

Prevention and Control of Selected Chronic NCDs in Sri Lanka:

Policy Options and Action

Michael Engelgau, Kyoko Okamoto, Kumari Vinodhani Navaratne, and Sundararajan Gopalan

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Health, Nutrition and Population (HNP) Discussion Paper

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Health, Nutrition and Population (HNP) Discussion Paper

Prevention and Control of Selected NCDs in Sri Lanka: Policy Options and Actions

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Abstract: Strategic decisions to reorient population-based prevention and clinic- and hospital-based care policies toward noncommunicable diseases (NCDs)¹ will enable healthier aging and reduce loss of productivity among the working-age population in Sri Lanka. This report aims to stimulate policy dialogue for NCDs and to provide an evidence base to facilitate decisions. Its focus is mainly on chronic NCDs—that is, cardiovascular disease (CVD), diabetes, and asthma/chronic obstructive pulmonary disease (COPD), and to a lesser extent cancer—and their major modifiable risk factors (tobacco use, unhealthy diet, lack of exercise, and harmful alcohol use). This is not to detract, though, from the importance of injuries and mental health since both are major issues that carry a huge burden, as supported by evidence in this report.

Sri Lanka, now having transitioned from a low income country to a middle income country, has a life expectancy for its citizens of 71 years, and is in the advanced stages of a *demographic transition*. The proportion of people 60 years and older is likely to more than double by 2040, to just above 24 percent. However, these gains have not been even. Male life expectancy gains have stagnated since 1970, while those for females have continued. In addition, an *epidemiologic transition* is shifting the disease pattern from maternal and child health and infectious diseases towards NCDs, which now account for nearly 90 percent of the disease burden. Because NCDs are more common with aging—but not inevitable—timely actions now could trigger many future benefits such as healthy aging, lower disability, and longer, more productive lives.

During the past half-century the proportion of deaths due to circulatory disease (such as heart disease and stroke) has increased from 3 percent to 24 percent, while that due to infectious diseases has decreased from 42 percent to 20 percent. Mortality rates from NCDs are currently 20–50 percent higher in Sri Lanka than in developed countries. The NCD burden is not equally distributed among the rich and the poor. In Sri Lanka the pattern is more complex and changing. Deaths from heart disease are higher among the rich while those from asthma are higher among the poor.

In the public sector, NCDs are largely managed by specialist clinics as long-term outpatients and as inpatients in higher-level (secondary or tertiary) facilities. Primary health care facilities are not expected to initiate management of chronic NCDs, but only provide follow-up care in some lower-level hospitals. In 2008, bed-occupancy rates were nearly 85 percent in higher-level facilities and below 50 percent in lower-level facilities. In terms of inpatient morbidity among all admissions, in 2008, chronic NCDs accounted for 24 percent and injuries for 18 percent, while infectious diseases accounted for 26 percent, maternal and child health conditions for 12 percent, and other causes for 20 percent of the total. Specialist clinics in secondary and tertiary facilities manage 65 percent of the chronic NCDs in overcrowded clinics.

¹ NCDs are defined by the World Health Organization (WHO) to include chronic diseases, principally cardiovascular disease, diabetes, cancer, and asthma/chronic obstructive pulmonary disease (COPD), in addition to injuries and mental illness.

Primary care facilities manage follow-up for approximately 33 percent of the acute NCDs. About 60% of the asthma is managed in public facilities.

Diagnostic testing and essential medicines for NCDs are limited. Essential clinical investigation and medical equipment necessary to diagnose and manage NCDs are frequently unavailable at primary and secondary care levels and low availability of essential medications for treating NCDs is a problem.

Health information systems are reasonably well developed but suffer from some major limitations. Both inpatient and outpatient data lack key information on patient characteristics and diagnosis, limiting data usefulness for assessment and planning. Also, a surveillance system for NCDs and their risk factors is missing. These systems are critical for planning and policy development.

Owing to the current system's organization, a substantial proportion of care for NCDs is delivered in the private sector where patients pay for almost all their treatment costs. In the public sector, patients receive clinic visits without paying fees but frequently obtain prescribed medicines and laboratory tests from the private sector where they bear the costs. Treatment of cancer and acute myocardial infarction is mostly or predominantly publicly financed, while expenditures for chronic NCDs, such as diabetes, asthma, and other types of ischemic heart disease (IHD), are predominantly paid for out of pocket.

Several major areas for policies and actions emerged from the analysis of Sri Lanka's health sector organization and capacity as well as its NCD orientation. Some areas are not specific to NCDs but, rather, will strengthen the health sector generally while leading to better NCD prevention and control. These areas include: (i) increasing financial resources for NCD prevention and control, (ii) increasing access to NCD drugs, especially for the poor, (iii) addressing social determinants, (iv) focusing on specific NCDs, (v) addressing undernutrition and overnutrition, (vi) creating an intensified national NCD program, strengthening and reorganizing NCD prevention and curative care services, (vii) moving services closer to clients and improving efficiency, (viii) further decentralizing and devolving health service delivery, (ix) human resource development for NCD prevention and control, (x) creating a national NCD surveillance system, (xi) developing public-private partnerships and aligning service delivery

Keywords: chronic non-communicable diseases, demographic transition, epidemiologic transition, health services utilization, out-of pocket spending on health, policy options and actions

Disclaimer: The findings, interpretations and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank, its Executive Directors, or the countries they represent.

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Preface

To achieve healthy aging during its rapid demographic transition, Sri Lanka will need to effectively tackle noncommunicable diseases. The rationale for this report is that strategic decisions to reorient population-based prevention and clinic- and hospital-based care policies toward noncommunicable diseases will enable healthier aging.

The main target readership comprises policy makers in the governments of Sri Lanka and the South Asia region more widely, both inside and outside the health sector. The report will also be useful for professionals working in development in South Asia and elsewhere.

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Abbreviations

ACE	Angiotensin converting enzyme
BMI	Body mass index
CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DALYs	Disability-adjusted life years
DSD	Divisional Secretariat Division
ICD-10	International Classification of Diseases, 10th Revision icd-10
IHD	Ischemic heart disease
IHP	Institute for Health Policy
MOH	Ministry of Health (provincial or central)
NCD	Noncommunicable disease
OECD	Organisation for Economic Co-operation and Development
PHIDS	Public Hospital Inpatient Discharge Survey
SES	Socioeconomic status
SLDCS	Sri Lanka Diabetes, Cardiovascular Study
WHO	World Health Organization

Prevention and Control of Selected Chronic NCDs in Sri Lanka: Policy Options and Actions

Executive Summary

Introduction

Strategic decisions to reorient population-based prevention and clinic- and hospital-based care policies toward noncommunicable diseases (NCDs)² will enable healthier aging and reduce loss of productivity among the working-age population in Sri Lanka. This report aims to stimulate policy dialogue for NCDs and to provide an evidence base to facilitate decisions. Its focus is mainly on chronic NCDs—that is, cardiovascular disease (CVD), diabetes, and asthma/chronic obstructive pulmonary disease (COPD), and to a lesser extent cancer—and their major modifiable risk factors (tobacco use, unhealthy diet, lack of exercise, and harmful alcohol use). This is because global and national policies target these diseases and risk factors because the burden from them is large and the evidence base to reduce their impact tends to be stronger than for other NCDs. This is not to detract, though, from the importance of injuries and mental health since both are major issues that carry a huge burden, as supported by evidence in this report.

Current and Future Disease Burdens

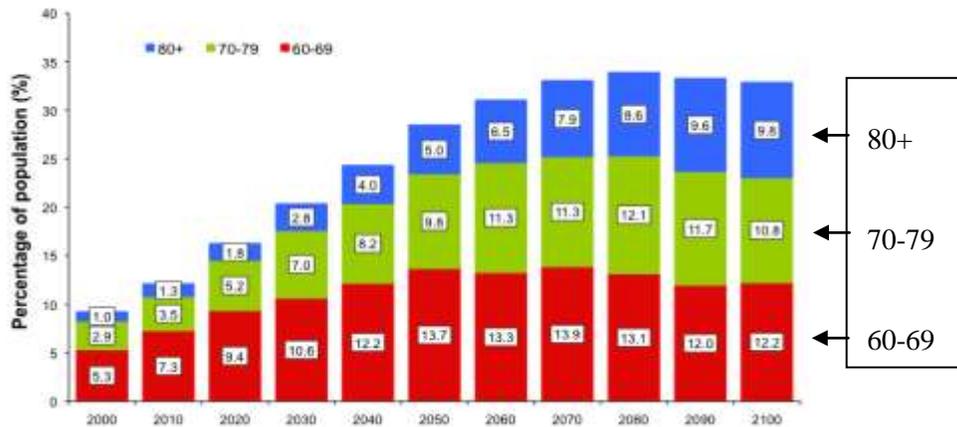
Demographic (aging) and epidemiologic (disease pattern) transitions are under way

Sri Lanka, now having transitioned from a low income country to a middle income country, has a life expectancy for its citizens of 71 years, and is in the advanced stages of a *demographic transition*. The proportion of people 60 years and older is likely to more than double by 2040 to just above 24 percent (Figure 1).³ However, these gains have not been even. Male life expectancy gains have stagnated since 1970, while those for females have continued.

² NCDs are defined by the World Health Organization (WHO) to include chronic diseases, principally cardiovascular disease, diabetes, cancer, and asthma/chronic obstructive pulmonary disease (COPD), in addition to injuries and mental illness.

³ See the main text for sources to this executive summary.

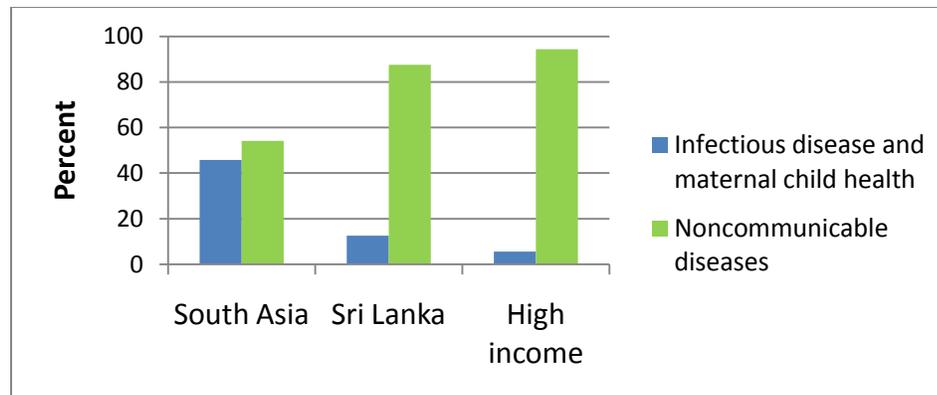
Figure 1 Proportion of people in older (≥60 years) age groups, Sri Lanka, 2001–2100



Source: De Silva 2007.

In addition, the *epidemiologic transition* is shifting the disease pattern from maternal and child health and infectious diseases to NCDs, which now account for nearly 90 percent of the disease burden (Figure 2). Because NCDs are more common with aging—but not inevitable—timely actions now could trigger many future benefits such as healthy aging, lower disability, and longer, more productive lives. NCDs are often associated with changes in lifestyle related to urbanization, improvements in economic status, and exposure to undernutrition early in life.

Figure 2 Disease burden for main health conditions, South Asia, Sri Lanka, and high-income countries, 2004



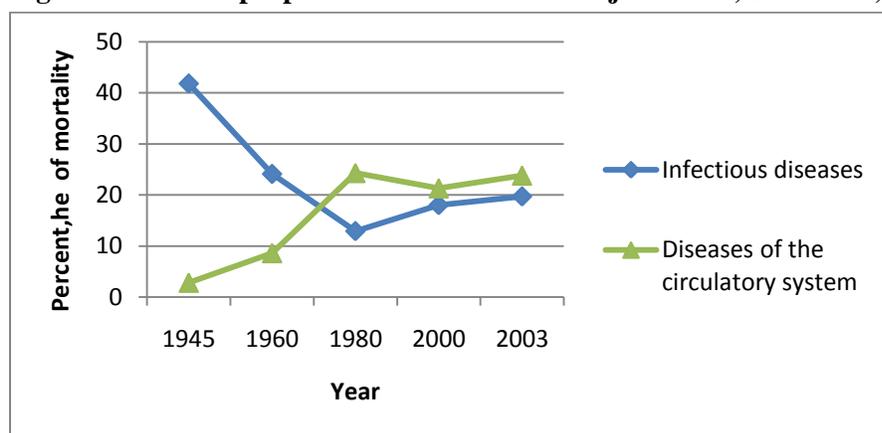
Source: WHO 2004a.

Note: Burden is in disability adjusted life years (DALYs) which account for premature death and for years lived with significant disability.

The NCD burden is rising

During the past half-century the proportion of deaths due to circulatory disease (such as heart disease and stroke) has increased from 3 percent to 24 percent while that due to infectious diseases has decreased from 42 percent to 20 percent (Figure 3). Mortality rates from NCDs are currently 20–50 percent higher in Sri Lanka than in developed countries. The disparities are most substantial for CVD and asthma. This is because in developed countries, mortality rates from NCDs, especially CVD, have fallen significantly during the past three decades, but not in Sri Lanka.

Figure 3 Trend of proportion of deaths from major causes, Sri Lanka, 1945–2003



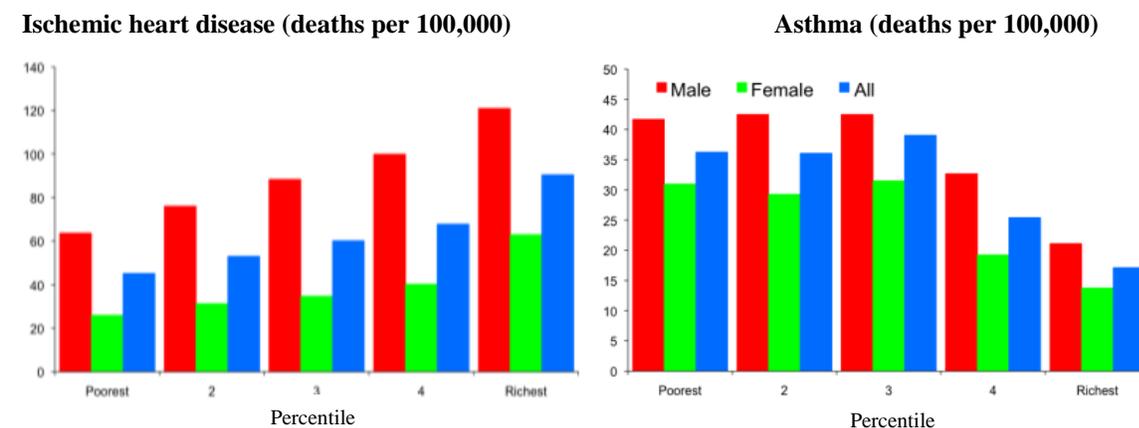
Sources: Analysis by authors of data of the Registrar General’s Department for 2000 and 2003; UN ESCAP (1976); Department of Census and Statistics (1987).

Note: Infectious diseases include infectious, parasitic, and respiratory diseases, dysentery (all forms), tuberculosis of the respiratory system, typhoid, malaria, pneumonia, and bronchitis. Maternal and child health include anemia, and complications of pregnancy and child-birth. Injuries include violent or accidental deaths. Ill-defined deaths are not classified to any specific cause.

The NCD burden is shifting toward the poor

The NCD burden is not equally distributed among the rich and the poor. In high- and middle-income countries chronic NCDs tend to be concentrated in the poor. However, in Sri Lanka the pattern is more complex and changing. Deaths from heart disease are higher among the rich while those from asthma are higher among the poor (Figure 4). Other countries in the region with similar demographics to Sri Lanka’s, such as Maldives, are seeing this pattern change with all chronic NCDs concentrating in the poor. The main reasons for chronic NCDs concentrating in the poor in high-income countries are their lesser uptake of healthy lifestyles and lesser access to health services.

Figure 4 Death rates for heart disease and asthma by wealth quintiles and sex, Sri Lanka, 1999–2003



Source: Institute for Health Policy 2010.

Most NCDs and their risk factors are expected to increase

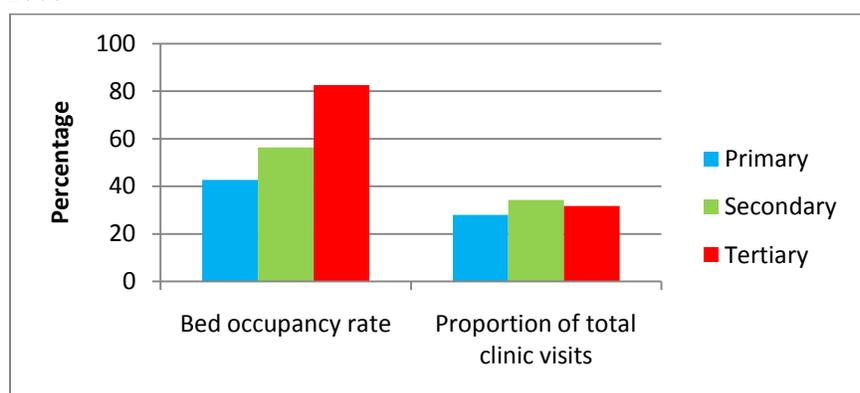
Compared to developed countries, NCD risk factors in Sri Lanka are lower for some diseases (for example, hypertension, obesity, tobacco, physical inactivity, and alcohol use) but higher for others (such as dyslipidemias [high cholesterol]). Some risk factor levels can be expected to increase in the coming years, especially those associated with urbanization and development gains (for example, obesity and physical inactivity).

Health services for chronic NCDs are mostly delivered at higher-level facilities

Health service delivery for chronic NCDs has developed a specific pattern. In the public sector, NCDs are largely managed by specialist clinics as long-term outpatients and as inpatients in higher-level (secondary or tertiary) facilities. Primary health care facilities are not expected to initiate management of chronic NCDs but only provide follow-up care in some lower-level hospitals. A formal referral system is not in place and government policy allows self-referral on demand to secondary and tertiary facilities. Thus patients often use these higher-level facilities, aware that primary facilities lack the capacity to manage NCDs in terms of their ability to perform clinical investigations and provide all medications. In addition, after-hours patients seeking care are typically admitted to hospital when it might not be warranted.

These patterns are confirmed with public sector data. In 2008 bed-occupancy rates were nearly 85 percent in higher-level facilities and below 50 percent in lower-level facilities (Figure 5). In terms of inpatient morbidity among all admissions, in 2008 chronic NCDs accounted for 24 percent and injuries for 18 percent, while infectious diseases accounted for 26 percent, maternal and child health conditions for 12 percent, and other causes for 20 percent of the total. Specialist clinics in secondary and tertiary facilities manage 65 percent of the chronic NCDs in overcrowded clinics. Primary care facilities manage follow-up for approximately 33 percent of the acute NCDs. About 60% of the asthma is managed in public facilities.

Figure 5 Bed-occupancy rates and the proportion of total clinic visits by level of facility, Sri Lanka, 2008



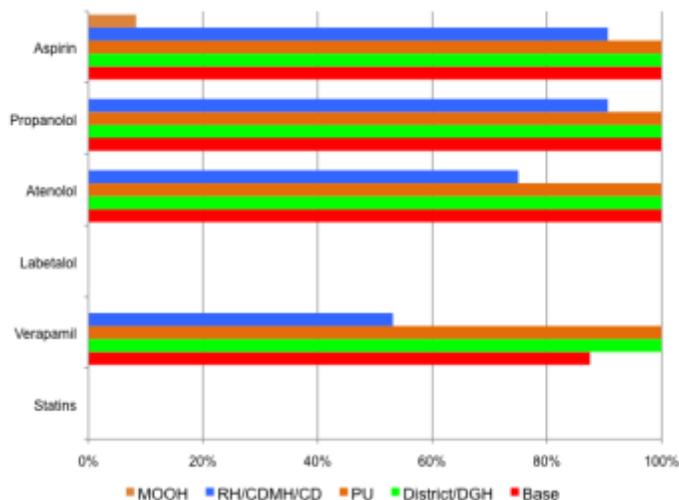
Source: Computed by World Bank based on *Annual Health Statistics 2008* provisional data and 2007 data from the Medical Statistics Unit.

Diagnostic testing and essential medicines for NCDs are limited

Several capacity features that are important for NCD prevention and control have gaps. Essential clinical investigation and medical equipment necessary to diagnose and manage NCDs are frequently unavailable at primary and secondary care levels. In addition, low availability of essential medications for treating

NCDs is a problem (Figure 6). Lower-level (primary care) facilities⁴ such as divisional hospitals often not have the full spectrum of medicines for heart disease, asthma, cancer, and diabetes patients. These patterns are similar for other essential chronic NCD medicines, and more recent assessment (in 2009) finds little change.

Figure 6 Availability of essential medicines for ischemic heart disease at different facility levels, Sri Lanka, 2005



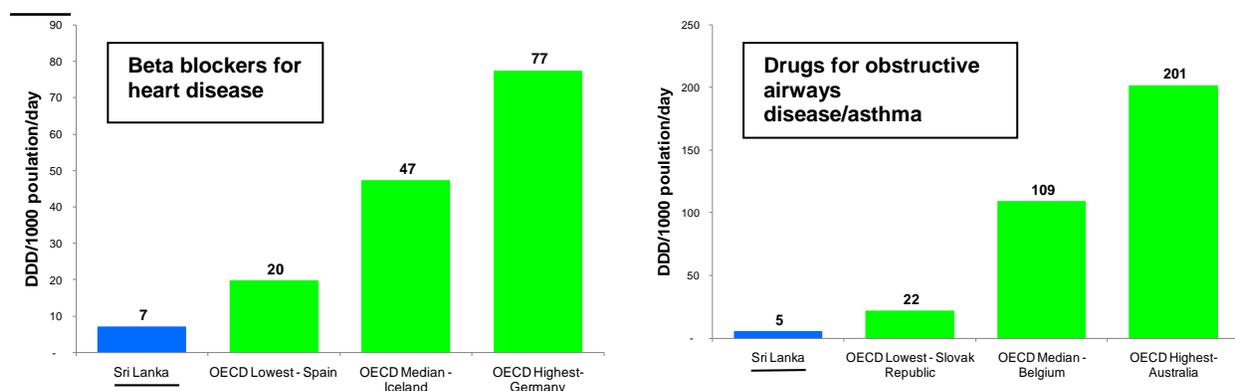
Source: Institute for Health Policy/Ministry of Health Public Facility Survey 2005.

Note: Estimates are for the districts of Colombo, Badulla, and Matale. “Availability” means at any time during the year. MOOH = Medical officer of health unit; RH = rural hospital; CDMH = central dispensary maternal home; CD = central dispensary; PU = peripheral unit; DGH = district general hospital; Base = base hospital.

The short supply of key medications and its impact is confirmed by the overall rates of essential NCD medicine use in Sri Lanka being below the range among Organisation for Economic Co-operation and Development (OECD) countries with comparable NCD disease burden patterns (Figure 7). One explanation is the low volumes of essential NCD medicines available in the public sector. Other possible explanations include provider practice patterns and patients not following their treatments plans.

Figure 7 Consumption of selected NCD medicines in defined daily dose units, Sri Lanka, 2008 and OECD countries, 2006

⁴ This pattern is due in part to primary care protocols and is worsened with stock outs.



Source: OECD countries for 2006 from *OECD Health Data 2008*, and Sri Lanka for 2008 computed from data provided by MOH and IMS-Health (Sri Lanka).

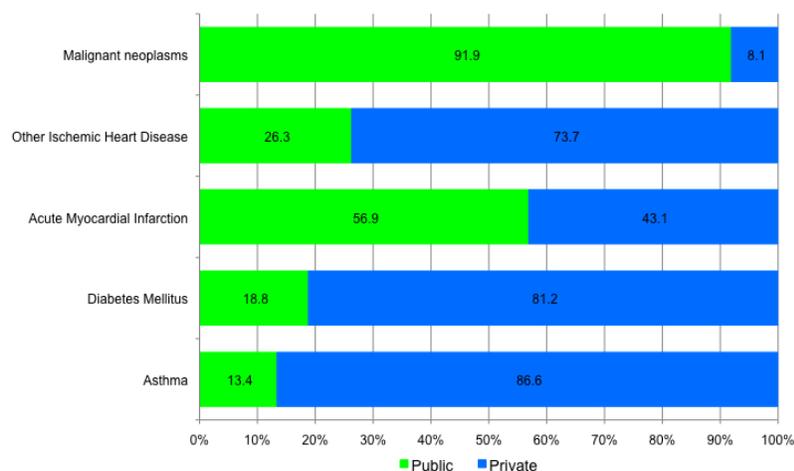
Health information systems and surveillance for NCDs are incomplete

Health information systems are reasonably well developed but suffer from some major limitations. Both inpatient and outpatient data lack key information on patient characteristics and diagnosis, limiting data usefulness for assessment and planning. Also, a surveillance system for NCDs and their risk factors is missing. These systems are critical for planning and policy development.

NCD care depends heavily on out-of-pocket spending

Owing to the current system's organization, a substantial proportion of care for NCDs is delivered in the private sector. In the private sector, patients pay for almost all their treatment costs. In the public sector, patients receive clinic visits without paying fees but frequently obtain prescribed medicines and laboratory tests from the private sector where they bear the costs. However, for emergency inpatient care of NCDs and for some illnesses, such as cancer, most patients rely on the public sector. Treatment of cancer and acute myocardial infarction is mostly or predominantly publicly financed, while expenditures for chronic NCDs, such as diabetes, asthma, and other types of ischemic heart disease (IHD), are predominantly paid for out of pocket (Figure 8).

Figure 8 Expenditures on major NCDs, by public and private sources (%), Sri Lanka, 2005



Source: Computed from estimates of the Institute for Health Policy Sri Lanka Disease-specific Accounts Project in 2005.

Because of the government’s ability to purchase most medicines at prices far lower than the whole price paid by the private sector, the cost to the public sector of increasing the supply of most NCD medicines to 80 percent of the median level of NCD drugs used in OECD countries would be cost effective and might be financially feasible. Such an increase would also be pro-poor, as the marginal benefits would be greatest for those in the poorest households.

Patterns of service utilization show that much NCD care is based in higher-level facilities and that, in addition to limited availability of medications, medication use also appears low, and financing depends largely on out-of-pocket expenses and puts all people potentially, especially the poor, at great financial risk.

Sector Characteristics: The Tools to Respond

The health infrastructure for preventive and curative care is solid

Tackling NCDs will require adjustment in the country’s existing health infrastructure, which has achieved remarkable health gains with modest health spending. As a low-income country that has recently transitioned to low middle-income status, its key indicators for maternal and child health are better than many high- middle-income countries and match those in some high-income countries. Long-standing national social policies for education and health, alongside modest public resource investments in key strategic areas, largely account for this position.

Such health gains have hinged on an educated population and on two key health sector attributes. First, a well-developed preventive health system tooled to provide antenatal, prenatal, and postnatal care, immunizations, infectious disease prevention, and health promotion. Second, a curative care system that has geographically well-distributed facilities to improve access, and that has a major focus on key outputs including universal institutionalized deliveries, access to timely outpatient and inpatient services, and reduction of equity issues.

On the other side of the coin, however, human resources are inequitably distributed, largely because human resource distribution has historically been based on patient demand created by facility expansion, leading to unplanned expansion of postings. In addition, NCD training is yet to be institutionalized, while clinical guidelines for some selected NCDs are available but not widely disseminated. Finally, with the

exception of tobacco control, population-level prevention programs to promote healthy lifestyles are limited.

Developed-country experiences lend insight into Sri Lanka’s NCD strategies

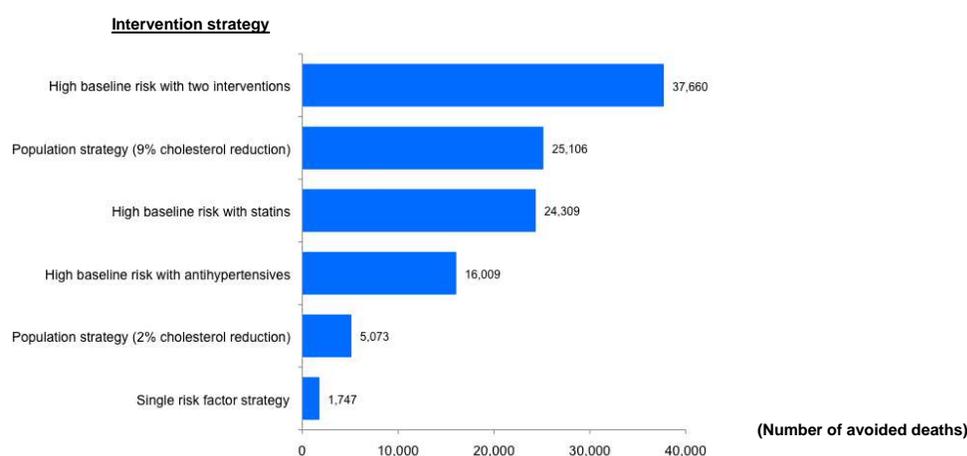
Developed countries provide an evidence base for CVD reduction at both the population level—by reducing tobacco use and improving diet (such as reductions in salt, trans fats, and saturated fats)—and at the primary care level—through treatment of conditions with medications (such as hypertension and cholesterol). High-income countries have developed several service delivery models for NCDs that focus on efficiently providing primary care, and, even though these structures vary, some common lessons emerge. For example, most care delivery models in developed countries have multi-professional teams of physicians, nurses, and other health professionals who are responsible for delivering primary care, including most routine curative care. They also have patients registered with a specific primary care facility. Additionally, primary health care provision is closely coordinated and integrated with the delivery of hospital and secondary care services.

Less is known of middle-income countries and their service delivery models. In general they focus on primary care systems. Some early models from Malaysia and Thailand are showing promise.

Some policy simulations for heart disease suggest that interventions can reduce deaths significantly

Because of the importance of CVD among NCDs, outcomes of various policy option scenarios to address the disease were simulated using developed-country assumptions. Clinic-based interventions targeted at high-risk groups, alongside aggressive population-based health promotion approaches, could reduce 10-year cardiovascular deaths in Sri Lanka by nearly 25 percent, assuming ideal implementation (Figure 9).

Figure 9 Deaths avoided at 10 years under different intervention strategies for heart disease among Sri Lankans, 18–74 years



Source: Institute for Health Policy 2010. The Framingham cardiovascular risk prediction equation and data from Katulanda et al. (2008) were used for the calculation.

Policies need to address both treatment of those affected and reductions in risk factors

From the overall policy standpoint, the developed-country experience with CVD highlights opportunities for improving the Sri Lankan trends, while the expected shift in burden toward the poor, similar to that in other countries, highlights the need for future pro-poor health policies to address NCDs. Policies have to address both NCDs and their risk factors in order to have the best returns.

Policy Options and Actions

Several major areas for policies and actions emerged from our analysis of Sri Lanka's health sector organization and capacity as well as its NCD orientation. Some areas are not specific to NCDs but, rather, will strengthen the health sector generally while leading to better NCD prevention and control.

Increasing Financial Resources for NCD Prevention and Control

Factors that will drive increased future health expenditures in general and NCD interventions in particular are:

- the NCD burden in Sri Lanka, which is already at comparable levels to those in developed countries, is set to increase further as the population ages;
- current system capacity needs significant strengthening to meet the growing NCD burden;
- the population expects the government to ensure the provision of high-quality clinic-based curative care services through the public sector delivery system, free at the point of delivery, and these expectations will only rise as Sri Lanka's economic status improves;
- the cost of addressing the NCD challenges will be much higher than those of infectious diseases and maternal and child health issues; and
- overall, total and government health spending in Sri Lanka is still at the lower end of the international spectrum, given its level of national income.

In addition to clinic-based services, population-level risk-factor reduction efforts will also increase resource needs. Such efforts will need to be financed from public funds because they deliver public goods or positive externalities, or both.

A financing policy option package for Sri Lanka should consider efforts to:

- mobilize greater resources for NCD control and prevention (from both public and private sources) which may require expanding public financing and/or exploring alternative sources;
- establish mechanisms for reducing out-of-pocket contributions from the poorer segments of the population;
- look for ways to increase efficiencies in the public sector, for example, bulk purchase negotiations by the government on behalf of the population; and
- ensure that additional allocation for NCD does not come at the expense of action to control infectious diseases or to provide maternal and child health services.

Total and public health expenditures are relatively low in Sri Lanka. Public health expenditures have not kept up with needs and demands, and out-of-pocket spending has been increasing as a share of total spending. NCDs will increase and accelerate the demands on the system, along with other factors that will push up future health care costs. The question to be asked at this time is: how will the needs be met? Raising tax revenues commensurate with increasing demands might be the best way forward, given the growing proportion of out-of-pocket contributions to total health expenditures and the context of consecutive years with budget deficits. The low revenue tax-based financing may be unable to cope with future increased health care costs. The government may need to consider securing alternative sources of financing..

Increasing Access to NCD Drugs, Especially for the Poor

It is evident that essential drugs for NCD management are underutilized in Sri Lanka. In addition, low availability of such drugs has been found to be more pressing at the primary care level than secondary and tertiary levels, at least partially contributing to the inappropriate use of higher-level facilities by patients who could have been managed at lower-level facilities. To ensure adequate supply of essential NCD

drugs, the most appropriate approach might be through public sector procurement of these drugs, due to economies of scale.

Increasing the drug supply through public financing and/or procurement is a feasible option. It may be financially feasible in Sri Lanka to increase the level of drugs to 80 percent of the utilization rates in OECD countries through public financing for two reasons. First, public sector unit prices for key NCD drugs are a small fraction of private sector wholesale prices. . The private sector costs are as much as four times that of the public sector. Second, the overall cost of these drugs is a small fraction of total public spending on health. Raising supply levels of these essential NCD medicines, excluding statins, would have represented less than 1 percent of total public sector health expenditures in 2008.

If the supply of drugs in the public sector remains inadequate, then the government may need to consider policies to protect poor segments of the population who may underutilize drugs because they can not afford to pay for them out of pocket.

Addressing Social Determinants

The causative and risk-enhancing determinants of most NCDs include social factors. Educational status, income level, gender issues, peer pressures impinging on lifestyles (such as smoking, harmful alcohol use, unhealthy diet, and lack of exercise—key risk factors), occupational exposure to certain carcinogens, and environmental health are just some examples illustrating the importance of policies and actions in nonhealth sectors to national efforts to prevent and control NCDs.

Successful prevention of NCDs therefore calls for well-coordinated intersectoral action, but such action needs to be initiated and led by the Ministry of Health. Institutional mechanisms need to be created to involve various nonhealth ministries in a multi-disciplinary effort. Examples of nonhealth ministries are Education, Social Services, Agriculture, Environment, Labor, Commerce, Law & Justice, Urban Development, Home Affairs (Police) and, of course, Finance and Planning.

Because the prevalence of NCDs increases with age and the diseases have important long-term care implications beyond medical treatment, there is a critical role for the Ministry of Social Services in developing services for the elderly, with special attention to those with NCDs. Policies targeting workplaces with a view to making them conducive to healthy lifestyles should be developed and implemented. Finally, the health sector itself should design and implement effective communication campaigns aimed at changing population behaviors with respect to the key risk factors.

Focusing on Specific NCDs

Because NCDs are such a broad category of diseases, this report adopts a strategic approach to focus on selected diseases, keeping in mind their disease burden and the availability of cost-effective interventions. As policies and efforts for these diseases are refined, the knowledge and experience gained in both public and private sectors and among all the major stakeholders will be useful for addressing other NCD areas. The risks of expanding or of going too broad, too quickly are the dilution of strategic efforts and nonsustainability.

Addressing Undernutrition as well as Overnutrition

There is a growing body of evidence that low birth weight and childhood undernutrition increase the risk of NCDs at a later age. Reducing childhood and maternal undernutrition is an unfinished agenda for Sri Lanka—appropriate policies and programs are urgently needed. Community-based nutrition interventions are required, targeting vulnerable population groups, such as mothers and children in the tea estate sector and in certain rural districts. The targeting needs both to be at the right age group (conception to 24 months, which is generally described as the “window of opportunity” for nutrition interventions), and to adopt a life-cycle approach, that is, include adolescent girls and lactating women. Such interventions should focus on household behaviors related to eating, feeding, and caring.

At the other end of the spectrum, overweight and obesity are growing public health problems, causing another sort of “double burden,” in addition to the double burden of noncommunicable and infectious diseases. Both population-based and personal interventions aimed at improving dietary practices would be similar to those targeting the other key NCD risk factors.

Creating an Intensified National NCD Program

National NCD prevention and control efforts are spread across three key directorates (for NCDs, cancer, and mental health), yet they need support from many other directorates. An intensified national NCD program with the resources and authority to make it effective—working through existing systems and structures rather than creating a vertical parallel program—is an option for developing, organizing, and implementing national prevention and control policy.

Strengthening and Reorganizing NCD Prevention and Curative Care Services

The emergence of NCDs as a major health problem may need fundamental reorientation in the way that primary health care is delivered. Such care comprises public services that include preventive services and a separate stream of curative services, and private physicians who work independently of the public sector. Organized this way, primary health care is poorly placed to deliver primary care for NCDs for the following reasons: preventive efforts such as individual counseling on smoking, diet, or exercise tend to be neglected by the purely curative-oriented providers, especially in the private sector; Medical Officer of Health activities on prevention are difficult to coordinate with the independent curative services; and private practitioners, being outside the purview of the public system, do not report data on patients they see, and are extremely difficult to regulate on quality.

Expansion and improvement of the curative services to provide better quality care must be an integral component of a successful response to NCDs. Currently, apart from specialist clinics, the delivery system is not set up for providing organized, high-quality, continuing care for NCD patients. Outpatient clinics have no system to ensure long-term follow-up management for many NCD patients. Medical Officer of Health units focus on preventive care for maternal and child health and infectious disease prevention, and have the potential to provide population-level outreach prevention activities for NCDs. Primary care facilities lack access to all the necessary NCD drugs and required laboratory facilities, as well as experience and training in NCD case management to provide high-quality NCD care.

The curative care response to NCDs should prioritize the expansion of treatment with cheap and cost-effective drug treatment of NCDs, in particular for CVD and asthma. However, drug availability needs to be closely linked with the service delivery system. Even if all NCD medicines are made available, the current primary care system probably lacks the capacity to assess patients adequately with routine follow-up tests, to provide long-term follow-up with appropriate calibration of treatment schedules, and to coordinate with the treatment of other chronic conditions. The use of specialist clinics based in higher-level hospitals likely makes expansion with a specialist-led care model unfeasible, and will require expansion of the primary care system, with specialists shifting their role to providing backup for more difficult cases, as well as supporting initial assessment of new patients.

Moving Services Closer to Clients and Improving Efficiency

Many of the patients treated at tertiary care facilities could be managed at lower cost in a secondary or even primary facility. This would also be more convenient for patients. The fact that they are willing to travel longer distances for higher-level facilities shows that the quality difference, perceived or real, is significant. Therefore, unless higher-quality care—perceived to be as good as what is offered in a tertiary hospital—is provided in secondary and primary facilities (and in the absence of an effective referral system or gate-keeping function of primary care providers), this trend cannot be reversed. Once the quality improvements are made, in terms of the availability of skills, equipment, and drugs, an education campaign needs to be launched to change care-seeking behaviors.

Additionally, anecdotal observations indicate that many hospital inpatients could be managed as outpatients or clinic patients; the current approach clearly has negative cost implications and results in systemic inefficiency. The choice of being admitted to the hospital resides with the doctors. Added to this, there has been a policy that prohibits outpatient services after 4 pm, compelling public sector hospitals to admit any patient who shows up after that time (for overnight stay) regardless of the clinical need for inpatient care. The introduction of emergency treatment units and preliminary care units is addressing this practice and improving the quality of care, but these units are not yet available in all facilities.

After more careful analysis of hospital admission policies, a clear policy on triaging outpatients before admission to the ward and emergency care facilities for acute NCDs and acute events for chronic NCDs need to be established, a nationwide training program launched for doctors on appropriate practices with regard to inpatient admissions and emergency treatment, and an education campaign started to stimulate appropriate attitudinal and behavioral changes in the population.

Further Decentralizing and Devolving Health Service delivery

Sri Lanka has already seen much decentralization of health services. The central level is vested with stewardship functions, such as financing, policy making, planning, coordination, monitoring and oversight, standard setting, guidelines development, and a few support functions such as human resources and pharmaceuticals. The provinces (and districts under them) are responsible for service delivery with the exception of tertiary (teaching) hospitals and a few selected secondary-level hospitals.

