

# The Challenge of Non-Communicable Diseases and Road Traffic Injuries in Sub-Saharan Africa

## AN OVERVIEW



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*'I was 12 years when I got this bicycle. I'm now 16. I like riding my bike. I ride to Koelenhof, I live there. And I go to school on this bike every day. I have no brakes. I stop with my foot.'*

FROM: "Bicycle Portraits" by Stan Engelbrecht and Nic Grobler, Cape Town, South Africa.

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ABOUT: "*Bicycle Portraits* is a photographic study of South Africans who rely on their bicycles every day, revealing who rides, why they ride, and of course why so few South Africans choose the bicycle as a primary mode of transport. With more than 500 portraits compiled over three years and 10,000 cycled kilometers, the project culminates in three published volumes as a portrait of a nation through its commuter subculture – uncovering all manner of societal, historical and cultural nuances never imagined. *Bicycle Portraits* celebrates the noblest machines ever dreamt up, and those who ride them. Stan Engelbrecht and Nic Grobler cycled everywhere to meet the bold individuals photographed for this project – people who choose to ride a bicycle in the face of cultural and social stigma, crime and dangerous roads ... They did not photograph people who ride purely for exercise or recreation, but instead searched for those who use bicycles as an integral tool in their day-to-day existence. They learnt that in South Africa, especially in the cities, very few people use bicycles to get around. It became clear that as major centers develop, there is still a trend to structure cities for cars, not people."

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# THE CHALLENGE OF NON-COMMUNICABLE DISEASES AND ROAD TRAFFIC INJURIES IN SUB-SAHARAN AFRICA: AN OVERVIEW

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*with inputs*

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# ABSTRACT

This report draws on a comprehensive review of the literature and on input from policy makers, researchers, and practitioners to address four questions: (1) How is the growing burden of non-communicable diseases (NCDs) and road traffic injuries (RTIs) changing the epidemiology of Sub-Saharan Africa? (2) What determines and drives this burden, and what are the commonalities with communicable diseases? (3) What is the rationale for public intervention? (4) How could resource-constrained governments approach NCD prevention and treatment and road safety in a comprehensive, effective and efficient way? The data show that action against NCDs and RTIs in Sub-Saharan Africa is needed, together with continued efforts to address communicable diseases and maternal and child health as well as to reach the Millennium Development Goals (MDGs). The report suggests that NCDs/RTIs should not be tackled separately as a vertical program, nor should they dis-

place communicable diseases as priorities. Instead, given resource constraints, and some shared determinants, characteristics, and interventions, there is scope for an integrated approach focusing on functions (prevention, treatment, and care) rather than on disease categories. Examples are cited of potential opportunities to integrate and add NCD prevention and treatment into existing services and programs. Proven, cost-effective, prevention interventions are clearly needed, many of which (such as tobacco and alcohol taxes, road safety measures, and fuel-efficient ventilated cookstoves) require action beyond the health sector. These can deliver broader development benefits in addition to their benefits for health. Selective, evidence-based actions to reduce NCDs and RTIs would address the changing disease burden in Africa and achieve a more sustainable improvement in health outcomes, more efficient use of resources, and better equity across patients and populations.



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# LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome	ICCC	Innovative Care for Chronic Conditions
AMRH	African Medicines Regulatory Harmonization	ICT	Information Communication Technology
APC	Adult per capita consumption	IHD	Ischemic Heart Disease
ART	Anti-Retroviral Therapy	IPMS	Integrated Patient Management System
ASMR	Age-standardized mortality rate	LBW	Low birth weight
BMI	Body mass index	LMIC	Low-and middle-income countries
BNAPS	Botswana National HIV/AIDS Prevention Support (oproject)	MDG	Millennium Development Goal
CCM	Chronic Care Model	MMR	Maternal Mortality Ratio
CDC	Centers for Disease Control and Prevention	MOH	Ministry of Health
CHF	Congestive Heart Failure	NCD	Non-Communicable Disease
COPD	Chronic Obstructive Pulmonary Disease	NGO	Non-Governmental Organization
CRD	Chronic Respiratory Disease	NMRAs	National Medicine Regulatory Authorities
CSO	Civil Society Organization	PEPFAR	United States President's Emergency Plan for AIDS Relief
CVD	Cardiovascular Disease	PLWH	People Living with HIV and AIDS
DALY	Disability Adjusted Life Year	PPP	Public Private Partnership
DOTS	Directly observed therapy, short-course	R&D	Research and development
DM	Diabetes Mellitus	RBF	Results-based financing
EAC	East African Community	RHD	Rheumatic Heart Disease
EBV	Epstein-Barr Virus	RTI	Road Traffic Injury
EHR	Electronic health records	SADC	Southern Africa Development Community
FCTC	Framework Convention on Tobacco Control	SSA	Sub-Saharan Africa/Sub-Saharan African
GAVI	Global Alliance for Vaccines Initiative	TB	Tuberculosis
GDP	Gross Domestic Product	THE	Total expenditure on health
GMRH	Global Medicines Regulatory Harmonization Multi-Donor Trust Fund	UN	United Nations
HALE	Global Health Life Expectancy	UNAIDS	Joint United Nations Program on HIV/AIDS
HbA1C	Hemoglobin A1C ('glycosylated hemoglobin')	VIA	Visual inspection with acetic acid (cervical cancer screening)
HBV	Hepatitis B Virus	WHO	World Health Organization
HCV	Hepatitis C Virus	YYL	Years of Life Lost
HHV8	Human Herpes Virus 8		
HIV	Human Immunodeficiency Virus		
HPV	Human Papilloma Virus		



*“Countries will take different paths towards universal health coverage. There is no single formula. However, today, an emerging field of global health delivery science is generating evidence and tools that offer promising options for countries.... For decades, energy has been spent in disputes opposing disease-specific ‘vertical’ service delivery models to integrated ‘horizontal’ models. Delivery science is consolidating evidence on how some countries have solved this dilemma by creating a ‘diagonal’ approach: deliberately crafting priority disease-specific programs to drive improvement in the wider health system.... Whether a country’s immediate priority is diabetes; malaria control; maternal health and child survival; or driving the ‘endgame’ on HIV/AIDS, a universal coverage framework can harness disease-specific programs diagonally to strengthen the system.”*

*Dr. Jim Kim, President of the World Bank,  
World Health Assembly  
Geneva May 21, 2013*

## EXECUTIVE SUMMARY

The rising burden of non-communicable diseases (NCDs) – including cardiovascular diseases (CVDs), diabetes mellitus, cancers, and chronic respiratory diseases – poses a growing health challenge for Africa; this is compounded by the rise in road traffic injuries (RTIs). Yet, in contrast to communicable diseases, Africa’s epidemic of NCDs and RTIs remains largely hidden.

This report approaches NCDs and RTIs within the context of existing work on communicable diseases and maternal and child health, to consider whether common challenges, drivers, and potential solutions provide opportunities to build on existing resources and experience and capitalize on their inter-linkages. It shows that effective, proven, cost-effective interventions to control NCDs and RTIs are available and possible – even in the region’s resource-constrained environment.

This report aims to answer four questions, drawing on a comprehensive review of the literature and on input from policy makers, researchers and practitioners: (1) How is the growing burden of NCDs and RTIs changing the epidemiology of Sub-Saharan Africa (SSA)? (2) What determines and drives this burden, and what are the commonalities with communicable diseases? (3) What is the rationale for public intervention? (4) How could resource-constrained

governments approach NCD prevention and treatment and road safety in a comprehensive, effective and efficient way?

### **The Growing Burden of NCDs and RTIs**

NCDs and RTIs are already a significant problem for SSA, causing almost a third of deaths in the region as a whole: for some countries, such as Mauritius and the Seychelles, and some populations, such as those over 45 years, NCDs are already the leading cause of death. For all four SSA sub-regions, strokes and RTIs are already among the top 15 causes of years of life lost, along with ischemic heart disease, diabetes mellitus and hypertensive heart disease in Southern SSA. NCDs are at least as common among the poor as they are among the more affluent. Moreover, Africa has the highest RTI death rate per population in the world, with pedestrians and other vulnerable road users suffering most. Among young men, RTIs are already the leading cause of premature death after HIV/AIDS. RTIs disproportionately affect the poor, whose limited access to emergency care may mean worse outcomes.

NCD and RTI trends point to the need to act. The largest relative increase in NCD deaths globally in the next decade is expected to occur in Africa, where

NCDs will become the leading cause of death by 2030. The burden from cancer alone is expected to more than double between 2008 and 2030. By 2015, RTIs are expected to be the number one killer of children aged 5-15 in Africa. Yet, although funding to developing countries for NCDs grew sixfold from 2001 to 2008, it still comprised less than 3 percent of overall global development assistance for health.

NCDs and RTIs are preventable causes of premature mortality and morbidity. They reduce productivity and consume resources that could otherwise be used for social and economic development. Health-care needs for chronic conditions and disabilities resulting from NCDs and RTIs increase pressure on existing fragile health systems, and impose large health and social care costs. NCDs can inflict substantial financial and psychosocial burdens on individuals and their families, particularly where treatment costs are mostly paid out-of-pocket and are lifelong.

NCDs and RTIs also have consequences for sustainable development. Some of the changes in lifestyle practices that increase NCDs and RTIs, such as increased car use, are also linked to greenhouse emissions and climate change.

## Drivers, Determinants and Commonalities

Communicable diseases have long been the leading causes of death and the disease burden in SSA – and in many countries still are – but rising incomes, population growth and ageing, globalization, rapid urbanization and changing lifestyle practices are shifting the disease pattern. In particular:

- Africa's population is growing rapidly enough to double within a generation. The high proportions of young people, in combination with the relatively early age at which some chronic conditions manifest themselves, exacerbates the situation. The proportion of elderly persons is projected to double in many African countries between 2000 and 2030, accounting for a substantial proportion of the projected increase in cancer.
- SSA is urbanizing faster than any other region. Living in an urban environment is associated with

decreased physical activity and increased cardiovascular risk, while air pollution is an emerging issue. The risk of crashes and injury increases with a poorly regulated transport sector, the lack or non-use of seat belts, hazardous road environments, poor maintenance of vehicles and roads, and deficient monitoring and enforcement.

- Over the last 20 years, SSA has seen a shift in the attributable burden of disease of risk factors away from risks for communicable diseases in children towards those for NCDs in adults. A nutrition transition is underway, with an increase in female obesity in some population groups; and lifestyles practices are changing. Tobacco use among young people has increased, particularly of products other than cigarettes. Harmful alcohol consumption is a common risk factor for both NCDs and RTIs (as well as for intimate partner violence and HIV), and is expected to increase with further economic development – Africa already has the highest prevalence of heavy episodic drinking of any region.

Close relationships exist in cause, course and outcome between NCDs, communicable diseases, and maternal, perinatal, and nutritional conditions. There are common underlying social conditions, such as poverty and unhealthy environments, and commonalities across disease groups in causation, co-morbidity, and care needs. Frequently, both communicable diseases and NCDs co-exist in the same individual, and one can increase the risk or impact of the other, as happens for example with diabetes and tuberculosis. Maternal health and practices, the intra-uterine environment and low birth weight may have long-term consequences for developing chronic diseases. Interventions to improve maternal and child health – such as reducing malnutrition and exposure to smoke – are also integral components of a continuum of preventive measures for NCDs.

## The Rationale for Public Intervention

From an economic perspective, government intervention is justified as a means to achieve a net improvement in social welfare. That is, it is justified when private markets fail to function efficiently or when the social objectives of equity in access to



health services are otherwise unlikely to be attained. Global evidence suggests the following sources of market failure that could justify government intervention for tackling the risk factors that give rise to NCDs: (1) ‘externalities’ where society or family members bear health or social costs of an individual’s unhealthy behaviors, for example alcohol-related crime and the harm to health caused by second-hand smoke; (2) ‘non-rational’ behavior, recognizing that people, particularly children, often do not act in their own best interests and may require protection, for example restrictions on marketing of unhealthy foods to children, or laws requiring use of seat belts; (3) what is termed ‘imperfect’ information – that is, where insufficient information is available for people to make informed choices; and (4) time-inconsistent preferences where people pursue instant gratification at the expense of long-term best interests. Highly effective and cost-effective interventions for the prevention and control of NCDs and RTIs have been identified. Their implementation has been calculated to be well justified in economic terms by potential welfare gains and averted economic losses.

Besides the economic rationale, human capital and overall economic and social development considerations need to be taken into account. People need to be healthy, educated, and adequately housed and fed in order to be more productive and better able to contribute to society. Unequal progress in health Millennium Development Goals (MDGs) in low-income countries seems to be significantly related to HIV and NCD burdens in a population, and the rising burden of NCDs threatens to reverse the gains already made on MDGs, especially those relating to poverty, education, and child and maternal health

Africa spends a relatively low share of national income on health and social services. With additional investment, programs to build human capital, such as education and nutrition, can also benefit NCD prevention and control, as can social protection and safety nets. Transport systems play their part: improvements can significantly increase school attendance, as well as contributing to injury reduction.

## A Comprehensive, Effective and Efficient Approach

In considering responses, this report is comprehensive but intentionally not prescriptive. It systematically considers a range of functions (prevention, treatment, care) and systems that cut across disease categories to highlight what can be done. To identify what has been done and what works, it draws on evidence and examples from within and beyond SSA. It deliberately stops short of recommending what countries should do, in the belief that tailored, country-led approaches need to follow on from this report, taking account of the needs, capacity, and context of each country.

Drawing on the rich material available, it is possible to identify a range of effective policy measures. Core messages that emerge from this knowledge are as follows:

### (i) Ensure synergies between MDGs and NCDs to maximize resource envelopes

Action against NCDs and RTIs in SSA is needed now, and must take place alongside continued efforts to address communicable diseases and maternal and child health, and to reach the MDGs. One set of actions cannot wait for the other. Nevertheless, there are opportunities to take advantage of the commonalities between these disease groups and build on existing work. For instance, leveraging the resources, experience and models of existing HIV/AIDS programs could benefit other chronic conditions; and a greater emphasis on strengthening health systems through universal coverage, stronger primary health care, integrated chronic care delivery, and community-based interventions is likely to be valuable for any condition. It is important to acknowledge and address the potential risks of setting up yet another vertical program in resource-constrained countries – and to promote integration and resource-sharing where feasible.

### (ii) Put primary focus on prevention and population-based actions

Globally, a set of cost-effective ‘best buys’ has been identified for prevention of NCDs and RTIs. These are typically population-wide interventions, imple-

mentable at little additional cost, which focus on prevention of common modifiable risk factors. They include proven measures to reduce tobacco and alcohol use, such as increased taxation; a ban on advertising, promotion and sponsorship; protection from exposure to tobacco smoke; and drink-driving counter-measures. As overweight/obesity emerges as an issue, measures are also being put in place to regulate other 'unhealthy commodities' such as ultra-processed, energy-dense, nutrition-poor food and drink. To prevent RTIs, law-enforcement needs to be combined with public awareness campaigns and education to increase seatbelt use and helmet wearing, and to reduce speeding and drink-driving. Legislation and regulation can also protect against some occupational and environmental hazards such as outdoor air pollution, industrial waste and contamination of drinking water and soil, which can exacerbate asthma or be linked to carcinogenic agents.

It should be noted that policy makers need to avoid the potential negative consequences that some population-based actions might create. For example, it is important to ensure that measures to alleviate under-nutrition do not have deleterious consequences for over-nutrition. And while developing a health-supporting environment that facilitates walking and cycling can be part of a pro-growth and pro-poor transport strategy, such an environment should also be safe and protect vulnerable road users.

### **(iii) Promote 'treatment as prevention,' and effective care**

Health services can implement a number of proven, targeted preventive measures – at relatively low cost – for CVD, diabetes, chronic respiratory diseases and cancer, and acute and chronic conditions. These measures include multidrug treatment for individuals at high risk of a cardiovascular event; drug treatment of myocardial infarction; glycemic control and foot care for people with diabetes; and several highly cost-effective interventions to combat cancer, such as Hepatitis B vaccination for liver cancer prevention, HPV vaccination for cervical cancer control, and male circumcision to reduce high-risk HPV.

Prompt emergency care for RTIs and acute NCD events can save lives, reduce the incidence of short-term disability and dramatically improve long-term

consequences for patients and their families. At the same time, screening programs, for example for cancer, can raise awareness of early signs and symptoms of those cancers amenable to early diagnosis, and increase the quality and coverage of effective evidence-based treatment using standardized protocols – thus can increasing survival rates. Where facilities are limited, non-laboratory tools are needed to support such screening and assess risk cheaply and quickly. Where the majority of cancer is diagnosed late, improvement in quality of life can be achieved relatively inexpensively by improving access to pain management and supportive care close to home – palliative and home-based care programs already in place for HIV/AIDS are transferrable to other conditions.

### **(iv) Adapt and strengthen health systems**

Together with other disease groups, NCDs and RTIs face constraints across all main components of a health system, but solutions can be shared across programs and initiatives, and be part of a wider systemic improvement.

Common problems faced by disease groups include the heavy reliance on external financing and the shortfall in total health expenditure per capita. Health-care infrastructure is insufficient across all tiers of service delivery – not just facilities but also laboratory and diagnostic systems and capabilities – while primary care is limited in many places. The severe shortage and imbalanced distribution of trained health workers is not just an obstacle to tackling NCDs but also to the delivery of good quality clinical services in general, jeopardizing achievement of the MDGs and improvement of the overall health of the poor. Moreover, all the main health and disease programs draw from the same data sources and share common challenges of weak information systems, limited civil registration, and unreliable vital statistics – which make it difficult to assess disease burden and create a compelling political case for action.

The chronic, life-long nature of many NCDs heightens some of these issues. The limited financial and social protection against the high costs of health-care can mean that a life-long condition or

disability from RTI can throw a family further into poverty. Health systems are particularly challenged by care of chronic conditions which require a complex response over an extended time period. While medicines, such as insulin for diabetes, are essential in NCD prevention and treatment, their quality, safety and effective use are not assured and they make up a substantial part of the direct costs of care for chronic diseases. Evidence shows that availability may be worse for medicines for chronic diseases than for acute diseases, and that under-funding, poor planning, and inefficient procurement, supply, storage and distribution systems within the public sector may exacerbate the problem. Health service delivery systems in low- and middle-income countries (LMIC) are typically more suited to providing episodic care for acute conditions; models for delivery of care for chronic conditions may be unfamiliar and hindered by shortcomings of the system.

Some of the potential solutions would benefit all disease groups. Universal health coverage aims to ensure that everyone has access to effective health services when needed, without incurring financial hardship; some countries have made significant progress in developing financial systems towards this goal. Shifting from originator medicines to generic products could achieve substantial savings without loss of quality, and a GAVI-like capacity at the regional or global level could usefully negotiate, make bulk purchases, and distribute vaccines, medicines and test kits. A health care delivery system that has been designed to decentralize and integrate chronic care across health care provider boundaries can span a spectrum of diseases with similar care needs, assisted by simplified protocols and treatment plans. Decision support tools for health-care professionals can improve their adherence to guidelines, standardized case management and patients' outcomes. Performance-based funding can be used to incentivize providers towards public health goals, and more efficient use of resources with reductions in waste, errors and corruption could help gain 'more health for the money'. Innovative strategies to expand health system capacity include 'task-shifting' in clinical settings so that appropriate tasks are delegated to the lowest cadre of health worker with the ability to perform the task effectively – and even to

people with the condition themselves. Finally, the application of ICT in health (eHealth), for example through telemedicine and distance learning, has the potential to facilitate better health care delivery in situations where health services and human resources for health are scarce.

Some of these solutions have already been developed or implemented by other disease groups, and NCDs and RTIs can benefit from this work. For example, many existing programs, such as TB control, aim to strengthen primary care in low-resource countries; there are opportunities for improved NCD care to 'piggy-back' existing efforts, by integrating services when an individual is seen by a health worker. There is broad experience in implementing chronic care models for HIV/AIDS in Africa, and this may be transferable to NCDs. Systems for communicable diseases can be adapted, and existing health surveys and surveillance instruments can be expanded to measure NCDs and their risk factors. Rather than pursuing separate solutions, therefore, there are opportunities for initiatives to share resources and benefits.

#### **(v) Revisit governance for health**

Weak governance impedes work to improve health systems effectiveness and health outcomes generally. With the greater emphasis on prevention and the recognition that many of the solutions for NCDs and RTIs lie outside of the health sector, broad partnerships across a range of sectors are needed. Political will, active civil society organizations, and research support are all significant contributors to success. Furthermore, underlying social determinants such as inequitable distribution of power, money and other resources have implications for prevention and care strategies, and both health and non-health sectors have roles to play in addressing these. There is an opportunity to revisit the roles and terms of reference of Ministries of Health to allow them to play an oversight role of coordinating actions from other sectors to deliver health outcomes. There are encouraging signs, for example with civil society organizations emerging to hold governments to account, and increased recognition that population health is not the outcome of a single ministry but requires a wide range of actors and a synergetic set of policies.

## The Way Forward

The burden of NCDs and RTIs is growing fast, even as SSA continues to grapple with high burdens of communicable diseases, maternal and child health, and HIV. Much of the disease and disability from NCDs and RTIs could be prevented by effective, cost-effective, proven interventions. There are strong rationales for government action on NCDs and RTIs, alongside continued efforts to achieve the MDGs.

The extensive literature reviewed, together with the views of many of the African and international experts consulted for this report, suggest that separate, special NCD programs may not be optimal or feasible in resource-constrained contexts. Moreover, given the shared determinants and characteristics of several diseases, there seems scope for an integrated approach focusing on functions (prevention, treatment and care) rather than on disease categories. The report has identified examples of potential opportunities to integrate NCD prevention and treatment into existing services and programs that would build on resources and experience already in place – and would capitalize on the inter-linkages among communicable diseases, NCDs, maternal and child health. Also needed are proven, cost-effective, NCD and RTI prevention interventions, many of which (such as tobacco and alcohol taxes, road safety

measures, and fuel-efficient ventilated cookstoves) require action beyond the health sector. These can deliver broader development benefits in addition to their benefits for health. Selective, evidence-based actions to reduce NCDs and RTIs would address the changing disease burden in Africa and achieve a more sustainable improvement in health outcomes, more efficient use of resources, and better equity across patients and populations.

In conclusion, it should be clear that controlling NCDs and RTIs is a key public health issue in Africa. Ensuring an effective response, however, is a particularly difficult challenge in countries facing a double or triple burden of disease, and with low national income levels and weak health care systems. As argued here, and fully consistent with the health improvement and poverty alleviation objectives of World Bank work in the health sector, efforts to address this challenge in Africa should be part of a broader multisectoral effort, including programs to strengthen health systems. This effort will need to be supported by national governments, public and private employers and businesses, civil society and the international community over the short and medium terms. It is hoped, therefore, that this report will contribute to advancing the discussion on this topic in Africa and beyond in the years to come.

*“The kola nut was given to him to break, and he prayed to the ancestors. He asked them for health and children. We do not ask for wealth because he that has health and children will also have wealth. We do not pray to have more money but to have more kinsmen.”*

Chinua Achebe, “Things Fall Apart”

# 1. INTRODUCTION

There is growing optimism about Africa<sup>1</sup> [1]. Since the turn of the century, Africa’s growth has been robust (averaging 5-6 percent GDP growth a year), making important contributions to poverty reduction. Over the last decade, six of the world’s ten fastest-growing nations were African. The GDP growth rate for the region as a whole was an estimated 4.6 percent in 2012, about the same as Asia. As world trade slowed in recent years, Africa was the only region that posted double-digit growth in exports and imports. The current boom is underpinned by sound macro policies, political stability, and regional integration efforts. Unlike in some rich countries, public debt levels in most of Africa are sustainable.

Yet the continent cannot rest on its laurels; deep development challenges persist [2]. Non-sustainable resources, such as minerals, are the main drivers of growth. Job creation has not matched need – unemployment, particularly of youth and women, remains high. Social and human development indicators remain poor. Poverty reduction has lowered the US\$1.25 a day poverty rate from 57.9 percent in 1999 to 47.5 percent in 2008, but results vary widely across resource-rich and resource-poor countries. Access to quality health care and education is patchy, there is a large deficit in infrastructure and human capital (poor learning outcomes, skills deficit, lagging health indicators), and many African countries are not likely to meet the Millennium Development Goals (MDGs) by 2015 [3].

Against this backdrop, there is a growing health challenge for Africa, spurred on in part by its own successes. Population growth and ageing, globalization, and rapid urbanization – with improvement in roads [4] and infrastructure – are contributing to a fast-rising burden of non-communicable diseases (NCDs) and road traffic injuries (RTIs). These are rapidly overtaking the long-standing communicable diseases such as malaria, tuberculosis (TB), and the Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (HIV/AIDS) [5].

## The Nature of the Problem and Rationale for the Report

NCDs are expected to become the leading cause of death in Africa by 2030 – and already are for some African nations. In 2008, they caused 2.8 million deaths in Africa, and almost two-thirds (62 percent) of deaths in people over 45 years of age [6]. RTIs are largely killers of the young, including many child pedestrians [7]. Globally, the four main NCDs are cardiovascular disease (CVD) such as strokes and heart attacks; cancers; diabetes mellitus; and chronic respiratory diseases (CRDs) such as asthma and chronic obstructive pulmonary disease (COPD). They share many common risk factors and underlying determinants, some of which also contribute to RTIs. Mental illness, neuropsychiatric conditions and other endemic NCDs add to the burden. The care of chronic conditions and disabilities resulting from NCDs and RTIs threatens to overwhelm existing fragile health systems and send the costs of health and social care soaring – and families and individuals further into poverty in the face of inadequate social protection.

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<sup>1</sup> The main focus of this document is Sub-Saharan Africa, but the scope in the different sources used for its preparation varies and is not always clear. A definition of region and income groups is available from: [http://www.who.int/healthinfo/global\\_burden\\_disease/definition\\_regions/en/index.html](http://www.who.int/healthinfo/global_burden_disease/definition_regions/en/index.html).

Both NCDs and RTIs are receiving global attention. The United Nations (UN) High-level meeting on NCD Prevention and Control in September 2011 was only the second time that disease has been highlighted in this way, the first being AIDS a decade earlier [8]. The year 2011 also marked the beginning of the UN Decade of Action for Road Safety 2011-2020 [4]. At the World Health Assembly in May 2012, Member States agreed to adopt a global target of “25 by 25” – for a 25 percent reduction in premature mortality<sup>2</sup> from NCDs by 2025 [9]. They also placed a new Global Action Plan and Monitoring Framework for NCDs under consideration [10-11].

NCDs and RTIs are largely preventable causes of premature mortality and morbidity and a package of cost-effective measures has been identified [12-13]. It has been estimated that implementing a core package of ‘best buys’ for NCDs would cost less than US\$1 per day in low-income countries, and less than US\$3 per day in middle-income countries – with three dollars expected in return for every dollar invested in NCDs [14]. Achieving a 50 percent reduction in RTI fatalities in Africa by 2020 would save an estimated one million lives and 10 million serious injuries, with an estimated social benefit of around US\$340 billion [15].

NCDs and RTIs are a hidden yet growing health challenge for Africa. The report aims for a broader understanding of NCDs and RTIs within Africa’s health and development context, and explores shared drivers and potential integrated solutions. It essentially seeks to answer four questions:

- (1) How is the growing burden of NCDs and RTIs changing the epidemiology of SSA?
- (2) What determines and drives this burden, and what are the commonalities with communicable diseases?
- (3) What is the rationale for public intervention?
- (4) How could resource-constrained governments approach NCD prevention and treatment and road safety in a comprehensive, effective, and efficient way?

<sup>2</sup> ‘Premature mortality’ in this context refers to mortality between the ages of 30 and 70 years of age due to cardiovascular disease, cancer, diabetes or chronic respiratory disease.

The challenge presents risks for an already resource-constrained situation: how to respond in a way that does not further deepen any divide between communicable and NCDs, or add new vertical programs that are potentially in competition for scarce resources, but which instead could capitalize on the commonalities among disease groups, in causation, co-morbidity, and care.

Development is multi-dimensional – social, economic, environmental – and the challenges, and their solutions, are interlinked [6]. To sustain and increase growth in an inclusive and equitable way, Africa’s governments need to adopt long-term development strategies, increasing investments in high-quality education, health, and infrastructure. To the same end, they must find ways of addressing the threat posed by NCDs and RTIs which build on existing resources and experience and take account of the many commonalities between communicable diseases, NCDs, maternal and child health, and development.

This report is not a World Bank policy paper nor is it an academic review of the literature. Instead, it seeks to stimulate new ways of thinking and approaches to health and development, specifically to tackling NCDs and RTIs, within the context of SSA. It is grounded in evidence and in practical experience, drawing upon a broad and extensive review of the data and literature and benefitting from the insights and experience of policymakers, analysts, and managers in the field.<sup>3</sup>

While the report is comprehensive, it is intentionally not prescriptive. It systematically considers a range of functions (prevention, treatment, care) and systems that cut across disease categories to highlight what can be done. To find what has been done and works, it harvests from evidence and examples from within and beyond SSA. It deliberately stops short of advocating what countries should do in the belief that more tailored, country-led approaches need to follow that take account of individual country need, capacity, and context.

The report is intended for policymakers and technical staff at the national and international level,

<sup>3</sup> See *Acknowledgements* section, for list of experts consulted.

working within government institutions and international bodies in health and in related sectors such as finance, trade, agriculture, transport, and environment. It is expected, therefore, that this report will contribute to advance the discussion on this topic in Africa and beyond in the years to come.

The report is organized in four main sections, in line with the four main questions already posed. First, it summarizes the burden of NCDs and RTIs

from the health, economic, and social perspectives. Second, it explores their underlying drivers and determinants, and commonalities with other diseases. Third, it examines the rationale for public intervention from the economic, human capital, and development perspectives. Fourth, it suggests possible elements of a comprehensive, effective and appropriate response to NCDs and RTIs in SSA.





## 2. BURDEN OF NCDs AND RTIs

This section considers the question, “How is the growing burden of NCDs and RTIs changing the epidemiology of SSA?”. It covers:

- An overview of the health perspective in the region, including:
  - The relative burden of disease in Africa;
  - The rising epidemic of NCDs and RTIs;
  - The types of disease that reflect the stage of a country’s development; and
  - An examination of specific NCDs (CVDs, cancers, diabetes, chronic respiratory diseases and others) and RTIs; as well as
- A look at the consequences of NCDs and RTIs on the economic and social development of SSA.

### 2.1. A Health Perspective

#### The Relative Burden of Disease in Africa

For some time, much of the health focus in the SSA region has been understandably directed towards communicable diseases, maternal, perinatal, and nutritional causes of mortality and morbidity. These all remain among the leading five causes of disability-adjusted life years (DALYs) for the sub-regions of SSA in 2010, accounting for 67-71 percent of DALYs in Eastern, Western, and Central SSA [16]. TB, HIV/AIDS, and malaria were responsible for 22 percent of all deaths in SSA in 2010, other communicable diseases account for another 23 percent. These figures are already slightly exceeded by the 25 percent share of deaths caused by NCDs (Figure 1).

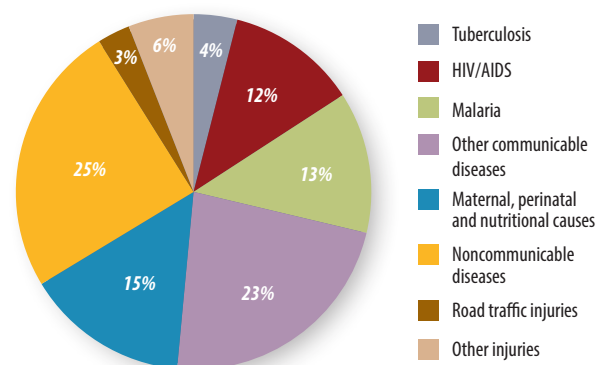
HIV was the leading cause of DALYs in Southern and Eastern SSA in 2010 [16]. In recent years, the dramatic increase in anti-retroviral therapy (ART) coverage, helped by increases in safer sex and condom use, have contributed to a decline in HIV incidence in the region[18].

Nine of the world’s 22 high-burden countries for TB are African (Democratic Republic of Congo, Ethiopia, Kenya, Mozambique, Nigeria, South Africa, Uganda, Tanzania, and Zimbabwe) [19]. Six African countries (Nigeria, Democratic Republic of Congo, Burkina Faso, Mozambique, Cote d’Ivoire, and Mali) account for 60 percent of malaria deaths in the world [20], and malaria was the leading cause of DALYs lost in Central and Western SSA in 2010 [16]. Nigeria is one of only three polio-endemic countries in the world (with Pakistan and Afghanistan).

Close to 60 percent of global maternal deaths occur in SSA which has the highest maternal mortality ratio (MMR) in the world [21]. The main specific causes are unsafe abortion, sepsis, hemorrhage, obstructed labor, and hypertensive disorders. Africa has a high stunting rate – 40 percent of children under five years old are underweight for their age – and the rate is falling much more slowly than in other regions [22].

Little attention has been paid to the extent to which these conditions contribute, directly or indirectly, to the growing burden of NCDs. In this context it must be remembered, for example, that

**FIGURE 1: Proportion of Deaths by Cause in SSA, 2010**

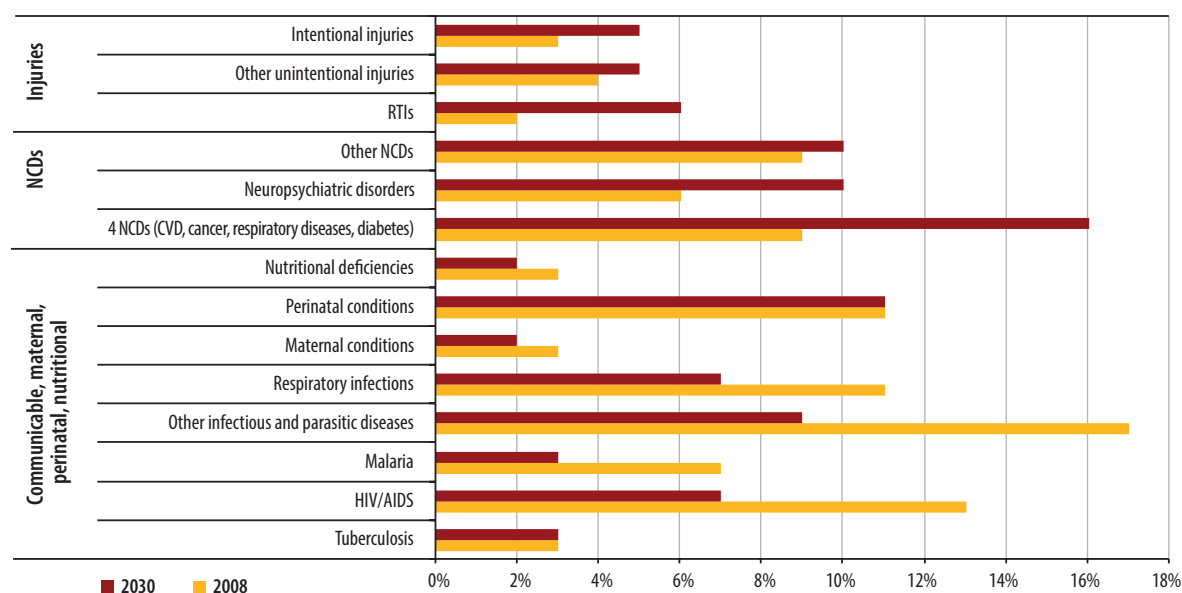


Source: Authors from [17]

some tropical diseases and infections of poverty cause heart disease [23]; TB worsens outcomes for diabetes [24]; stunting is associated with increased risk of obesity in later life [22, 25]; and many infectious agents such as hepatitis B (HBV), human papilloma virus (HPV), and HIV are associated with increased risk of cancer [26-27] – about one third of cancers in Africa are infection-related, double the world average [27].

By 2010, cerebrovascular disease, diabetes and COPD already ranked as the 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> highest causes of DALYs in Southern SSA [16]. A further shift in relative disease burden is expected: by 2030, the disease burden (in DALYs) for HIV/AIDS, malaria, and other infectious and parasitic conditions is expected to be significantly lower, with the four main NCDs becoming pre-eminent (Figure 2) [28].

**FIGURE 2: Projected Burden of Disease (percentage of Total DALYs) by Groups of Disorders and Conditions, SSA, 2008 and 2030**



Source: Authors from [28]<sup>4</sup>

Projected DALYs by cause for 2008, 2030 - standard DALYs (3 percent discounting, age weights) – Baseline scenario.

4 At the time of preparation of this report, projections of mortality and burden of disease were not available through the Global Burden of Disease study 2010 [17] so an earlier version [28] was used for Figures 2 and 9.

## A Rising Epidemic of NCDs and RTIs

NCDs are becoming a significant burden in SSA, and RTIs are rapidly emerging as a major cause of death and disability. By 2010, cerebrovascular diseases (stroke) and road injuries were already within

the top 15 causes of years of life lost (YLL) for all four SSA regions, joined by ischemic heart disease (IHD), diabetes mellitus (DM), and hypertensive heart disease in Southern SSA (Table 1) [29].

**TABLE 1: Top 15 Leading Causes of YLL in Each Region of SSA, 2010**

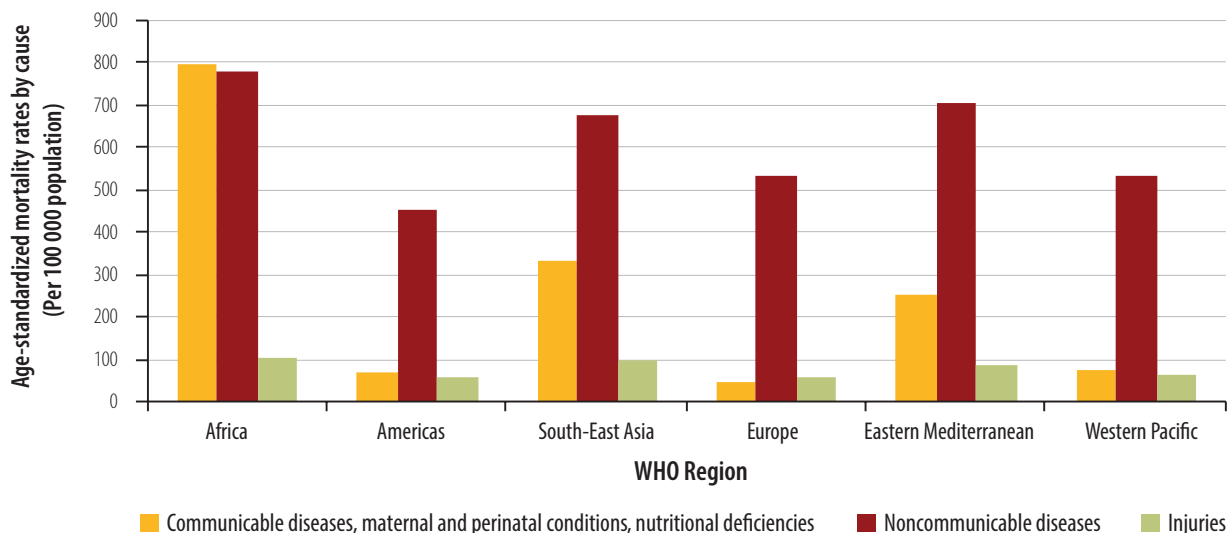
Global rank		Southern SSA	Eastern SSA	Central SSA	Western SSA
1	Ischemic heart disease	11	17	16	17
2	Lower respiratory infections	2	3	4	2
3	Cerebrovascular disease (stroke)	7	14	13	12
4	Diarrhoeal diseases	3	4	2	3
5	Malaria	14	2	1	1
6	HIV/AIDS	1	1	5	4
7	Pre-term birth complications	6	5	6	7
8	Road injury	12	11	11	9
10	Neonatal encephalopathy (incl. birth asphyxia/trauma)	9	9	10	10
11	Tuberculosis	5	8	8	11
12	Sepsis	18	7	12	5
14	Congenital anomalies	13	15	7	15
15	Protein-energy malnutrition	29	6	3	6
18	Meningitis	19	10	9	8
19	Diabetes mellitus	8	26	26	24
20	Interpersonal violence	4	18	17	23
23	Fire, heat, and hot substances	23	16	19	13
27	Hypertensive heart disease	15	38	39	46
28	Maternal disorders	20	13	15	14
34	Exposure to mechanical forces	10	28	22	40
40	Syphilis	31	12	14	18

Ranking legend	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36+
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Source: Authors from [17, 29]

Compared to other regions of the world in 2008, Africa was estimated to have the highest age-standardized mortality rate for NCDs (779 per 100,000 population) and for injuries including RTIs (107 per 100,000 population) (Figure 3) [30]. Globally, NCD deaths are expected to increase by a further 17 percent in the next 10 years, with the largest increase expected in Africa (27 percent) [31].

