



Improving responsiveness of health systems to non-communicable diseases

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Lancet 2013; 381: 690–97

Published Online

February 12, 2013

[http://dx.doi.org/10.1016/S0140-6736\(13\)60063-X](http://dx.doi.org/10.1016/S0140-6736(13)60063-X)

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In almost all countries, development of health systems that are responsive to the challenge of prevention and treatment of non-communicable diseases (NCDs) is a priority. NCDs consist of a vast group of conditions, but in terms of premature mortality, emphasis has been on cardiovascular disease, cancer, diabetes, and chronic respiratory diseases—diseases that were also the focus of the UN high-level meeting on NCDs, held in 2011.¹

In 1990, there were 26·6 million deaths worldwide from NCDs (57·2% of 46·5 million total deaths), increasing in 2010 to 34·5 million (65·5% of 52·8 million deaths) as the leading cause of death in all regions apart from sub-Saharan Africa and south Asia.² Similarly, the global burden of NCDs has increased from 43% (1·08 billion of the total 2·50 billion) in 1990, to 54% (1·34 billion of 2·49 billion) of the total number of disability-adjusted life-years in 2010.³

The global economic burden of NCDs is large, estimated at US\$6·3 trillion in 2010, rising to \$13 trillion in 2030. A 10% rise in NCDs leads to a 0·5% decrease in gross domestic product.⁴ The projected cumulative global loss of economic output due to NCDs for 2011–30 is estimated at \$46·7 trillion, with around \$21·3 trillion (46%) in low-income and middle-income countries.⁵

The growing burden of NCDs in low-income and middle-income countries will compound the poverty and economic hardship created by communicable diseases and hold back development.⁴ Yet, few such countries have the fiscal strength to meet the future health, economic, and social burden that NCDs will impose,⁵ which raises concerns of economic instability, arrested development, and government fragility—with implications for global security as well as foreign policy.

An ageing society, alongside improving health care, means that health systems have to manage not only diseases such as heart disease, stroke, and cancer, but also individuals with multiple chronic disorders.^{6–9} Multimorbidity disproportionately affects those who are poorest.^{6,9} Furthermore, around 9 million people in low-income and middle-income countries now benefit from antiretroviral treatment (ART), with remarkably improved survival, but with new comorbidities such as diabetes or cardiovascular disease. Health systems also have to manage patients with new comorbid disease patterns, in which infectious diseases combine with NCDs.^{10–12}

Management of people with NCDs and multimorbidity will be particularly challenging in low-income and middle-income countries with weak health systems characterised by fragmented health-care services, which are still designed to respond to single episodes of care, or the long-term prevention and control of infectious

diseases such as HIV, tuberculosis, and neglected tropical diseases. These health systems are ill prepared to manage changing disease patterns with a growing burden of NCDs and multimorbidity.¹³

To achieve the World Health Assembly target of 25% reduction in preventable deaths from NCDs by 2025,¹⁴ health systems need to be transformed to provide person-centred care with improved outreach and self-management to effectively manage risk factors, illness episodes, and multimorbidity over many years. Along with outreach and community-based services, health facilities in low-income and middle-income countries need to be strengthened to develop reliable individual records that enable assessment and management of risks of individuals under their care. Yet, in many such countries, long-term care and risk management that includes follow-up at clinic and repeat prescriptions are a new idea for many patients and health staff. However, existing service delivery platforms can be used to address chronicity, the emerging NCD epidemic, and multimorbidity. Resource constraints imposed by the worldwide economic crisis means that sustaining increases in global health financing will be a challenge.¹⁵ There is an imperative to find solutions that create synergies among investments in low-income and middle-income countries for different diseases, especially HIV and tuberculosis, which have substantially benefited from international financing and have clear links with NCDs.

In this paper we provide examples of how HIV and tuberculosis investments have been used to strengthen health systems and opportunities to integrate NCD prevention and control with HIV and other programmes. We describe the importance of building health services that profile the risks of NCDs and multimorbidity in their population. Finally, we propose a stepwise approach to scale up health systems by building on existing programmes to tackle NCDs and multimorbidity.