The current system functions relatively smoothly, but lacks an effective referral system. Though this lack has other dimensions than decentralization, a seamless referral system may be easier to achieve if all service delivery is decentralized, including tertiary hospitals.

Human Resource Development for NCD Prevention and Control

A human resource needs assessment of current and future NCD efforts would provide much-needed guidance for developing a strategy. Medical, nursing, and other relevant curricula do currently cover the various NCDs, but improvements could be made by providing latest knowledge and by emphasizing the commonalities of risk factors among several NCDs. Such a more integrated approach could result in preventive interventions that can deal with multiple conditions at the same time. In addition, the new national clinical standards and guidelines of 2008 include many NCDs, but these are yet to be applied in practice. These guidelines need to be institutionalized by integration into training curricula, by in-service training for current staff, and by periodic updating and review to assure that the latest information is incorporated.

An aspect of NCD service provision that may need to be included explicitly in medical education and its curricula (and subsequent in-service training) is training for decision making on when and where to refer cases. Similarly, the proper triaging of patients before admission to the ward also warrants such inclusion.

Creating a National NCD Surveillance System

A national NCD surveillance system is needed. Its major elements should include behavior risk factors; NCD morbidity; mortality; health services utilization and quality of care (public and private sector); special registries (for example, cancer and injury); and the economic burden. In addition, as prevention efforts using nonhealth sector policies are developed and implemented (for example, taxation of tobacco, and reductions in salt and harmful fats in manufactured foods), surveillance of key indicators outside the health sector will be needed (again, on cigarette consumption and on salt and fat content in manufactured foods, for example).

NCD morbidity data from both inpatient and outpatient services are limited. For public inpatients at all levels of the public system, although the diagnosis is recorded, individual data with demographic and other characteristics are not. For outpatients using public systems, neither diagnosis nor individual

demographic data are collected in the returns. In addition, data are not routinely collected on private sector health service delivery.

Mortality will continue to be an important element of surveillance and Sri Lanka has a comprehensive system in place, in contrast to many other developing countries. However, areas needing improvement include accuracy of recording the cause of death; appropriate coding; and timeliness of the data collection, collation, analysis, and report dissemination. Finally, as prevention efforts unfold, development of surveillance tools for outside the health sector should be tailored to fit the needs of tracking progress and evaluating impacts.

Public–private Partnerships and Aligning Service Delivery

The market share of private providers is significant (about 50 percent of ambulatory care and 10 percent of inpatient care), almost all of which is financed through out-of-pocket payments. Given this share, as well as the cost of NCD care and the need for modern technology, there is an even stronger argument for a more proactive policy of public–private sector engagement, both for financing and for provision of NCD curative care services.

Private sector service delivery remains poorly understood and its quality of care delivered is mostly uncharacterized. Therefore, the first step in building the platform for effective public–private partnerships is to carry out a private health sector assessment, so that public policy makers can understand the configuration of the clinics, clientele, costs, and quality of services. The aim of public–private partnerships would be to leverage the private sector toward public policy goals.

Chapter 1: Introduction

Key Messages

- Using modest levels of health expenditures, Sri Lanka has made substantial gains in health. Its key indicators approach those in high-income countries.
- The country, now transitioned from a low income to middle income is also in the later stages of the demographic and epidemiologic transitions—that is, it is both aging and shifting the disease burden from maternal and child health and infectious diseases toward noncommunicable diseases (NCDs).⁵
- Developed countries' experience with NCDs has shown that the combination of population-based prevention efforts (for example, reducing tobacco use) and basic primary care can substantially reduce the disease burden.
- Because NCDs are such a broad issue, this report focuses on strategic areas where policy and actions can have a high impact on NCDs.

Context

Sri Lanka, now transitioned from a low income to middle income country had an estimated population of 20.2 million in 2008. From before the middle of the 20th century, it had invested significant public resources into the social sector, with particular emphasis on expanding universal access to education and health care through public financing. As a result, literacy rates and access to primary and secondary education are high as are use of health services, despite limited national health expenditures compared to other countries (Rannan-Eliya and Sikurajapathy, 2008) (Table 1.1).

Public financing of health care services and education, and investments in a minimum level of food security, have been major factors behind a high level of life expectancy and generally good health indicators, which are generally better than in other countries at a similar level of development (Table 1.2). Gains in maternal and child health and control of vaccine-preventable diseases are impressive. In combination with substantial declines in fertility since the 1970s, these advances have led to rapid demographic aging (World Bank, 2008). This demographic transition has been accompanied by an epidemiologic transition, that is, a growing NCD burden which increasingly outweighs the disease burden caused by infectious and maternal and child health issues. In addition to these transitions, nutrition-related problems (underweight, anemia) remain and new health issues have emerged, such as dengue and leptospirosis.

⁵ Noncommunicable diseases are defined by the World Health Organization (WHO) to include chronic diseases, principally cardiovascular disease, diabetes, cancer, and asthma/chronic obstructive pulmonary disease (COPD), in addition to injuries and mental illness. Injuries include unintentional injuries such as road traffic crashes, drowning, burns, poisoning, falls, and other mechanical injuries (occupational, sports, etc.) and injuries related to mental health such as intentional injuries (suicides, violence, etc.) Mental illness includes its prevention and control and can include mental health issues related to alcohol and tobacco control.

Table 1.1 International comparison of health expenditures, 2008

Country	GNI per capita, Atlas method (current US\$)	Total expenditure on health as % of gross domestic product	General government expenditure on health as % of total expenditure on health	General government expenditure on health as % of total government expenditure	Per capita total expenditure on health at average exchange rate (US\$)
Sri Lanka	1,780	4	43	8	81
India	1,070	4	28	4	43
Maldives	3,630	11	70	13	462
Australia	40,350	9	68	18	4,301
China ^a	2,940	4	47	10	142
Malaysia	6,970	4	44	7	353
Republic of Korea	21,530	7	55	13	1,255
Russian Federation	9,620	5	66	10	620
United Kingdom	45,390	9	83	16	3,924
United States	47,580	16	47	19	7,536

Source: Data for GNI per capita are from the World Bank. Health Expenditure data (provisional estimates) are World Bank calculations based on data from World Health Organization, National Health Accounts (<http://www.who.int/nha/country/en/>).

a. Excluding Hong Kong (China) and Macao Special Administrative Region.

Table 1.2 Health status in selected countries

Country	Maternal mortality ratio (per 100,000 live births), 2005	Infant mortality rate (per 1,000 live births) both sexes, 2007	Total fertility rate (per woman), 2007	Malnutrition (% of children under 5 years, 2000–2007)		Immunization coverage among 1-year-olds (%), measles, 2007	Population with sustainable access to improved drinking water sources (% rural), 2006	Life expectancy at birth (years), 2007	
				Stunting	Under-weight			Female	Male
Sri Lanka	58	11	2.3^a	18.4	22.8	98	79	75	68
India	450	54	2.8	47.9	43.5	67	86	65	63
Maldives	120	26	2.6	31.9	25.7	97	76	75	70
Australia	4	5	1.8	—	—	94	100	84	79
China ^b	45	19	1.7	21.8	6.8	94	81	75	72
Malaysia	62	10	2.6	—	—	90	96	75	70
Republic of Korea	14	4	1.2	—	—	92	—	82	76
Russian Federation	28	10	1.3	—	—	99	88	73	60
United Kingdom	8	5	1.8	—	—	86	100	82	77
United States	11	6	2.1	3.9	1.3	93	94	81	76

Source: WHO 2009.

a. Department of Census and Statistics 2008. The *World Health Statistics* figure (WHO 2009) for Sri Lanka is 1.9.

b. Excluding Hong Kong (China) and Macao Special Administrative Region.

— = not available.

NCDs: The Emerging Disease Burden

The health trends in Sri Lanka are consistent with the later stages of the epidemiologic transition, which is characterized by receding pandemics, control of infectious diseases, improved maternal and child health, and increasing life expectancy (Omran, 1971). In part due to increased aging, NCDs are more common and now account, by far, for the majority of the disease burden in Sri Lanka.

The demographic transition is characterized by population aging, that is, a larger proportion of older age groups than in earlier years.⁶ A major health implication is that the transition will change both the volume and the types of health services required. Population aging is occurring much faster in Sri Lanka than in other developing countries. But although Sri Lankans now live longer, they also tend to spend more years in poor health and with more disabilities than people in developed countries. In fact, disability rates among the aging population may be increasing. Reasons for this trend are unclear, although in part they could be related to longer exposures to NCD risk factors, development of disease and its complications, and potentially suboptimal use of NCD-related health services.

Global and National Policy Context for NCDs

In 2000, the World Health Assembly adopted a resolution (WHA/53.17) endorsing a WHO Global Strategy for the Prevention and Control of NCDs (WHO, 2008a). The Director-General of WHO was requested to continue giving priority to the prevention and control of NCDs and the member states were requested to develop national policy frameworks and to promote initiatives. A Global Forum for NCDs was created. In 2003 and 2004 the World Health Assembly adopted the Framework Convention on Tobacco Control and the Global Strategy on Diet, Physical Activity and Health. In 2008, the *2008–2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases* was released. The Plan focused on four types of NCDs—cardiovascular disease (CVD), cancers, chronic respiratory diseases, and diabetes—because current evidence indicates that these make a large contribution to mortality in the majority of low- and middle-income countries. These diseases are also largely preventable by means of effective interventions that tackle their risk factors—tobacco use, unhealthy diet, physical inactivity, and harmful use of alcohol.

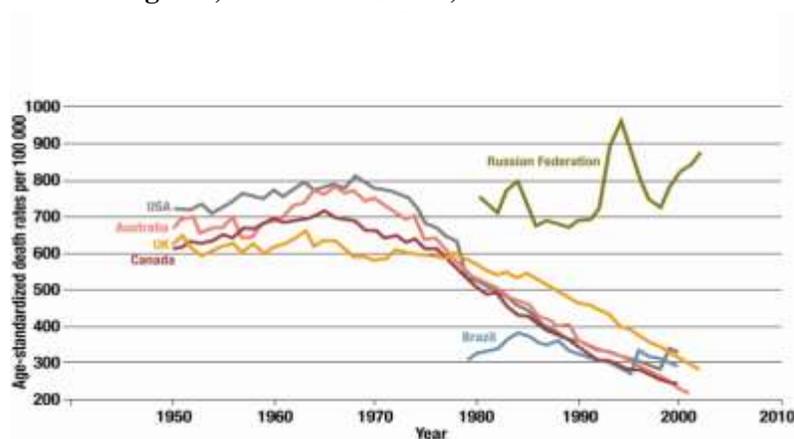
The document *National Policy and Strategic Framework for Prevention and Control of Noncommunicable Diseases, 2009*, was developed by the NCD Directorate in the central Ministry of Health (MOH) with input from several policy guidance documents related to NCDs. The overall goals of the national policy are to reduce the burden due to chronic NCDs by promoting healthy lifestyles, reducing the prevalence of common risk factors, and providing integrated evidence-based treatments for diagnosed patients. Policy objectives are to reduce premature mortality due to chronic NCDs by 2 percent annually over 10 years through expansion of evidence-based curative services and individual and community-wide health promotion measures for reduction of risk factors. The document is not linked to a budgeted nor detailed work plan, however.

Prevention and Treatment of NCDs

Developed-country experiences can lend important insight into prevention and control strategies for developing countries. CVD mortality saw major declines in several developed countries during the 1960s and 1970s, which have continued into the present (Figure 1.1). These findings received considerable attention and much effort was made to understand the underlying reasons.

⁶ The epidemiologic and demographics transitions are discussed further in Chapter 2.

Figure 1.1 Heart disease death rates among men aged 30 years and older, Australia, Canada, United Kingdom, and United States, 1950–2002



Source: WHO 2005.

During the last half century knowledge of pathophysiology, risk factors and their role in causing disease, and the impact of reducing risk factors on developing disease have all increased dramatically. In addition, many effective treatments to lower the risk of complications have been developed. Several studies examined these secular trends to determine the factors that accounted for these declines (see the sources for Table 1.3 for a nonexhaustive listing). The main finding was that on average, about half the reduction can be attributed to population-level changes in risk factors such as tobacco use, diet, and physical activity, and about half to treatment of disease and its complications, with most of the treatment effect due to medication use (Table 1.3). This makes the case that *both prevention and treatment are needed* and that the challenge is determining the strategic mix.

In Chapter 2, we note that treatment interventions may have more favorable cost-effectiveness for CVD prevention and control, although comprehensive models that include sectorwide interventions call for both. For mental health and injuries, the situation is similar and calls for consideration of both prevention and treatment.

Table 1.3 Reduction in secular trend of CVD mortality attributed to population-level risk factors and to treatment with medication and surgery (%)

Jurisdiction and period	Population-level risk factor	Treatment with medication and surgery
Scotland, 1975–94	60	40
New Zealand, 1982–93	54	46
Finland, 1982–97 ^a	48	31
Ireland, 1985–2000 ^a	48	44
United States, 1980–2000 ^a	47	44

Sources: Vartiainen et al. 1994; Capewell 1999; Capewell, Morrison et al. 1999; Capewell et al. 2000; Capewell, Beaglehole et al. 2000; Bennett et al. 2006; Ford et al. 2007.

a. Do not add up to 100% because some deaths are unexplained.

An early and important policy question that concerns government decision makers universally is how much focus should be on prevention of disease and how much on treating those already affected, while tackling NCDs. In parallel, whether governments should focus more on populations or more on individuals requires careful consideration of the burden, capacity, and many other country-level factors.

Reducing the risk factor burdens for NCDs is a major challenge in high-income countries and can be more so in low- and middle-income countries—the challenges posed by Sri Lanka’s demographic and epidemiologic transitions are, for example, huge. And once a person develops a chronic disease, such as heart disease, lifelong clinic- and hospital-based care is needed. Delivering effective prevention and primary care services for NCDs may require retooling current efforts, including new skills for human resources, population-level policies and health promotion strategies, health services linkages, and sustainable financing strategies. This report aims to help low-income countries along that path.

Rationale, Objectives, and Methods of this Report

The rationale for this World Bank report is that strategic health policy decisions to reorient population-based prevention and clinic- and hospital-based services toward NCDs can more effectively address the future burden. The focus of this report is mainly on chronic NCDs—CVD, diabetes, and asthma/COPD, and to a lesser extent cancer—and their major modifiable risk factors (tobacco use, unhealthy diet, lack of exercise, and harmful alcohol use). This is because global and national policies target these diseases and risk factors because the evidence base to reduce their impact tends to be stronger than for other NCDs. This is not to detract from the importance of injuries and mental health, since both carry a huge burden as supported by evidence in this report. This report focuses on chronic NCDs affecting the working and aging population. Its main objectives are to:

- Describe the chronic NCDs and prevalence of risk factors
- Describe the health sector’s organization and its capacity to address NCDs and identify potential organizational opportunities for moving toward more efficient and effective NCD prevention and control efforts
- Describe health services utilization and trends with special reference to NCDs
- Describe key health financing issues for NCDs
- Develop policy options to improve population-based prevention efforts and delivery of clinic- and hospital-based services for NCDs.

The analysis underlying this report required several sources of data. Previously published reports and analyses of data were used to describe the disease burden, risk factors, service utilization trends, and sector financing. Health sector reports and interviews with MOH officials and staff were used to describe the organizational structure, current prevention and control efforts, and service utilization patterns. Comparisons with other countries with similar NCD burden patterns were made to identify potential opportunities where policy options and actions can be targeted. However, because of Sri Lanka’s exceptional health indicators, its stage in the epidemiologic and demographic transitions, and its current and likely future disease burden pattern, countries used for comparisons are often middle- and high-income countries, rather than low-income countries. Thus statistical models that were used to simulate the potential impact of various policy options employed assumptions mainly from high- and middle-income countries. Finally, on the basis of the findings from the analysis, policy options and actions were developed for country-level consideration.

During the analysis, the MOH was engaged. It provided a technical review of early drafts to ensure that the report would be useful for subsequent policy discussions and actions, and that the report was focused on the key issues that will help future government decisions.

We made three key decisions for this report. First, since NCDs are such a broad issue, the focus—at the expense of being comprehensive—is on chronic NCDs and their major modifiable risk factors, where incremental, strategic policy and actions can have a high impact.

Second, because data from the Sri Lanka national health information and surveillance systems are not specifically designed for NCD assessments (although these data were included whenever possible),

several different data sources, including global, regional, national, and subnational studies, were used to describe the NCD burden. In addition, new secondary analyses were conducted to study equity issues and facilitate development of policy options.

Third, most country-level comparisons to Sri Lanka are made with high- or middle-income (not low-income) countries. At first pass, these countries may seem like suboptimal comparators. However, with Sri Lanka's current disease burden profile, these comparisons are more suited for identifying strategic areas to target as well as policy options.

This report is organized to focus on key areas that should help identify policy solutions. Here, in Chapter 1, we start with an orientation to the Sri Lankan context and introduce the country's epidemiologic transition. Chapter 2 explores the evolving NCD disease burden and the demographic and epidemiologic transitions. Chapter 3 goes on to examine the organization, capacity, and activities of the health sector that are important for a response to NCDs. Chapter 4 details the utilization and trends in clinic-based health services for NCDs. Chapter 5 briefly reviews overall health financing, then examines key financing issues for NCDs. Chapter 6 reviews prevention and control strategies, largely in middle- and high-income countries, then moves to simulating the impact of CVD-oriented policy scenarios. Finally, Chapter 7 develops policy options and actions that aim to improve both the NCD response and the health infrastructure overall. These options and actions relate to financing, social determinants, strategic focus, organizational structure, human resources, information and surveillance systems, and public-private partnerships.

Chapter 2: Evolving Disease Burden and Risk Factors

Key Messages

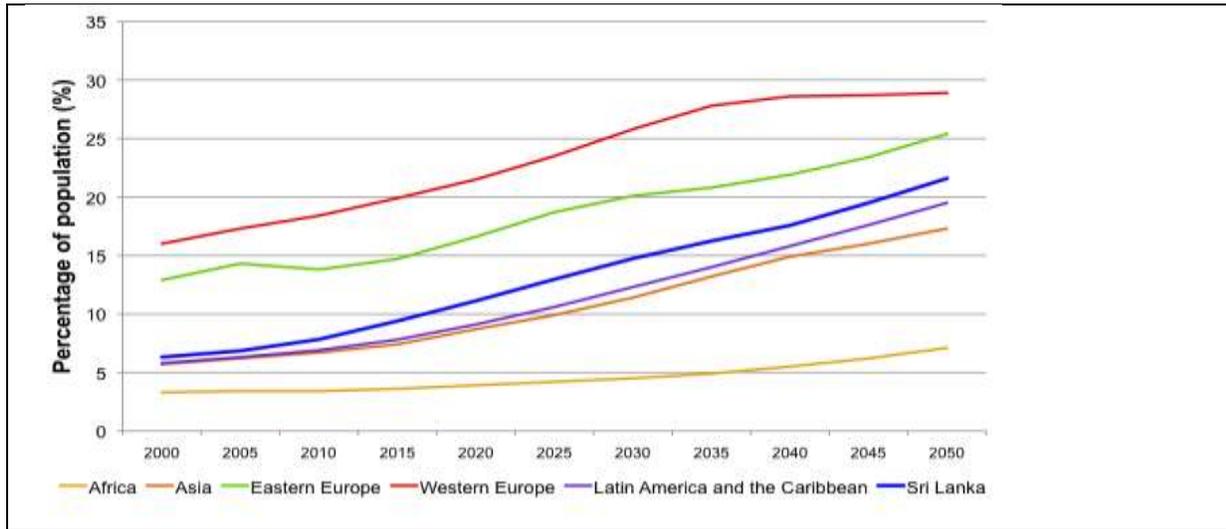
- Sri Lanka is aging rapidly and the proportion of people 60 years and older will double from 12.1 percent to 24.4 percent between 2010 and 2040.
- Life expectancy gains have been unequal, with females making steady gains since 1920 while gains among males have stalled since 1980.
- NCDs now account for 85 percent of the disease burden. During the past half century the proportion of deaths due to circulatory disease (for example, heart disease and stroke) increased from 3 percent to 24 percent while that due to infectious diseases decreased from 42 percent to 20 percent.
- NCD mortality rates are higher in Sri Lanka than in middle- and high-income countries (especially for asthma among younger populations) and, on the basis of limited national morbidity data, heart disease hospitalization and diabetes rates are similar to those in Organisation for Economic Co-operation and Development (OECD) countries.
- Lipid levels (such as cholesterol) are high. This is not necessarily due to a high fat intake in the diet, since at 25 percent of total energy intake this is relatively low. Rather, the main explanation is an exceptionally high ratio of saturated fats to polyunsaturated fats of 9:1 compared to a recommended ratio of <1:1. This has food policy implications.
- The poor are experiencing significant NCD-related mortality, morbidity, and risk factor burdens, which, in some cases, are higher than among the rich.

Demographic Trends and Population Aging

The most important feature of Sri Lanka's current and future demography is population aging, due to its past rapid fertility decline and the increase in life expectancy. By 2007, life expectancy had reached 71 years,⁷ and the total fertility rate had declined to 2.3 (Table 1.2, above). In the coming decades the population will age faster than in almost all other developing countries, with the percentage of the population aged more than 65 years more than doubling by 2035 to 16.2 percent, a level comparable to Western Europe today (Figure 2.1). This rate of change is many times faster than that experienced by developed countries earlier, most of which saw this level of aging over more than a century.

⁷ <http://www.who.int/gho/countries/lka.pdf>, accessed April 30, 2010.

Figure 2.1 Growth in percentage of population aged 65 years and above, Sri Lanka and world regions, 2000–2050

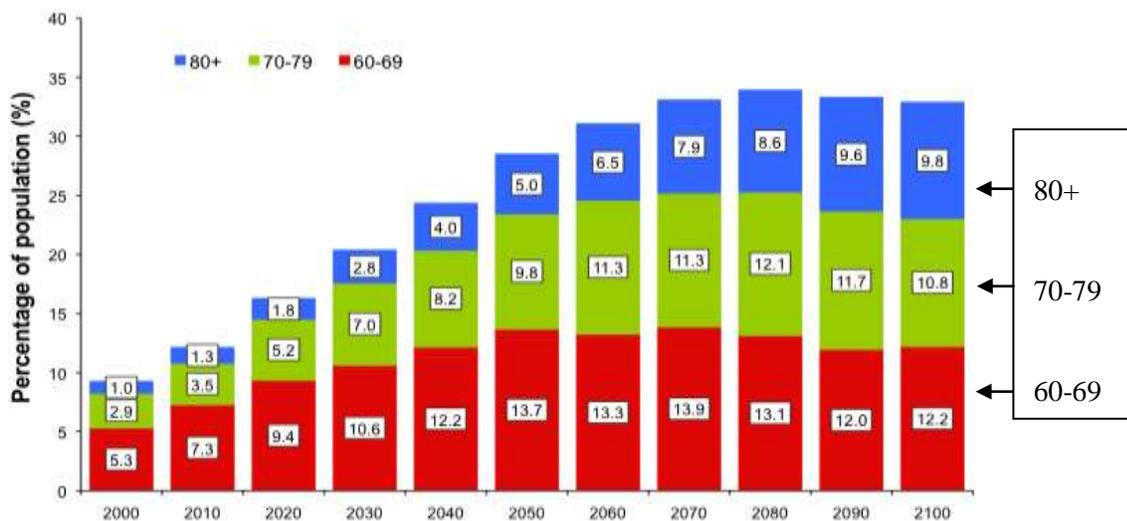


Source: De Silva (2007) for Sri Lanka; UN Population Division (2009) for other regions.

An important feature of Sri Lanka’s demographic aging is the pattern within the older age groups. The population 60 years and above will increase from one tenth of the population in 2010 to almost one third by 2050 (Figure 2.2), at which time the 80 years and older age group—those most likely to be frail and dependent—will account for 5 percent of the population.

The growth in all these age groups will pose challenges not only for health policy but also social policy, as these Sri Lankans are likely to need extensive provision of long-term care and other services. It will also increase dependency ratios.

Figure 2.2 Proportion of people in older (≥ 60 years) age groups, Sri Lanka, 2001–2100



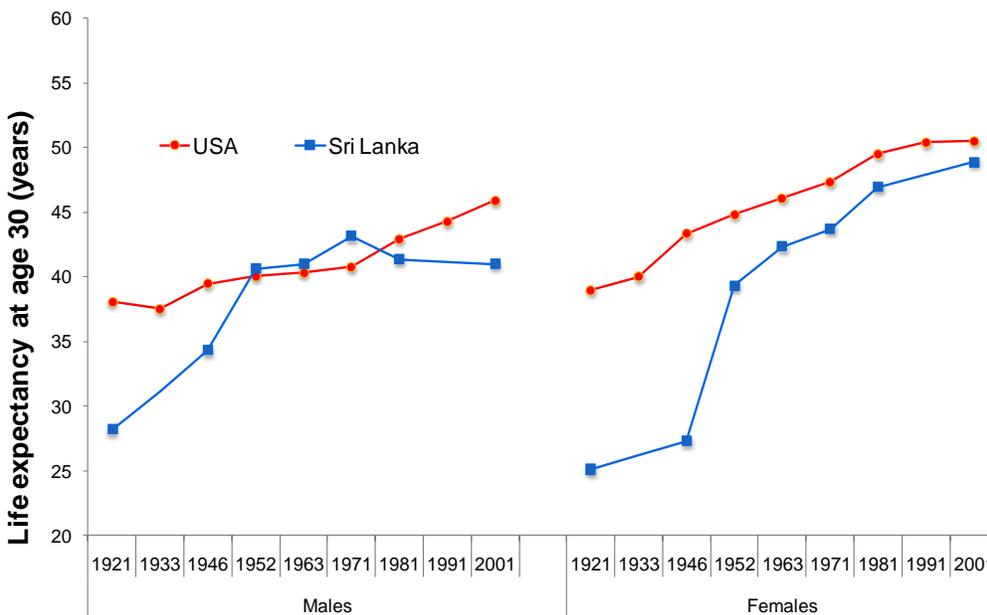
Source: De Silva 2007.

Mortality Trends and the Problem of Adult Mortality

Comparing the trends in life expectancy since the 1920s at 30 and 60 years of age, in both men and women in Sri Lanka, to that in the United States lends insight into the Sri Lanka pattern (Figures 2.3 and 2.4). First, in the case of Sri Lankan women, the history is initially of a large gap in life expectancy in the 1920s, and then rapid gains in the 1940–1950s, narrowing the gap with the United States to less than four years by the 1950s, and then sustained, slower increases, which have gradually further reduced the gap.

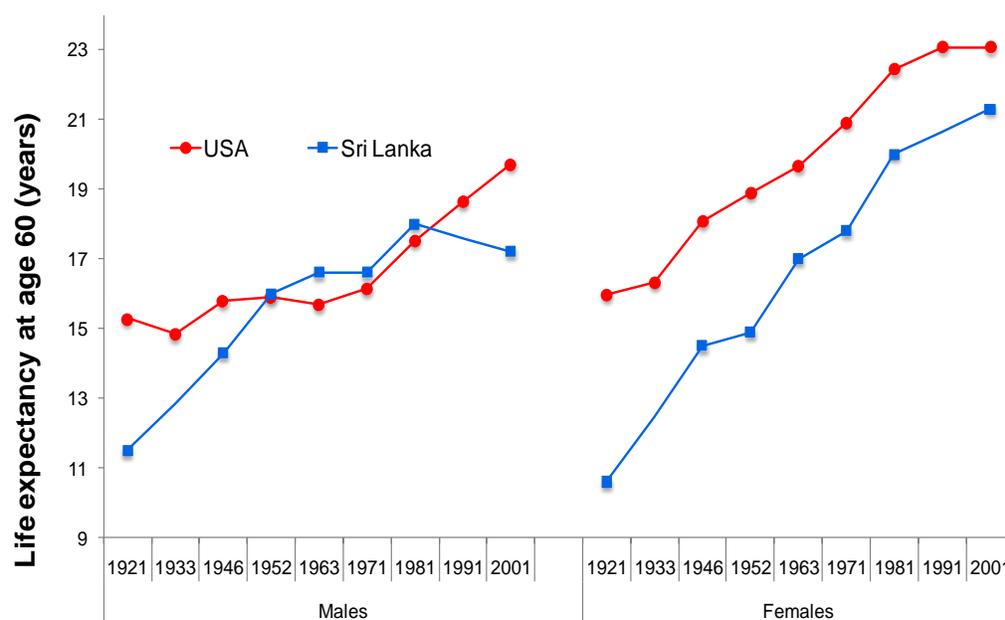
The story with adult men is more complex. In the United States, gains in life expectancy at 30 and 60 years of age stagnated from the 1940s to the 1970s and gains in life expectancy in Sri Lanka actually caught up with the levels in the United States by the 1960s. Then in the mid-1970s, life expectancy in the United States started to improve again, keeping pace with that of women. By contrast, in the same period Sri Lanka’s male life expectancy appears to have stagnated. Unfortunately, more recent life expectancy data will not be available until the census in 2011.

Figure 2.3 Changes in life expectancy at 30 years of age, Sri Lanka and the United States, 1921–2001



Sources: Sri Lanka from Sarkar (1951); Department of Census and Statistics (1970); De Silva (2007); and Institute for Health Policy’s computations from the same sources; the United States from Bell and Miller (2005).

Figure 2.4 Changes in life expectancy at 60 years of age, Sri Lanka and the United States, 1921–2001



Sources: Sri Lanka from Sarkar (1951); Department of Census and Statistics (1970); De Silva (2007); and Institute for Health Policy's computations from the same sources; the United States from Bell and Miller (2005).

These trends have resulted in a substantial male–female gap in life expectancy at birth of almost nine years (De Silva, 2007), one of the largest in the world. This is more than the four to six years seen in Europe and North America, but is smaller than the 13-year gap in the Russian Federation.

This lack of improvement in adult male mortality rates once a certain level of life expectancy has been achieved is not unique to Sri Lanka. A similar pattern was noted in Malaysia at similar levels of life expectancy in the 1970s (United Nations, 1982).

The reasons why adult male life expectancy improved, then stagnated, and improved again in the United States are well understood. The initial improvements in both male and female mortality in developed countries in the first half of the 20th century were primarily due to reductions in infectious disease deaths. Then in many of these countries, there was a slowdown in mortality improvement in the 1950s–1980s, owing to the persistence of mortality from NCDs, and in particular CVD, which affects males more than females. The peaking of the smoking epidemic in the 1940s–1950s was a key contributor to CVD.

However, starting in the 1970s, declines in smoking and then the increasing impact of medical therapies and interventions for CVD led to older adult mortality falling in both sexes in the United States (and other advanced economies). Since CVD accounts by far for the largest share of older adult mortality in advanced economies, these reductions in CVD mortality are the principal driver today of increasing older adult life expectancy there (Cutler and Meara, 2001).

To fully establish the reasons why older male mortality in Sri Lanka has continued to stagnate since the 1960s requires a more detailed analysis that would quantitatively decompose the changes in life expectancy in Sri Lanka by disease and age, and would compare these with trends in advanced economies, whose life expectancy indicators were similar to Sri Lanka's in the 1960s. While beyond the scope of this report, such an analysis is critically needed for the period since the 1960s because there do not appear to be comparable analyses for other developing countries from which findings can be generalized. Sri Lanka is almost unique among lower-income countries in having the detailed historical mortality data required to do this type of assessment.

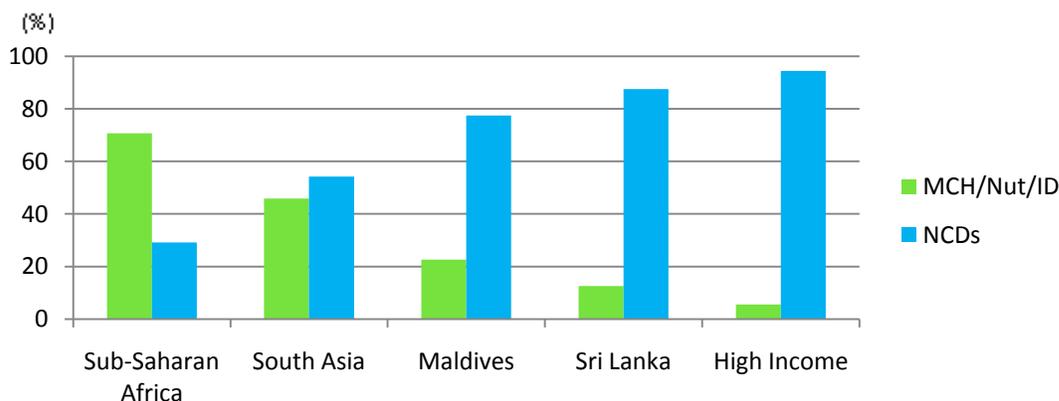
Health Burden: Disability-Adjusted Life Years

When describing the health burden from diseases, the disability-adjusted life years (DALYs) method measures the number of years lost to disability and premature mortality. Using this method, the death of a child would contribute more forgone DALYs to the disease burden than that of an older person. An advantage of using DALYs to measure the burden of disease is that it considers years with disability and so it includes conditions that, although not fatal, can be a large economic and social burden, as is the case with many NCDs. Another major strength of DALYs is that a similar methodology has been used globally, allowing country and regional comparisons.

However, this method does have limitations. Researchers have raised concerns over the weights used to measure disability, since these have not been fully validated in the South Asian region (Anand and Hanson, 2005). In addition, for countries without data, DALYs have been calculated by extrapolating level and composition of death and disability from countries of similar epidemiologic and economic profile, allowing assessment only by broad groups of diseases and leading conditions within those groups.

Using this standard method, Sri Lanka's health burden reflects the later stages of both the epidemiologic and demographic transitions (Figure 2.5). NCDs account for approximately 85 percent of the forgone DALYs (35 percent are from injuries). This pattern is more similar to high-income countries (and Maldives) than to South Asia as a whole. Sub-Saharan Africa has not yet begun these transitions. Thus for this report, Sri Lanka's comparisons are largely made to middle- and high-income countries experiencing similar disease burden patterns.

Figure 2.5 Disease burden as a proportion of forgone DALYs, selected regions and countries, 2004



Source: WHO 2004a.

Note: Injuries are included in the NCD category.

NCD Mortality

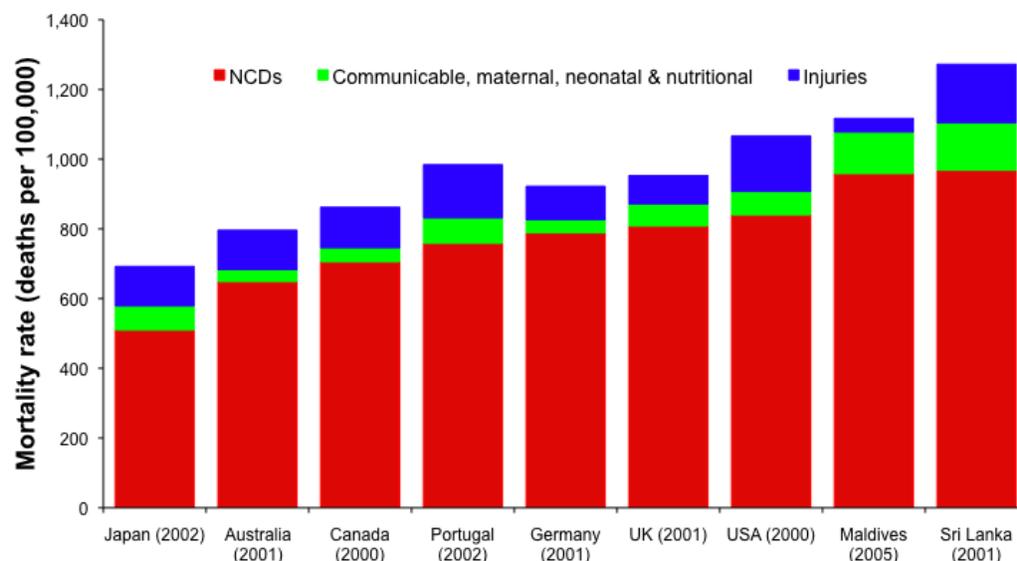
International Comparisons

Mortality data indicate that the predominant mortality burden in Sri Lanka is, as said, from NCDs. For the following analysis, injuries are segmented from other NCDs because they account for a significant proportion.

Although NCDs account for proportionately higher mortality, it is not the case that NCD mortality *rates* must inevitably increase with reductions in infectious disease, or that the increase in NCD mortality *rates* is a corollary of economic development. As noted by Adeyi et al. (2007), on an age-standardized basis

both noncommunicable and infectious disease mortality rates tend to be lower as per capita GDP increases. Analysis of Sri Lanka’s mortality data for 1999–2003 confirms this—that is, while the proportion of the total mortality burden is less than that of high-income countries (Figure 2.5) the age-standardized mortality rates for all NCDs are 20–50 percent higher in Sri Lanka than in developed countries (Figure 2.6, and see Appendix 1). Thus, this finding identifies an opportunity for improvement.

Figure 2.6 Comparison of age-standardized mortality rates by cause of mortality, Sri Lanka and selected countries



Source: Institute for Health Policy 2010.

Note: Mortality rates standardized using Sri Lanka 2001 population as reference.

Further international comparisons for specific types of NCDs were estimated using country-level ratios of mortality rates for all causes, CVD, diabetes, and injuries, to those in Sweden. Sweden is used as the comparison country because it has low overall mortality rates, and because this comparison was previously made in the 1970s when the stagnation in male life expectancy was first noted (UN ESCAP, 1976). The overall mortality rates in Sri Lanka are higher than in most developed countries; relative to Sweden, mortality rates from all diseases are 100–200 percent higher (see Appendix 2). When overall mortality rates are examined by sex, it is evident that higher mortality rates in Sri Lanka, compared to developed countries, are largely among men, with female mortality rates at some ages lower than in some OECD nations, including the United States.

Among specific NCDs, CVD mortality rates in Sri Lanka are almost double those in developed countries, demonstrating that CVD is the major driver of the higher rates of NCDs and all-cause mortality in Sri Lanka. These findings suggest that a major reason that Sri Lanka has been unable to improve its performance relative to these countries since the 1970s is its worse performance in NCD mortality, and in particular, in CVD.

Pattern and Trends in Sri Lanka

Past reductions in mortality in Sri Lanka have come largely from decreases in deaths due to infectious diseases and maternal and child health conditions (Table 2.1). At the same time, NCD mortality has increased its share. In 1945, diseases of the circulatory systems, diabetes, and cancer accounted for

2.8 percent, 0.4 percent, and 0.6 percent, respectively, of all deaths, but these proportions increased to 23.8 percent, 3.0 percent, and 7.6 percent, respectively, by 2003.

Table 2.1 Percentage of deaths from major causes, Sri Lanka, 1945–2003

Cause of death (%)	Deaths (%)				
	1945	1960	1980	2000	2003
Disease of the circulatory system	2.8	8.6	24.3	21.3	23.8
Infectious diseases	41.8	24.1	12.9	18.0	19.7
Cancer	0.6	2.6	5.7	6.8	7.6
Diabetes mellitus	0.4	0.7	1.1	2.3	3.0
Maternal and child health	4.8	4.4	1.7	0.5	0.5
Injuries	2.5	5.0	6.5	14.3	9.5
Other	47.1	54.6	47.8	36.8	35.9
All causes (number)	142,931	84,918	91,020	114,554	104,508

Sources: Analysis by Institute of Health Policy using data of the Registrar General's Department for 2000 and 2003; UN ESCAP (1976); Department of Census and Statistics (1987).

Note: Infectious diseases include infectious, parasitic, and respiratory diseases, dysentery (all forms), tuberculosis of respiratory system, typhoid, malaria, pneumonia, and bronchitis. Maternal and child health include anemia, and complications of pregnancy and child-birth. Injuries include violent or accidental deaths. Ill-defined deaths are not classified to any specific cause.

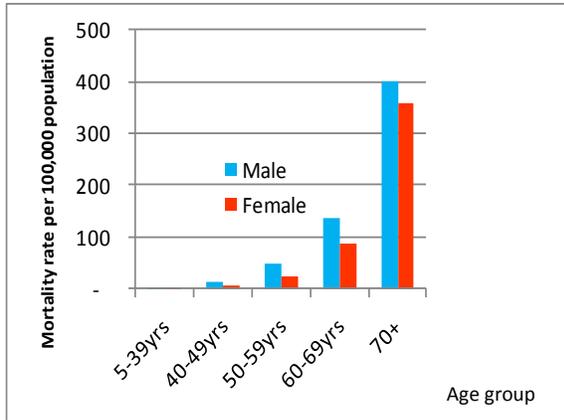
Mortality data for 2005 (the most recent available to this study, as provided by the MOH in 2010), used different disease categories and are problematic for direct comparison to the above table (especially for injuries, where a much broader definition is used) and confirmed a similar trend.