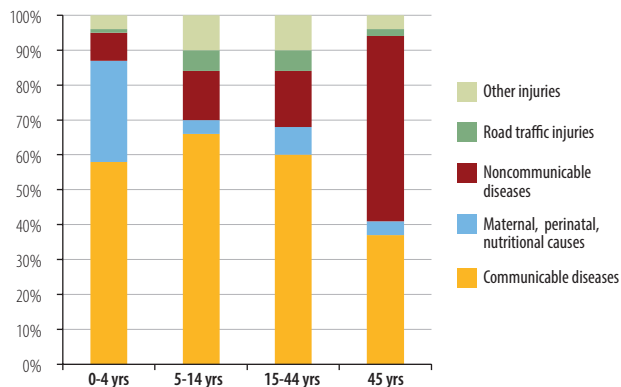
**FIGURE 3: Age-Standardized Mortality Rates by Cause, WHO Regions, 2008**



Source: [32]

NCDs occur at younger ages in SSA than elsewhere: for example, the average age of death from CVD is at least 10 years younger than in developed countries [33]. Half of the deaths caused by NCDs in Africa occur in people under 70 years of age [6], and NCDs are already the leading cause of death in people aged over 45 years (Figure 4). The NCD death rate among women in Africa is twice as high as the rate in high-income countries [31].

**FIGURE 4: Proportion of Deaths by Age Group (Years) in SSA, 2010**



Source: Authors from [17]

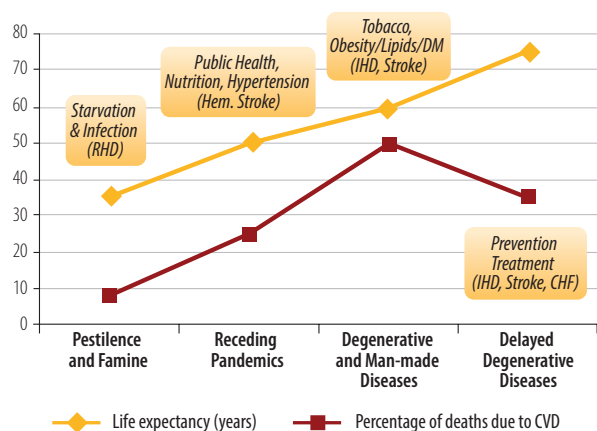
### Types of Disease Reflect Stage of Development

The relative burden and types of NCDs that are present reflect to some extent the stage of epidemiological transition of a country or its population (Figure 5). In countries at the earliest stages of development, circulatory diseases due to nutritional deficiency or infections (such as rheumatic heart disease) predominate. As countries develop, circulatory diseases related to hypertension (such as hemorrhagic stroke) become more common. With high-fat diets, sedentary lifestyles, and increased tobacco use, mortality from atherosclerotic CVD (such as IHD) predominates, especially in those below the age of 50 years [34]. The prevalence of and complications from diabetes also increase during this disease transition. Differences can co-exist within countries – for example rural versus urban populations – and obesity can be seen alongside under-nutrition even in the same household [35]. Trends in these risk factors in SSA, and their drivers, are discussed further in Section 3.

Figure 6 shows the relative burden of communicable disease, NCDs, and injuries by country in SSA, as measured by age-standardized mortality rate (ASMR). The number of countries in which NCDs and injuries dominate may surprise many readers.

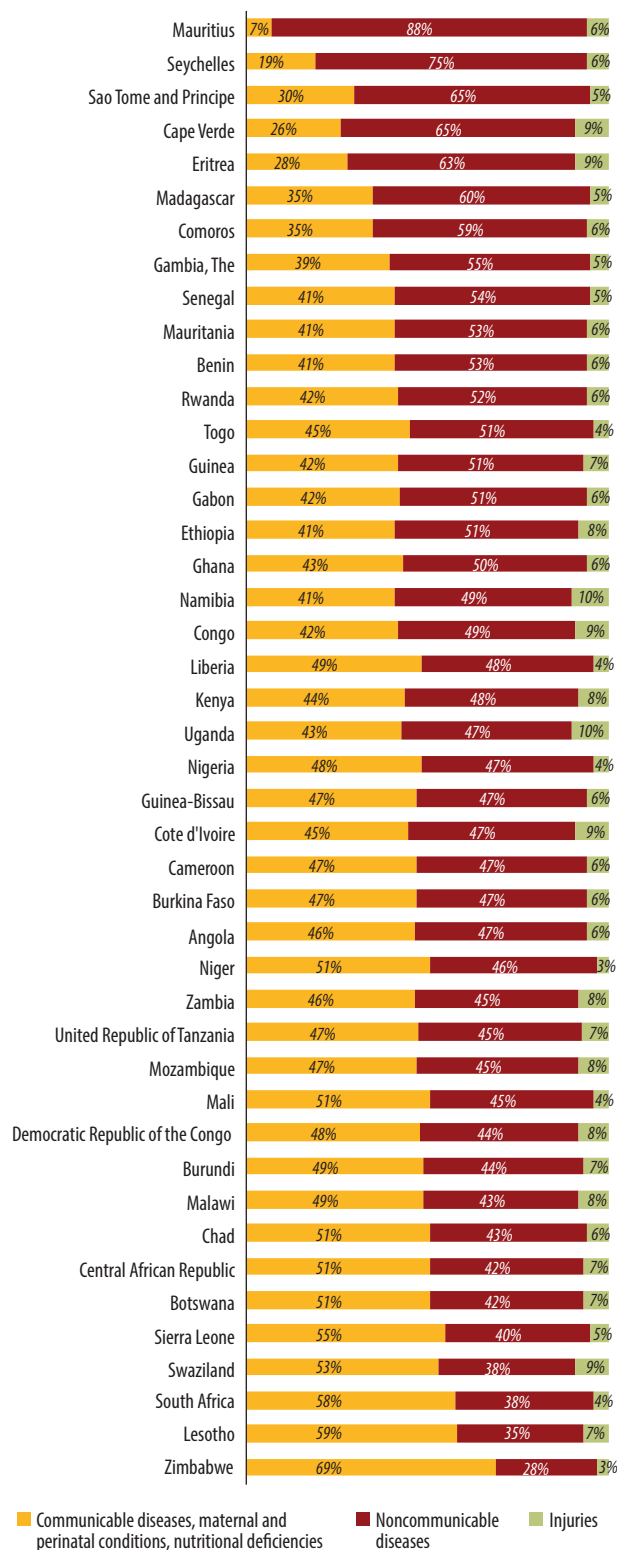
Table 2 shows ASMR by country for the main NCDs focused on in this report (cancer, CVD, diabetes, and chronic respiratory diseases), with countries organized by World Bank Income Group (WBIG).

**FIGURE 5: Epidemiological Transition for CVD in Developing Countries**



Source: [36]

**FIGURE 6: ASMR by Cause in Countries of SSA, 2008**



Source: [32]

**TABLE 2: ASMR by Cause and Country for SSA, 2008**

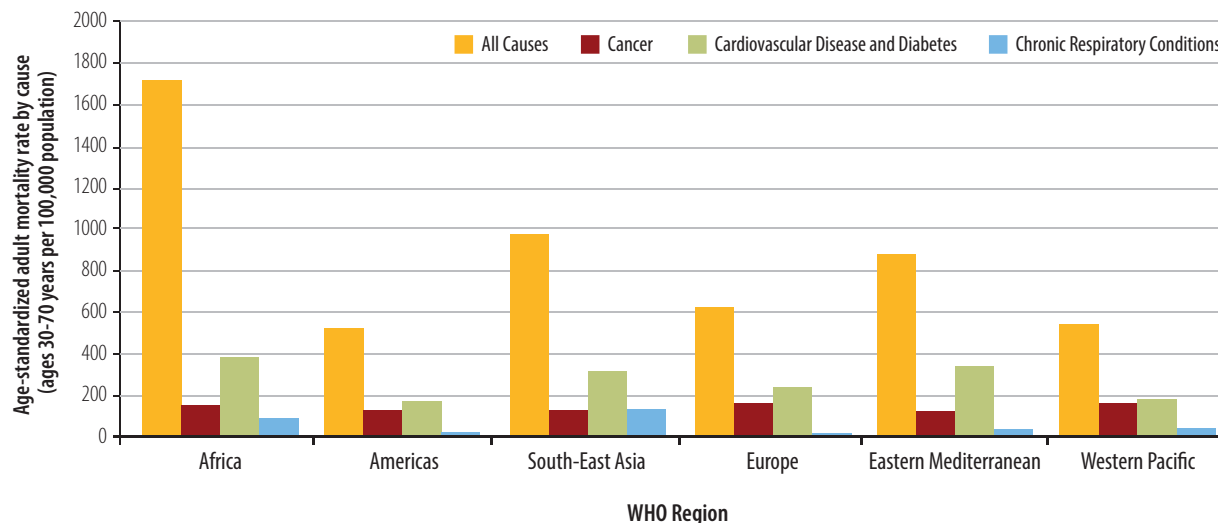
Countries in SSA arranged by World Bank Income Group	Age-standardized mortality rate by cause (ages 30-70 years, per 100 000 population)			
	All causes of death	Cancer	Cardiovascular disease and diabetes	Chronic respiratory conditions
<b>Upper-middle income</b>				
Angola	1685	130	459	110
Botswana	1633	66	293	70
Gabon	1251	117	325	80
Mauritius	774	110	440	29
Namibia	1889	73	524	84
Seychelles	867	199	265	32
South Africa	2259	193	307	68
<b>Lower-middle income</b>				
Cameroon	1846	122	473	115
Cape Verde	772	144	235	55
Congo, Rep.	1468	113	391	95
Cote d'Ivoire	2567	104	651	166
Ghana	1452	151	359	93
Lesotho	2748	109	443	108
Nigeria	1632	148	377	90
Sao Tome and Principe	654	169	183	40
Senegal	1133	152	307	73
Swaziland	3109	117	551	136
Zambia	2395	166	527	135
<b>Low income</b>				
Benin	1528	161	413	102
Burkina Faso	1497	143	377	94
Burundi	1893	161	391	91
Central African Republic	2275	121	483	116
Chad	1841	130	461	111
Comoros	1194	140	393	92
Democratic Republic of the Congo	1765	138	399	95
Eritrea	952	119	306	73
Ethiopia	1863	132	473	115
Gambia, The	1618	183	500	118
Guinea	1906	177	542	137
Guinea-Bissau	2007	166	522	128
Kenya	1495	178	276	69
Liberia	1760	149	378	89
Madagascar	1058	154	289	69
Malawi	3147	163	634	125
Mali	1262	171	292	71
Mauritania	1265	147	362	85
Mozambique	2167	143	498	125
Niger	1057	129	246	57
Rwanda	1174	158	290	68
Sierra Leone	1675	133	383	92
Togo	1562	143	370	89
Uganda	1959	191	421	111
United Republic of Tanzania	1733	113	341	86
Zimbabwe	3046	157	206	51

Source: [32]

### Cardiovascular Diseases

CVDs are the second most common cause of adult deaths in SSA and, in some countries such as Mauritius and the Seychelles, already the leading cause [37]. The age-standardized mortality rate for CVD and diabetes is highest for the African region (Figure 7). Table 2 shows the relative burden of the main NCDs of focus in this report.

Surveys find a hypertension prevalence rate of 25–35 percent in the adult population aged 25–64 years [38] with treatment rates relatively low, contributing to the high rates of stroke reported [6, 39]. The burden of disease from CVD is projected to double from 1990 to 2020 [40].

**FIGURE 7: ASMR by NCD Cause, WHO Regions, 2008**

Source: [32]

## Cancers

The burden from cancer is expected to more than double between 2008 and 2030, with new cases rising from 681,000 to 1.6 million and deaths rising from 512,000 to 1.2 million over that period [6]. Risk factors for cancer can be infectious and/or non-infectious (Table 3). The most common cancers for men in Africa are HIV-associated Kaposi's sarcoma, and cancer of the liver, prostate, and bladder; and for women they are cancer of the cervix, breast, Kaposi's

sarcoma, and cancer of the liver. The lifetime risk of cancer in females (0-64 years) in Africa is only 30 percent lower than the risk in developed countries but their risk of dying is almost twice as high [41]. The regions in the world with the highest risk for cervical cancer are Western and Eastern Africa [42]. The growing use of tobacco and occupational and environmental risks such as air pollution and exposure in mining, add to the cancer burden [43-44].

**TABLE 3: Common Cancers in SSA: Infectious and Other Risk Factors**

Cancer sites, in rank order of incidence	Infectious agents	Other risk factors of high public health relevance
Breast		Hormonal/reproductive factors, obesity, physical inactivity, alcohol
Cervix	HPV	Tobacco
Liver	HBV, HCV	Aflatoxins (produced by <i>Aspergillus</i> moulds), alcohol
Prostate		
Lymphomas (non-Hodgkin and Burkitt)	EBV, malaria, HIV (indirect), HCV	
Colon and rectum		Diet, obesity, physical inactivity, alcohol, tobacco
Kaposi sarcoma	HIV (indirect), HHV8	
Oesophagus		Tobacco, alcohol
Lung		Tobacco
Stomach	Helicobacter pylori (bacterium)	Diets low in fruit and vegetables and high in salt, tobacco
Bladder	Schistosoma haematobium (fluke)	Tobacco, occupational exposure

Source: Adapted from [27, 44]

Abbreviations: HPV Human papilloma virus; EBV Epstein-Barr virus; HBV hepatitis B virus; HCV hepatitis C virus; HHV8 human herpes virus 8.

## Diabetes

An estimated 14.7 million people were living with diabetes in SSA in 2011 (3.8 percent of the population), and rising prevalence was expected to affect 28 million people by 2030 [45]. Over 90 percent of cases are Type 2 diabetes [46] but this may be due in part to early mortality for those with type 1 diabetes who have insufficient access to insulin, syringes, and monitoring equipment [47]. Children in the region with Type 1 diabetes often go undiagnosed; some may even be misdiagnosed as having AIDS. Surveys during the period 2003–2009 found that between 5 and 15 percent of the population of individual countries have diabetes [48]. Almost one in two Mauritians aged 25–74 years has either diabetes or impaired glucose metabolism (pre-diabetes) [49]. Around three-quarters (78 percent) of people with diabetes in Africa are undiagnosed [45], and the proportion of people with diabetes having complications is high [50].

## Chronic Respiratory Diseases

There is limited information available about the prevalence of chronic respiratory diseases in SSA, but conditions appear to be under-recognized, under-diagnosed, and under-treated [51]. Asthma appears to be on the increase, particularly in urban regions, and COPD has become an increasing health problem due to tobacco smoking and exposure to biomass fuel emissions [52]. Environmental pollution, occupational exposure, and high levels of TB infection may also increase the prevalence of these diseases [51].

## Other NCDs

While much international attention has focused on four main NCDs (CVD, cancer, CRD, diabetes), and these are the main focus of this report, African health leaders have also voiced concern about other chronic conditions, such as mental health disorders, haemoglobinopathies such as sickle cell disease, oral and eye diseases, and violence and injuries. This is because of their burden on health and development in the African region and for their shared risk factors and/or care need [6, 53–54]. Indeed, by 2010 major depressive disorders were already the 10<sup>th</sup> highest cause of DALYs in Southern SSA [16]. There

has even been a call for a “5 by 5” approach in Africa, adding a focus on neuropsychiatric disorders as the ‘5<sup>th</sup> NCD’ and transmissible agents as the ‘5<sup>th</sup> risk factor’ [55]. For some countries such as Rwanda with populations early in the epidemiological transition, NCDs are not dominated by any one condition; instead each NCD is relatively uncommon thus making an individual, disease-specific approach even less useful [56].

While it is outside the scope of this report to go into detail on these other conditions, it is worth noting that an individual may carry multiple co-morbidities, or risk factors for other conditions, and that these may impact overall outcomes and thus need to be taken into account in disease management. For example, a review of patients with heart failure in Cameroon found that over half had at least one co-morbidity, and around a third had multiple co-morbidities, such as renal impairment, COPD, diabetes, and gout [57]. A survey of over 700 residents aged over 50 years in South Africa found that a quarter had hypertension with one or more other chronic diseases [58].

## RTIs

Despite being the least motorized region, SSA has the highest road traffic death rate in the world, proportional to its population: an estimated 24.1 people per 100,000 population are killed in road crashes each year [59]. The number of road traffic deaths is predicted to rise by at least 80 percent by 2020 [60]. Just seven countries account for almost two-thirds (64 percent) of all road deaths in the region (Democratic Republic of Congo, Ethiopia, Kenya, Nigeria, South Africa, Tanzania, and Uganda), with Nigeria and South Africa having the highest fatality rates (33.7 and 31.9 deaths per 100,000 per year respectively) [61].

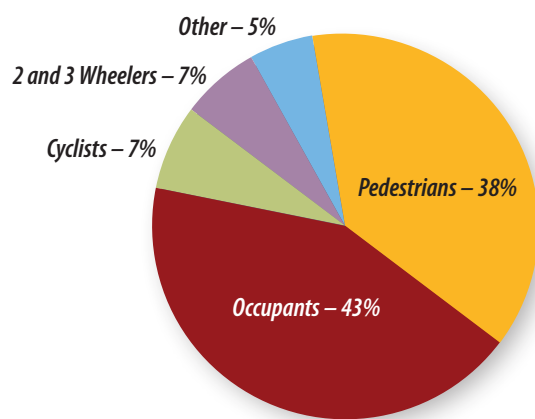
Vulnerable road users—pedestrians, cyclists, and users of motorized two-wheelers—constitute more than half of all those killed on roads (Figure 8). In all four SSA regions more than 40 percent of road injury deaths are amongst pedestrians [16].

By 2015, RTI are expected to have become the number-one killer of children aged 5–15 in Africa, outstripping Malaria and HIV/AIDS [62] (Figure 9).



For young men, RTI are the second leading cause of premature death after HIV/AIDS. Economically active young people are most at risk of road injury – in South Africa over half of pedestrian deaths were people aged 20-44 years. Road crashes are estimated to cost African countries between 1 and 3 percent of their Gross National Product each year [63].

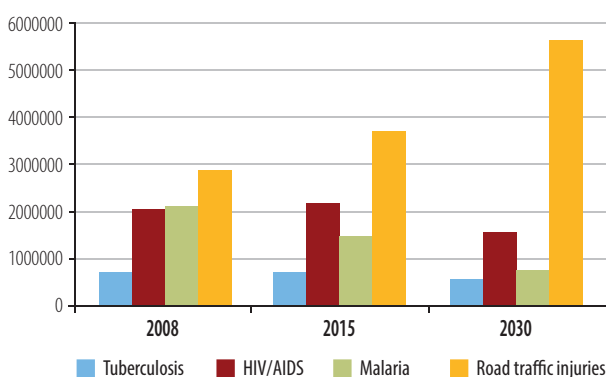
**FIGURE 8: Distribution of Road Traffic Deaths by Type of Road User in SSA Countries**



Source: [59, 61]

Note that the small difference in the percentage of pedestrians between this source and [17], cited in the text above, results from differences in the countries included.

**FIGURE 9: Projected Disease Burden (DALYs) in SSA for Children Aged 5-15 Years, 2008-2030**



Source: Authors from [28]

Projected DALYs by age, sex, and cause for 2008, 2015, 2030 – standard DALYS (3 percent discounting, age weights) – Baseline scenario.

## 2.2. Economic and Social Development Consequences

As the leading cause of death in low- and middle-income countries (LMIC), NCDs have costs for individuals and families, health systems and economies, and also for sustainable development. The two main factors accounting for the macroeconomic impacts are productivity loss—nearly 30 percent of NCD-related deaths in low-income countries occur in people under 60 years of age [64]—and costs of treatment, which pose particular challenges in LMIC where resources and health systems are already overstretched.

Although the biggest economic burden is currently in high-income countries, the burden will rise in the developing world as economies enlarge and populations grow and age [65]. Rising NCD mortality rates are expected to reduce economic growth in developing countries [66]. A review of LMIC in 2007 estimated total losses in economic output during the period 2006–15 from coronary heart disease, stroke, and diabetes alone; namely, US\$1.88 billion in South Africa, US\$1.17 billion in Nigeria, US\$16 million in Ethiopia, and US\$15 million in Democratic Republic of Congo [67]. The estimated economic cost (direct and indirect) of diabetes alone in the African region in 2000 was I\$25.51 billion<sup>5</sup> (at purchasing power parity) [68]. Total costs attributed to CVD in the African region were US\$11.6 billion, of which 41 percent represented loss of productivity costs [65]. A review of over 7,000 employees in Namibia found that high blood glucose and diabetes had the largest effect on absenteeism, greater than being HIV positive [69].

NCDs and the risk factors that fuel them can inflict substantial financial and psychosocial burdens on individuals and their families, particularly where treatment costs are paid mostly out-of-pocket. In the poorest households of some countries, 15 percent of disposable income is spent on tobacco [31]. One study in Sudan showed that for a family with a diabetic child, 65 percent of their family's annual health expenditure was spent on their child's diabetic care [70]. A study of how households in Afri-

5 I\$ refers to International dollar which is a hypothetical unit of currency that has the same purchasing power parity that the U.S. dollar had in the United States at a given point in time.

can countries cope with high out-of-pocket health expenditure found that households with the highest levels were at least 10 percent more likely to borrow and sell assets than those without such expenditure, and this effect was greatest in Congo, Ethiopia, and Ghana where the likelihood rose to 38-40 percent [71]. Average out-of-pocket costs for treatment of injury (including RTIs) in Ghana was found to be US\$31 per injury in an urban area and US\$11 in a rural area [72], at a time when average monthly per capita income was only US\$86. Coping strategies after injury included intra-family labor reallocation, borrowing money, and selling belongings.

The consequences of alcohol abuse have large costs for society in health care costs and social harm.

This burden is disproportionate: poor populations and low-income countries have a greater burden of related disease per unit of alcohol consumption than high-income populations and countries [73].

The changes in lifestyle behaviors that lead to an increase in NCDs, such as a diet more reliant on meat and processed foods and a reduction in physical activity with increased use of cars, are also linked to increasing greenhouse gas emissions and to climate change [74-75]. In turn, climatic factors have a negative impact on health; for example, asthma is likely to increase with the related increase in air pollution [76]. So reducing risk factors for NCDs can have wider social and economic benefits in addition to improving health.

## 3. THE DRIVERS AND DETERMINANTS OF NCDs

Changes in the magnitude and distribution of the risk factors and determinants for NCDs, alongside demographic change and economic development, are driving the trends in the disease burden [24, 35, 77]. In considering the question, “What determines and drives the NCD and RTI burden, and what are the commonalities with communicable diseases?” this section covers:

- NCD risk factors in SSA (nutrition, tobacco, alcohol, and physical activity and travel);
- The drivers of NCD trends (growing urbanization and the impact of demographic changes);
- Socio-economic determinants and distributions; and
- Commonalities between NCDs and other risk groups.

### 3.1. NCD Risk Factors

Over the period 1990-2010 globally and in Sub-Saharan Africa, there has been a shift in the contribution of different risk factors to the disease burden away from risks for communicable diseases in children towards those for non-communicable diseases in adults [78]. Leading risk factors for SSA regions in 2010 can be found in Table 4. In 2010 in Central, Eastern, and Western SSA, childhood underweight, household air pollution from solid fuels, and suboptimal breastfeeding continue to be leading causes of disease, but their contribution to the disease burden has fallen substantially since 1990. A much larger share of the disease burden can be attributed to risk factors for NCDs and injury, most notably alcohol use and high blood pressure. Since 1980 mean blood pressure has been stable or been increasing in most African countries: by 2008, the prevalence of raised

blood pressure<sup>6</sup> in the WHO African Region, at 36.8 percent (34.0-39.7 percent) of adults aged 25 years and over, was highest of any region [79]. In Southern SSA in 2010, alcohol use was the leading risk factor, followed by high blood pressure and high body mass index, with smoking also in the top five.

#### Nutrition

Countries in SSA are undergoing a nutrition transition [80]. More than half of them are still at an early stage, experiencing a high prevalence amongst children of stunting or being underweight for their age, a low prevalence of overweight and obesity amongst women, and low intakes of energy, protein, and fat. For a few countries, changes in dietary patterns are affecting health outcomes in a large portion of the population; for example, South Africa, Ghana, Gabon, Cape Verde, and Senegal have relatively high levels of obesity/overweight, and low levels of underweight in women, as well as high intakes of energy and fat. In several countries, overweight and obesity have reached substantial proportions with levels of 30-50 percent amongst adults and higher in women [81]. Among a sample of recent mothers in 31 SSA countries more women were overweight or obese than underweight (Figure 10) [82].

Where measured, cholesterol levels are generally low except for the wealthier countries such as Mauritius, where elevated cholesterol levels have been seen in 30 percent of the population [49]. A high intake of sodium is common in SSA, with salt being used to preserve food and add taste [83], but salt intake generally does not make the 15 top-ranked risk factors for attributable disease burden in SSA regions.

6 Systolic blood pressure (SBP) of 140mmHg or above or diastolic blood pressure (DBP) of 90mmHg or above.

**TABLE 4: Top 15 Risk Factors Ranked by Attributable Burden of Disease for SSA Regions, 2010**

Global rank		Southern SSA	Eastern SSA	Central SSA	Western SSA
1	High blood pressure	2	6	5	6
2	Tobacco smoking, including second hand smoke	5	7	12	10
3	Alcohol use	1	5	6	5
4	Household air pollution from solid fuels	7	2	2	2
5	Diet low in fruits	8	8	11	13
6	High body mass index (BMI)	3	14	18	15
7	High fasting plasma glucose	6	10	13	11
8	Childhood underweight	9	1	1	1
9	Ambient particulate matter pollution	25	16	14	7
10	Physical inactivity and low physical activity	11	15	15	16
11	Diet high in sodium	13	21	17	18
13	Iron deficiency	10	4	4	4
14	Suboptimal breastfeeding	4	3	3	3
17	Diet low in vegetables	15	23	23	20
19	Drug use	12	19	24	22
23	Intimate partner violence	14	18	20	23
25	Unimproved sanitation	18	9	8	9
29	Vitamin A deficiency	17	11	7	8
31	Zinc deficiency	21	13	10	14
34	Unimproved water source	27	12	9	12

Ranking legend	1-5	6-10	11-15	16-20	21-25	26-30
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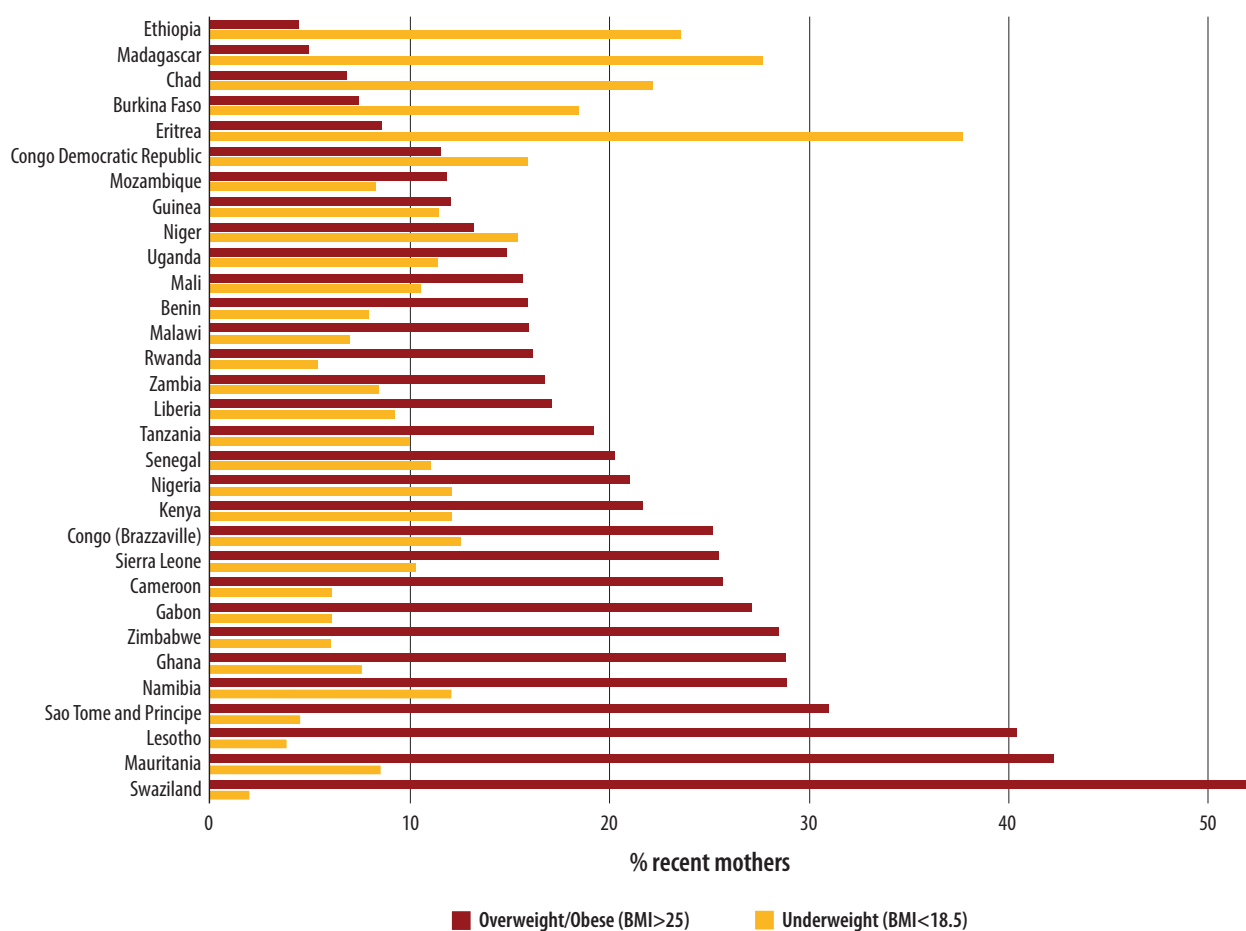
Source: Authors from [17, 78]

Global economic policies in agriculture, trade, investment, and marketing have played a part in changing what people eat, by altering the quantity, type, cost, distribution, and desirability of foods available [84-85]. Globalization gives access to greater food diversity but also convergence towards more homogeneous diets (“McDonaldization”). As countries develop, dietary differences between rich and poor are further exacerbated as the latter tend to adopt a poor quality ‘obesogenic’ diet, with ultra-processed products that are typically energy dense and high in unhealthy dietary fat, free sugars, and sodium [86-87].

Fruit and vegetable consumption varies considerably among and within countries but is generally low, with few individuals consuming recommended levels [88]. Dietary diversity is often lacking in many SSA countries. Diets traditionally consist of cereal or root staples with very few micronutrient-rich sources [82]. One study found that a large proportion of young children across a group of countries were exposed to no more than two food groups [89].

Diversion of resources from food production to cash crop exports by African governments, in order

**FIGURE 10: The Double Burden of Under-Nutrition and Overweight in SSA: Share of Recent Mothers Who are Underweight or Overweight (Most Recent Data Available Since 2000)**



Source: [82] based on MEASURE DHS, ICF International, 2012; Stat Compiler: [www.statcompiler.com](http://www.statcompiler.com)

to pay debt and achieve macroeconomic adjustment targets, has not helped food security [82]. Furthermore, international investors have acquired the rights to use large tracts of land in SSA, and they have invested mainly in non-food products such as biofuels, industrial cash crops, and game reserves [90].

### Tobacco

Tobacco is a risk factor for four of the 10 main causes of death in Africa [31], with 3 percent (5 percent males; 1 percent females) of all deaths attributable

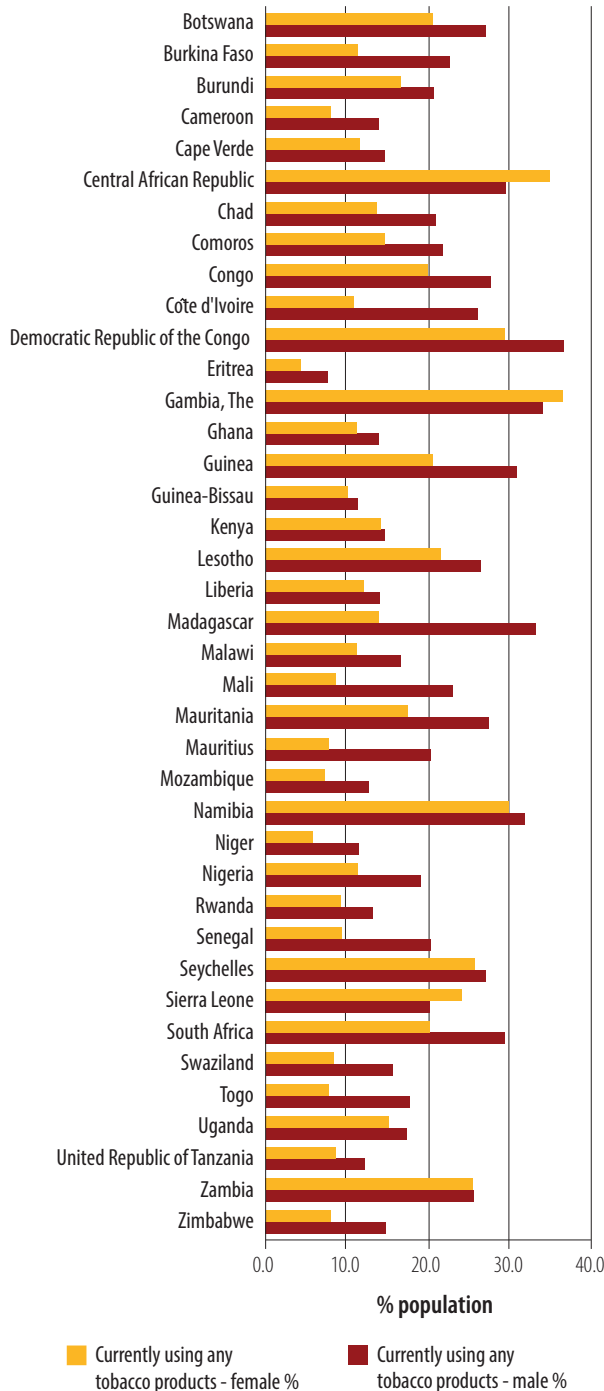
to tobacco use [91]. More than 40 million people are current smokers in Africa [31]. According to WHO estimates, adult daily smoking prevalence ranges from 3 percent in Ethiopia to 22 percent in Sierra Leone [92]. The poor are most likely to smoke, whatever the income level of the country.

Tobacco use is expanding in Africa and the age of initiation is decreasing, increasing people's years of exposure and risk levels. This is reflected in increased tobacco use prevalence among young people, particularly of products other than cigarettes.

The rate of smoking among young girls is becoming similar to boys [6] (Figure 11).

Around one in ten adolescents smoke cigarettes, around one in ten use other tobacco products, and half of all adolescents are exposed to second-hand

**FIGURE 11: Current Use of Tobacco Products among African Youth, 13-15 Years, 2005-2010**



Source: [32] [92]

smoke. For example, in 2007 in Uganda, 5.5 percent of students were currently smoking tobacco (males 6.6 percent; females 4.0 percent), and 13.9 percent were currently using other tobacco products [93].

Tobacco companies are shifting their focus from the west to developing nations, and marketing heavily in Asia and Africa. This is particularly because as incomes rise, cigarettes are likely to become more affordable. Smoking is promoted as a sign of independence and success for women. The tobacco industry also takes advantage of a country's need for economic development, promoting reliance: Botswana has recently started cigarette manufacturing, even providing incentives to companies to increase employment opportunities [94].

Africa is home to some of the most tobacco-dependent economies in the world: in Malawi, 2 million people rely on growing tobacco for their livelihood, and in Nigeria British American Tobacco presents itself as a significant stakeholder in the rural economy [95]. Where nutrition is a threat to public health there is a tradeoff between tobacco growth and food production, and this may in time lead to conflict over land: in the Democratic Republic of Congo, cassava is no longer available in some places due to tobacco plantations, and has to be imported from Uganda [94].

### Alcohol

In SSA 2.2 percent of all deaths and 2.5 percent of all DALYs are related to alcohol, and consumption is rising throughout the region [73, 96]. Africa's total adult per capita consumption (APC) of 6.15 liters is similar to the world average, but levels differ greatly across countries [97]. Around one-third (31.4 percent) of the alcohol consumed is 'unrecorded', often being home-brewed. Beverages other than wine, beer, and spirits, such as fermented maize or millet, are mainly consumed in SSA (48.2 percent of APC), with beer accounting for around a third (34.1 percent) of APC.

The African region has the highest prevalence of heavy episodic ("binge") drinking globally, present in around a quarter (25.1 percent) of those drinking, and including nearly one-third (30.5 percent) of men (Table 5). While seven out of 10 adults in the

**TABLE 5: Prevalence of Weekly Heavy Drinking Episodes among Drinkers in the Past 12 Months by Sex – WHO Region and the World, 2005**

WHO region	Women (%)	Men (%)	Average Total (%)
Africa	16.2	30.5	25.1
Americas	4.5	17.9	12.0
Eastern Mediterranean	17.9	24.9	24.7
Europe	4.6	16.8	11.0
South-East Asia	12.9	23.0	21.7
Western Pacific	1.3	11.6	8.0
WORLD	4.2	16.1	11.5

Source: [97]

region abstain from alcohol, those that do drink do so in a harmful way that increases risk particularly of acute consequences: almost two-thirds of the alcohol-attributable disease burden relates to injuries [6], and heavy-episodic drinking is linked with unsafe sex leading to STIs and HIV transmission [98]. The presence of alcohol as a contributory factor to road crashes is likely to be under-reported in Africa, due to lack of detection technology, and unspecified reporting, due to limited use of standard codification, logistics, and enforcement. Nevertheless, a study in Nigeria over the period 1996-2000 found alcohol to be a factor in 50 percent of police report accidents [99].

There is a strong relationship between economic wealth and alcohol consumption for low-income countries: as GDP rises, the overall volume that is consumed increases, and the proportion of abstainers decreases [73]. Consumption of commercially-produced alcohol is expected to rise as economic conditions improve in African countries [100]; while other regions have experienced stable consumption trends, an increase has been noted in the African and Southeast Asian regions. With Western markets more or less saturated, low-income countries and emerging markets with large populations such as South Africa and Nigeria, and even Malawi and Uganda, are being targeted by global alcohol corporations [101]. Adolescents and young adults are a particular target, for example through sponsorship of sports [96].

### Physical Activity and Travel

Overall physical activity levels are relatively high in Africa, with most either work-related or transport-related. This is especially so in rural areas, but levels of physical inactivity have been shown to rise with urbanization [102-104].

In most African cities, most residents walk or use public transportation for daily routine activities. Cycling is usually negligible in large cities, but may reach 20 percent of daily journeys in smaller cities [105]. Poor law enforcement combined with poor road infrastructure, and high traffic mix and little separation of vulnerable road users from high speed motorized traffic, contribute to the high rate of crashes and fatalities [59]. A poorly-regulated private sector may be the major supplier of public transport, and the risk to passengers of collision and injury involving public buses is increased by lack of seat belts, overcrowding, and hazardous road environments: in Ghana, the majority (58 percent) of crashes in urban areas involved buses and mini-buses, with most of those injured being their passengers or pedestrians [63, 106].

## 3.2. Drivers of NCD Trends

### Growing Urbanization

SSA is urbanizing faster than any other continent, and in the Northern and Southern sub-regions over half the total population already live in urban agglomerations [107]. Rapidly-growing cities can be

major assets for a nation's development – the 40 percent of Africa's population that now lives in cities produces 80 percent of its GDP – but if not properly or fairly steered they can lead to major social and economic challenges [108]. SSA follows South and East Asia in having the third largest number of slum dwellers worldwide, with slum conditions, such as lack of access to basic services, impacting most negatively on the poorest people, particularly women and children [109-110]. As people move away from villages, traditional family- or community-based safety nets are breaking down, and governments are recognizing the need to set up or extend social protection systems to protect vulnerable households from sudden shocks to offset poverty [111].

Living in an urban environment is associated with raised blood pressure, blood sugar, and BMI, particularly for recent settlers, with increased blood pressure becoming apparent within months of migrating from rural to urban areas [40, 104]. Urban residents have a 1.5- to fourfold higher prevalence of diabetes than their rural counterparts, and have increased cardiovascular risk [34, 112]. Urbanization, income, sedentary lifestyles, and alcohol consumption independently contribute to higher BMI [113], and changes in dietary habits, stress, and uptake of smoking among women raise cardiovascular risk [114-115].

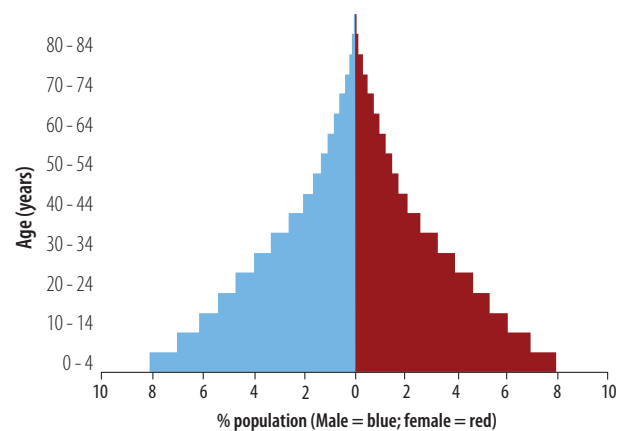
Pollution is an emerging issue in urban centers. It is caused by emissions from industry, motor vehicles, and households, and exacerbated by the use of trucks for long-distance transportation in the presence of poor railway systems [116]. The use of obsolete vehicles is a major contributor to air pollution, and poor maintenance of vehicles and monitoring and enforcement systems also contribute to crashes [63, 117]. Urbanization is associated with increased asthma prevalence in South Africa and other parts of SSA. Unsafe working conditions, out-of-date technology, and poor regulation contribute to occupational lung diseases [118].