Strengthening health systems through HIV and tuberculosis investments

Investments in HIV and tuberculosis, increasingly regarded as chronic diseases themselves, have been successfully used in low-income and middle-income countries to strengthen health systems. For example, Ethiopia and Malawi have channelled HIV funding to train health workers who can manage multiple conditions, to build primary health-care centres, develop monitoring and evaluation systems, and strengthen supply chain management to improve patient outcomes for a range of illnesses.¹⁶ Bangladesh, Cambodia, India,

Tanzania, Thailand, and Vietnam have used investments for tuberculosis to strengthen governance, supply chain management, human resources, and monitoring and evaluation functions.¹⁷ Laos,¹⁸ Indonesia,¹⁹ Papua New Guinea,²⁰ and Nepal²¹ have used investments in HIV and tuberculosis programmes with similar benefits. Emerging evidence suggests that integrated health services provide health and economic benefits.^{22–24}

Panel 1: Planning for an integrated approach to prevention and health-care delivery in Malawi

Around 65% of the Malawian population lives on less than US\$1 a day. Health indicators are among the poorest in sub-Saharan Africa, with a mortality rate in children younger than 5 years of 110 per 1000 livebirths, an adult mortality rate of 599 per 1000, and a maternal mortality ratio of 510 per 100 000 livebirths. Adult HIV seroprevalence rate is estimated at 12%. As in other countries in sub-Saharan Africa, the burden of non-communicable diseases (NCDs) is increasing rapidly; the Nationwide STEPS Survey²⁵ undertaken in 2009 showed that more than 30% of adult Malawians have hypertension and nearly 6% have diabetes.

Despite the challenging context, Malawi has had several successful disease-specific programmes (including for HIV, tuberculosis, and malaria control), but patients with NCDs have traditionally not had structured care. With increasing political commitment, selected NCDs have been incorporated into the WHO Essential Health Package and are prioritised in the National Health Research Agenda. The Ministry of Health and Population now has a manager for control of NCDs. With assistance of local and international institutions, there has been a systematic attempt to improve diabetes and hypertension services at the Queen Elizabeth Central Hospital that serves the southern region of Malawi, with a population of 5.9 million. Increased nurse support is now available, biochemistry testing and pharmacy procurement have been improved, and an electronic patient record system has been established to help with patient management and audit. Funding for a dedicated laser for retinopathy treatment has been secured, and a retinopathy management clinic started in 2010.

Whether the diabetes programme will take a vertical or integrated approach is unclear. In view of constraints in the financial and human resources (two doctors per 100 000; 38 nurses per 100 000), an integrated approach seems to be more attractive to policy makers. There have been ongoing government efforts to integrate health delivery structures through primary health care and adoption of the sector-wide approach to health financing. However, several other factors will determine how well NCDs are integrated with other programmes, including identification of the right programmes (eg, chronic care for antiretroviral therapy services) to integrate with, the response of these existing programmes to accommodate NCDs, and the buy-in of key stakeholders, particularly donors.

In southeast Asia (Burma, Thailand, Vietnam,²⁵ and Cambodia²⁶), HIV/AIDS services have been integrated with hypertension and diabetes programmes. In sub-Saharan Africa (Ethiopia,²⁷ Kenya,²⁸ Malawi,¹⁶ Rwanda,²⁹ and Swaziland³⁰), HIV/AIDS services have been used as platforms to introduce NCD screening programmes—eg, for cervical cancer screening in Côte D'Ivoire,³¹ Haiti,³² Malawi,¹⁶ Rwanda,²⁹ South Africa,³³ and Zambia.³⁴ Similarly, tuberculosis programmes have provided suitable platforms in low-income and middle-income countries to scale up management of chronic respiratory diseases and other NCDs.¹⁷ Outcomes from these studies suggest benefits from integration.