CVD, Diabetes, and Cancer

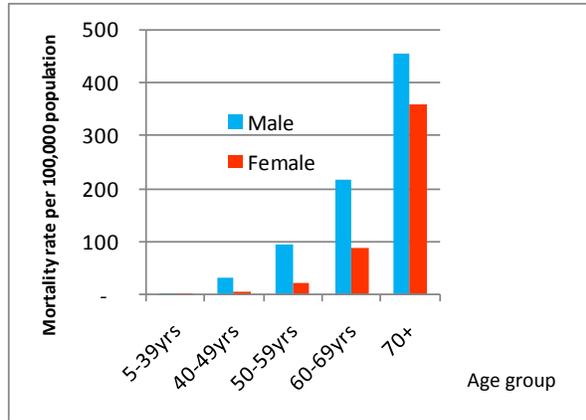
The mortality burden for these conditions clearly demonstrates the importance of age for NCDs, and a very strong age gradient is universally present (Figure 2.7), as in all developed countries. Of concern are the significant rates among working and near-retirement age groups since they indirectly reflect the impact that these diseases have on indicators such as workforce participation. These data also reflect the higher mortality rate among males, especially for CVD (combined hypertension and IHD), during working age years, contributing to the lagging gains in adult male mortality already noted.

Figure 2.7 Mortality rate for hypertension, IHD, diabetes, and cancer (per 100,000) by sex, Sri Lanka, 2005

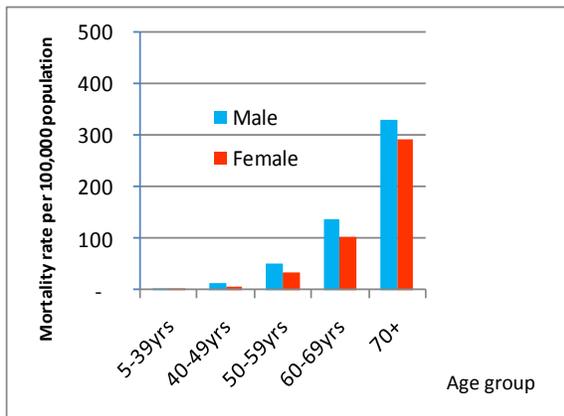
Hypertension



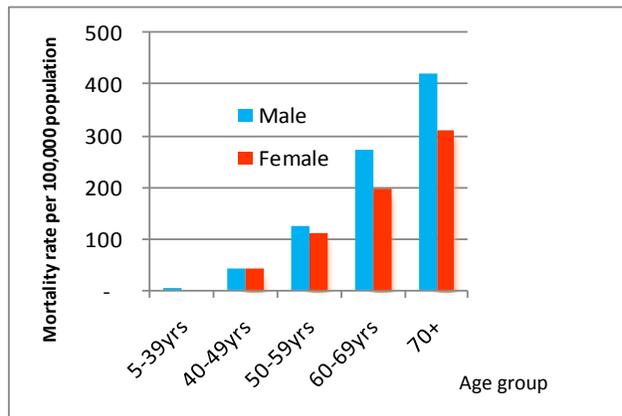
IHD



Diabetes



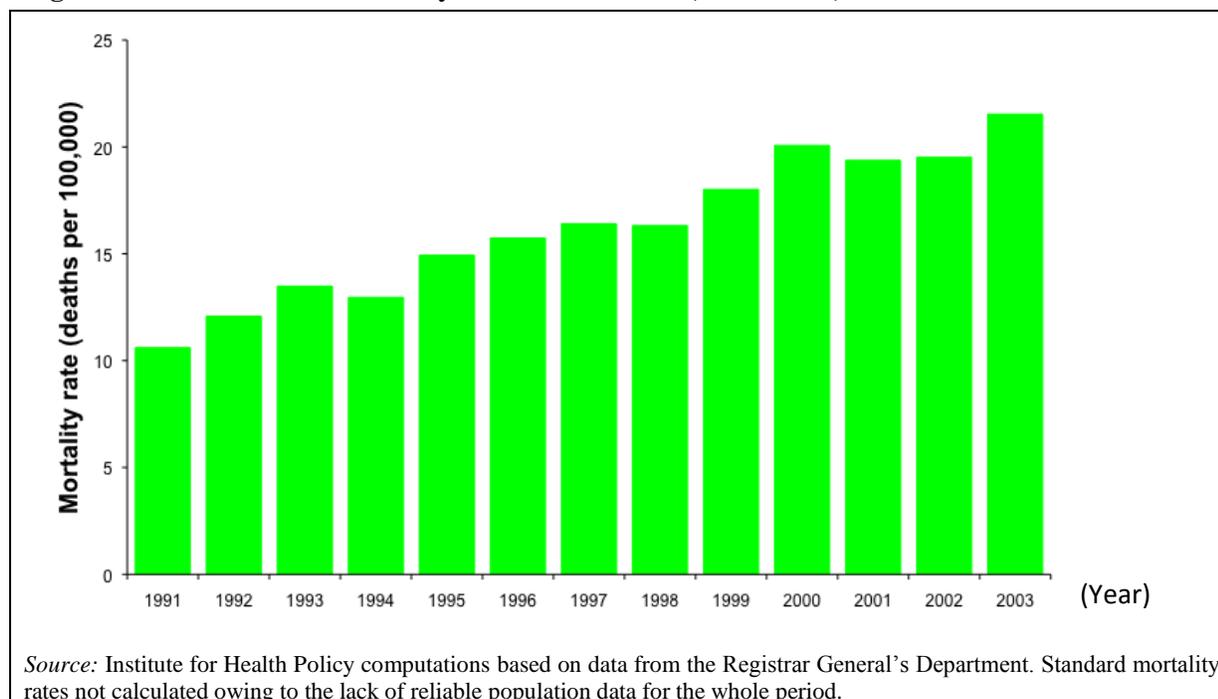
Cancer



Sources: Mortality from the Registrar General's Department and population data from 2005 midyear census estimate.

Asthma and Chronic Respiratory Disease

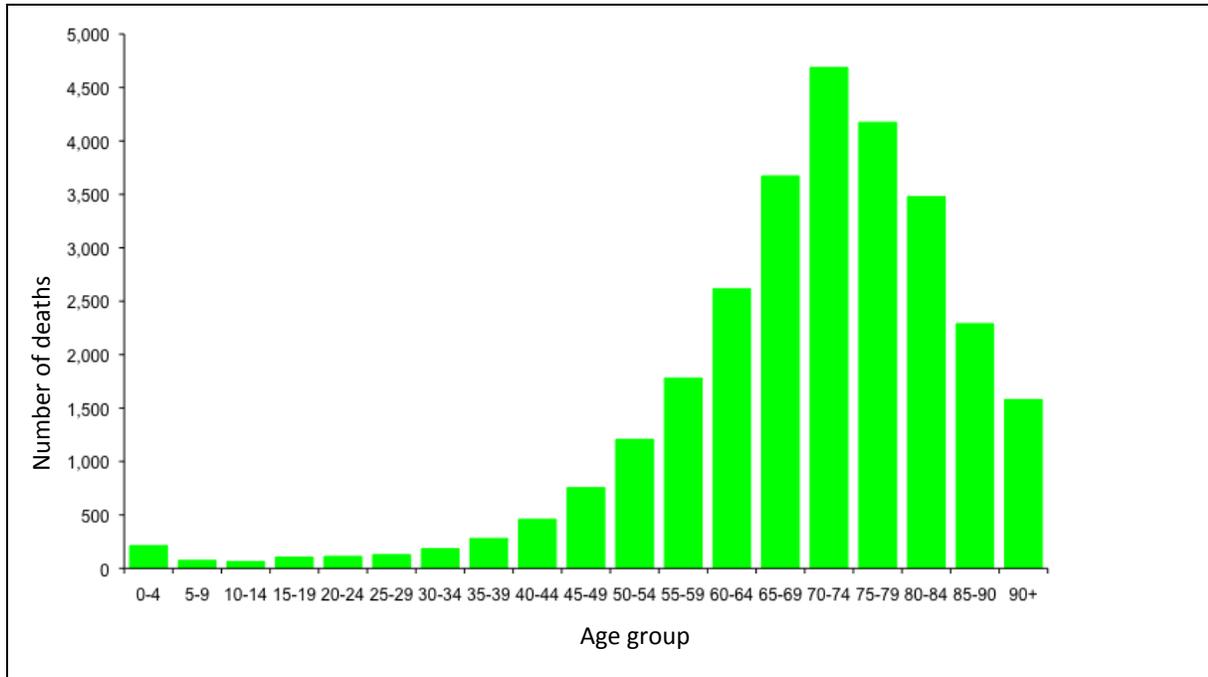
The trends in the crude mortality rate due to asthma from 1991 to 2003 point to an increasing burden, as illustrated by Figure 2.8. Since 1991, mortality rates from asthma have doubled, with annual recorded deaths from asthma also doubling from under 2,000 a year to more than 4,000 in 2003. Asthma accounts for 4 percent of all deaths. This can be contrasted with 1 percent of all deaths attributed to the bronchitis category, which would have included asthma, during the 1940s–1960s (UN ESCAP, 1976).

Figure 2.8 Annual crude mortality rate due to asthma, Sri Lanka, 1991–2003

However, recorded mortality from asthma is not a reliable measure of the asthma burden for two reasons. The first is the high potential for misdiagnosis of asthma deaths in the elderly, because its signs and symptoms can be confused with other diseases (such as COPD), leading to an overreporting of asthma mortality. This issue is pertinent since the recorded mortality from asthma in Sri Lanka is concentrated among the elderly (Figure 2.9). The mortality rate from asthma in the 5–39-year age group is internationally considered a more reliable measure (Masoli et al., 2004). For Sri Lanka this rate was 1.3 deaths per 100,000 a year during 2001–2003, which is significantly higher than all countries for which data are reported to the WHO Mortality Database or to the OECD, and two to five times the levels seen in European and other developed countries (Figure 2.10). Such a high relative level of asthma mortality in Sri Lanka has not been previously reported.

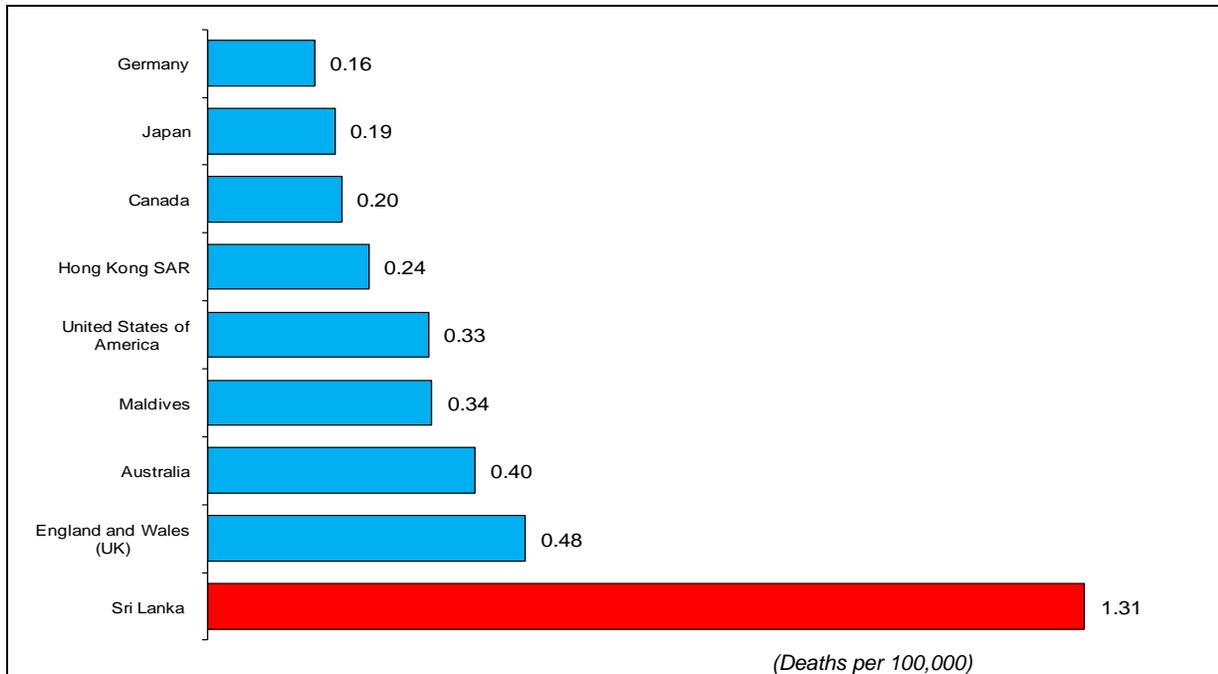
The second reason, as with all diseases, is that the share of asthma cases that result in death is highly susceptible to treatment interventions, and so the mortality rate is a function both of disease incidence and of overall treatment success. The high rates of mortality in Sri Lanka could be the result of an unexceptional rate of asthma prevalence combined with high case fatality rates. However, even if this were the case, the very high mortality from asthma would still imply that the disease imposes a high disease burden, since death is the ultimate burden. Consequently, it is valid to interpret the available evidence as indicating that asthma imposes a disease burden that is exceptionally high in relative terms. The matter deserves further research.

Figure 2.9 Number of deaths from asthma by age group, Sri Lanka, 1999–2003



Source: Institute for Health Policy computations based on data from the Registrar General’s Department.

Figure 2.10 Asthma mortality in 5–39-year olds per 100,000, Sri Lanka and other selected economies



Source: Institute for Health Policy computations: Sri Lanka estimate for 1999–2003 based on Registrar General Department data, estimates for OECD countries around 2005 from OECD (2007), and estimates for other countries estimated from the WHO Mortality Database.

Chronic NCD Morbidity

It is not easy in Sri Lanka to track the prevalence or incidence of most NCDs, as in nearly all developing countries. The two main approaches in developed countries to measure trends in chronic diseases are using population surveys, and tracking morbidity via clinical records maintained by primary care providers. In the first approach, surveys need to be continually conducted to estimate incidence and prevalence of most NCDs, and are not currently undertaken in Sri Lanka. The second approach depends on an organized system of service delivery and on a good health information system, which registers the whole population and maintains detailed clinical records on the problems with which patients present to the health system. Such a health information system does not exist in Sri Lanka (see Chapter 3). Even if this second approach were possible, it could still produce different estimates of prevalence for chronic NCDs because inclusion depends on the NCD being diagnosed and entered in the health information system (Esteban-Vasallo et al., 2009).

IHD

Hospital admissions for IHD, in particular acute myocardial infarction, are a crude indicator of underlying IHD trends, because a substantial proportion of IHD cases (even in developed countries) are identified only when acute events occur. In 2005, 82,000 admissions in government hospitals were IHD cases, equivalent to a rate of 410 admissions per 100,000. (This figure does not take into account private IHD admissions, which may add a significant number, since IHD admission rates are known to be higher in Colombo district, where most private hospitals are located.) This rate is comparable to those in OECD countries of 330–1,200 admissions per 100,000 (Moise, 2003). Given that the Sri Lankan population is younger than the OECD average, this rate is higher on an age-standardized basis than in most developed countries.

*Hypertension*⁸

Hypertension is a major risk factor for CVD, including stroke. The prevalence of hypertension in Sri Lanka is low by international standards. A population survey of cardiovascular risk factors in Sri Lanka in 1998–2002 (Wijewardene et al., 2005) found that the age-standardized prevalence rate for hypertension (defined as systolic blood pressure ≥ 140 mmHg and diastolic pressure ≥ 90 mmHg) was 19 percent in Sri Lanka, with little difference between men and women. A more recent national survey by Katulanda et al. (2008) reported a national prevalence of hypertension in adults of 13 percent in men and 14 percent in women. These levels are lower than those reported for most developed countries (Wolf-Maier et al., 2003), such as the United States (28 percent) or countries in Europe (44 percent). Thus other risk factors, in addition to hypertension, must account for the CVD profile.⁹

Diabetes

Table 2.2 presents the estimates of diabetes prevalence as reported in different surveys in Sri Lanka since the 1990s. Although these studies focused on different populations and used different methods, the prevalence appears to be increasing. The earliest study found a prevalence of 5.8 percent in a community study of urban older men (35–59 years) in 1990, while the Sri Lanka Diabetes, Cardiovascular Study (SLDCS) (Katulanda et al., 2008) found a prevalence of 10 percent in a national sample of those aged 18 years and above.¹⁰ Because diabetes is more common with age, studies of older populations find higher prevalence rates. Increases in diabetes prevalence over the past two decades can be partly due to the aging

⁸ Hypertension is considered both a disease and a risk factor (for cardiovascular disease) and is placed in the morbidity section arbitrarily. Treating hypertension is considered secondary prevention for cardiovascular disease.

⁹ Undernutrition is now recognized as a major long-term risk factor in the development of adult coronary heart disease, stroke, diabetes, and hypertension. See the section *Fetal and Childhood Undernutrition and Epigenetic Determinants*, below.

¹⁰ The survey was carried out in seven of the nine provinces (not Northern and Eastern provinces).

of the population (since diabetes prevalence increases with age), and to increasing age-specific prevalence rates for diabetes. These levels indicate that Sri Lanka already has a prevalence of diabetes similar to or more than those seen in many developed countries (10.7 percent in the United States among those aged 20 years and above),¹¹ and a high prevalence compared to most other developing countries (though comparable national data are sparse).

Taking into account the aging of the population, Katulanda et al. (2008) projected that the diabetes prevalence in Sri Lanka would increase to 14 percent by 2030. However, their estimate does not take into account factors such as unfavorable changes in diet or physical activity, which may further increase prevalence rates.

Table 2.2 Changes in prevalence of diabetes mellitus as estimated by different surveys, Sri Lanka, 1993–2006

Period	Study population	Sample size	Ages (years)	Prevalence (%)
1990 ⁽¹⁾	Suburban community (urban older males)	975	35–59	5.8
1991 ⁽²⁾	Rural community	200	≥18	2.5
1994 ⁽³⁾	Suburban community	633	30–64	5.2
2000 ⁽⁴⁾	Suburban community	1,303	30–64	6.6
2000 ⁽⁵⁾	Rural community	200	19–80	8.5
2004 ⁽⁶⁾	National	6,047	30–65	Males: 14.9 Females: 13.9
2005/06 ⁽⁷⁾	National	5,000	≥ 18	10.3

Sources: (1) Mendis and Ekanayake 1994; (2) Illangasekara et al. 1993; (3) Fernando et al. 1994; (4) Malavige et al. 2002; (5) Illangasekera et al. 2004; (6) Wijewardene et al. 2005; (7) Katulanda et al. 2008.

Cancer

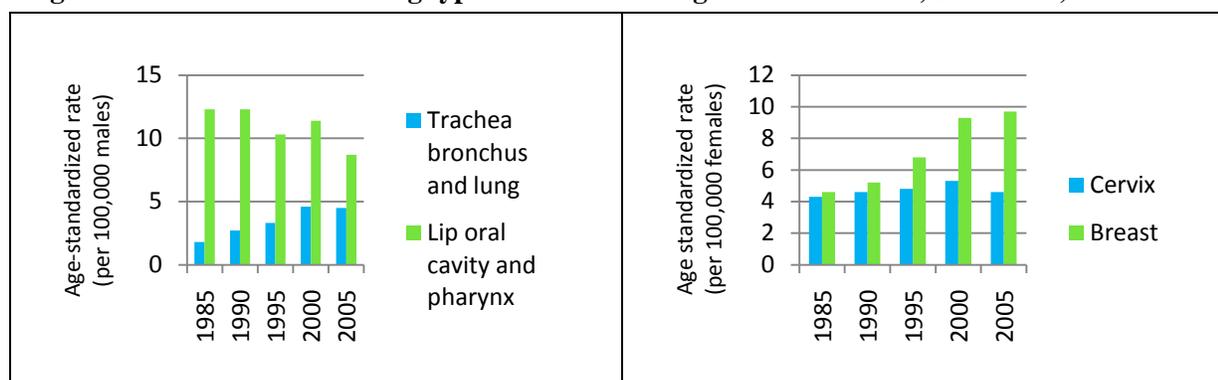
Morbidity for cancer is tracked primarily through cancer registries that capture all types of cancer. Each cancer can differ in its etiology, prevention strategies, case detection methods, and treatments. This makes them difficult to address as a group. However, the more common types, which have established prevention strategies (such as tobacco control for reducing oral cancer and lung cancer), and which have established detection methods and effective treatments (such as screening for breast and cervical cancers) are the focus of prevention and control efforts.

In Sri Lanka, the National Cancer Control Program started an institution-based cancer registry¹² in 1985, and has periodically generated reports. The overall rate of all cancers combined is rising, with the age-adjusted rate increasing from 37.6 to 70.6 per 100,000 from 1985 to 2005 (NCCP, 2009). Cancer rates have risen among both men and women. Similar to the mortality pattern, incidence increases markedly with age, and most cases are in the 50 years and above group.

Gender determines the dominant cancer type. Among men, oral cancer and lung cancer are the top two and account for 30–35 percent of all cancers. While lung cancer is on the rise and increased two or three times from 1985 to 2005, oral cancer declined by 20–25 percent during the same period (Figure 2.11). Among women, breast and cervical cancer are the top two and account for 35–40 percent of all cancers. Trend analyses find that breast cancer rates doubled from 1985 to 2005 while cervical cancer rates rose slightly, but then almost returned to the base year rate (Figure 2.11).

¹¹ www.cdc.gov/diabetes, National Diabetes Factsheet 2007.

¹² Population-based cancer registries are the gold standard and (attempt to) include all cancers in the covered area, whereas institutional registries only include those who receive care at the institution. But if most people are accessing care, data from the latter source can still be very useful.

Figure 2.11 Incidence of leading types of cancer among men and women, Sri Lanka, 1985–2005

Source: NCCP 2009.

Asthma

Population-based studies of asthma morbidity are scant. The bulk of the information for our analysis comes from mortality and utilization data where together asthma and chronic respiratory disease account for about 8 percent of patient discharges (Chapter 4, Table 4.5).

Major NCD Risk Factors

Moving from mortality and the disease burden to NCD risk factors, two important concepts need consideration. First, the period between risk factor exposure and its related morbidity or mortality can be long (decades for tobacco and lung cancer, for example), especially compared with some infectious diseases where the duration between exposure and disease onset can be quite short (months, days, or even hours). Second, in some countries people die from other causes (such as infectious diseases) at younger ages before the full impact of NCD risk factor exposure is felt. Thus, morbidity and mortality do not always track risk factors.

In Sri Lanka, where the demographic transition is advanced, increasing life expectancy can result in longer exposure to risk factors, making their ill effects more likely to develop. Conversely, the delayed benefit of risk factor reduction at younger life stages can be enjoyed at later stages. This section summarizes what is known about some of the risk factors for the major chronic NCDs in the country.

Fetal and Childhood Undernutrition and Epigenetic Determinants

Despite some maternal and child health indicators that rival those of developed countries (Table 1.2 above), the prevalence of malnutrition is high among Sri Lankan children, with 21 percent under five years of age classified as underweight (Department of Census and Statistics, 2008). Furthermore, these national aggregates mask widening inequalities between different population groups. The problem is concentrated in the tea estate sector and in some rural areas, particularly in districts of the east where chronic malnutrition (stunting) and acute malnutrition (wasting) rates reach 42 percent and 28 percent, respectively. Rates of stunting are highest in areas where the tea estates are located, whereas the highest rates of wasting are in the post-conflict areas of the east.

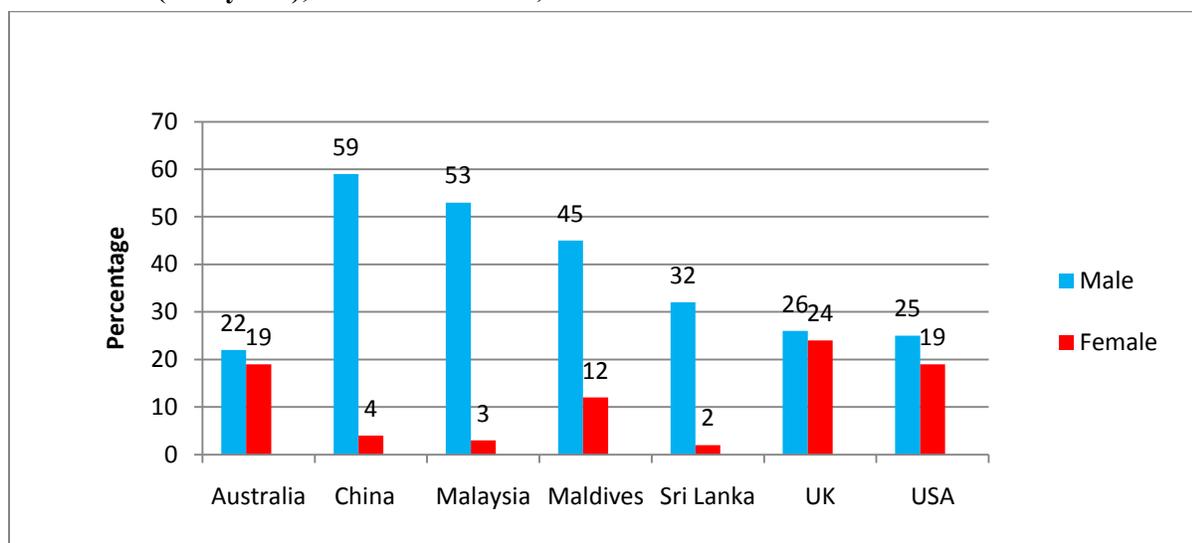
Thanks to the work of Barker and colleagues (Barker and Robinson, 1992; Barker and Clark, 1997), fetal undernutrition is now recognized as a major long-term risk factor in the development of adult coronary heart disease, stroke, diabetes, and hypertension. In addition, recent research has identified epigenetic mechanisms as potentially providing a pathway by which conditions of scarcity in the past can influence the pathogenesis of heart disease in subsequent generations (NHLBI Working Group, 2008).

Maternal undernutrition was widespread in Sri Lanka in the past and continues today. The legacy should be expected to act as a significant predisposing factor for adult CVD and diabetes for many years to come, and must be considered as one of the key explanations for current high levels of CVD. However, there has been little research on this in Sri Lanka, and is an area that should be a future national research priority. Still, Sri Lanka should ensure that raising mothers' nutritional levels is a continuing priority, regardless of the NCD risk associated with maternal undernutrition.

Tobacco

Tobacco use is a major risk factor for heart disease, chronic respiratory disease, and cancer. Overall smoking prevalence in Sri Lanka is approximately 18 percent, which is lower than in other South Asian countries and some developed countries (Figure 2.12). The share of the population who smoke at all and who smoke on a daily basis, and the mean number of cigarettes consumed per capita, are lower than in most other developing countries and have been declining in the past two decades (Rahman and Ramaboot, 2003; Central Bank of Sri Lanka, 2005). However, there is a marked sex disparity in smoking: it is almost exclusively confined to men, similar to the pattern in most South Asian countries but different from high-income countries. The actual rate of smoking in men is thus higher than implied by the overall population average. This disparity may help explain part of the gender disparity in overall NCD mortality rates.

Figure 2.12 Age-standardized prevalence of current smoking of any tobacco product among men and women (≥ 15 years), selected countries, 2006



Source: WHO MPOWER Report 2009. <http://www.who.int/tobacco/mpower/en/>.

Note: Smoking is at the time of the survey, including daily and non-daily smoking, of any form of tobacco, including cigarettes, cigars, pipes, but excluding smokeless tobacco.

Smoking rates in children and youth are also lower than in other low-income countries but are still very concerning. According to the Global Youth Tobacco Survey, 2007, 5.1 percent of youth (students 13–15 years) had ever smoked tobacco cigarettes, and of them, 39.5 percent of them had smoked cigarettes before age 10, and 8.6 percent were current users of other tobacco products (WHO/SEARO, n.d.)

Air Pollution

Air pollution is recognized as an emerging public health problem in developing countries. However, most countries, including Sri Lanka, do not have adequate data to fully characterize its extent. The main source of indoor air pollution, other than second-hand tobacco smoke, is cooking fuels (Nandasena et al., 2010). In the 2006/7 Demographic and Health Survey (Department of Census and Statistics, 2008), 78 percent of

households in Sri Lanka used firewood as the main type of cooking fuel. While the impact of exposure to firewood smoke is not well characterized, studies suggest that it may be significant. In one study, the use of firewood fuel for cooking was a significant risk factor for respiratory systems among household members. In a school-based study among children (Nandasena et al., 2010), firewood smoke, use of mosquito coils, and a dusty environment at home all significantly increased the risk for asthma.

Obesity

Obesity is a risk factor for CVD and diabetes, and it also plays a role in some cancers. Overall obesity levels in Sri Lanka have been increasing for the past 20 years.

Wijewardene et al. (2005) found that 20.3 percent of men and 36.5 percent of women aged 30–65 years were obese (body mass index [BMI] ≥ 25 kg/m²), compared with 25.0 percent and 24.7 percent of men and women in the United States, and 12.0 percent and 28.5 percent of men and women in the Russian Federation. However, WHO recommends the classification of obesity at smaller BMIs in Asian than European populations, so this comparison understates the problem. Using this recommended cutpoint for Asian populations, data from the SLDCS carried out by Katulanda et al. (2008) (Chapter 3), which included, on average, a younger population (≥ 18 years) than the studies above, found obesity rates of 7 percent in men and 13 percent in women. Thus while cross-comparisons of these data are difficult, obesity levels are probably lower than in developed countries.

Arambepola et al. (2008) also shows that obesity levels are higher among women than men in Sri Lanka, and that they are higher in urban than rural areas. The mean BMI of the urban population in Colombo district was found to be 1 kg/m² higher than that of rural counterparts, which suggests that urbanization will lead to increased BMI.

Lipid Levels

Abnormal lipid levels—specifically, high levels of triglycerides—and a low ratio of high-density lipoprotein (HDL) cholesterol to low-density lipoprotein (LDL) cholesterol, are major risk factors for CVD. A risk factor survey of 1998–2002 found that mean total cholesterol levels were in the 200–236 mg/dl category in Western Province (Sri Lanka Medical Association, 2004), compared to levels of 200–240 mg/dl reported from developed countries. The more recent, more nationally representative SLDCS (Katulanda et al., 2008) reported similar levels. It found mean total cholesterol and LDL-cholesterol levels in the population to be 203 mg/dl and 133 mg/dl, respectively, with levels significantly higher in females than in males.

The high prevalence of abnormal lipid levels is not necessarily due to a high fat intake in the diet, since at 25 percent of total energy intake this is relatively low. Instead the main explanation is an exceptionally high ratio of saturated fats to polyunsaturated fats, of 9:1, compared to a recommended ratio of <1:1 (Abeywardena, 2003). This finding has potential food policy implications.

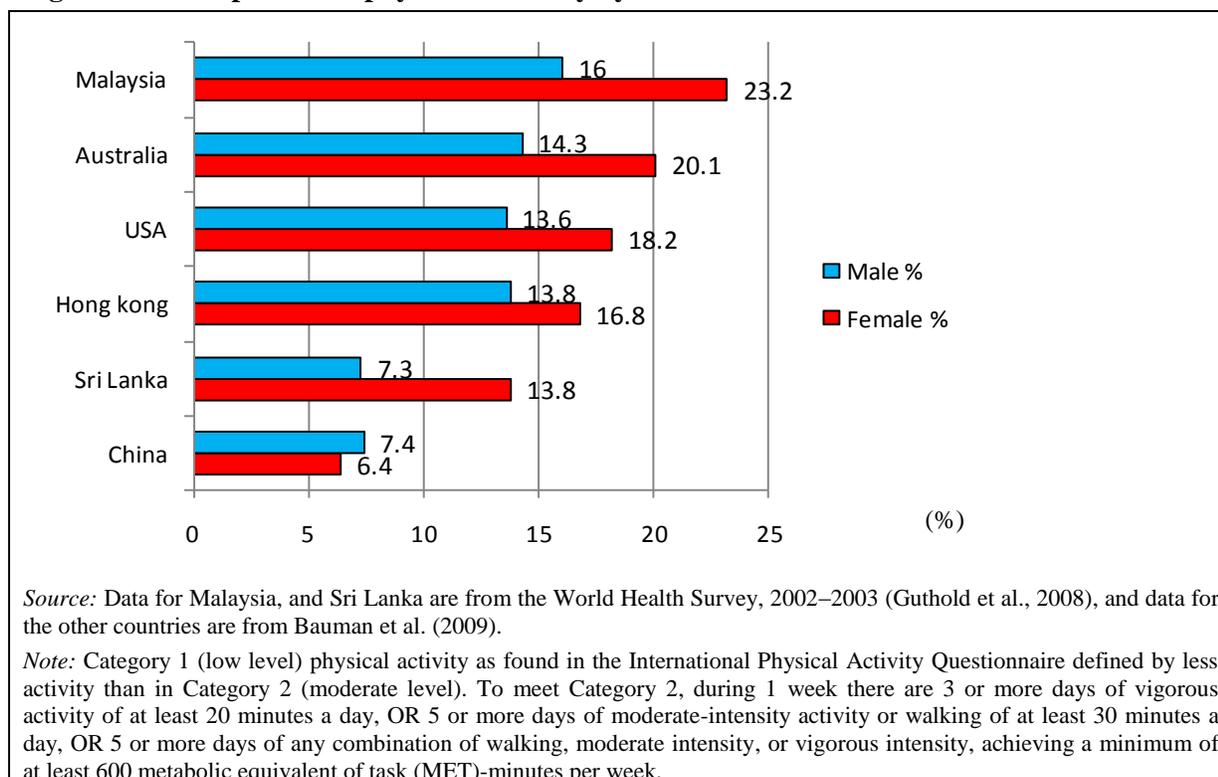
Physical Inactivity

Physical inactivity is a risk factor for both CVD and diabetes, and an increase in inactivity is a widespread global corollary of modernization (Guthold et al., 2008). Rapid urbanization, economic growth, and technological changes are contributing to the likelihood of increased physical inactivity in the developing world, and in Sri Lanka specifically to the need to focus on developing interventions to counter increasing levels of physical inactivity among men and women.

Figure 2.13 presents a comparison of the physical inactivity levels by sex in Sri Lanka with other selected countries. (The note to the figure defines inactivity as “Category 1”). The data are from surveys that have used the International Physical Activity Questionnaire instrument to measure inactivity levels in national populations. The level of inactivity in men in Sri Lanka in 2002 was 7.3 percent and in women 13.8

percent. These levels are in fact low (that is, favorable) relative to international standards, and lower than in most developed and in many developing countries.

Figure 2.13 Comparison of physical inactivity by sex in Sri Lanka with other selected economies



Alcohol

Excessive consumption of alcohol is a risk factor for a range of NCDs, including liver disease, cancer, and CVD. Assessment of the prevalence of excessive consumption is hard in most countries, owing to difficulties in obtaining reliable responses in surveys, and the potential impact of illicit consumption. Sri Lanka is no different given a significant level of illicit alcohol production and consumption. Nevertheless, the mean per capita consumption of alcohol (non-illicit) is considered a reasonable proxy indicator for drinking levels in a population.

WHO statistics show that average alcohol consumption in Sri Lanka is far lower than in most countries (excluding countries with predominantly Muslim populations). Annual per capita consumption of alcohol among adults aged 15 years or older was estimated to be 0.28 liters in 2003, compared with an average of 4.0 liters in lower-middle-income countries, and 9.07 liters in high-income countries (WHO, 2008b).

The situation in Sri Lanka is characterized by a high prevalence of abstinence from alcohol, and very low rates of consumption in women (WHO, 2004b). According to WHO the rate of abstainers during the last year (prior to the study) in Sri Lanka was 67.6 percent (total), 41.4 percent (males), and 92.9 percent (females). WHO also found that the rate of last-year heavy and hazardous drinking (defined as average daily consumption of 40 g or more of alcohol for men and 20 g or more of alcohol for women) among drinkers was 15.6 percent for men and zero for women (WHO, 2004b).

Given that alcohol consumption is largely confined to men—as with smoking—the main problem in Sri Lanka is that excessive alcohol consumption and heavy drinking are concentrated in a small proportion of the male population, and these people tend to be poorer and less educated. National consumption patterns

show that 3.4 percent of monthly household expenditures are for alcohol and tobacco, but this pattern varies considerably with urban, rural, and tea estate population expenditures at 2.1 percent, 3.6 percent, and 13.4 percent, respectively (Household Income and Expenditure Survey 2006-7). Thus, there appears to be a significant concentration of both heavy alcohol and tobacco use intake in the tea estate population. Indeed, alcoholism is a significant social problem there.

Socioeconomic and Geographic Differentials in NCD Burden and Risk Factors

Dimensions of Inequality

Inequalities in health needs and health outcomes are important issues for public health policy internationally, but especially in Sri Lanka where the concern for equity has been a major motivating factor in guiding policies. NCDs might give rise to significant inequalities in the incidence of illness and in obtaining treatment for NCDs, and to inequities caused by the costs of illness. The key dimensions of potential inequalities relate to income and socioeconomic status, and to where people live (urban or rural).

In developed countries, NCDs disproportionately affect the poor. Disadvantages in access to health care, increased incidence of disease and risk factors associated with employment and living conditions, and poor health behaviors result in the poor generally suffering a higher NCD burden than the rich.

The situation in developing countries is much less understood, but the limited available evidence suggests that the relationship with income is reversed, with the rich suffering more from NCDs than the poor (WHO, 2002). In South Asia this is particularly the case for IHD and diabetes in India, for which many studies exist. However, in the case of Maldives, recent research indicates that the socioeconomic gradient for several NCDs is shifting from one where NCDs are more prevalent in richer and better educated persons to one where they will be concentrated in poorer and less educated persons (Anuranga et al., 2009).

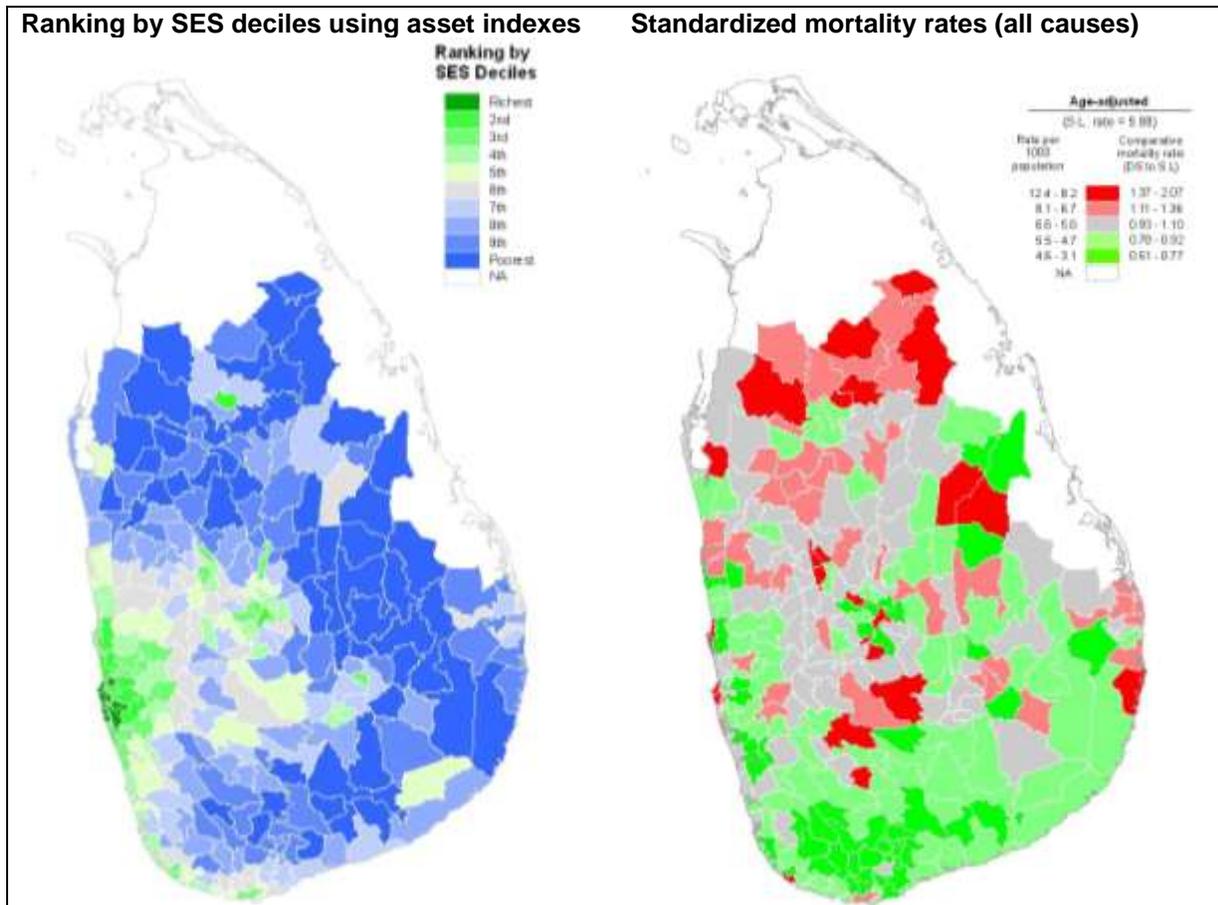
Poor social policies and programs, inequitable economic arrangements, and bad politics all bring in their train an unequal distribution of health-damaging experiences. This section now examines the relationship between socioeconomic status (SES) and overall and NCD-related mortality, then presents some evidence on inequalities for morbidity and risk factors for NCDs. It rounds off the chapter by looking at the relationship between NCDs and social determinants, especially poverty.