### The Contribution of Demographic Change

Africa is undergoing rapid population growth and it is likely to double within the coming generation. Projections are for a population increase from 1.02

billion in 2010 to 1.56 billion in 2030, with around 85 percent of his population living in SSA [119]. Figure 12 shows the population distribution by age for the region in 2010.

**FIGURE 12: Population of SSA, 2010**



Source: [119] (medium variant)

All SSA countries but one (Mauritius) are considered either high- or medium-fertility countries; nearly half have an estimated fertility level above five children per woman. There are signs of a fertility transition to lower rates but this is fairly unpredictable in SSA countries, and depend on the level of development, socio-economic factors such as levels of education, female employment, and urbanization, as well as more 'proximate' determinants such as contraceptive use [120]. Countries with the highest population growth rates struggle to meet the social, economic, and health needs of their people, and face increasing environmental stress and competition for land and water resources [109].

Africa is the 'youngest' region in the world. A demographic shift which sees half of the increase in world population over the next 40 years in Africa could be favorable in economic terms, while populations age elsewhere in the world [1]. However, youth already comprise up to 60 percent of the unemployed in the region. Investments in education and health are needed to provide skills for jobs, and to enhance protection against preventable diseases that affect productivity and the negative impact of unemployment on health [121].



Life expectancy has stagnated or gone down in many African countries, reflecting worsening social and economic conditions, and the impacts of AIDS and related diseases especially in Southern Africa [109]. Nevertheless, large gains in life expectancy have occurred since 1990 in some SSA countries; most notably, increases of 12-15 years for men and women in Angola, Ethiopia, Niger, and Rwanda are due to HIV-control strategies and a reduction of childhood diseases [122]. All four SSA regions had at least a 10 percent decline in adult mortality from 2004 to 2010, particularly in Eastern and Southern SSA.

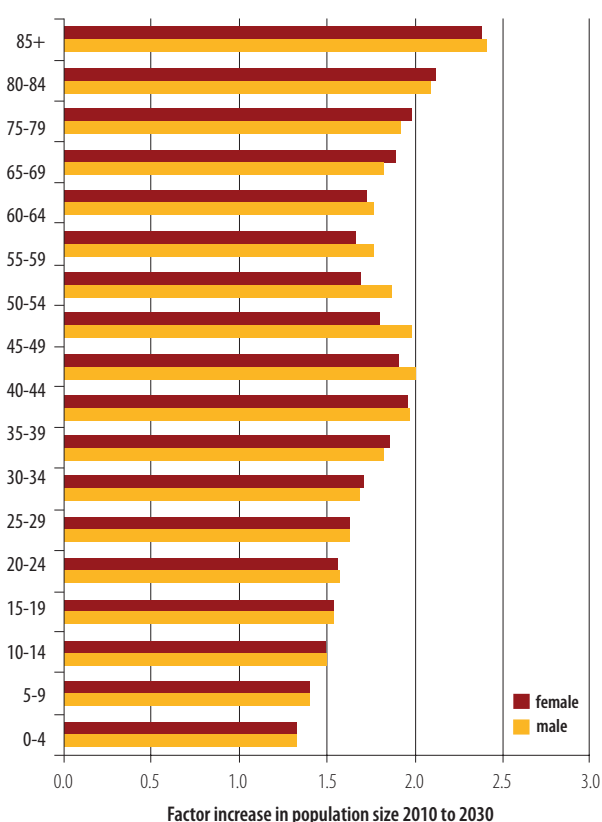
Global healthy life expectancy (HALE) increased over the period 1990-2010, mainly through reductions of child and adult mortality rather than through reductions in disability [123]. For similar reasons, overall HALE also rose in the SSA regions (East, West, and Central), with the

exception of Southern SSA due to adult mortality from HIV/AIDS.

Chronic conditions occur in younger age groups more commonly in SSA than in developed countries [83]. High burdens of CVD are attributable not just to the epidemiological transition, but also to the relatively early age at which CVD manifests in combination with the large population of individuals who are young or middle aged [34].

The number of elderly persons in SSA is projected to double between 2000 and 2030 (Figure 13). Advancing age is associated with increased risk of a number of chronic diseases [124], more so for people living with HIV and AIDS (PLWH) [125]. Population growth and ageing alone are driving a substantial part of the projected increases in cancer by 2030. Nevertheless, health and wellbeing in older age is determined more by chronic disease status and co-morbidity than by age [126].

**FIGURE 13: Projected Age-Specific Increase in Male and Female Populations in SSA, 2010 to 2030**



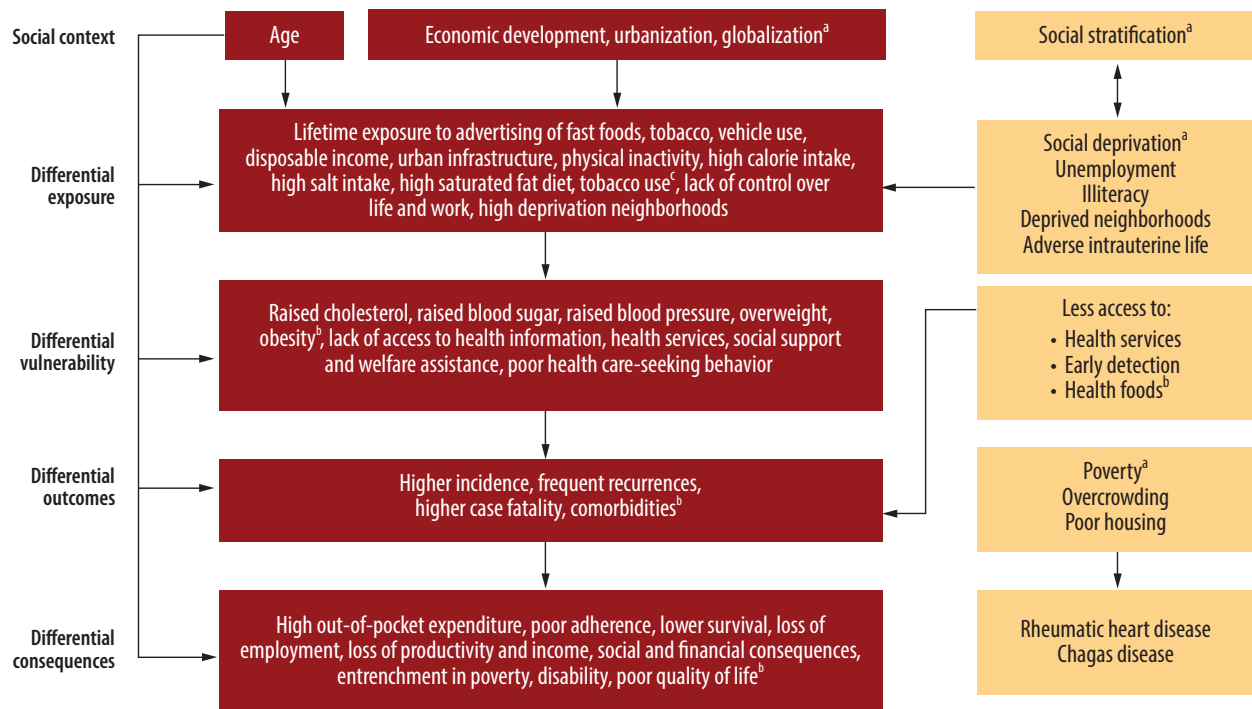
Source: Authors from [119] (medium variant)

### 3.3. Socio-Economic Determinants and Distributions

Increased prevalence of both communicable and NCDs in disadvantaged populations is caused by the same social conditions [127-128]. Poverty and the challenges of poverty, such as overcrowding, insanitary environments, malnutrition, infections, and psychosocial stress, play a critical role in the rise of NCDs in poor and rural communities [114, 129]. Differential exposures throughout a person's lifetime result in a range of consequences and outcomes (Figure 14) – Africa may have some specific insights to contribute on these linkages.

As noted before, Africa's growth has been robust (averaging 5-6 percent GDP growth a year) since the turn of the new century, making important contributions to poverty reduction. Income inequality, however, remains high and SSA has some of the highest income inequalities in the world. Nevertheless, there has been a trend toward improvement in several countries [82, 131]

Wealthy communities experience a higher risk of chronic diseases, while poor communities experience a higher risk of communicable diseases and a double burden of communicable diseases and NCDs

**FIGURE 14: Conceptual Framework for Understanding Health Inequities, Pathways and Entry Points****Determinants**

*a. Government policies influencing social capital, infrastructure, transport, agriculture, food*

*b. Health policies at macro, health system and micro levels*

*c. Individual, household and community factors: use of health services, dietary practices, lifestyle*

Source: [130]

[132]. NCDs are at least as common in the poor as in the more affluent sector of society [83] and the observed increase in hypertension and obesity accompanying wealth bodes badly for the consequences of future socio-economic development [133].

Some lifestyle factors are more common for women and others for men: for example, smoking is still mainly a risk factor for men; whereas obesity is predominantly a risk factor for women [114]; more women than men abstain from alcohol consumption; and higher proportions of men engage in heavy episodic drinking [97]. Gender inequality and power relationships are reflected in the distribution of diseases and risk factors [129], and specific roles place women at risk for some NCDs in a number of ways [134]; for example, in most SSA countries, 90 percent of rural households depend on biomass fuel for cooking and heating, and the indoor air pollution generated affects principally young children (acute

lower respiratory infections) and women (COPD) [118, 135]. When women have less say in household decisions than men, household food security deteriorates, access to health care lags and child nutrition suffers [82]; better female education improves child under-nutrition. Violence against women, particularly sexual, can increase their risk of sexually transmitted diseases including HPV and the later development of cervical cancer.

SSA has the highest concentration of fragile and conflict-affected states [121]. Post-conflict environments can increase NCD risks in a number of ways: for example, psychological distress is associated with the taking up of harmful behaviors; and tobacco, alcohol, and food companies can take advantage of weakened trading and regulatory systems [136]. There are lessons to be learnt of how the tobacco industry has used chaotic conditions in countries elsewhere to exploit legislative loopholes [137] or

employ business practices that fall short of international standards [138]; for example, by using flawed economic arguments to persuade cash-starved or naïve governments of the economic rewards from their investment.

The burden of RTI falls disproportionately on the poor and vulnerable road users [63]. The poorest communities often live alongside the fastest roads, their children may need to negotiate the most dangerous routes to school, and they may have poorer outcomes from injuries due to limited access to post-crash emergency health care [60].

### 3.4. Commonalities between NCDs and Other Disease Groups

The usual epidemiological grouping of conditions into communicable diseases, maternal, perinatal, and diseases from nutritional causes, NCDs, and injuries perhaps makes less sense in SSA given some of the close relationships among them, which in turn have implications for the appropriate response

needed. Some of the commonalities have been alluded to in the preceding section, and are summarized below:

- i) There are some: shared causal pathways, partly related to stage in epidemiological transition, with many shared determinants between NCDs and communicable diseases, such as under-nutrition and poor sanitation; shared risk factors, such as alcohol for NCDs and injuries and poverty; and shared causative agents, such as untreated infections linked to cancers and some CVDs [27, 139] (Table 6). Rapid urbanization together with an increase in diabetes prevalence is likely to make TB control more difficult; and an increase in smoking could substantially increase TB cases and deaths in coming years [140];
- ii) Several conditions (co-morbidities) can co-exist in one person which has consequences for their management and implications for taking a person-centered approach [24];

**TABLE 6: Examples of NCDs Linked to Conditions of Poverty\***

	Condition	Risk factors related to poverty
Cardiovascular	Hypertension	Idiopathic, treatment gap
	Pericardial disease	Tuberculosis
	Rheumatic valvular disease	Streptococcal diseases
	Cardiomyopathies	HIV, other viruses, pregnancy
	Congenital heart disease	Maternal rubella, micronutrient deficiency, idiopathic, treatment gap
Respiratory	Chronic pulmonary disease	Indoor air pollution, tuberculosis, schistosomiasis, treatment gap
Endocrine	Diabetes mellitus	Undernutrition
	Hyperthyroidism and hypothyroidism	Iodine deficiency
Neurological	Epilepsy	Meningitis, malaria
	Stroke	Rheumatic mitral stenosis, endocarditis, malaria, HIV
Renal	Chronic kidney disease	Streptococcal disease
Musculoskeletal	Chronic osteomyelitis	Bacterial infection, tuberculosis
	Musculoskeletal injury	Trauma

Source: Adapted from: [56]

\*Links between cancers and diseases of poverty such as infection shown in Table 3.

- iii) Presence of one condition can increase the likelihood of developing another condition: for example, NCDs or their risk factors can also increase the risk of infection, for example smoking and diabetes each increase the risk of TB [140-141];
- iv) Treatment of one condition can increase the risk for developing another condition, for example anti-retroviral therapy (ART) for HIV can increase risk of developing metabolic syndrome [142];
- v) Presence of one condition can worsen the outcome of another, for example co-morbidity of TB and diabetes can worsen outcomes for both diseases [143], and tobacco and alcohol use can impact negatively on HIV disease progression and the ability to fight HIV-related infection [144];
- vi) Presence of one condition may act as a barrier to prevention of another, for example, stigma associated with HIV may impede participation in physical activity and health promoting opportunities [145].

These inter-linkages have consequences for the management of care, as illustrated in Box 1 and expanded further in the sections that follow.

Many maternal illnesses and lifestyle behaviors can affect the child, for example tobacco and alcohol use, anemia and over- and under-nutrition, and have potential long term consequences [149-150]. Gestational diabetes is a strong predictor of future health, both of the mother, who may develop diabetes and CVD later in life, and the child who also becomes at risk. Poor maternal nutrition before and during pregnancy, as well as tobacco use during pregnancy, contribute to poor intrauterine growth, resulting in low birth weight (LBW), which in turn predisposes the child to metabolic disorders and NCD risk in later life [35, 83]. The problem can be compounded by HIV and malaria: for example, LBW and malnutrition are more frequent in HIV-infected children [37], and malaria infection during pregnancy is a common cause of anemia and LBW [151]. Thus, the current poverty of much of SSA may contribute to

### **BOX 1: Collaborative Framework for the Care and Control of TB and Diabetes**

Diabetes triples the risk of developing TB and is a common co-morbidity in people with TB. Lessons learnt from approaches to reduce the dual burden of HIV and TB can be applied to screening, diagnosis, treatment, and prevention of diabetes and TB [146]. A framework for joint management has been proposed as part of a move to better integrate communicable and NCD prevention and care strategies, focusing on the patient rather than the disease [147-148]:

- 1) *Establishing mechanisms for collaboration*; for example through joint coordination, planning, surveillance, and agreement of a set of core indicators for monitoring and evaluation
- 2) *Detecting and managing TB in patients with diabetes*; by for example screening people with diabetes for chronic cough, along with investigation, referral, and treatment as needed and raising awareness amongst health workers of the interactions between the two diseases to improve case-finding
- 3) *Detecting and managing diabetes in patients with TB*; through for example screening patients with TB for diabetes, along with further investigation and treatment as required.

rising levels of CVD in people of middle age in future [40].

Putting effective interventions in place for women – such as reducing malnutrition, preventing anemia, and improving access to effective contraception – and improving nutrition in early life are likely to be important preventive measures also for NCDs [40, 152-153]. Promotion of breastfeeding – which protects against diarrhea, respiratory infections, and obesity – would also help prevent NCDs and protect against infection, apart from its nutritional benefits [154]. Screening for gestational diabetes and screening for and prevention of malaria, HIV, and HBV transmission from mother to child could be part of an integrated antenatal care program with multiple benefits [155].

## 4. THE RATIONALE FOR PUBLIC INTERVENTION

This section describes the rationale for public intervention on NCDs and RTIs, under the following headings:

- Economic rationale
- Human capital rationale
- Development rationale.

### 4.1. Economic Rationale

Experiences from different countries suggest that NCDs and RTIs may impose a huge financial and social burden on government and society [156-157]. As detailed in Box 2, recent assessment conducted in the Russian Federation and in China clearly illustrates the magnitude of this burden.

Interventions for the prevention and control of NCDs have been identified which are highly cost-effective [160]. Investment in their implementation is justified in economic terms in that the potential welfare gains and economic losses that could be averted are considerably larger than the investments themselves [161]. Justification can also rely on a rights-based argument for NCD services: the *raison d'être* of a health system is to address health conditions prevalent in the community, and health systems and governments need to be responsive to the needs of their citizens.

While the largest share of costs of disease are borne by the individual concerned, the economic case for government action relates to ‘market failures’. These are areas where the market alone fails to achieve socially optimal outcomes [162]; namely:

- Externalities: There are substantial external costs resulting from second-hand smoke and alcohol-induced RTIs and fatalities. NCDs also impose costs on health care and the social insurance system and hence on “third parties”.

- Imperfect information: People are not always fully aware of the health (and other) consequences of unhealthy lifestyle choices such as smoking, alcohol abuse, physical inactivity, and poor diet. They may also be misled by deliberately distorted information promoted by the food, alcohol, and tobacco industries. Government intervention in the form of the provision (and production) of NCD-related health information (such as the health consequences of smoking) provides a public good that generally is undersupplied compared to the social optimum. This also includes the role for a government to engage in research about the health consequences of unhealthy behavior.

- Non-rational behavior: Children and adolescents (and even adults) tend not to take into account the future consequences of their current choices, irrespective of whether they are informed about them or not. Their current choices may well conflict with their long-term best interests. This provides, in principle, a justification for government to support interventions to prevent people from harming themselves in situations where they do not fully appreciate the consequences of behaviors that pose health risks.

There are two distinct rationales for public policy intervention to achieve a net improvement in social welfare, one equity-based and one efficiency-based [163]. Regarding NCD prevention and treatment in low- and middle-income countries, these could be framed as follows [160]:

- For primary prevention, which is mainly through population-level and non-clinical interventions, a regulatory and fiscal framework is needed to limit externalities relating to tobacco (such as harm and associated costs resulting from second-hand smoke) and alcohol (such as social harm and RTIs and deaths). Information can be provided in culturally appropriate formats about the various risk

**BOX 2: The Economic and Social Impact of NCDs in the Russian Federation and in China**

In **Russia**, poor adult health, largely due to NCDs, negatively affects economic well-being at the individual and household level. If effective action were taken in Russia, improved health would play an important role in sustaining high economic growth rates at the macro level.

*The cost of absenteeism due to ill health:* On average, 10 days per employee per year are lost due to illness in Russia, while in the EU-15 the average is 7.9 days. Absence due to sickness incurs a direct cost, namely the benefits paid to absent employees, and the indirect cost of lost productivity. The overall cost varies between 0.55 and 1.37 percent of GDP (annual absenteeism rates can be converted into a monetary value either by using the average wage rate, resulting in the lower value, or the GDP per capita, resulting in the higher value). This is a significant impact, given that the indicator fails to capture the many other ways that ill health impacts the labor market. In particular, it does not capture the effects of reduced productivity and mortality.

*The impact on the labor supply:* Ill health also impacts labor supply because jobholders with chronic diseases or alcoholism are more likely than healthy individuals either to retire early or lose their jobs and draw on state pensions. While a hypothetical Russian male aged 55 with median income and other average characteristics would be expected to retire at age 59, chronic illness would lower his expected retirement age by two years. Similar results are obtained for females. Also, an individual who suffers from chronic illness has a significantly higher probability of retiring in the subsequent year than the same individual would be, free of the illness.

This all means that chronic illness is a highly significant predictor of subsequent retirement in Russia. The lower the income of an individual in Russia, the more likely that chronic illness will result in the decision to retire. This implies that less-affluent people carry a double burden of ill health: first, they are more likely to suffer from chronic illness in the first place, and second, once ill, they are more likely to suffer worse economic consequences – having less income than rich people tends to perpetuate socio-economic disadvantage.

*Job loss:* Alcohol abuse, which is arguably an important factor in explaining the high adult mortality in Russia, significantly increases the probability of job loss (that is, it was found that alcohol has a positive and statistically significant effect on the probability of being fired).

*The impact on the family:* The death of a household member affects other household members' welfare and behavior in various ways. Alcohol consumption was found to increase by about 10 grams per day as a consequence of the death of an unemployed household member and by about 35 grams if the deceased had been employed; also, the probability of suffering depression increased by 53 percent when control-

ling for other relevant factors. Chronic illness was also found to affect household incomes negatively, particularly during the period 1998-2002, when chronic illness contributed an estimated annual loss of 5.6 percent of per capita income.

In **China**, in the absence of a scaled-up Government response, heart attacks, stroke, and diabetes alone are expected to result in a loss of US\$550 billion between 2005 and 2015. More specifically, a recent World Bank report calls attention to the following potential gains stemming from effective NCD policies:

- *At the microeconomic level:* A change in adult health status can result in a 16 percent gain in hours worked and a 20 percent increase in individual income. Tackling NCDs, on top of being a valuable health investment, may thus be seen as an investment into people's productivity and hence their earnings potential.
- *At the macroeconomic level:* Reducing mortality from CVD by 1 percent per year over a 30-year period (2010–2040) could generate an economic value equivalent to 68 percent of China's real GDP in 2010, more than US\$10.7 trillion at purchasing power parity.
- *The society-wide 'economic costs' of NCDs are even larger if the value which people attribute to health is captured.* Reducing CVD mortality by 1 percent per year produces – if the intrinsic value that is attributed to life is measured – an annual benefit of about 15 percent of China's 2010 GDP (US\$2.34 trillion at purchasing power parity), while a 3 percent reduction would amount to an annual benefit of 34 percent (US\$5.40 trillion at purchasing power parity).

The combination of exceptionally fast population aging in China with a low fertility rate will strain China's labor force participation rate by 3–4 percentage points by 2030. The increase in NCDs, if not addressed effectively as a governmental priority in the years to come, would not only exacerbate the expected labor force shortages, but also compromise the quality of available human capital, because more than 50 percent of the NCD burden currently falls on the economically active population (aged 15–64).

To optimize labor productivity as the population ages, interventions to improve the quality and skill mix of the existing labor force and extend the retirement age could only provide a short-term solution. The success of these interventions in the medium and longer terms would depend on the working-age population's staying healthy. Indeed, if not addressed, the rise of NCDs will dilute and hinder the positive effects of such policy measures. Inertia in response to NCDs will result in an aggravation of health inequalities, and may contribute to a slowdown in economic growth.

factors (given that people are not always aware of the consequences of their lifestyle choices), particularly to reach poor populations. It should, however, be noted that the effectiveness of information campaigns alone in changing health behaviors is limited, and they are not a substitute for effective regulatory and fiscal measures. Thus, on efficiency grounds, there is a strong rationale for: taxes on tobacco and alcohol that make them less affordable; advertising bans; information labels on packaging; and a ban on smoking in public places – and also, in the case of middle income countries, regulation to address the content of manufactured foods. As delivery of these interventions in most settings is not transaction intensive and does not require strong health systems, they are likely to be a first priority for low-income countries, and they are the most effective and cost-effective.

- For secondary prevention and treatment, mainly at the level of the individual and clinical-based-services, the choice of interventions and budget allocation decisions would depend on cost-effectiveness, as well as on the health system's capacity to deliver effective services.
  - Equity concerns would motivate a public role for achieving a set of simpler, low-cost NCD interventions which could be included in a well-targeted basic package of services, delivered probably in non-hospital settings, which have a high chance of reaching the poor, and which will not strain the government budget. An example of such an intervention might be 'see-and-treat' cervical screening and treatment in community clinics, using visual inspection by acetic acid (VIA) method to reach women aged 35-45 years at least once.
  - Efficiency concerns relating to insurance markets or public financing would motivate for the public role of intervening on high-cost NCD services, an example of which might be multidrug treatment for secondary prevention of CVD. Again, these would need to be delivered in a way that is pro-poor, taking into account the country's health system, context, and capacities, and at a pace that is affordable and sustainable. Other public interventions might be for the government to influence the cost-effectiveness ratio, for example by negotiating lower drug or vaccine prices.

## 4.2. Human Capital Rationale

People need to be healthy, educated, and adequately housed and fed to be more productive and better able to contribute to society. In Africa, around a third (38 percent) of adults are illiterate; around a third (37 percent) of children will not complete primary school; and only 5 percent of the relevant age group go to university [121]. This is likely to impact health literacy and people's ability to understand and engage in health-promoting interventions and in managing their own diseases.

Better health outcomes depend in part on stronger health systems, but investment may be insufficient. SSA has spent a relatively low share of income on health, estimated at 5.1 percent (equivalent to I\$82 per capita) in 2001, and only rising to 6.5 percent (equivalent to I\$159 per capita) by 2011 [164-165]. In addition, its relatively high external funding per capita amounts to little, compared to the amount mobilized by local governments and individuals' out-of-pocket payments. Furthermore, while studies show that countries with the highest investments in social security tend to have low poverty rates, SSA also spends only 8.7 percent of GDP on social services, the lowest in the world [121].

Programs to build human capital can also benefit NCDs. Sexual and reproductive health programs aimed at reducing fertility rates and HIV transmission, through increasing access to condoms and promoting safer sex, also contribute to primary prevention of cervical cancer [166]. Community-based nutrition programs to reduce the prevalence of stunting and underweight and maternal malnutrition will in turn reduce the development of chronic diseases in the long term. Social protection and safety-net programs can reduce and mitigate the different income risks that poor households may meet, so that when faced with health care bills, a family will be less likely to have to cut down on nutrition.

Transport systems play a part – ensuring the basic quality of local transport infrastructure and services enables an easier, cheaper, and safer movement for pupils and teachers to access school and improves attendance, as well as reducing the risk of injuries [167].

### 4.3. Development Rationale

The rising burden of NCDs threatens to reverse the gains already made on MDGs, especially those relating to poverty, education, and child and maternal health [129, 168-169]. There are many examples of links between NCDs, child mortality, and infectious diseases and the general well-being of households: illness can reduce household earnings and ability to provide for and educate children; disability of an adult may mean a child (probably a girl) staying home from school to provide care; tobacco and alcohol use-related illness, cost of health care, and death of the main wage earner can propel a family into poverty [163, 170].

There are co-benefits for health from actions to address climate change, and vice versa; for example, through increasing walking and cycling. An improved understanding of the relationship between NCDs, RTI, and climate change could enable improved policy formulation to the common benefit of these issues [171-172].

Developing policies for NCD prevention and control requires a better understanding of the processes and political economies of policy making in Africa, in particular the relationships between national policy making and international economic and political pressures as well as the extent to which the health MDGs and aid architecture supports (or not) an NCD agenda for Africa [129, 173].

There has been a call for including NCDs in new international development goals, especially given the

close associations among NCDs, infectious diseases, and maternal and child health, and to encourage some rethinking of the relative allocations of health development assistance and delivery approaches [161, 174]. Although funding to developing countries for NCDs grew more than sixfold during the period 2001-2008, it still comprised less than 3 percent of overall, global development assistance for health in 2007 – a similarly disproportionate, small amount, relative to the NCD contribution to DALYs [175]. This imbalance is highlighted in Table 7.

In order to re-position NCDs within health and development agendas, a different approach and view may be needed. It may be helpful to reframe the debate at country level to emphasize the societal (rather than individual) determinants of disease, and the inter-relationship with poverty and development [176]. Distribution of resources could be made on the basis of avoidable mortality, health effects, or broad care needs rather than disease or category. For example, an analysis of Tanzanian health data according to chronicity and mortality found that for the majority of the population older than five years, the burden of disease, irrespective of etiology, would require a health system that could provide long-term care and management [177]. Resources could be mobilized through an inclusive approach that links closely with global health and development agendas, allowing emerging strategic and political opportunities to be seized and built upon, with better coordination of efforts among global actors [176-178].

**Table 7: ODA Funding for Health and Disease Areas per 2008 DALY**

	2008 DALYs LMIC (million)	Health Development Assistance 2007	Funding per DALY
HIV, TB, Malaria	264	US\$6,315 million	US\$23.9
NCDs	646	US\$503 million	US\$0.78
All conditions	1,338	US\$22,013 million	US\$16.4

Source: [175]



# 5. A COMPREHENSIVE, INTEGRATED APPROACH TO NCDs AND ROAD SAFETY

In this section, the elements of a comprehensive approach to NCD and road safety control are considered. It draws on the available literature, and explores the potential for adopting shared approaches with other conditions. The section covers the following:

- Policy approaches
- Population-level prevention
- Individual-level prevention
- Therapies – treatment, care, and rehabilitation
- Strengthening health systems
- Addressing information and health gaps
- The role of public and private employers and businesses.

## 5.1. Policy Approach

### Improving Commitment and Response

An important starting point for action is clear government acknowledgement of the problem and commitment to address the issue [179]. There is evidence of a renewed effort across Africa and within countries to strengthen action on NCDs [54, 180-182] since the initial commitments made during the previous decade [53-54, 183-184]; this has not necessarily been translated into policy or action at country level [64, 185-186], however, and some policies have had only mixed results or been weakened [187-188]. On road safety, several global reports and the Decade of Action for Road Safety [59-60, 117, 189] appear to have revitalized Africa-wide interest with the resulting Accra Declaration in 2007 [190], a set of targets in 2009, and an African Road Safety Plan of Action in 2011 [15, 191]. While some progress has been made and positive examples have emerged from some countries [181, 192-193], there appears to be much still to do: by 2013, only 12 SSA

countries were reported as having national strategies that set targets for reducing road deaths and injuries, for example.

Given the range of risk factors and determinants of NCDs and RTIs, multiple stakeholders from different sectors within and outside government have a contribution to make in prevention and control – health, welfare, transport, environment, education, agriculture, trade, urban planning, the private sector, Civil Society Organizations (CSOs)/Non-Governmental Organizations (NGOs), and victims of disease and/or injury. With respect to road safety, ministries of the interior, traffic police, transport, education, health, emergency services as well as private sector enterprises such as alcohol, car, and health insurance industries need to work together. A cross-governmental task force, steering group, or coordinating committee of multiple stakeholders can help achieve the broad perspective required, but needs sufficient convening and decision-making power to promote participation, commit resources, and design a plan of action.

Ministries of health and public health professionals have an important leadership role to play, but critical mass is low, with departments understaffed, and there are few qualified public health professionals: over half (55 percent) of African countries, particularly in Lusophone and Francophone areas, do not have any postgraduate public health programme [194]. Public health agencies or institutes can make a critical contribution by providing technical evidence to health authorities for decision making, and in monitoring and evaluating NCD-related programs, projects, and interventions, but these are not present in all countries: the International Association of National Public Health Institutes has members from only 15 SSA countries. Where public health institutes do exist, they may have had a strong focus

on communicable disease rather than experience in tackling NCDs and RTIs: for example, although epidemiological research in SSA has increased dramatically since the 1990s, it has been largely driven by a few countries, and has focused mainly on communicable diseases especially AIDS, TB, and malaria, with very little attention yet given to the growing burden of NCDs and injuries [195].

A global survey of country capacity to prevent and control NCDs revealed major gaps in health system capacity in many LMIC in Africa [196]. Opportunities exist for better coordination of existing, relevant policies and approaches at national and sub-national levels, and with governmental and non-governmental actors including donors [197]. Low-cost mechanisms include shared targets and indicators and intersectoral and intrasectoral committees and projects [198].

Commitment needs to be underpinned by resources. One global survey in 2012 found that only three SSA countries had full funding for implement-

ing their road safety strategies, and another global survey in 2010 found that only seven SSA countries appeared to have an operational NCD policy with a dedicated budget [59, 64]. Given the number of related and potentially interlinking programs, a more integrated approach could be taken to estimate resource requirements, costs, and expected impact; in this regard the joint United Nations One Health tool may hold some promise [199].

### Developing a Strategic Framework for Action

A number of global and African strategic frameworks exist to frame a comprehensive approach for NCDs [53, 200-201] and for RTIs [191, 202]. Within these, certain common principles are promoted (Table 8).

There is some debate over the relative value of having multiple NCD issue-specific or disease-specific policies or programs, for example for CVD, diabetes, and tobacco, versus a single, more comprehensive policy for NCD prevention. While the latter is seen as having certain advantages (for example, providing

**TABLE 8: Principles to Guide Action on NCDs and RTIs**

<b>Multisectoral response</b>	Mobilize a multisectoral response to build support and capacity
<b>Partnership &amp; Ownership</b>	Establish effective partnerships and promote civil society engagement, broad participation, and ownership
<b>Evidence-based</b>	Select cost-effective and evidence-based approaches, and use and build an evidence base, with investment in research
<b>Stepwise &amp; Prioritize</b>	Implement priority interventions according to potential for health gains, local considerations, and need
<b>Integration</b>	Take account of common risk factors, determinants, and care models across diseases, and promote integration where it adds value and/or saves costs
<b>Comprehensive prevention</b>	Balance a combination of population-level primary prevention and individual health care strategies
<b>Life course</b>	Promote prevention throughout life, beginning in early life and continuing with interventions for adults and the elderly
<b>Health system strengthening</b>	Reorient and strengthen health systems, in particular primary health care, striving for universal coverage and fairness in resource allocation
<b>Enabling &amp; Empowering</b>	Enable and empower people with NCD and their families to manage their conditions better
<b>Equity</b>	Promote equity, taking account of social and environmental determinants
<b>Evaluation &amp; Accountability</b>	Strengthen surveillance, monitoring, evaluation, and information-sharing to increase accountability and target effort and resources more effectively
<b>Development</b>	Integrate with national programs for sustainable development, and ensure consistency with national health policy and existing programs

Source: Authors based on: [53-54, 64, 200-204]

clarity of vision and purpose, emphasizing common elements, and facilitating efficient and effective use of resources [200, 205]), the reality of individual countries may be that a mixture of policies, programs, and interventions are already in place, as was found in the case in Ghana and Cameroon, [192, 206]. A meeting of SSA health leaders in 2009 suggested the value of having a generic NCD plan which integrates palliative care, surveillance, and the reduction of risk factors, alongside disease-specific plans that take account of specific issues in individual diseases (such as diagnosis and treatment) [207]. The challenge is to find a good model that fits a specific context and the specificities of SSA [179], and focus on achieving outcomes. First Implementing a priority set of interventions, such as tobacco control and salt reduction measures, before adopting a more comprehensive approach, has been proposed lest starting with a comprehensive plan is too ambitious, and risks diverting resources from moving ahead quickly with the most productive actions [208].

There has also been debate over the place for ‘vertical’ (stand-alone) programs in health systems [209], and concern that establishing new vertical programs for NCDs and RTIs in resource-constrained countries risks placing them in direct competition for scarce funding with existing programs such as those on communicable diseases and maternal and child health, which is likely to be unsustainable [210]. Both advantages and limitations of ‘vertical’, disease-specific programs have been recognized, with calls for the lessons learnt to be applied [211-212]. Further research has been proposed to ascertain what ‘integration’ would really mean in different settings and for different services [144], and instead of a false dichotomy between so-called vertical and horizontal approaches, analytical and conceptual frameworks have been proposed to help shift the debate and reframe the issues [213-214]: for example ‘diagonal’ programs have been proposed whereby disease-specific interventions are designed to minimize the untoward impact on other health programs, and/or support health systems more. Similarly, rather than refer to specific disease categories, there have also been proposals to rethink health systems to be better able to encompass all diseases, with a greater emphasis on primary health care and community-based interventions [215-217].

While donor-driven and global health initiatives have mobilized substantial new resources for health in many LMIC, there is a recognized challenge to combine disease-specific programs with broader approaches for health improvement so that positive synergies are capitalized upon and negative impacts minimized [218-219]. Any approach involving greater integration or ‘diagonalization’ may meet with resistance if it appears to take control away from donors and proponents of vertical programs [215], or if it undermines existing programs and their broader benefits [220], or fails to take account of lessons learnt [221]. Both potential negative impact (loss of funding and of political attention) and positive impact (a greater commitment to investing in health care for chronic diseases) have been seen as potential outcomes. Nevertheless, there is increasing enthusiasm for leveraging HIV resources, experience, and models for the benefit of other chronic conditions, and to ‘jumpstart’ initiatives to provide prevention, care, and treatment services for them [5, 142, 222-225]. After all – on grounds equity and efficiency – some argue that there is no basis for HIV/AIDS care to be better resourced than care for other chronic conditions, such as diabetes.

## 5.2. Population-Level Prevention

Population-level interventions are not reliant on health services for delivery: costs are relatively low and they may even generate funds; they have relatively little “downside”; most people will be exposed to them; and people who are at high risk or already suffering from NCDs will benefit [226]. Population-level prevention, particularly in resource-limited countries, benefit from a strong regulatory and fiscal framework, particularly for tobacco control. Most cost-effective measures to reduce risk factors are in the domain of agencies or ministries other than health, such as ministries of trade, finance, agriculture, and transport, but may challenge vested interests and face strong lobbying by tobacco, alcohol, and other industries. Therefore, while they include some of the cheapest and most effective interventions (such as tobacco and alcohol taxation), they may be politically difficult to achieve, requiring robust, high-level leadership and/or effective impacts to build partnerships and garner broad support.

**TABLE 9: Population-Level Priority Interventions for NCDs Relevant to SSA (by Incremental Cost-Effectiveness)**

Area	Interventions	Status	Cost-effectiveness
Tobacco	Raise prices by raising taxes on tobacco	BEST BUY	Very cost-effective
	Inform on harm from use and benefits of quitting	BEST BUY	Very cost-effective
	Enforce bans on tobacco advertising	BEST BUY	Very cost-effective
	Protect people from tobacco smoke	BEST BUY	Very cost-effective
	Offer counseling to smokers	GOOD BUY	Quite cost-effective
Alcohol	Restrict access to retailed alcohol	BEST BUY	Very cost-effective
	Enforce bans on alcohol advertising	BEST BUY	Very cost-effective
	Raise prices by raising taxes on alcohol	BEST BUY	Very cost-effective
	Enforce drink-driving laws (breath-testing)	GOOD BUY	Quite cost-effective
	Offer brief advice for hazardous drinking	GOOD BUY	Quite cost-effective
Diet	Promote reduced salt intake	BEST BUY	Very cost-effective
	Promote replacing of trans-fat with polyunsaturated fat	BEST BUY	Very cost-effective
	Promote public awareness about diet	BEST BUY in combination	Very cost-effective
	Restrict marketing to children of nutrient-poor food and beverages, food high in salt, fats, and sugar	GOOD BUY	Very cost-effective*
	Replace saturated fat with unsaturated fat	GOOD BUY	Very cost-effective*
	Manage food taxes/subsidies to discourage consumption of unhealthy foods and encourage consumption of healthier options	GOOD BUY	Very cost-effective*
Physical Activity	Promote physical activity (mass media)	BEST BUY in combination	Very cost-effective
Injuries (road traffic)	Legislation and enforce bicycle helmet use, 80% coverage	BEST BUY	Very cost-effective
	Speed cameras + breath testing + motorcycle helmets, 80% coverage	BEST BUY in combination	Very cost-effective
	Seat belts + motorcycle helmets + bicycle helmets + speed cameras + breath testing, 80% coverage	BEST BUY in combination	Very cost-effective

Source: Authors, based on [12, 64, 232-234]

\* Needs more studies, not yet assessed globally, therefore given only 'good buy' status.

There have been a number of efforts in recent years to identify effective and cost-effective interventions for NCD and RTI prevention [12, 226-229], and on how much a combined approach would cost [230-231]. Table 9 draws together a list of 'best buys' and 'good buys'<sup>7</sup> for low- and middle-resourced countries, countries with high adult and child mortality, and SSA. While this list does not take into account

the diversity or specificity of individual country contexts, it does provide a broad indication of value for money, and can form the basis of an evidence-based policy package [12, 64].

In practice, 'best buys' or 'good buys' and other cost-effective interventions are not always pursued [235]. This may be because of the reasons referred to above such as difficulties related to political will, social preferences, or vested interests. It may also be that most are based on cost-effectiveness studies derived mainly from high-income countries or on their implementation in ideal conditions rather than SSA realities. In the sections that follow, examples are given where these interventions have been successfully implemented in LMIC and particularly in Africa.

7 WHO defines 'best buys' as "highly cost effective, cheap, feasible, and culturally acceptable to implement", and 'good buys' as "effective interventions that provide good value for money but which may cost more or generate less health gain". An intervention is defined as very or highly cost-effective if the cost of generating an extra year of healthy life (equivalent to averting one DALY) is below the average annual income or gross domestic product (GDP) per capita (US\$ 2000); and 'quite cost-effective' if less than three times per capita GDP per DALY. Interventions that are effective but which are three-fold more costly than per capita GDP per DALY are considered 'less cost-effective' or 'not cost-effective', depending on source, and are not included in this list. Main data sources for globally applicable, cost-effectiveness estimates are the Disease Control Priorities project and WHO-CHOICE project.

## Tobacco

There is strong evidence, including from LMIC, to show that tobacco excise taxes are an effective tool in reducing tobacco use, particularly amongst the young and the poor, as well as a reliable source of government revenues. Multiple-country examples and technical guidance to assist implementation exist [236].

Increasing tobacco taxes by 10 percent will reduce tobacco use by up to 8 percent in LMIC as well as an increase revenues by 7 percent [237]: in South Africa, for example, each 10 percent increase in price reduces consumption by 6 percent. A focus on excise taxes is recommended, relying more on specific than ad valorem tax, especially where tax administration is challenging. All tobacco products should be taxed as relative increases in the prices of cigarettes may lead to substitution by lower-price products – particularly important given that smokeless tobacco (snuff or chewing) is more common amongst youth and women. Arguments that higher taxes will have harmful economic effects, for example by encouraging smuggling or reducing employment, are false or overstated [238]: in South Africa the tobacco industry claims that illicit trade is 20 percent whereas research indicates it is only 10 percent, underlining the importance of scrutinizing data sources for misinformation or tobacco industry involvement [94].