Transitioning to effective health systems to address NCDs

Although good examples of integrated service delivery exist, there are unexploited opportunities to create further synergies and integrate NCD activities with other

Panel 2: Addressing NCDs in Pakistan

In 2005, non-communicable diseases (NCDs) and injuries accounted for 52% of crude deaths and 66% of age-standardised deaths in Pakistan, which began to integrate NCDs into national health planning in its 1997 policy. In 2003, the National Action Plan for the Prevention and Control of Non-communicable Disease and Health Promotion in Pakistan, a public-private partnership, aimed to address four NCDs with common risk factors by: grouping NCDs so that they could be targeted through a set of actions, harmonising actions, integrating actions with existing public health systems, and incorporating contemporary evidence-based ideas into this approach. Both the policy and plan could not be implemented because of change in government and uncertainties around policy.^{37,38}

Pakistan's health system is undergoing major changes with devolution of responsibility for health to the provincial level. Although many NCD-related policies and regulatory actions are federally mandated, planning for integration of NCDs within the primary health-care level is now the responsibility of provincial authorities—where poor health system performance has been a major stumbling block to improving health outcomes.³⁹ Early implementation of the National Action Plan created instruments that can be used to scale up the NCDs programme in provinces, including a population-based risk factor surveillance model,⁴⁰ and methods to integrate NCDs with the work plan of Lady Health Workers including behaviour change communication strategy.^{41,42} However, many health system barriers need to be addressed to develop a sustainable NCD programme—most notably out-of-pocket expenditure, which accounts for 57% of total health expenditure, poorly regulated private sector that provides almost 75% of health services, and human resource imbalances, by which physicians outnumber nurses and midwives by two to one. Although Pakistan's National Essential Drugs List includes antihypertensive, lipid-lowering, and antidiabetic drugs, major stock-out issues are frequent, leading to treatment interruptions.³⁷ However, changes in Pakistan's administrative structure that devolved a health mandate to the provinces provide an opportunity to introduce health system changes to institutionalise NCD control.

There has also been some progress with tobacco control—eg, the 2002 law on prohibition of smoking and protection of non-smokers health ordinance, adoption of the Framework Convention on Tobacco Control in 2004, curbs on marketing of tobacco in 2009, and policy stipulation mandating pictorial warnings on all packs in 2010. However, despite these policies the price of cigarettes remains low and easily affordable for the population.

Panel 3: Family Health Programme in Brazil as a platform for prevention and management of NCDs

In Brazil, deaths from non-communicable diseases (NCDs) have been increasing since the 1960s, and accounted for around 72% of all deaths in 2007. From 1996 to 2007, NCD mortality decreased by 20%, mainly because of falls in cardiovascular (31%) and chronic respiratory (38%) diseases; for diabetes and other chronic disorders, mortality remained stable (a 2% increase and a 2% decrease, respectively).⁴⁴ A large decrease in the prevalence of smoking in Brazilian adults from 34.8% in 1989, to 17.2% in 2009 (a 51% reduction),^{44,45} the creation of a national registry of hypertension and diabetes in 2001, and expanded free access to basic medicines for these diseases have all contributed to the reduction in NCD mortality. However, growing evidence suggests that the expansion of the Family Health Programme was a key contributor to the decrease recorded in mortality. Launched in 1994, the Family Health Programme has become the world's largest community-based primary health-care programme. By 2011, there were around 32 000 family health-care teams, covering 50% of the Brazilian population (98 million people) in 5374 (94%) municipalities.⁴⁶

The Family Health Programme teams are composed of one doctor, one nurse, one auxiliary nurse, and four to six community health and oral health professionals. Each team is assigned to specific geographical areas and to cover a maximum of 1000 families. The teams have two components to their priorities. First are the priorities defined at the national level focusing on some population groups (pregnant women and children) and some specific health problems (tuberculosis, leprosy, hypertension, and diabetes). All teams are obliged to follow these priorities. Second, the teams are mandated to analyse the social and environmental conditions and the health problems of the population for which they are responsible. The teams can define their local agenda of priorities, with actions that are integrated, solution oriented, and intersectoral. The teams provide a first point of contact with the local health system, coordinate care, and work towards integration with diagnostic, specialist, and hospital care. Health services and health promotion activities take place at health facilities, in patients' homes, and in the community.⁴⁶