SES and Overall Mortality

In order to examine NCD mortality across SES levels, all registered deaths during 1999–2003 ($n = 553,192$) were pooled and the deceased residence mapped from Registrar General Department Districts to the corresponding Divisional Secretariat Divisions (DSDs). The DSDs were then mapped to household amenities and other characteristics identified in the 2001 Census and assigned a tentative wealth status (see Appendix 3).

Figure 2.14 shows the geographic variations in SES and in standardized mortality rates for all causes by DSDs for the period 1999–2003. Statistics for DSDs in the east and north are not reported, owing to conflict and the unavailability of Census 2001 population data for these areas. Figure 2.15 shows the relationship between all-cause mortality and SES quintiles.

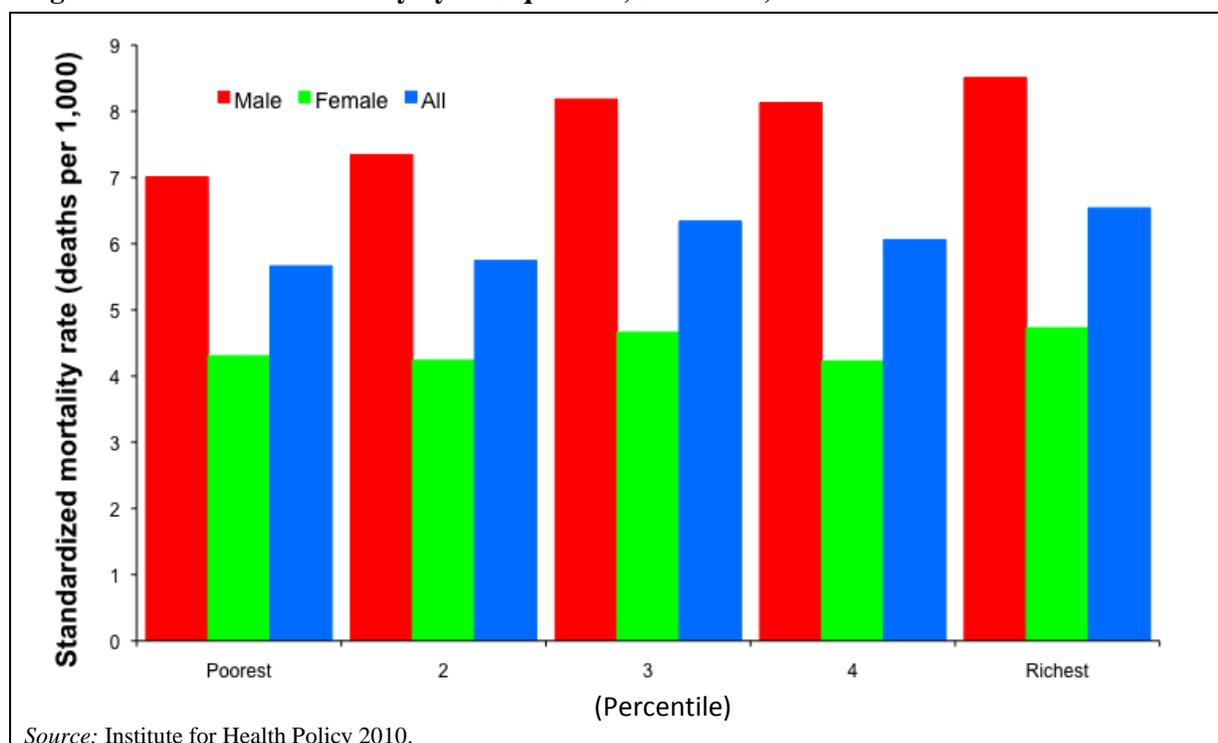
Figure 2.14 SES and mortality rates for both sexes combined by DSDs, Sri Lanka, 1999–2003



Source: Institute for Health Policy 2010.

All-cause mortality in Sri Lanka tends to be highest in richer areas. This is consistent with the pattern in Sri Lanka since the 1960s, when mortality rates in rural areas were first noted to be below those in richer areas. However, increased mortality rates are seen in the north-central and eastern areas, which border the former conflict areas.

An examination of all-cause mortality rates in relation to SES (Figure 2.15) suggests a possible slight increase for both sexes with increasing socioeconomic position. An increase in mortality with SES is seen across all major disease groups, including infectious diseases, maternal, neonatal, and child health conditions, injuries, and NCDs.

Figure 2.15 All-cause mortality by SES quintiles, Sri Lanka, 1999–2003

This finding of higher or equal mortality rates in richer areas, although unusual along an international perspective, is not new. It is consistent with the demographic records in Sri Lanka, where official life-table estimates have consistently reported the highest life expectancies and lowest overall mortality rates in some of the poorest and most rural districts of the country since at least the 1970s; mortality rates in rural areas have long been lower than in urban areas (Meegama, 1986).

SES and Mortality for NCDs

Figure 2.16 shows mortality by SES quintiles for hypertension, IHD, diabetes, and cancer. Without exception, within the poorer quintiles a significant absolute mortality burden from NCDs is present, although it not always greater than among richer quintiles. Relative comparisons across all the quintiles to detect gradients are not conclusive in most cases. Mortality from hypertension may tend to increase at lower quintiles. By contrast, mortality from IHD, diabetes, and cancer may tend to increase with SES. Asthma mortality has the most striking gradient, with a much higher burden among the poor.

However, these mortality findings across SES quintiles, when morbidity is also considered, must be interpreted cautiously. A mismatch between underlying morbidity and observed mortality would be consistent with a scenario where the prevalence of a condition increases with SES, but where better access to diagnosis and treatment among higher SES quintiles might group results in a lower net mortality. Consistent with this possible scenario is that of World Bank (2008), which found that it was much more likely that the poor perceived their health to be poor than the rich, while at the same time, among the rich, self-reported chronic diseases were more common than among the poor (see Appendix 4).

A context for each condition-SES profile in Figure 2.16 is now discussed.

Hypertension

In developed countries socioeconomic gradients for hypertension-related mortality tend to be weak or negative (higher among the poor). Lower levels of psychosocial stress in higher-income groups might

explain the pattern of hypertension mortality, and this would be consistent with findings from other countries (Pickering, 1999; Steptoe and Willemsen, 2004).

IHD and Diabetes

The suggested positive gradients (greater burden among richer populations) for IHD and diabetes are opposite to those reported from developed countries, where gradients are either generally negative (IHD), or absent or negative (diabetes) (Chaturvedi, 2004). The reasons for this different pattern in Sri Lanka may be higher levels and/or longer duration of risk factor exposure in higher-income groups. In addition, Sri Lanka is, perhaps, evolving from the patterns seen in developing countries to those in developing countries.

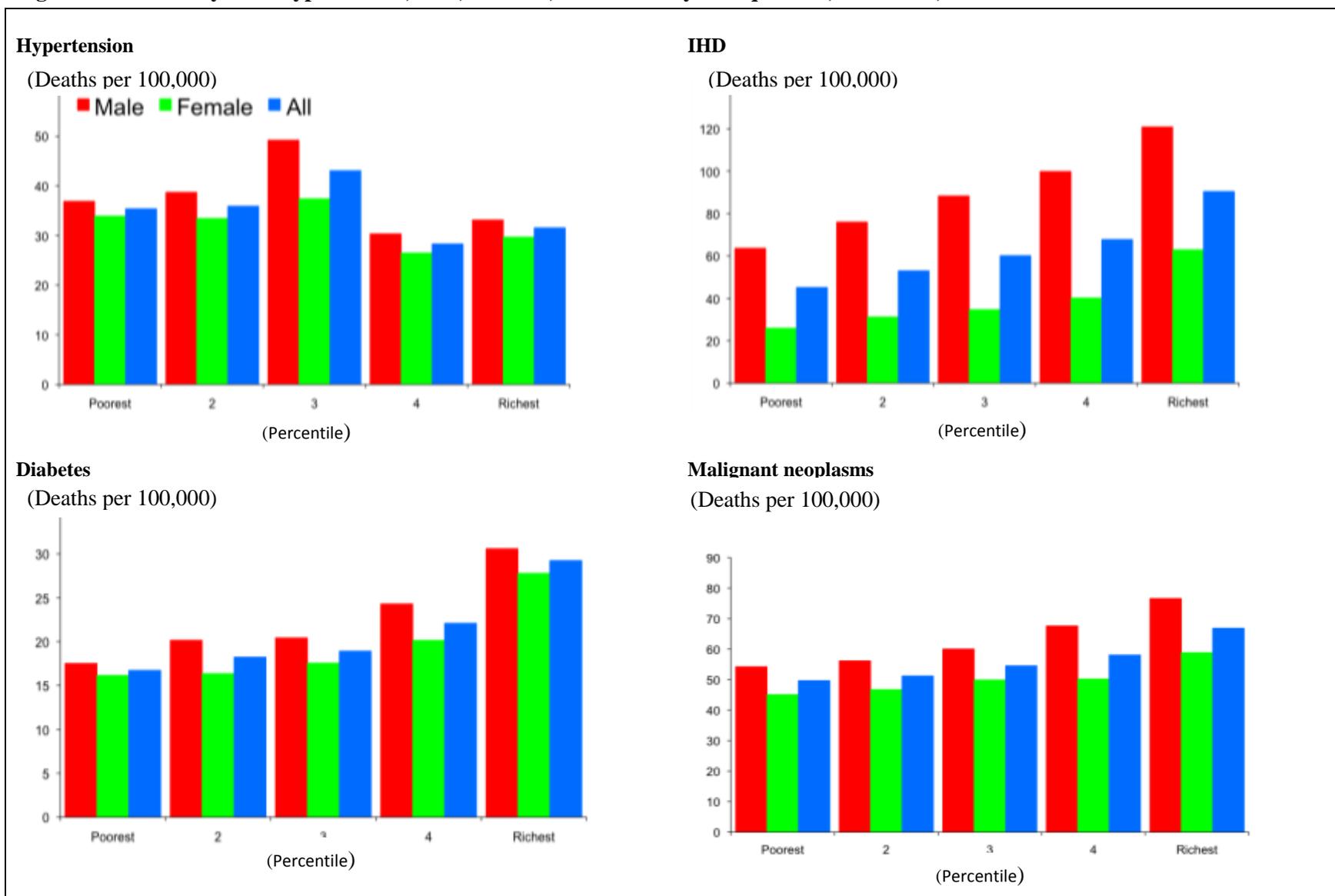
Cancer (malignant neoplasms)

The SES gradient in cancer mortality may be positive (higher among the rich), but less so than for IHD and diabetes. Interpreting cancer trends is problematic since there are many different types of cancer, each of which may have different risk factors ranging from behaviors (such as tobacco use) to exposure to environmental toxins and risk factors. In addition, cancer outcomes (such as mortality) can vary by access to early screening and treatment, which can also be SES related.

Asthma

Asthma mortality is highest among the lower SES quintiles and then decreases significantly in the top two quintiles (Figure 2.17). Given the high rates of asthma mortality in Sri Lanka and the known sensitivity of asthma mortality to treatment, this condition provides a clear case of where access to and use of effective treatment can play a significant role in determining mortality among the various SES quintiles. The higher levels of mortality in the lower quintiles may reflect worse access to care, while those in the richest quintiles are able to access care and prevent mortality. This possibility is confirmed by the geographic pattern of asthma mortality rates, which are highest in the tea estate areas of the central hill country and Eastern province (Figure 2.18). These high rates may, in part, be due to poor access to treatment.

Figure 2.16 Mortality from hypertension, IHD, diabetes, and cancer by SES quintiles, Sri Lanka, 1999–2003



Source: Data provided from analysis by Chamara et al., November 2009, Institute for Health Policy. Mortality data for Sri Lanka from Institute for Health Policy Registrar General Analysis Project. Analysis by Institute for Health Policy Equitap Mortality Differentials Project.

Figure 2.17 Asthma mortality for all ages by SES quintiles, Sri Lanka, 1999–2003

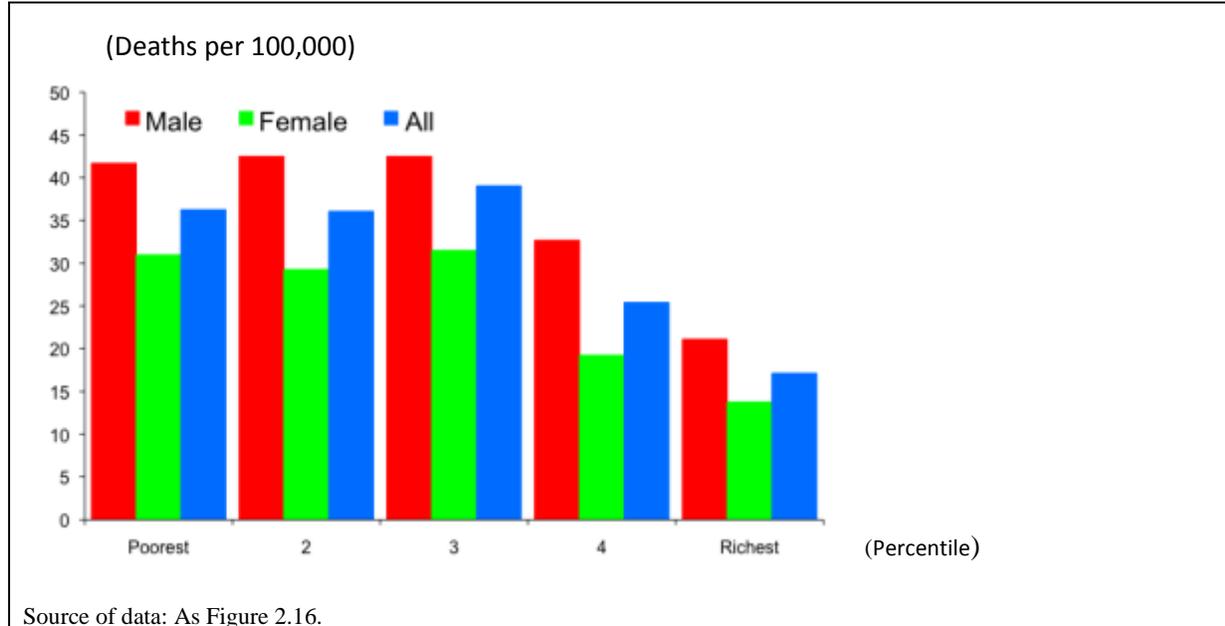
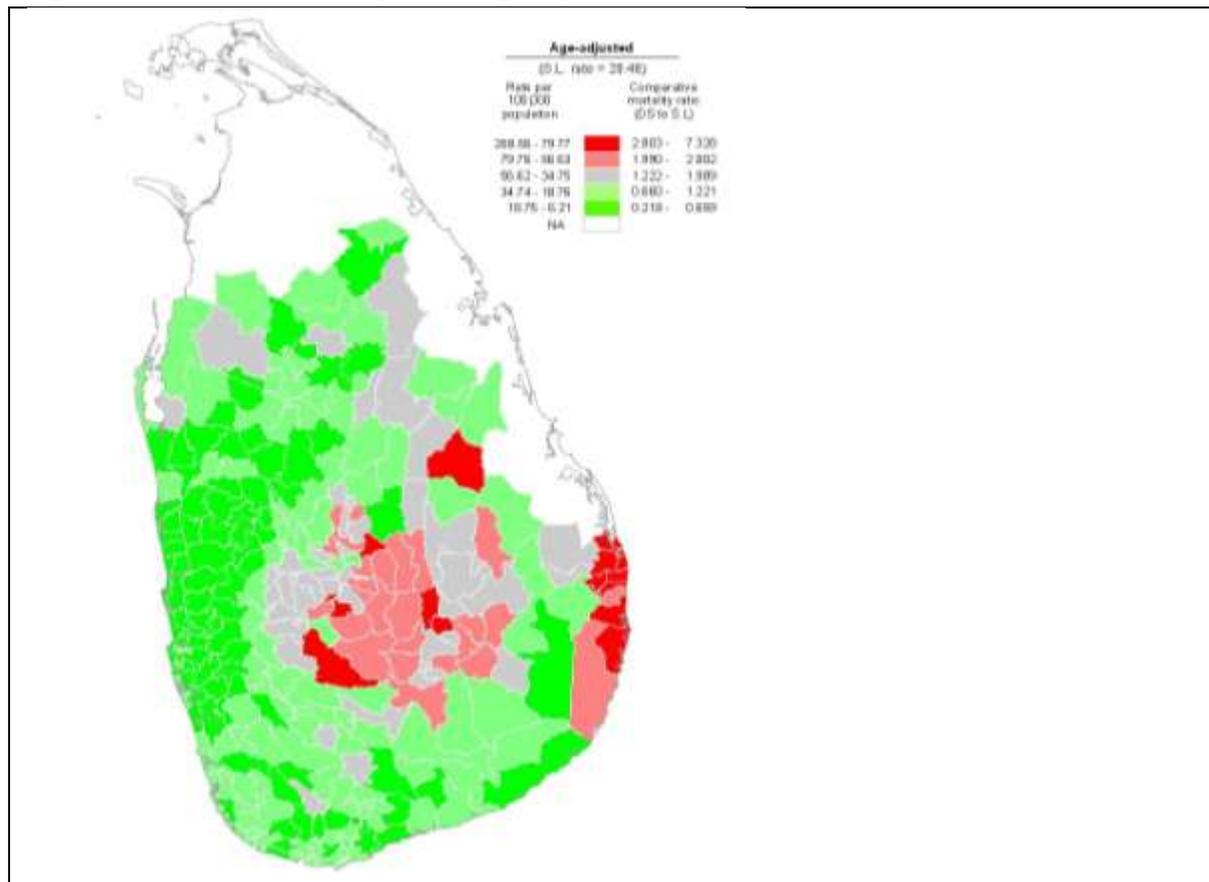


Figure 2.18 Asthma mortality for all ages by DSDs, Sri Lanka, 1999–2003



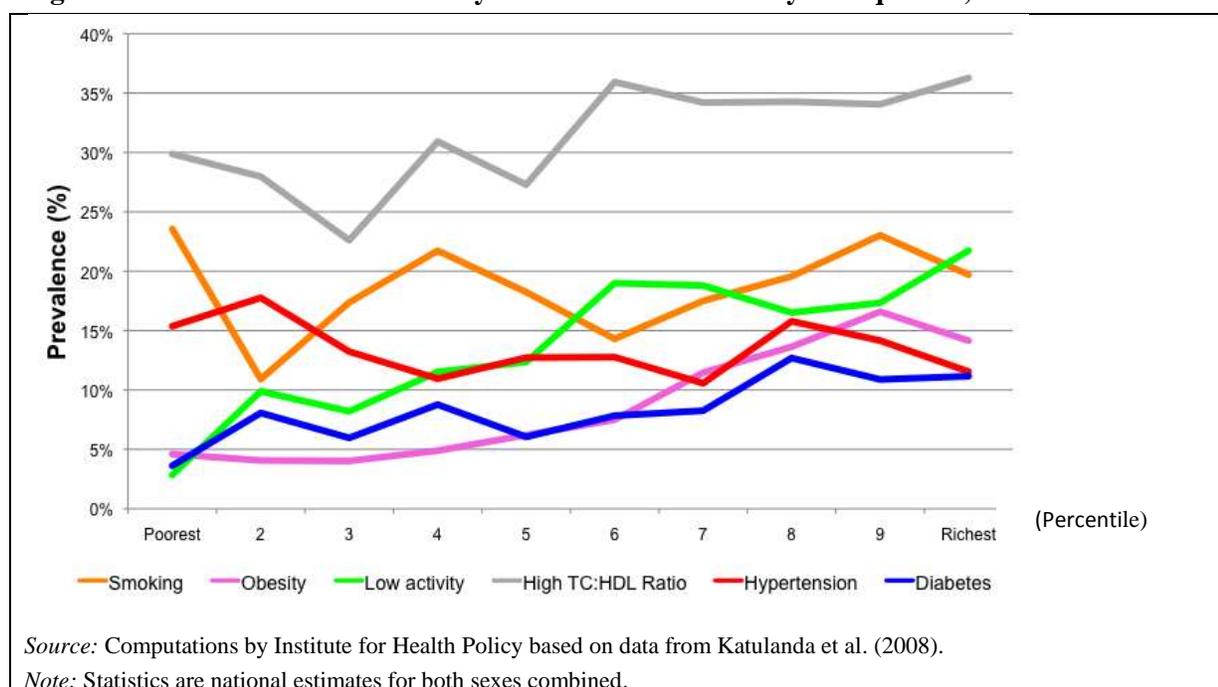
Evidence for Morbidity and Risk Factor Inequalities

The SLDCS collected data on NCD risk factors and prevalence of diabetes and heart disease from a nationally representative sample of 5,000 adults (Katulanda et al., 2008). Although the survey did not collect detailed and reliable data on the SES or income of its respondents, for this current analysis, an index to proxy for respondents' SES was developed.¹³

The prevalence of morbidity (hypertension and diabetes) and CVD risk factors (smoking, obesity, low physical activity, and unfavorable lipid profiles) by SES deciles is shown in Figure 2.19. Diabetes, obesity, lipid profiles, and low physical activity all tend to increase among those at higher SES levels, whereas hypertension and smoking do not reveal a clear trend. However, the concentration indexes are positive and statistically significant for all these conditions with p values ≤ 0.001 (except for a high total cholesterol:HDL ratio, $p \leq 0.038$) suggesting that these risk factors are higher in the rich. By contrast, smoking decreases with income, although the concentration index is not statistically significant ($p \leq 0.23$).

Another study on smoking in urban and rural areas (Colombo and Polonnaruwa district, respectively) found similar smoking rates (29.9 percent and 24.4 percent, $p=0.52$) (De Silva et al., 2009). However, significantly higher smoking rates were found among the poorest quintile (44.8 percent urban, 25.7 percent rural) than the richest (21.6 percent urban, 12.8 percent rural).

Figure 2.19 Distribution of morbidity and CVD risk factors by SES quintile, 2005



The total cholesterol:HDL-C and other dyslipidemia ratios in Sri Lanka are worse among the rich, in contrast to the lack of a consistent pattern in developed countries (Riddell and North, 2003). The high burdens of obesity, hypertension, and diabetes among the rich are comparable to those generally reported in developing countries, but are the opposite to those seen in developed countries (WHO, 2002; Riddell and North, 2003).

¹³ Detailed descriptions of the methodology used in this parallel study will be reported in a forthcoming publication by the Institute for Health Policy and University of Colombo.

These results suggest that the patterns of inequalities in cardiovascular risk factors in Sri Lanka fall between those in developing and developed countries. Sri Lanka is, perhaps, transitioning between the two patterns. This would be consistent with the patterns observed in Maldives, where higher living standards and the level of modernization probably place it further ahead in the transition than Sri Lanka (Box 2.1).

Box 2.1 Maldives: SES, morbidity, and risk factors

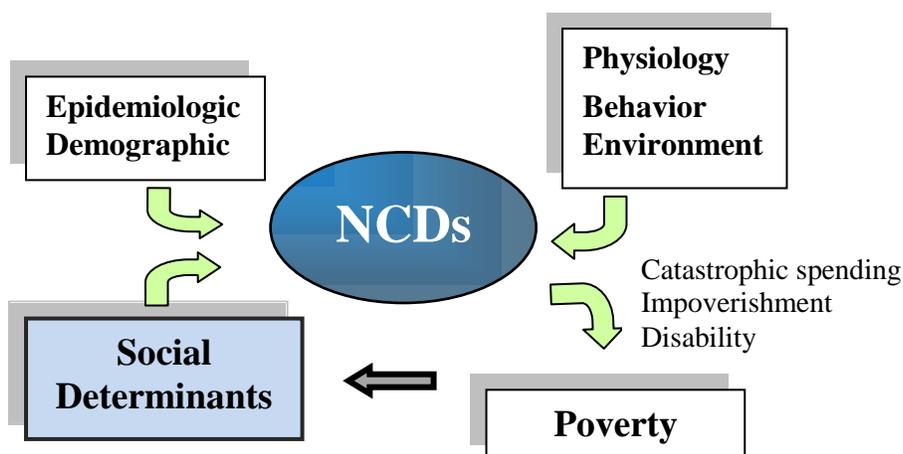
A recent analysis by Anuranga et al. (2009) in Maldives indicates that the profiles for obesity, hypertension, and diabetes are either mixed or run counter to those in Sri Lanka. In Maldives, the gradient for diabetes in both sexes and for obesity in males was negative with increasing SES, although neither statistically significant, while the gradient for hypertension was flat.

By contrast, the gradient for physical inactivity was increasing with rising SES, which is similar to that in Sri Lanka. However, this gradient was due to a strong relationship with education, and income was not a significant explanatory factor.

A similar analysis of the correlates of some of these risk factors in Sri Lanka is warranted, and is currently being undertaken by a joint team from the Institute for Health Policy and researchers from the University of Colombo.

Social Determinants and NCDs

Dramatic differences in health are closely linked with the degree of social disadvantage found within countries (CSDH, 2008; WHO/SEARO, 2008). These inequities arise because of the circumstances in which people grow, live, work, and age, and the systems put in place to deal with health and illness. The conditions in which people live and die are, in turn, shaped by political, social, and economic forces. In addition, the relationship between NCDs and poverty is bidirectional via social determinant forces (Figure 2.20).

Figure 2.20. Social determinants, NCDs, and their relationship to poverty

Source: Authors.

In developed countries the poor and disadvantaged experience a larger NCD burden than the rich. Sri Lanka does not show this pattern, although that may be changing. As seen, this report finds mortality for some conditions clearly higher for the poor, as is the case with asthma. However, most of the burden and risk factors are currently similar among the rich and the poor. But even if the burden is similar, there is an inequitable situation if the poor have more difficulty in accessing comprehensive care and are less able to adopt healthy lifestyles due to their social and financial position.

Addressing social determinants requires not only health policies that are sensitive to the situation but also attention across many other sectors. Education and social protection are the key human development areas alongside health. Most of the items in the development agenda—economic opportunities; the distribution of power, money, and resources; and living conditions—influence social determinants.

Chapter 3: Health Sector Organization, Capacity, and Response to NCDs

Key Messages

- Health services are organized with a decentralized system. The central MOH manages tertiary curative services, drug procurement, training of health staff, and oversight of the health sector, in addition to performing stewardship functions. Provincial MOHs manage preventive and lower-level curative services.¹⁴
- The central MOH is responsible for NCD prevention and control, which is led by three key central directorates with many other directorates playing supporting roles.
- Curative care is delivered through an extensive system of clinics and hospitals at primary, secondary, and tertiary levels.
- The preventive health system is managed by the public sector and services are provided through Medical Officer of Health areas covering the entire country.
- Over the last three decades public sector health workforce numbers have risen in almost all categories. About half now work in the central MOH and half in the provincial system. Eighty-nine percent work in curative care and 11 percent in preventive care.
- Inequitable distribution of staff across provinces is compounded by lack of a solid human resource development plan and postings driven by current demand.
- Essential clinical investigation equipment and medical equipment necessary for diagnosis and management of NCDs is frequently unavailable at primary and secondary care levels.
- Low availability and use of essential drugs for treatment of NCDs has been a long-standing problem; recent data confirm this is still the case.
- Health information systems do not collect key inpatient data (there are no demographic indicators) or outpatient data (there are no demographic or morbidity indicators), which severely limits their usefulness. NCD surveillance is still at a very early stage.
- The pattern of health service delivery, low availability of drugs, and no formal referral system encourages outpatient care for NCDs to be delivered in higher-level facilities. In addition, after-hours outpatients are often admitted as inpatients.
- Promising NCD pilots for prevention and control should create an evidence base to develop appropriate policies.

¹⁴ The terms “preventive” and “curative” services warrant some explanation. Public health theory describes three levels of prevention: primary (specific prevention, such as immunization, micronutrient supplementation, statins to prevent heart attacks, and health promotion such as good hygiene, healthy diet, smoking cessation); secondary (early detection of disease and treatment); and tertiary prevention (disability limitation and rehabilitation). Thus, “curative” services are actually part of secondary prevention, making the distinction between “preventive” and “curative” services conceptually untenable. However, these terms are in common parlance, having specific meanings in the Sri Lankan context, and are therefore used repeatedly in this report. While not wishing to lose the very helpful concept of the three levels of prevention, for the purposes of this report, we would like to define “preventive services” as primary prevention efforts and “curative services” as secondary and tertiary prevention (while acknowledging that rehabilitation services are often beyond the curative system).

Health Sector Organization and Capacity

Central Level

At the central (national) level, health services function under the central MOH (see Appendix 5). The Secretary, MOH is the chief executive and chief accounting officer of the ministry and is responsible for the implementation of the government's national health policy. The Minister of Health Care and Nutrition is the representative of the Cabinet of Ministers within the ministry, and is accountable to the Cabinet for all matters related to the health of Sri Lankans.

A National Health Policy statement adopted by the Cabinet in 1996 emphasized the goal of increasing life expectancy by reducing preventable deaths due to both infectious and noncommunicable diseases and to improve the quality of life by reducing preventable diseases, health problems, and disability. The National Health Policy identified areas needing attention, including nutritional health, oral health, mental health, accidents, coronary heart diseases, hypertension, diabetes, cerebrovascular disease, renal disease, substance abuse, and malignancies.

The MOH, through the Director-General of Health Services, supports implementation of the National Health Policy by provincial councils (Appendix 5) and provides technical guidance to them on all matters related to health service delivery in the country, including preventive, curative, and rehabilitative services. However, there is blurring of responsibilities between the central MOH and the Department of Health Services. MOH is involved in running day-to-day programs and projects that may impact aspects of policy development.

The MOH deals with all recruitment, appointments, and transfers related to medical officers for both central and provincial levels. Furthermore, all teaching hospitals and specialized hospitals are managed by the MOH and are under the Deputy Director-General, Medical Services. In addition, some provincially managed hospitals, over time, have been transferred to the MOH. Currently the MOH manages 50 institutions including all teaching hospitals. Most provinces have a centrally managed hospital.

The National Institute of Health Sciences and 14 nurse training schools, under the MOH, conduct training of auxiliary medical care personnel such as nurses, medical laboratory technicians, public health inspectors, and public health midwives, even though the legal framework for Sri Lanka's devolution has such training addressed by the provinces (see Appendix 6). Some other activities, too, have not been fully decentralized and continue to be managed centrally, including blood transfusion services (a network of more than 64 blood banks) and all drug procurement.

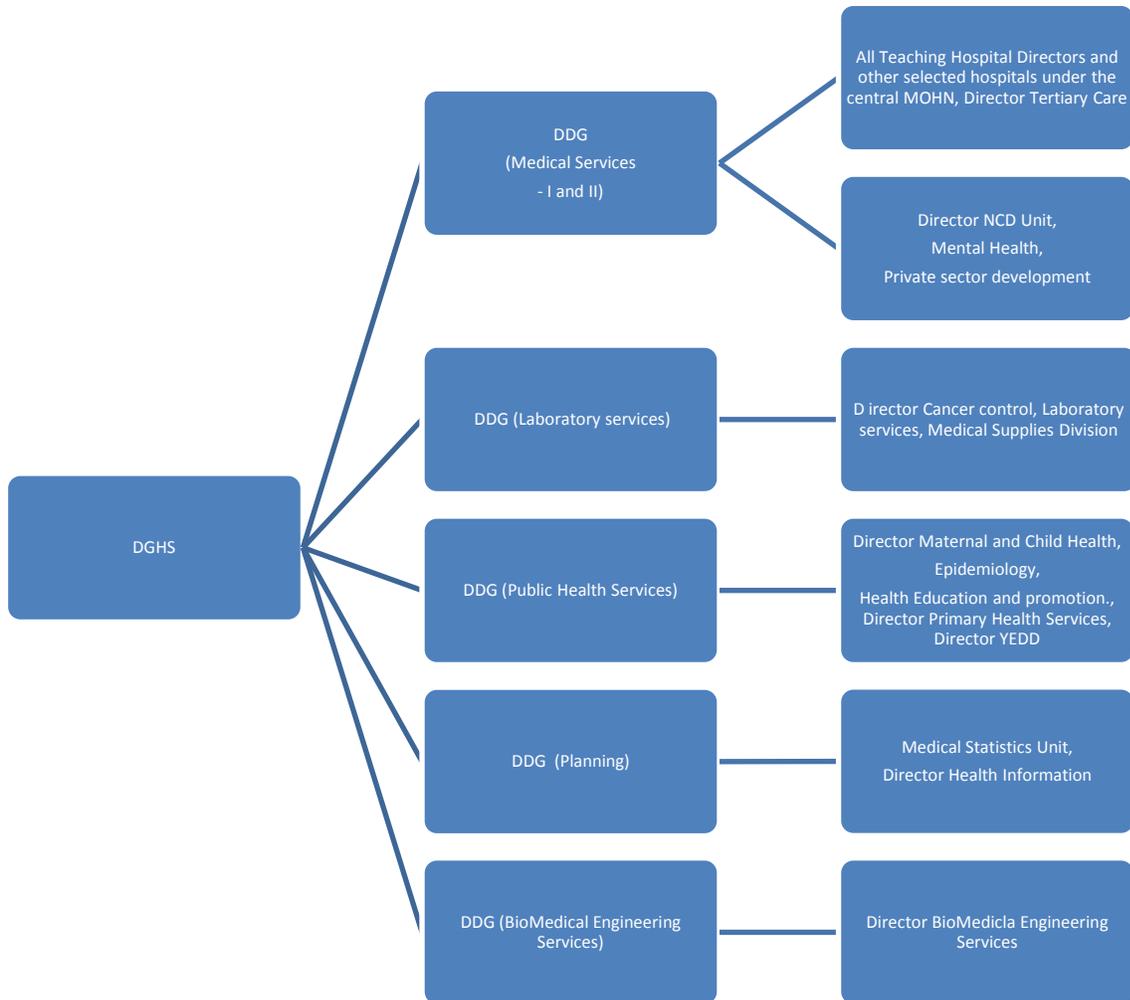
Provincial MOH and Local Governments

Provincial MOHs are responsible for the health services within a province. The Provincial Director of Health Services assists the Provincial Minister in all activities pertaining to the health sector within the province, the Deputy Provincial Director of Health Services (DPDHS) within the respective districts of the province, and the Divisional Director of Health Services (DDHS) within the respective divisions in each of the districts.

Structure Specific to NCDs

The central MOH organizational structure in relation to NCDs is shown in Figure 3.1. The responsibility for NCD management has evolved over the years. Directorates for NCDs, Mental Health, and Cancer Control work within the MOH and are responsible for major NCDs-specific activities. (In addition to these directorates, others are also important but their roles have not been finalized yet.)

Figure 3.1 Central MOH organizational structure in relation to NCDs



Source: MOH.

YEDD = Youth, Elderly, Displaced and Disabled.

NCD Directorate

The NCD Directorate was created in the late 1990s with few support staff. The staffing structure was revised in 2009 and two consultant community physicians and four medical officers were added. The objective of the directorate is to plan and coordinate the national NCD response for prevention and management of NCDs. It is tasked with CVD, endocrine (diabetes), respiratory (asthma/chronic respiratory) diseases, acute unintentional injuries, and renal system-related chronic diseases.

The directorate recently prepared, and the Cabinet approved, *The National Policy and Strategic Framework for Prevention and Control of Chronic Noncommunicable Diseases, 2010*. In addition, the Cabinet had decided that the MOH should formulate an action plan in association with other relevant

institutions to achieve the objectives of the policy (Box 3.1). The action plan is currently under development.

Box 3.1 Objectives of *The National Policy and Strategic Framework for Prevention and Control of Chronic Noncommunicable Diseases, 2010*

- Support prevention of chronic NCDs by strengthening policy, regulatory, and service delivery measures for reducing the level of risk factors of NCDs in the population
- Implement a cost-effective NCD screening program at the community level with special emphasis on cardiovascular diseases
- Facilitate provision of optimal NCD care by strengthening the health system to provide integrated and appropriate curative, preventive, rehabilitative, and palliative services at each service level
- Empower the community for promotion of healthy lifestyles for NCD prevention and control
- Enhance human resource development to facilitate NCD prevention and care
- Strengthen the national health information system, including disease and risk factor surveillance
- Promote research and utilization of research findings for prevention and control of NCDs
- Ensure sustainable financing mechanisms that support cost-effective health interventions in both preventive and curative sectors
- Raise priority for and integrate prevention and control of NCDs in policies across all government ministries and private sector organizations.

The directorate is also preparing and has nearly finalized a national policy and strategic plans for injury prevention and management, which will soon be up for Cabinet approval. This effort was coordinated with the Trauma Secretariat, the National Centre for Medical Toxicology, and the various agencies involved in road safety, both within and outside the health sector.

At the provincial level, positions for district medical officers for NCDs have been created in 25 districts. They report to the Regional Director, Health Services, and the Provincial Director, Health Services, and receive technical guidance and stewardship from the central NCD Directorate. Their main functions are to liaise with other stakeholder departments for prevention of NCDs (education, sports, youth, media, etc.) as well as to train primary health care staff in NCD prevention. They also collect, analyze, and disseminate information on NCDs and monitor NCD-related activities in the province. They are expected to organize screening programs and review NCD activities periodically. In addition, they coordinate injury prevention activities, promote school programs, and monitor implementation of the Tobacco and Alcohol Act in the provinces. The central technical guidance and stewardship provided to the district medical officers for NCDs have mostly been ad hoc, though since 2009 this support has become more systematic.

Mental Health Directorate

This directorate was established in early 2000. Its objective is to plan and coordinate the national mental health response to prevent and manage the mental health-related conditions in the country.

The directorate has a Director and support staff. Implementation of activities are facilitated by 47 Medical Officers (Mental Health) and Medical Officers (Psychiatry) who are posted mostly within secondary-level hospitals that do not have staff clinical psychiatrists. They support the clinical psychiatrist (if present), provide clinical psychiatry services in institutions without a specialist psychiatrist, provide outpatient care services for mental health within hospitals, and coordinate community activities with the MOH offices.

Cancer Control Directorate

This, the first NCD-related directorate, was established in 1980 as the National Cancer Control Program. It currently functions with a staff of more than 15 that includes a Director, Deputy Director, consultant

community physicians, a data expert, medical officers, and other support staff. Its objectives are to control or eliminate risk factors of preventable cancers through public awareness and thereby to reduce the incidence of cancers and its morbidity and mortality.

Directors of Teaching Hospitals and Other Specialized Hospitals

All hospitals managed under the MOH have a direct budget line for operations and provide services based on the demand and available human resources. As the specialist medical officers complete their training programs, there is a tendency for them to be posted to locations with inadequate facilities and equipment for fully practicing their specialty. (Existing specialists may also need their facilities and equipment to be upgraded for the same reason.) Examples include advanced radiology, cardiac surgery, eye surgery, pediatric surgery, oncology surgery, neurosurgery, and rehabilitation services.

If NCD clinics (such as hypertension or diabetes clinics) are loaded beyond capacity, the practice has been that additional general and specialized clinics are introduced or additional staff are added to the existing clinics, both leading to “immediate need” personnel requests, with only minimal planning or strategic policy directives from the MOH (see *Human Resources for Health*, below).

Director Tertiary Care

The Director Tertiary Care provides support to all tertiary care hospitals. The unit facilitates communication and coordination among hospital directors.