Although the Framework Convention on Tobacco Control (FCTC) has entered into force in most SSA nations (40 by December 2012<sup>8</sup>; see Box 3)[239], only modest progress has been made in its implementation. While many countries have legislation or policies on protection from exposure to tobacco smoke, only a handful meet required standards in implementation. Little progress has been made on packaging and labeling of tobacco products and while slightly better progress has been made in banning tobacco advertising, promotion, and sponsorship, again this is not to required standards [240]. Lessons from a review of African countries are that an active tobacco control civil society movement, political will, and active research support are significant contributors to success [241-242]: in the countries

with the most successful tobacco control programs (South Africa, Mauritius, and Kenya) partnership between CSOs and government institutions is a key feature, and NGOs in 15 African countries have produced ‘shadow reports’ monitoring compliance of their country with FCTC obligations [243].

### BOX 3: Regional Response to Tobacco

In 2011, the global tobacco epidemic killed almost six million people; nearly 80 percent of these deaths occurred in LMIC. Cigarette consumption in Western Europe dropped by 26 percent between 1990 and 2009, but increased in Africa and the Middle East by 57 percent during the same period. African countries are experiencing the highest increase in the rate of tobacco use amongst developing countries: the number of smokers in SSA is projected to increase 148 percent by 2030, to 208 million smokers or one-fifth of the total population.

Africa is at a crossroads in its response to tobacco control. On the one hand, countries in this region have become an increasingly attractive market as tougher regulations, high taxes, and greater consumer awareness in developed countries are ‘closing the door’ to tobacco imports and leading to reductions in use. On the other hand, cigarettes are becoming more affordable as incomes rise in many African countries.

Significantly, Africa is fighting back. In Africa, 42 percent of countries have already signed the 2003 WHO FCTC, which binds them to a number of anti-tobacco measures. Additionally, on June 3-5, 2012, the World Bank, in partnership with the Southern Africa Development Community (SADC), the Ministry of Finance of Botswana, the Bloomberg and Bill and Melinda Gates Foundations, and WHO, convened a high level forum on The Economics of Tobacco Control: Taxation and Illicit Trade. With the participation of delegations from the Ministries of Finance, Trade, and Health of 14 SADC member countries, the aim of the forum was to promote dialogue on best practices in effective design and administration of excise taxes on tobacco as an instrument to promote public health, and to share knowledge on the dimensions, causes, and extent of illicit trade in tobacco products and strategies to control it. The involvement of high-level officials from different sectors in the forum underscored the potential for multisectoral collaboration and action to prevent and control tobacco addiction that contributes to ill health, disability, and premature mortality in Africa.

<sup>8</sup> At the time of publication, in SSA, Mozambique and Ethiopia have signed but not ratified or entered it into force, and Eritrea, Malawi, Somalia, South Sudan, and Zimbabwe have not signed, ratified, or entered it into force.

Partners such as those in agriculture, trade, finance, justice, public health, and NGOs all have a role to play, particularly in countries where tobacco is an important cash crop, and the support of international agencies is relevant in developing alternative livelihoods and crop diversification. Regional cooperation is also important in counteracting illicit trade and in south-south capacity-building: the Kenyan Revenue Authority, for example, has been active in sharing its experience and supporting other countries in supply-chain control, tracking and tracing technology, and enforcement [94].

### Alcohol

A substantive evidence base also shows that making alcohol more expensive and less easily available, banning alcohol advertising and its promotion, and enforcing drink-driving legislation or countermeasures are cost-effective in reducing alcohol-related harm [244].

Increasing alcohol prices, usually through raising alcohol taxes, is particularly effective among problem drinkers and youth. Restrictions on availability include restrictions on sales and consumption by people below a legal drinking age: in some countries the age for legally buying alcohol is as low as 15 years (Angola). Another means for restriction is through government control of alcohol distribution and sales: in the Gambia, for example, there is a state monopoly on the production and sale of beer, and alcohol advertising is banned on national television and radio.

Restriction of alcohol marketing is one of the most promising strategies for governments in developing countries [245]. Sophisticated marketing strategies target African youth, with alcohol portrayed as a symbol of heroism, courage, and virility, and information on the risks are missing or on a small scale [246].

Nevertheless, the infrastructure for enforcement and the monitoring of restrictions and regulations may be missing. In the Gambia, the mandatory health warning message on alcohol advertising is rarely enforced [96]. Violation of laws and regulations can extend to the practice of 'shaking hands' (requesting and providing bribes to the police), an all-too-com-

mon practice for drunk driving and car crashes. In a recent global survey of 44 SSA countries, only nine countries had a national drink-driving law based on Blood Alcohol Concentration, and only one country (Botswana) rated their enforcement of drink-driving laws as good [59]. Although 25 countries had targets for reducing alcohol-impaired driving, most were unable to measure or monitor the prevalence of the problem.

### Food

SSA already has a mixed picture of malnutrition and overweight/obesity, and both can contribute to NCDs. Efforts to improve food security and alleviate under-nutrition include improvement of agricultural productivity, pro-poor primary care, and food programs [247]. The time from conception until two years of age is a critical period when length-for-age can be improved by high-quality nutrition. Yet, care must be taken, learning from some programs in Mexico, Chile, and Brazil where under-nutrition was traded for over-nutrition [248-249] – programs that miss the main opportunity for height recovery, or that continue to supply energy-dense foods to children who already meet weight-for-age criteria, can unintentionally increase overweight [250].

For NCD prevention, traditional diets, which for example are high in added salt or sugar or low in vegetables, could be improved from nutritional and public health perspectives. Effective salt-reduction strategies for a country depend on whether salt consumption is largely non-discretionary (that is, it is added during food manufacture) or discretionary (that is, added during cooking or at the table) [251]. For most countries, it will mean a focus on the food industry and reformulation of products [252-253]: in South Africa, it has been estimated that reducing the salt content of bread, soup mix, seasoning, and margarine could achieve 7,400 fewer CVD deaths and 4,300 fewer non-fatal strokes per year [254].

The potential for intervening in agricultural policies to encourage healthy eating appears limited, but there are important links among agricultural policies, food industry choices, and consumer diets, and so the food supply chain as a whole needs to be taken

into account [255]. Brazil has used a combination of fiscal and other legislation to protect and improve its traditional food system: supporting cooperatives and small-scale farmers to produce green vegetables and other fresh foods, and helping to protect and stabilize prices of healthy staple foods and ingredients so that they become more affordable and available [256]. Brazilian children are entitled to one meal per day at school and legislation also requires that at least 30 percent of the national budget for school lunches be spent on fresh foods from local/family farms [87].

The market for snacks, soft drinks, and processed foods is growing fastest in LMIC, and its correlation with higher tobacco and alcohol sales suggests common industry tactics [257], enabled by rising incomes and weak regulation. Use of fiscal pricing (tax or subsidy) policy instruments have also been proposed to influence food consumption patterns to favor the intake of healthier, less energy-rich foods and drinks [258]. For prevention of overweight and obesity, evidence suggests that non-trivial pricing interventions could impact on weight, particularly among children, adolescents, low socio-economic populations, and those most at risk, but that small taxes or subsidies have little effect [259-260]. Restricting the promotion of energy-rich, high fat, and high sugar foods to young children through advertising on television or in schools can be achieved through government-supported forms of self-regulation and statutory measures [261-262].

International efforts could be made to prohibit the hydrogenation process that generates industrial saturated fats and trans-fats. Governments also need to mitigate the impact of large transnational food corporations, some of which have headquarters within African nations: for example, many of the South African “Big Food” companies, particularly the supermarket chains, have invested in other African nations [263]. For the ultra-processed food and drink industries, as with tobacco and alcohol, there is clear evidence that public regulation and market intervention can help prevent the potential harm caused by ‘unhealthy commodities,’ and that these industries should not have a role in national policy formulation [86].

### **Physical Activity and the Imperative of Road Safety**

Increased communications about healthy eating and physical activity as part of programs of information and education at the sub-national and national levels could be used to reinforce legislation and other interventions. An important factor is the design of urban environments and road and transport systems, which can be influenced to promote or maintain physical activity.

Keeping people physically active as part of daily living is important for counteracting obesity [264]. A health-supporting and safe environment that facilitates walking and cycling can be part of a pro-growth, pro-health, and pro-poor transport strategy, helping increase urban productivity, reduce poverty, and improve health [265]. Only two SSA countries have national policies that encourage walking and/or cycling as an alternative to car travel, and only 10 SSA countries have national policies to separate road users as a way of protecting vulnerable road users [61].

As discussed in Box 4, consistent with the goals of the 2011-2020 UN Decade of Action on Road Safety, a safe and efficient road and transportation environment is needed in Africa which gives high priority to large-scale traffic calming measures, pedestrian infrastructure, and the provision of safe transport space for pedestrians and cyclists alongside major arterial roads [105, 266].

Good and safe roads are increasingly seen as a critical investment for enhancing competitiveness and resilience in Africa. International experience shows that the most effective and sustainable way to make roads safer is to adopt a “safe system approach”. The good news is that multilateral development banks, including the World Bank, have committed to supporting countries in developing sustainable “safe systems” to prevent road traffic casualties, including mobilizing more and new resources for road safety [267].

The key challenge in most countries in SSA is to build and strengthen institutions and capacity to plan, manage, and implement road safety initiatives at national scale that go well beyond just

**BOX 4: The Imperative of the 2011-2020 UN Decade of Action on Road Safety in Africa**

Unnecessary loss of life can be prevented by the adoption of measures that are clearly outlined in the five pillars of the ongoing 2011-2020 UN Decade of Action for Road Safety, which is supported by 103 countries worldwide. These are geared to:

- Strengthening institutional capacity to further national road safety efforts, including activities such as establishing a lead agency for road safety in the country involving partners from a range of sectors and developing a national road safety strategy;
- Influencing safe road design and network management to make roads safer for users, particularly the vulnerable (pedestrians, cyclists, children, the elderly, bus passengers) and reducing the severity of crashes;
- Making vehicles safer by adopting motor vehicle safety standards; implementing new car safety assessment programs; and ensuring that all new cars are equipped with seat belts that meet regulatory requirements and pass applicable crash test standards;
- Influencing road user behavior through sustained enforcement of road traffic laws and standards and rules combined with public awareness/education activities; and
- Improving post-crash care for the injured, including transporting them in ambulances or rescue helicopters to hospitals and clinics according to a pre-hospital screening process which determines the appropriate health facility to which to transport patients, rather than sending them to the nearest facility which might not have the capacity to offer needed care, to prevent further loss of life.

adopting isolated interventions. The road safety system (Figure 15) is one scheme for drawing all these aspects together.

Countries that have successfully reduced RTIs and fatalities – such as, Australia, Great Britain, the Netherlands, New Zealand, Sweden, and the United

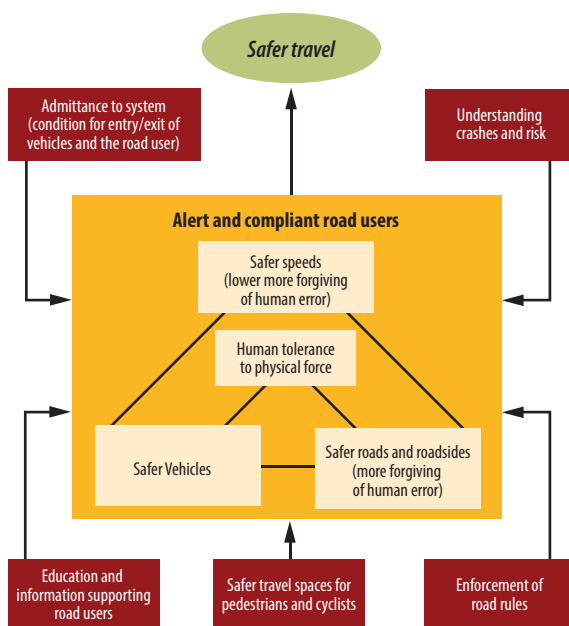
States – have adopted a safe systems approach which is anchored in the long-term vision of eliminating road deaths. Under this approach, improved road safety results depend on three inter-related elements: institutional management functions, interventions, and results [269].

Some African countries such as Ghana, Kenya, Namibia, Nigeria, and South Africa have in place most of the elements of the safe systems approach but additional efforts are required to strengthen institutions and governance capacity for road safety, including that of the lead agency capacity to better coordinate and manage an effective multisectoral response.

Sustained support from the highest levels of government is needed to:

- Strengthen the results focus of the lead agency and coordinate arrangements among sectoral institutions and different levels of government;
- Promote active engagement by business, professional, and non-government entities;
- Implement policy reviews and institutional reforms to improve legislation and enforcement practices, accountability, and the capacity of organizations, and the testing and licensing of drivers and the imposition of vehicle safety standards;

**FIGURE 15: The Safe System Model for Road Safety**



Source: [268] with an addition by the authors



- Secure sustainable and adequate funding for the lead agency and key stakeholders, and strengthen their management and operational capacity to achieve safety targets; and
- Enhance nationwide RTI-surveillance systems to collect data, better understand the nature and characteristics of the problem, and evaluate the results of interventions.

Sustained support is also needed to implement effective Interventions with a results focus. This requires the following:

- Road safety should be integrated in all phases of planning, design, and operation of road infrastructure. Improved project design is helped by analyses of the safety performance of road networks, conducted at the planning stage of new road construction, and complemented by road safety audits and safety impact assessments. Also, reviews of road sections with high concentrations of crashes help target investments towards places with the highest crash-reduction potential.
- Intersection controls, crash barriers, signs, markings, traffic calming measures around schools, and road maintenance are effective interventions.
- Vehicle design and safety equipment: The use during the daytime of cars and motorcycle lights, and other safety technologies such as electronic stability-control systems, seat belts, and airbags, contribute towards reducing road traffic crashes and fatalities. Fiscal and transport policies, customer information, and incentives can be used to ensure motor vehicles reach internationally-agreed standards, provide high levels of road user protection, and discourage the import and export of new or used cars with reduced safety standards [268].
- Legal measures to improve road-user behavior include: issuing graduated driving permits for teenagers that require six months of driving with learners' permits, curfews prohibiting driving between midnight and 5:00 a.m., and passenger restrictions on the first year of driving after getting a license. Mandatory seat belt use helps reduce road traffic deaths and serious injuries once a crash has occurred. Requirements on the use of motorcycle and bicycle helmets protect against fatal head injuries. Setting and enforcing speed limits reduces RTIs by up to 34 percent, particularly among pedestrians, cyclists, and motorcyclists. The introduction of speed cameras has led to a 14 percent reduction in fatal crashes and a 6 percent reduction in nonfatal crashes in developed countries.
- Comprehensive programs can improve road-user behavior, but laws and standards need to be enforced, monitored, and combined with public awareness and education campaigns to increase seatbelt and helmet wearing and to reduce speed and drink-driving and distractions such as texting on mobile phones while driving. Only 11 countries in Africa have national speed limits on urban roads less than or equal to 50km/hour and allow local authorities to reduce these, and only three countries rate their enforcement of speed laws as good. Whereas 35 African countries have national seat belt laws, these only cover all occupants in 18 countries, and only six of these rate enforcement as good. Almost two-thirds of countries have national laws regulating the use of mobile phones while driving, but very few collect data to monitor use [59].
- RTIs are also reduced by setting and enforcing legal blood alcohol limits and minimum drinking age laws, using checkpoints to stop drivers randomly to detect alcohol, and running mass media campaigns to reduce drinking and driving. Other measures, such as license revocation and suspension, markedly reduce fatalities from alcohol-related crashes. Measures to outlaw the use of cell phones and texting devices by young drivers are starting to show positive results in countries such as the United States.
- Effective post-crash medical care and treatment can prevent deaths and limit the severity of injuries. France's Service d'Aide Médicale d'Urgence (Emergency Medical Assistance Service, SAMU), and the effective service arrangement established, for example, in Kenya, Nigeria, and Namibia, are good practices in this area.

A strategy that simultaneously implements multiple road safety interventions produces the most health gains for a given investment [60]. The adoption by governments and international agencies of "shared

value” principles [270], which combine economic and social concerns, could help redress road infrastructure deficits and implement the road safety agenda in Africa. This approach is needed to generate collective action and help win political and community support to implement the African Road Safety Action Plan 2011-2020, forge public and private partnerships to share the cost of enhanced infrastructure and interventions, and build institutional and management capacity to deal effectively with road safety challenges.

### **Protection against Environmental and Occupational Risk Factors**

Particular hazards include those within the home, for example indoor air pollution from use of stoves burning solid fuels, exposure within the workplace (for example in particular industries such as mining and agriculture), and exposure in the outdoor environment to solar radiation, urban air pollution, and hazardous industrial and household waste [43]. Relatively low-cost, population-level prevention measures lie with environmental and occupational legislation and regulation, although environmental protection and occupational health standards need to be monitored and enforced. Examples include worker protection through health and safety measures; safe use of dangerous substances; as well as regulations to reduce contamination of drinking water and soil to protect the public and environment and bans on the use of asbestos. Better food storage could reduce aflatoxin-related liver cancers, and improved water and sanitation could reduce the spread of infectious agents such as helicobacter pylori which are linked to cancers. Enabling families to switch from traditional fires to fuel-efficient ventilated stoves that fit their lifestyles would dramatically reduce harmful indoor air pollution, carbon emissions, and use of wood fuel [271]. Policies that combine promotion and facilitation of active urban travel through walking and cycling alongside those promoting lower-emission motor vehicles are a potential win: win for both public health and climate change [272].

### **Promoting the Health of Individuals, Families, and Communities**

Opportunities for health promotion occur throughout the life-course but particularly at significant

events or transition points in people’s lives, for example, entering school, starting work, becoming a parent, and retirement [273-275]. Behavioral strategies in SSA need to take account of the socio-cultural context and consider whether and which interventions at individual, family, or community level are likely to be effective [114, 129].

So-called settings approaches to health promotion are organized to reach defined populations in a holistic way in their everyday life, in places “where they learn, work, play, and love”. These approaches in settings such as schools, workplaces, and prisons seek to develop health-supporting environments, incorporating the values of participation, equity, and partnership. There have been healthy cities initiatives in SSA (and other regions) for over a decade [276], and Africa has seen a significant development in health promotion in recent decades [277-278]. Almost all the countries in SSA have structures in place for health education or promotion, some involving a diverse set of players, as in South Africa, Mauritius, and Uganda. There is a recognized need to build greater capacity of practitioners across government and community sectors, and to establish a sustainable financing mechanism [279-282]. So-called ‘sin taxes’ (on tobacco and alcohol) have been proposed as a means of funding health promotion foundations [283-284].

HIV prevention and control is probably one of the best examples of good health promotion in Africa and some of these skills and resources may be transferrable. There is also potential for community health workers and other community cadres (for example agricultural extension workers and community nutrition workers) to be mobilized to support more integrated approaches at the community level. Most community health workers already have a strong health promotion element to their work, have been selected on the basis of being respected community members, and have the potential to act as change agents at community level [285].

Strengthening integrated health promotion systems and interventions that cover NCDs, communicable diseases, and maternal and child conditions is a key policy issue. For some countries, there has been a gradual weakening of health promotion units of ministries of health, which is linked to limited

financing and external financing that is allocated to specific interventions rather than to systems strengthening [286].

### Community-Based Interventions

The community, whether defined socially or spatially, can be a good hub for health promotion in Africa, as elsewhere [277]. Community-based demonstration projects for CVD prevention have been shown to be effective in achieving reduced rates of CVD and risk factors, and given the common risk-factor approach these have been expanded to focus on NCD prevention [287-288]. The approach is based on low-cost lifestyle modifications and community participation and is generalizable, with the general principles the same regardless of the degree of development of the country [289-290]. Table 10 summarizes the main components of a community-based intervention program.

Any demonstration project to pilot and evaluate the approach in a country context should work closely with national policy makers throughout, with a view to scaling-up and country-wide dissemination. Shifting from project to program and ensuring sustainability can be challenging, requiring investment in the skills and capacity of community-based organizations and public health systems during a phased transition [291].

### A Focus on Determinants

Programs need to take into account social determinants – the causes underlying causes – which influence risk factors and behaviors; for example, gender norms have implications for health prevention and care strategies in Africa [130, 295]. The discussion on burden of disease in Section 2 highlighted clear variations in the risk factors between women and men; thus policies, interventions, and monitoring of impact need to be gender sensitive. Both the health and non-health sectors have roles to play in improving day-to-day living conditions and addressing the inequitable distribution of power, money, and resources so that people have greater health opportunities [296]. Investing in early child development and compulsory education at primary and secondary levels can have strong returns, and comprehensive and universal social protection strategies would support a level of income for healthy living [128].

Helping people change their behaviors can be difficult, and needs to take account of the challenges that face people and understanding what motivates and influences their behaviors and choices [297]. Successful NCD preventive interventions do make it feasible for people, including those in poverty, to adopt healthier lifestyles. Making the healthier choice the easier choice can be achieved through the

**TABLE 10: Components of a Community-Based Program for NCD Prevention**

<b>Diagnosis</b>	A good understanding of the community's needs, practices, beliefs and priorities, developed in close collaboration with the community itself
<b>Planning</b>	Carefully planned activities that take account of the community context, including primary health care services, voluntary organizations, food shops, restaurants, work sites and schools, that link with any existing strategies for identifying and targeting people at high risk, and which build upon the existing skills and resources within the community
<b>Communication</b>	Messages and interactions to provide information and reinforce behavior change, using the most effective channels (media, peer-to-peer, opinion leaders, and so forth)
<b>Interventions</b>	Equipping practitioners with the necessary skills and competencies to carry out cost-effective interventions, ensuring the community is exposed to an effective dose of the intervention
<b>Health-Supporting Environments</b>	Working with community organizations and sectors such as education, transport, environment, and spatial planning to help change social and physical environments to make them more health-supporting and conducive to health and healthy life-styles
<b>Evaluation</b>	Monitoring the change process and evaluating the interventions and program objectively and in terms of the community's perceptions, and including an economic component in the evaluation where possible; disseminating results so that other communities can benefit

Source: Authors, adapted from [275, 292-294]

creation of health-supporting and enabling environments (for example, through urban design, such as the nature and location of buildings and transportation routes), the presence of encouraging mechanisms (for example disincentives and incentives such as regulatory and fiscal measures, and food pricing), in the way that choices are presented (for example, opt-out rather than opt-in), and engagement (for example getting people involved in designing initiatives) [298-299].

Conditional cash transfer programs have proved effective in increasing the use of preventive services and improving health status, leading for example to better nutritional outcomes in children [300-302]. Nevertheless, given their dependence on effective primary health care and mechanisms for disbursement of payments, careful introduction with rigorous evaluation is needed for low-income countries with limited health system capacity in SSA, so as to replicate the benefits seen elsewhere [303-304] and minimize potential negative associations [248].

### 5.3. Clinical Services for Individual-level Prevention

There are some relatively low-cost measures for prevention and care which could be delivered to relieve present suffering from NCDs and prevent future burden (Table 11).

#### Cardiovascular Risk Management

A combination of population-level and individual strategies is needed for cardio-vascular risk reduction [305]. For primary prevention of coronary heart disease and stroke, it is more effective and less expensive to manage according to assessment of the risk of having a cardiovascular event within 10 years (total cardiovascular risk score) rather than to use arbitrary thresholds such as levels of single risk factors such as hypertension; this is so, also in Africa [305-306]. For people at very high risk – that is, at least a one in four chance of a cardiovascular event within 10 years (10-year cardiovascular risk  $\geq 25$

**TABLE 11: Priority Interventions for NCDs Relevant to SSA Involving Clinical Services at Population- or Individual-Level (by Incremental Cost-Effectiveness)**

Area	Interventions	Status	Cost-effectiveness
Cancer	Hepatitis B vaccination to prevent liver cancer	BEST BUY	Very cost-effective Quite low cost Feasible (primary care)
	VIA at age 40 (50% coverage) with treatment of pre-cancerous lesions to prevent cervical cancer	BEST BUY	Very cost-effective Very low cost Feasible (primary care) (treatment may require referral)
	HPV vaccination at age 12 (US\$0.60 per dose)	GOOD BUY	Cost-effective (depending on price of vaccine)
CVD and Diabetes	Counseling and multidrug therapy (including glycemic control for diabetes) for people 30 years or over with 10 year risk of fatal or non-fatal cardiovascular events of 30% or more (includes prevention of recurrent vascular events in people with established coronary heart disease and cerebrovascular disease)	BEST BUY	Very cost-effective Quite low cost Feasible (primary care)
	Aspirin therapy for acute myocardial infarction	BEST BUY	Very cost-effective Quite low cost Feasible (primary care)
Respiratory Disease	Treatment of persistent asthma with inhaled corticosteroids and beta-2 agonists	GOOD BUY	Quite cost-effective Very low cost Feasible (primary care)

Source: Authors, based on [12, 64]

percent) – or those who have suffered a previous cardiovascular event, a regimen of aspirin, statin, and blood pressure-lowering drugs may significantly reduce their risk of death from CVD, and can lower the risk of recurrent cardiovascular events with multidrug therapy for secondary prevention (that is, for those who have had a heart attack or stroke already). This regimen is considered highly cost-effective for SSA [227].

There are three particular challenges in SSA for implementing total cardiovascular, risk-based guidelines [307]. First, current physicians would need educating to change practice from targeting and treating individual risk factors such as hypertension to using total cardiovascular risk. Second, simplified ways of measuring risk would be needed where laboratory facilities for biochemical measurement are limited, using for example non-laboratory tools for risk assessment which assess risk quickly and cheaply, avoiding the need for cholesterol values [308]. Third, better access to cheap, effective medication is needed, given the lower use of secondary prevention medication in rural areas and in countries with lower income levels [309].

### **Vaccination, Circumcision and Screening**

Several highly cost-effective interventions to prevent NCDs in SSA are available, often borrowing from interventions more commonly used for communicable diseases.

As the epidemiology suggests, for many LMIC, most African CVD is not currently ischemic. Prevention can include rubella vaccination of women to prevent some forms of congenital heart disease in their offspring, and controlling rheumatic heart disease through treatment of suspected streptococcal sore throat with penicillin (primary prevention), and register-based prophylaxis with penicillin for patients with a history of rheumatic fever, heart failure, and/or rheumatic heart disease (secondary prevention) [310]. Vaccination is also possible for viruses associated with liver cancer (HBV) and cervical cancer (HPV) [26].

For prevention of cervical cancer, as for HIV, there is promotion of safe sex, use of condoms, avoiding harmful use of alcohol, and male circumcision

[311]. Male circumcision is associated with a weak reduction in the prevalence and incidence of high-risk HPV and increased clearance of infection [312-313]. Given that licensed HPV vaccines are highly effective against only a limited number of HPV types, these interventions are likely to be synergistic in countries without well-established programs for cervical screening [314].

There are a number of strategies available for cervical cancer prevention and the balance of vaccination, screening, and treatment needs to be according to country context. For Sub-Saharan African countries characterized by low income, high mortality and low treatment levels, increased coverage of treatment with or without screening would be cost-effective, as would one-off PAP or VIA screening at 40 years of age or vaccinations (at \$0.60 per dose) [229, 315]. The VIA method does not require laboratory facilities and can enable treatment of pre-cancerous lesions [229, 315-316]. Where resources are limited, cost-effectiveness could be improved with targeted screening and by directing vaccinations towards people infected with HIV, since HIV infection is associated with increased risk of cervical cancer. Box 5 describes examples of approaches taken by various countries.

Given the present high cost of HPV vaccines, countries need to decide the best strategies for their context, based on the evidence, in order to allocate resources efficiently and equitably. While the GAVI Alliance has recently decided to support the introduction of HPV vaccines [320], and public-private partnerships exist to make breast and cervical screening as well as HPV vaccination more available and affordable in SSA (see for example [321]), countries still need to consider the longer-term budgetary implications for sustainable programs, and ensure that effective treatment is available for detected lesions [322].

Early detection and screening programs could achieve down-staging of the targeted cancers within five years, and could reduce mortality within ten years. For both programs, methods need to be accessible, benefits need to outweigh potential harmful effects (such as over-diagnosis and unnecessary intervention), and diagnosis, treatment, and follow up procedures need to be in place with quality assurance.

**BOX 5: Cervical Cancer Screening**

The 2012 World Development Report “Gender Equality and Development” found that, while many disadvantages faced by women and girls have shrunk thanks to development, major gaps remain [317]. A significant gap is the excess female mortality, especially in childhood and during reproductive years. Cervical cancer — a preventable condition that usually results from a viral infection by HPV that is generally sexually transmitted — is one of the leading causes of premature death and ill health among women in SSA. Eastern, Western, and Southern African regions have the highest incidence rates of cervical cancer in the world. Rates exceed 50 per 100,000 of populations, and age-standardized mortality exceeds 40 per 100,000. This situation is due to minimal screening services for cervical cancer, resulting in a significant number of patients diagnosed with advanced-stage disease. In Eastern and Southern Africa, it is compounded by the high prevalence of HIV (HIV-positive women are 4-5 times more likely to develop cervical cancer). A key problem in most cases is the limited health-system capacity to conduct widespread cytology screening – through microscopic examination of cellular specimens, accurate diagnosis of pre-cancerous lesions, and appropriate referral and treatment. This care pathway, which is common in developed countries, is work-intensive and expensive as it usually requires multiple visits, screening at regular intervals, modern laboratory infrastructure, and specialized personnel. Also, among 20 countries reporting cervical cancer screening activities in 2009 in Africa as a whole, only 11 had ongoing country programs; and of 49 projects initiated, only six were funded by the domestic government [318].

Taking into account the health system limitations in Africa, reducing excess female mortality due to cervical cancer, particularly among HIV-infected women, is likely to be feasible through lower-cost but equally effective “see and treat” screening procedures, adopted and integrated into existing service-delivery platforms – such as maternal and child health programs or HIV/AIDS prevention and control programs. Botswana and Zambia are already starting to use this cost-effective alternative to confront cervical cancer.

A demonstration program in Botswana illustrates the point for cervical cancer prevention among HIV-positive women at a community-based clinic in Gaborone. As documented in a recent study [316], faced with resource limitations that hindered the expansion of cytology-based screening, the “see and treat” approach was introduced using the VIA procedure and enhanced digital imaging (EDI), as well as cryotherapy to destroy abnormal tissue in the cervix by freezing it. Between 2009-2011, slightly over 11 percent of the women screened were found to have low-grade lesions; 61 percent had a normal examination result; and 27.3 percent were referred for further evaluation and treatment. In Zambia, the implementation of the ‘see-and-treat’ approach linked to HIV care has also shown that it enhances the impact of the HIV/AIDS program by preventing cervical cancer in women living longer on ART who had never been screened [319].

These results indicate that the low-cost, “see and treat” approach for the prevention cervical cancer is a feasible and efficient alternative, especially for reaching women living in distant and/or underserved regions of countries with limited access to cytology-based screening services. The results also show that this alternative has a significant impact on the early identification and treatment of precancerous and invasive cancerous lesions in HIV-infected women.

## 5.4. Therapies – Treatment, Care, and Rehabilitation

### Treatment of Conditions

There are a number of effective interventions available for treating NCDs. Lists differ by source but some of those more commonly considered cost-effective are given here as a guide for decision makers. These are not exclusive or prescriptive, given that local considerations need to be taken into account within individual country contexts, notably epidemiology, health infrastructure, financing, and government support.

For countries with facilities able to make a rapid diagnosis of acute myocardial infarction, relatively cheap and effective interventions exist that can reduce the relative risk of dying, such as drug treatment with aspirin and atenolol and, in urban centers or day hospitals with well-trained staff, the use of streptokinase [307]. Acute treatment of stroke with aspirin or by provision of a stroke unit is considered less cost-effective for SSA (cost per DALY of more than three times the average per capita income) [323]. For patients with congestive heart failure, mortality risk can be reduced by the use of diuretics, exercise training, and drug treatment for hypertension.

Several interventions for diabetes management are effective and can help reduce complications such as blindness, neuropathy, and diabetic foot and amputation. Where resources are limited, blood pressure control is one of the most feasible and cost-effective interventions for people with diabetes. Tight glycemic control for people with hemoglobin-A1c (HbA1c)-values greater than 9 percent can reduce microvascular disease, and foot care for those at high risk of ulcers can reduce serious foot disease [324]. Annual eye examinations and treatment of retinopathy can reduce serious loss of vision [323].

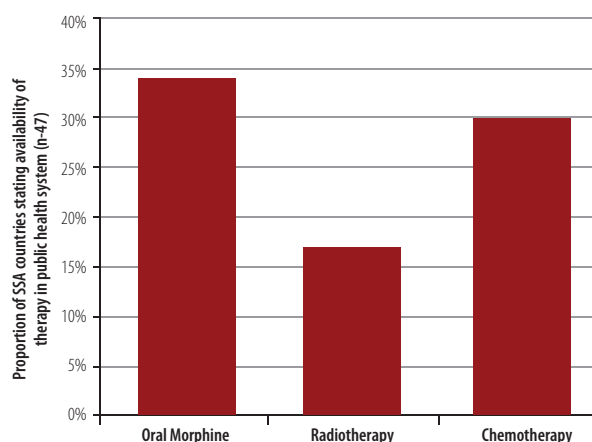
COPD is irreversible and progressive, and current treatment options produce relatively little gain relative to the cost [325]. Patients with asthma can be managed in general health services with inhaled drugs such as salbutamol, and additional corticosteroids if persistent, avoiding costly hospitalization [326]. Avoidance of environmental triggers such as secondhand smoke and smoke from combustion of solid cooking fuels can also reduce acute exacerbations. Treatments too frequently rely on expensive imported drugs, with wide variability in cost across countries [327], but initiatives are underway to enable countries to procure quality-assured inhaled drugs at lower prices to improve access [328].

In a population where the majority of cancers amenable to early detection are diagnosed at late stages, establishing an ‘early diagnosis’ program may be the most feasible strategy to reduce the proportion of patients presenting with late stage cancer, and improve survival rates [329]. Such a program would involve raising awareness amongst public and health professionals of the common signs and symptoms of cancers such as breast, cervical, colorectal, and skin, that may be amenable to effective treatment with limited resources.

Some cancers may not be amenable to early diagnosis but nevertheless have a high potential for being cured, such as childhood leukemia, or have a high chance for significant prolongation of survival, such as breast cancer and advanced lymphoma [64]. Treatment options need careful selection based on evidence and the resources available [330]. In low-income countries, improvement in the quality and coverage of cancer treatment following stan-

dardized protocols is important, prioritizing which cancers to include in an early detection or screening program [331]. There is limited availability of basic cancer therapies in SSA (Figure 16) public health systems: even where stated to be available, this may only mean a few facilities in the whole country [64].

**FIGURE 16: General Availability of Cancer Therapies in the Public Health System in SSA**



Source of data: Global Health Observatory Data Repository: <http://apps.who.int/ghodata/>

### A Public-Health Approach to Palliative Care

In a region where most cancer is diagnosed late, improvement in quality of life and relief from moderate to severe pain could be achieved relatively inexpensively by improving access to pain management and supportive care, particularly at home and at the primary-care level [332].

Access to pain relief and symptom control is poor in many developing countries [333-335]. In SSA, an estimated 88 percent patients with cancer pain are without relief [336]. Although some palliative care programs exist in Africa for cancer and other diseases such as AIDS [337][Box 6], the general lack of awareness, policy, and provider skills add barriers to accessing pain medication [338].

### Emergency Care and Rehabilitation

For victims of road traffic crashes as well as stroke, there is a need to improve responsiveness and the ability of health and other emergency systems to provide appropriate emergency treatment and lon-

### **BOX 6: Palliative and End-of-Life Care for AIDS, Cancer and Other Conditions**

Uganda was the first country in Africa to include palliative care for chronically and terminally ill people as a priority within its National Health Policy in 1999 [337]. It later participated in a joint project with four other countries – Botswana, Ethiopia, United Republic of Tanzania, and Zimbabwe – and WHO to improve the quality of life of AIDS and cancer patients by developing comprehensive palliative care programs with a community-health approach [339]. ART has not removed the need for palliative care. Around one-quarter to one-third of patients on ART can experience virological failure [340], and despite treatment, HIV-related cancers still develop, pain persists, and psychological and spiritual need continues [341].

Palliative or end-of-life care for people, irrespective of cause or condition, is scarce across the continent [342]. One study mapping such initiatives during 2003–05 found services in only 26 countries, and only in Uganda, South Africa, Kenya, and Zimbabwe were they integrated into the existing health system [343]. The nature of palliative-care needs and services in SSA reflects their development in the context of poverty and AIDS, and include pain and symptom control, psychological support, and financial support for food, shelter, and funeral costs. Such a holistic approach is likely to be relevant for any life-threatening condition. The African Palliative Care Association advocates for palliative care to be an integral part of health systems (with service delivery models that span diseases), and promotes south-south collaboration [344].

ger-term rehabilitation. Prompt emergency care can save lives, reduce the incidence of short-term disability and dramatically improve the long-term consequences for victims and their families [63].

Setting up a single, nationwide telephone number for emergencies could help simplify matters [202], but one-third of SSA countries have no emergency number, and in another third there are multiple numbers which leads to inefficiency in dispatch [61]. Five countries have no ambulance services, and in only nine countries do a reasonable proportion (50 percent or above) of injured patients reach hospital by ambulance.

There is a lack of resources for emergency response and care, especially in rural areas, and there is evidence of inconsistent pre-hospital care with most

victims receiving minimal or no treatment in the field, and with hospitals and their staff not equipped to provide trauma care [345]. Even if admitted to a more sophisticated unit, disabilities are often inadequately assessed and rehabilitation services not in place for the vast majority of cases [346]. This situation results in a great loss of human potential. Ghana is probably not the only country in which 95 percent of disabled people have had no access to rehabilitative services [347]. A study in Nigeria found that RTIs resulted in disability for 29.1 percent of subjects, of whom 67.6 percent were unable to perform activities of daily living; 16.7 percent consequently lost their jobs, and 88.6 percent had a reduction in earnings [348].

## **5.5. Strengthening Health Systems**

Countries' ability to address chronic disease is limited by challenges in many aspects of health systems; notably, governance, financing, medicines and technologies, service delivery, workforce, and information [349]. The challenges are not related just to the income or development level of the country. The shortcomings are hampering progress to communicable disease control and MDG targets, and responding to NCD and RTI needs is likely to be even more challenging. Box 7 illustrates the manner in which countries as diverse as South Africa, Mauritius, Ghana, and Kenya are working to assess the health systems challenge posed by NCDs and to address them comprehensively.

### **Governance**

A well-governed health system should have clear goals, participation of relevant stakeholders, transparent policies, oversight, and accountability [356]. Weak governance impedes the work to improve health-system effectiveness and health outcomes, and, to some extent, may reflect the wider governance-environment in a country [357]. As already described in Section 6.1, in SSA relevant policies frequently do not exist or are poorly implemented, and regulatory frameworks are not in place or are weakly or not enforced. Performance management in African health systems is hindered by the absence of robust indicators of quality of services as experienced by citizens. Inadequate monitoring and



## BOX 7: Country Responses to NCD Challenges

In **Namibia**, a September 2012 report from the Ministry of Health and Social Services emphasized the manner in which health systems need simultaneously to address the challenge of undernutrition and overnutrition [350]. An estimated 29 percent of Namibian children (under five years of age) are classified as stunted, with 17 percent classified as underweight, and 8 percent classified as wasted. However, slightly more than 4 percent of Namibian children (under five) are classified as overweight or obese – with this figure reaching 7 percent of children (under five years of age) in urban settings. Among women 16–49 years of age, 6 percent were moderately or severely thin, in contrast to the 28 percent of women considered either overweight or obese. Data based on health facilities indicates hypertension and diabetes as the first and second causes of disability among adults, respectively. The proportion of NCD-related deaths was estimated at 8 percent in 2007. The Namibian Ministry of Health and Social Services is focusing on addressing these challenges within the context of its broader efforts at developing the country's health systems.

In **Mauritius**, recent data indicates that NCDs represent an estimated 80 percent of the total disease burden and account for 85 percent of total deaths each year. Surveys on the prevalence of NCDs and risk factors indicate that among adults 30 years and older, there is a 19.3 percent prevalence of diabetes, 30 percent prevalence of hypertension, and 38 percent of the population is either overweight or obese. In addition, 39.3 percent of the population smokes tobacco, and 19.1 percent have been classified as heavy drinkers. In response to such data, Mauritius is implementing a national strategy to address NCDs, which involves the use of mobile clinics/medical teams to address primary prevention at community level (including schools and workplaces), a community-based network of health centers and community health centers to address prevention needs at the secondary level, and a structured prevention program at the tertiary level (involving specialized units in all regional hospitals) [351].

In **South Africa**, the 2000 Burden of Disease Study indicates that NCDs accounted for 37 percent of deaths and 16 percent of DALYs, while the leading causes of death were HIV/AIDS (30 percent), intentional injuries (7 percent), and unintentional injuries (5.4 percent). It should be noted that the high coverage of the ART program has transformed HIV/AIDS into a chronic disease as the needs of ART patient now resemble those of patients with NCDs. Additionally, the urban poor bear the heaviest burden of NCDs, in addition to other diseases. Alcohol use, tobacco smoking, and excessive weight are responsible for 13.9 percent of total DALYs and nutrition is a major challenge to South Africa's NCD epidemic, with the average diet high in sodium and fat consumption. Nationally, 60 percent of women and 31 percent of men are either obese or overweight [352]. The South African health system has responded to this challenge at the facility level through the integration of care for NCD and communicable chronic conditions, expanded outreach by primary health care teams at the community level, and with a greater focus on human resource management and health information programs to support these initiatives [353].