High coverage of the Family Health Programme has been associated with greater use of primary health services,⁴⁷ reduced avoidable hospital admissions for NCDs,⁴⁸ and improved health outcomes such as adult mortality.⁴⁷ The inclusion of primary health-care-sensitive disorders (that include some NCDs) in an essential service package has led to a 24% decrease in hospital admissions for them, which is more than 2.5 times greater than the decreases recorded in admissions for all other disorders.⁴⁹

health programmes. The greatest opportunity for integration is for diseases involving patients who come into contact with health services several times. HIV/AIDS, tuberculosis, and reproductive health services represent ideal opportunities in countries with high HIV and tuberculosis endemicity. The prevalence of NCDs is higher in people with AIDS (particularly those receiving ART) and with tuberculosis than in individuals of the same age in the general population, and as with these patients many women come into repeated contact with health services for reproductive health and pregnancy care. Key risks can be identified, and risk mitigation interventions opportunistically delivered to these patients accessing health services.

A key lesson from the AIDS response is the broad-based governance in identification of problems, needs, and responses. Engagement of the civil society, affected communities, and the private sector has been crucial in

Panel 4: Opportunities for integrated prevention and delivery of services for women's cancers

Women and health systems in low-income and middle-income countries face a double cancer burden that includes both the backlog of preventable cervical cancer and the emerging challenge of breast cancer—both leading causes of death, especially for young women, in all such countries.⁵⁸ The burden of these two cancers, both associated with reproduction, now exceeds that of many other priorities for women's health in low-income and middle-income countries. The 30% decrease in maternal mortality over the past three decades means that the number of adult women who die of breast and cervical cancer each year exceeds that from childbirth.⁵⁹

In response to this growing burden, several low-income and middle-income countries are including early detection and treatment of women's cancers in national programmes for social protection in health. The *Seguro Popular* programme of Mexico, which covers a full range of interventions for cervical and breast cancer, illustrates how expanded financing can be used to improve early detection and care of these cancers. The *Oportunidades* programme in Mexico has used cash transfers to poor households to promote better nutrition, education, and early detection of breast and cervical cancer.⁶⁰

Combating of discrimination and gender inequity—integral parts of many other health and social programmes—are key to programmes for women's cancers. Disparities in the cancer burden, especially for women's cancer associated with reproduction, are exacerbated by discrimination, stigma, and gender inequity. The removal of a breast or loss of reproductive potential can lead to social exclusion.

As successfully achieved in the *Oportunidades* and *Seguro Popular* programmes, maternal and child health, sexual and reproductive health, and antipoverty, social welfare, and women's empowerment programmes can serve as platforms to expand access to cancer control and care. Simultaneously, extending work on women's cancers can strengthen existing health system and antipoverty programmes.⁵⁷

mounting an effective response to the HIV pandemic. National AIDS commissions and country coordinating mechanisms offer multisectoral platforms to create synergies with NCDs, with low additional cost. Similarly, in addition to national strategies that combine responses to multiple diseases, such as those in Malawi (panel 1), national human resource strategies exemplified by those in Cambodia,^{17,26} Ethiopia,^{16,27} and Malawi¹⁶ have enabled a holistic response to staff shortages.

A second area offering potential synergies is integrated monitoring and evaluation systems—especially in low-income and middle-income countries benefiting from large investments for HIV and tuberculosis programmes. Integrated information systems can bring together individual-level socioeconomic, behavioural, clinical, and

service utilisation data, which are crucial to build individual risk profiles and establish targeted responses. New technologies such as mobile telephones that are widely available and used in low-income and middle-income countries can be used to develop integrated individual-level data and deliver risk-based behavioural change interventions,³⁶ especially by targeting risks shared by NCDs and other diseases—such as primary prevention to reduce alcohol and tobacco consumption—or to improve treatment adherence. Pakistan has promoted integrated management of NCDs (panel 2), where mobile phones are used to improve health-care financing and access.⁴³