Bureaus and Units Supporting NCD Prevention and Control

Health Education Bureau

The Health Education Bureau in the MOH is responsible for health promotion and building capacity among personnel engaged in health development for both government and nongovernment sectors. This is achieved through the mobilization of resources of the health and health-related sectors and the community. Health promotion and community mobilization is the responsibility of the primary health care teams at the peripheral level. Volunteer health workers use holistic approaches and carry out activities at the grassroots level. The MOH NCD Directorate uses Health Education Bureau resources and services for incorporating NCD efforts into programs.

Family Health Bureau (Directorate for MCH)

This unit has been in existence since 1968 and it leads maternal and child health services. The Bureau introduced Well Women Clinics that provide NCD screening services for women over 35 years old (see *Health Sector Responses to NCDs*, below).

Epidemiology Unit

In place for more than four decades, it leads (besides infectious disease surveillance) the immunization program for vaccine-preventable diseases, the Acute Respiratory Disease Control Programme, and the Diarrhoea Prevention and Control Programme. Relevant data are sent to the Medical Statistics Unit for publication in the *Annual Health Bulletin* of the MOH. This unit has the capacity to introduce NCD surveillance programs countrywide.

Medical Statistics Unit

The unit has staff (statisticians and others) dedicated to collecting and analyzing medical statistics from the Census and Statistics Department. The unit trains data collection officers at each hospital. Current efforts are focused on improving data collection formats. Data are received from all hospitals with inpatient facilities through the Indoor Morbidity and Mortality data returns and other relevant documents. The unit provides morbidity and mortality information based on the International Classification of Diseases, 10th Revision (ICD-10). This ICD-10 expertise has the potential to be used for coding relevant NCD data.

The Medical Statistics Unit produces the *Annual Health Bulletin*, and MOH directorates provide summary write-ups to the unit on each of their programs.

Health Information Unit

The unit coordinates human resource and hospital data. It is also responsible for providing relevant data for planning, monitoring, and evaluation of the health sector. This unit currently provides technical support for the development of a national NCD surveillance system.

Director Youth, Elderly, Disabled and Displaced

This directorate attends to the needs of these special groups of persons in the community. In addition, the unit coordinates the functioning of day care services for the elderly at each of the MOH levels. Specific NCD prevention programs are held at some centers for the elderly.

Medical Supplies Division

This is the sole agency that coordinates the total drug and consumables budget for the public health sector. The unit purchases required items with the support of the State Pharmaceuticals Corporation where required, based on requests from provinces and all major hospitals.

Laboratory Services

The Deputy Director-General, Laboratory Services coordinates the laboratory support required for different levels of care for the country. But hospitals tend to make decisions for different laboratory services based on demand, availability of human resources, and experience. Many NCDs require laboratory services for diagnosis and clinical management.

Biomedical Engineering Services Directorate

This directorate provides technical guidance (including details of specifications when required) and coordinates the procedure for purchase of all biomedical equipment funded for all health institutions managed under the MOH. It also provides technical guidance to provinces and supports the province-based biomedical units as required.

Primary Health Care Directorate

This directorate works closely with other units already providing support to primary care services. However, an NCD-related role has not yet been identified for this unit.

Health Services Units

Public Sector

Sri Lanka has a well distributed network of hospitals and preventive health offices. The majority of the population has reasonable access to either a private or government health care facility. On average, Sri Lankans are within 1.4 kilometers of a basic health clinic and 4.8 kilometers from a free, government-sponsored allopathic health care facility (*Annual Health Bulletin 2003*).

Curative Health Services

A total of 1,084 public hospitals and outpatient facilities (646 hospitals with inpatient facilities and 438 central dispensaries which provide only outpatient facilities) were functioning as of December 2008 (*Annual Health Statistics 2008* from the Medical Statistics Unit). The government has three levels of curative care institutions depending on the size and the facilities offered by the institution—primary, secondary, and tertiary (Table 3.1).

Primary care institutions include central dispensaries, maternity homes, rural hospitals, peripheral units, and district hospitals—now collectively called divisional hospitals. All these institutions offer nonspecialist inpatient and outpatient care, except central dispensaries (outpatient only). Secondary care institutions include base, general, and provincial hospitals, now also called district general and base hospitals A and B. These hospitals, in addition to providing outpatient care, provide specialist care

through general surgical and medical units, at least one obstetric or gynecology unit, and a pediatric unit. In addition, some of these hospitals have specialist units. Tertiary care institutions, essentially the teaching hospitals, have all the facilities and units that secondary care institutions have but they also have various other ultra specialist units, such as neurology and cardiology.

Table 3.1 Basic statistics and information about all public sector hospitals (curative) in Sri Lanka, 2007 and 2008

Type of care	Hospital name/ category	Total number of hospitals, 2008	Range in total number of beds per unit, 2007	Total beds, 2007	Facilities provided ^a
Tertiary care	Teaching hospitals	17 (in 8 districts)	257–3,264	18,451 (27%)	Specialist and subspecialist care through inpatient, clinic care and outpatient care ^b
Secondary care	Provincial hospitals, district general hospitals, general hospitals, base hospitals, and other specialized hospitals ^c	122 (in 25 districts) ^d	13–1,328	24,923 (36%)	Specialist inpatient, clinic care and outpatient care ^b
Primary care (inpatient and outpatient)	Divisional hospitals, district hospitals, rural hospitals, ^e and peripheral units and tea estate hospitals	507 (in all 26 districts)	1–484	25,320 (37%)	Inpatient and outpatient care ^b (managed only by medical officers; specialist medical officers not available)
Primary care (outpatient only)	Central dispensaries	438 (in all 26 districts)	0	0	General outpatient care ^b (managed only by medical officers or assistant medical officers; specialist medical officers not available)
Total	All facilities	1,084 (countrywide)	0–3,264	68,694 (100%)	

Source: Computed by World Bank from *Annual Health Bulletin* provisional data for 2008 and data from *Annual Health Statistics 2007*.

a. Outpatient and inpatient care are provided to any patient at any of the levels of care without a referral. Only clinic-based care patients need to be referred from an outpatient medical officer or directly from the relevant specialist medical officer when working in the private sector.

b. All outpatient services are provided only from 8.00 am to 12 noon and 2.00 pm to 4.00 pm; all other patient visits are admitted.

c. Includes mental, chest, leprosy, police, prison, fever, cancer, dental, and rehabilitation hospitals

d. Except Mullativu district, other specialist hospitals are in seven districts that also have other secondary care hospitals.

e. Includes tea estate hospitals.

Preventive Health Services

The core of the preventive health system is managed by the public sector and services are provided through 297 divisional health units known as Medical Officer of Health areas covering the entire country (*Annual Health Bulletin*, provisional data for 2008). A few of these units are municipal council–managed and the others are managed by provincial health authorities. A Medical Officer of Health unit provides comprehensive preventive health care for a population of 80,000–100,000. The unit is staffed by a team of multidisciplinary health workers. A medical officer of health functions as unit manager and the team includes public health nursing sisters, supervising public health midwives, supervising public health inspectors, public health inspectors, and public health midwives.

Preventive services include comprehensive antenatal, postnatal, and family planning care, including house visits; nutrition services for mothers and children including nutrition supplementation and growth monitoring of children below five years; immunization services for vaccine-preventable diseases in children; Well Women Clinic services; environmental and occupational health services including inspection of food stores for hygiene, factories for safety, and school for environmental cleanliness and screening of children in school years 1, 4, and 7; field activities for rabies, dengue, malaria, filaria, and tuberculosis control; and preventive dental health services for antenatal mothers and school children below 12 years.

Private Sector

The private health sector has seen growth in the last two decades and currently provides outpatient and inpatient curative care to people demanding such services in urban and semiurban areas. Outpatient care is provided through private clinics and private hospitals. Of private sector inpatient beds, about 50 percent are in Colombo and the remainder are in a few districts (Kandy, Galle, Kurunegala, and Anuradhapura) in small hospitals (20–30 beds each). The total number of private sector beds was estimated at 8,850 in 2008 (*Central Bank Annual Report 2008*). In addition, specialized private health services provide laboratory tests, nursing, and other services.

The government has encouraged private medical practice since 1977, largely by permitting government medical officers, who provide care in the public system, to provide private medical services outside their official duty hours. The majority of the private sector medical staff also work in the public sector as medical specialists and general medical practitioners.

Human Resources for Health

Over the last three decades public sector health workforce numbers have risen in almost all categories and a recent shortage of nurses has been resolved (Table 3.2). The public sector staff headcount is 95,805 with approximately half the employees (46,492) working for the MOH and the other half (48,839) posted to provincial health units.

Table 3.2 Trends in key health personnel in the health sector

Year	Medical officers ^a		Nurses		Public health midwives	
	Number	Rate ^b	Number	Rate ^b	Number	Rate ^b
1982	2,035	13.4	6,931	45.6	2,296	15.1
1992	3,345	19.2	11,214	64.4	4,108	23.6
2002	9,290	48.9	16,517	86.9	4,819	25.4
2007	11,023	55.1	31,466	157.3	6,167	30.8

Source: *Annual Health Bulletin 2008*.

a. Covers all medical officers in curative, administrative, and preventive services, including specialists and interns.

b. Per 100,000 population.

The central administrative level has 15 Deputy Directors-General and 67 Directors leading different aspects of health services, including administrative and supportive functions. The provincial administrative level under the Provincial Director of Health Services has (depending on the number of districts) between two and four district-level Regional Directors. The majority of other staff are hospital- and preventive sector-based service providers (*Annual Health Bulletin 2008*). Most staff work in the curative sector (89 percent) while 11 percent work in the preventive sector (Table 3.3).

Table 3.3 Government health sector staffing categories by service provision, 2008

Staffing category and sector	Number	%
General administrative (senior and deputy)	117	0.1
Preventive	10,422	10.9
Medical officers	865	0.9
Nurses	290	0.3
Technicians (includes dental and entomological assistants)	472	0.5
Public health inspectors (includes environment, sanitation and food hygiene related inspectors)	1,766	1.8
Public health midwives	6,384	6.7
Other field officers	645	0.7
Curative	85,266	89.0
Medical officers (includes specialists, general medical officers, dentists and interns, postgraduate Institute of Medicine, Registered Medical Officers)	12,549	13.1
Nurses (includes supervising nurses, matrons, and pupil nurses)	31,176	32.5
Statistics officers	701	0.7
Support technical staff (includes specialized technicians, hospital midwives, dispensers, and microscopists)	6,973	7.3
Support nontechnical staff (attendants, laborers, etc.)	33,867	35.3
Total	95,805	100

Source: Computed by World Bank based on data from *Annual Health Bulletin 2008*.

Within the health sector, human resource distribution historically has been based on demand. When a hospital is upgraded to a higher level, the infrastructure as well as the diagnostic and treatment capability are improved. This is followed by more human resource allocation to meet the resulting demand. A well-developed human resource development plan linked to curative and preventive sector development is not, though, in place.

Unplanned expansion of human resource posting has led to maldistribution of staff in several categories (Table 3.4; see bold). While these data cannot define the optimal ratio of staff to population or staff to hospital beds, they can identify variation and potentially inequitable distributions. The Northern Province has the worst profile with especially low ratios for medical specialists, medical officers, nurses, medical officers of health, and public health midwives. Other provinces also have some inequitable distributions. Medical specialists and dentist ratios both have substantial variation throughout. Nurse ratios are low in Eastern and North Central provinces, the statistics officers, essential for data reporting, have a low ratio in Western Province. In terms of prevention, Central, Northern, and Northwestern provinces have low ratios for medical officers of health while Central and Western provinces have low public health inspector ratios.

Table 3.4 Availability of different categories of human resources in the government sector by province, Sri Lanka, 2007

Description	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabaragamuwa	Total
Population (000)	5,707	2,599	2,417	1,159	1,493	2,276	1,196	1,275	1,888	20,100
No. of hospital beds	20,977	10,150	7,224	4,249	5,098	6,303	4,489	4,766	5,438	68,694
Beds per 1,000 pop	3.7	3.9	3.0	3.7	3.4	2.8	3.8	3.7	2.9	3.4
Medical specialists										
No.	336	126	104	18	55	78	44	49	42	852
Per 100,000 pop	5.9	4.8	4.3	1.6	3.7	3.4	3.7	3.8	2.2	4.3
Per 1,000 beds	16.0	12.4	14.4	4.2	10.8	12.4	9.8	10.3	7.7	12.4
Medical officers (all hospital-based categories)										
No.	4,004	1,569	1,124	392	609	960	392	597	781	10,428
Per 100,000 pop	70.2	60.4	46.5	33.8	40.8	42.2	32.8	46.8	41.4	52.1
Per 1,000 beds	190.0	154.6	155.6	92.3	119.5	152.3	87.3	125.3	143.6	151.8
Dental officers (all hospital-based categories)										
No.	687	167	75	33	54	88	42	53	70	1,269
Per 100,000 pop	12.0	6.4	3.1	2.8	3.6	3.9	3.5	4.2	3.7	6.3
Nurses										
No.	11,433	4,256	3,603	751	1,689	4,004	1,353	1,804	2,283	31,176
Per 1,000 beds	545.0	419.3	498.8	176.7	331.3	635.3	301.4	378.5	419.8	453.8
Statistics-related officers										
No.	132	141	86	57	55	100	17	52	61	701
Per 1,000 beds	6.3	13.9	11.9	13.4	10.8	15.9	3.8	10.9	11.2	10.2
Support staff—Technical categories (technical officers)										
No.	2,167	733	895	364	568	748	361	447	690	6,973
Per 1,000 beds	103.3	72.2	123.9	85.7	111.4	118.7	80.4	93.8	126.9	101.5
Nontechnical support staff (laborers and attendants, etc.)										
No.	8,790	5,207	3,356	2,770	2,823	3,818	1,939	2,185	2,970	33,867
Per 1,000 beds	419.0	513.0	464.6	651.9	553.7	605.7	431.9	458.5	547.8	493.0
Medical officers of health										
No.	221	79	79	14	47	65	41	50	72	668
Per 100,000 pop	3.9	3.0	3.3	1.2	3.1	2.9	3.4	3.9	3.8	3.3
Public health inspectors										
No.	379	169	244	126	206	153	136	110	243	1,766
Per 100,000 pop	6.6	6.5	10.1	10.9	13.8	6.7	11.4	8.6	12.9	8.8
Public health midwives										
No.	1,284	932	879	242	747	654	426	462	758	6,384
Per 100,000 pop	22.5	35.9	36.4	20.9	50.0	28.7	35.6	36.2	40.1	31.9

Source: Computed by World Bank based on data from *Annual Health Bulletin 2008*.

Many of these staff have key roles for both preventive and curative services delivery. As the NCD burden increases, these inequities will have an impact on the public sector response.

Finally, at present, there are no formal in-service training programs for NCDs for any level of staff, though ad hoc programs have been carried out during the last five years at provincial and district levels. Clinical guidelines for some selected NCDs are available (see *Health Sector Responses to NCDs*, below). Recently, the public health inspector curriculum has been revised to include a module on NCDs.

Availability of Investigation and Medical Equipment

The availability of essential clinical investigation equipment and medical equipment necessary for diagnosis and management of patients among the nearly 950 provincial managed facilities is a critical issue to providing quality care. Unfortunately, no database with hospital information is available. However, the Director of Policy Analysis and Development in the MOH conducted a special survey in 2008 on the availability of these facilities in selected secondary- and primary-level hospitals (Table 3.5). It found that, even in secondary hospitals, basic laboratory testing and medical equipment was often unavailable, and the situation was worse in primary hospitals.

Table 3.5 Availability of basic facilities from a sample of hospitals, Sri Lanka, 2008

Medical equipment or basic laboratory test description	Secondary-level hospitals	Primary-level hospitals	Primary-level outpatients only
No of hospitals sampled / Total hospitals in 2008 (%)	18/122 (15%)	74/507 (15%)	23/438 (5%)
Availability of (%):			
Blood pressure apparatus (1 per medical officer)	39	51	91
Oxygen cylinder	67	42	9
Nebulizer	72	54	61
Suction apparatus	50	41	22
Emergency tray	72	60	35
Electrocardiogram	50	41	4
Test for urine sugar	33	45	26

Source: Computed by World Bank based on 2008 survey data from the Director of Policy Analysis and Development.

Note: Data not available for tertiary-level hospitals.

Drug Availability for NCDs

The Medical Supplies Division procures all required drugs for centrally and provincially managed hospitals. Drugs from the national essential drugs list are purchased and the MOH then determines the types of drug that can be dispensed at different levels of care. In addition, each hospital has an allocation that is made available to the head of the hospital for emergency purchase of other additional drugs and consumables for seriously ill patients and poor patients.

Substantial underprovision of the essential medicines required for routine management of chronic NCDs is a prevalent feature of Sri Lanka's public sector. Both international clinical guidelines (WHO and global best practice guidelines for developing countries) and Sri Lanka national clinical guidelines recommend the use of relatively cheap, essential medicines in primary care for secondary prevention¹⁵ and treatment of complications of the major chronic NCDs (IHD, diabetes, and asthma). There is an overall limited supply of these medicines at all levels, with a real lack of supply at the primary care level.

A WHO study assessed the availability of 32 essential medicines for chronic diseases in Sri Lanka and five other low- and middle-income countries (Mendis et al., 2007). In Sri Lanka the median proportion of the 32 essential medicines available in public facilities was 28 percent (range: 8–75 percent) compared to 79 percent (range: 2–96 percent) in private facilities. The study also examined affordability of various treatment regimens. For patients with established coronary heart disease, the standard medicine treatment regimen¹⁶ for one month would cost 1.5 day's wages, for hypertension (monotherapy), 0.01 day's wages, for diabetes, 6.1 days' wages, and for asthma, 2.3 days' wages.

In an earlier WHO study, Mendis et al. (2005) assessed the extent to which registered IHD patients treated at health facilities received adequate prevention in 10 developing countries, including Sri Lanka. The study looked at diagnosed IHD patients registered in a secondary-level institution. They found that patients in most developing countries were inadequately treated, but surprisingly, that levels of treatment were lowest in Sri Lanka. For example, only 8.7 percent of IHD patients in Sri Lanka received beta-blockers, compared with 34–72 percent in the other countries. Similar disparities were reported for the use of aspirin, angiotensin converting enzyme (ACE) inhibitors, and statins. Despite Sri Lanka's vaunted

¹⁵ Secondary prevention is the early detection and management of disease. Primary prevention includes specific prevention (for example, immunization) and health promotion (for example, good hygiene, healthy diet, smoking cessation). Tertiary prevention is disability limitation and rehabilitation.

¹⁶ Aspirin, statin, beta-blocker, and ACE inhibitor, all at the lowest generic price.

good access to health services, IHD patients received worse treatment than in many developing countries, including those with weaker health systems.

While the 2005 WHO study focused on secondary health care facilities in Sri Lanka, the lack of medicines is even greater at primary care level. Figures 3.2 and 3.3 show the availability of selected NCD medicines in MOH health facilities in three districts surveyed in an Institute for Health Policy/MOH Public Facility Survey in 2005. Availability is defined here as the supply to a facility during a 12-month period of any quantities of the relevant medicines. This is a rather generous definition of availability, since a facility that receives insufficient stocks of a medicine is still defined as having availability.

Figure 3.2 presents the availability of the four medicines identified by WHO as essential treatment for patients diagnosed with IHD: aspirin, beta-blockers, ACE inhibitors or calcium-channel blockers, and statins. Most of these medicines were unavailable at the lowest health facilities, regarded as the entry point for primary care. At preventive care-oriented Medical Officer of Health units, only 8 percent of facilities were provided with aspirin, and none was provided with stocks of the other three medicines. Central dispensaries to rural hospitals fared a little better, but even at their level, no facilities were provided with statins, and less than half received stocks of calcium-channel blockers, such as verapamil, while supplies of beta-blockers were not universal. Only peripheral units and above had supplies of all three medicines, excepting statins, which were not made available to any facilities surveyed in the three districts.

Figure 3.2 Any availability during year of essential medicines for IHD at different facility levels, Sri Lanka, 2005

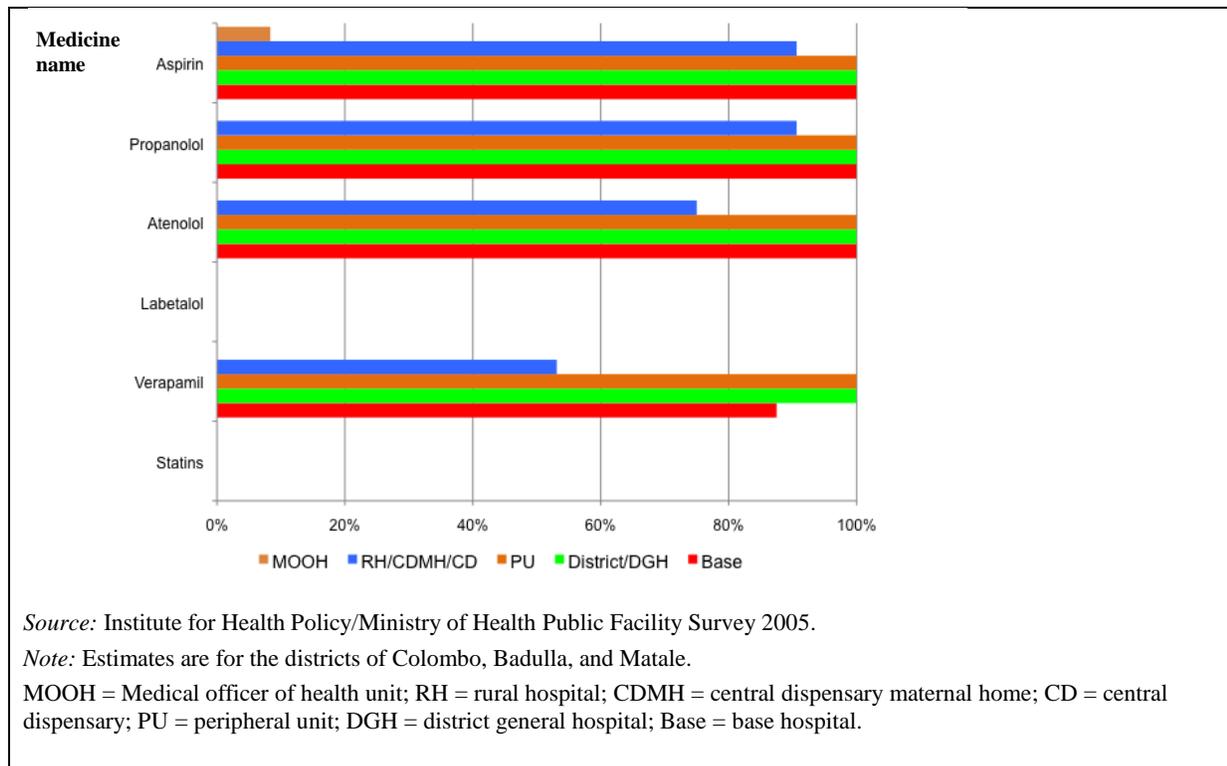
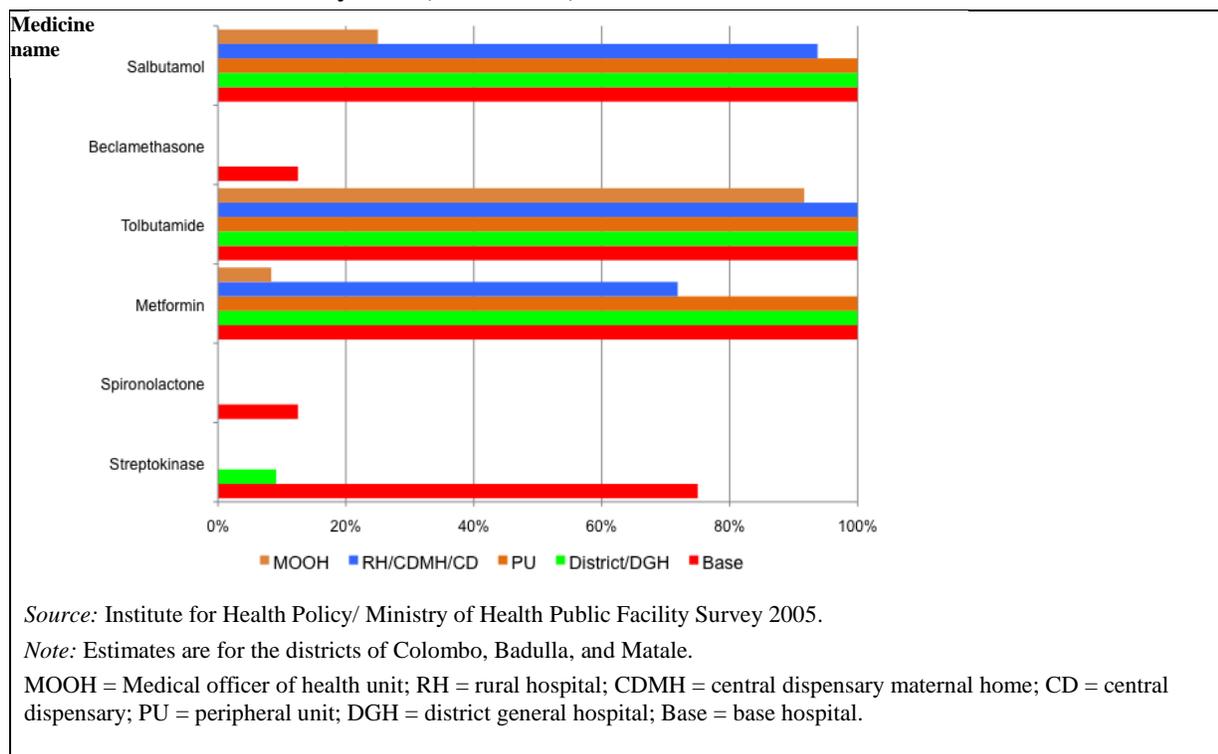


Figure 3.3 illustrates the availability of other medicines for asthma, diabetes, and heart disease. Again only peripheral units and above were assured of supplies of medicines for asthma (salbutamol) and diabetes (tolbutamide and metformin), while other essential medicines such as spironolactone and streptokinase (essential treatment for acute myocardial infarction) were only available in limited supplies in base hospitals and above.

Figure 3.3 Any availability during year of essential medicines for asthma, diabetes, and heart disease at different facility levels, Sri Lanka, 2005



A review of 2009 data of drug availability at various levels found little change from the earlier studies (see Appendix 7). Most NCD drugs are available only at secondary- and tertiary-level hospitals. As health-seeking behavior is known to be based on drug availability, the current institutional arrangements tend to encourage patients to seek care at higher facilities, bypassing the lower ones. Based on current policy, even drugs required for first-line management of asthma, CVD, hypertension, and diabetes, as well as a few other basic drugs required for the management of these conditions, are not currently in the essential drugs list for primary care facilities.

Health Information Systems and Surveillance

Surveillance of NCD risk factors, mortality and morbidity trends, as well as health services utilization patterns, all provide important input for the strategic planning of a response to the current and likely future NCD burden. Several health information systems are operating in the public sector and collecting information routinely. In addition, special studies and surveys provide critical inputs.

Health Information Systems

The Medical Statistics Unit and many other directorates in the MOH collect, collate, and analyze data for management purposes and publications (for example, the *Epidemiology Bulletin*, and Family Health Bureau publications). They also provide summary data for the *Annual Health Bulletin* on curative and preventive health sector data. A separate, well-established paper-based system for transmission of health information is also in place for preventive health services managed by the Epidemiology Unit and the Family Health Bureau.

Curative sector data are collated by the Medical Statistics Unit for the various returns on quarterly indoor morbidity and mortality; notification of infectious diseases and EPI; quarterly outdoor and clinic data; monthly maternity; annual bed strength and staff; maternal and child health; family planning; and others.

These inpatient and outpatient data have major limitations. Hospital inpatient data are collected in aggregate form, without patient-level demographic information. Outpatient data include only aggregate numbers without demographic information, reason for visit, or diagnosis information. Thus detailed or cross-tabulation analyses are not possible.

NCD Risk Factor and Morbidity Surveys

Efforts have been made in the past to conduct subnational NCD risk factor surveys to supplement NCD data gaps. The NCD Unit at the MOH led risk factor surveys using the WHO STEPS methodology in 2002 and 2006. The STEPS survey in 2006 covered five (of the 26) districts, and assessed the basic risk factors responsible for major NCDs but did not conduct biological assessments (see Appendix 8). Although the survey was completed and preliminary results have been made available, the report has not yet been finalized.

Several small-scale surveys by individual researchers and by medical faculties have been conducted over the last decades and many are cited in this report (see for example Chapters 2 and 4). In addition, the first comprehensive national study on diabetes and pre-diabetes in Sri Lanka, the SLDCS (Katulanda et al., 2008), measured chronic disease morbidity and risk factors for all age groups 18 years and above.

The Ragama Risk Factor Survey, led by the University of Kelaniya in collaboration with the International Medical Center of Japan, has established a longitudinal cohort to study the prevalence of metabolic disorders, establish diagnostic criteria for metabolic syndrome, and determine risks factors for NCDs among Sri Lankans. In 2008, a baseline survey was conducted and a follow-up survey is being carried out.

Cancer Registry

The National Cancer Control Program started a cancer registry in 1985. The data are institution based and collected and reported periodically. A population-based cancer registry is yet not in place.

Mortality Data

Mortality data are recorded by the Registrar General's Department using data from death certificate records from all provinces in the country. This department uses ICD-10. Even though death certification coverage is more than 90 percent, the quality of the data on reported cause of death was low up to 2006, although since 2004, efforts have been taken to improve the quality those data by changing reporting structures and formats. Another issue is timeliness, since the latest available mortality statistics, including data on cause of death, are for 2005.

Private Sector Data

The private sector does not have an established system of collecting or sending health sector data to the public sector except for the notification of infectious diseases and for special studies done by researchers. Furthermore, little is known of the quality of the private sector's data systems.

Health Sector Responses to NCDs

Public Curative Services

The current public system approach to health service delivery does not specifically target NCDs, aside from some NCD-specific initiatives and individual institutions. A new chronic NCD case is typically diagnosed at one of two locations: outpatient short-term care within the outpatient department or in the hospital when they are admitted as an inpatient. For newly diagnosed cases, no systematic procedures are in place in most institutions to ensure that standard diagnostic and treatment procedures are followed, leaving diagnosis and treatment dependent on the clinical awareness and training of physicians involved.

The current practice is that once diagnosed (for example, in the outpatient department short-term clinic), patients are referred to a specialist clinic for continuing care and management. In many secondary- and tertiary-level institutions these patients are permanently registered in specialist clinics, where they can continue to obtain care on a regular basis (at, for example, monthly clinics). At these clinics, patients may be given regular appointments for routine follow-up and management, as well as supplies of drugs and regular testing and monitoring of blood pressure, blood sugar, lipids, etc. When laboratory tests or drugs are unavailable in the facility, patients are requested to buy these services from the private sector at their own cost. This specialist-led treatment model, where patients are managed in specialist clinics, is currently the predominant approach for managing NCDs in the public sector. Complications and advanced-stage conditions related to NCDs are also handled in this way, or by admission to public hospitals.

Patients are aware of the system's limitations, especially the lack of capacity at lower-level facilities, and so most patients who have been diagnosed show a strong preference to continue obtaining care from specialist clinics. This leads to systematic bypassing of the primary-level institutions for NCD care. Patients in rural areas often travel long distances and spend considerable time accessing specialist clinics. Spending significant amounts of money to obtain necessary drugs and tests for NCD care is frequently reported as the leading complaint and cause of dissatisfaction among public sector patients (for example, JICA Study Team, 2003). Persons seeking care after standard clinic hours are often admitted to hospital when the illness might not warrant it.

Well Women Clinic

The Well Women Clinic program, which started in 1996, aims to improve women's health through providing screening services for hypertension, diabetes, and breast and cervical cancer to women over 35 years. It also provides referrals and follow-up as needed. Clinic participants receive general physical examinations; blood pressure measurements; urine screening for glucose; breast examination and instruction on breast self-examination; pelvic examination with screening for infections and cervical cancer; health education on menopause, STD/AIDS, and nutrition; and family planning needs.

To maintain uniformity in implementation of the program and to ensure standards of care, clinics are provided with guidelines. Even though this program has been in existence for more than a decade and provides services through over 600 functioning clinics in most Medical Officer of Health areas (Table 3.6), the coverage of the target population is limited. In addition, Pap smear results often take time to come through, and low community awareness of the clinics is problematic.

Table 3.6 Well Women Clinic Experience

Activity	2007
Total number of Well Women Clinics	611
Total number of Pap smears examined	83,480
Total number of abnormal smears detected	173
Diabetes mellitus cases detected	2,338
Hypertension cases detected	5,425
Breast abnormalities detected	1,830

Source: Report on Family Health. 2007. Family Health Bureau.

Public Sector Referral System

There is currently no formal referral system in the public or private health sector in Sri Lanka. Patients seek care in the medical institution of their choice. This is a result of the political system, in response to public pressure prioritizing equity in access over other technocratic and quality concerns. This policy implicitly recognizes that restrictions in access would result in different rights of access to higher-level care, which is more accessible to better-off Sri Lankans (Rannan-Eliya and de Mel, 1997). This

prioritization is similar to what has happened in Japan (Campbell and Ikegami, 1998), and, as in Japan, is a key reason for the good equity performance of the system.

With growing patient expectations, awareness, and demand for specialist physician care, patients are increasingly seeking care from higher-level facilities, a trend that is most easily seen in the case of childbirth where 88 percent of deliveries take place in secondary and tertiary hospitals (*Annual Health Bulletin 2008*). In response, the public sector has incrementally expanded higher-level facilities over time and upgraded facilities to provide better services.

Private Sector NCD Care Services

NCD patients obtaining care in the private sector need to directly pay for the cost of consultations, laboratory tests, and all drugs. Since NCDs are typically excluded from coverage as preexisting conditions, private health insurance generally does not pay for NCD care (JICA Study Team, 2003). Nevertheless, use of private outpatient care is common by both high- and middle-income Sri Lankans, as outpatient consultation is affordable for many (see Chapter 4).

To the extent that NCD patients can identify a private doctor whom they can see on a routine basis, access to continuity of care is feasible. This is most likely in the case of the minority of private sector physicians, who are full-time private family or general practitioners, or who are government specialists with established private sector practices. However, such practitioners are really only found in urban areas.

There is limited evidence on the quality of care provided for private sector patients, but past studies indicate that the quality of treatment for common NCDs given by private general practitioners may be high. For example, analysis of data from the Sri Lanka Private Clinic Survey 2000 (Rannan-Eliya et al., 2003), indicates that the pattern and appropriateness of drugs prescribed, the type and number of interventions, and the overall level of referrals for patients with asthma and hypertension seen by private general practitioners in Sri Lanka are comparable with the patterns reported for Australian primary care physicians. Such levels of quality are almost certainly related to the high levels of formal training in family practice of these private general practitioners, and to the high degree of professionalism that most gained during their training in the public sector. However, these levels may not be representative of the care received by most private sector patients, since these general practitioners see fewer than 15 percent of all private patients. Junior government doctors working in their off-duty hours, with no formal training in family medicine, see most private patients.

Recent years have seen a significant increase in supply of high-technology NCD treatments by private hospitals. These range from coronary artery bypass grafts and angioplasty procedures for heart disease to specialized radiotherapy services. For some services such as coronary angioplasty, private sector provision may now be greater than the public sector's. However, as such treatments are effectively restricted to the richest Sri Lankans, they have no material impact on the country's overall NCD burden.

NCD Activities

Tobacco Control and National Authority on Tobacco and Alcohol

In 2005, Sri Lanka was the first Asian country to adopt and ratify the Framework Convention on Tobacco Control. In collaboration with the WHO and Bloomberg Global Tobacco Initiative, the focus of efforts in Sri Lanka have been to protect young people. A ban on smoking in public places was passed by Parliament in 2006 with strong penalties for violators. Since the passage of the National Authority on Tobacco and Alcohol Bill (2007), tobacco control policies that have been developed include tax increases on cigarettes and tobacco products; restrictions on sales to youth; and restrictions on public and mass media advertising. Local control efforts include creation of district tobacco control cells with a lead role for them in implementing the provisions aimed at reducing tobacco use. (The smoking prevalence in Sri

Lanka cited in this report was measured before these initiatives were in place. Any impact from them would result in additional gains in tobacco use reductions.)

Clinical Guidelines for Care of Selected NCDs

The hospital efficiency and quality improvement component of the Sri Lanka Health Sector Development Project (a World Bank–financed project in 2005–2010) developed 93 clinical guidelines for care of selected conditions identified by teams of specialists from eight medical colleges (covering internal medicine, surgery, radiology, microbiology, gynecology and obstetrics, pediatrics, and anesthetics). Ten guidelines were for NCDs and related conditions including hypertension, diabetes, CVD, asthma, stroke, epilepsy, antithrombotic therapy, unstable angina, and non-ST elevated myocardial infarction. The guidelines consider local capacity and provide guidance at three levels: basic but mandatory components; desirable components where capacity is available; and optional components when capacity becomes available in the future. They were distributed to all specialist units in base hospitals, district general hospitals, provincial hospitals, and teaching hospitals. They were also distributed to primary-level care hospitals in Uva and Southern provinces.

These clinical guidelines should prove to be a major asset, although barriers to their uptake include lack of a systematic plan to ensure continuous training of all frontline clinical staff in the protocols/guidelines and follow-up training of new staff, and monitoring of the implementation after training; distribution on CD-ROM when many institutions lack computer facilities (and only few paper-based guidelines are available); and failure to embed the initiative in an overall national process to continuously review and update the guidelines.¹⁷ (This outcome might be fairly typical of some projects where no long-term impact is realized, highlighting the need to evaluate and adjust pilots and programs.)

Pilots for NCD Care

Three important pilot schemes are ongoing and should provide data and an evidence base for developing interventions for prevention and treatment. In addition, they should provide better understanding of the additional burden that newly diagnosed cases will add to the public health care system during screening and early detection efforts. These pilots are now outlined.

Population Screening for Selected NCDs

The introduction of population screening for NCDs for men and women over 35 years was planned by the Regional Director, Health Services team and initiated in the Ratnapura district under funds available through the World Bank–financed Health Sector Development Project in 2005. Clinics were held in remote parts of each Medical Officer of Health area within the district. The team consisted of the Medical Officer of Health, relevant public health inspectors and public health midwives, and a pharmacist from a divisional hospital that was equipped with primary care drugs and basic medical and laboratory equipment for blood pressure assessments.

In 2008, the NCD screening clinics were expanded to include asthma and selected cancers. Over the first three years of this activity, the number of clinics held and the numbers screened increased substantially. In years two and three the yield of new cases among those screened was approximately 3–4 percent (Table 3.7). This approach provided screening services to only a small fraction of the targeted population. The population that is reached with this effort may be quite small, even in the best of circumstances.

However, gaps in follow-up care and overall low coverage led to the program’s suspension in 2009. Current plans are to restart the program in July 2010 with outreach clinics in the rural areas in order to facilitate primary care units to screen patients over 40 years of age during clinic encounters, and to develop health card and referral forms. In addition, it is planned to provide screening services at

¹⁷ Countries such as the United Kingdom and the United States, which follow this type of approach, have update reviews embedded in the process.

workplaces. Guidelines are being prepared for the screening frequency and management of diagnosed patients.

Table 3.7 Details of screening clinics held for selected NCDs, Ratnapura district, 2005–2008

Description	2005	2006	2007	2008
Number of outreach clinics held for screening at all Medical Officer of Health areas of district	75	99	128	—
Total number of persons screened for diabetes, hypertension, asthma, IHD, cancer, and other conditions	3,023	12,598	15,314	—
Total number of new cases detected for hypertension (HT), diabetes (DM), and IHD	543 (18.0%)	547 (4.3%)	512 (3.3%)	614
	HT 404	HT 406	HT 377	HT 373
	DM 84	DM 83	DM 94	DM 177
	IHD 55	IHD 58	IHD 41	IHD 64

Source: Regional Director, Health Services, Ratnapura district, 2010.

— = data not available.

Package of Essential NCD Interventions

The Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings pilot (Mendis et al., 2009), supported by WHO, was recently started. The package includes six core activities as well as plans to introduce comprehensive NCD care within the primary care settings. The core activities are: assessing human resource availability; providing NCD care knowledge updates for staff; assessing availability of essential equipment needs for NCD care (including blood glucometers, peak flow meters, electrocardiograms, and nebulizers); making necessary changes to the essential drugs list to include first line for NCDs; developing and applying 10-year CVD risk charts to clinic populations; and developing and introducing protocols for follow-up care and management of NCDs. All preliminary assessments under each of these six core activities have been concluded and implementation is planned for late 2010 in Badulla district in three selected divisional secretariat areas. Three other such areas from the same district will be used for comparison.