In **Kenya**, NCDs are estimated to contribute 33 percent of total mortality and over half of the top 20 causes of morbidity and mortality. About 53 percent of all hospital admissions in Nairobi are due to NCDs, with diabetes contributing 27.3 percent of this figure. Smoking prevalence is 26 percent among adult males and alcohol use prevalence estimated to be 20 percent. HPV prevalence in women is estimated to be 38 percent. The national strategic response to NCDs involves strengthening health services for the integrated prevention and management of chronic diseases, as reflected in the annual operating plans for the health sector and the integration of NCDs into the primary health care system. Achievements, to date, include improved human resource capacity, provision of medical equipment and other supplies to address NCDs, infrastructure improvement for expanded service delivery, and routine screening for NCD risk factors during routine health facility visits [354].

In **Ghana**, stroke and hypertension have been among the leading causes of hospital deaths for over 20 years. The estimated adult prevalence of diabetes in Accra increased from 0.4 percent in 1956 to nearly 7 percent between 1998 and 2002. By 2003, an estimated 35 percent of women in Accra were classified as obese, with 40 percent hypertensive and 23 percent hypercholesterolemic. Although the public health response to NCDs has been described as limited to date, the government is now processing nine health-related bills (including a tobacco bill) into law [355]. There has also been a fivefold expansion in the uptake of clients screened for cervical cancer using VIA in an Accra hospital, following an intensive health educational campaign. The recently introduced District Health Information Management System is anticipated to serve as an integral tool in capturing preventive and clinical service outputs, thereby enabling the collection of more accurate and timely NCD-related data at decentralized levels in the future.

assurance of the quality of services within government limits return on investment for management of NCDs [358]. Reviews of health governance in Kenya, Nigeria, and Rwanda found that citizens and civil society commonly had minimal roles in policy-making processes, and where there were also structural and institutional weaknesses and capacity gaps, the responsiveness of services and accountability of government was further limited [359-361];

Nevertheless, all is not gloomy. Africa has made recent progress in improving governance, including better economic governance and public financial management, respect for human rights, and the rule of law [362]. CSOs are emerging and growing and, together with other non-state actors (professional groups and private sector), are starting to play important roles in providing checks and balances to government, and demanding accountability and transparency.

There is emerging consensus that population health is not an outcome of a single ministry but involves a wide range of actors and a synergetic set of policies [363]. The UN Political Declaration called for a whole-of-government and a whole-of-society effort

to respond to the challenge of NCDs [8]. This may require institutional adaptation and new ways of working [364] and examples are emerging (Box 8).

### Health Financing

In 2010, total expenditure on health (THE), as a percentage of GDP, was 6.5 percent for the WHO African Region, slightly up from 5.8 percent in 1995, and lower than the global average of 10.4 percent. Similarly, health, as a share of total government expenditure, registered a modest increase, from 9.8 percent in 2004 to 10.8 percent in 2010. The average per capita total health expenditure for SSA countries has more than doubled, increasing from US\$32 in 1995 to US\$84 in 2010 [366]. This may seem relatively good compared with regions of similar GDP per capita [367]. Yet, much of the increase is from external sources. There is also a wide variation across countries in the magnitude and level of increases. And in 2009 there were still 21 African countries falling short of the minimum THE per capita (US\$44) needed to ensure universal access to even just a limited set of essential health services focusing on HIV, TB, malaria, maternal and child health, and

### BOX 8: Integration of the Health Sector in Botswana

Botswana is one of the countries hardest hit by HIV/AIDS. In response, the Government of Botswana, along with significant support from international development partners, invested heavily in the health sector to provide a comprehensive response to the epidemic. Although the creation of a completely separate department of HIV/AIDS within the Ministry of Health (MOH) has enabled Botswana to be a leader of the AIDS response in the region, the epidemic has overstretched the capacity of the health workforce and created fragmentation in the overall planning of the health sector.

The MOH has embarked on an ambitious agenda to harmonize and align health-sector planning, financing, and monitoring and evaluation. These include: revising the national health policy to reprioritize health issues; a more appropriate focus on key diseases and conditions beyond HIV/AIDS; improving organization and management of the sector with the inclusion the private and NGO sectors as well as traditional medicine; and redressing health service weaknesses to attain the MDGs. The MOH has also begun designing an Integrated Health Sector Plan, which will be a ten-year strategic plan to guide the country in tackling current priority problems, and preparing for future health needs. They have also committed to restructuring the MOH to merge the Departments of HIV/AIDS and of Public Health, thereby creating a more streamlined approach to planning, care, and evaluation.

A recent strategy agreed upon by the Government with the World Bank and technical partners such as the George W. Bush Institute's Pink Ribbon Red Ribbon initiative, that mobilizes the coordinated participation of a diverse groups of institutions such as US CDC, US PEPFAR, USAID, UNAIDS, Susan G. Komen Foundation, Bill and Melinda Gates Foundation, CARIS Foundation, pharmaceutical companies such as Merck, GlaxoSmithKline, and Bristol-Myers Squibb, and Becton, Dickinson and Company, IBM, and QIAGEN, is rolling out a Cervical Cancer Control Program. This will include cervical screening and HPV vaccination, and will use the HIV diagnostic and treatment platforms established across Botswana over the last decade, with key elements financed by the Botswana National HIV/AIDS Prevention Support Project.

some NCD prevention [79]. Many African LMIC are heavily reliant on external financing. External resources for health as a percentage of THE in 2010 ranged from 2 percent in Mauritius and Equatorial Guinea to 63.8 percent in Malawi. External financing is volatile and uncertain, and a big issue for SSA is the fungibility of government spending and donor spending. There is evidence of a strong substitution effect, with donor funding for health substituting for health financing by recipient governments, the effect being largest in low-income countries [368]. Donor funding for NCDs is negligible, comprising only about 2-3 percent of overall development assistance for health in 2007.

Some LMIC – notably Rwanda and Ghana – have made significant progress in developing financing systems towards universal coverage, although fragmentation and sustainability can be a continuing problem. Many people have little financial protection against the high costs of health care. More than half (51 percent) of THE in the WHO African Region is private health expenditure (global average 37.1 percent) of which more than half (55.6 percent) is out-of-pocket, ranging from 8.1 percent in the Seychelles to 90 percent in Guinea-Bissau [367]. WHO estimates that if the proportion of THE that is out-of-pocket is below 15-20 percent, the incidence of financial catastrophe caused by such expenses is negligible: in 2010, only 7 SSA countries were below the threshold of 15 percent [369-370]. Only 5-10 percent of people in SSA are covered by social protection in the event of lost wages during illness or pregnancy [371].

Available resources must be used efficiently and equitably to realize potential gains in health outcomes. A study of Tanzania, Ghana and South Africa found that although overall health care financing was progressive in all three countries, the distribution of service benefits favored richer people, despite illness burden being greater amongst lower-income groups, and access to necessary services was the main challenge to universal coverage [372].

## **Responses**

Many countries have embraced the goal of “universal health coverage”, aiming to ensure equitable access to effective health services (promotion, pre-

vention, treatment, and rehabilitation) when needed and without incurring financial hardship for the whole population. To achieve this, countries need a health-financing system that raises sufficient funds, protects people from financial impoverishment associated with health care costs, and uses resources efficiently [371, 373]. This requires balancing trade-offs among the populations, services, and costs that can realistically be covered.

Moving towards universal health coverage, as for example in Ghana, South Africa, and Tanzania, requires less-fragmented financing arrangements, less reliance on out-of-pocket payments at the point of service, increased financial protection for people in the informal sector, and more equitable allocation of public resources [374].

Ways of raising additional resources for health include better revenue collection, increasing the share of government budgets for health, and more innovative means such as increasing excise taxes on tobacco and alcohol. As African countries with rich endowments of natural resources largely do not have good human development outcomes, including in health, natural resource wealth-management should consider both the long-term requirements for economic growth when these revenues dwindle, as well as the immediate need to increase public investment in health, education, and social protection to cut poverty, reduce inequality, and build human capital as a key contributing factor to diversified growth over the medium and longer terms [375]. International aid may need to be restructured to better align incentives and goals. Performance- or results-based financing (RBF) which links funding to performance has been promoted as a means of achieving this. It has been used for example by the Global Fund in HIV, TB, and Malaria programs [376] and the World Bank as a way of incentivizing health workers and health providers towards the achievement of health goals. Overall, the evidence for the effectiveness of these strategies in improving health care and health in LMIC is mixed, and results depend on the design of the intervention; for example, who receives payments, the size of the incentives, the targets and how they are measured, additional funding and support, and contextual factors [377]. Rigorous evaluation of a randomized study in Rwanda demonstrated large

improvements in quality and quantity of care for maternal and child health, and impact evaluations are underway in many other countries. RBF is increasingly being adopted in SSA; currently there are three countries with nationwide programs and 14 countries with ongoing pilots [378].

Existing health resources could be used much more efficiently. The WHO estimates that 20-40 percent of resources spent on health are wasted, for example through medical errors, waste, and corruption. Reducing unnecessary expenditure on, and inappropriate use of, medicines could save countries up to 5 percent of their health expenditure [371]. Replacing fee-for-service payments by capitation payments at the primary-care level can reduce incentives for over-servicing. A significant step could be to link allocative efficiency and spending decisions with the practice of care. Evidence-informed clinical guidelines, together with quality standards and measurable indicators derived from them, can be powerful tools to underpin pay-for-performance schemes, hold providers accountable, and drive more efficient and equitable use of technologies.

Also, as the Public Private Partnership (PPP) of the Queen 'Mamohato Memorial Hospital and Clinics in Lesotho has shown, health PPPs are becoming more popular and could be structured to address NCDs effectively along the medical care continuum and, in a relatively short period of time, transform the quality of care being provided to its population [379-380]. There are four key factors driving governments to use the PPP model: (1) desire to improve operation of public health services and facilities and to expand access to higher quality of services; (2) opportunity to leverage private investment for the benefit of public services; (3) desire to formalize arrangements with non-profit partners who deliver an important share of public services; and (4) more potential partners for governments as private health care sector matures [381].

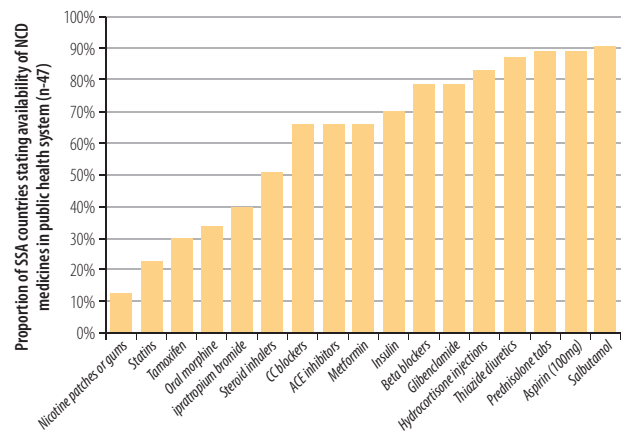
### Medicines, Vaccines, and Technologies

Drug costs make up a substantial part of the direct costs of programs for chronic diseases [349]. Up to 90 percent of the population in LMIC buy medicines through out-of-pocket payments [382]. In one study

of the affordability of medicines in LMIC, purchasing some common medicines for the treatment of NCDs would impoverish a large proportion (up to 86 percent) of the populations of many African countries [383].

Access is inadequate even for many items on the list of essential medicines in most LMIC [382, 384-385]. Prices vary widely and are comparatively high in developing countries, with affordability deteriorated as a result of the global economic crisis [386]. Availability may be worse for medicines for chronic diseases than for acute disease [387]. Figure 17 presents results for WHO African Region countries to a WHO survey on the availability of NCD drugs in the public health system, although whether these are always physically available or require co-payment is not clear [64].

**FIGURE 17: Availability of NCD Medicines in the Public Health System in SSA**



Source: Authors from [496]

Under-funding, poor planning, and inefficient procurement, supply, storage, and distribution systems within the public sector may exacerbate the problem, leading patients to the private sector where prices for generic medicines can be two- to three-fold higher than in the public sector, and expensive branded products may predominate [349, 371]. Weak systems may be exacerbated in countries where the involvement of multiple donor agencies operating without any coordination can contribute

to fragmentation and/or duplication in distribution functions [388].

Medicines may be of poor quality and the number of cases of counterfeit medicines is increasing. Challenges also exist around the promotion of rational use of medicines: given the long-term market potential of drugs for ‘chronic diseases’, the pharmaceutical industry can be actively engaged in the development of clinical guidelines which can lead to potential conflicts of interest [389].

### **Responses**

Equitable access to essential medicines, vaccines, and technologies, their assured quality and safety, and their effective use by prescribers and consumers are important goals [373]. For some NCDs, as for AIDS, prevention may be aided by treatment: it is estimated that appropriate use of medicines alone could reduce the burden of NCDs by up to 80 percent [388]. Many patients will require long-term, if not life-long, access to medicines as well as other equipment; living with Type 1 diabetes mellitus for example requires not just insulin but also syringes, needles, and diagnostic and monitoring tools [390].

Both price- and non-price barriers to access need to be overcome. Improving purchasing efficiency, eliminating taxes, and regulating mark-ups could reduce medicine prices; and more efficient procurement and distribution of medicines would increase access [385]. Guidelines for good pharmaceutical procurement have been published and capacity building and information exchange could improve essential procurement and regulatory capacities in many countries [391].

Countries could save an estimated 60 percent of their pharmaceutical expenditures if they shifted from originator medicines to generic products, but only a few wealthy and middle-income countries do so [371]. Most first-line drugs for the treatment of NCDs are off-patent and inexpensive: even for cancer, many medicines are off-patent generics, costing less than US\$100 per treatment course [214]. Generic products could be promoted through patient and professional education, alongside technology assessment and evidence-based guidelines which are enforced and adapted to the local situation.

National Essential Medicines Lists need to include drugs for NCDs chosen by national experts based on considerations of cost-effectiveness, budget impact, affordability, and so forth.

Lessons might be learnt from the scale-up of ART where transparency in price information, generic competition, and price negotiation helped achieve dramatic decreases in price; some steps have already been applied in Brazil to reduce the cost of certain cancer medicines [392]. A GAVI-like capacity at regional or global level could be useful to negotiate, bulk purchase, and distribute vaccines and drugs. Mechanisms such as Advance Market Commitments, as used for vaccines [393], could be considered to offer an improved market for drugs now in development, ensuring that drugs are bought only if they meet pre-determined standards of efficacy and safety and helping to assure a sustained and affordable supply in the long term.

There are emerging concerns regarding intellectual property rights in relation to NCD drugs, particularly for cancer and diabetes, and how these might interfere with innovation models and access to treatments [394]. Since the WTO TRIPS (trade-related aspects of intellectual property rights) agreement, health officials need a good understanding of patent status in order to procure lower-cost generic products, use health budgets efficiently, and determine the ‘freedom to operate’ in research and development of new medicines; this may require national and regional capacity to be built.

An additional area requiring joint commitment and resources to strengthen the overall response to NCDs, involves the need for improving governance and regulation in the pharmaceutical sector, building upon ongoing efforts as noted in Box 9.

### **Health-Care Delivery**

Health service delivery systems in LMIC are typically more suited to providing episodic care for acute conditions. Models for the delivery of care for chronic conditions, such as integration of care across levels, may be unfamiliar to policymakers and practitioners, and their establishment hindered by limitations of space, staff, systems, and infrastructure [211, 396]. To some extent, HIV/AIDS may have

**BOX 9: East African Community Medicines Regulatory Harmonization Project**

Strengthening governance, regulations, and accountability in the pharmaceutical sector is an important challenge of health systems. Improved regulatory policies and harmonization of efforts can lead to more competitive markets, economic growth, improved access to new medicines, better quality of pharmaceuticals in circulation, and ultimately to better health outcomes.

In 2009, a coalition of partners including the Pan African Parliament, NEPAD Coordinating and Planning Agency, WHO, the Bill and Melinda Gates Foundation, UK Department for International Development, and the Clinton Health Access Initiative came together to establish the African Medicines Regulatory Harmonization (AMRH) program. Working with African regional economic communities, the program's goal is to increase access to good quality, safe, and effective medicines through harmonizing medicines regulations, and expediting the registration of essential medicines. With support from the Bill and Melinda Gates Foundation, the Global Medicines Regulatory Harmonization Multi-Donor Trust Fund (GMRH) was set up by the World Bank in 2011 to implement and scale-up AMRH activities. In 2012, the East African Community (EAC) became the first regional economic community in Africa to receive GMRH funding.

The East African Community Medicines Regulatory Harmonization Project (US\$5.5 million grant) is a five-year project that will be implemented in two phases. GMRH provides support for Phase I which covers the first three years (2012-2015) of the project. The project's aims are: to harmonize medicine registration systems, to improve efficiency, and to enhance transparency in medicines registration among EAC Partner States (Burundi, Kenya, Rwanda, Tanzania, and Uganda). The results of this innovative partnership are expected to include: (1) EAC Partner States participating in harmonized medicine registration; (2) National Medicine Regulatory Authorities (NMRAs) using common integrated Information Management System; (3) NMRAs have a functioning quality management system in place; (4) regulatory capacity building in the region institutionalized; and (5) government, industry, and civil society partnerships improved. As the project moves ahead, continuous dialogue and collaboration with local industry and civil society groups will be emphasized to improve the quality of technical standards being developed.

Source: [395]

made the situation worse, where vertical approaches to planning and managing health systems crowded out pre-existing, more-integrated approaches and attention to NCDs.

Health-care infrastructure is insufficient across all tiers of service delivery, not just in the case of facilities but also laboratory and diagnostic systems and capabilities. The WHO African Region as a whole had the lowest ratio of hospital beds per 10,000 of population of any region, which ranged from one in Mali to 63 in Gabon (global average 30) [397]. Chronic NCDs may be over-represented in hospitals, with patients lingering for weeks or months, partly because of a lack of reliable outpatient facilities for follow up; one study in Rwanda found that these conditions accounted for 30-40 percent of adult hospitalization time [56].

There is a growing sector of private health care providers in some parts of Africa which already treats a significant proportion of those covered by private health care insurance and the well-to-do [398].

The use of traditional medicine is widespread, often in parallel to modern medicine: in some SSA countries, 80 percent of the population rely on traditional medicine for primary health care [399]. Payment is always out-of-pocket and can be substantial: a national survey in South Africa in 2008 found that there was widespread use and that almost three-quarters of the poorest quintile had spent more than 10 percent of their household expenditure in the previous month on traditional healers [400-401].

Primary health care in much of SSA is dismal, and prevention and promotion aspects are limited. A study in Senegal and Tanzania found that on average only 19 percent of primary health facilities in Tanzania and 39 percent in Senegal had access to basic infrastructure (electricity, water, sanitation) [358]. Around half (47 percent) of clinics in Senegal and one-fifth (22 percent) in Tanzania did not have access to the most basic equipment (thermometer, stethoscope, weighing scale) and around one-fifth of clinics (22 percent Senegal; 24 percent Tanzania)

experienced shortfalls in stocks of essential drugs. One-fifth of health workers (20 percent Senegal; 21 percent Tanzania) were absent on a given day. Most indices were worse in rural settings.

An overhaul of the health care delivery system so that it is also responsive to chronic conditions and NCDs, could focus on a number of areas:

- Re-engineering of primary health care within a well-functioning district system, with a greater role for prevention and promotion [402]
- Design of a delivery system suited to the coordinated continuity of care needed for chronic conditions
- A greater role for patients in self-management
- Decision support tools and clinical information systems.

This would need to be underpinned by broader health system strengthening such as sustainable financing, performance management, improved pro-

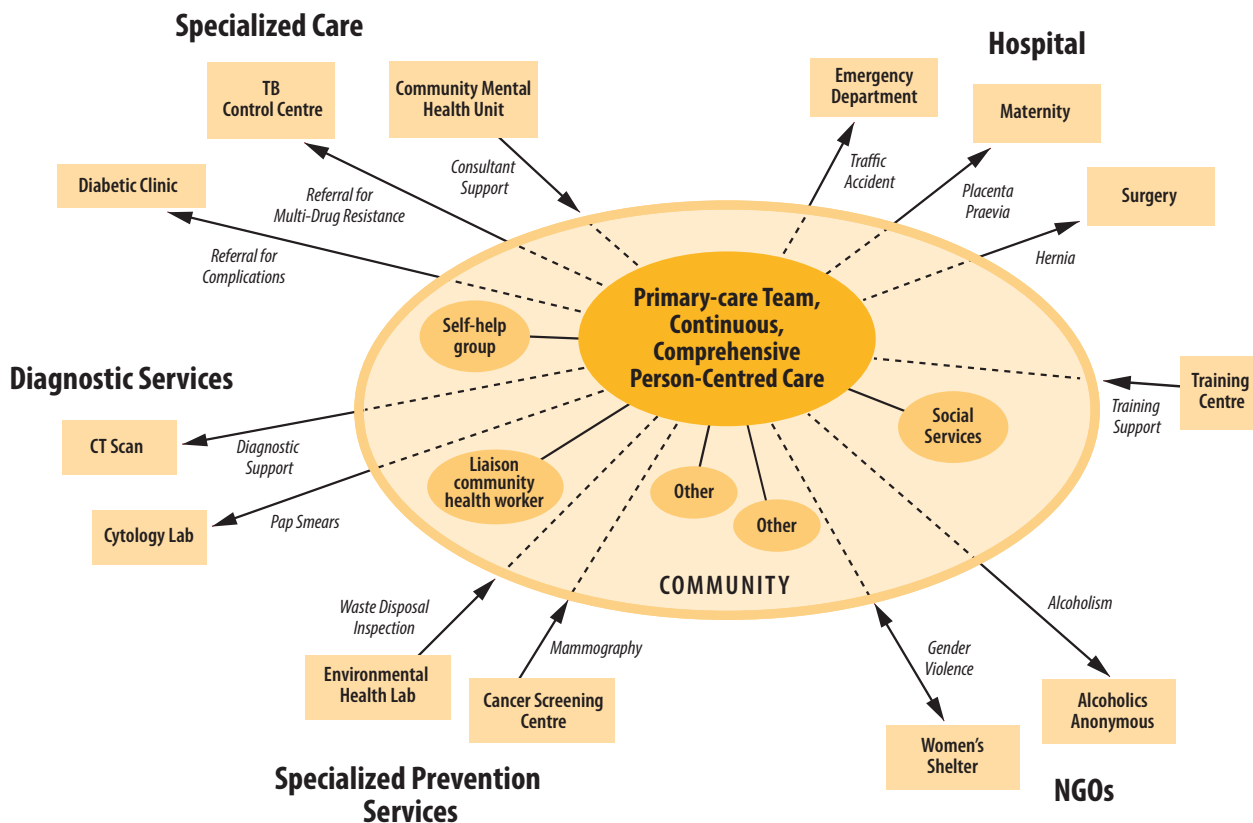
curement and supply of medicines and equipment, and task shifting.

**Primary Health Care**

Primary care is the main entry point into health services for most people. Ideally, although perhaps not often achieved, care is person-centered, comprehensive, and integrated, with continuity and participation of patients, families, and communities [403] (Figure 18). Apart from the management of disease, primary care opens up opportunities for disease prevention and health promotion as well as early detection of disease.

Primary care helps prevent illness and death, is better value for money than its alternatives, and, in contrast to specialty care, is associated with a more equitable distribution of health in populations [403-404]. Health systems with a strong primary care orientation, emphasizing comprehensive care and the overall health of the patient, are likely to find it eas-

**FIGURE 18: WHO Model of Primary Care and its Place within a Larger Network**



Source: [403]

ier to introduce practices that benefit patients with chronic conditions [405].

In many African countries primary care for NCDs is very poorly developed and expectations of what can be delivered need to take account of the realities and challenges faced. Practical policy proposals for improving primary and NCD care include: improving data on disease burden; implementing a structured approach to care delivery, with the part played by primary care in the broader system of care better defined; and highlighting quality of care, aligned with broader health system strengthening [406]. A number of existing programs in low-resource countries such as TB control and maternal and child health include strengthening primary care as one aim. This creates an opportunity for improvements for NCD care to ‘piggy-back’ onto existing efforts [406].

Innovations to cope with staff shortages in primary care include developing a cadre of clinical associates to perform a limited clinical role, and on-site training of nurses and mid-level health workers for integrated care of chronic diseases, whether infectious or NCD in origin [399]. The role of appropriately-trained community health workers for NCD care should also be explored for SSA settings.

Frameworks and simple, standardized protocols for case finding, diagnosis, and treatment of several risk factors and diseases can effectively be used by nurses and mid-level health workers [399]. These may be adaptations of protocols for individual diseases, such as TB [407], and designed for the management of symptoms and signs of chronic disease, irrespective of cause (see Box 10) [408], potentially increasing cost-effectiveness by improving the care of several conditions [409].

Widespread use of traditional medicine providers for primary care may reflect cultural and/or health beliefs, taboos, or inaccessibility of other forms of health care and drug costs, but one reason for its popularity may be a desire for continuity of care [401]. There have been moves to acknowledge its role within primary health care and national health systems, as well as to ensure its safety and quality [411]. Better understanding of why people go to traditional healers could help inform the de-

### **BOX 10: Integrated Care for Communicable Diseases and NCDs in Primary Care**

In South Africa, cough is the commonest complaint in primary care and eight of the top 10 diagnoses are respiratory conditions of both an infectious and chronic nature, including upper respiratory tract infection, acute bronchitis, asthma, TB, and HIV-associated pneumonias [399].

Programs such as PALS PLUS (Practical Approach to Lung Health in South Africa) have been training health workers in state-funded primary care clinics to take a more people-centered rather than disease-centered approach, using a syndromic, integrated guideline for diagnosis and care of patients with respiratory symptoms [408]. An educational outreach program has enabled the guideline to be used successfully by nurse practitioners with favorable outcomes, including increased TB-detection rates, proportion of patients with asthma appropriately managed, and cost-effectiveness [409].

The PALS PLUS program has been extended to include the most frequently occurring NCDs in the primary care setting. This program is called ‘PRIMARY CARE 101’ [410].

sign of the health care delivery system for it to be more accessible and desirable to people, especially in rural areas.

### ***Chronic-Care Models***

Primary health care should not be seen in isolation – it is but one cog in a wheel of care that also involves secondary and tertiary care as well as the community and patient, in both public and private health systems. And while for SSA the challenge of strengthening primary health care remains, and there is limited integration of NCD prevention and promotion in primary health care, hospitals are also not ready in most countries to address even the existing burden of NCDs and RTIs.

A further challenge is ensuring that various aspects of care are linked and coordinated across care levels and boundaries. Care of chronic conditions requires a complex response over an extended time period, involving coordinated inputs from a wide range of health professionals, continuous access to essential medicines, health information and monitoring systems, and a system that promotes patient empowerment [412]. Several organizational models exist



for managing chronic conditions, with the Chronic Care Model (CCM) [413] and WHO’s related Innovative Care for Chronic Conditions (ICCC) framework [414](Figure 19) amongst the most well-known [415]. There have also been attempts to expand the model to better integrate health promotion and prevention aspects [416].

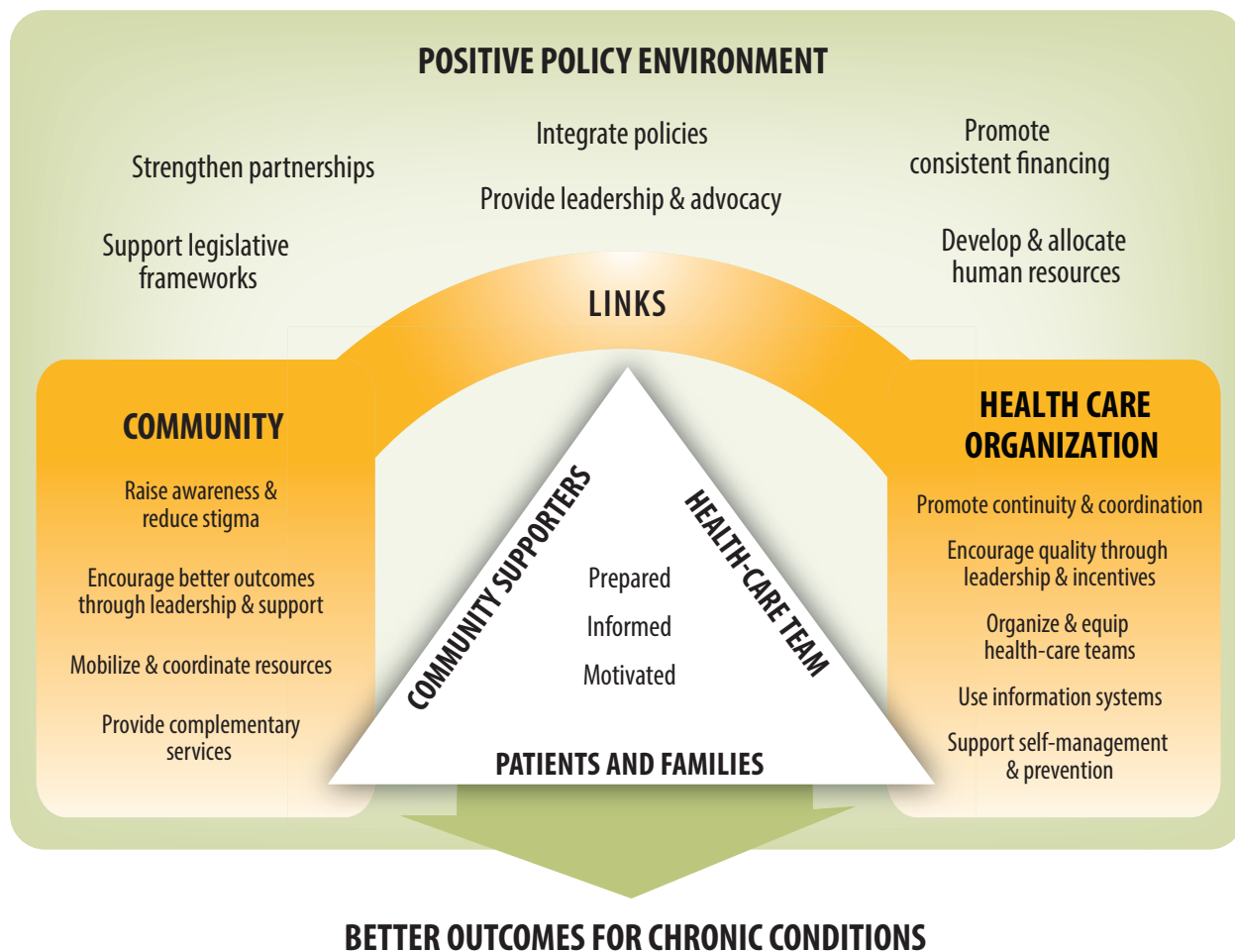
The main models have been applied in a number of countries, the CCM most frequently in high income countries [417-418] while the ICCC framework has been applied in a more diverse range of settings [419]. While there is evidence that single or multiple components of the Chronic Care Model (such as self-management support, delivery system design, decision support, and clinical information systems) improve quality of care, clinical outcomes,

and the use of health care resources, it is less clear if the whole model is needed, or whether only some components would be sufficient [420-421].

Chronic care models are already being applied in the care of chronic conditions of infectious origin such as HIV/AIDS and adapted for use in Africa [422-423](Box 11). The otherwise limited application in LMIC, however, may reflect the need for a level of capacity and resourcing that is out of reach for many countries at present [215]. Models of care developed in one setting may not easily translate to another although they may be more easily implemented in health systems with a strong primary care orientation [420].

A health care delivery system can be designed, even for very low-income populations that decen-

**FIGURE 19: Innovative Care for Chronic Conditions Framework**



Source: [414]

**BOX 11: Quality Improvement Lessons for HIV Improve Care for Other Chronic Conditions in Uganda**

In the Buikwe District, Uganda, the USAID Health Care Improvement project has been working with patients, providers, managers, and the central Ministry of Health to improve the health care system for people with HIV using the Chronic Care Model. These efforts are being carried out at 15 hospitals and health centers and emphasize: (1) improving support for patient self-management to strengthen patients’ knowledge, skills, and confidence to care for themselves; (2) reorganizing the design of the delivery system to decrease waiting time and increase the amount of time providers are able to spend providing patient care; and (3) improving longitudinal documentation systems to facilitate patient care and continuous quality improvement. As a result, patient enrolment has increased and health outcomes have improved.

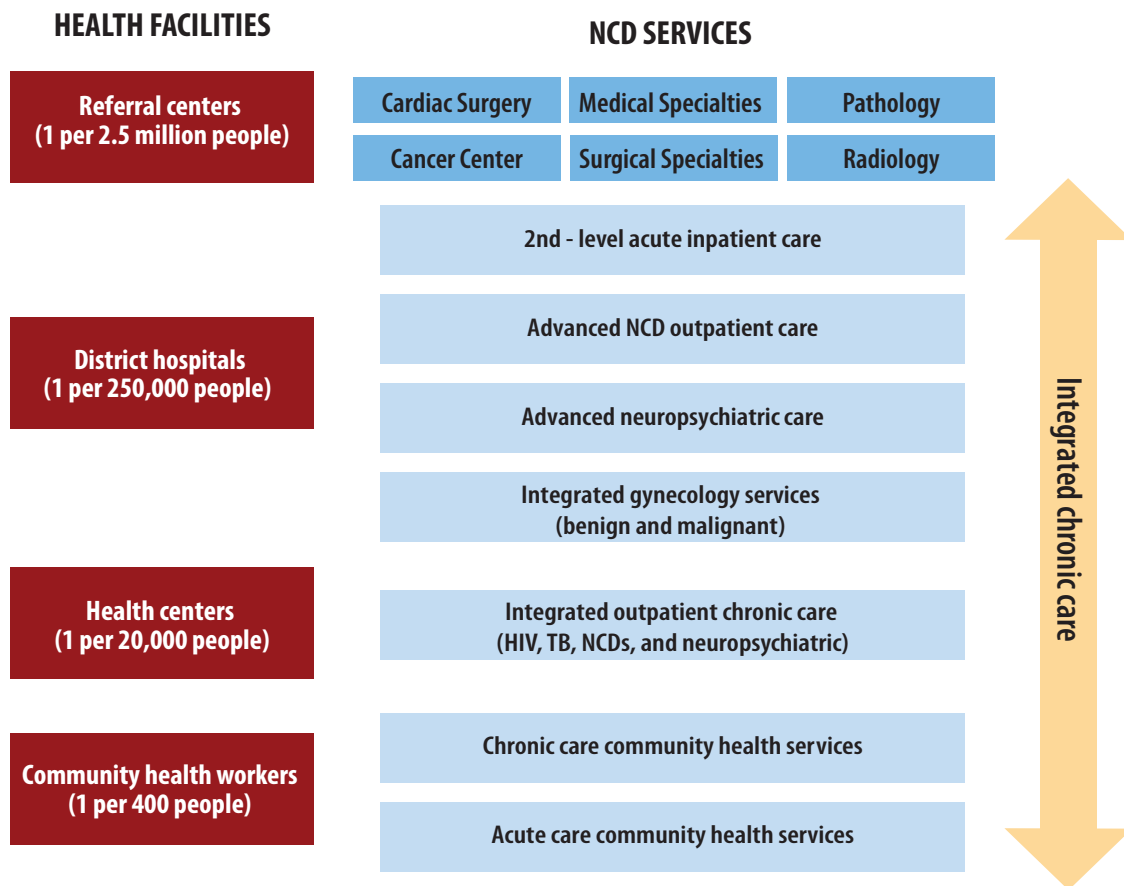
Providers working in the same facilities are now using lessons from HIV-focused work to improve care for patients with diabetes and hypertension. They have established: (1) routine screening of all adults for hypertension; (2) dedicated clinic days for hypertension and diabetes; (3) improved support for patient self-management; and (4) longitudinal documentation to facilitate ongoing follow up. These interventions have led to more than a tenfold increase in the number of patients receiving care for hypertension and an eightfold increase in patients receiving care for diabetes. Between February and November 2011, the percentage of patients meeting blood pressure goals (110/60-140/90mmHg) and fasting blood glucose targets (4-7.5mmmol/L) increased by 49 percent and 54 percent respectively.

Source: [433]

tralize and integrate chronic care to span the spectrum of diseases (neuropsychiatric, infectious, non-communicable, physical disability) as well as across

levels (community, health center, district hospital). As illustration, an example of such a system developed in Rwanda is shown in Figure 20 [56].

**FIGURE 20: Units of Care for Endemic NCDs in Rural Rwanda**



Source: [56]

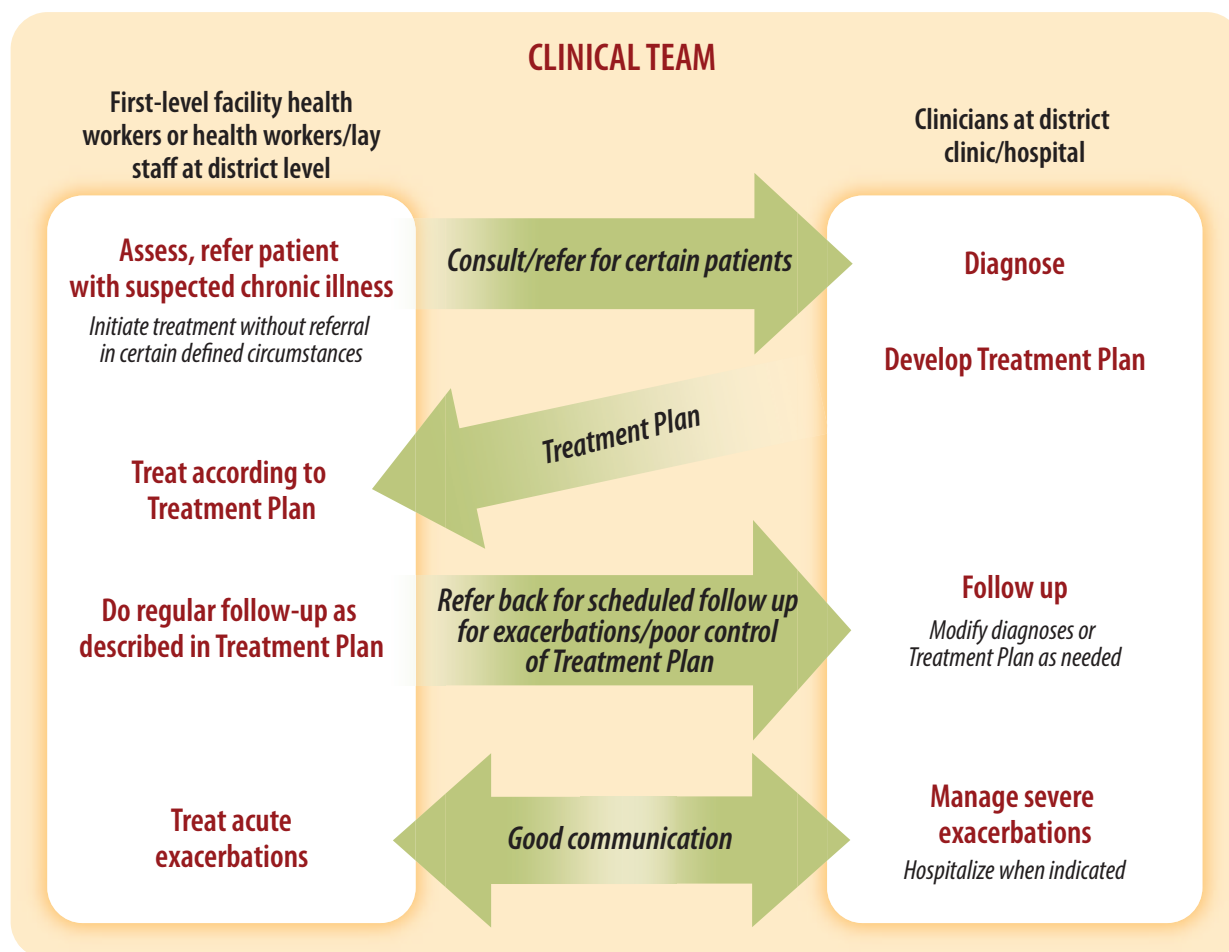
In this example, a strengthened district hospital provides clinical leadership and training, reduces transfers to tertiary centers, and creates a pathway for decentralizing uncomplicated chronic care so that conditions are managed closer to patients' homes and scarce specialist time is judiciously used. Both outpatient management of chronic conditions and inpatient care of their acute exacerbations take place at the district level. At the community or primary care level, simplified protocols based on local epidemiology enable the health worker to assess patients, and broadly categorize them to the appropriate clinical pathway, making referrals and managing treatment accordingly.

For HIV/AIDS, guidance already exists that lays out the principles of good chronic care and the

cross-boundary relationship – an example is shown in Figure 21 [424]. Human resources could be developed to provide the skills and clinical capacity for effective management of other chronic illnesses.

