of evolving population-health needs in low-income and middle-income countries. From this shared global vision will follow policy reforms that can encourage greater appropriateness, relevance, and efficiency in health-care financing; instruments and structures for health governance; recruitment, training, and deployment of health workers; health-information systems; supply management; and delivery of health services.

At present, chronic disease programmes are languishing at the bottom of the agenda for global-health development. Instead, progress in the response to chronic diseases as a whole should represent a litmus test for health-systems strengthening. If a national health system is designed so that it can respond effectively to chronic diseases, that country will also be well equipped to respond to a wide

range of other population-health needs, including acute conditions. Investment in a systems approach to chronic diseases in low-income and middle-income countries could therefore represent a strategic focus for a new, post-2015 global health agenda.

Contributors

BS conceptualised the report and led the information gathering. BS and AW drafted successive versions of the paper. ND, JH, and AM did the review of published works and provided input and comments on successive drafts. SN did the review of global political commitments to chronic diseases and to health-systems strengthening and prepared panels 1 and 2. SM, HB, FC, KP, FA, MM, and TE contributed their ideas, provided additional data, and commented on successive drafts of the paper. CE, ADA, and TE provided overall leadership and guidance in the development of the report.

Conflicts of interest

We declare that we have no conflicts of interest.

References

- WHO. Preventing chronic disease: a vital investment. Geneva: WHO, 2005.
- Miranda JJ, Kinra S, Casas JP, Smith GD, Ebrahim S. Non-communicable diseases in low- and middle-income countries: context, determinants and health policy. *Trop Med Int Health* 2008; **13**: 1225–34.
- Strong KL, Mathers CD, Leeder S, Beaglehole R. Preventing chronic diseases: how many lives can we save? *Lancet* 2005; **366**: 1578–82.
- Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL, eds. Global burden of disease and risk factors. Washington, DC: World Bank, 2006.
- WHO. Global health risks: mortality and burden of disease attributable to selected major risks. Geneva: WHO, 2009.
- Beaglehole R, Epping-Jordan J, Patel V, et al. Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care. *Lancet* 2008; **372**: 940–99.
- Nishtar S. Choked pipes: reforming Pakistan's mixed health system. Oxford: Oxford University Press, 2010.
- WHO. Everybody's business: strengthening health systems to improve health outcomes: WHO's framework for action. Geneva: WHO, 2007.
- Cisse B, Luchini S, Moatti JP. Progressivity and horizontal equity in health care finance and delivery: what about Africa? *Health Policy* 2007; **80**: 51–68.
- Preker AS, Langenbrunner J. Spending wisely: buying health services for the poor. Washington, DC: World Bank, 2005.
- Souteyrand YYP, Collard V, Moatti JP, Grubb I, Guerma T. Free care at the point of service delivery: a key component for reaching universal access to HIV/AIDS treatment in developing countries. *AIDS* 2008; **22** (suppl 1): 161–68.
- Wagner AK, Valera M, Graves AJ, Laviña S, Ross-Degnan D. Costs of hospital care for hypertension in an insured population without an outpatient medicines benefit: an observational study in the Philippines. *BMC Health Serv Res* 2008; **8**: 161.
- Sun Q, Liu X, Meng Q, Tang S, Yu B, Tolhurst R. Evaluating the financial protection of patients with chronic disease by health insurance in rural China. *Int J Equity Health* 2009; **8**: 42.
- Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicounty analysis. *Lancet* 2003; **362**: 111–17.
- Emoti CE, Enosolcase ME. The effect of accessibility to drugs on outcome of therapy inpatients with malignant lymphoma. *Niger Postgrad Med J* 2008; **15**: 10–14.
- Ravishankar N, Gubbins P, Cooley RJ, et al. Financing of global health: tracking development assistance for health from 1990 to 2007. *Lancet* 2009; **373**: 2113–24.