Health Promotion and Preventive Measures of Chronic NCDs

The five-year Project on Health Promotion and Preventive Measures of Chronic NCDs, supported by the Japan International Cooperation Agency (JICA), began in 2008. Its purpose is to develop effective and efficient implementation strategies for controlling chronic NCDs. The project plans four major outputs: prevalence estimates of NCDs and risk factors; intervention strategies formulated using surveillance data; development of an implementation structure and mechanisms to implement strategies to control chronic NCDs in the target areas; and development of an outline for scaling up and generalizing relevant operations at the national level.

In Kurunegala district the project is piloted in two Medical Officer of Health areas, and in Polonnaruwa district it is piloted in one such area. People aged 40 to 75 years without a past history of NCD (total target population 64,201 persons from the three areas) are provided with health guidance support, a health checkup, and a risk analysis. Patients are allocated into one of three risk groups based on blood pressure, BMI, and smoking status. Health promotion for low-risk people is provided in two settings—village and workplace. For those with newly diagnosed NCDs or already diagnosed, referrals are made to primary care centers or higher-level facilities as appropriate.

Chapter 4: Patterns and Trends in Utilization of Curative Care for NCDs

Key Messages

- The public sector provides nearly all the preventive care, not quite half the outpatient care, and most of the inpatient care.
- Annual inpatient utilization rates in Sri Lanka are similar to those in OECD countries.
- Bed-occupancy rates are 83 percent in tertiary, 56 percent in secondary, and 47 percent in primary facilities. This distribution points to inefficiencies in the system and places unnecessary strain on tertiary-level facilities.
- Two-thirds of clinic-based services (mainly for chronic NCDs) are provided through secondary- and tertiary-level facilities.
- Across household income quintiles, overall utilization of outpatient and inpatient services is similar, although richer quintiles use more private outpatient services, and the richest quintile uses more private inpatient services.
- In 2008 in terms of inpatient morbidity, NCDs (excluding injuries) accounted for 23.7 percent of hospital stays and injuries for 18.2 percent, while infectious diseases accounted for 26.3 percent, maternal and child health conditions for 11.5 percent, and others for 20.3 percent.

General Patterns of Utilization of Curative Care Services

Health services are provided by private and public sectors for allopathic and Ayurvedic (indigenous medicine) treatment. Over 25 years to 2003/04 the public system was the source of treatment by sick persons 45–50 percent of the time, mainly in the form of allopathic care (Table 4.1). The private sector's allopathic proportion grew while private Ayurvedic care declined, yet the total from the private sector (both types) remained constant at 45–50 percent.

Table 4.1 Sources of treatment used by sick persons, Sri Lanka (%)

Source of treatment	1978/79	1981/82	1986/87	1996/97	2003/04
Public allopathic	42.6	45.6	44.1	50.7	45.2
Private allopathic	34.3	34.2	37.2	38.1	46.7
Public Ayurvedic	1.9	2.2	1.9	2.0	1.2
Private Ayurvedic	16.1	12.1	12.9	7.6	5.2
Others	5.1	6.0	3.8	1.7	1.7
Total (%)	100	100	100	100	100

Source: Computed by Institute for Health Policy from reports and data of Central Bank Consumer Finance Surveys.

Note: The percentages are for those who reported falling ill during a 14-day reference period and used any source of treatment, including both inpatient and outpatient treatment. Private allopathic sources include pharmacies.

In terms of the type of care, the public sector provides nearly all the preventive care, not quite half the outpatient care, and most of the inpatient care. The private sector provides the rest (Table 4.2).

Table 4.2. Health service provided by different sectors, Sri Lanka (%)

Type of care	Private providers	Public providers (government)
Preventive	Minimal	Nearly 100
Curative—Outpatient	50–60	50–40
Curative—Inpatient	10–15	90–85

Sources: Annual Health Bulletin 2003 and Central Bank Annual Report 2008.

Levels of Curative Care Utilization

Sri Lanka's extensive health care system facilitates a high level of utilization. Inpatient utilization rates are in the middle or at the higher end of the OECD range, while outpatient rates are at the lower end (Table 4.3).

Table 4.3 Annual rates of medical care utilization, Sri Lanka and OECD countries

Indicator	Sri Lanka (2006)	OECD range
Outpatient visits per capita	4–5	3–14
Inpatient admissions per 100 capita	22–24	6–28
Acute care bed-days per 100 capita	90–100	40–180
Bed-occupancy rate (%)	74	65–91

Source: Institute for Health Policy estimates based on its own data, MOH data, and OECD Health Data 2008.

The main explanation for this variation comes from the high pressure under which the public sector has to operate (Hsiao and Associates, 2001). While empirical evidence is lacking, given the current organization of the service delivery system in the community, this pattern may reflect the fact that patients go to hospital outpatient departments to consult, even for most minor illnesses, and if diagnosis is uncertain (for example, due to lack of diagnostic tests), conservative treatment would be to admit patients to hospital.

Utilization by Type of Institution

The curative care institutions of the central and provincial MOHs account for almost all public sector curative care provision, with only a very limited volume of other services provided by a few dispensaries run by municipal councils, and two small hospitals for the army and police.

Secondary and tertiary hospitals provide care for about two-thirds of inpatient admissions and have relatively higher bed-occupancy rates than primary care hospitals (Table 4.4). Two-thirds of the long-term clinic visits, which would include NCD patient visits, are also made at secondary and tertiary care facilities. Primary care hospitals and clinics manage the majority of outpatient visits (short-term patients with three-day treatment).

These patterns reflect the general trend of at least the past half-century for public sector patients to increasingly use higher-level facilities. The health system's organization and treatment patterns have also resulted in the majority of chronic NCD primary care being provided at higher-level public hospitals in long-term clinics rather than at short-term, lower-level, public outpatient facilities.

Table 4.4 Distribution of public sector institutions and patient utilization by level of facilities

Hospital level	Number of hospitals	Beds (%)	Bed-occupancy rate (%)	Inpatient admissions (%)	Clinic visits (%)	Outpatient visits (%)
Tertiary care	17	27	82.6	25.6	31.7	12.3
Secondary care	122	36	56.3	43.1	34.3	24.8
Primary care	507	37	47.2	31.3	28.0	48.5
Primary care (outpatient only)	438	0	0	0	6.0	14.4
Total	1,084	100	49.8	100	100	100

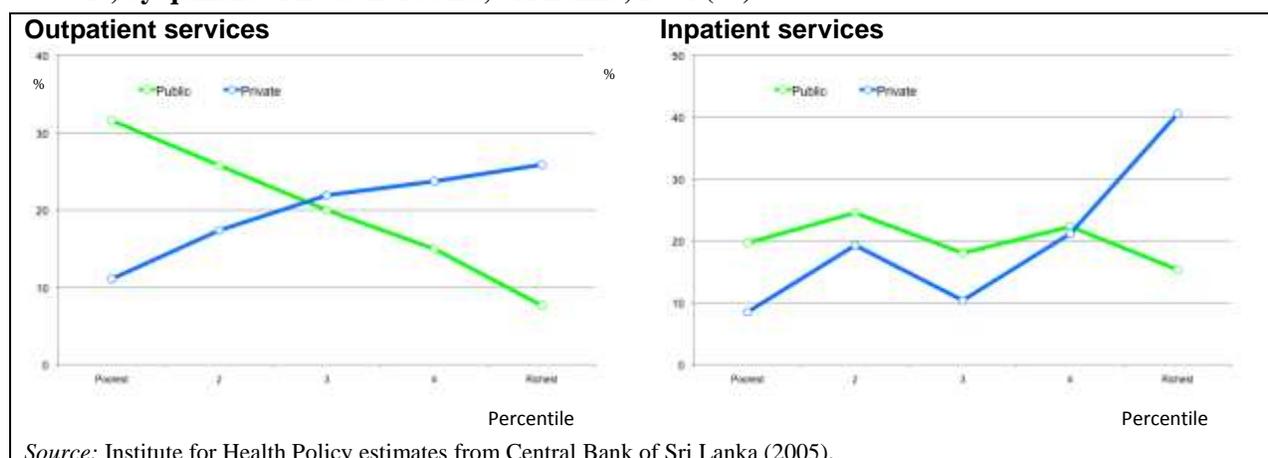
Source: Computed by World Bank based on *Annual Health Statistics 2008* provisional data and 2007 data from the Medical Statistics Unit.

Note: Total beds = 68,694; total inpatient admissions = 4,897,815; total clinic visits = 17,609,370; total outpatient visits = 45,381,715.

Utilization by Income Level

The overall volume of curative services utilization is essentially equal across income levels (Figure 4.1). If the need for medical care were greater among the poor, the use of care would not be equitable, but as seen in Chapter 2, unlike other countries the evidence on this is mixed in Sri Lanka, with infant and child mortality higher among the poor, but overall mortality rates possibly higher among the better-off.

Figure 4.1 Share of health care utilization of outpatient and inpatient services in public and private sectors, by quintile of household SES, Sri Lanka, 2004 (%)



Source: Institute for Health Policy estimates from Central Bank of Sri Lanka (2005).

Still, patterns of use of public and private services differ, with public services used more by the poor and private services used more by the rich. Outpatient care has a pronounced poor–rich gradient (the rich use more private services). However, inpatient care finds a more complex pattern. In the lower quintiles public inpatient services are the dominant source. In the fourth quintile, private use equals public and then in the richest quintile, private is the dominant source. This pattern of use of public and private services by income level is also found in Malaysia, Hong Kong (China), and some Pacific islands.

Patterns of Curative Care Services by Patients with NCDs

Contribution of NCDs to Curative Care Use

Systematic data on the use of curative care services by patients with NCDs are limited to public services and inpatients (outpatient data are not routinely classified) and these statistics are aggregated as they are nationally compiled, which does not allow for cross-tabulations. However, provisional data for inpatient morbidity for 2008 can lend some broad insight.¹⁸ In 2008 injuries accounted for 18.2 percent of inpatient stays while the remaining NCDs (excluding injuries) accounted for 23.7 percent. Infectious diseases accounted for 26.3 percent, maternal child health for 11.5 percent, and other causes for 20.3 percent.

Further analysis of inpatient services was made by the Public Hospital Inpatient Discharge Survey (PHIDS) (Perera et al., 2009). It collected 10,000 patient discharges from government hospitals in 2005 and is the only nationally representative database of patient-level records available for analysis of inpatient discharges by type of disease.

According to PHIDS data, one-third of all hospital admissions in the public sector were due to the major NCDs. Their importance at each level is shown in Table 4.5. Injuries account for a little less than half of all NCD admissions at all levels of the system, although have a bigger share of admissions at primary and secondary institutions than tertiary ones. Of the rest, asthma was the leading cause of admission at all levels, but it was much more important at the primary level (7.7 percent) than in higher-level institutions (2–3 percent). The next major cause of NCD admissions was CVD. Cancers account for almost no admissions at primary and secondary level, but their share increased at higher levels.

Table 4.5 Share of patient discharges accounted by selected NCD and other conditions at different levels of health care institutions, Sri Lanka, 2005 (%)

Primary diagnosis	Tertiary	Secondary	Primary	All levels
Asthma	1.8	3.0	7.7	4.2
Other chronic respiratory disease	2.1	3.2	5.8	3.7
Diabetes mellitus	1.1	1.4	1.2	1.2
IHD	1.8	2.4	1.8	2.0
Hypertension	0.9	1.5	3.5	1.9
Other CVD	2.2	2.2	1.4	2.0
Cancers	6.5	0.5	0.2	2.3
Other NCDs	3.3	1.6	1.5	2.1
Injuries	11.1	18.5	19.7	16.6
Maternal/neonatal/congenital/nutritional	13.4	16.3	7.8	12.6
Infectious and parasitic disease	6.7	8.3	16.6	10.5
Others	49.2	41.1	32.8	40.9
Total	100.0	100.0	100.0	100.0

Source: Institute for Health Policy estimates based on data from Perera et al. (2009).

Note: NCD causes ranked in order of decreasing size. For this analysis other diseases not included in NCD category include peptic ulcer disease/gastritis, other diseases of the digestive system, urolithiasis, disorders of the female genital system, other genitourinary diseases, skin diseases, and all ill-defined conditions.

Table 4.6 provides additional information on the inpatient demand from NCDs. It classifies the overall composition of inpatient discharges, bed-days, and costs in the public sector in 2005. Injuries account for the largest share of overall patient discharges and for hospital costs. However, the average length of stay (ALOS) for injuries is relatively short, indicating that most such admissions are probably for minor injuries. Furthermore, a community-based injury incidence survey indicated that even though the injury

¹⁸ Provisional data provided by MOH Medical Statistics Unit for indoor morbidity in 2008.

burden was very high (24.6 per 100 population), only 25 percent of those injured required inpatient care (Navaratne et al., 2009). Although some NCDs, such as cancer, account for only a moderate proportion of actual discharges, they account for a greater proportion of bed-days and overall inpatient costs. Cancer, diabetes, and CVD in particular tend to be more costly than the average admission. In general, the more expensive NCD diseases are more likely to be handled in higher-level hospitals.

Table 4.6 Patient discharges, bed-days, and inpatient costs by major categories in the public sector, Sri Lanka, 2005

Cause	Discharges (%)	ALOS (days)	Bed-days (%)	Costs (%)
Injuries	16.6	3.4	13.4	14.7
Malignant neoplasms	2.3	10.8	5.8	7.2
CVD	4.0	4.4	4.1	5.8
Chronic respiratory diseases	7.9	4.0	7.4	5.2
Diabetes mellitus	1.2	6.3	1.8	1.5
Hypertension	1.9	3.8	1.8	1.0
Other NCDs	2.1	10.4	5.3	3.7
Infectious and parasitic diseases	10.5	3.6	8.9	7.4
Maternal, neonatal, congenital, and nutritional	13.0	5.2	15.8	17.7
Other	40.5	3.7	35.7	35.8

Sources: Institute for Health Policy estimates from data collected in PHIDS 2005; cost estimates from Institute for Health Policy Sri Lanka Disease-specific Accounts Project in 2005.

International Comparison of NCD Inpatient Demand

The rates of hospital admission for selected major NCDs are compared to those for OECD countries in Table 4.7. As the table shows, overall rates of inpatient demand for many NCDs, with the exception of myocardial infarction which is lower, are already comparable to the average in OECD economies, despite Sri Lanka's relatively younger population.

The most notable difference in the table between Sri Lanka and OECD countries is that Sri Lanka's admission rates for asthma are nearly 10 times as high as the OECD average, and three times as high as the highest rate reported by any OECD country. Asthma is inherently a treatable, though not curable, disease through appropriate medical care, so hospitalization for asthma is essentially a consequence of insufficient medical treatment in the community or may reflect provider behavior and reluctance to treat it in the outpatient department. For this reason, asthma admission rates are used in many OECD countries as a health system quality indicator. For example, asthma admission rates are a High Level Performance Indicator in the U.K. National Health Service, and both pediatric and adult admission rates are part of the U.S. National Healthcare Quality Report (OECD, 2007). This exceptionally high rate of admission for asthma may suggest deficiencies in care.

Table 4.7 Rates of admission for selected NCDs (discharges per 100,000 population), Sri Lanka and OECD countries, 2005

Cause of admission	Sri Lanka	OECD mean	OECD range
Acute myocardial infarction	70	183	15–390
Diabetes mellitus	177	197	66–498
Schizophrenia	87	93	4–370
Asthma	893	97	27–301
Bronchitis/COPD	138	200	20–414
Cataracts	196	208	2–902

Source: Sri Lanka estimates are Institute for Health Policy computations based on data from Perera et al. (2009), and are for the public sector only. OECD estimates are from OECD Health Data 2008.

Future trends in Health Care Utilization

Projecting Future Inpatient Demand

Building on a model originally conceived with funding from the U.S. National Institute on Aging, Rannan-Eliya (2008) developed projections of future health care costs in Sri Lanka. This study found that population aging would be only one of many factors to influence growth in future health care costs. It concluded that changes in health care seeking behavior, in public sector productivity, and in private sector price inflation would be equally important determinants, and that sustained productivity growth and continued public sector dominance of health financing would be able to minimize the impact of aging on health care costs. These projections, however, did not explore further the trends in demand for curative care, or look in detail at trends in specific diseases.

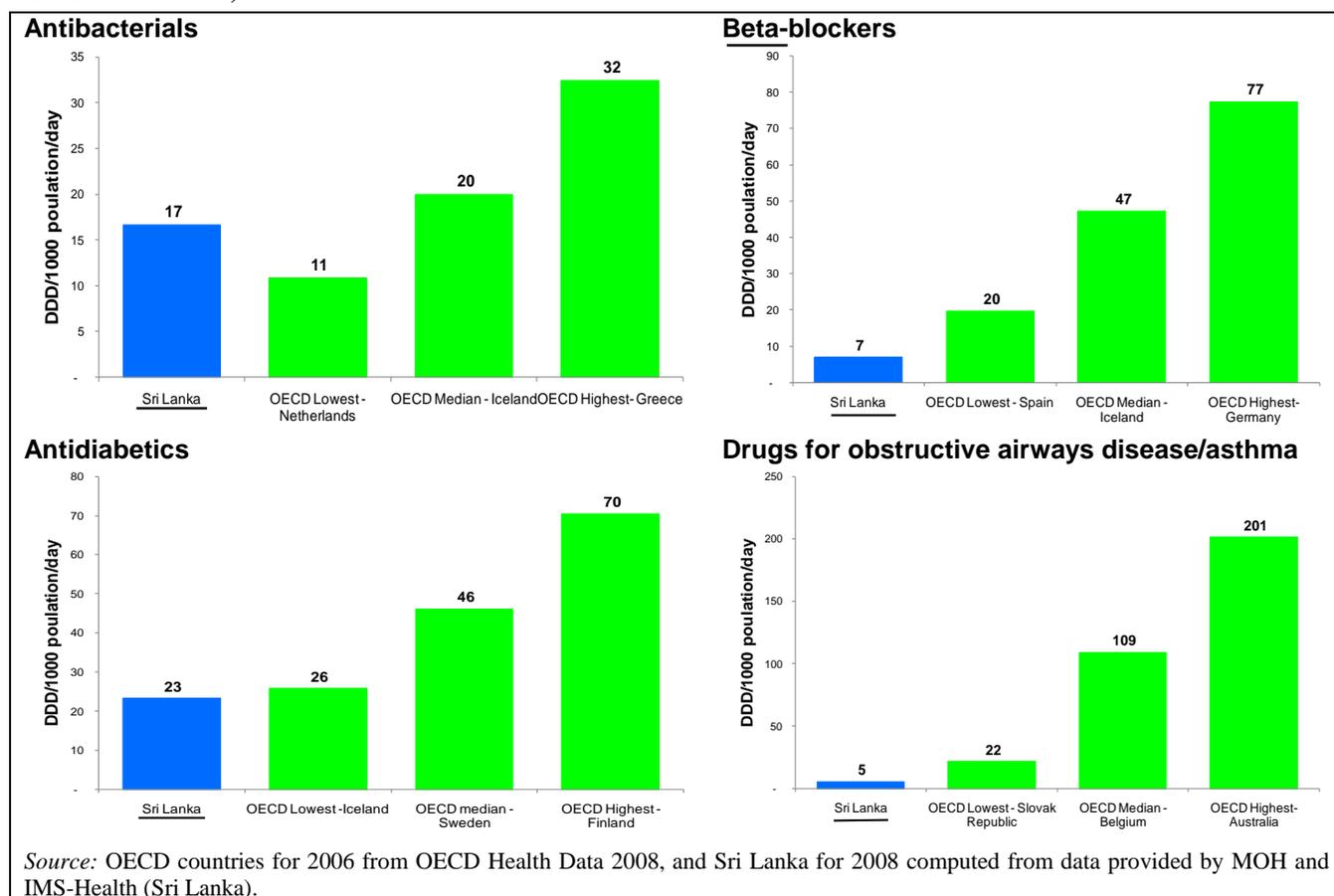
It is not possible to meaningfully project future trends in utilization of NCDs in Sri Lanka at the current time, as there is a lack of data on past trends in prevalence and only minimal data on the relationships between risk factors and disease prevalence in most cases. Another approach might be to use population projections for Sri Lanka (De Silva, 2007) and the rate of admissions for each disease category, and then project forward, taking account of the projected changes in the age and sex structure of the population. This allows assessment of how future population aging might affect the pattern of inpatient care use, both for NCDs and other diseases. However, this modeling assumes that age–sex specific rates of inpatient admission for each disease category will not change. In reality, this is unlikely to be the case. Hence, any modeling of future trends needs to be interpreted with great caution and many caveats.

Utilization of Pharmaceuticals for NCDs

Use of NCD Medicines in International Comparison

Overall rates of use of NCD medicines in Sri Lanka are at the lower end of the range among developed countries with comparable standardized mortality rates for chronic NCDs. Figure 4.2 contrasts levels of use of antibacterial drugs and selected NCD drugs in Sri Lanka, measured in terms of defined daily doses per 1,000 capita a year (WHO Collaborating Centre for Drug Statistics Methodology, 2008) with the range seen in OECD countries. The figure presents the rates of use in the lowest, median, and highest OECD countries.

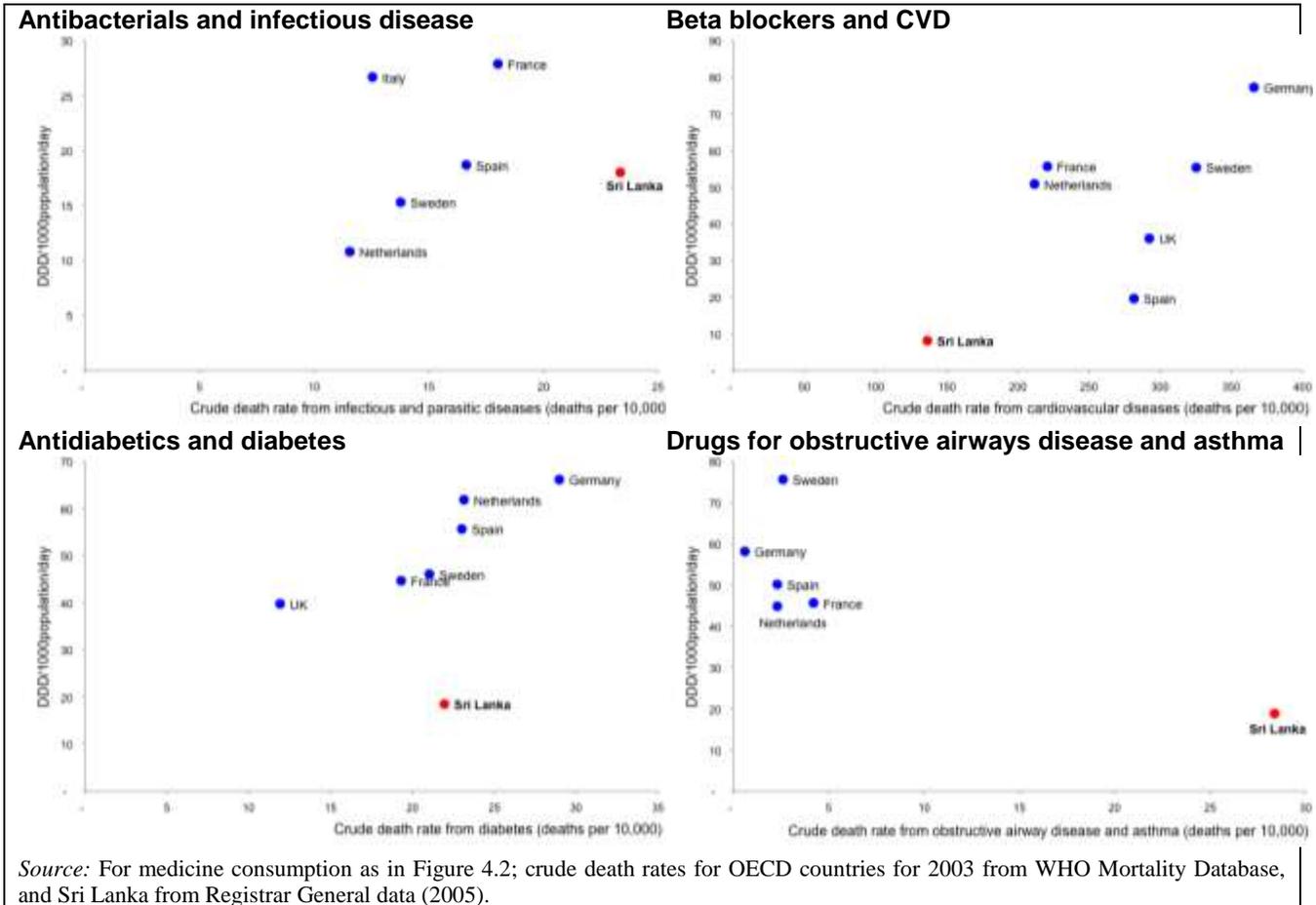
Figure 4.2 Consumption of selected NCD medicines in defined daily dose units, Sri Lanka, 2008 and OECD countries, 2006



The data show that while the rates of use of medicines for infectious disease in Sri Lanka are near the median range of OECD countries, the rates of use of NCD medicines in Sri Lanka are all below the lowest OECD countries in the case of many NCD medicines, such as beta-blockers for IHD or drugs for asthma. Rates of use in Sri Lanka may be considered more optimal if overall rates of use in OECD countries are too high. However, analyses of the prescribing of these medicines in OECD countries generally find that almost all these NCD medicines are underprescribed and underconsumed in relation to clinical guidelines (Dickson and Jacobzone, 2003; Stolk et al., 2006), indicating that the gap with actual need is even greater in Sri Lanka than these data suggest.

Of course, it could be argued that the side-by-side comparisons made in Figure 4.2 may be misleading, since the aggregate NCD burden in Sri Lanka will be lower given its younger population, despite having comparable standardized mortality rates. To address this, Figure 4.3 extends the comparison by charting the levels of use of these medicines against the crude death rates for relevant diseases, which are a measure of the total burden of disease. In OECD economies, the figure shows a clear linear relationship between the underlying disease burden and the use of relevant medicines. However, in all the cases, consumption of relevant medicines in Sri Lanka is less than the expected level, with the differences least for antibacterial drugs and beta-blockers, and most for asthma. This result implies not only that overall medicine utilization is less in Sri Lanka, but also that the disparity is most substantial for asthma. However, the disparity for beta-blockers would be consistent with research in OECD countries that has found that cross-country variations were least for the cheapest and oldest heart disease medicines, such as beta-blockers (Dickson and Jacobzone, 2003).

Figure 4.3 Consumption levels of medicines and mortality rates for relevant NCDs, Sri Lanka and selected OECD countries



One explanation for the low overall levels of use of NCD medicines in Sri Lanka is the low volumes of essential NCD medicines available in the public sector (as seen in Chapter 3). Other explanations include provider practice patterns and low patient compliance with treatment. In OECD economies the bulk of NCD medicines are purchased through public financing, and considerable evidence exists to indicate that if not for this public financing, overall levels of use of NCD medicines in OECD economies would be substantially less (Dickson and Jacobzone, 2003). In the next chapter, we examine in detail the current pattern of NCD drug purchasing in Sri Lanka.

Chapter 5: Financing of Health Services for NCDs

Key Messages

- Total health expenditures in Sri Lanka increased from 3.5 percent of GDP in 1995 to 4.0 percent in 2008, of which the share of public spending declined from 47 percent to 43 percent. These overall expenditures are lower than in countries with comparable demographic indicators.
- The expenditures for treatment of cancers and acute heart attacks in 2005 were predominantly publicly financed while those for diabetes, asthma, and heart disease were predominantly privately financed. Private expenditures were mainly out of pocket.
- From two-fifths to nearly all expenditures on NCD medicines are from private sources (mostly out of pocket). For CVD, diabetes, and asthma about half the out-of-pocket expenditures are for outpatient care and drugs.
- The need for frequent clinic visits created repeated costs. Patients from rural, low-income areas with diabetes are often unable to go to a clinic, contributing to a deterioration in their condition.
- The private sector handles approximately three-fifths of the market requirements for drugs while the government handles the balance, implying high risk of inequity.
- Because public sector unit prices for key NCD drugs are a small fraction of private sector prices, it may be financially feasible with public funds to increase drug supply to 80 percent of the median utilization rate in OECD countries.

Overview

Total health expenditures climbed from 3.5 percent of GDP in 1995 to 4.0 percent in 2008, while the proportion of public spending declined from 47 percent to 43 percent of this total. This level of spending, overall, is lower than in other countries with comparable demographic indicators (Table 1.1 and 1.2). Health financing in Sri Lanka is from two main sources: general taxation and out-of-pocket household spending. Supplementary private insurance, whether provided by employers or self-purchased, covers only a small fraction of individuals in higher-income groups; moreover, as the available benefits are usually inadequate for treatment of serious or chronic illnesses, these conditions are predominantly treated by the public sector. Most public funds come from taxes on goods, services, and incomes. Neither the central nor provincial MOHs have succeeded in revenue-generating schemes within the health system. The general public is sensitive to equity issues and carries the persuasion that basic government medical services should be free to all.

Most inpatient care and almost all preventive care is funded by the government, while most private expenditures are for outpatient services and purchase of medicines from pharmacies and clinical investigation tests from private laboratories. Catastrophic illnesses are mostly covered by public funds that provide hospital, outpatient, and public health care, to the extent feasible.

The MOH receives grants and loans from external development partners for NCDs including the World Bank, WHO, and JICA. These external resources accounted for less than 5 percent of total health expenditures during the last decade.

Financing of NCD Expenditures

Figure 5.1 illustrates the relative contributions of public and private financing to spending on several major NCDs. Owing to the current organization of the health system, much care for NCDs is delivered in the private sector. In the private sector, patients pay for almost all their treatment costs. In the public sector, patients making clinic visits do not pay fees, although they must frequently pay for the costs to the private sector for prescribed medicines and laboratory tests. However, for emergency inpatient care of NCDs and for some illnesses such as cancer, most patients have to rely on the public sector. Treatment of cancer and acute myocardial infarction is predominantly publicly financed, while expenditures on chronic NCDs, such as diabetes, asthma, and other types of IHD, are predominantly privately financed.

Figure 5.1 Expenditures on major NCDs, by public and private sources (%), Sri Lanka, 2005

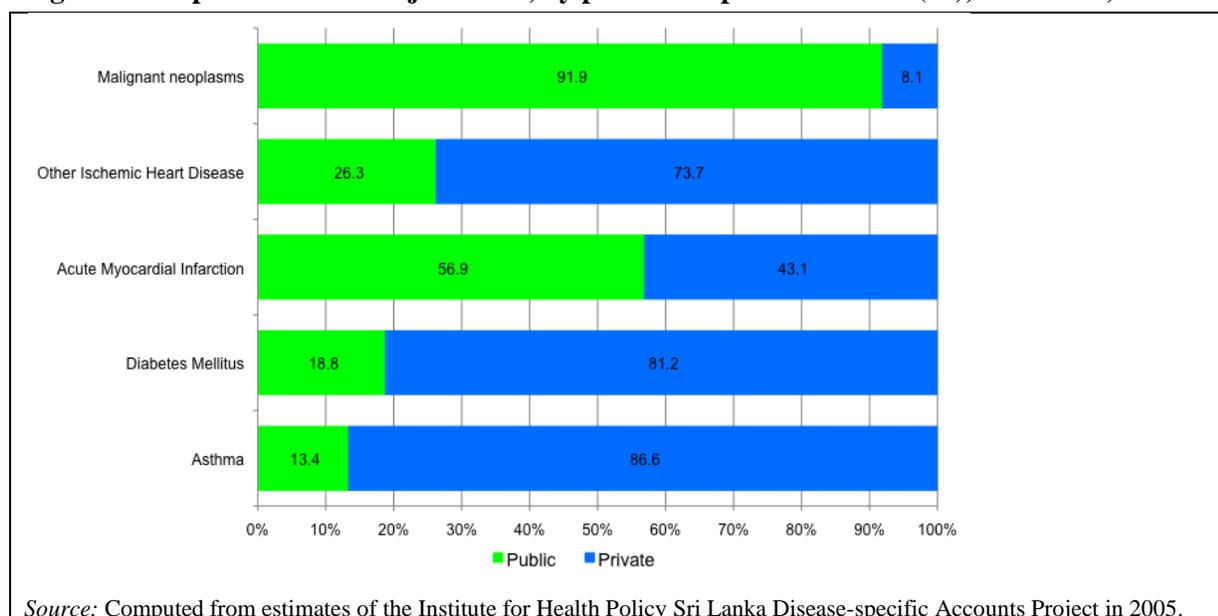
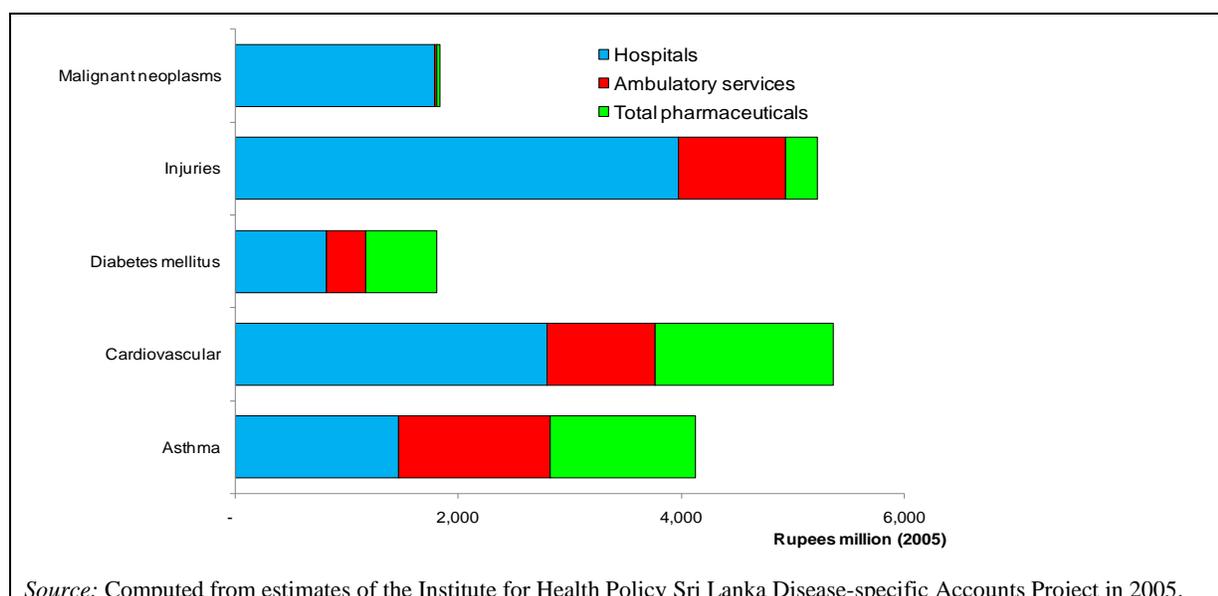


Figure 5.2 shows how spending on selected NCDs is distributed by type of services and goods. For those NCDs where private financing is predominant (diabetes, CVD, and asthma), a large proportion of spending is for medicines and for ambulatory care services because patients must largely finance these costs themselves. These findings point to public sector underfinancing of medicines in ambulatory care for NCDs. (As this is an important —though not the only—issue, the next section examines it in greater detail.)

These findings have been confirmed through in-depth interviews and focus group discussions conducted in four Sri Lankan districts investigating the care-seeking behaviors of persons with diabetes from households at different income levels (Perera et al., 2007). In addition, these visits to clinics with the capacity for diagnosis and management of diabetes, are often far from their communities. This implies that clinic visits also incurred losses in income from missed work. The need for frequent visits also creates repeated costs. Many patients, especially those from low-income, rural households, may not be able to maintain their management regimen, and their condition deteriorated. These findings suggest that existing facilities that are closer should have diagnostic and management capacity and that financial support for the poor is required to prevent their foregoing preventive and curative care.

Figure 5.2 Expenditure on major NCDs, by major spending areas (%), Sri Lanka, 2005



Financing of Medicines

Overview

The pharmaceutical sector is heavily dependent on imports with only 14 percent of needs met by local manufacturers. Almost all imports by the private sector are channeled to retail pharmacies, private hospitals, and physicians (general practitioners) through wholesale distributors. MOH hospitals also purchase urgently required drugs from private sector importers. All drugs necessary for treatment of NCD patients are imported.

The State Pharmaceutical Corporation purchases drugs both for the private and public sector through a tender procedure. The private sector also imports directly from the manufacturers under individual import licenses issued by the Import Control Department. The private sector imports drugs under brand names, while the government, as far as possible, restricts imports to generic names. The share of the government health budget spent on medicines and supplies for outpatient and hospital use is about 18.7 percent (2006). The total pharmaceutical market for outpatient medicines is currently estimated to be nearly SLR16 billion, which accounts for per capita consumption of medicines of roughly SLR800 a year.

In the public sector, all drugs issued to both inpatients and outpatients are free of charge. However, health care facilities routinely ask patients to purchase their own medicines and supplies from private suppliers when these are not in stock. Although in the private sector there is no price control, all importers adhere to a formula agreed with the government in pricing drugs to the consumer.

Patients' actual needs for NCD drugs and available public financial resources to purchase them have to be considered in light of three important points. The first is that the Sri Lankan public sector operates a highly cost-efficient procurement mechanism for medicines, making extensive use of global tendering and generic and bulk purchasing. Consequently, the average price paid by the public sector for most medicines is substantially lower than in other countries, and the volume of medicines purchased with the government budget is greater than it would otherwise be. Second, there is an implicit recognition that the public sector cannot afford to stock all medicines needed all the time, and an official policy of transparency requires institutions to inform public sector patients when medicines are unavailable, so that they know when they need to purchase them themselves.

The third point is the prioritization by the MOH of what medicines it buys with its budget. In recent years, the budgetary allocation has provided for three-quarters of the stocks of medicines requested by government medical institutions.¹⁹ The initial requests for medicine supply are generated each year by institutions, and then collated and transmitted upward to formulate an overall estimate of national needs. The Medical Supplies Division then decides what medicines to purchase, taking into account the actual budget allocations. This rationing process involves internal deliberation, where vital medicines are the highest priority, followed by essential medicines. The lowest priority is for non essential drugs. In practice, purchases of medicines for treatment of acute and life-threatening illnesses are prioritized, while purchases of medicines for chronic NCDs tend to be given lower priority. This favors medicines for conditions such as injuries and acute NCD events, including acute myocardial infarction, but results in underpurchasing of medicines for long-term treatment of NCDs. In recent years, there has been an increasing demand from institutions for NCD drugs, particularly for heart disease, but this has only been partly reflected in increased purchases.

Financing Medicines for NCDs

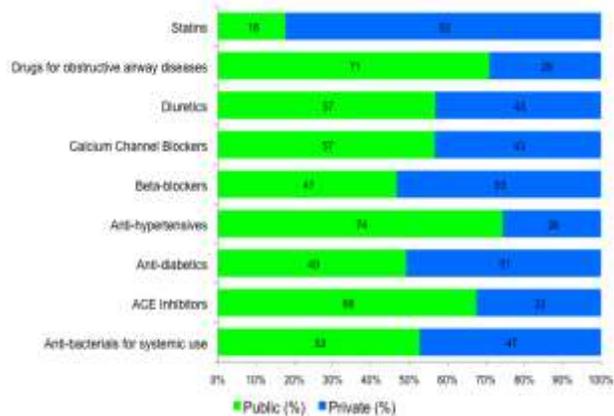
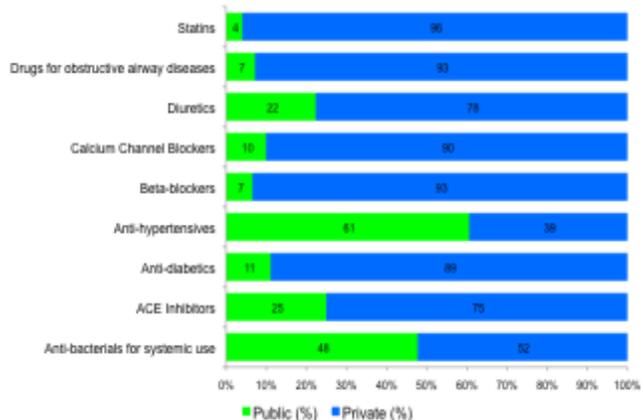
Appropriate use of drugs for diseases such as asthma, IHD, and diabetes can substantially cut mortality rates, and reduce levels of disability and illness. Sri Lanka has reduced its overall mortality rates to levels close to those in developed economies, but has done less well in reducing mortality rates from NCDs that are amenable to treatment. A major concern of any NCD policy in Sri Lanka must therefore be to ensure that the population has access to and makes use of adequate quantities of cost-effective NCD medicines.