Integrated approaches could create immediate synergies in service delivery. Structural integration of service delivery at the community and primary care levels is the third area of potential synergy, and can establish a single point of entry to manage multiple diseases, including NCDs, as with Brazil's Family Health Programme (panel 3). Post-Soviet countries such as Estonia and Kyrgyzstan have successfully integrated ineffective vertical services for tuberculosis, HIV, and women and children within primary care.^{50,51} Resources from well established HIV and tuberculosis programmes in low-income and middle-income countries and the WHO Package of Essential NCD Interventions⁵²—such as treatment guidelines, simplified point-of-service diagnostic testing, monitoring and evaluation indicators, right-skilling and task-sharing approaches, clinical mentoring and supportive supervision, and methods for systematic use of peer educators—can be rapidly adapted to support programme implementation and services for NCDs. Practical methods available to manage NCDs from other health programmes in low-income and middle-income countries include appointment books, charting tools and flow sheets, job aides and algorithms, registers for monitoring and evaluation, logbooks, databases, transportation vouchers, and referral and linkage forms.

Structural integration in service delivery needs to be accompanied by suitable training of staff to deliver services that are appropriate to health system needs. The Health Extension Workers in Ethiopia and Health Surveillance Assistants in Malawi,¹⁶ and the Multipurpose Workers Scheme in Tamil Nadu in India,⁵³ offer integrated services that include NCDs in community health units in villages with reported benefits. Ethiopia, Malawi, Namibia, Rwanda, and Uganda have trained community health workers to deliver integrated programmes for multiple conditions at the community level and to address the needs of women and children and improve health outcomes.⁵⁴

Procurement and supply chain management systems, which are crucial to ensure timely forecasting, purchasing, and distribution of health products—especially for chronic illnesses that need uninterrupted supply and access to medicines—is the fourth area offering potential synergies. Ghana, Guyana, Haiti, Kenya, Rwanda, and Zambia have

Panel 5: Lessons from scaling up of HIV programmes⁶³⁻⁶⁵

- Prevention of non-communicable diseases (NCDs) is likely to be suboptimal without treatment, and treatment without effective prevention is unlikely to have a major sustained effect.
- Behaviour change for prevention of NCDs is challenging. Just as antiretroviral-based prevention methods are now being introduced for HIV prevention, drug therapies (eg, for smoking cessation, hypertension, and lipid control) will likely be needed in addition to smoking control, reduction of salt and sugar in food, and creation of facilities that stimulate physical activities.
- Diagnostic testing through community outreach will need scaling up for early identification of people at high risk. Similarly, treatment and prevention services must be delivered in the community with minimal reliance on clinical staff, particularly clinicians; such services can be rapidly scaled up provided that they are streamlined and simplified. Malawi, which has some of the greatest shortages of health staff, has achieved high coverage rates for antiretroviral therapy (ART)⁶⁶ by providing a single fixed-dose of combination therapy in the early years of their ART roll-out, starting treatment on the basis of clinical stage alone, and by undertaking similar routine monitoring in all patients. Malawi then introduced more drug combinations and monitoring tailored to the patient.
- Drug supplies must be affordable and reliable. With HIV, drug shortages demotivated patients, reduced adherence, and increased clinic workloads.
- Community involvement is key to success. Health services must empower and build partnerships with communities, people affected by the disease, and patient support groups to ensure buy-in, foster innovation, and increase accountability.
- A continuum of care involving multidisciplinary teams responds best to the needs of patients. Strategies to minimise loss to follow-up of patients with NCDs in care must target those under observation and being assessed for treatment, and those in whom treatment is started.
- A unified strategy for how to tackle the problem and at what cost, is needed to mobilise political will and resources at national, regional, and global levels. Consensus guidelines for patient management, based on both international norms and on local relevance and cost-effectiveness, should be the cornerstone of effective prevention and patient management.

effectively used investments for HIV to establish integrated supply chain management systems.⁵⁵ Tanzania has successfully introduced tracking systems using mobile phones to monitor delivery of antimalarial medicines.³⁶ These platforms can be effectively used for NCDs.