Large-scale service delivery models for chronic conditions in developing countries appear to be relatively absent [192]. Chronic diseases initiatives can potentially learn lessons from the approach to HIV scale-up whereby a model for health maintenance as well as disease management, with promotion of treatment adherence and long-term behavior change, was put in place in a relatively short period of time [211]. Table 12 gives examples of some of the program innovations which could be transferrable.

**FIGURE 21: Approach to Chronic Care at Primary Care and District-Level Facilities for HIV/AIDS, Relevant for Managing Other Diseases and Conditions**



Source: Adapted from: [424]

**TABLE 12: Illustrative HIV/AIDS Program Innovations**

<b>Stewardship</b>	Transparent target-setting; ‘Three Ones’ principles* ; support for decentralization
<b>Financing and payments</b>	Performance-based financing, elimination of user fees, and innovative insurance schemes
<b>Human resources</b>	Training, mentoring, task-shifting, task-sharing, and engaging PLWH in care and support
<b>Infrastructure</b>	Renovations and repairs of clinical, counseling, laboratory, and pharmacy space
<b>Commodities /supply chain</b>	Development and strengthening of procurement systems
<b>Information /data</b>	On-site medical records, electronic medical records, and ‘Three Ones’ approach
<b>Clinical services</b>	Family-focused care, adherence support, and comprehensive primary care for PLWH
<b>Behaviors of providers and patients</b>	Multi-disciplinary teams, prominent use of counselors and peer educators, increased focus on adherence and psychosocial support, and enhanced demand/uptake of services

Source: [211]

\* In 2004, donors, developing countries, and UN agencies agreed to three core principles – known as the “Three Ones” – to better coordinate the scale-up of national AIDS responses; namely, one agreed HIV/AIDS action framework that provides the basis for co-ordinating the work of all partners; one national AIDS coordinating authority, with a broad based multi-sector mandate; and one agreed country-level monitoring and evaluation system [425, 426].

An integrated approach to the management of chronic diseases in LMIC, irrespective of cause, is being called for increasingly [427]. Suggestions include integrating the management of chronic NCDs such as diabetes and hypertension with those of chronic communicable diseases such as AIDS [428]. A focus on broad care needs rather than disease categories could be more beneficial in planning

services [177]; and the establishment of multidisciplinary chronic disease clinics with standardized approaches could improve continuity of care [429], adherence to therapy [430], and in turn efficiency gains. It may also help to decrease the stigma often associated with some communicable diseases. Examples of ‘cross-fertilization’ of care between communicable and NCDs are given in Box 12.

### **BOX 12: Cross-Fertilization of Care for Chronic Conditions**

Care models from HIV/AIDS, TB, and other communicable diseases are being extended or adapted to address other chronic conditions and co-morbidities.

The DOTS framework (directly observed therapy, short-course) has been a cornerstone of TB control for over a decade. The model has also been developed to deliver ART successfully in Malawi, with simplified management protocols, uninterrupted drug supplies, and monitoring of standardized treatment outcomes and key contributory factors [431]. It was proposed that a similar paradigm could be adapted for NCDs [407] and aspects of the DOTS model have since been applied to the management of people with diabetes mellitus in Malawi [432].

Care for people with HIV/AIDS was resourced and expanding in Cambodia, but care for diabetes, hypertension and other chronic diseases was limited. During a three-year project, multi-disciplinary chronic disease clinics were established to offer integrated care for patients with HIV/AIDS, diabetes, and hypertension within the same clinic [428]. Services were well accepted by patients and continuity of care and adherence to treatment were achieved with good outcomes. Providing care for sero-positive patients and those with other conditions within the same facility also reduced HIV-related stigma.

Chronic care models, more frequently used for the care of chronic NCDs, are also being applied to cover chronic diseases whatever their cause. Projects using such models to improve quality of care for chronic conditions such as HIV, hypertension, and diabetes are underway in Uganda, Tanzania, and South Africa [5, 422-423, 433]. There have also been moves to apply self-management programs from chronic NCDs to HIV care [434].

### ***Guidelines and Quality of Care***

Support for decision making by health care professionals in the form of evidence-based guidelines and other educational materials, educational meetings, audit, and feedback, improve their adherence to disease management guidelines and standardized case management, and improve patient outcomes [421]. High-quality drugs need to be procured and supplied at low prices and equipment upgraded and available. Successful implementation of guidelines requires wide distribution, training, and supervision of health workers, and evaluation in practice with appropriate quality or care and outcome measures [118]; this is not straightforward, given the shortages of health workers and funding and the organization needed. Nevertheless, the use of clinical guidelines as tools for linking allocative efficiency with the practice of care has already been discussed in Section 5.5 on ‘Health Financing’.

Using models familiar from communicable disease care has been proposed for strengthening performance management [435]; and lessons learnt from efforts to improve quality of HIV/AIDS care may be applicable to promoting quality of care of those with NCDs. Elements include the number and mix of health staff, clinician performance, a safe and well-equipped health care environment, diagnostic support, and reliable drug supply [436].

Diagnosis and management of disease can be frustrated by the paucity or quality of equipment. Measurement of lung function or hypertension using simple and inexpensive methods can be a major issue for diagnosis and management of disease, given the limited access to spirometry and sphygmomanometers [51] for example. Adaptation of guidelines for use in low-resource settings to avoid dependence on laboratory measurement has been referred to already in relation to CVD risk assessment [308].

Efforts to scale up interventions for chronic diseases still tend to focus on individual diseases [349] or use a single disease guideline as a starting point [147]. This approach is likely to be unaffordable and unsustainable as populations age [215]. It risks confronting front-line health workers and patients with multiple disease management frameworks, which may be unworkable in practice for patients with

multiple co-morbidities [437], and runs contrary to patient-centered care.

### ***Self-Management and Patient-Centered Care***

For developing countries, team-work and patient partnership may be as important as adequate funding [438]. Apart from the organization and quality of care, it can be a significant challenge in some settings to enable patients to understand the choices they have, and to make informed decisions, as well as to support patient compliance and active participation in treatment.

Supporting patient self-management is worthwhile, central to good outcomes of NCD treatment, and has the potential to alleviate pressure on health and social services [439], especially given that people with long-term conditions manage these most of the time by themselves or with family members. Self-management support, particularly patient education about their condition and care and motivational counseling, improves patient adherence to treatments and outcomes, service use and satisfaction, and knowledge of their disease [421]. Patient-centered, self-management support is already provided to PLWH in Africa although its quality may vary [422]. An example of how patient self-management for HIV has been implemented and extended to cover other risk factors is given in Box 13.

Supporting self-management is likely to work best as part of a wider initiative to improve care which also includes education of practitioners, effective use of evidence and technology, decision aids, and community partnerships [439]. Information provision alone is unlikely to be enough, and different clinical conditions may need varying approaches according to the self-care activities required. There is emerging evidence that strategies co-created by professionals and service users have positive outcomes [440].

Given the limited health service resources in low-income countries, ‘full self-management’, with the patient as the hub of disease management, supported by smart phone technology, peer support, and other resources such as primary care providers and informal care givers, has been proposed as an alternative to models of chronic care that are more provider-centered [441].

**BOX 13: Supporting PLWH Self-Management Leads to Expanded Services in Tanzania**

In the Morogoro Region of Tanzania, the USAID Health Care Improvement project has been working with providers, health officials, and community-based organization to support a facility-based, peer mentoring program for people with HIV. PLWH with a record of successful self-management are recruited and trained as expert patients, known as “peer mentors”. They volunteer at health facilities to support new HIV patients and patients having difficulties in providing good self-care through group education sessions and individual motivational counseling. Improved self-management support has resulted in significant increases in adherence, appointment-keeping, and the percentage of patients expressing the confidence to self-manage themselves. These peer mentors have also assumed many routine clinic tasks, such as: patient registration, filing, packaging of cotrimoxazole tablets, and assessment of patients’ nutritional status. Consequent reductions in provider work load have allowed facilities to begin introducing expanded services for HIV patients such as hypertension screening and treatment.

Source: [422]

**Human Resources for Health**

Africa has long struggled with acute health workforce shortages: SAA has 24 percent of the global burden of disease but only 3 percent of all health workers, and migration of health workers, both to positions that do not include patient care and to clinical positions in higher income countries, is a significant problem [442]. Furthermore, some see the growing private health care sector in some countries as having the potential to siphon off both human and financial resources [398]. The average physician-to-population ratio in SSA is 2.2 per 10,000 of the population (ranging from 0.1 in Liberia to 5.7 in Cape Verde). The nursing and midwifery personnel-to-population ratio is nine per 10,000 population (ranging from 0.4 in Guinea to 28.4 in Botswana) [397]. There are relatively few specialist training institutions in Africa, with some countries completely reliant on foreign education for specialists.

The severe shortage and imbalanced distribution of trained health workers (and health promoters) is not just an obstacle to tackling NCDs but also to the delivery of good quality clinical services in general, jeopardizing achievement of the MDGs and improvement of the overall health of the poor, suggesting the need to align health sector, civil service, and macroeconomic policies in finding workforce solutions [443].

Simply scaling up the production of health workers is not a good enough fix, as urban unemployment, rural shortages, health sector attrition, including migration abroad, as well as absenteeism and low productivity (labor market leakages and inefficiencies)

will waste investments. Potential solutions need to identify and address country-specific labor market leakages and inefficiencies, including through: (1) monetary and non-monetary incentives; (2) innovative education models (including rural pipeline models); (3) increasing opportunities for funding for human resources for health, particularly in rural areas; and (4) strengthening management and accountability systems in frontline facilities [444].

***Task Shifting***

Innovative strategies to expand health-system capacity to address HIV and other health challenges include ‘task-shifting’ in clinical settings so that tasks performed by physicians (or any higher cadre) are delegated where appropriate to lower cadre health workers who have a defined set of skills or been specifically trained to perform a limited task [445]. Appropriately trained nurses have been demonstrated to provide effective care for patients similar to that provided by doctors, and to achieve positive health outcomes in chronic disease management, illness prevention, and health promotion [446-447]. This approach has been applied in a range of NCDs, such as asthma, hypertension, and diabetes mellitus, and with minimal additional resources can also improve patient retention and satisfaction for chronic disease management [448-453].

While the rationale behind transferring the tasks is that the alternative would be no service at all to those in need, the approach is not without risk. Unless planned and managed appropriately, there is potential for fragmentation and decreased quality of care, and

a balance needs to be achieved in physicians' roles in direct patient care and as supervisors or trainers to others [454]. Task shifting should be implemented within systems that contain checks and balances to protect both workers and patients [455]. Task-shifting should also not be seen as a substitute for tackling some of the more fundamental issues relating to staff shortages, as well-trained physicians (generalist and specialist) and nurses are needed; it should be complemented, for example, with other approaches such as incentives for retention of health professionals and improved working conditions.

Task shifting efforts can go beyond the health workforce to include people with chronic diseases themselves, their peers, and family members, as seen in the 'expert patients' successfully used in a number of countries in Africa for HIV/AIDS [434, 456-458]. Trained patients have been shown to be as effective in imparting knowledge to their peers as specialist health professionals if given appropriate training. Also, peer support interventions for adults with diabetes in low-resource settings can improve symptom management and blood sugar and hypertension control amongst participants [458-460]. Forming support groups for those living with disease can contribute to success.

### ***Equipping Health Workers***

NCD care clearly needs a well-trained physician (generalist and specialist) and nurse workforce. Chronic disease management, disease prevention, and health promotion need to be well introduced into the education of health workers. Specializations such as family medicine, palliative care, and trauma care may need to be introduced in some countries.

There are opportunities to equip and expand health workers from all fields to be agents for NCD prevention and care; for example, training midwives to identify and manage hypertensive disorders and gestational diabetes in pregnant women can reduce maternal mortality and have an impact on longer-term conditions [396, 438].

### ***Retain, Motivate, Raise Status***

For a well-performing health workforce, entry and exits need to be managed, as do the distribution

and performance of existing health workers [373]. Some roles may be perceived to have low status, especially for nurses, midwives, and auxiliary staff. To retain highly-trained staff, and redistribute the health workforce, African countries need to offer internally competitive wages and benefit packages. Non-monetary incentives, such as training, professional development, improved work environments, and appropriate equipment, are also important to improve motivation, quality and productivity [443]. Partnerships are likely to be important to support comprehensive human resources for health strategies. WHO's 'Treat, train, and retain' plan to strengthen health workforces in countries greatly affected by HIV recognizes the impact of HIV on health workers and the need to overcome persistent stigma and discrimination to be able to treat and retain staff [461]. Given that many health workers may also have NCDs such as diabetes there may be further transferrable learning.

### ***Telemedicine and Information Communication Technology (ICT)***

The application of ICT in health (eHealth), through, for example, telemedicine and electronic medical records, has the potential to facilitate better health care delivery including in situations where health services and human resources for health are scarce [398, 462]. Telemedicine can, for example, offer remote physician access, care, and diagnosis where specialist opinions would be otherwise unavailable, reduce the need for patient transfers and travel, facilitate knowledge-sharing and collaboration across boundaries, and provide professional support and opportunities for continuing professional development to rural practitioners. A WHO survey in 2009 found the African Region to have one of the lowest proportions of countries with established telemedicine services, with less than 10 percent of responding countries having the four telemedicine fields surveyed (teleradiology, telepathology, teledermatology, telepsychiatry) [463].

While mobile phone use in Africa is growing, with subscribers doubling to 500 million during 2008-11 [464], there are infrastructure challenges to e-health such as technical expertise, interrupted power supplies, insufficient communication networks, and

unreliable or limited internet connectivity. A positive sign is that although few African countries have national policies or governance relating to e-health or telemedicine, a growing number have institutions involved in telemedicine development. There is already, for example, a well-established collaboration between high- and low-income countries in the RAFT Project (Réseau en Afrique Francophone pour la Télémédecine) coordinated by the Geneva University Hospital, Switzerland, and university hospitals in 18 largely francophone countries in Africa, which focuses on telemedicine and distance education of health care professionals working in remote sites [465].

## 5.6. Addressing Information and Research Gaps

### Information

Health information is needed for assessing health needs, developing evidence-based policy-making, performance management, and monitoring and evaluating interventions [39]. Countries with the greatest health challenges also tend to have weak information systems [466]. On top of this, monitoring and reporting requirements related to grants, global declarations, and health and disease programs can add considerable burdens – a potential risk that NCD efforts need to avoid.

Several countries (for example, Botswana, Namibia) are making significant efforts in integrating their multiple, disparate, disease-focused, standalone health information systems. In Botswana, the MOH completed the Health Information Management System Strategic Plan in April 2012, that provides an ICT road map in line with the MOH-adopted e-health strategy, to integrate the current standalone systems into the existing Integrated Patient Management System (IPMS). IPMS is a centralized, electronic medical record system focused on patient care and treatment in clinic, and hospital settings. It stores data on various health services, including ART, prevention of mother-to child transmission, laboratory, and pharmacy, and in the near future will support the clinical case-management of Safe Male Circumcision and the National Cervical Cancer Prevention Programs. It is being implemented in 11 hospitals covering close to

75 percent of total MOH hospital beds, their labs, and satellite clinics and have plans to expand to at least 30 hospitals across Botswana. In Namibia, the Ministry of Health and Social Services is in the process of integrating 61 disease-oriented, donor-supported, standalone applications into a single Web-based, Web-enabled platform. The Integrated Health Care Information Management System is a patient-centered record management system, that is HL7<sup>9</sup> compliant, which covers all aspects of hospital clinical case management and ancillary services in day to day operations. The system is being pilot tested in the Windhoek Central Hospital and it is expected to be operational in the other three largest hospitals in the country by the end of 2013, including the Katutura Hospital, which operates as the national trauma referral center. It is expected that once full connectivity is in place, the system will allow the sharing of complete patient records across Namibian health institutions.

In the implementation of electronic health records (EHR) and ICT platforms, important challenges need to be addressed in order to overcome, in addition to existing technological barriers (such as lack of uninterrupted power supply, connectivity, and bandwidth): (a) the transitioning of hybrid approaches where traditional paper-based processes are maintained in parallel in direct competition with the EHR and supporting ICT platform; (b) the adoption of common health and information exchange standards (for example, ICD-10; HL7); (c) change-management strategies aiming to implement organizational change processes deemed critical in the delivery of health services, incorporating the clinical workflows and decision-making processes supported by the new technology; and (d) the required, qualified IT operational and maintenance support and financial backing needed for the sustainability of the systems.

Limited civil registration and unreliable vital statistics relating to fertility, mortality and causes of death in Africa are recognized problems: for example, only four African countries report cause of

9 HL7 standards provide a framework for the integration, sharing, and retrieval of electronic health information. These standards define how information is packaged and communicated from one party to another, setting the language, structure, and data types required for seamless integration between systems.



death statistics to WHO, of which only one is of high quality [79]. There are a few recent signs of progress nationally and internationally: for example, South Africa increased coverage of birth and death registrations to nearly 90 percent by 2008, and the Statistical Commission of Africa has prioritized strengthening of civil registration and vital statistics for the period 2012-17 [467]. All the main health and disease programs draw from the same data sources and share common problems. Rather than develop separate solutions, there is opportunity for shared action and benefit. For example, improved global reporting, oversight, and accountability for women's and children's health could lead to the strengthening of civil registration systems [468].

NCD mortality and morbidity surveillance is largely hospital-based and only 59 percent of countries report having a cancer registry. However, there is growing use of NCD risk-factor surveys to measure health determinants [6]; for example, by 2012 more than 20 African countries had carried out STEPS surveys, some more than once, and most included physical and biochemical measurements enabling assessment of the prevalence of hypertension and diabetes [469]. And, while health information capacity in general and for NCDs may be low, there may be the possibility of adapting and exploiting some of the existing systems set up for communicable diseases [435]. Possibly three important and transferrable lessons for NCDs from the history of AIDS are: the need to pull evidence together to convince politicians to take action; the need for reliable ways to measure success accurately; and that vertical initiatives need system investment for sustainability [466].

Better epidemiological data is called for and a vigorous effort needed to gather more evidence that decision makers, including politicians, can absorb; including data about prevalence, demography, incidence trends, and costs to governments and donors. Better knowledge is needed about NCDs in Africa to underpin the design of contextualized NCD strategies. A tremendous contribution could be made by the international donor and scientific communities, for example: DHS surveys could be expanded to include NCD prevalence and risk factors such as measurement of adult obesity, glycaemia, and blood

pressure; demographic surveillance sites could expand NCD surveillance; donors could fund more STEPS surveys; and partners could strengthen local capacity for NCD surveillance and epidemiology [470-471]. A good example is the ongoing effort in South Africa to develop a strategic surveillance system for NCDs involving vital statistics, population-based health statistics, health facility data, and health facility audits. Taking into account recent WHO recommendations, indicators are being revised, alongside the strengthening of the analysis and reporting capacity to ensure that information can be used for monitoring and planning, and the development of a strategy to strengthen research in the field of NCDs [472].

There have been moves to overcome health information limitations: estimates of mortality and disease burden have been calculated and composite NCD and road safety country profiles developed to assist countries' needs assessments [473-476]. There are rapid assessments for health systems for a number of diseases [477], and manuals exist to assist countries systematically work through the steps involved, for example in assessing road safety management capacity [269]. Community members can be engaged in diagnosis of problems and solutions.

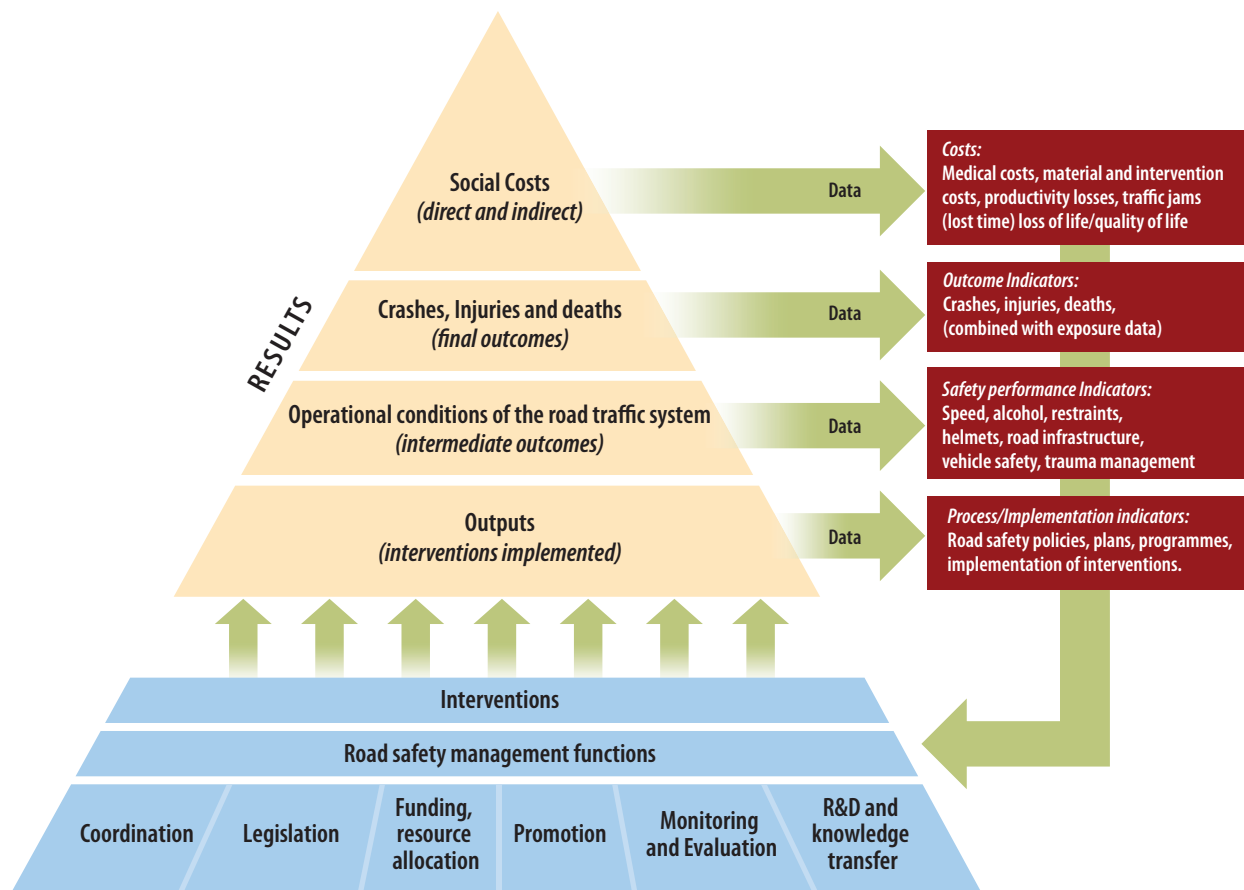
Under-reporting of RTIs is also a problem, with data quality affected by political influences, competing priorities, and the availability of resources; the number of crashes involving vulnerable road users and non-motorized vehicles are thought to be greatly under-reported [117]. A population-based survey in Dar es Salaam, Tanzania, found that police reports for RTIs were only filed 50 percent of the time [478]. An assessment of RTIs in Zambia by the Road Traffic Safety Agency, Police, Ministry of Health, and World Bank, showed that current registries of RTIs lack adequate use of standard codification (such as ICD-10), making it impossible to determine the number of pre-hospital deaths and deaths after arrival at an emergency room [479]. The hospital registries also lack the underlying causes of injury or death classified under the WHO International Classification of Diseases (ICD-10 – Chapter 20) which are needed for effective public health interventions and related preventive measures.

Improving information systems and links between police, transport, and health service data improve data quality; for example, capturing figures for those who die after admission to hospital and triangulation of sources helps to confirm trends and identify data problems. Figure 22 illustrates a data management system for road safety. The health sector also needs to be better at collecting data on non-fatal injuries in a standardized way as this can guide resource allocation [480]. Collecting data on motorcycle helmet-wearing and seatbelt-wearing can indicate success of measures, and estimates of costs to the health system and economy can help advocacy and decisions about enforcement efforts.

### Research Gaps

Research gaps exist for NCD prevention and control in Africa. Priority areas for research include epidemiological surveillance, primary and secondary prevention, and adaptation of health system responses [481]. National and international efforts are needed to develop resource-appropriate strategies and create “frugal innovations”, such as low-cost radiation therapy. Given the need for a health care system that can cope not just with acute care but with chronic care needs effectively, it may be useful to explore the further development of appropriate tools to help model NCD/communicable disease combi-

**FIGURE 22: Systemic Use of Data for Road Safety Planning, Monitoring, and Evaluation**



Source: [480]

nations of interventions and costs of new types of community based services.

Without research in clinical- and cost-effectiveness of NCD prevention interventions in SSA to guide and evaluate improvements, treatment and prevention may be overly subject to the influence of local and global commercial interests [482]. It can also be very useful to monitor and make public the activities in Africa of these global commercial interests, notably of the transnational manufacturers of unhealthy commodities [483].

For road safety, indispensable research would include assessment of knowledge, attitudes, and behaviors, and an evaluation of the effectiveness of interventions [484]. Much knowledge and information is potentially transferable from existing studies elsewhere, given the similarity in contributory factors and that many motorized countries have undergone a similar developmental stage, taking into account cultural, economic, and social conditions in adapting successful experiences [63].

Research in Africa needs to address broader social and cultural factors, as well as interventions. This means that research policy leaders must engage national governments and international agencies, service providers, and research communities [485]. Multi-disciplinary, multi-institutional, and multi-country collaborations could conduct research and properly inform the design of interventions, working with health care providers, policymakers, NGOs, and communities to bridge the gap between research, practice, and policy [129, 179]. Investment in postgraduate training in chronic disease research is also needed to produce the next generation of multidisciplinary researchers. Under country ownership, public-private research and training partnerships can result in country-wide workforce devel-

opment [486]. There is a growing recognition that current incentive systems fail to generate enough research and development to address the health care needs of developing countries and that global financing and coordination needs to be strengthened [487]. A promising model for 'growing research' in developing countries is to use funding to link a developed country supervisor with a developing country supervisor for PhD students working in the developing country on local projects; this model is further strengthened if students from both settings work together in the developing country [488]. The impact of all these efforts, however, would need to be rigorously measured.

## 5.7 Role of Public and Private Employers and Businesses

Public and private employers and businesses have an important role to play in addressing the socio-economic determinants of health. Indeed, their involvement could be particularly important in addressing the complex burden of disease in Africa. The poor health of employees quickly affects a company's bottom line and has a longer-term impact on earnings and profits. Firms have a vested interest in supporting activities to improve employee health, and can have a strong influence on their employees' behavior and make them aware of health risks in ways unavailable to the government.

The involvement of major African companies, multinational corporations, and other stakeholders with experience in employee- and community-directed health programs will be critical in reducing NCDs and injuries. As discussed in Box 14, the concept of employers playing a larger role in improving employee fitness and health is not new, and there is robust international evidence on its positive impact.

**BOX 14: Healthier Workplaces = Healthy Profits**

The current debate in many countries on how to change a health system that is geared to treat illnesses to one that focuses on preventing people from getting sick is highly relevant for the question in Africa on how companies can improve employee health. After all, employees spend most of their waking hours at the workplace.

There is a robust body of evidence showing that investment in workplace wellness programs is not only good for employees but also for the bottom line of companies. These programs, which are organized and sponsored by the employer, help employees, and in some cases, their families, adopt and sustain behaviors that reduce health risks associated with chronic diseases and injuries. Both employees and employers value these programs because they help reduce health risks, absenteeism, and employee turnover.

The entry point for participation in these programs is employee health risk assessments, coupled with clinical screening for risk factors (such as, blood pressure, cholesterol, and body mass index) that provide the baseline for subsequent interventions. Other methods include self-help education materials, individual counseling with health care professionals, and on-site group activities led by trained personnel. Besides obesity and smoking cessation, programs commonly focus on stress management, nutrition, alcohol abuse, and blood pressure, and on preventive care such as the administration of the flu vaccine. Companies have begun giving incentives to motivate healthy behavior, such as bonuses for completing health risk assessments, reimbursements for the cost of fitness-center memberships, or lower health insurance premiums if employees adopt healthier behaviors (for example, quit smoking).

As new strides in global health continue to be made, the workplace should be seen as another promising “entry point” to tackle not only unhealthy behavior among individuals but also to reduce community health risks (for example, through the adoption of programs to better train truck drivers and conduct regular vehicle inspections to prevent road traffic deaths).

The essential pillars of these programs are:

- **Engaged leadership:** Johnson & Johnson helps employees living with HIV/AIDS access ART. Additionally, all of its facilities are smoke-free.
- **Strategic alignment with the company's identity and aspirations:** To promote a culture of health in a company where 60-70 percent of jobs are safety-sensitive, Chevron has made fitness-for-duty a central concern on oil platforms and rigs, in refineries, and during the transport of fuel. Its wellness program includes a comprehensive cardiovascular health component, walking activities, fitness centers, stress-injury prevention, and work/life services.
- **Design that is broad in scope and high in relevance and quality:** To be relevant to the needs of their employees, companies have adopted programs that are not just about physical fitness but also focus on mental health issues such as depression and stress, which are major sources of lost productivity.
- **Broad accessibility:** SAS, a software firm, makes low- or no-cost services a priority. This is complemented by convenient arrangements that ensure high employee participation; for example, recreation facilities that are open before and after work and on weekends.
- **Internal and external partnerships:** Companies offer services, such as biometric health screenings, at the worksite. These, in turn, are used to devise “individualized” programs with a local sport club and medical practice for at-risk employees.
- **Effective communications:** To help overcome employee apathy or sensitivity about personal health issues, some companies are sharing information about wellness in regular corporate e-mails, health-related messages on intranet portals, and wellness “clues” in the workplace, such as the availability of bicycle racks in parking garages with showers nearby to make cycling to work appealing.

What are the returns on this investment? In the case of Johnson & Johnson, since 1995 the percentage of employees who smoked dropped by more than two-thirds, and the number who had high blood pressure or were physically inactive declined by more than half. The companies reaped financial rewards as well: thanks to wellness programs in the workplace, medical costs for U.S. firms fell by about US\$3.27 and illness-related absenteeism costs dropped by about US\$2.73 for every dollar spent on such programs.

Governments can play an important role in helping implement and expand employer wellness programs, not only to improve the health of the population, but also to control health care spending. The 2009 Affordable Care Act, adopted by the U.S. Government to expand health insurance coverage, is a good example, as it expands employers' ability to reward employees who meet health status goals by participating in wellness programs and to require employees who don't meet these goals to pay more for their employer-sponsored health coverage.

*“As we start the journey of the next fifty years, we are clear about the task before us: to educate our populace, and ensure healthy bodies and minds; to modernize and expand Africa’s infrastructure and connect our peoples and countries; to grow our agriculture and agro-businesses so that we can feed ourselves and the world; to use our natural resources to industrialize and grow our shared prosperity; to invest in science, technology, research and innovation as enablers of rapid progress; and finally to empower women and youth as the drivers of Africa’s renaissance”.*

*Dr. Nkosazana Diamini Zuma  
Chairperson of the African Union Commission  
Commemoration of the 50th anniversary of the Organization  
of African Unity (OAU) now the African Union (AU)  
Addis Ababa, 25 May 2013*

## 6. CONCLUSION

Africa is seen as having the potential to become a pillar of global growth [2], but its social and human development indicators are lagging, and threaten to reverse gains made in sustainable development [116].

This report set out to address four questions:

- (1) How is the growing burden of NCDs and RTIs changing the epidemiology of SSA?
- (2) What determines and drives this burden, and what are the commonalities with communicable diseases?
- (3) What is the rationale for public intervention?
- (4) How could resource-constrained governments approach NCD prevention and treatment and road safety in a comprehensive, effective, and efficient way?

The evidence is that while communicable diseases, maternal, perinatal, and nutritional conditions remain leading causes of the disease burden, NCDs and RTIs are already a significant problem for SSA as a whole, and a leading cause of death for some countries, populations, or age groups. Trends in risk factors, drivers, and determinants predict rising levels of NCDs and RTIs. These, added to existing disease burdens, put further pressure on already fragile health systems, and their impact on health outcomes may have consequences for sustainable development.

There are both equity- and efficiency-based rationales for public policy intervention. Highly cost-effective interventions for the prevention and control of NCDs and RTIs have been identified which are appropriate for low- and middle-income settings, and their implementation would appear to be economically justified by likely welfare gains and the avoidance of economic losses.

An appropriate response needs to balance population-based and individual-level strategies, prioritizing a set of effective and cost-effective interventions that are feasible, scalable, and affordable. Developing a comprehensive approach requires adjustments throughout the health system, some of which pertain beyond NCDs and RTIs; such as, improvements in health governance, universal coverage, access to essential medicines, quality of care, and support for self-management of chronic diseases. It also requires attention to broader determinants of health and wellbeing such as social, economic, and environmental conditions.

The report hypothesized that a broader understanding of NCDs and RTIs, one which explores shared challenges, drivers, and potential solutions with other diseases and conditions, could be constructive in SSA’s health and development context. Reviewing the literature through this perspective, the report found many links between communicable diseases, maternal, perinatal, and nutritional

conditions, and NCDs; for example, evidence for common causes; shared underlying social conditions; interacting co-morbidities; as well as common solutions such as vaccination, standardized syndromic protocols, and care models. Many of the measures needed for strengthening health systems cut across disease categories, and there are opportunities for NCDs and RTIs to benefit from the lessons and initiatives of interventions for HIV/AIDS, TB, and maternal health, for example, and vice versa. Thus, the report concludes that there is likely to be added value in capitalizing on the shared challenges, drivers, and potential solutions across the different disease categories, with broader health-systems strengthening measures, and that there is already evidence of this taking place and being effective.

Globalization, rapid urbanization, population growth, and ageing are contributing to the burden of disease in SSA, as NCDs and RTIs emerge from the shadows. The response to NCDs and RTIs in SSA needs to avoid establishing yet another set of vertical programs in competition for scarce resources.

As the evidence shows, divisions between disease categories, or between so-called vertical and horizontal programs, are to some extent artificial, and may not be optimal for Africa at this stage of its health development. Opportunities for integration can arise out of synergies between targeted interventions, necessity, or desirability [493]. Consideration of NCDs and/or RTIs within broader development initiatives could, for example, mean mitigating the impact of road infrastructure, buildings, and urban design on safe and active travel, by building in from the start ways of keeping pedestrians and cyclists safe and for managing speed. Or it could mean designing programs to maximize benefit and minimize harm in terms of NCD and RTI outcomes, such as ensuring that infant feeding programs and conditional cash transfer programs are not designed in such a way that they worsen NCD outcomes.

It should also be possible to continue ongoing efforts to strengthen health systems in ways that enable the benefits to be shared – this report has included examples of how improvements for NCD care can ‘piggy-back’ onto other existing efforts at little additional cost, such as extending chronic care delivery to span a spectrum of diseases with similar care needs, or for palliative care to reach beyond AIDS, or for demographic and other health surveys to be expanded to incorporate measurement of NCDs and their risk factors. Finally, there are a number of NCD interventions that are not only cost-effective but also potentially resource-generating and beneficial for dealing with other diseases, such as putting in place and enforcing a strong regulatory and fiscal framework for tobacco and alcohol including the raising of prices. In making this happen, and facilitating it, there are roles not just for politicians and policy-makers within countries but also at the regional and international level. There is also work for researchers in furthering the evidence base on the integration of health programs, the integration of health concerns into other development interventions, and in different country contexts.

In conclusion, it should be clear that controlling NCDs and RTIs are key public health issues in Africa. Ensuring an effective response, however, is a particularly difficult challenge in countries facing a double or triple burden of disease with a low national income level and weak health care systems. As argued here, and fully consistent with the health improvement and poverty alleviation objectives of World Bank work in the health sector [494-495], efforts to address this challenge effectively in Africa should be part of broader multisectoral effort, including health system strengthening programs and activities, that need to be supported by national governments, public and private employers and businesses, civil society, and the international community over the short and medium terms. It is expected therefore that this report will contribute to advance the discussion on this topic in Africa and beyond in the years to come.

# REFERENCES

1. The Economist, *Africa rising*, in *The Economist*. 2011.
2. UNECA, *Economic Report on Africa 2012: Unleashing Africa's Potential as a Pole of Global Growth*. 2012: Addis Ababa.
3. UNECA, *Assessing Progress in Africa toward the Millennium Development Goals, 2011*, in *MDG Report*. 2011: Addis Ababa.
4. UN, *Improving global road safety*. 2010, United Nations: New York.
5. Levitt, N.S., et al., *Chronic noncommunicable diseases and HIV-AIDS on a collision course: relevance for health care delivery, particularly in low-resource settings - insights from South Africa*. *American Journal of Clinical Nutrition*, 2011. **94**(6): p. 1690S-6S.
6. WHO, *WHO African Region Ministerial Consultation on Noncommunicable Diseases: Background document*. 2011, WHO Regional Office for Africa: Brazzaville.
7. Hyder, A.A., S.S.F. Muzaffar, and A.M. Bachani, *Road traffic injuries in urban Africa and Asia: A policy gap in child and adolescent health*. *Public Health*, 2008. **122**(10): p. 1104-1110.
8. UN, *Political declaration of the high-level meeting of the general assembly on the prevention and control of noncommunicable diseases*. 2011, United Nations: New York.
9. WHO. *65th World Health Assembly closes with new global health measures*. 2012 27 May 2012]; Available from: [http://www.who.int/mediacentre/news/releases/2012/wha65\\_closes\\_20120526/en/index.html](http://www.who.int/mediacentre/news/releases/2012/wha65_closes_20120526/en/index.html).
10. WHO. *Fourth round of informal consultations on the development of a WHO global action plan for the prevention and control of NCDs 2013-2020*. 2013 1 April 2013]; Available from: [http://www.who.int/nmh/events/2013/consultation\\_201303015/en/](http://www.who.int/nmh/events/2013/consultation_201303015/en/).
11. WHO. *NCD global monitoring framework*. 2013 1 April 2013]; Available from: [http://www.who.int/nmh/global\\_monitoring\\_framework/en/](http://www.who.int/nmh/global_monitoring_framework/en/).
12. Chisholm, D., et al., *What are the priorities for prevention and control of non-communicable diseases and injuries in sub-Saharan Africa and South East Asia?* *British Medical Journal*, 2012. **344**(e586).
13. Chisholm, D., et al., *Cost effectiveness of strategies to combat road traffic injuries in sub-Saharan Africa and South East Asia: mathematical modelling study*. *British Medical Journal*, 2012. **344**.
14. Beaglehole, R., et al., *UN High-Level Meeting on Non-Communicable Diseases: addressing four questions*. *Lancet*, 2011. **378**(9789): p. 449-455.
15. UNECA. *Report of the Second African Road Safety Conference*. in *Second African Road Safety Conference*. 2011. Addis Ababa, Ethiopia: UNECA.
16. Murray, C.J.L., et al., *Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010*. *The Lancet*, 2012. **380**(9859): p. 2197-2223.
17. IHME, *Global Burden of Disease*. 2013, Institute for Health Metrics and Evaluation.
18. UNAIDS, *World AIDS Day Report 2011. How to Get to Zero: Faster, Smarter, Better*. 2011.
19. Stop TB Partnership, *The Global Plan to Stop TB 2011-15: Transforming the Fight. Towards the Elimination of Tuberculosis*. 2011: Geneva.
20. WHO, *World malaria report 2011*. 2011: Geneva.
21. WHO, *Trends in Maternal Mortality: 1990 to 2010*. WHO, UNICEF, UNFPA and The World Bank estimates. 2012, World Health Organization: Geneva.
22. Onis, M.d., M. Blossner, and E. Borghi, *Prevalence and trends of stunting among pre-school children, 1990-2020*. *Public Health Nutrition*, 2011: p. 7.
23. Moolani, Y., G. Bukhman, and P.J. Hotez, *Neglected Tropical Diseases as Hidden Causes of Cardiovascular Disease*. *Plos Neglected Tropical Diseases*, 2012. **6**(6).
24. Young, F., et al., *A review of co-morbidity between infectious and chronic disease in sub-Saharan Africa: TB and Diabetes Mellitus, HIV and Metabolic Syndrome, and the impact of globalization*. *Globalization and Health*, 2009. **5**(9).
25. Bove, I., et al., *Stunting, overweight and child development impairment go hand in hand as key problems of early infancy: Uruguayan case*. *Early Human Development*, 2012. **88**(9): p. 747-751.