Figure 5.3 presents a profile of the pattern of financing and supply of selected NCD medicines in Sri Lanka in 2008. This is based on analysis of the purchases of the Medical Supplies Division (responsible for more than 95 percent of all public sector purchases), and of data provided by IMS-Health (Sri Lanka) on the volume and cost at wholesale price of medicines supplied through pharmacies, which account for 85 percent of total private sector distribution. The volumes of medicines distributed in public and private sectors are compared after converting all quantities into defined daily dose units, as defined by WHO (WHO Collaborating Centre for Drug Statistics Methodology, 2008). To provide a comparison with non-NCD medicines, statistics for antibacterial drugs are provided.

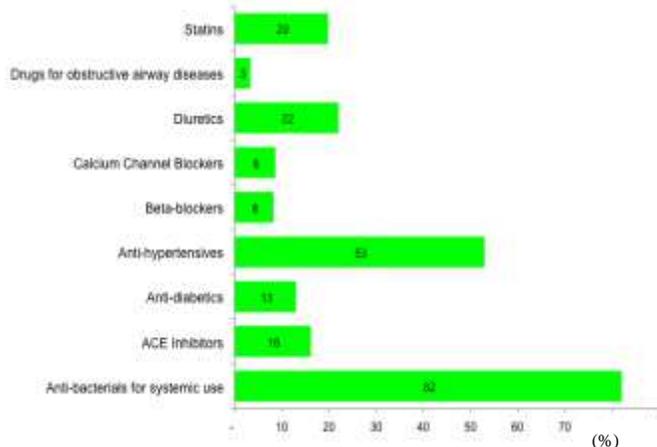
¹⁹ Institute for Health Policy personal communication from Director, Medical Supplies, MOH, November 2009.

Figure 5.3 Analysis of financing and supply of NCD medicines by public and private sectors and funding gap, Sri Lanka 2008

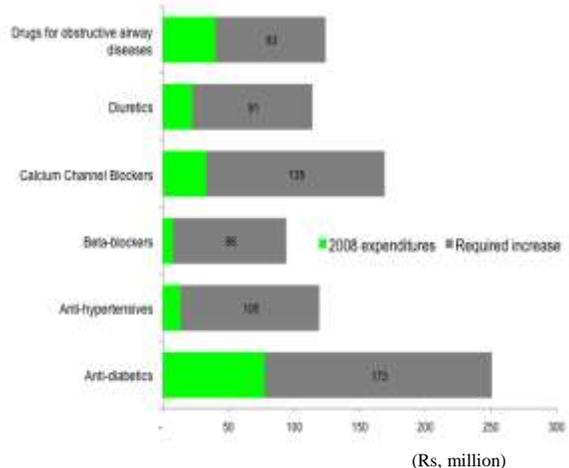
Share of expenditures on selected medicines by source (%) **Share of volumes of selected medicines financed by source (%)**



Ratio of public to private sector unit wholesale prices for selected medicines (%)



Cost to increase MOH supply to 80% of OECD median level (SLR million)



Source: Sri Lanka for 2008 from MOH and IMS-Health (Sri Lanka), and OECD countries for 2006 from OECD Health Data 2008.

For most medicine classes, public sector expenditures are only a small fraction of those in the private sector (top-left panel). For beta-blockers, calcium channel blockers, and antidiabetic agents, for example, private spending is more than four times public spending. However, in terms of volume of supply (top-right panel), the public sector accounts for half, or more, of actual consumption, with the exception of statins. Extensive use of bulk purchasing and competitive tendering ensures that MOH purchases most medicines at less than half the price paid by the private sector.

The bottom-left panel of Figure 5.3 shows the ratio of public to private prices for selected medicines. For most NCD classes, the public sector purchases at prices ranging from half to one tenth of wholesale prices in the private sector. Its ability to purchase at far lower prices than the private sector means that for many NCD medicines, if the public sector was to expand its purchasing, it could reach OECD levels of supply while still spending less than current combined public and private spending. OECD levels can be considered a reasonable indication of what is appropriate for Sri Lanka, given comparable levels of NCDs.

The bottom-right panel of Figure 5.3 illustrates this point. It shows the additional cost to the government of increasing public provision of NCD medicines to raise the overall volume of public sector supply to 80 percent of the median level in OECD economies. This assumes that the public sector can purchase the additional medicines at the same average price as current stocks, which is a reasonable assumption given that increased MOH purchasing can only enhance its ability to negotiate prices. The increases implied are either significantly less than or comparable to current private expenditures for most medicine classes: SLR86 million versus SLR113 million for beta-blockers; SLR91 million versus SLR79 million for diuretics; SLR173 million versus SLR619 million for antidiabetics; and SLR83 million versus SLR514 million for drugs to treat obstructive airways disease and asthma. The only drug class for which the increased public cost would be substantially greater than current private spending would be statins, where the SLR2 billion increase required is four times current private spending.

These calculations imply that to raise supply levels of these essential NCD medicines, excluding statins—namely, antidiabetics, antihypertensives, beta-blockers, calcium channel blockers, diuretics and drugs for obstructive airways disease and asthma—to OECD levels would come to less than SLR700 million, or US\$7 million a year. In 2008, this would have represented less than 1 percent of total public sector health expenditures of more than SLR72 billion.²⁰ However, procurement costs of medicines are only part of the costs. Overheads (storage and management) and transportation costs, which can all be substantial, also need to be considered.

Such a move assumes that public financing is needed to raise overall consumption levels of these medicines to more desirable levels with better supplies in public facilities and/or expanding the sale of these medicines at low prices through government owned or subsidized pharmacies. However, this is a logical inference given the experience of OECD countries. There, the evidence shows that the levels of public financing or reimbursement by public insurance schemes have major impacts on the overall level of use of essential heart disease drugs (Dickson and Jacobzone, 2003).

²⁰ To put this into perspective, the cost compares well with other important public expenditure priorities in 2008, such as the average cost of building 2 kilometers of the Southern Express Highway, which was SLR1,200 million.

Chapter 6: Prevention and Control Strategies from Developed Countries and their Potential Impact in Sri Lanka

Key Messages

- Most NCDs can be controlled, but not cured, and require lifelong treatment.
- About half the decline in cardiovascular mortality in developed countries from the 1950s to the 1970s was attributed to changes in population-level cardiovascular risk factors (such as lower tobacco use) and half to treatment of chronic NCDs and their complications (with most of the treatment effect due to drug use).
- Developed countries provide an evidence base for CVD reduction at both the population level by reducing tobacco use and improving diet (salt, trans fats, and saturated fats) and at primary care level by treatment of conditions with drugs (for example, hypertension and cholesterol).
- NCDs have emerged as a major health issue in developing countries. The focus was and remains on prevention strategies involving predominantly health promotion and primary prevention through population-level risk factor reduction. But the revolution in low-cost medical therapies for NCDs, in particular for CVD, suggests that developing countries should now consider both sets of strategies.
- Simulations of policy option scenarios for CVD in Sri Lanka indicate that population-based risk factor reduction and clinic-based interventions (with drugs), using a total cardiovascular risk approach with treatment thresholds based on CVD risk, can substantially reduce mortality.
- High-income countries have developed several service delivery models for NCDs that focus on efficiently providing primary care. The structures and costs of the different models are very country specific and depend on existing health system structure, incentives, and traditions. Still, common lessons have emerged.
- Selected middle-income countries in the region have service delivery models that include well-developed primary health care components.

Developed-country Experiences

Population aging and the increased prevalence of NCDs present new challenges. Two features are at the heart of this issue. First, most NCDs are the result of accumulated exposure to risk factors over a lifetime, and modern medical knowledge can only control them, not cure them. The second is that increased incidence of chronic NCDs with age means that the numbers and proportion of the population living with these conditions will increase. Consequently, in contrast to many infectious diseases, a very large proportion of the population may eventually be living with chronic NCDs at any given time.

As noted in Chapter 1, developed countries during the second half of the 20th century saw a major decline in CVD mortality. Several analyses of these developed-country trends have found that about half the reduction can be attributed to population-level changes in cardiovascular risk factors, such as from lower tobacco use and more favorable dietary intake and physical activity, and about half to treatment of chronic NCDs and their complications (Moïse, 2003; Cutler et al., 2005; Ford et al., 2007). This decline

in cardiovascular mortality is especially important because CVD accounts for the largest share and more than half of overall NCD mortality, and an even greater share of the observed reductions in NCD mortality. It may also explain more than half of all the declines in older adult disability ratios that have occurred in these same countries (World Bank, 2008).

In past decades as NCDs have emerged as a leading health issue in developing countries, the focus has been on prevention strategies involving predominantly health promotion and primary prevention through population-level risk factor reduction. This is still the case. However, the revolution in low-cost medical therapies for NCDs, in particular for CVD, in the past three decades suggests that developing countries should now consider both sets of strategies. This, in fact, is the strong recommendation of WHO (2008b), based on global evidence and multiple expert reviews.

CVD, Diabetes, Asthma, and Common Cancers

As said, this report focuses most of its attention on CVD, diabetes, and asthma, and to a lesser extent cancer, and their risk factors, because the burden from them is large and the evidence base to reduce their impact tends to be stronger than for other NCDs.

CVD

There are four major types of intervention available to prevent and reduce CVD morbidity and mortality: smoking cessation; other preventive health and health promotion activities; treatment-based secondary prevention; and hospital treatment of advanced disease, including surgical interventions. (Appendix 9 details several interventions and their cost effectiveness—which for most of them is highly favorable.)

Of these four interventions, smoking cessation is the single most effective intervention, and success in reducing smoking has been the most important reason for the decline in CVD in developed countries. Tobacco control strategies include taxation, which is highly effective in reducing consumption, in conjunction with advertising bans, health information, warning labels, smoking restrictions, and control of smuggling. Through the use of tobacco taxation and other restrictions on the sale, advertising, and consumption of tobacco, Sri Lanka has already made solid gains compared with other countries in the region.

Other preventive health and health promotion activities include salt-intake reduction efforts. These use public awareness campaigns in conjunction with legislation to reduce the salt content of manufactured foods. Trans fat and saturated fat intake-reduction efforts use similar methods, and aim to eliminate trans fats, lower saturated fats, and increase unsaturated (that is, healthier) fats in manufactured foods. Low- and middle-income countries have had some success in improving dietary oil consumption. In Mauritius, an NCD prevention program that started in 1987 promoted health lifestyles. In addition, between 1987 and 1992, the government changed the composition of the universally used cooking oil from 75–100 percent palm oil, which is high in saturated fat, to 100 percent soya bean oil, which is high in unsaturated fats (Uusitalo et al., 1996). A population-based follow-up survey in 1992 found cholesterol concentrations dropped significantly in both men and women (0.79 mmol and 0.82 mmol, respectively), and that dietary changes accounted for most the impact.

Another important example in this vein, but this time concerning consumption of dietary oils, can be taken from Poland (Zatonski and Willett, 2005). In 1960 mortality from circulatory disease was high, and IHD roughly doubled through 1991. Since 1991, however, the fall in IHD was larger than that observed in any other country during peace time. During the rapid devolution of the Soviet Union in the late 1980s the change in fat consumption was large due to the move to a market economy. A dramatic shift occurred, from animal sources that were previously subsidized and high in saturated fats to vegetable fats with more unsaturated fats. The roles of several changes during this period, including availability of foods and alcohol, smoking prevalence, socioeconomic indicators, and access to medical care, were carefully examined. Of these, the more healthy dietary fats and greater fresh fruit intake were the most likely candidates to account for these positive changes.

Introducing food policy to change from harmful to healthier fats can be challenging. A recent study investigated the barriers and opportunities for trans-fat policy development in low- and middle-income countries (Perez-Ferrer et al., 2010). It showed that more trans fat policies have been implemented in developed countries. Voluntary reductions by the food industry, following labeling and/or consumer lobbying, has been tried by several developing countries with varying degrees of success, leading to major differences in formulation among developing countries. Developed countries have moved to mandatory approaches. Common factors for successful trans fat reduction include increased consumer and political awareness of the harmful health effects of trans fats and advocacy by consumer organizations.

For clinical-based treatment of CVD, several classes of medicines are now recommended as standard for patients or those at high risk of developing the disease. Such an essential package includes aspirin, beta-blockers, other antihypertensives (such as ACE inhibitors or calcium channel blockers), and statins for reducing LDL-cholesterol. These are part of the Package of Essential NCD (PEN) primary care interventions for CVD (noted in Chapter 3).

Hospital treatment of advanced disease, including surgical interventions, tends to be expensive and less accessible for most people, limiting their population impact. In addition, their cost-effectiveness can be very unfavorable.

Diabetes

A much increased understanding of prevention and control strategies for diabetes has been gained over the last few decades. Exercise and diet interventions, similar to those important for reducing CVD, can prevent or delay development of diabetes in high-risk groups (Narayan et al., 2006). Also, basic primary care interventions with continuity of care can prevent or delay the onset of complications. Finally, because diabetes also increases the risk for CVD, aggressive CVD risk-factor reduction (such as tobacco and hypertension control) is recommended.

Asthma

Substantial improvements in asthma treatment have resulted in declining mortality and ill health in the past two decades in developed countries. The reductions in asthma mortality have occurred despite an increasing prevalence of the disease in many of these countries. So effective has ambulatory treatment been in preventing the severe complications of asthma that hospital admissions and mortality from asthma are now regarded in OECD countries as indicators of failure in the health care system (OECD, 2007). Asthma now accounts for only a small share of overall mortality in these countries, and for a much larger share of averted mortality.

Common Cancers

Common cancers in men (oral and lung) can be prevented with tobacco control, while those among women (breast and cervical) can be detected early through primary care-based screening and then treated (Brown et al., 2006).

Impact of Health Promotion and Drugs on CVD

The potential benefits of expanding interventions for CVD can be explored by simulating policy scenarios and comparing their impact. Focusing on CVD is strategic for two reasons. First, as already noted, CVD accounts for a significant share of the recent reductions in NCD mortality in developed countries, which Sri Lanka has not yet matched. Second, the evidence base for treatment of CVD is the most developed of all the chronic NCDs, and uniquely allows for quantitative exploration of the impact of expanding treatment.

Taking advantage of globally available knowledge bases, the approach of Manuel et al. (2006) was used with data from the SLDCS (Katulanda et al., 2008) to simulate the impact of different lifestyle and drug interventions on CVD outcomes.

The SLDCS collected information on diabetes and CVD risk factors, including laboratory measurements of blood lipids and fasting glucose, electrocardiogram heart examination, and information on the drugs that respondents were taking for diabetes and heart disease (Katulanda et al., 2008). These data can help predict future CVD risk and mortality in the surveyed individuals using the Framingham cardiovascular risk prediction equation (Anderson et al., 1991).

This equation, which predicts future risk of coronary heart disease (CHD) morbidity and mortality, including stroke and stroke death, was applied to the adult Sri Lankan population (18–74 years). For this analysis, the focus was on CHD death. The future risk of CHD death at 10 years for each SLDCS respondent, under different intervention scenarios, was then simulated. In doing this, the assumption was that the whole population was screened according to the New Zealand CVD prevention guidelines (New Zealand Guidelines Group, 2003), which are comparable to the national guidelines used in most OECD countries. The intervention scenarios considered were:

- *Baseline scenario (counterfactual)*—no intervention was made, but individuals continue to take any drugs they are currently taking.
- *Population health strategy to reduce cholesterol by 2 percent*—lowering total cholesterol uniformly in the population by 2 percent, which is the mean reduction in cholesterol observed over 10 years in WHO’s 21-country MONICA study²¹ (Kuulasmaa et al., 2000; Tunstall-Pedoe et al., 2000).
- *Population health strategy to reduce cholesterol by 9 percent*—lowering total cholesterol uniformly in the population by 9 percent, which is the mean reduction in cholesterol observed in the top decile of country performances over 10 years in the 21-country MONICA study.
- *Single risk factor strategy*—screening the whole population, and treating everyone with total cholesterol concentration >8 mmol/l with a standard dose of statins.
- *Treatment of high individual risks with an antihypertensive*—screening the whole population, and treating everyone with a high risk (>15 percent at 10 years) of CVD, or anyone with blood pressure more than 170/100 mm Hg.
- *Treatment of high individual risks with a statin*—screening the whole population, and treating everyone with a high risk (>15 percent at 10 years) of CVD, or anyone with total cholesterol >8 mmol/l.
- *Treatment of high individual risks with two drugs*—screening the whole population, and treating everyone with a high risk (>15 percent at 10 years) of CVD with a combination of one antihypertensive and one statin.

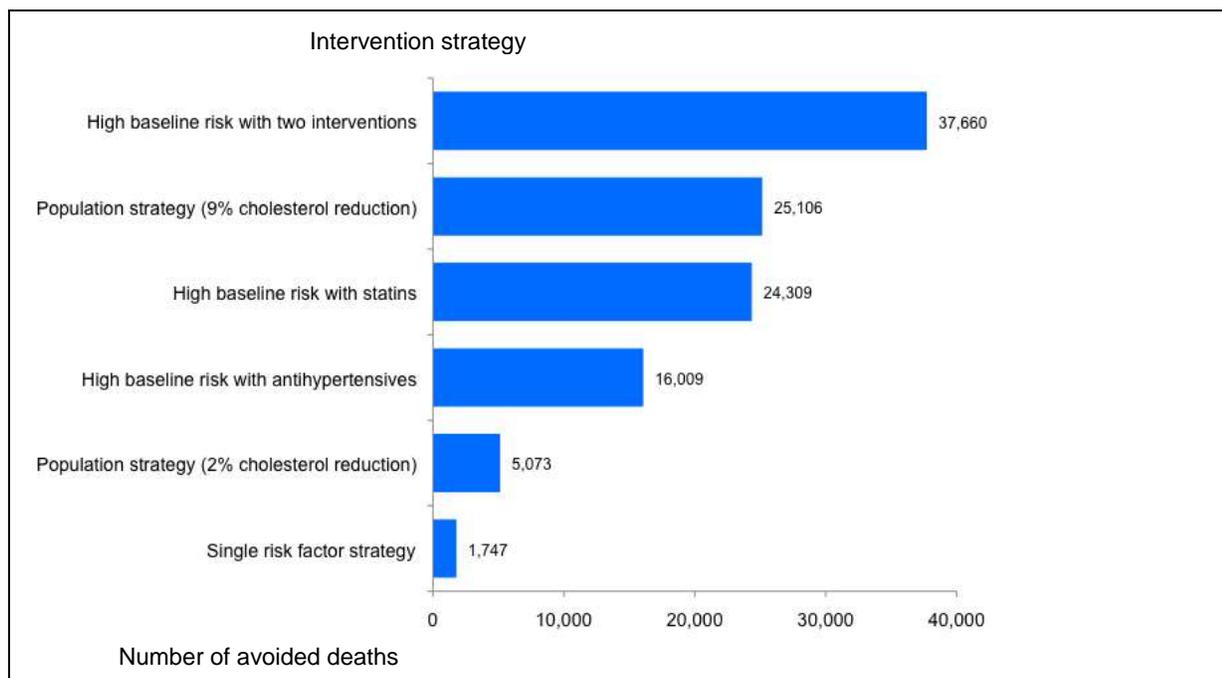
The impact of aspirin was not explicitly simulated, since the estimates of its impact on coronary heart disease death are not so clear, although it does have other CVD benefits.

In the baseline scenario, out of the 13.3 million Sri Lankans aged 18–74 years in 2005, an estimated 164,000 CHD deaths would occur after 10 years. In all the treatment scenarios, the model predicts a reduced number of deaths at 10 years. This is summarized in Figure 6.1. It shows that the 2 percent population cholesterol reduction strategy and the single risk factor treatment strategy will save the least numbers of lives—avoiding fewer than 6,000 deaths over 10 years. Treatment with one or two medicines saves substantially far more lives, ranging from 16,000 deaths avoided with the use of one

²¹ A study that has tracked population changes in cardiovascular risks and outcomes in a large number of mostly developed countries over several decades.

antihypertensive, to 38,000 lives with the use of both an antihypertensive and one statin. A population strategy that achieves a 9 percent reduction in population cholesterol would do almost as well as the use of just one statin, but this level of cholesterol reduction would be far better than what most countries achieved in the MONICA study.

Figure 6.1 Deaths avoided at 10 years under different intervention strategies for CHD, Sri Lankans 18–74 years



Source: Institute for Health Policy computations using the Framingham cardiovascular risk prediction equation and data from Katulanda et al. (2008).

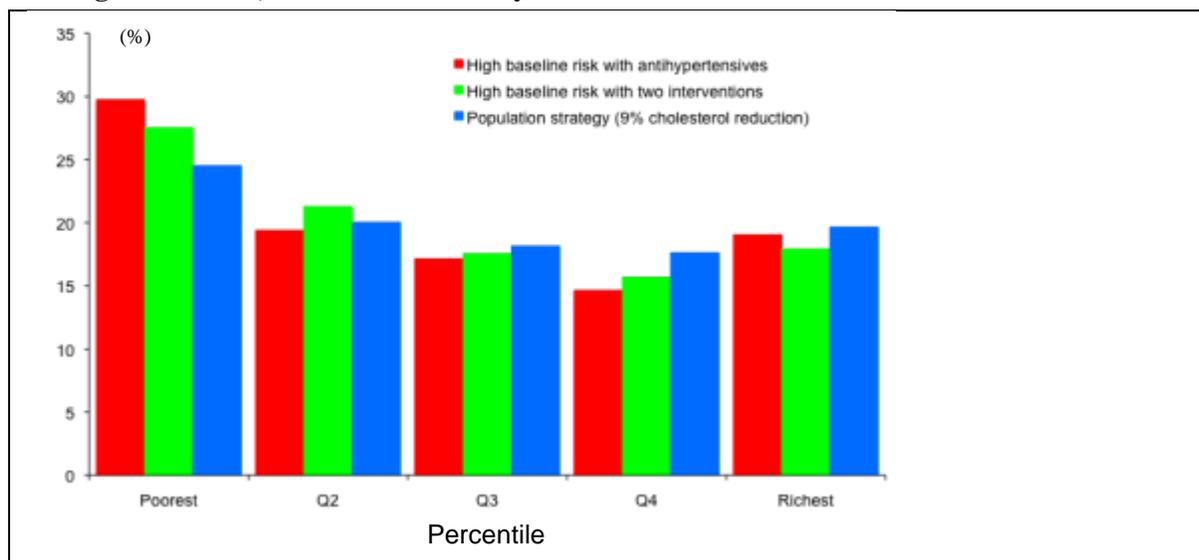
A reduction of 38,000 deaths (23 percent) over 10 years in CHD mortality with the use of just two drugs is substantial, and in combination with other measures is of the order of magnitude necessary to reduce Sri Lankan CHD mortality rates to the levels seen in OECD economies. These simulations indicate that increasing treatment of NCDs would allow Sri Lanka to close the gap with developed countries in adult mortality rates.

Expanding access to primary care-based treatments and implementing some population-level interventions would have a major impact on CVD in Sri Lanka, and should be a necessary component of any overall NCD strategy, supplementing other preventive health measures. Furthermore, the population-level strategy that has had the most impact in developed countries is reduction in smoking, which was not included in this simulation. Thus, in conjunction with gains in population-level risk factor reduction from lowering tobacco use and improvements in diet with salt reduction and lower trans fats and saturated fats, these gains might be larger.

The SLDCS also allows us to look at the distributional impact of the different strategies.

Figure 6.2 shows the number of avoided deaths by SES quintile in three strategies. These results indicate that primary care-based strategies using drugs will benefit the poorest quintile more than a population-based strategy that achieves a uniform 9 percent reduction in cholesterol. This comparison almost certainly understates the pro-poor advantage of treatment measures, since any population strategy will rely substantially on behavior change through health education, and global experience indicates that such measures will change behavior in the richest and most educated households the most.

Figure 6.2 Distribution of avoided deaths at 10 years by SES quintile under different intervention strategies for CHD, Sri Lankans 18–74 years



Source: Institute for Health Policy computations using the Framingham cardiovascular risk prediction equation and data from Katulanda et al. (2008).

So, how much would it cost to expand access to essential medicines for treatment of CVD and thereby save a substantial numbers of lives? It is not feasible to estimate the cost of the delivery system, since almost certainly the current system may be evolving (see next section). However, the cost of the additional medicines can be estimated. In all the treatment strategies modeled above, the share of the adult population that would need to be prescribed new medicines ranges from 9 percent to 11 percent, or about 1.3 million people.

In 2008, the price of purchasing a single standard dose of an antihypertensive ranged from SLR0.18 to SLR1.1, depending on the medicine class, and the price of one dose of a statin was just SLR1.02. At these costs, it would cost just SLR1.5 a day to purchase one antihypertensive and one statin for each individual who needed them. This would come to less than SLR700 million a year (less than 2 percent of government health expenditures). These cost estimates indicate that the cost of purchasing these drugs will not be the principal barrier to expanding access. In practice, however, the costs are likely to be lower, since it is unrealistic to expect that, even with the best primary care system, all those who need drugs will be identified and treated.

Service Delivery Models for Primary Care in High- and Middle-income Countries

High-income Countries

Most health systems, including Sri Lanka's, are developed to treat and manage acute illnesses with definite end-points, and so are organized around an episodic, acute-care model. This approach is not suitable for managing the problems of chronic NCD patients, who require prolonged and coordinated management by health care professionals who have ready access not only to essential medicines, but also to appropriate screening and monitoring equipment, in addition to possessing counseling skills.

As a consequence of this service delivery model, health systems in developed countries have responded to the emergence of NCDs by evolving new organizational arrangements. In so doing, most of these

countries have benefited from being able to build on an organized system of primary care where treatment is led by primary-care physicians, who are expected to provide care on a routine and sustained basis to patients within the community. Even with this, most developed countries have still had to develop new models of care to cope with the challenges of managing chronic NCD patients.

There is, in short, no universal model that countries are using to manage chronic NCDs. Rather, each country's model reflects the characteristics of its health system, in terms of governance mechanisms and the relationships between, and responsibilities of, different stakeholders in the regulation, funding, and delivery of health care. Nevertheless, recent reviews have identified some common patterns in the approaches adopted by developed countries for managing chronic NCDs (Nolte et al., 2009; Nolte and McKee, 2008), and these have important lessons for Sri Lanka. Some of these lessons are now summarized.

The most coordinated response has been in developed countries where multi-professional teams of physicians, nurses, and other health professionals were already responsible for delivering primary care, including most routine curative care, and where patients are registered with a specific primary care facility. In these countries, health care personnel at the primary level play the dominant role in managing NCDs and other chronic diseases. However, in all these cases, health care provision at the primary care level is closely coordinated and integrated with the delivery of hospital and secondary care services.

These countries have witnessed a progressively larger role for nurses in managing many chronic diseases, commonly taking the form of nurse-led clinics, discharge planning, and/or case management. This has been the case in Sweden (where such clinics are extensive) and the United Kingdom (less so), and more recently, the Netherlands. In Sweden nurse-led clinics are now common at primary health care centers and in hospital polyclinics. They manage diabetes and hypertension, with some also managing allergy/asthma/COPD, psychiatric disorders, and heart failure.

Given differences in professional roles within Europe, it is evident that caution is required in applying this model elsewhere (even in Europe). In England, while nursing staff make an increasing contribution, general practitioners have been entrusted with the lead role, but working with larger primary care teams employing both nurses and other health care professionals. Through the use of a national performance framework, which pays general practitioners according to quality of care and health outcomes, primary care physicians are being incentivized to expand and improve the quality of care provided to NCD patients. However, the feasibility of such incentivization depends on the high degree of computerization in primary care in the United Kingdom, and on a tradition of independent but highly administered general practitioners who are financed from public funds.

In other developed countries, such as Canada, France, and Germany, there is usually more of a history of separation between primary care and hospital sectors, and patients have often had free choice of both family practitioners and clinic-based specialists. Physicians are more likely to work as individual practitioners, and national responses have focused on introducing structured disease-management programs to improve the care given for selected diseases. In these three countries, there has been more concern about the lack of coordination and continuity of care, both in the outpatient and inpatient settings. Governments have often attempted to address this issue by encouraging or developing coordination mechanisms between providers, including provider networks, but many of these initiatives have been criticized for lacking an integrative vision. In all these countries, the tradition of primary care delivered by solo doctors, often with limited support staff, has made more difficult the development and implementation of new roles and competencies.

Another common finding in developed countries is that payment systems often hinder the delegation of tasks from doctors to other health professionals. A lack of appropriate incentives has also been identified as creating barriers to greater involvement by general practitioners in integrated approaches to care in Denmark and the Netherlands. In France, the payment of providers on a fee-for-service basis does not encourage improved coordination between physicians and nurses.

As Busse and Mays (2008) note, those health systems with a tradition of patient choice of any provider, and little or no enrollment with particular providers paying for services episodically using fee-for-service payments as the predominant method of reimbursement, seem to face the greatest challenges in adapting their payment arrangements to provide effective chronic care. Such systems tend to discourage continuity of care or a population perspective. In contrast, systems with strong primary health care are more likely to give greater attention to the management of people with chronic conditions and to obtain better results.

Singapore, a high-income country in the region, provides useful lessons (Cheah, 2001). Chronic diseases present challenges that include readmissions for exacerbations of disease on long-term complications, the need for long-term follow-up and medications, and the importance of multidisciplinary clinical management. Lack of coordination among providers can lead, among other issues, to duplicated laboratory and radiological investigations, sporadic, unplanned patient education, and inconsistent care plans.

The Ministry of Health in Singapore has adopted a multipronged disease-management approach that includes a framework with the following main aims: identifying the chronic disease and defining the target population for a disease-management program; organizing a multidisciplinary team; defining the core components, treatment protocols, and evaluation methods; and measuring outcomes and aims toward continuous quality improvement. (Unfortunately, little information on the impact of this approach is yet available.)

Middle-income Countries

Much less is known about the performance of middle-income countries' models of care delivery. Both Thailand and Malaysia have service delivery models that include well-developed primary health care components, which in the past have, similar to Sri Lanka's, been the cornerstone for achieving infectious disease and maternal and child health successes.

In Thailand, chronic diseases are a growing and major health problem (Pagaiya and Noree, 2008). Heart disease hospitalization increased from 56.5 per 100,000 in 1985 to 691 per 100,000 in 2003. Similar trends are found for cancer and diabetes. The country's efforts to tackle chronic diseases led to a three-tiered system with subdistrict health centers, district hospitals, and general/regional hospitals. The rural health system comprises district hospitals and subdistrict health centers that serve the majority of the population. Subdistrict health centers are staffed by nurses and primary care workers. District hospitals serve as the essential link between the health centers and the upper-tier facilities by an effective referral system. Nurse and village health volunteer competency is a high priority and in 2007 nationwide retraining emphasized prevention, control, and screening for hypertension, cancer, and diabetes. The impact of these efforts has yet to be evaluated.

One key component of the Thai system has been the universal insurance coverage scheme introduced in 2001 to increase coverage and quality of care (Gottret et al., 2008). The main goals of the scheme were to increase accessibility, restructure financing, and improve quality of care. Other schemes have evolved and include the Civil Service Benefit Scheme for civil servants and dependents funded by tax revenue and fee for service; the Social Security Scheme, which is funded by employers, employees, and government; the Universal Coverage Scheme (the "30 Baht Scheme"), which covers preventive and curative care for 75 percent of the population and is financed exclusively by tax revenues; and a very small private health insurance scheme, which covers less than 2 percent of the population.

In Malaysia, policies and a focus on maternal and child health have resulted in commendable achievements of the key health indicators (maternal and infant mortality) and increase in life expectancy—similar to Sri Lanka's achievements (Table 1.2, above). Primary health care has been the thrust of health services since the Seventh Malaysia Plan in 1996 (Merican and Rohaizat, 2002). It is provided by both the public and private sectors, although the public sector is the larger source, accounting for 58.4 percent of total health expenditures in 2006. In the public sector, services are heavily subsidized

at minimal or no cost to patients and delivered by a team of doctors, paramedics, nurses, and support staff. In the private sector, clinics are run by solo providers or small groups and payment is mostly out of pocket. The data suggest that most people with chronic diseases receive their care from public facilities rather than private, although the data used to make this conclusion may not be fully representative of private clinics (Ramli et al., 2008). Systematic data from both public and private sectors are unavailable to examine morbidity patterns, resource utilization, and practice patterns.

In recent years, the Malaysian Ministry of Health has introduced policy changes pertaining to chronic disease management in primary care. However, the current primary care systems remains oriented toward acute, episodic care and maternal and child health. Several primary care-based studies find that a substantial proportion of the patients have not received effective therapy and that optimal disease control has not been achieved. For example, a national study on hypertension found that only 35 percent of patients were aware of their status; and of the 32 percent who were taking medicines, only 27 percent were under control (Rampal et al., 2008). Diabetes care is also a challenge. In an earlier study of the private primary care system, only 12 percent were receiving routine monitoring and more than 80 percent were not under good control (Mafauzy, 2005).

Several barriers have emerged, including a shortage of human resources, specifically family medicine specialists; lack of coordination between public and private sectors, leading to duplication of services and inefficiencies; absence of a developed information system (although an electronic clinical information system is being piloted); and chronic shortages of medicines.

Another source to which low- and middle-income countries can turn is WHO's *Innovative Care for Chronic Disease Framework*, designed in particular to be relevant to low- and middle-income countries (WHO, 2006). It organizes the evaluation along macro (policy and financing), meso (health care organization and community), and micro (patient and family) levels of the health care system. This framework is centered on a triad of partnerships between the patient, health care team, and community. This triad is placed in the background of organized and well-equipped health care teams and a positive policy environment. The model is comprehensive and seeks to provide high-quality care as well as continuity, while involving patients, health care teams, and communities, as well as policy makers. The guiding principles of the framework are evidence-base decision making, population focus, prevention focus, quality focus, integration, flexibility, and adaptability.

Implications for Sri Lanka

High-income countries have some understanding of each model's impact, but middle-income countries less so. Still, the Sri Lankan care delivery system has many common characteristics with those in middle-income countries. While the context and population are different, these examples reveal the elements for policy makers and others to consider when retooling the delivery system and present lessons on how these models can perform.

Among other things, the care model for Sri Lanka will need to be sensitive to the state's financing limits and patients' out-of-pocket expenses, particularly since patients already pay a lot for CVD, diabetes, and asthma care, especially—in relative terms—the poor. Thus financing should be considered carefully alongside the adoption of a new model, a subject to which we now turn.

Chapter 7: Policy Options and Actions

Key Messages

- The NCD burden will increase the need for long-term care among the elderly and affect labor-force participation among older working-age adults. Both these effects will have a significant impact, the former through higher costs of health care and the latter through productivity losses.
- Government expenditures on health—as a share in total health financing and as a share of total government expenditures—are less than expected for the country’s level of national income.
- Policy options for health financing include mobilizing greater resources for NCD prevention and control (from both public and private sources), establishing mechanisms for higher contributions from richer population groups, increasing efficiencies in the public sector, reducing costs in the private sector, and raising public financing of NCD drugs targeted to poorer segments of the population.
- Piloting social health insurance to cover catastrophic expenditures needs serious consideration.
- A strategic approach for tackling NCDs is to focus on selected diseases such as CVD, diabetes, asthma, and cancer, in view of their disease burden and availability of cost-effective interventions to address them that also include population-wide strategies to lower risk factors.
- An intensified national NCD control program with sufficient resources and authority to make it effective—working through existing systems and structures rather than being established as a vertical program—is an option for developing, organizing, and implementing national prevention and control policy.
- The current health services organization has separate preventive and curative care mechanisms (each with their own staff and facilities) and needs to align them in order to provide the spectrum of services required to mount an appropriate response to NCDs.
- Better efficiencies may be gained from increasing use of lower-level public facilities for NCD care and from refining after-hour hospital admission policies that encourage overutilization of inpatient services.
- More decentralization of health services may result in better coordination of care among different facility levels and allow the central MOH to focus on policy, governance, and regulation.
- Well-trained and competent health personnel will be needed, in adequate numbers and appropriate categories, and who are capable of treating, counseling, screening, and other preventive services with regard to NCDs.
- A national NCD surveillance system is required for strategic planning and for assessing progress with prevention and control efforts. It should cover behavioral risk factors, as well as NCD morbidity, mortality, health services utilization and quality of care, and special registries (among others, for cancer and injuries).
- Private sector health service delivery remains poorly understood and its outputs mostly uncharacterized, yet its contribution to provision of health care makes a strong argument for a more proactive policy of public–private engagement.

Future Implications of NCDs in Sri Lanka

Sri Lanka is facing an increasing burden from NCDs with high levels of morbidity and mortality relative to other low-income countries. This report has found that the current population-based prevention efforts in tobacco and other risk factor reduction could be bolstered, that the health system's capacity to provide integrated care for NCDs is limited, and that substantial underuse of medicines against NCDs is adversely impacting program effectiveness.

This growing NCD burden has broad negative implications for Sri Lanka's health and social systems, and for its economy. With population aging, the impacts of this burden will tend to get worse, placing increasing pressures on the country's health system, including the government's health budget. Furthermore, households are already bearing a sizable burden, with even public sector patients frequently having to purchase drugs and laboratory tests from the private sector. Such out-of-pocket expenditures threaten the poverty reduction achievements of the past, through their potentially impoverishing effect.

Looking beyond the health care system, this future burden may substantially increase the need for long-term care among the most elderly Sri Lankans. Recent medical research suggests that CVD may be an important cause of physical frailty in the elderly (Newman et al., 2006), and that future demand for long-term care will be closely linked to the numbers of the physically dependent elderly. As governments in developed countries have found in the past decade, once the need for such care becomes substantial, it may not be possible to depend solely on households and the private sector to finance it. In the long run, the costs of providing long-term care could end up with the public sector, and these costs will be substantial, being of the order of 2 percent or more of GDP (Huber et al., 2009). Such an increased cost on the public exchequer is even more likely in the Sri Lankan context, where there is a strong tradition of the state bearing social costs.

A growing NCD burden will also have broader economic costs through its impact on the labor force and productivity. Apart from the mortality caused by NCDs, the disability and consequent loss of productive workdays would be significant, especially given the chronic nature of these diseases. Moreover in Sri Lanka, chronic illness has been reported as the leading cause for older working-age adults to retire from work (World Bank, 2008).

The financing of retirement incomes is undoubtedly an important long-term macroeconomic challenge in view of the rapidly aging population. As developed countries have come to accept in the past few years, a key policy for managing this challenge will be to encourage people to work longer and retire later: developed nations are increasing retirement age to as high as 67 or 70 years. However in Sri Lanka, such a policy is unlikely to be feasible when so many workers in their 40s and 50s are either becoming chronically sick from NCDs or are dying prematurely.

Ensuring that people live healthier lives and work longer will be central to managing the challenges of pensions and retirement income financing. Even in the absence of a policy to increase the retirement age (which is currently somewhat controversial in view of concerns about the potential for youth unemployment), the NCD burden in the aging population will add significantly to the costs to be borne by the productive population.

Policy Options and Actions: Overview

In this section, strategic options and actions are presented for consideration by the government of Sri Lanka to respond effectively to NCDs (and see Appendix 10). Some options are in the domain of policy, while others are programmatic and operational in nature. The actions are based on, and should be read together with, the evidence, findings, and analyses presented in earlier chapters. These options are primarily aimed at prevention and control of chronic NCDs with, as always in this report, a focus on CVD, diabetes, asthma/COPD, and, to a lesser extent, cancers.

To avoid the NCD program becoming a vertical “single-purpose” intervention with its own structures, it is important that it be firmly embedded within the framework of the health system, using and building on existing structures. Therefore, some policy options and actions are broader in scope than others, and systemic in nature. Strengthening the health sector to address chronic NCDs may also have positive spin-off effects that will improve the infrastructure and capacity for prevention and control of other conditions as well.

Addressing NCDs warrants strong and concerted action on the part of nonhealth sectors as well. As most NCDs have important social determinants—causative or risk-enhancing factors—the solution often lies outside the health sector when it comes to prevention, especially in terms of broader population-level interventions. Trade policies, educational programs, legislative and regulatory measures, and environmental approaches are just some of the necessary actions.