The fifth area in which opportunities for synergies exist is with financing for universal coverage. Rwanda has used funding from HIV programmes to expand health insurance coverage for poor sections of the population to improve access to health services, including those for NCDs.⁵⁶ Expansion of social protection schemes and pooling of inefficient out-of-pocket expenditures have enabled several low-income and middle-income countries, most notably Kyrgyzstan,⁵³ Mexico,⁵⁷ and Thailand,⁵³ to provide social insurance schemes that support NCDs. The *Seguro Popular* programme in Mexico has introduced a full range of interventions for cervical and breast cancer (panel 4).⁵⁷

Finally, the sixth area in which synergies can be achieved is demand generation and treatment management. Community-based approaches have been particularly successful in mobilising and demand and in

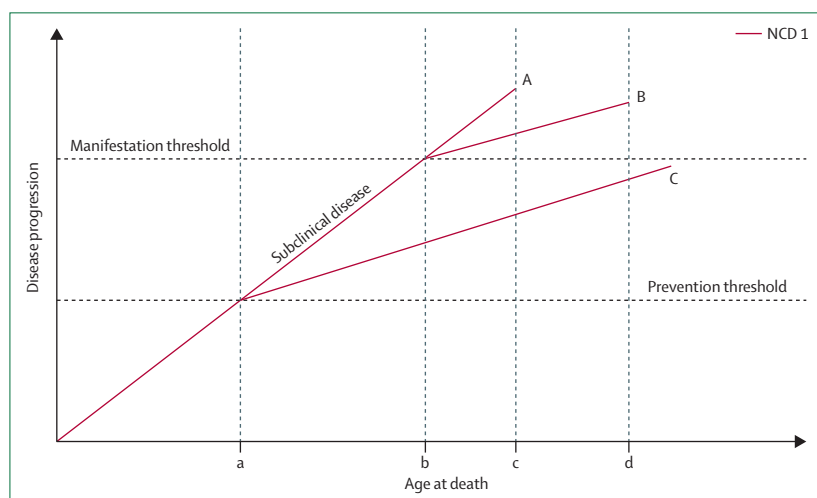


Figure 1: NCD trajectory of disease progression with different prevention strategies
 NCD 1=non-communicable disease 1. A=trajectory of NCD in a health system unable to afford primary or secondary prevention interventions. B=trajectory of NCD in a health system able to offer secondary prevention intervention. C=trajectory of NCD in a well resourced health system able to afford primary prevention intervention. a=age at which primary prevention intervention is introduced for subclinical disease for NCD 1 with trajectory C in a well resourced health system. b=age at which disease NCD 1 manifests under trajectories A and B and when secondary prevention intervention is introduced with trajectory B. c=age at which premature mortality related to the NCD 1 occurs with trajectory A. d=age at which mortality related to the NCD 1 occurs with trajectory B.