26. Sitas, F., et al., *Part II: Cancer in indigenous Africans - causes and control*. Lancet Oncology, 2008. **9**(8): p. 786-795.
27. Parkin, D.M., *The global health burden of infection-associated cancers in the year 2002*. International Journal of Cancer, 2006. **118**(12): p. 3030-3044.
28. WHO, *The global burden of disease: 2004 update*. 2008, Geneva: World Health Organization,.
29. Lozano, R., et al., *Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010*. The Lancet, 2012. **380**(9859): p. 2095-2128.
30. WHO, *World Health Statistics 2011*. 2011: Geneva.
31. UN, *Note by the Secretary-General transmitting the report by the Director-General of the World Health Organization on the global status of non-communicable diseases, with a particular focus on the development challenges faced by developing countries., in Follow up to the outcome of the Millennium summit*. 2010, UN General Assembly: New York.
32. WHO, *World Health Statistics 2013*. 2013: Geneva.
33. Disease Control Priorities Project, *Noncommunicable Diseases on the Rise in East, Central and Southern Africa., in Fact sheet*. 2007, World Bank.
34. Yusuf, S., et al., *Global burden of cardiovascular diseases Part I: General considerations, the epidemiological transition, risk factors and impact of urbanization*. Circulation, 2001. **104**: p. 2746-2753.
35. Amuna, P. and F.B. Zotor, *Epidemiological and nutrition transition in developing countries: impact on human health and development*. Proceedings of the Nutrition Society, 2008. **67**: p. 82-90.
36. Gaziano, T., *Prevention and treatment of chronic diseases in developing countries., in Expert Paper*, P. Division, Editor. 2011, United Nations Department of Economic and Social Affairs: New York.
37. Baingana, F.K. and E.R. Bos, *Changing patterns of disease and mortality in sub-Saharan Africa: an overview., in Disease and mortality in sub-Saharan Africa, 2nd edition*. 2006, World Bank: Washington, D.C.
38. WHO, *Blood pressure, in AFRO STEPS Database 2003-2009*. 2011.
39. Dalal, S., et al., *Non-communicable diseases in sub-Saharan Africa: what we know now*. International Journal of Epidemiology, 2011. **40**: p. 885-901.
40. Mbewu, A. and J.-C. Mbanya, *Cardiovascular disease., in Disease and mortality in sub-Saharan Africa, 2nd edition*. 2006, World Bank: Washington, D.C.
41. Parkin, D.M., et al., *Part I: Cancer in indigenous Africans-Burden, distribution, and trends*. Lancet Oncology, 2008. **9**(7): p. 683-692.
42. IARC, *Cervical Cancer Incidence, Mortality and Prevalence Worldwide in 2008: Summary in Cancer Fact Sheet*. 2010, GLOBOCAN 2008: Lyon.
43. McCormack, V.A. and J. Schuz, *Africa's growing cancer burden: Environmental and occupational contributions*. Cancer Epidemiology, 2012. **36**(1): p. 1-7.
44. Sylla, B.S. and C.P. Wild, *A million Africans a year dying from cancer by 2030: What can cancer research and control offer to the continent?* International Journal of Cancer, 2012. **130**(2): p. 245-250.
45. IDF, *Diabetes Atlas*. 2011.
46. Levitt, N.S., *Diabetes in Africa: epidemiology, management and healthcare challenges*. Heart, 2008. **94**(11): p. 1376-82.
47. Beran, D. and J.S. Yudkin, *Looking beyond the issue of access to insulin: What is needed for proper diabetes care in resource poor settings*. Diabetes Research and Clinical Practice, 2010. **88**(3): p. 217-221.
48. WHO, *Blood glucose and cholesterol measurements, in African Health Observatory*. 2011, World Health Organization: Brazzaville.
49. MHQL, *The Trends in Diabetes and Cardiovascular Disease Risk in Mauritius: The Mauritius Non Communicable Diseases Survey 2009*. 2009.
50. Hall, V., et al., *Diabetes in Sub Saharan Africa 1999-2011: Epidemiology and public health implications. a systematic review*. BMC Public Health, 2011. **11**.
51. Mehrotra, A., A.M. Oluwole, and S.B. Gordon, *The burden of COPD in Africa: a literature review and prospective survey of the availability of spirometry for COPD diagnosis in Africa*. Tropical Medicine & International Health, 2009. **14**(8): p. 840-848.
52. van Gemert, F., et al., *The impact of asthma and COPD in sub-Saharan Africa*. Primary care respiratory journal : journal of the General Practice Airways Group, 2011. **20**(3): p. 240-8.
53. WHO, *Noncommunicable Diseases: A Strategy for the African Region*. 2000, WHO Regional Office for Africa: Brazzaville.
54. WHO, *The Brazzaville Declaration on Noncommunicable Diseases Prevention and Control in the WHO African Region*. 2011, WHO Regional Office for Africa: Brazzaville.
55. Mensah, G.A. and B.M. Mayosi, *The 2011 United Nations high-level meeting on non-communicable diseases: the Africa agenda calls for a 5-by-5 approach*. South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde, 2013. **103**(2): p. 77-9.



56. Bukhman, G. and A. Kidder, eds. *The PIH Guide to Chronic Care Integration for Endemic Noncommunicable Diseases. Rwanda edition.* . Rwanda edition. Cardiac, Renal, Diabetes, Pulmonary, and Palliative Care. ed. 2011, Partners in Health: Boston.
57. Dzudie, A., et al., *Chronic heart failure, selected risk factors and co-morbidities among adults treated for hypertension in a cardiac referral hospital in Cameroon.* European Journal of Heart Failure, 2008. **10**(4): p. 367-372.
58. Westaway, M.S., *The impact of chronic diseases on the health and well-being of South Africans in early and later old age.* Archives of Gerontology and Geriatrics, 2010. **50**(2): p. 213-221.
59. WHO, *Global status report on road safety 2013.* 2013: Geneva.
60. Peden, M., et al., eds. *World report on road traffic injury prevention.* 2004, World Health Organization: Geneva.
61. WHO, *Road safety in the WHO African Region. The Facts 2013.* 2013.
62. WHO, ed. *Youth and road safety.*, ed. T. Toroyan and M. Peden. 2007, World Health Organization: Geneva.
63. Chen, G., *Road traffic safety in African countries - status, trend, contributing factors, countermeasures and challenges.* International Journal of Injury Control and Safety Promotion, 2010. **17**(4): p. 247-255.
64. WHO, *Global status report on noncommunicable diseases 2010.* 2011, World Health Organization: Geneva.
65. Bloom, D.E., et al., *The Global Economic Burden of Non-communicable Diseases.* 2011: Geneva.
66. Stuckler, D., *Population causes and consequences of leading chronic diseases: A comparative analysis of prevailing explanations.* Milbank Quarterly, 2008. **86**(2): p. 273-326.
67. Abegunde, D.O., et al., *The burden and costs of chronic diseases in low-income and middle-income countries.* The Lancet 2007. **370**(9603): p. 1929 - 1938.
68. Kirigia, J.M., et al., *Economic burden of diabetes mellitus in the WHO African region.* BMC Int Health Hum Rights, 2009. **9**(6).
69. Guariguata, L., I. de Beer, R. Hough, E. Bindels, D. Weimers-Maasdorp, F.G. Feeley, III, and T.F. de Wit, *Diabetes, HIV and other health determinants associated with absenteeism among formal sector workers in Namibia.* BMC.Public Health, 2012. **12**: p. 44.
70. Elrayah, H., et al., *Economic burden on families of childhood type 1 diabetes in urban Sudan.* Diabetes Research and Clinical Practice, 2005. **70**(2): p. 159-165.
71. Leive, A. and K. Xu, *Coping with out-of-pocket health payments: empirical evidence from 15 African countries.* Bull World Health Organ., 2008. **86**(11): p. 849-856.
72. Mock, C.N., et al., *Economic consequences of injury and resulting family coping strategies in Ghana.* Accid.Anal.Prev., 2003. **35**(1): p. 81-90.
73. Rehm, J., et al., *Global burden of disease and injury and economic cost attributable to alcohol use and alcohol use disorders.* The Lancet, 2009. **373**(9682): p. 2223 - 2233
74. Mash, R., *Chronic diseases, climate change and complexity: the hidden connections.* SA Fam Pract, 2010. **52**(5): p. 438-445.
75. Friel, S., *Climate change, noncommunicable diseases and development: the relationships and common policy opportunities.* Annual Review of Public Health, 2011. **32**: p. 133-47.
76. Kjellstrom, T., et al., *Public health impact of global heating due to climate change: potential effects on chronic non-communicable diseases.* International Journal of Public Health, 2010. **55**(2): p. 97-103.
77. Popkin, B.M., *The shift in stages of the nutrition transition in the developing world differs from past experiences.* Public Health Nutrition, 2002. **5**(1 A): p. 205-214.
78. Lim, S.S., et al., *A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010.* The Lancet, 2012. **380**(9859): p. 2224-2260.
79. WHO, *World Health Statistics 2012.* 2012: Geneva.
80. Abrahams, Z., Z. McHiza, and N.P. Steyn, *Diet and mortality rates in Sub-Saharan Africa: Stages in the nutrition transition.* BMC Public Health, 2011. **11**.
81. WHO, *Overweight and obesity,* in *AFRO STEPS Database 2003-2009* 2011, World Health Organization.
82. UNDP, *Africa Human Development Report 2012: Towards a Food Secure Future.* 2012, Regional Bureau for Africa: New York.
83. Steyn, K. and A. Damasceno, *Lifestyle and related risk factors for chronic diseases.*, in *Disease and mortality in sub-Saharan Africa, 2nd edition.* 2006, World Bank: Washington, D.C. p. 247-65.

84. Hawkes, C., *Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases*. *Globalization and Health*, 2006. **28**(2): p. 4.
85. Popkin, B.M., L.S. Adair, and S.W. Ng, *Global nutrition transition and the pandemic of obesity in developing countries*. *Nutrition Reviews*, 2012. **70**(1): p. 3-21.
86. Moodie, R., et al., *Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries*. *Lancet*, 2013. **381**(9867): p. 670-679.
87. Schmidt, M.I., et al., *Health in Brazil 4 Chronic non-communicable diseases in Brazil: burden and current challenges*. *Lancet*, 2011. **377**(9781): p. 1949-1961.
88. WHO, *Fruit and vegetable consumption*. 2011, World Health Organization: Brazzaville.
89. Arimond, M. and M.T. Ruel, *Dietary diversity is associated with child nutritional status: Evidence from 11 Demographic and Health Surveys*. *Journal of Nutrition*, 2004. **134**(10): p. 2579-2585.
90. Deininger, K., et al., *Rising global interest in farmland : can it yield sustainable and equitable benefits?*, in *Agriculture and Rural Development*. 2011: Washington, DC.
91. WHO, *WHO global report: mortality attributable to tobacco*. 2012: Geneva. p. 392.
92. WHO, *WHO report on the global tobacco epidemic 2011, in Warning about the dangers of tobacco*. 2011, World Health Organization: Geneva.
93. Musoke, F., *The Uganda Global Youth Tobacco Survey Report (2008) – Tobacco Control Policy Implications*. 2008, Makerere University, Kampala, Uganda: Brazzaville.
94. The World Bank. *Meeting report*. . in *The Economics of Tobacco Control in Southern Africa: the Issues of Taxation and Smuggling*. 2012. Gaborone, Botswana.
95. Jakpor, P., *Nigeria: how British American Tobacco undermines the WHO FCTC through agricultural initiatives: invited commentary*. *Tobacco Control*, 2012. **21**(2): p. 220.
96. WHO, *Monitoring alcohol marketing in Africa*. 2011, WHO Regional Office for Africa: Brazzaville.
97. WHO, *Global status report on alcohol and health*. 2011, World Health Organization: Geneva.
98. Chersich, M.F., et al., *Enhancing global control of alcohol to reduce unsafe sex and HIV in sub-Saharan Africa*. *Globalization and Health*, 2009. **5**(16).
99. Mandong, B.M., et al., *Epidemiology of Accident Deaths in Jos, Nigeria (1996-2000)*. *Annals of African Medicine*, 2006. **5**(3): p. 149-152.
100. Obot, I.S., *Alcohol use and related problems in sub-Saharan Africa*. . *African Journal of Drug and Alcohol Studies*, 2006. **5**(1): p. 17-28.
101. Casswell, S. and T. Thamarangsi, *Alcohol and Global Health 3 Reducing harm from alcohol: call to action*. *Lancet*, 2009. **373**(9682): p. 2247-2257.
102. Guthold, R., et al., *Physical Activity in 22 African Countries Results from the World Health Organization STEPwise Approach to Chronic Disease Risk Factor Surveillance*. *American Journal of Preventive Medicine*, 2011. **41**(1): p. 52-60.
103. WHO, *Physical activity*. 2011.
104. Sobngwi, E., et al., *Exposure over the life course to an urban environment and its relation with obesity, diabetes, and hypertension in rural and urban Cameroon*. *International Journal of Epidemiology*, 2004. **33**(4): p. 769-776.
105. Pendakur, V.S., *Non-motorized transport in African cities. Lessons from experience in Kenya and Tanzania*, in *Sub-Saharan Africa Transport Policy Program*. 2005, Africa Region.
106. Mock, C.N., S.N. Forjuoh, and F.P. Rivara, *Epidemiology of transport-related injuries in Ghana*. *Accident Analysis and Prevention*, 1999. **31**(4): p. 359-370.
107. UNDESA, *World Urbanization Prospects: The 2009 Revision*. 2009, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.
108. UN-HABITAT, *The State of African Cities 2010: Governance, inequality and urban land markets*. 2010, United Nations Human Settlements Programme (UN-HABITAT): Nairobi. p. 270.
109. UN-ECA, *Sustainable Development Report on Africa*. 2012: Addis Ababa.
110. Sverdluk, A., *Ill-health and poverty: a literature review on health in informal settlements*. *Environment and Urbanization*, 2011. **23**(1): p. 123-155.
111. African Union, *Social Policy Framework for Africa*. 2008: Addis Ababa.
112. Mbanya, J.-C. and K. Ramiaya, *Diabetes Mellitus, in Disease and mortality in sub-Saharan Africa, 2nd edition*. 2006, World Bank: Washington, D.C.
113. Delisle, H., et al., *Urbanisation, nutrition transition and cardiometabolic risk: the Benin study*. *British Journal of Nutrition*, 2012. **107**(10): p. 1534-1544.

114. BeLue, R., et al., *An overview of cardiovascular risk factor burden in sub-Saharan African countries: a socio-cultural perspective*. *Globalization and Health*, 2009. **5**(10).
115. Stern, R., T. Puoane, and L. Tsolekile, *An Exploration into the Determinants of Noncommunicable Diseases Among Rural-to-Urban Migrants in Peri-urban South Africa*. *Preventing Chronic Disease*, 2010. **7**(6).
116. UNEP, *Africa Environment Outlook 2: Our environment, Our wealth*. 2006: Nairobi.
117. WHO, *Global status report on road safety: time for action*. 2009: Geneva.
118. Bousquet, J., et al., *Management of chronic respiratory and allergic diseases in developing countries. Focus on sub-Saharan Africa*. *Allergy*, 2003. **58**(4): p. 265-283.
119. UN, *World Population Prospects, the 2010 Revision*. 2010, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.
120. Guengant, J.-P. and J.F. May, *Proximate determinants of fertility in sub-Saharan Africa and their possible use in fertility projections.*, in *Expert Paper P*. Division, Editor. 2011, United Nations Department of Economic and Social Affairs: New York.
121. The World Bank, *Building human capital in Africa.*, A.r.-H. Development, Editor. 2011, The World Bank: Washington, DC.
122. Wang, H., et al., *Age-specific and sex-specific mortality in 187 countries, 1970–2010: a systematic analysis for the Global Burden of Disease Study 2010*. *The Lancet*, 2012. **380**(9859): p. 2071-2094.
123. Salomon, J.A., et al., *Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the Global Burden Disease Study 2010*. *Lancet*, 2012. **380**(9859): p. 2144-2162.
124. Smith, S.M. and G.A. Mensah, *Population ageing and implications for epidemic cardiovascular disease in sub-Saharan Africa*. *Ethnicity & Disease*, 2003. **12**(2 Suppl.2): p. S77-80.
125. Hirschhorn, L.R., et al., *Cancer and the 'other' non-communicable chronic diseases in older people living with HIV/AIDS in resource-limited settings: a challenge to success*. *AIDS (London, England)*, 2012. **26 Suppl 1**: p. S65-75.
126. Westaway, M.S., *Effects of ageing, chronic disease and co-morbidity on the health and well-being of older residents of Greater Tshwane*. *Samj South African Medical Journal*, 2010. **100**(1): p. 35-36.
127. Rasanathan, K. and R. Krech, *Action on social determinants of health is essential to tackle noncommunicable diseases*. *Bulletin of the World Health Organization*, 2011. **89**: p. 775-776.
128. CSDH, *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health*. 2008, Geneva: World Health Organization.
129. British Academy, *Africa's neglected epidemic: multidisciplinary research, intervention and policy for chronic diseases. Conference report May 2010*. 2010.
130. Blas, E. and A. Sivasankara Krup, eds. *Equity, social determinants and public health programmes*. 2010, World Health Organization: Geneva.
131. Ortiz, I. and M. Cummins, *Global Inequality: Beyond the Bottom Billion. A Rapid Review of Income Distribution in 141 Countries*, in *UNICEF Policy and Practice*. 2011, Policy, Advocacy and Knowledge Management, Division of Policy and Practice: New York.
132. Agyei-Mensah, S. and A.d.-G. Aikins, *Epidemiological transition and the double burden of disease in Accra, Ghana*. *Journal of Urban Health*, 2010. **87**(5): p. 879-97.
133. Schneider, M., et al., *Poverty and non-communicable diseases in South Africa*. *Scandinavian Journal of Public Health*, 2009. **37**: p. 176-186.
134. Vlassoff, C., *Gender differences in determinants and consequences of health and illness*. *Journal of Health Population and Nutrition*, 2007. **25**(1): p. 47-61.
135. Gordon, B., R. Mackay, and E. Rehfuss, eds. *Inheriting the World: the Atlas of Children's Environmental Health and the Environment*. 2004, World Health Organization: Geneva.
136. Roberts, B., P. Patel, and M. McKee, *Noncommunicable diseases and post-conflict countries*. *Bulletin of the World Health Organization*, 2012. **90**: p. 2-2A.
137. Gilmore, A.B. and M. McKee, *Moving East: how the transnational tobacco industry gained entry to the emerging markets of the former Soviet Union - part I: establishing cigarette imports*. *Tobacco Control*, 2004. **13**(2): p. 143-150.
138. Gilmore, A.B. and M. McKee, *Moving East: how the transnational tobacco industry gained entry to the emerging markets of the former Soviet Union - part II: an overview of priorities and tactics used to establish a manufacturing presence*. *Tobacco Control*, 2004. **13**(2): p. 151-160.
139. Ogoina, D. and G.C. Onyemelukwe, *The role of infections in the emergence of non-communicable diseases (NCDs): compelling needs for novel strategies in the developing world*. *Journal of Infection and Public Health*, 2009. **2**: p. 14-29.
140. Basu, S., et al., *Projected effects of tobacco smoking on worldwide tuberculosis control: mathematical modelling analysis*. *British Medical Journal*, 2011. **343**: p. d5506

141. Jeon, C.Y. and M.B. Murray, *Diabetes mellitus increases the risk of active tuberculosis: A systematic review of 13 observational studies*. PLoS Medicine, 2008. 5(8): p. e152.
142. Smart, T., *HIV and non-communicable diseases (NCDs)*, in HATIP. 2011: [online]. p. 1-13.
143. Baker, M.A., et al., *The impact of diabetes on tuberculosis treatment outcomes: A systematic review*. BMC Medicine, 2011. 9.
144. Geneau, R. and G. Hallen, *Toward a systemic research agenda for addressing the joint epidemics of HIV/AIDS and noncommunicable diseases*. AIDS (London, England), 2012. 26 Suppl 1: p. S7-10.
145. Ley, C. and M.R. Barrio, *A narrative review of research on the effects of physical activity on people living with HIV and opportunities for health promotion in disadvantaged settings*. Ajar-African Journal of Aids Research, 2012. 11(2): p. 123-133.
146. Harries, A.D., et al., *The looming epidemic of diabetes-associated tuberculosis: learning lessons from HIV-associated tuberculosis*. International Journal of Tuberculosis and Lung Disease, 2011. 15(11): p. 1436-1444.
147. WHO, *Collaborative framework for care and control of tuberculosis and diabetes*. 2011.
148. Maher, D., et al., *A global framework for action to improve the primary care response to chronic non-communicable diseases: a solution to a neglected problem*. BMC Public Health, 2009. 9.
149. Delisle, H., V. Agueh, and B. Fayomi, *Partnership research on nutrition transition and chronic diseases in West Africa - trends, outcomes and impacts*. BMC international health and human rights, 2011. 11 Suppl 2: p. S10.
150. Gangopadhyay, R., M. Karoshi, and L. Keith, *Anemia and pregnancy: A link to maternal chronic diseases*. International Journal of Gynecology & Obstetrics, 2011. 115: p. S11-S15.
151. Christensen, D.L., A. Kapur, and I.C. Bygbjerg, *Physiological adaptation to maternal malaria and other adverse exposure: Low birth weight, functional capacity, and possible metabolic disease in adult life*. International Journal of Gynecology & Obstetrics, 2011. 115: p. S16-S19.
152. UNICEF. *Roundtable summary*. in *The 'early origins' of chronic disease prevention – addressing the NCD, MDG and maternal health link*. 2011. New York: UNICEF.
153. The World Bank, *Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action*. 2006: Washington, D.C.
154. Lutter, C.K. and R. Lutter, *Fetal and Early Childhood Undernutrition, Mortality, and Lifelong Health*. Science, 2012. 337(6101): p. 1495-1499.
155. Bygbjerg, I.C., *Double Burden of Noncommunicable and Infectious Diseases in Developing Countries*. Science, 2012. 337(6101): p. 1499-1501.
156. Nikolic, I.A., A.E. Stanciole, and M. Zaydman, *Chronic Emergency: Why NCDs Matter*, in *Health, Nutrition and Population (HNP) Discussion Paper*. 2011: Washington, D.C.
157. Meiro-Lorenzo, M., T.L. Villafana, and M.N. Harrit, *Effective responses to non-communicable diseases: embracing action beyond the health sector*, in *Health, Nutrition and Population (HNP) Discussion Paper*. 2011: Washington, D.C.
158. The World Bank, *Dying Too Young: Addressing Premature Mortality and Ill Health Due to Non Communicable Diseases and Injuries in the Russian Federation*. 2005, The World Bank.
159. The World Bank, *Toward a Healthy and Harmonious Life in China: Stemming the Rising Tide of Non-Communicable Diseases*. 2011, The World Bank.
160. Adeyi, O., O. Smith, and S. Robles, *Public policy & the challenge of chronic noncommunicable diseases*. Directions in Development. Human Development. 2007, Washington, D.C.: The International Bank for Reconstruction and Development / The World Bank.
161. Jha, P., et al., *Chronic disease prevention and control*, in *Copenhagen Consensus 2012 Challenge Paper*. 2012: Copenhagen.
162. Suhrcke, M., et al., *Chronic Disease: An Economic Perspective*. 2006: London.
163. Chand, S., *Silent killer, economic opportunity: rethinking non-communicable disease*. 2012, Chatham House.
164. Poulhier, J.-P., et al., *Patterns of Global Health Expenditures: Results for 191 Countries*. 2002, EIP/HFS/FAR: Geneva.
165. WHO, *WHO Global Health Expenditure Atlas*. 2012: Geneva.
166. The African Union Commission, *Plan of Action on Sexual and Reproductive Health and Rights (Maputo Plan of Action)*, in *Special session of the African Union Conference of Ministers of Health*. 2006, UN-FPA: Maputo, Mozambique.
167. African Union/UNECA, *Transport and the millennium development goals in Africa*, in *Meeting of African Transport Ministers on the role of transport in achieving the MDGs in Africa*. 2005, African Union/UNECA: Addis Ababa.

168. Stuckler, D., S. Basu, and M. McKee, *Drivers of Inequality in Millennium Development Goal Progress: A Statistical Analysis*. Plos Medicine, 2010. 7(3).
169. WHO, *NCDs and development*, in *Global status report on noncommunicable diseases 2010. Description of the global burden of NCDs, their risk factors and determinants*. 2011, World Health Organization: Geneva.
170. Nugent, R., *Chronic diseases in developing countries - Health and economic burdens*. Reducing the Impact of Poverty on Health and Human Development: Scientific Approaches, 2008. 1136: p. 70-79.
171. Capon, A.G. and C.E. Rissel, *Chronic disease and climate change: understanding co-benefits and their policy implications*. New South Wales public health bulletin, 2010. 21(5-6): p. 109-13.
172. Dennekamp, M. and M. Carey, *Air quality and chronic disease: why action on climate change is also good for health*. New South Wales public health bulletin, 2010. 21(5-6): p. 115-21.
173. Setel, P.W., *Non-communicable diseases, political economy, and culture in Africa: anthropological applications in an emerging pandemic*. Ethnicity & Disease, 2003. 13(2 Suppl 2): p. S149-57.
174. Venkatapuram, S., M. McKee, and D. Stuckler, *Ethical tensions in dealing with noncommunicable diseases globally*. Bulletin of the World Health Organization, 2012. 90: p. 241-242.
175. Nugent, R.A. and A.B. Feigl, *Where Have All the Donors Gone? Scarce Donor Funding for Non-Communicable Diseases.*, in *CGD Working Paper 228*. . 2010: Washington, D.C.:
176. Geneau, R., et al., *Raising the priority of preventing chronic diseases: a political process*. The Lancet, 2010. 376(9753): p. 1689-1698.
177. Setel, P.W., et al., *Is it time to reassess the categorization of disease burdens in low-income countries?* American Journal of Public Health, 2004. 94(3): p. 384-388.
178. Magnusson, R.S., *Rethinking global health challenges: Towards a 'global compact' for reducing the burden of chronic disease*. Public Health, 2009. 123(3): p. 265-274.
179. Aikins, A.d.-G., et al., *Tackling Africa's chronic disease burden: from the local to the global*. Globalization and Health, 2010. 6(5).
180. CHOGM, *Statement on Commonwealth Action to Combat Non-Communicable Diseases*, in *Commonwealth Heads of Government Meeting, Republic of Trinidad & Tobago, 27-29 November 2009*. 2009: Port of Spain.
181. Commonwealth Secretariat, *Progress report: Commonwealth Secretariat Road map on Non-communicable Diseases*. 2011.
182. Bradshaw, D., et al., *Noncommunicable diseases - a race against time.*, S.A.M.R.C.C.D.I.f.A. Burden of Disease Research Unit, Department of Medicine, University of Cape Town, Editor. 2011: Capetown.
183. WHO, *Diabetes Prevention and Control: A Strategy for the WHO African Region*. 2007: Brazzaville.
184. WHO, *Cancer Prevention and Control: A Strategy for the WHO African Region*. 2008, WHO Regional Office for Africa: Brazzaville.
185. Aikins, A.d.-G., *Ghana's neglected chronic disease epidemic: a developmental challenge*. Ghana Medical Journal, 2007. 41(4): p. 154-159.
186. ECSA-HC. *NCDs: time for action is now*. 2011 [cited 2 Dec 2011 22 April 2012]; Available from: <http://www.ecsahc.org/news.php?id=29>.
187. Tagoe, H.A. and F.A.A. Dake, *Healthy lifestyle behaviour among Ghanaian adults in the phase of a health policy change*. Globalization and Health, 2011. 7.
188. Bakke, O. and D. Endal, *Alcohol policies out of context: drinks industry supplanting government role in alcohol policies in sub-Saharan Africa*. Addiction, 2010. 105(1): p. 22-28.
189. WHO, *Decade of Action for Road Safety: Global Launch*. 2011, World Health Organization: Geneva.
190. UNECA/WHO, *Accra Declaration. Declaration of African Ministers responsible for Transport and Health.*, in *African Road Safety Conference*. 2007, UNECA: Accra, Ghana.
191. UNECA, *African Road Safety Plan of Action 2011-2020.*, in *The Second African Road Safety Conference*. 2011, UNECA: Addis Ababa, Ethiopia.
192. Aikins, A.d.-G., P. Boynton, and L.L. Atanga, *Developing effective chronic disease interventions in Africa: insights from Ghana and Cameroon*. Globalization and Health, 2010. 6(6).
193. Cooper, K., *Taking up the challenge of non-communicable diseases in the Commonwealth: 17 good-practice case studies*. 2011, Commonwealth Secretariat: London.
194. IJsselmuiden, C.B., et al., *Mapping Africa's advanced public health education capacity - the AfriHealth project*. Bulletin of the World Health Organization, 2007. 85(12): p. 914-922.
195. Nachega, J.B., et al., *Current status and future prospects of epidemiology and public health training and research in the WHO African region*. International Journal of Epidemiology, 2012. 41(6): p. 1829-1846.

196. WHO. *Health system response and capacity to address and respond to NCDs*. 2012; Available from: [http://www.who.int/gho/ncd/health\\_system\\_response/en/](http://www.who.int/gho/ncd/health_system_response/en/).
197. Lins, N.E., C.M. Jones, and J.R. Nilson, *New frontiers for the sustainable prevention and control of non-communicable diseases (NCDs): a view from sub-Saharan Africa*. Health Promotion International, 2010. 17(Suppl(2)): p. 27-30.
198. Ritsatakis, A. and P. Makara, *Gaining Health. Analysis of policy development in European countries for tackling noncommunicable diseases*, ed. J.L. Farrington, R. Geneau, and B. Pettersson. 2009, Copenhagen: WHO.
199. Stenberg, K. and D. Chisholm, *Resource Needs for Addressing Noncommunicable Disease in Low- and Middle-Income Countries: Current and Future Developments*. Global Heart, 2012. 7(1): p. 53-60.
200. WHO, *2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases*. 2008, Geneva: World Health Organization.
201. WHO, *Preventing chronic diseases : a vital investment* WHO global report. 2005, Geneva: World Health Organization.
202. UN Road Safety Collaboration, *Global Plan for the Decade of Action for Road Safety 2011-2020* 2011.
203. WHO Regional Office for Africa. *African Health Observatory & Knowledge Management*. 2012 [cited 2012 18 May 2012]; Available from: <http://www.afro.who.int/en/clusters-a-programmes/ard/african-health-observatory-a-knowledge-management/overview.html>.
204. WHO, *Global strategy for the prevention and control of noncommunicable diseases*. 2000: Geneva.
205. Mendis, S. and V. Fuster, *National policies and strategies for noncommunicable diseases*. Nature Reviews Cardiology, 2009. 6(11): p. 723-727.
206. Echouffo-Tcheugui, J.B. and A.P. Kengne, *Chronic non-communicable diseases in Cameroon - burden, determinants and current policies*. Globalization and Health, 2011. 7.
207. Lins, N.E., C.M. Jones, and J.R. Nilson, *New frontiers for the sustainable prevention and control of non-communicable diseases (NCDs): a view from sub-Saharan Africa*. Global health promotion, 2010. 17(2 Suppl): p. 27-30.
208. Bonita, R., et al., *Country actions to meet UN commitments on non-communicable diseases: a stepwise approach*. Lancet, 2013. 381(9866): p. 575-584.
209. Atun, R.A., S. Bennett, and A. Duran, *When do vertical (stand-alone) programmes have a place in health systems?*, in *WHO European Ministerial Conference on Health Systems*. 2008, World Health Organization, on behalf of the European Observatory on Health Systems and Policies: Tallinn, Estonia.
210. Miranda, J.J., et al., *Non-communicable diseases in low- and middle-income countries: context, determinants and health policy*. Tropical Medicine & International Health, 2008. 13(10): p. 1225-1234.
211. Rabkin, M. and W.M. El-Sadr, *Why reinvent the wheel? Leveraging the lessons of HIV scale-up to confront non-communicable diseases*. Global Public Health, 2011. 6(3): p. 247-256.
212. WHO Maximizing Positive Synergies Collaborative Group, *An assessment of interactions between global health initiatives and country health systems*. The Lancet, 2009. 373(9681): p. 2137-2169.
213. Atun, R., K. Ohiri, and O. Adeyi, *Integration of Health Systems and Priority Health, Nutrition and Population Interventions: A Framework for Analysis and Policy Choices.*, in *Health, Nutrition and Population Discussion Paper*. 2008, The World Bank: Washington, DC.
214. Knaul, F.M., J. Frenk, and L. Shulman, *Closing the Cancer Divide: A Blueprint to Expand Access in Low and Middle Income Countries.*, in *A Report of the Global Task Force on Expanded Access to Cancer Care and Control in Developing Countries*. 2011: Boston, MA.
215. Allotey, P., et al., *Rethinking health-care systems: a focus on chronicity*. The Lancet, 2011. 377(9764): p. 450-451.
216. C.D.I. Study Group, *Community-directed interventions for priority health problems in Africa: results of a multicountry study*. Bulletin of the World Health Organization, 2010. 88(7): p. 509-18.
217. Dybul, M., P. Piot, and J. Frenk, *Reshaping Global Health*. Policy Review, 2012(173): p. 3-18.
218. MPSAC, *Interactions between global health initiatives and health systems: evidence from countries*. 2009, The Maximizing Positive Synergies Academic Consortium
219. Samb, B., et al., *An assessment of interactions between global health initiatives and country health systems*. The Lancet 2009. 373(9681): p. 2137-2169.
220. Dye, C., et al., *WHO and the future of disease control programmes*. Lancet, 2013. 381(9864): p. 413-418.
221. Grepin, K.A., *Leveraging HIV Programs to Deliver an Integrated Package of Health Services: Some Words of Caution*. Jaiids-Journal of Acquired Immune Deficiency Syndromes, 2011. 57: p. S77-S79.

222. Narayan, K.M.V., et al., *Global Noncommunicable Diseases — Lessons from the HIV–AIDS Experience*. New England Journal of Medicine, 2011. **365**(10): p. 876-878.
223. Lamprey, P., R. Dirks, and I. Kabore, *Leveraging existing health platforms to expand NCD services.*, in *Global Health*. 2011.
224. Rabkin, M. and S. Nishtar, *Scaling Up Chronic Care Systems: Leveraging HIV Programs to Support Noncommunicable Disease Services*. Journal of Acquired Immune Deficiency Syndromes, 2011. **57**: p. S87-S90.
225. UNAIDS, *Chronic care of HIV and non-communicable diseases. How to leverage the HIV experience.* . 2011: Geneva
226. Beaglehole, R., et al., *Priority actions for the non-communicable disease crisis*. The Lancet, 2011. **377**(9775): p. 1438 - 1447.
227. Ortegón, M., et al., *Cost-effectiveness of strategies to combat cardiovascular disease, diabetes and tobacco use in sub-Saharan Africa and South East Asia: mathematical modelling study*. British Medical Journal, 2012. **344**(e607).
228. Stanciole, A., et al., *Cost-effectiveness of strategies to combat chronic respiratory diseases in sub-Saharan Africa and South East Asia: mathematical modelling study*. British Medical Journal, 2012. **344**(e608).
229. Ginsberg, G.M., et al., *Cost-effectiveness of strategies to combat breast, cervical and colorectal cancer in sub-Saharan Africa and South East Asia: mathematical modelling study*. British Medical Journal, 2012. **344**(e614).
230. Asaria, P., et al., *Chronic diseases 3 - Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use*. Lancet, 2007. **370**(9604): p. 2044-2053.
231. WHO, *Scaling up action against noncommunicable diseases: How much will it cost?* 2011, World Health Organization: Geneva.
232. WHO, *Reducing risks and preventing disease: population-wide interventions.*, in *Global status report on noncommunicable diseases 2010*. 2011, World Health Organization: Geneva.
233. The World Bank. *Disease Control Priorities Project*. 2006 1 October 2012]; Available from: <http://www.dcp2.org/main/Home.html>.
234. WHO. *CHOosing Interventions that are Cost Effective (WHO-CHOICE)*. 2012 1 October 2012]; Available from: <http://www.who.int/choice/en/>.
235. Hutubessy, R., et al., *Generalized cost-effectiveness analysis for national-level priority-setting in the health sector*. Cost Effectiveness and Resource Allocation, 2003. **1**(8).
236. WHO, *WHO Technical Manual on Tobacco Tax Administration*. 2010: Geneva.
237. WHO. *Tobacco Factsheet No. 339*. Factsheet 2012 May 2012 6 October 2012]; Available from: <http://www.who.int/mediacentre/factsheets/fs339/en/index.html>.
238. Chaloupka, F.J., A. Yurekli, and G.T. Fong, *Tobacco taxes as a tobacco control strategy*. Tobacco Control, 2012. **21**(2): p. 172-180.
239. WHO. *Parties to the WHO Framework Convention on Tobacco Control*. 2013 7 December 2012 27 March 2013]; Available from: [http://www.who.int/fctc/signatories\\_parties/en/](http://www.who.int/fctc/signatories_parties/en/).
240. Tumwine, J., *Implementation of the Framework Convention on Tobacco Control in Africa: Current Status of Legislation*. International Journal of Environmental Research and Public Health, 2011. **8**(11): p. 4312-4331.
241. Drope, J., ed. *Tobacco Control in Africa: People, Politics and Policies*. . Anthem Studies in Development and Globalization. . 2011, Anthem Press.
242. Drope, J.M., *The politics of smoke-free policies in developing countries: Lessons from Africa*. CVD Prevention and Control, 2010. **5**(3): p. 65-73.
243. FCA. *FCA trains African NGOs in shadow reporting*. 2013 19 March 2013 27 March 2013]; Available from: [http://www.fctc.org/index.php?option=com\\_content&view=article&id=977:fca-trains-african-ngos-in-shadow-reporting&catid=245:implementation-monitoring&Itemid=249](http://www.fctc.org/index.php?option=com_content&view=article&id=977:fca-trains-african-ngos-in-shadow-reporting&catid=245:implementation-monitoring&Itemid=249).
244. Anderson, P., D. Chisholm, and D.C. Fuhr, *Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol*. Lancet, 2009. **373**(9682): p. 2234-2246.
245. Parry, C., *Alcohol problems in developing countries: challenges for the new millennium*. . Suchtmed, 2000. **2**(4): p. 216-20.
246. Jernigan, D., *Global Status Report: Alcohol and Young People, 2001*. 2001: Geneva.
247. Stevens, G.A., et al., *Trends in mild, moderate, and severe stunting and underweight, and progress towards MDG 1 in 141 developing countries: a systematic analysis of population representative data*. The Lancet, 2012. **380**(9844): p. 824-834.
248. Fernald, L.C.H., P.J. Gertler, and X. Hou, *Cash component of conditional cash transfer program is associated with higher body mass index and blood pressure in adults*. Journal of Nutrition 2008. **138**(11): p. 2250-2257.
249. Uauy, R. and J. Kain, *The epidemiological transition: need to incorporate obesity prevention into nutrition programmes*. Public Health Nutrition, 2002. **5**(1A): p. 223-229.

250. Gordon-Larsen, P. and J. Jones-Smith, *Challenges in ameliorating hunger while preventing obesity*. The Lancet, 2012. **380**(9844): p. 787-789.
251. Brown, I.J., et al., *Salt intakes around the world: implications for public health*. International Journal of Epidemiology, 2009. **38**(3): p. 791-813.
252. Webster, J.L., et al., *Salt reduction initiatives around the world*. Journal of Hypertension, 2011. **29**(6): p. 1043-1050.
253. WHO, *Creating an enabling environment for population-based salt reduction strategies*, in *Report of a joint technical meeting held by WHO and the Food Standards Agency, United Kingdom, July 2010*. 2010, World Health Organization.
254. Bertram, M.Y., et al., *Reducing the sodium content of high-salt foods: Effect on cardiovascular disease in South Africa*. South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde, 2012. **102**(9): p. 743-5.
255. Hawkes, C., et al., *Linking agricultural policies with obesity and noncommunicable diseases: A new perspective for a globalising world*. Food Policy, 2012. **37**(3): p. 343-353.
256. Monteiro, C.A. and G. Cannon, *The Impact of Transnational "Big Food" Companies on the South: A View from Brazil*. Plos Medicine, 2012. **9**(7).
257. Stuckler, D., et al., *Manufacturing Epidemics: The Role of Global Producers in Increased Consumption of Unhealthy Commodities Including Processed Foods, Alcohol, and Tobacco*. Plos Medicine, 2012. **9**(6).
258. McColl, K., "Fat taxes" and the financial crisis. Lancet, 2009. **373**(9666): p. 797-798.
259. Tiffin, R. and M. Arnoult, *The public health impacts of a fat tax*. European Journal of Clinical Nutrition, 2011. **65**(4): p. 427-433.
260. Thow, A.M., et al., *The global context for public health nutrition taxation*. Public Health Nutrition, 2011. **14**(1): p. 176-186.
261. Hawkes, C., T. Lobstein, and C. Polmark, *Regulating the commercial promotion of food to children: A survey of actions worldwide*. International Journal of Pediatric Obesity, 2011. **6**(2): p. 83-94.
262. Hawkes, C., *Marketing food to children: changes in the global regulatory environment 2004-2006*. 2007, International Food Policy Research Institute: Geneva.
263. Igumbor, E.U., et al., "Big Food," the Consumer Food Environment, Health, and the Policy Response in South Africa. Plos Medicine, 2012. **9**(7).
264. WHO, *A guide for population-based approaches to increasing levels of physical activity: implementation of the WHO global strategy on diet, physical activity and health*. 2007: Geneva.
265. Mitiku, T.N., *A Framework for a Pro-growth, Pro-poor Transport Strategy*, in *Sub-Saharan Africa Transport Policy Program*. 2009.
266. Edwards, P. and A. Tsouros, eds. *Promoting physical activity and active living in urban environments. The role of local governments*. The Solid Facts. 2006, World Health Organization.
267. The World Bank, *Confronting "Death on Wheels". Making roads safe in Europe and Central Asia*. 2009, The World Bank.
268. OECD/ITF, *Towards zero: ambitious road safety targets and the Safe System approach*. 2008, Joint Transport Research Centre of the International Transport Forum and the Organisation for Economic Cooperation and Development (OECD).
269. Bliss, T. and J. Bleen, *Country Guidelines for the Conduct of Road Safety Management Capacity Reviews and the Specification of Lead Agency Reforms, Investment Strategies and Safe System Projects*. Implementing the Recommendations of the World Report on Road Traffic Injury Prevention. 2009, Washington, DC: World Bank Global Road Safety Facility.
270. Porter, M.E. and M.R. Kramer, *Creating Shared Value*. Harvard Business Review, 2011(January-February 2011).
271. WHO. *Indoor air pollution and health*. Factsheet No. 292 2011 6 May 2013]; Available from: <http://www.who.int/mediacentre/factsheets/fs292/en/>.
272. Woodcock, J., et al., *Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport*. The Lancet, 2009. **374**(9705): p. 1930-1943.
273. Ben-Shlomo, Y. and D. Kuh, *A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives*. International Journal of Epidemiology, 2002. **31**(2): p. 285-293.
274. Hayman, L.L., et al., *A Life Course Approach to Cardiovascular Disease Prevention*. Journal of Cardiovascular Nursing, 2011. **26**(4): p. S22-S34.
275. NICE, *Behaviour change at population, community and individual levels*, in *NICE public health guidance*. 2007.
276. WHO, *Healthy Cities Initiative: approaches and experience in the African Region*. 2002, WHO Regional Office for Europe: Brazzaville.
277. Nyamwaya, D., *Health promotion in Africa: strategies, players, challenges and prospects*. Health Promotion International, 2003. **18**(2): p. 85-87.