- Nugent R, Feigl A. Scarce donor funding for non-communicable diseases: will it contribute to a health crisis. Centre for Global Development. Working Paper, 2010; in Fuster V and Kelly B. Promoting cardiovascular diseases in the developing world, Washington, DC: National Academies Press, 2010.
- Stuckler D, King L, Robinson H, McKee M. WHO's budgetary allocations and burden of disease: a comparative analysis. *Lancet* 2008; **372**: 1563–69.
- Lu C, Schneider MT, Gubbins P, Leach-Kemon K, Jamison D, Murray CJL. Public financing of health in developing countries: a cross-national systematic analysis. *Lancet* 2010; **375**: 1375–87.
- International Finance Corporation. The business of health in Africa: partnering with the private sector to improve people's lives. Washington DC: International Finance Corporation, 2008.
- 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.
- Biesma R, Brugha R, Harmer A, Walsh A, Spicer N, Walt G. The effects of global health initiatives on country health systems: a review of the evidence from HIV/AIDS control. *Health Policy Plan* 2009; **24**: 239–52.
- Harries AD, Jahn A, Zachariah R, Enarson D. Adapting the DOTS framework for tuberculosis control to the Management of non-communicable disease in sub-Saharan Africa. *PLoS Med* 2008; **5**: e124.
- Joshi R, Jan S, Wu Y, MacMahon S. Global inequalities in access to cardiovascular health care. *J Am Col Cardiol* 2008; **52**: 1817–25.
- Miranda JJ, Kinra S, Casas JP, Davey Smith G, Ebrahim S. Non-communicable diseases in low- and middle-income countries: context, determinants and health policy. *Trop Med Int Health* 2008; **13**: 1225–34.
- Schmittiel JA, Shortell SM, Rundall TG, Bodenheimer T, Selby JV. Effect of primary health care orientation on chronic care management. *Ann Fam Med* 2006; **4**: 117–23.
- Bhowmik D, Pandav CS, Tiwari SC. Public health strategies to stem the tide of chronic kidney disease in India. *Indian J Public Health* 2008; **52**: 224–29.
- Epping-Jordan JE, Pruitt SD, Bengoa R, et al. Improving the quality of health care for chronic conditions. *Qual Saf Health Care* 2004; **13**: 299–305.
- Doyle C, Patel P. Civil society organizations and global health initiatives: problems of legitimacy. *Soc Sci Med* 2008; **66**: 1928–38.
- Seckinelgin H. A global disease and its governance: HIV/AIDS in sub-Saharan Africa and the agency of NGOs. *Global Governance* 2005; **11**: 351–68.
- Seckinelgin H. Time to stop and think: HIV/AIDS, global civil society, and people's politics. In Anheir H, Glasium M, Kaldor M, eds. Global civil society. Oxford: Oxford University Press, 2002: 422–24.
- Anand S, Bärnighausen T. Health workers and vaccination coverage in developing countries: an econometric analysis. *Lancet* 2007; **369**: 1277–85.
- WHO. The World Health Report 2006—working together for health. Geneva: WHO, 2006.
- Goudge J, Gilson L, Russell S, Gumede T, Mills A. Affordability, availability and acceptability barriers to health care for the chronically ill: longitudinal case studies from South Africa. *BMC Health Serv Res* 2009; **9**: 75.
- Dräger S, Gedik G, Dal Poz MR. Health workforce issues and the Global Fund to fight AIDS, Tuberculosis and Malaria: an analytical review. *Hum Resour Health* 2006; **4**: 23.
- Valsecchi MG, Steliarova-Foucher E. Cancer registration in developing countries: luxury or necessity? *Lancet Oncol* 2008; **9**: 159–67.
- Evans T, Stansfield S. Health Information in the new millennium: a gathering storm? *Bull World Health Organ* 2003; **81**: 856.
- Harries AD, Jahn A, Zachariah R, Kapur A, Jahn A, Enarson D. The vital signs of chronic disease management. *Trans Roy Soc Trop Med Hyg* 2009; **103**: 537–40.
- Yach D, Hawkes C, Gould CL, Hofman KJ. The global burden of chronic diseases: overcoming impediments to prevention and control. *JAMA* 2004; **291**: 2616–22.
- Components of a strong health information system: a guide to the HMN framework. http://www.who.int/healthmetrics/documents/Components_of_a_strong_HIS.pdf (accessed Oct 10, 2010).
- AbouZahr C, Gologly L, Stevens G. Better data needed: everyone agrees, but no one wants to pay. *Lancet* 2010; **375**: 619–21.