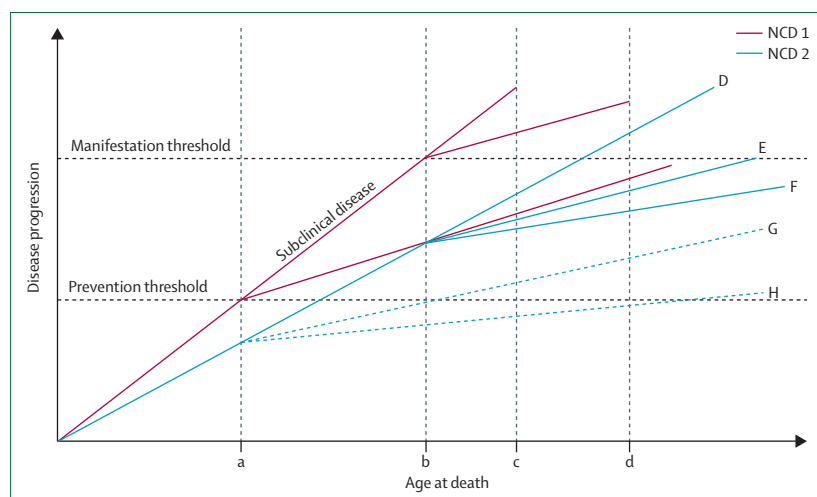


Figure 2: NCD trajectory of disease progression with risk-based prevention strategies
 NCD 1=non-communicable disease 1. NCD 2=non-communicable disease 2. D=disease progression trajectory of NCD 2 in the absence of intervention for comorbid NCD 1. E=disease progression trajectory of NCD 2 with secondary prevention intervention for comorbid NCD 1. F=disease progression trajectory for NCD 2 with tailoring of the secondary prevention strategy for NCD 1 to optimise primary prevention for NCD 2, enabling individual to live life free of symptoms from NCD 2. G=disease progression trajectory of NCD 2 with primary prevention intervention for comorbid NCD 1, under single-disease model. H=disease progression trajectory of NCD 2 under multimorbidity management model with optimum integration of primary prevention across NCDs 1 and 2 at time a. a=age at which intervention is introduced for subclinical disease for NCD 1 with trajectory C in a well resourced health system. b=age at which disease NCD 1 manifests under trajectories A and B and when secondary prevention intervention is introduced with trajectory B. c=age at which premature mortality related to the NCD 1 occurs with trajectory A. d=age at which mortality related to the NCD 1 occurs with trajectory B.

mobilisation, and management of NCDs and multimorbidity.⁶² Panel 5 summarises lessons learnt from scaling up of HIV programmes that can inform effective responses for NCDs.

Transforming health systems to reduce the risk of NCDs

In terms of NCDs, health systems in low-income and middle-income countries initially need to focus on the key modifiable risk factors of tobacco use, unhealthy diet, physical inactivity, and the harmful use of alcohol, at individual and population levels. Multisectoral actions over sustained periods are needed to effectively address other modifiable risk factors, such as in-utero and early childhood experiences, social status, economic wealth and income, education, employment, built and social environments, social and family support, social exclusion, stigma, peer-network influence, and health literacy, which collectively interact to affect the emergence and progression of NCDs and multimorbidity.

Many of the risks for NCDs and communicable diseases are shared (eg, smoking for cancer, heart disease, and tuberculosis), particularly in low-income and middle-income countries where communicable and non-communicable diseases coexist and could be jointly addressed by identification and tackling of these risks. Mobile technologies have been used effectively and at low cost to capture individual and health-related data.³⁶ Combined with appropriate analytical methods, individual-level data can be used for risk profiling individuals and populations to design and deliver targeted prevention and treatment interventions for management of NCDs and multimorbidity. Studies from low-income and middle-income countries^{48,67–72} have shown that risk profiling and risk management at individual and population levels is possible with substantial health benefits (appendix).

Interventions of varying intensity can be designed to address risks, with individuals at the highest risk receiving more intense interventions, including individual case management when affordable and feasible.^{73–77} The intensity of intervention and the threshold for initiation of primary and secondary prevention interventions will vary according to context, as determined by the disease burden and the resource availability in the health system, as will the ability to optimally manage multimorbidity to achieve greater health outcomes.

Figure 1 summarises the difference between health systems in the context of one NCD. In a health system unable to afford prevention of treatment intervention, the trajectory of disease continues along trajectory A, with premature mortality related to the NCD at the age of c. In a health-care system offering secondary prevention after diagnosis (eg, for coronary heart disease after myocardial infarction), the trajectory becomes shallower (B) and death occurs later in life at point d (ie, less prematurely). In a well resourced health system, which is able to offer

See Online for appendix treatment adherence for HIV in sub-Saharan Africa.⁶¹ Integrated community-based approaches, established mainly through HIV-related investments, offer powerful platforms to combine risk identification, demand

primary prevention after the identification of an individual being at risk at point a, the trajectory of disease follows C, with the disease remaining subclinical throughout the individual's life—the trajectory that low-income and middle-income countries should aspire to.