278. Catford, J., *Implementing the Nairobi Call to Action: Africa's opportunity to light the way*. Health Promotion International, 2010. **25**(1): p. 1-4.
279. Amuyunzu-Nyamongo, M., *Need for a multi-factorial, multi-sectorial and multi-disciplinary approach to NCD prevention and control in Africa*. Global Health Promotion, 2010. **17**(Suppl(2)): p. 31-32.
280. Onya, H.E., *Health promotion competency building in Africa: a call for action*. Global Health Promotion, 2009. **16**(2): p. 47-50.
281. WHO Regional Office for Africa, *Progress report on the implementation of the regional health promotion strategy*, in *Sixty-first session of the WHO Regional Committee for Africa*. 2011, World Health Organization: Yamoussoukro. Cote d'Ivoire.
282. Giles, W.H., *Preventing non-communicable diseases in sub-Saharan Africa*. Global Health Promotion, 2010. **17**(2 Suppl): p. 3-5, 53-6, 92-7.
283. HPF. *International Network of Health Promotion Foundations*. 2012; Available from: <http://www.hp-foundations.net/>.
284. WHO, *Statement*, in *Second Meeting of the International Network of Health Promotion Foundations*. 2002: Bangkok, Thailand.
285. McIntyre, D., *Personal communication*, P. Marquez, Editor. 2012.
286. Mutasa, R., *Personal communication*, P. Marquez, Editor. 2012.
287. Puska, P., *From Framingham to North Karelia From Descriptive Epidemiology to Public Health Action*. Progress in Cardiovascular Diseases, 2010. **53**(1): p. 15-20.
288. Vartiainen, E., et al., *Thirty-five year trends in cardiovascular risk factors in Finland*. International Journal of Epidemiology, 2010. **39**: p. 504-518.
289. Nissinen, A., X. Berrios, and P. Puska, *Community-based noncommunicable disease interventions: lessons from developed countries for developing ones*. Bulletin of the World Health Organization, 2001. **79**(10): p. 963-970.
290. Dowse, G.K., et al., *Changes in population cholesterol concentrations and other cardiovascular risk factor levels after five years of the non-communicable disease intervention programme in Mauritius*. BMJ, 1995. **311**(7015): p. 1255-1259.
291. Cole, C., et al., *The Avahan India AIDS Initiative: Managing Targeted HIV Prevention at Scale*, in *Global Health Delivery Case Studies*. 2012, Harvard Medical School. p. 37p.
292. Parker, D.R. and A.R. Assaf, *Community interventions for cardiovascular disease*. Primary Care, 2005. **32**(4): p. 865-+.
293. NICE, *Prevention of cardiovascular disease*, in *NICE public health guidance*, NICE, Editor. 2010.
294. NICE, *Preventing type 2 diabetes - population and community interventions*, in *NICE public health guidance*. 2011.
295. Seedat, M., et al., *Violence and injuries in South Africa: prioritising an agenda for prevention*. The Lancet, 2009. **374**(9694): p. 1011-1022.
296. WHO Regional Office for Africa, *A strategy for addressing the key determinants of health in the African Region*, in *Sixtieth session of the WHO Regional Committee for Africa*. 2010: Malabo, Equatorial Guinea.
297. Mulgan, G., *Influencing public behaviour to improve health and wellbeing*. 2010.
298. Collier, A., et al., *Understanding and influencing behaviours: a review of social research, economics and policy making in Defra*. 2010.
299. Dolan, P., et al., *MINDSPACE: Influencing Behaviour Through Public Policy*. . 2010: London.
300. Lagarde, M., A. Haines, and N. Palmer, *Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review*. . Journal of the American Medical Association, 2007. **298**(16 ): p. 1900-10.
301. Paes-Sousa, R., L.M.P. Santos, and É.S. Miazaki, *Effects of a conditional cash transfer programme on child nutrition in Brazil*. Bulletin of the World Health Organization, 2011. **89**: p. 496-503.
302. Lindert, K., et al., *The nuts and bolts of Brazil's Bolsa Família program: implementing conditional cash transfers in a decentralized context*, in *Social Protection Discussion Paper 709*. 2007, The World Bank: Washington.
303. Farrington, J. and R. Slater, *Introduction - cash transfer: panacea for poverty reduction or money down the drain?*. Dev Policy Rev, 2006. **24**: p. 499-511.
304. Lagarde, M., A. Haines, and N. Palmer, *The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries*. Cochrane Database of Systematic Reviews, 2009(4).
305. WHO, *Prevention of cardiovascular disease: guidelines for assessment and management of cardiovascular risk*. 2007: Geneva.
306. Gaziano, T.A., et al., *Cost-effectiveness analysis of hypertension guidelines in South Africa - Absolute risk versus blood pressure level*. Circulation, 2005. **112**(23): p. 3569-3576.

307. Gaziano, T.A., *Economic burden and the cost-effectiveness of treatment of cardiovascular diseases in Africa*. Heart, 2008. **94**(2): p. 140-144.
308. Pandya, A., M.C. Weinstein, and T.A. Gaziano, *A comparative assessment of non-laboratory-based versus commonly used laboratory-based cardiovascular disease risk scores in the NHANES III population*. Plos One, 2011. **6**(5): p. e20416.
309. Yusuf, S., et al., *Use of secondary prevention drugs for cardiovascular disease in the community in high-income, middle-income, and low-income countries (the PURE Study): a prospective epidemiological survey*. The Lancet, 2011. **378**(9798): p. 1231-1243.
310. Mayosi, B.M., *The four pillars of rheumatic heart disease control*. South African Medical Journal 2010. **100**(8): p. 506.
311. Fauci, A.S. and G.K. Folkers, *The World Must Build On Three Decades Of Scientific Advances To Enable A New Generation To Live Free Of HIV/AIDS*. Health Affairs, 2012. **31**(7): p. 1529-1536.
312. Wawer, M.J., et al., *Effect of circumcision of HIV-negative men on transmission of human papillomavirus to HIV-negative women: a randomised trial in Rakai, Uganda*. Lancet, 2011. **377**(9761): p. 209-218.
313. Larke, N., et al., *Male Circumcision and Human Papillomavirus Infection in Men: A Systematic Review and Meta-Analysis*. Journal of Infectious Diseases, 2011. **204**(9): p. 1375-1390.
314. Giuliano, A.R., A.G. Nyitray, and G. Albero, *Male circumcision and HPV transmission to female partners*. Lancet, 2011. **377**(9761): p. 183-184.
315. Ginsberg, G.M., et al., *Screening, prevention and treatment of cervical cancer-A global and regional generalized cost-effectiveness analysis*. Vaccine, 2009. **27**(43): p. 6060-6079.
316. Ramogola-Masire, D., et al., *Cervical Cancer Prevention in HIV-Infected Women Using the "See and Treat" Approach in Botswana*. Jais-Journal of Acquired Immune Deficiency Syndromes, 2012. **59**(3): p. 308-313.
317. The World Bank, *World Development Report 2012: Gender Equality and Development*. 2011: Washington, D.C.
318. SALC, *Tackling Cervical Cancer: Improving Access to Cervical Cancer Services for Women in Southern Africa*. 2012: Johannesburg.
319. Mwanahamuntu, M.H., et al., *Implementation of 'see-and-treat' cervical cancer prevention services linked to HIV care in Zambia*. Aids, 2009. **23**(6): p. N1-N5.
320. GAVI Alliance. *Human papillomavirus vaccine support*. 2012 [cited 2012 20 May 2012]; Available from: <http://www.gavialliance.org/support/nvs/human-papillomavirus-vaccine-support/>.
321. USDS. *Pink Ribbon Red Ribbon Overview*. Fact Sheet 2011 25 October 2012]; Available from: <http://www.state.gov/r/pa/prs/ps/2011/09/172244.htm>.
322. Glassman, A., *Separating the good from the bad on HPV*, in *Global Health Policy*. 2011, Center for Global Development.
323. Ortegon, M., et al., *Cost effectiveness of strategies to combat cardiovascular disease, diabetes, and tobacco use in sub-Saharan Africa and South East Asia: mathematical modelling study*. British Medical Journal, 2012. **344**.
324. Narayan, K.M.V., et al., *Diabetes: The Pandemic and Potential Solutions*, in *Disease Control Priorities in Developing Countries*. 2006, Oxford University Press: New York. p. 591-604.
325. Stanciole, A.E., et al., *Cost effectiveness of strategies to combat chronic obstructive pulmonary disease and asthma in sub-Saharan Africa and South East Asia: mathematical modelling study*. British Medical Journal, 2012. **344**.
326. Ait-Khaled, N., et al., *Management of asthma: a guide to the essentials of good clinical practice*. . 2008: Paris, France.
327. IUATLD, *The Global Asthma report 2011*. 2011: Paris, France.
328. IUATLD. *Asthma Drug Facility*. 2009 [cited 2012 24 October 2012]; Available from: [http://www.globaladf.org/index.php?option=com\\_content&view=article&id=2&Itemid=2&lang=en](http://www.globaladf.org/index.php?option=com_content&view=article&id=2&Itemid=2&lang=en).
329. WHO, *Early Detection*. Cancer control : knowledge into action : WHO guide for effective programmes ; module 3. 2007.
330. WHO, *Diagnosis and Treatment*. Cancer control : knowledge into action : WHO guide for effective programmes ; module 4. 2008.
331. WHO, *Planning*. Cancer control: knowledge into action: WHO guide for effective programmes; module 1. 2006, Geneva: World Health Organization.
332. WHO, *Palliative Care*. Cancer control : knowledge into action : WHO guide for effective programmes ; module 5. 2007.
333. Shetty, P., *The parlous state of palliative care in the developing world*. Lancet, 2010. **376**(9751): p. 1453-1454.
334. Stjernsward, J., *Instituting palliative care in developing countries--an urgently needed and achievable goal*. Journal of pain & palliative care pharmacotherapy, 2003. **17**(3-4): p. xxix-xxxvi.
335. Webster, R., J. Lacey, and S. Quine, *Palliative Care: A Public Health Priority in Developing Countries*. J Public Health Pol, 2007. **28**(1): p. 28-39.

336. O'Brien, M., et al., *Improving access to analgesic drugs for patients with cancer in sub-Saharan Africa*. The Lancet Oncology, 2013. **14**(4): p. e176-e182.
337. Stjernsward, J., *Uganda: Initiating a government public health approach palliative care*. Journal of Pain and Symptom Management, 2002. **24**(2): p. 257-264.
338. APCA, *Review of legislation, policy documentation and implementation guidelines in ten Southern African countries*. 2012.
339. WHO, *A Community Health Approach to Palliative Care for HIV/AIDS and Cancer Patients in Sub-Saharan Africa*. 2004: Geneva.
340. Barth, R.E., et al., *Virological follow-up of adult patients in antiretroviral treatment programmes in sub-Saharan Africa: a systematic review*. Lancet Infect Dis. , 2010. **10**(3): p. 155-66.
341. Harding, R. and I.J. Higginson, *Palliative care in sub-Saharan Africa*. The Lancet, 2005. **365**(9475): p. 1971-1977.
342. Gysels, M., et al., *End of life care in sub-Saharan Africa: a systematic review of the qualitative literature*. BMC Palliative Care, 2011. **10**(1): p. 6.
343. Clark, D., et al., *Hospice and Palliative Care Development in Africa: A Multi-Method Review of Services and Experiences*. Journal of pain and symptom management, 2007. **33**(6): p. 698-710.
344. APCA, *Strategic Plan 2011-2020 for the African Palliative Care Association*. 2011: Kampala, Uganda.
345. Bellagio Essential Surgery Group, *Background Paper for Session on Strategies to strengthen the delivery of trauma care with a case study from Uganda.*, in *Strategies to increase access to surgical services in resource-constrained settings in sub-Saharan Africa*. . 2008: Kampala, Uganda.
346. Christian, A., et al., *Rehabilitation needs of persons discharged from an African trauma center*. Pan-African Medical Journal, 2011. **10**(32).
347. Tinney, M.J., Chiodo, A., Haig, A., Wiredu, E., *Medical rehabilitation in Ghana*. Disabil Rehabil., 2007. **29**(11-12): p. 921-7.
348. Juillard, C., et al., *Socioeconomic impact of road traffic injuries in West Africa: exploratory data from Nigeria*. Inj.Prev., 2010. **16**(6): p. 389-392.
349. Samb, B., et al., *Prevention and management of chronic disease: a litmus test for health-systems strengthening in low-income and middle-income countries*. Lancet, 2010. **376**(9754): p. 1785-1797.
350. Republic of Namibia, *Landscape analysis to accelerate action to improve maternal and child nutrition in Namibia*. 2012, Ministry of Health and Social Services, Primary Health Care Services Directorate, Family Health Division, Food and Nutrition Subdivision: Windhoek.
351. Servansing, S.B.C., *Addressing non-communicable diseases and injuries: Uniting development and public health agendas.* , in *Statement made to the Substantive Session of the ECOSOC, 9 July 2009*. 2009, ECOSOC: Geneva, Switzerland.
352. Anon., *South Africa and Non-Communicable Diseases.* , in *Smart Global Health.org*. 2011, Center for Strategic and International Studies.
353. Asmall, S. and O.H. Mahomed, *Controlling Non Communicable Diseases through Health System Strengthening. Commission Concept Paper.*, in *Summit on Prevention and Control of Non-Communicable Diseases*. 2011, Department of Health, Republic of South Africa.
354. Maina, W.K., *Non-communicable diseases in Kenya – Past, present, and future. [Presentation]* 2009, Corporate Africa Health Foundation.
355. Bosu, W.K., *A Comprehensive Review of the Policy and Programmatic Response to Chronic Non-Communicable Disease in Ghana*. Ghana Medical Journal, 2012. **46**(2 Suppl): p. 69-78.
356. Mikkelsen-Lopez, I., K. Wyss, and D.d. Savigny, *An approach to addressing governance from a health system framework perspective*. BMC International Health and Human Rights, 2011. **11**(13).
357. Health Systems 20/20 project, *Health Systems 20/20 Final Project Report.*, in *Health Systems 20/20 project*. 2012: Bethesda, MD.
358. AERC, *Service Delivery Indicators: Pilot in Education and Health Care in Africa*. 2011, African Economic Research Consortium, in collaboration with The World Bank and Hewlett Foundation: Nairobi.
359. Fox, L.M., et al., *Rwanda Health Governance Report, in Health Systems 2020 project*. 2010: Bethesda, MD.
360. Kombe, G., et al., *Nigeria Health System Assessment, 2008.*, in *Health Systems 2020 project*. 2009: Bethesda, MD.
361. Luoma, M., et al., *Kenya Health System Assessment 2010.*, in *Health Systems 20/20 project*. 2010: Bethesda, MD.
362. UNECA, *African Governance Report II*. 2009, Economic Commission for Africa.
363. Kickbusch, I. and D. Gleicher, *Governance for health in the 21st century*. 2012: Copenhagen.

364. McQueen, D.V., et al., eds. *Intersectoral Governance for Health in All Policies. Structures, actions and experiences*. Observatory Studies Series. 2012, World Health Organization, on behalf of European Observatory on Health Systems and Policies: Copenhagen.
365. Voetsch, K. and S. El-Halabi, *Personal communication*, P. Marquez, Editor. 2012, Ministry of Health, Botswana: Gabarone, Botswana.
366. The World Bank, *Health Financing and Fiscal Health in Africa: Bridging Collaboration between Ministries of Finance and Health. Background Paper.*, in *Africa Health Forum 2013: Finance and Capacity for Results*. 2013, The World Bank: Washington, D.C.
367. WHO. *Table of regional averages for key indicators*. . Health expenditure series. 2012 [cited 2012 10 September 2012]; Available from: [http://apps.who.int/nha/database/StandardReport.aspx?ID=REPORT\\_6\\_REGIONAL\\_AVERAGES](http://apps.who.int/nha/database/StandardReport.aspx?ID=REPORT_6_REGIONAL_AVERAGES).
368. Farag, M., et al., *Does funding from donors displace government spending for health in developing countries?* *Health Affairs*, 2009. **28**(4): p. 1045-55.
369. Xu, K., et al., *Exploring the thresholds of health expenditure for protection against financial risk*. , in *World Health Report (2010) Background Paper, No 19*. 2010, World Health Organization: Geneva.
370. WHO. *Global Health Expenditure Database*. 2012 [cited 2012 11 September 2012]; Available from: <http://apps.who.int/nha/database/DataExplorerRegime.aspx>.
371. WHO, *The world health report: health systems financing: the path to universal coverage*. 2010, World Health Organization: Geneva.
372. Mills, A., et al., *Equity in financing and use of health care in Ghana, South Africa, and Tanzania: implications for paths to universal coverage*. *Lancet*, 2012. **380**(9837): p. 126-133.
373. WHO, *Everybody's business - strengthening health systems to improve health outcomes. WHO's framework for action*. 2007: Geneva.
374. Mills, A., et al., *Progress towards universal coverage: the health systems of Ghana, South Africa and Tanzania*. *Health Policy and Planning*, 2012. **27**: p. i4-i12.
375. The World Bank, *How to translate mineral wealth into health and social development. Background paper*, in *Africa Health Forum 2013: Finance and Capacity for Results 2013*, The World Bank: Washington, DC
376. Low-Beer, D., et al., *Making Performance-Based Funding Work for Health*. *PLoS Med*, 2007. **4**(8): p. e219.
377. Witter, S., et al., *Paying for performance to improve the delivery of health interventions in low- and middle-income countries*. *Cochrane Database of Systematic Reviews*, 2012(2): p. CD007899.
378. The World Bank, *Results-Based Financing for Health. Background paper*, in *Africa Health Forum 2013: Finance and Capacity for Results*. 2013, The World Bank: Washington, D.C.
379. Marquez, P.V., J.J.D.S. Antoine, and K. Yamashita-Allen, *Taking the pulse: The evolving health public-private partnership in Lesotho*, in *Nasikiliza*. 2012, The World Bank.
380. Downs S., et al., *Health System Innovation in Lesotho: Design and Early Operations of the Maseru Public Private Integrated Partnership*. , in *Healthcare Public-Private Partnerships Series, No.1*. . 2013, The Global Health Group, Global Health Sciences, University of California: San Francisco, U.S.A.
381. The World Bank, *Public Private Partnerships for Health: PPPs are Here and Growing. Background paper*, in *Africa Health Forum 2013: Finance and Capacity for Results*. 2013, The World Bank: Washington, DC
382. Cameron, A., et al., *Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis*. *The Lancet*, 2009. **373**(9659): p. 240-249.
383. Niëns, L.M., et al., *Quantifying the impoverishing effects of purchasing medicines: a cross-country comparison of the affordability of medicines in the developing world*. *PLoS Med*, 2010. **7**(8).
384. WHO, *WHO Model List of Essential Medicines: Adults*. 2011: Geneva.
385. Mendis, S., et al., *The availability and affordability of selected essential medicines for chronic diseases in six low- and middle-income countries*. *Bulletin of the World Health Organization*, 2007. **85**(4): p. 279-288.
386. UN, *Strengthening the global partnership for development in a time of crisis. MDG Gap Task Force report*. . 2009: New York.
387. Gelders, S., et al., *Price, availability and affordability An international comparison of chronic disease medicines.*, in *Background report prepared for the WHO Planning Meeting on the Global Initiative for Treatment of Chronic Diseases held in Cairo in December 2005*. 2006, World Health Organization and Health Action International: Cairo.
388. Abegunde, D., *Essential medicines for noncommunicable disease.*, in *Background paper*. 2011, World Health Organization: Geneva.
389. WHO, *Briefing document. Essential medicines for non-communicable diseases (NCDs)*. 2011: Geneva.

390. Beran, D., A. McCabe, and J.S. Yudkin, *Access to medicines versus access to treatment: the case of type 1 diabetes*. Bulletin of the World Health Organization, 2008. **86**(8): p. 648-649.
391. WHO, *Operational principles for good pharmaceutical procurement.*, in *Essential Drugs and Medicines Policy*. 1999, Interagency Pharmaceutical Coordination Group: Geneva.
392. Schwartzmann, G. and P.D. Picon, *When drugs are worth more than gold!* Lancet Oncology, 2007. **8**(12): p. 1049-1050.
393. WHO. *Advanced Market Commitments for vaccines*. 2006 19 July 2006 27 October 2012]; Available from: <http://www.who.int/immunization/newsroom/amcs/en/index.html>.
394. New, W. *Questions Arise Over UN Policy On Non-Communicable Diseases And IP Rights*. 2011 16 September 2011 27 October 2012]; Available from: <http://www.ip-watch.org/2011/09/16/questions-arise-over-un-policy-on-non-communicable-diseases-and-ip-rights/>.
395. Boateng, K., *Contribution.*, in *Federation of East African Pharmaceutical Manufacturers (FEAPM) - Yearbook 2012*. 2012, The World Bank.
396. Bischoff, A., et al., *Chronic disease management in Sub-Saharan Africa: whose business is it?* International Journal of Environmental Research and Public Health, 2009. **6**(8): p. 2258-70.
397. WHO Regional Office for Africa, *Health Situation Analysis in the African Region. Atlas of Health Statistics 2012*. 2012: Brazzaville.
398. EIU, *The future of healthcare in Africa*. 2012, The Economist Intelligence Unit.
399. Bateman, E., et al., *Systems for the management of respiratory disease in primary care--an international series: South Africa*. Primary care respiratory journal : journal of the General Practice Airways Group, 2009. **18**(2): p. 69-75.
400. Kale, R., *South Africa's Health: Traditional healers in South Africa - a parallel health-care system*. British Medical Journal, 1995. **310**(6988): p. 1182-1185.
401. Nxumalo, N., et al., *Utilization of traditional healers in South Africa and costs to patients: Findings from a national household survey*. Journal of Public Health Policy, 2011. **32**: p. S124-S136.
402. Dookie, S. and S. Singh, *Primary health services at district level in South Africa: a critique of the primary health care approach*. BMC Family Practice, 2012. **13**.
403. WHO, *The World Health Report 2008 - Primary Health Care (Now More Than Ever)*. 2008: Geneva.
404. Starfield, B., L.Y. Shi, and J. Macinko, *Contribution of primary care to health systems and health*. Milbank Quarterly, 2005. **83**(3): p. 457-502.
405. Schmittdiel, J.A., et al., *Effect of primary health care orientation on chronic care management*. Annals of Family Medicine, 2006. **4**(2): p. 117-123.
406. Maher, D., L. Smeeth, and J. Sekajugo, *Health transition in Africa: practical policy proposals for primary care*. Bulletin of the World Health Organization, 2010. **88**(12): p. 943-948.
407. Harries, A.D., et al., *Adapting the DOTS framework for tuberculosis control to the management of non-communicable diseases in sub-Saharan Africa*. PLoS Med, 2008. **5**(6).
408. English, R.G., et al., *Development of a South African integrated syndromic respiratory disease guideline for primary care*. Primary care respiratory journal : journal of the General Practice Airways Group, 2008. **17**(3): p. 156-63.
409. Fairall, L., et al., *Cost-effectiveness of educational outreach to primary care nurses to increase tuberculosis case detection and improve respiratory care: economic evaluation alongside a randomised trial*. Tropical Medicine & International Health, 2010. **15**(3): p. 277-286.
410. Steyn, K., *Personal communication with update on PALSA PLUS based on unpublished data Dr Lara Fairall, University of Cape Town.*, P. Marquez, Editor. 2012.
411. WHO, *Fact sheet: Traditional medicine*, in *Fact sheet: No. 134*. 2008, World Health Organization: Geneva.
412. Nolte, E. and M. McKee, eds. *Caring for People with Chronic Conditions: A Health System Perspective*. European Observatory on Health Systems and Policies Series. 2008, Open University Press. 288.
413. Wagner, E.H., *Chronic disease management: what will it take to improve care for chronic illness?* Effective Clinical Practice, 1998. **1**(1): p. 2-4.
414. WHO, *Innovative care for chronic conditions: building blocks for action: global report*. 2002, Geneva: World Health Organization.
415. Singh, D. and C. Ham, *Improving care for people with long-term conditions: a review of UK and international frameworks*. 2006: Birmingham.
416. Barr, V.J., et al., *The expanded Chronic Care Model: an integration of concepts and strategies from population health promotion and the Chronic Care Model*. Hospital quarterly, 2003. **7**(1): p. 73-82.
417. Nolte, E., C. Knai, and M. McKee, eds. *Managing chronic conditions: Experience in eight countries*. 2008, World Health Organization, on behalf of the European Observatory on Health Systems and Policies: Copenhagen.

418. Coleman, K., et al., *Evidence On The Chronic Care Model In The New Millennium*. Health Affairs, 2009. **28**(1): p. 75-85.
419. Nuño, R., et al., *Integrated care for chronic conditions: The contribution of the ICCC Framework*. Health Policy, 2012. **105**(1): p. 55-64.
420. Nolte, E. and M. McKee, *Integration and chronic care: a review.*, in *Caring for people with chronic conditions: a health system perspective.*, E. Nolte and M. McKee, Editors. 2008, Open University Press / McGraw Hill Education: Maidenhead.
421. Zwar, N., et al., *A systematic review of chronic disease management*. 2006, Australian Primary Health Care Research Institute.
422. Mgunda, F., et al., *A Baseline Assessment of Self-management and Community Support for HIV/AIDS Patients at Four Facilities in Morogoro, Tanzania.*, published by the USAID Health Care Improvement Project. 2011, University Research Co., LLC: Bethesda, MD.
423. Isenhower, W. and R. Kyeyagalire, *Chronic Care Design Meeting: Transforming Health Systems and Improving Quality Care for Chronic Conditions in Africa*. 2011, University Research Co., LLC (URC). Bethesda, MD.
424. WHO, *General Principles of Good Chronic Care. Interim Guidelines for First-level Facility Health Workers.*, in *Integrated Management of Adolescent and Adult Illness*. 2004: Geneva.
425. WHO. "Three Ones" agreed by Donors and Developing countries. The 3 by 5 initiative 2004 27 October 2012]; Available from: <http://www.who.int/3by5/newsitem9/en/index.html>.
426. UNAIDS, "Three Ones" key principles "Coordination of National Responses to HIV/AIDS": *Guiding principles for national authorities and their partners*. 2004: Geneva.
427. Beaglehole, R., et al., *Alma-Ata: Rebirth and revision 3 - Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care*. Lancet, 2008. **372**(9642): p. 940-949.
428. Janssens, B., et al., *Offering integrated care for HIV/AIDS, diabetes and hypertension within chronic disease clinics in Cambodia*. Bulletin of the World Health Organization, 2007. **85**(11): p. 880-5.
429. Haggerty, J.L., et al., *Continuity of care: a multi-disciplinary review*. British Medical Journal, 2003. **327**(7425): p. 1219-1221.
430. WHO, *Adherence to long-term therapies. Evidence for action.*. 2003, World Health Organization: Geneva.
431. Harries, A.D., et al., *Why Did the Scale-up of HIV Treatment Work?: A Case Example From Malawi*. *Jacids-Journal of Acquired Immune Deficiency Syndromes*, 2011. **57**: p. S64-S67.
432. Allain, T.J., et al., *Applying lessons learnt from the 'DOTS' Tuberculosis Model to monitoring and evaluating persons with diabetes mellitus in Blantyre, Malawi*. *Tropical Medicine & International Health*, 2011. **16**(9): p. 1077-1084.
433. USAID Health Care Improvement Project, *Improving care for people with chronic conditions in East Africa*. 2011, University Research Co., LLC Bethesda, MD.
434. Kober, K. and W.V. Damme, *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*. 2006, Institute of Tropical Medicine: Antwerp.
435. Harries, A.D., et al., *The vital signs of chronic disease management*. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2009. **103**(6): p. 537-40.
436. Maher, D. and A.D. Harries, *Quality care: a link between clinical and public health approaches to HIV infection in developing countries*. *Tropical Medicine & International Health*, 2010. **15**(4): p. 391-395.
437. Mangin, D., I. Heath, and M. Jamouille, *Beyond diagnosis: rising to the multimorbidity challenge*. *British Medical Journal*, 2012. **344**(e3526).
438. Swartz, L. and J. Dick, *Managing chronic conditions in less developed countries*. *British Medical Journal*, 2002. **325**(7370): p. 914-15.
439. Silva, D.d., *Helping people help themselves.*, in *Evidence*. 2011, The Health Foundation: London.
440. New, N., *Teaching so they hear: Using a co-created diabetes self-management education approach*. *Journal of the American Academy of Nurse Practitioners*, 2010. **22**(6): p. 316-325.
441. Olmen, J.v., et al., *The growing caseload of chronic life-long conditions calls for a move towards full self-management in low-income countries*. *Globalization and Health*, 2011. **7**(38).
442. WHO, *The world health report 2006: working together for health*. 2006, World Health Organization: Geneva.
443. Liese, B. and G. Dussault, *The state of health workforce in sub-Saharan Africa: evidence of crisis and analysis of contributing factors.*, in *Africa Region Human Development Working Paper Series*. 2004, The World Bank: Washington, DC.

444. The World Bank, *Fixing Labor Market Leakages: Getting More Bang for Your Buck on Human Resources for Health. Background paper, in Africa Health Forum 2013: Finance and Capacity for Results*. 2013, The World Bank: Washington, D.C.
445. Callaghan, M., N. Ford, and H. Schneider, *A systematic review of task-shifting for HIV treatment and care in Africa*. Human Resources for Health, 2010. **8**(8).
446. Keleher, H., et al., *Systematic review of the effectiveness of primary care nursing*. International Journal of Nursing Practice, 2009. **15**(1): p. 16-24.
447. Laurant, M., et al., *Substitution of doctors by nurses in primary care*. Cochrane Database of Systematic Reviews, 2005(CD001271.pub2).
448. Abegunde, D.O., et al., *Can non-physician health-care workers assess and manage cardiovascular risk in primary care?* Bulletin of the World Health Organization, 2007. **85**(6): p. 432-40.
449. Lekoubou, A., et al., *Hypertension, diabetes mellitus and task shifting in their management in sub-Saharan Africa*. International Journal of Environmental Research and Public Health, 2010. **7**(2): p. 353-363.
450. Kengne, A.P., et al., *Primary Health Care for Hypertension by Nurses in Rural and Urban Sub-Saharan Africa*. Journal of Clinical Hypertension, 2009. **11**(10): p. 564-572.
451. Kengne, A.P., et al., *Type 2 diabetes management in nurse-led primary healthcare settings in urban and rural Cameroon*. Primary care diabetes, 2009. **3**(3): p. 181-8.
452. Gill, G.V., et al., *An effective system of nurse-led diabetes care in rural Africa*. Diabetic Medicine, 2008. **25**(5): p. 606-611.
453. Labhardt, N.D., et al., *Improved retention rates with low-cost interventions in hypertension and diabetes management in a rural African environment of nurse-led care: a cluster-randomised trial*. Tropical Medicine & International Health, 2011. **16**(10): p. 1276-1284.
454. World Medical Association, *WMA Resolution on Task Shifting from the Medical Profession, in Adopted by the 60th WMA General Assembly, New Delhi, India, October 2009*. 2009.
455. WHO, *Taking stock. Task shifting to tackle health worker shortages*. 2007, World Health Organization: Geneva.
456. Boothroyd, R.I. and E.B. Fisher, *Peers for Progress: promoting peer support for health around the world*. Family Practice, 2010. **27**(suppl 1): p. i62-i68.
457. Crigler, L., et al., *Task Shifting in HIV/AIDS Service Delivery: An Exploratory Study of Expert Patients in Uganda*, in *Research and Evaluation Report*. 2011, University Research Co.: Bethesda, MD.
458. Richardson, G., et al., *Cost effectiveness of the Expert Patients Programme (EPP) for patients with chronic conditions*. Journal of Epidemiology and Community Health, 2008. **62**(4): p. 361-367.
459. Fisher, E.B., et al., *Peer Support For Self-Management Of Diabetes Improved Outcomes In International Settings*. Health Affairs, 2012. **31**(1): p. 130-139.
460. Baksi, A.K., et al., *Peer advisers compared with specialist health professionals in delivering a training programme on self-management to people with diabetes: a randomized controlled trial*. Diabetic Medicine, 2008. **25**(9): p. 1076-1082.
461. WHO, *Treat, Train, Retain: The AIDS workforce plan. Report on the consultation on AIDS and human resources for health*. 2006: Geneva.
462. Mars, M. and R.E. Scott, *Global E-Health Policy: A Work In Progress*. Health Affairs, 2010. **29**(2): p. 237-243.
463. WHO, *Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009*, in *Global Observatory for eHealth Series*. 2010: Geneva.
464. Rao, M., *Mobile Africa Report 2011. Regional Hubs of Excellence and Innovation*. 2011.
465. HUG. *RAFT network: supporting care professionals where they are most needed*. 2012 16 October 2012 28 October 2012]; Available from: <http://raft.hcuge.ch/>.
466. WHO/HMN, *Country health information systems: a review of the current situation and trends*. 2011, World Health Organization and Health Metrics Network: Geneva.
467. Statistical Commission for Africa. *Resolutions of the Seventh Africa Symposium on Statistical Development*. . in *Improving Civil registration and Vital Statistics Institutional and Human Infrastructure*. 2012. Cape Town, South Africa, 18-20 January 2012.
468. WHO, *Keeping promises, measuring results. Report of the Commission on Information and Accountability for Women's and Children's Health*. 2011: Geneva.
469. WHO Regional Office for Africa. *STEPS survey on Chronic Disease Risk Factors*. 2012 26 May 2012]; Available from: <http://www.afro.who.int/en/clusters-a-programmes/hpr/health-risk-factors/diseases-surveillance/surveillance-country-profiles/step-survey-on-noncommunicable-disease-risk-factors.html>.
470. Frère, J.-J., *Personal communication*, P. Marquez, Editor. 2012: Washington, DC.
471. Rabkin, M., *Personal communication*, P. Marquez, Editor. 2012.

472. Bradshaw, D., K. Steyn, and A. Pascal-Kengne, *Surveillance and Research for the Prevention and Control of NCDs. Commission Concept Paper.*, in *Summit on Prevention and Control of Non-Communicable Diseases*. 2011, Department of Health, Republic of South Africa.
473. World Health Organization. *STEPS Country Reports*. 2011 [cited 2011 15 December 2011]; Available from: <http://www.who.int/chp/steps/reports/en/index.html>.
474. World Health Organization, *Noncommunicable diseases country profiles 2011* 2011, World Health Organization: Geneva.
475. WHO, *WHO Report on the Global Tobacco Epidemic 2009* 2009, Geneva: World Health Organization.
476. WHO, *Global status report on road safety: country profiles*. 2009: Geneva.
477. Beran, D. and J.S. Yudkin, *Diabetes care in sub-Saharan Africa*. *The Lancet*, 2006. **368**: p. 1689-95.
478. Zimmerman, K., et al., *Road traffic injury incidence and crash characteristics in Dar es Salaam: A population based study*. *Accident Analysis and Prevention*, 2012. **45**: p. 204-210.
479. Gonima, A., *Personal communication*, P. Marquez, Editor. 2012: San Antonio, Texas.
480. WHO, *Data systems: a road safety manual for decision-makers and practitioners*. 2010, Geneva: World Health Organization.
481. Maher, D., et al., *Research needs for an improved primary care response to chronic non-communicable diseases in Africa*. *Tropical Medicine and International Health*, 2010. **15**(2): p. 176-81.
482. Unwin, N., et al., *Noncommunicable diseases in sub-Saharan Africa: where do they feature in the health research agenda?* *Bulletin of the World Health Organization*, 2001. **79**(10): p. 947-953.
483. Stuckler, D. and M. Nestle, *Big Food, Food Systems, and Global Health*. *Plos Medicine*, 2012. **9**(6).
484. Lagarde, E., *Road traffic injury is an escalating burden in Africa and deserves proportionate research efforts*. *Plos Medicine*, 2007. **4**(6): p. 967-971.
485. McCarthy, M., et al., *Developing the agenda for European Union collaboration on non-communicable diseases research in Sub-Saharan Africa*. *Health Research Policy and Systems*, 2010. **8**(13).
486. The World Bank, *The Roles of Research-Based, Non-State Actors in Building Capacity for Effectiveness and Sustainability in Africa's Health Sector. Background paper*, in *Africa Health Forum 2013: Finance and Capacity for Results*. 2013, The World Bank: Washington, D.C.
487. WHO, *Research and Development to Meet Health Needs in Developing Countries: Strengthening Global Financing and Coordination. Report of the Consultative Expert Working Group on Research and Development: Financing and Coordination*. 2012: Geneva.
488. Steyn, K., *Personal communication.*, P. Marquez, Editor. 2012.
489. Baicker, K., D. Cutler, and Z. Song, *Workplace Wellness Programs Can Generate Savings*. *Health Affairs*, 2010. **29**(2): p. 304-311.
490. Berry, L.L., A.M. Mirabito, and W.B. Baun, *What's the hard return on employee wellness programs?* *Harvard Business Review*, 2010. **88**(12): p. 104-12, 142.
491. Health Affairs, *Workplace Wellness Programs*, in *Health Policy Brief*. 2012.
492. Marquez, P.V., *Healthier Workplaces = Healthy Profits*, in *Investing in Health*. 2013, The World Bank.
493. Atun, R., et al., *A systematic review of the evidence on integration of targeted health interventions into health systems*. *Health Policy and Planning*, 2010. **25**(1): p. 1-14.
494. Pierre-Louis, A.M., et al., *Connecting Sectors and Systems for Health Results*, in *Public Health Policy Note*. 2012, Health Nutrition and Population: Washington, D.C.
495. The World Bank, *The World Bank Strategy for Health, Nutrition, and Population Results*. 2007: Washington, D.C.
496. World Health Organization. *Global Health Observatory Data Repository*. 2013. Available from: <http://apps.who.int/glodata/>









*The Challenge of Non-communicable Diseases and Road Traffic Injuries in Sub-Saharan Africa: An Overview* draws on a comprehensive review of the literature and on input from policy makers, researchers and practitioners to address four questions: (1) How is the growing burden of non-communicable diseases (NCDs) and road traffic injuries (RTIs) changing the epidemiology of Sub-Saharan Africa? (2) What determines and drives this burden, and what are the commonalities with communicable diseases? (3) What is the rationale for public intervention? And (4) How could resource-constrained governments approach NCD prevention and treatment and road safety in a comprehensive, effective and efficient way?

The data show that action against NCDs and RTIs in Sub-Saharan Africa is needed, together with continued efforts to address communicable diseases and maternal and child health and reach the Millennium Development Goals (MDGs). The report suggests that NCDs/RTIs should not be tackled separately as a vertical program, nor should they displace communicable diseases as priorities. Instead, given resource constraints, and some shared determinants, characteristics, and interventions, there is scope for an integrated approach focusing on functions (prevention, treatment and care) rather than on disease categories.

A healthier and more productive population is a critical factor for ensuring sustainable economic growth and social development over the medium and longer terms in Sub-Saharan Africa.

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“Countries will take different paths towards universal health coverage. There is no single formula. However, today, an emerging field of global health delivery science is generating evidence and tools that offer promising options for countries.... For decades, energy has been spent in disputes opposing disease-specific ‘vertical’ service delivery models to integrated ‘horizontal’ models. Delivery science is consolidating evidence on how some countries have solved this dilemma by creating a ‘diagonal’ approach: deliberately crafting priority disease-specific programs to drive improvement in the wider health system.... Whether a country’s immediate priority is diabetes; malaria control; maternal health and child survival; or driving the ‘endgame’ on HIV/AIDS, a universal coverage framework can harness disease-specific programs diagonally to strengthen the system.”

*Dr. Jim Kim, President of the World Bank,  
World Health Assembly  
Geneva, 21 May 2013*

“As we start the journey of the next fifty years, we are clear about the task before us: to educate our populace, and ensure healthy bodies and minds; to modernize and expand Africa’s infrastructure and connect our peoples and countries; to grow our agriculture and agro-businesses so that we can feed ourselves and the world; to use our natural resources to industrialize and grow our shared prosperity; to invest in science, technology, research and innovation as enablers of rapid progress; and finally to empower women and youth as the drivers of Africa’s renaissance”.

*Dr. Nkosazana Dlamini Zuma  
Chairperson of the African Union Commission  
Commemoration of the 50th anniversary of the  
Organization of African Unity (OAU) now the  
African Union (AU)  
Addis Ababa, 25 May 2013*