- 42 Health Metrics Network. Framework and standards for country information systems. Geneva: World Health Organization, 2008. http://www.who.int/healthmetrics/documents/hmn_framework200803.pdf (accessed Oct 10, 2010).
- 43 Setel PW, Macfarlane SB, Szreter S, et al. A scandal of invisibility: making everyone count by counting everyone. *Lancet* 2007; **370**: 1569–67.
- 44 Harries AD, Zachariah R, Jahn A, Schouten EJ, Kamoto K. Scaling up antiretroviral therapy in Malawi—implications for managing other chronic diseases in resource-limited countries. *J Acquir Immune Defic Syndr* 2009; **52** (suppl 1): 14–16.
- 45 Liu WW, Jiang CQ, Zhang WS, Xiao LW, Lin QH, Zhou ZX. Analysis of the situation of occupational health surveillance and the morbidity of occupational diseases in Guangzhou [Article in Chinese] *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi* 2005; **23**: 263–66.
- 46 Beran D, Yudkin JS, de Courten M. Access to care for patients with insulin-requiring diabetes in developing countries: case studies of Mozambique and Zambia. *Diabetes Care* 2005; **28**: 2136–40.
- 47 WHO. Package of essential NCD interventions for primary care in low resource settings. Geneva: World Health Organization, 2009.
- 48 WHO. WHO model list of essential medicines 16th list (update) March 2010. Geneva, 2010. http://www.who.int/medicines/publications/essentialmedicines/Updated_sixteenth_adult_list_en.pdf (accessed May 25, 2010).
- 49 Mendis S, Fukino K, Cameron A, et al. The availability and affordability of selected essential medicines for chronic diseases in six low- and middle-income countries. *Bull World Health Organ* 2007; **85**: 279–88.
- 50 Cameron A, Ewen M, Ross-Degnan D, Ball D, Laing R. Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. *Lancet* 2009; **373**: 240–49.
- 51 Backman G, Hunt P, Khosla R, et al. Health systems and the right to health: an assessment of 194 countries. *Lancet* 2008; **372**: 2047–85.
- 52 WHO. Survey of the quality of antiretroviral medicines circulating in selected African countries. Geneva, 2007. http://www.who.int/medicines/publications/ARV_survey.pdf (accessed Oct 10, 2010).
- 53 Beran D, Yudkin JS. Diabetes care in sub-Saharan Africa. *Lancet* 2006; **368**: 1689–95.
- 54 Thorogood M, Connor MD, Hundt GL, Tollman SM. Understanding and managing hypertension in an African sub-district: a multidisciplinary approach. *Scand J Public Health Suppl* 2007; **69**: 52–59.
- 55 Onyango JF, Macharia IM. Delays in diagnosis, referral and management of head and neck cancer presenting at Kenyatta National Hospital, Nairobi. *East Afr Med J* 2006; **83**: 85–91.
- 56 Yeole BB, Sunny L, Swaminathan R, Sankaranarayanan R, Parkin DM. Population-based survival from colorectal cancer in Mumbai, (Bombay) India. *Eur J Cancer* 2001; **37**: 1402–08.
- 57 Balabanova D, McKee M, Koroleva N, et al. Navigating the health system: diabetes care in Georgia. *Health Policy Planning* 2009; **24**: 46–54.
- 58 Hopkinson B, Balabanova D, McKee M, Kutzin J. The human perspective on health care reform: coping with diabetes in Kyrgyzstan. *Int J Health Planning Management* 2004; **19**: 43–61.
- 59 Nolte E, McKee M. Caring for people with chronic conditions. A health system perspective. Maidenhead: Open University Press, 2008.
- 60 Corbett EL, Marston B, Churchyard GJ, De Cock KM. Tuberculosis in sub-Saharan Africa: opportunities, challenges, and change in the era of antiretroviral treatment. *Lancet* 2006; **367**: 926–37.
- 61 Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. *JAMA* 2002; **288**: 2469–475.
- 62 Smith SR, Rublein JC, Marcus C, Penick Brock T, Chesney MA. A medication self-management program to improve adherence to HIV therapy regimens. *Patient Educ Couns* 2003; **50**: 187–199.
- 63 Kober K, Van Damme W. Expert patients and AIDS care. A literature review on expert patient programmes in high-income countries, and an exploration of their relevance for HIV/AIDS care in low-income countries with severe human resources shortages. Antwerp: Institute of Tropical Medicine, 2006.