Figure 2 shows the effect of a single disease intervention model on an NCD that shares some risk factors with the NCD 1 model. The effect of secondary prevention for NCD 1 alters the trajectory of NCD 2 from D to E (eg, physical activity advice after myocardial infarction can contribute to diabetes prevention), enabling the disease to remain subclinical until later in life. If the health system is able to integrate both disease-specific initiatives, thus enabling tailoring of the secondary prevention strategy for NCD 1 to optimise primary prevention for NCD 2, the disease trajectory for NCD 2 now changes from E to F, enabling the individual to live a life free of clinical symptoms from NCD 2. In a disease-specific model, primary prevention for NCD 1 changes the trajectory of NCD 2 from D to G. However, optimum integration across diseases could change the trajectory of NCD 2 to that of H. Such integration, we argue, is ideal because it reduces the risk factor burden of individuals and allows cost-effective use of health-care resources in any health system. This integrated approach that focuses on management of multimorbidity in individuals is increasingly important in low-income and middle-income countries, which face a simultaneously increasing burden of multiple interacting NCDs.

A stepwise approach for scaling up of health systems to tackle NCDs

Risk profiling at the population and individual levels will enable the design of targeted prevention and treatment interventions for groups and individuals with different risk profiles. The intensity of services provided to these individuals and the threshold for starting them will vary between countries and will be decided by the nature of the epidemic, resource availability, the strength of the health system, and the political will of the health system leadership. A stepwise approach should be taken in development of such services.

Although there is an imperative to rapidly develop an NCD response in low-income and middle-income countries, a long-term view is crucial to ensure sustainability. Hence, the first step should focus on inclusion of management of NCDs and multimorbidity when national health plans, strategies, and government budgets are developed. Committed leadership will be needed at ministerial and service delivery levels to ensure a comprehensive set of actions for NCDs, taking into account existing and new investments for other health disorders, and a coordinated response.

The second step should identify ways to reduce fragmentation in service delivery through judicious integration across health system functions where synergies are possible. In weak health systems, existing

service delivery platforms—eg, those for HIV, tuberculosis, or reproductive health services—can be used to introduce risk identification and management for the four major NCD risks. For example, risk charts, developed as part of the WHO Package of Essential NCD Interventions,⁵² for poor nutrition, physical inactivity, tobacco use, and excess alcohol use can be used for each patient attending services in health units or managed in the community. In settings with access to financial, technological, and human resources, more sophisticated data collection and information management systems can be developed for risk identification and management.

The third step should aim to strengthen primary and community care services through gradual integration of HIV, tuberculosis, and other health programmes. The WHO Package of Essential NCD Interventions⁵² can guide expanded training of health workforce to manage a broad set of interventions, including strengthening of supply chain management systems to reduce interruptions to drug supplies and implementation of integrated information systems to manage chronicity. The speed, scope, and intensity of prevention and treatment interventions and the threshold for starting these interventions will vary in different contexts. The speed of introduction and the scale-up should be guided by local risk profiles and health system capacity, especially human resource availability, but will be determined in most cases by political will and leadership.

The lessons learnt from the HIV response can guide the introduction and stepwise expansion of the actions to address NCDs and multimorbidity. The HIV movement placed the civil society, communities, and people affected at the heart of the response, which created strong accountability to citizens and stressed the right to treatment. Although important differences should be recognised regarding NCDs, an inclusive and multidisciplinary response that moved beyond the boundaries of health sector with investments in new cadres of health human resources was crucial to the success of the HIV response.

With HIV, sustained advocacy by civil society, affected communities, and scientists enabled mobilisation of large financial investments to address the disease. However, lessons from the successful HIV response show that in embracing integration opportunities for NCD prevention and care, the challenge will be less clinical, but more managerial and political to create the right incentives in realisation of synergies to achieve greater health and equity.

Contributors

PP and RA conceived the study. RA and PP wrote the first draft with input from SJ, SN, FMK, MLB, and MN. RA undertook the literature search. The paper was revised and finalised by RA with input from PP, SJ, SN, FMK, MLB, MN, and NB. All authors have seen and approved the final version.

Conflicts of interest

The authors declare that they have no conflicts of interest. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

Acknowledgments

We thank Dr Kiran Patel (Sandwell and West Birmingham NHS Trust, Birmingham, UK) for the valuable comments and contributions, especially in relation to figures 1 and 2.

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