- 64 Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO, 2008.
- 65 Asaria P, Chisholm D, Mathers C, Ezzati M, Beaglehole R. Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use. *Lancet* 2007; **370**: 2044–53.
- 66 Geneau R, Stuckler D, Stachenko S, et al. Raising the priority of preventing chronic diseases: a political process. *Lancet* 2010; published online Nov 11. DOI:10.1016/S0140-6736(10)61414-6.
- 67 WHO. Ouagadougou declaration on primary health care and health systems in Africa: achieving better health for Africa in the new millennium. Burkina Faso; April 28–30, 2008. http://www.afro.who.int/phc_hs_2008/documents/En/Ouagadougou%20declaration%20version%20Eng.pdf (accessed May 20, 2009).
- 68 WHO. Global Workforce Alliance. <http://www.ghwa.org> (accessed Oct 10, 2010).
- 69 Venice statement on global health initiatives and health systems. Venice concluding statement: on maximizing positive synergies between health systems and global health initiatives Venice, Italy, June 23, 2009. *Lancet* 2009; **374**: 10–12.
- 70 Chen L, Evans T, Anand S, et al. Human resources for health: overcoming the crisis. *Lancet* 2004; **364**: 1984–90.
- 71 WHO. The Montreux challenge: making health systems work. Glion-sur-Montreux, Geneva: World Health Organization, 2005.
- 72 Bamako Call to Action. <http://unesdoc.unesco.org/images/0017/001777/177791m.pdf> (accessed Nov 26, 2008).
- 73 WHO. The Tallinn charter: health systems for health and wealth. Proceedings of WHO European ministerial conference on health systems. Tallinn, Estonia; June 25–27, 2008. <http://www.euro.who.int/document/E91438.pdf> (accessed May 20, 2009).
- 74 Paris declaration on aid effectiveness. <http://www.oecd.org/dataoecd/11/41/34428351.pdf/> (accessed June 27, 2008).
- 75 Accra agenda for action. <http://siteresources.worldbank.org/ACCRAEXT/Resources/4700790-1217425866038/AAA-4-SEPTEMBER-FINAL-16h00.pdf> (accessed Oct 10, 2010).
- 76 G8 Health Experts Group. Toyako framework for action on global health. Toyako, Japan: Ministry of Foreign Affairs of Japan, 2008. http://www.mofa.go.jp/policy/economy/summit/2008/doc/pdf/0708_09_en.pdf (accessed Oct 10, 2010).
- 77 WHO. Health Metrics Network. <http://www.who.int/healthmetrics> (accessed Oct 10, 2010).
- 78 International Health Partnership. <http://www.internationalhealthpartnership.net/en/home> (accessed Oct 10, 2010).
- 79 Global Alliance for Vaccines and Immunization. Health systems strengthening. <http://www.gavialliance.org/support/what/hss/index.php> (accessed Oct 10, 2010).
- 80 The Rockefeller Foundation. Results for development and the international health policy program, Thailand. Role of the private sector in health systems. <http://www.resultsfordevelopment.org/sites/default/files/resources/A%20Landscape%20Analysis%20of%20Global%20Attitudes%20toward%20the%20Private%20Sector.pdf> (accessed Oct 10, 2010).
- 81 Investing in our future. The Global Fund to Fight AIDS, Tuberculosis and Malaria; national strategy application. <http://www.theglobalfund.org/en/> (accessed Oct 10, 2010).
- 82 Note Verbale, June, 2009, from the permanent mission of Qatar to the United Nations addressed to the President of the Economic and Social Council. <http://www.un.org/en/ecosoc/newfunct/pdf/qatar%20-%20report%20of%20the%20western%20asia%20regional%20preparatory%20meeting%20-%20version%2025%20june%202009%20at%2010am.pdf> (accessed Oct 10, 2010).
- 83 World Health Assembly document A61/8. Prevention and control of non-communicable diseases: implementation of the global strategy. http://www.who.int/gb/ebwha/pdf_files/A61/A61_8-en.pdf (accessed Oct 10, 2010).
- 84 World Economic Forum. Global risks 2009. <http://www.weforum.org/en/initiatives/globalrisk/index.htm> (accessed Oct 10, 2010).
- 85 Adeyi O, Smith O, Robles S. Public policy and the challenge of chronic non-communicable diseases. Washington, DC: World Bank, 2007.

- 86 Global Noncommunicable Disease Network (NCDnet). http://www.who.int/mediacentre/news/releases/2009/noncommunicable_diseases_20090708/en/index.html (accessed Oct 10, 2010).
- 87 Historic CARICOM summit on chronic NCDs launched Wednesday. http://www.caricom.org/jsp/pressreleases/pres206_07.jsp (accessed Oct 10, 2010).
- 88 Global Alliance for Chronic Diseases. <http://www.gafcd.org/about.php> (accessed Oct 10, 2010).
- 89 Oxford Health Alliance. <http://www.oxha.org> (accessed July 27, 2007).
- 90 Sweet Resolution. Oventions partnership for chronic diseases. <http://sweetresolution.wordpress.com/2007/05/04/ovations-launches-global-partnership-to-address-chronic-disease/> (accessed July 27, 2007).
- 91 Institute of Medicine. The US commitment to global health: recommendations for the public and private sectors. Washington, DC: National Academies Press, 2009.
- 92 Suhrcke M, Rocco L, McKee M. Health: a vital investment for economic development in eastern Europe and central Asia. London: European Observatory on Health Systems and Policies, 2007.
- 93 The five year evaluation of The Global Fund. <http://www.theglobalfund.org/en/terg/evaluations/5year/> (accessed Oct 10, 2010).
- 94 Srinath Reddy K, Shah B, Varghese C, Ramadoss A. Responding to the threat of chronic diseases in India. *Lancet* 2005; **366**: 1744–49.
- 95 Samb B, Celletti F, Holloway J, Van Damme W, De Cock KM, Dybul M. Rapid expansion of the health workforce in response to the HIV epidemic. *N Engl J Med* 2007; **357**: 2510–14.
- 96 Sepúlveda J, Bustreo F, Tapia R, et al. Improvement of child survival in Mexico: the diagonal approach. *Lancet* 2006; **368**: 2017–27.
- 97 Price JE, Leslie JA, Welsh M, Binagwaho A. Integrating HIV clinical services into primary health care in Rwanda: a measure of quantitative effects. *AIDS Care* 2009; **21**: 608–14.
- 98 WHO. Task shifting global recommendations and guidelines. http://www.who.int/healthsystems/task_shifting/en/ (accessed Oct 10, 2010).