Financing

Increasing Financial Resources for NCD Prevention and Control

Some of the factors that will drive increased future health expenditures in general and NCD interventions in particular are:

- The NCD burden in Sri Lanka, which is already at a level comparable to that of developed countries, is set to increase further as the demographic and epidemiologic transitions progress further.
- Current system capacity needs significant strengthening to meet the growing NCD burden.
- The population expects the government to ensure the provision of high-quality curative care services through the public sector delivery system, free at the point of delivery, and these expectations will only rise as Sri Lanka’s economic status improves.
- The cost of addressing the NCD challenges will be much higher than that of infectious diseases and maternal and child health issues.
- For its level of income, health spending in Sri Lanka is still at the lower end of the international spectrum. Within this overall low spending, out-of-pocket expenditures, especially for drugs and laboratory investigations, constitute a relatively high proportion.
- Government expenditures on health—as a share in total health financing and as a share of total government expenditures—are less than expected for the country’s level of national income.

Population-level risk factor reduction efforts will also increase resource needs. Such efforts will need to be financed from public funds as they deliver public goods and/or positive externalities. Equity arguments, efficiency concerns, and risk protection, as well as the strong social welfare culture in Sri Lanka, argue for increased public spending for coverage of curative services as well. The feasibility of sustainably increasing public spending on health care needs careful assessment of the medium- to long-term strains on fiscal space. Such examinations should take into account that the current low level of tax revenue, as a percentage of GDP, and recent developments that have resulted in relaxation of fiscal constraints, such as the end of the civil conflict.

Evidence shows that the NCD burden is not exclusively among the richer population. Further, evidence from other countries indicates that over time the burden of NCDs will shift to the poor. If public funds are inadequate, government may need to consider policies to protect the poor segment of the populations.

A major objective would be to develop mechanisms that reduce out-of-pocket expenses by the poor. How this can be accomplished is a complex question; some new analysis on the benefits publicly financed and provided services will help develop a good evidence base for policy development.

At present in the Sri Lankan health sector, around 90–95 percent of inpatient care is financed and provided by the public sector, while about 50 percent of ambulatory care is financed and provided by the private sector. However, over 50 percent of the total health care spending is from private sources, largely from out-of-pocket spending (with a minimal presence of insurance mechanisms and some contribution from private employers). In other words, the half of total health spending that comes from the private sources covers about half the outpatient care and only 5–10 percent of the inpatient care.

This variance between private and public expenditure and services use may be explained by two main factors. First, the unit cost²² of care in the private sector is higher than that in the public sector. Though intuitively expected, this is not a given. In some countries there is evidence to show that inefficiencies and system losses in the public sector can more than offset the profits made by the private sector, making private provision more cost-efficient even for publicly financed services. Evidence for Sri Lanka finds that public provision and financing has been highly effective at low costs, although efficiency gains may still be possible.²³ Second, the overall volume of outpatient care is higher than that of inpatient care. In 2008, there were 4.9 million episodes for inpatients while roughly 63 million episodes of illness were treated as outpatients or clinic patients (Table 4.4, above). With private inpatient care unaffordable to the majority of the population, there is a selective utilization pattern, that is, more inpatient care from public sources, but significant private sector market share for ambulatory care (and related drugs and investigations), with the exception of the wealthiest, who can afford to get their inpatient care, too, from private hospitals.

It is important to recognize that resources have competing uses in general and specifically within the health system. NCD care has to compete with infectious diseases and emerging diseases. The fact is that infectious diseases have not been eradicated altogether and the government will continue to need significant resources for dealing with continuing, emerging, and reemerging diseases in this category. Rabies, dengue, leptospirosis, and influenza are just a few examples in Sri Lanka; additionally the threat of a future HIV epidemic cannot be ruled out. Even those diseases which are under control, such as malaria, will need resources for the maintenance of programs and interventions on a sustained basis. Maternal and child health services (which include a combination of infectious diseases and noncommunicable conditions) will need continued allocations. And beyond the selected set of NCDs considered by this report, significant resources will be needed to tackle other NCDs such as malnutrition, mental health, and injuries. Thus one needs to bear in mind the “double burden” of noncommunicable and infectious diseases when considering future resource allocations.

A financing policy option package for Sri Lanka should consider efforts to: mobilize greater resources for NCD control and prevention (from both public and private sources) which may require expanding public financing and/or exploring alternative sources; establish mechanisms for reducing out-of-pocket contributions from the poorer segments of the population; look for ways to increase efficiencies in the public sector, for example, bulk purchase negotiations by the government on behalf of the population; and ensure that additional allocation for NCD does not come at the expense of action to control infectious diseases or to provide maternal and child health services.

In summary, overall spending and public spending on health are relatively low in Sri Lanka. Public spending has not kept up with the needs and demands of the population, and out-of-pocket spending has been increasing as a share of total spending. NCDs will increase and accelerate the demands on the system, along with other factors that will push up future health care costs. The question to be asked at this time is: How will these needs be met? Raising tax revenues commensurate with the increasing demands

²² Unit cost of production is different from unit price (which is unit cost plus a margin). One usually refers to unit cost of production for the public sector (in the absence of any margin), but unit price for the private sector. Therefore any calculations that take the ratio of total spending to volume of output need to make note of such differences.

²³ Hsiao W, Li KT. A Preliminary assessment of Sri Lanka's health sector and steps forward. Cambridge, Massachusetts, USA, 2000.

might be the best way forward. However, in the context of consecutive years of budget deficits and a low revenue base, securing sources of financing other than taxes, may need to be considered to cope with future increases in health care costs.

Increasing Access to NCD Drugs, Especially for the Poor

The evidence presented in Chapter 4 indicates underutilization of essential drugs for NCD management in Sri Lanka. Examples (due to lack of availability, and/or lower prescription patterns) include beta-blockers, statins, ace inhibitors, and even aspirin. Such low availability has been found to be more acute at the primary care level than secondary and tertiary levels, at least partially contributing to the inappropriate use of higher-level facilities by patients who could have been managed at lower-level facilities. Chapter 4 also argued that to ensure adequate supply of essential NCD drugs, the most appropriate approach would be public sector procurement of these drugs, due to economies of scale.

Increasing the drug supply through public financing and/or procurement is a cost effective option. Since even patients visiting public providers have to pay for drugs mainly because care facilities routinely ask patients to self-purchase medicines and supplies from private suppliers when these are not in stock, providing these drugs at public facilities would reduce overall expenditures on these drugs. It may be financially feasible in Sri Lanka to increase the level of drugs to 80 percent of the utilization rates in OECD countries through public financing for two reasons. First, public sector unit prices for obtaining key NCD drugs are often a small fraction—even one-fourth—of those purchased through private sources. Second, the overall cost of these drugs is a relatively small fraction of total public spending on health. The cost of obtaining essential NCD medicines, excluding statins, would have represented less than 1 percent of total public sector health expenditures in 2008.

If the supply of drugs in the public sector remains inadequate, then the government may need to consider policies to protect poor segments of the population who may underutilize drugs because they cannot afford to pay for them out of pocket.

Addressing Social Determinants

The causal and risk-enhancing determinants of most NCDs include social factors. Educational status, income levels, gender constructs, peer pressures impinging on lifestyles (such as smoking, harmful alcohol use, unhealthy diet, and lack of exercise), occupational exposure to certain carcinogens, and environmental health are just some examples illustrating the importance of policies and actions in nonhealth sectors to any national efforts to prevent and control NCDs.

Successful prevention of NCDs therefore calls for well-coordinated intersectoral action, but such actions need to be initiated and led by the MOH. Institutional mechanisms need to be created to involve various nonhealth ministries in a multidisciplinary effort to address NCDs in Sri Lanka. Examples of ministries that need to be part of any such mechanism are Education, Social Services, Agriculture, Environment, Labor, Commerce, Law & Justice, Urban Development, Home Affairs (Police) and, of course, Finance and Planning.

The Education Ministry would have a valuable role in including important lifestyle-related education in the school and university curricula, so as to inculcate healthy behaviors from a young age. The Agriculture Ministry may well be helpful in developing and implementing appropriate policies for crop diversification and ensuring adequate supply of nutritious foods. The Ministry of Industry and Commerce, along with the Ministry of Law and Justice, will need to regulate the goods imported into the country, in terms of their health impact, as well as the advertisements targeted to NCD risk factors, such as smoking. The Environment Ministry would be critical in reducing the levels of particulate matter in the atmosphere that could be detrimental to health. The Ministry of Urban Development could help plan the cities in a manner that provides for many greener spaces. Together, these two ministries should develop and

implement policies for better urban air quality. The Ministry of Transportation could promote the use of public transportation by making it safer and more convenient, and the National Roads Authority could focus on road safety (to prevent injuries, which are acute NCDs).

As NCDs increase with age, and have important long-term care implications beyond medical treatment, there is a critical role for the Ministry of Social Services in developing services for the elderly, with special attention to those with NCDs. Currently, this ministry has an Elders' Secretariat and is managing a small program to take care of the older individuals who may not have the family support to look after them; these “elderly homes” need to be equipped with the necessary facilities to take care of those who are at a risk of or are suffering from NCDs.

Policies targeting workplaces with a view to making them conducive to healthy lifestyles should be developed and implemented. For instance, firms and offices employing more than a certain number of workers might provide exercise facilities. Those workplaces which offer canteen facilities could pay attention to the nutritious value of the diet provided. Workplaces can offer regular NCD screening and awareness-raising information services.

Finally, the MOH itself should design and implement effective communication campaigns aimed at changing population behaviors with respect to the major modifiable risk factors.

Strategic Focus

Prioritizing Focus on Specific NCDs

The evidence presented in earlier chapters argues the need to focus on a selected set of NCDs. A special focus on these problems, keeping in mind the disease burden as well as available cost-effective interventions to address them, is a strategic approach for consideration. What is proposed is an intensified (or special) program on selected NCDs, while dealing with other unmet needs in the areas of malnutrition, mental health, and injuries.

Such an intensified national NCD control program, rather than a broad-brush approach for all NCDs, would make sense, both from the point of view of effectiveness and affordability. Since certain risk factors are common to several NCDs, common risk-reduction strategies could help address multiple diseases. As the program matures, other NCDs could be added to its mandate.

Addressing Undernutrition as well as Overnutrition

While this report has emphasized the importance of dietary factors in reducing the risk of diabetes, hypertension, and CVD, its general focus has been on overnutrition and obesity, along with lack of exercise. However, recently, there has been a growing body of evidence that low birth weight and childhood undernutrition could increase the risk of NCDs at a later age (see *Fetal and Childhood Undernutrition and Epigenetic Determinants* in Chapter 2). Reducing childhood and maternal undernutrition is an unfinished agenda for Sri Lanka, in an otherwise impressive record of improvements in health status; therefore, appropriate policies and programs are urgently needed to achieve this goal. Community-based nutrition interventions are required, targeting the vulnerable population groups such as mothers and children in the tea estate sector and in certain rural districts. The targeting needs to be at the right age group of conception to 24 months, (generally described as the “window of opportunity” for nutrition interventions), and adopt a lifecycle approach (that is, include adolescent girls and lactating women). Such interventions need to focus on household-level behaviors related to eating, feeding, and caring.

At the other end of the spectrum, overweight and obesity are a growing public health problem, causing another sort of “double burden”. Both population-based and personal interventions aimed at improving dietary practices would be similar to those targeting other risky behaviors.

Organizational Structure

Creating an Intensified National NCD Program

There has been considerable debate about the central organizational arrangements for health in Sri Lanka. There is a director for NCD, but control of all the resources needed for NCD prevention or management is not vested in this position. Rather, the NCD Director has to work through other directors/departments (for example, Medical Services and Health Education Bureau) to make the NCD interventions effective and to ensure availability, quality, and access for NCD curative services. Similarly, to fulfill NCD information needs, the NCD Director relies on the Epidemiology Unit and the Management Information Systems Unit. Thus, the job is one of coordination rather than actual execution.

So, as NCDs are a growing part of the disease burden and the future of public health in Sri Lanka will be dominated by NCD issues, a policy option would be to consider elevating the NCD function to the level of Deputy Director-General (DDG), under whose supervision all the relevant functions would be located (that is, prevention, curative services, health education, and others). This is understandably a sensitive subject and there are strong opinions on both sides of the argument. While a better coordinated and stronger response to NCDs offers benefits, arguments against creating a dedicated DDG for NCDs include the following:

- The bulk of the caseload is already NCDs, such that much of the health system is caring for NCDs anyway. In that sense, the responsibility for NCD control and management is actually vested in the Director-General of Health Services, in reality, even higher than the proposed DDG level.
- Service delivery at primary and secondary levels is decentralized to provinces and districts, and the function of MOH is one of coordination and stewardship in any case.
- Functions of the Health Education Bureau and the Management Information Systems Unit, for example, need to remain as separate support functions and cannot be brought under a DDG for NCDs as they cater to infectious diseases as well.

How to resolve? One option is to create an intensified national NCD control program with sufficient resources and authority to make it effective. This program should work through existing systems and structures, rather than being developed as a vertical program.

The major activity of this program would be to assure engagement and ownership by all key stakeholders of the national policy and strategic plans for unintentional injuries and for chronic NCD prevention and management.²⁴ The program would also be tasked with implementing this policy. In addition, it would build on tobacco efforts, as well as lead and coordinate population-based prevention efforts (including those focusing on salt and harmful fat consumption, injuries, and mental health).

Strengthening and Reorganizing NCD Prevention and Curative Care Services

The emergence of NCDs as a major health care problem may need fundamental reorientation in the way that primary care is delivered in Sri Lanka. Primary health care comprises public and private services. The former include preventive services managed by medical officers of health and their teams, and a separate stream of curative services. The latter include private physicians who work independently of the public sector on a fee-for-service basis.

This organization of the health system is not well placed to deliver primary care for NCDs for the following reasons: preventive efforts such as individual counseling on diet, exercise, or smoking tends to be neglected by the purely curative-oriented providers, especially in the private sector; Medical Officer of Health unit activities on prevention are difficult to coordinate with the independent stream of curative

²⁴ Currently being finalized; see *Health Sector Organization and Capacity* in Chapter 3.

services; and private practitioners, being outside the purview of the public system, do not report data on patients seen by them, and are extremely difficult to regulate on quality.

Expansion and improvement of the curative services must be an integral component of a successful response to NCDs. Currently, with exception of the specialist clinics, the delivery system is not set up for providing organized, continuing care for NCD patients. Outpatient clinics have no system to ensure long-term follow-up management of NCD patients.

The curative care response to NCDs should prioritize the expansion of treatment with cheap and cost-effective drug treatment of NCDs, in particular for CVD. However, drug availability needs to be closely linked with service delivery system. Even if all NCD medicines were made available, the current primary care system probably lacks the capacity to assess patients adequately with the routine follow-up tests, provide long-term follow-up with appropriate calibration of treatment schedules, and coordinate with treatment of other chronic conditions. The use of specialist clinics based in higher-level hospitals makes expansion unlikely to be feasible with a specialist-led care model, and will require expansion of the primary care system, with specialists shifting their role to providing backup for more difficult cases, as well as supporting initial assessment of new patients.

A fundamental question about the health services organization is whether the separation of preventive and curative services (each with their own staff and facilities) is helpful in mounting an appropriate response to NCDs. The argument in favor of this separation is that it has served Sri Lanka very well thus far, with near 100 percent immunization coverage, high antenatal care services coverage, and other highly positive health indicators (Table 1.2, above). It is also feared that an integration of preventive and curative services could result in “medicalization” and perhaps the dilution of the preventive sector. However, the Medical Officer of Health system is also led by medical doctors, and the concern of medicalization is perhaps overblown. Moreover, in the case of NCDs the distinction between preventive and curative services is less marked than, for instance, in the case of vaccine-preventable diseases.

As explained in Chapter 3, primary and secondary prevention are represented by preventive and curative services, respectively. The current system places screening for NCDs under curative services (as investigative facilities are linked to curative facilities); but since periodic screening is to be done on “healthy” individuals it is difficult to attract them to the hospital, where only sick persons are supposed to go. Individual and family counseling on diet, exercise, or smoking is an important preventive step, which needs to be provided to already diagnosed patients, that is, linked to curative services. Similarly, the data for surveillance, which constitute an important piece of the prevention jigsaw, have to come from the curative sector. Much of the curative care can be provided in a community-based manner, for which the outreach network of the preventive sector is an asset.

While full integration of preventive and curative services is probably unrealistic in the current context of the Sri Lankan health system, undoubtedly there is a need to find ways of strong collaboration and coordination between prevention-oriented MOH units and the curative sector.

Policies therefore need to consider prevention in a comprehensive manner—not merely primary prevention, but secondary and tertiary prevention as well. Regardless of how secondary prevention is organized, there is a need for much greater emphasis on this service. Available evidence suggests that screening facilities are inadequate, especially at the primary care level. The key action in this regard would be to strengthen access to screening facilities. Location of improved screening facilities should follow the availability of diagnostic and treatment facilities, especially drugs that can keep risk factors like hypercholesterolemia and hypertension at bay (statins and antihypertensives). A key point is that screening will detect more cases and the system must have the capacity to effectively treat these new cases when added to the current case load.

Finally, continued treatment of NCD patients—beyond the early stages—is also important, to prevent sequelae and disabilities (tertiary prevention). For example, persons with diabetes need to keep their

blood sugar under control to avoid delayed wound-healing. Although diet and exercise continue to be important in such patients, drugs become indispensable. And while tertiary prevention will fall legitimately under curative services, the continuum between primary, secondary, and tertiary prevention (one that essentially encompasses curative care within the concept of prevention) has to be maintained. If the above view of such a continuum is accepted, there will be broader policy implications for how to organize health services in Sri Lanka.

Moving Services Closer to Clients, and Improving Efficiency

The population's clear preference for higher-level health facilities—not only for NCDs—results in underutilization of more peripheral health care units, causing inefficiencies and placing unnecessary strain on tertiary-level facilities, in turn risking their quality of services. Bed-occupancy rates of tertiary, secondary, and primary facilities show this difference quite clearly (Table 4.4, above).

Many of the patients treated at tertiary facilities could be managed at lower cost in a secondary or even primary facility. This would also be more convenient for the patients, if they see this benefit. The fact that they are willing to travel longer distances to tertiary facilities shows that the quality differential (perceived as well as real) is significant. Therefore, unless higher-quality care—perceived to be as good as what is offered in a tertiary hospital—is provided in secondary and primary facilities (and in the absence of an effective referral system or gate-keeping function of primary care providers), this trend cannot be reversed. Once the quality improvements are made, in terms of the availability of skills, equipment, and drugs, an education campaign needs to be launched to change care-seeking behaviors.

Additionally, anecdotal observations indicate that many inpatients could have been managed as outpatients or clinic patients (long-term ambulatory care, with periodic clinic visits for checkups, investigations, and drugs); this clearly has cost implications and results in systemic inefficiency. It is explained as a cultural phenomenon, where the population sees a hospital as a place to recuperate from illness, and not merely to get medical treatment. But since, clearly, the choice of being admitted to the hospital is not the patient's, the doctors who make the decision on admission to the ward and how long they need to stay there also seem to have a tendency to overuse the inpatient option. One study in the National Hospital found that 25 percent of those admitted were discharged within 24 hours (Delpachithra and Jayasinghe, 2001).

Added to this has been a policy that compels public sector hospitals to admit any patient who shows up after 4 pm (for overnight stay) regardless of the clinical need. This is being addressed by the introduction of emergency treatment units and preliminary care units, but these are not yet available in all facilities and the policy of compulsory admission for “after-hours patients” is still widely prevalent.

The issue of unnecessary admissions needs further careful analysis, to see whether the patients who are currently being admitted do need inpatient care from a medical standpoint, based on their diagnoses and severity of illness and on the type of treatment required. After such an analysis, a clear policy needs to be established on triaging outpatients before admission to the ward, a nationwide training program launched for doctors on appropriate practices with regard to inpatient admissions, and an education campaign initiated to effect appropriate attitudinal and behavioral changes among the population.

Further Decentralizing and Devolving Health Service delivery

Based on the 13th Amendment to the Constitution, Sri Lanka has already seen much decentralization of health services (Appendix 6). The central level is vested with stewardship functions, such as financing policy making, planning, coordination, monitoring and oversight, standard setting, guidelines development, and a few support functions such as human resources and pharmaceuticals. The provinces (and districts under them) are responsible for service delivery with the exception of tertiary (teaching) hospitals and a few selected secondary-level hospitals.

Though the current system functions relatively smoothly, there is general agreement that it does not have an effective referral system. Though such a lack has other dimensions than decentralization, a seamless referral system may be easier to achieve if all service delivery is decentralized, including tertiary hospitals. As medical education and its curricula are not under the MOH (it is under the Ministry of Higher Education), the logic of placing teaching hospitals under MOH is less clear. One argument in favor of central management of larger hospitals is that the provinces lack the resources for this function; in fact some of the hospitals decentralized to provincial control have been “recentralized” for this reason. But if a hospital transfer happens along with corresponding resource transfers and a strong program of capacity building, there is no reason why the fully decentralized system cannot work effectively.

Human Resources

Human Resource Development for NCD Prevention and Control

Putting more financial resources into NCD prevention and control is just the beginning. Unless spent efficiently and effectively on the right set of inputs, those additional finances will not yield the desired results. The first of those inputs would be well-trained and competent health personnel, in adequate numbers and appropriate categories. Such a workforce should be capable of treating NCDs with state-of-the-art techniques and of providing counseling, screening, and other preventive services. Thus a human resource needs assessment of current and future NCD effort would provide much-needed guidance for developing an appropriate strategy.

Medical, nursing, and other relevant curricula do currently include the various NCDs, but improvements could be made in terms of the latest knowledge and by emphasizing the commonalities of risk factors between several NCDs. Such a more integrated approach could result in preventive interventions that can deal with multiple conditions at the same time. In addition, the newly developed (2008) national clinical standards and guidelines²⁵ include many NCDs but these are yet to be applied in practice. This invaluable asset needs to be institutionalized by integration into training curricula; in-service training for current staff; and periodic updating and review to assure that the latest information is incorporated.

An aspect of NCD service provision that may need to be included explicitly in medical education and its curricula (and subsequent in-service training) is aligning the appropriate care level needed with patients and effective referral processes, so that care providers can make the right decisions on when and where to refer cases. Similarly, the proper triaging of patients before admission to the ward also warrants inclusion. Aside from greater emphasis on NCD management in the undergraduate medical, nursing, pharmacist, and other curricula, there is probably a case for increasing the training of specialists in relevant specialties, such as cardiology, endocrinology, and oncology.

Information Systems and Surveillance

Creating a National NCD Surveillance System

A national NCD surveillance system is needed. The major elements to be incorporated include behavior risk factors; NCD morbidity; mortality; health services utilization and quality of care (public and private sectors); special registries (for example, cancer and injuries); and the economic burden. In addition, as prevention efforts using nonhealth sector policies are developed and implemented (for example, taxation of tobacco, and reductions in salt and harmful fats in manufactured foods) surveillance of key indicators outside the health sector will be needed (again, related to cigarette consumption and salt and fat content in

²⁵ Ministry of Healthcare & Nutrition National Guidelines 2007.

manufactured foods). The current *National Policy and Strategic Framework for Prevention and Control of Chronic Non Communicable Diseases, 2009*, covers some of these elements.

Two WHO-developed STEPS behavior risk factor surveys have been conducted but currently no plans or resources are committed to build on these and expand them nationally. Options for the MOH that could be explored are to integrate elements of such a survey with other ongoing surveys at periodic intervals. Future surveys should also include the measurement of biological indicators, allowing clearer analyses of the links between risk factors and their impact on the human body. Policy based on such analyses should then be developed.

NCD morbidity data from both inpatient and outpatient services are limited. For public inpatients at all levels, although the diagnosis is recorded, individual data with demographic information and other characteristics are not. For public outpatients, neither diagnosis nor individual demographic information is collected in the returns. In addition, no data collection for private sector health service delivery is routinely conducted. Efforts to capture population-based morbidity and trends, such as with the SLDCS and the Ragama Risk Factor Study on NCDs, are needed, both to assess the disease burden and to present simulations of policy options (as was done for this report).

Mortality will continue to be an important element of surveillance and Sri Lanka has a comprehensive system in place, in contrast to many other developing countries. However, areas needing improvement include the accuracy of recording the cause of death; appropriate coding; and timeliness of data collection, collation, and analysis, and of report dissemination. Finally, as prevention efforts unfold, development of surveillance tools for outside the health sector should be tailored to track progress and evaluate impacts.

Public–Private Partnerships

Aligning Service Delivery

Sri Lanka aspires to providing universal access to free health care through the public sector for the entire population. In reality, private financing is substantial and increasing. The market share of private providers in the Sri Lankan health sector is significant (about 50 percent of ambulatory care and 10 percent of inpatient care), almost all of which is financed through out-of-pocket payments. Therefore, the private sector's contribution to both financing and provision of health care is significant. Moreover, given the rising cost of NCD care and the need for modern technology, there is an even stronger argument for a more proactive policy of public–private sector engagement to contain cost escalation. Alternatives to effectively mobilizing private financing should also be considered

Private sector service delivery remains poorly understood and its outputs mostly uncharacterized. Therefore, the first step in building a platform for effective public–private partnerships is to carry out a private health sector assessment so that public policy makers can understand the configuration of the clinics, clientele, costs, and quality of services delivered by private providers. The aim of public–private partnerships would be to leverage the private sector toward public policy goals. Several key areas for public–private partnerships could be: development of risk-pooling mechanisms; information systems to track utilization patterns and to capture data about private sector patients; regulation and accreditation of private providers; adoption of national guidelines; coordination of care; and an effective referral system across the public and private sectors.

Apart from a private health sector assessment, the government might consider piloting innovative initiatives to explore ways of partnering with the private sector, in a way that results in win-win solutions. For instance, the concept of corporate social responsibility could be promoted in terms of large companies giving back to the community through well-designed communication campaigns focusing on healthy lifestyles. Large firms that do not currently offer a good package of health benefits to their employees

may be persuaded to do so. This would be in their own interest, as a healthier workforce would be a more productive one. Expensive diagnostic equipment purchased by public sector hospitals could be permitted for use by private providers on a fee basis. Private practitioners could be allowed to use government hospitals for providing the services that are infeasible in their own clinic settings on a cost-recovery basis. Overall, a public-private partnership that benefits both the private and public sectors should ultimately be in the interest of addressing the NCD burden facing the population of Sri Lanka.

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Appendixes

Appendix 1: Technical Notes on Mortality Data in Sri Lanka

Sri Lanka has had an effective death registration system for many decades. It counts almost all deaths, and systematically codes the cause of death. In addition, recent upgrading of the Registrar General Department's systems has led to the computerization of the annual mortality statistics, which makes it easier to undertake extensive analysis.

Unfortunately, the Registrar General's data have not been systematically used in recent years to inform policy making. The major reasons are a substantial delay that has built up in the publication of the annual mortality returns, which were last published for 1997; and lack of access to more recent electronic data for domestic researchers. There are significant problems also with the quality of coding of the cause of death, particularly by non-medically qualified registrars, which leads to a significant fraction (at least 20 percent) of all deaths being coded incorrectly to invalid or indeterminate causes.

To overcome these limitations, the Institute for Health Policy obtained access to the raw electronic data of the Registrar General's Department to examine all deaths registered in 1990–2003. These data were processed to resolve the problem of invalid causes of death, by reassigning such deaths in a prorated manner to all other causes of death, except injuries. This was done after completing an analysis of the variations in invalid coding over time and by area. This approach does not fully address the problem of deficiencies in the quality of coding of cause of death, but to the extent that these problems cause errors in multiple directions, they will cancel out to some extent.

This database was then combined with the 2001 census estimates of the age structure of the population to estimate standardized mortality rates for 1999–2003. Such rates were not computed for earlier years, as reliable data on the age structure are not available. For comparisons with other countries, the WHO Mortality Database was used, as were data from Maldives (Anuranga et al., 2009).

Appendix 2: NCD Mortality Rates and International Comparisons

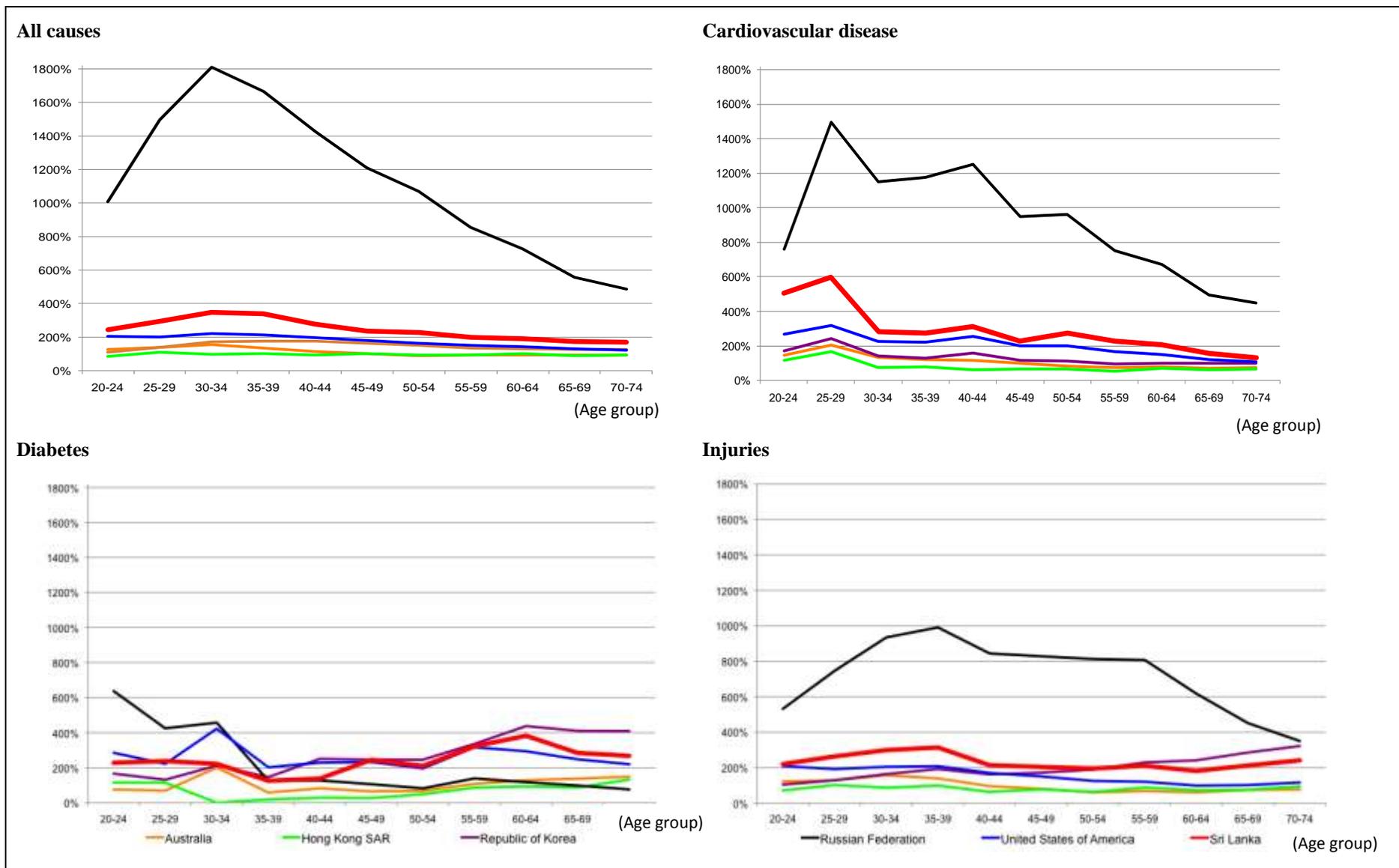
Sweden is the country in the Organisation for Economic Co-operation and Development (OECD) with the lowest overall mortality rates (UN ESCAP, 1976). Using Sweden as the base case and the vertical axis in each graph is the mortality rate in each country as a percentage of that in Sweden. The Russian Federation is included in the comparison, as it is the country best known for an excessive burden of NCD mortality (Suhrcrke et al., 2007).

The first point to note (Figure A2.1) is that overall mortality rates in Sri Lanka are modestly higher than in developed countries, and that the ratios of mortality from all diseases to those in Sweden are 100–200 percent higher. This reflects the reality that Sri Lanka's mortality patterns are almost comparable to those in developed nations. However, when overall mortality rates are examined by sex (Figure A2.2), it is evident that the higher mortality rates in Sri Lanka compared to developed countries are largely in men, with female mortality rates being comparable to or even lower at some ages than in some OECD nations, including the United States.

Looking more closely, cardiovascular mortality rates in Sri Lanka at all ages (Figure A2.1, top-right panel) are almost double those in developed countries. The burden of cardiovascular mortality in Sri Lanka is certainly not as high as that in the Russian Federation, where mortality rates are almost 10 times as high as in Sweden, but they are 200–300 percent of those in Sweden. This demonstrates that cardiovascular disease is the major driver of the higher overall rates of NCD and all-cause mortality in Sri Lanka.

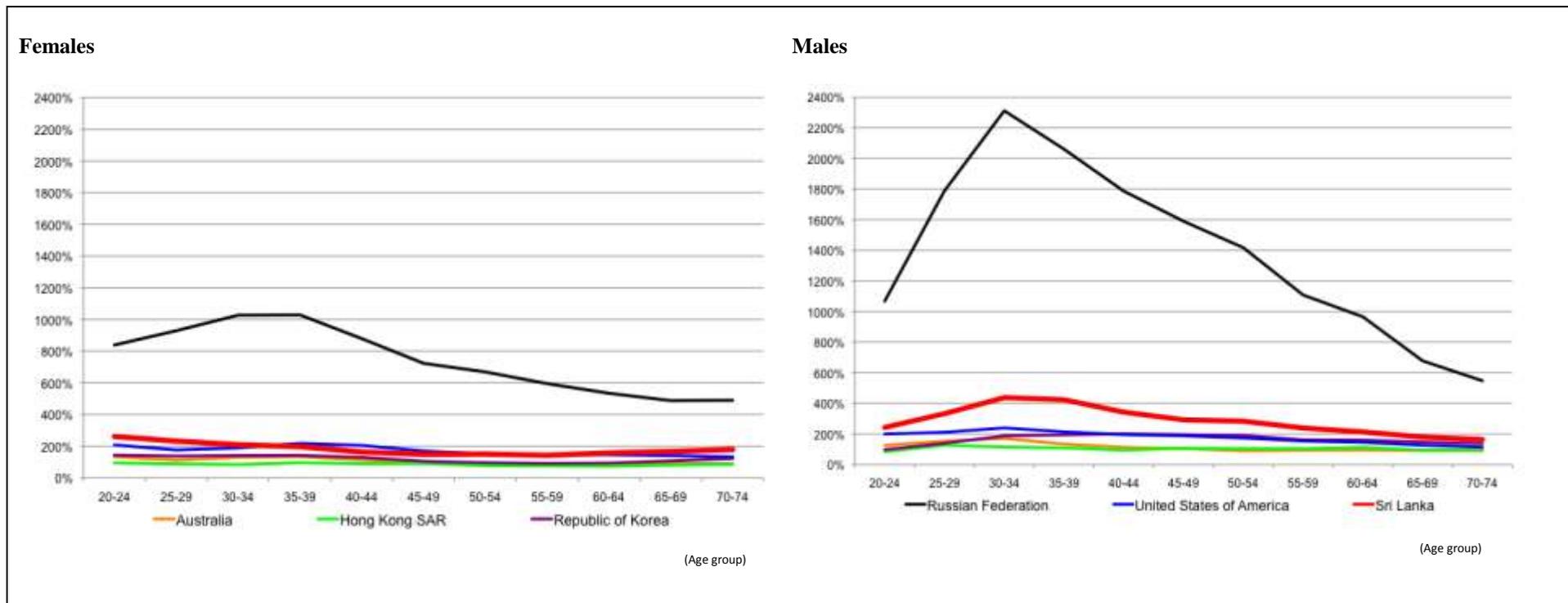
Relative diabetes mortality rates in Sri Lanka are comparatively high and increase with age, but are not as systematically higher as in the case of cardiovascular disease, with diabetes mortality rates being similar or less than those in some OECD countries, such as the United States and the Republic of Korea. Interestingly, diabetes is one NCD where the Russian Federation does not have such high relative rates. Mortality rates from injuries in Sri Lanka are also double those in Sweden, but again within the range of some OECD nations.

Figure A2.1 Age-specific mortality rates as a percentage of those of Sweden, Sri Lanka, and other selected economies (circa 2001)



Source: Institute for Health Policy 2010.

Figure A2.2 Age-specific mortality for all causes as a percentage of those in Sweden, Sri Lanka, and other selected economies (circa 2001),



Source: Institute for Health Policy 2010.

Appendix 3: Using Mortality to Assess Differentials in NCD Burdens by Socioeconomic Status

Almost no systematic population surveys collect information on disease prevalence in relation to socioeconomic status (SES) in Sri Lanka. The single exception is the Demographic and Health Survey (DHS), which contains data mostly for child and maternal health indicators. The 1993 and 2003 DHSs found generally pro-rich gradients in most indicators, except for family planning uptake (Rannan-Eliya and Somanathan, 2006; Saleem-Ismail et al., 2007; Rannan-Eliya and Sikurajapathy, 2008). However, the DHSs do not cover adult mortality or NCDs. To then examine this point, other data sources and methods are required. The following sections present a profile of inequalities in the NCD burden along income and geographic dimensions, exploiting primarily mortality data.

Sri Lanka's mortality registration system achieves almost universal coverage, but the death registration system does not record information on the SES of the deceased, so it is not possible to directly infer SES inequalities in mortality from these data. To overcome this limitation, this study uses variations in mortality by small areas as a proxy for variations in mortality by SES. This method, which is adapted from that used in Australia (Moon and Waters, 2006), exploits the fact that death certificates in Sri Lanka record both the place of death as well as the place of usual residence of the deceased, and that this information is available in the national mortality database at the level of the Registrar General's Divisions (RGDs). This is the first time this method has been used in Sri Lanka, since the data on usual place of residence have until now not been publicly available.

All registered deaths (numbering 553,192) during 1999–2003 were pooled in an analysis carried out by the Institute for Health Policy (IHP, 2010), and the place of death mapped from RGDs to the corresponding Divisional Secretariat Divisions (DSDs). The Registrar General's data actually code the place of usual residence at a lower level than RGDs, but these data are unreliable, so were not used.

The cause of these deaths was coded using the International Classification of Diseases, 10th edition (ICD-10), and this information plus data from the Population Census 2001 on the age–sex composition of the populations resident in each DSD in 2001 were used to estimate the age–sex standardized mortality rates for major disease categories for each DSD. In doing this, deaths that were coded with an invalid cause of death were redistributed on a pro-rata basis across the valid causes of death in their respective DSD and age and sex category. Such deaths account for 26 percent of all registered deaths. To relate mortality to SES, an index of average SES level was generated for each DSD applying principal component analysis to rank them using Census 2001 data on the DSD-level averages for household amenities and other characteristics. The DSDs were then grouped into quintiles of equal population.

This index of relative DSD SES levels is preliminary, as the use of area averages is associated with some biases, which can only be overcome by use of individual household level data. Follow-up analysis is being undertaken to address this issue, by exploiting a 5 percent sample of the 2001 population census. For this report, we report the preliminary results of this analysis, which have been mapped to show the geographic variation in mortality rates, in a similar manner to analyses in the United States (Pickle et al., 1996), European Union (Eurostat, 2009), and the United Kingdom (Gregory, 2009).²⁶

²⁶ *An Assessment of the Burden, Issues and Policy Options in Curative Care Services Delivery and Non-communicable Diseases in Sri Lanka*; Final Report, March 28, 2010. Ravi P. Rannan-Eliya, Chamara Anuranga, Lara Brearley, Ruwanthi Elwalagedara, APTL Abeykoon, Ahalya Balasundaram, and Shanti Dalpatadu. Institute for Health Policy, Colombo, Sri Lanka, <http://www.ihp.lk>.

Appendix 4: Poor Health and Chronic Disease in the Older Adult Population

The Sri Lanka Aging Survey, carried out in 2006, collected information on self-reported health status and self-reporting of chronic disease in the older adult population (World Bank, 2008). Since most chronic disease is likely to be NCDs, this information provides another perspective on the relative burdens from NCDs. The levels of self-reported illness by socioeconomic quintiles are shown in Table A4.1.

Table A4.1 Distribution of health status by socioeconomic quintiles, 2006

Age–sex standardized indicators	Expenditure Quintile					Concentration index
	1	2	3	4	5	
ADL index	0.8386	0.8369	0.8315	0.8357	0.8483	0.0018
Poor health	0.3904	0.3307	0.3275	0.2846	0.2160	-0.1012
Chronic disease	0.6157	0.6242	0.6078	0.7205	0.6972	0.0326
Acute disease	0.4850	0.4924	0.5009	0.4554	0.4346	-0.0235

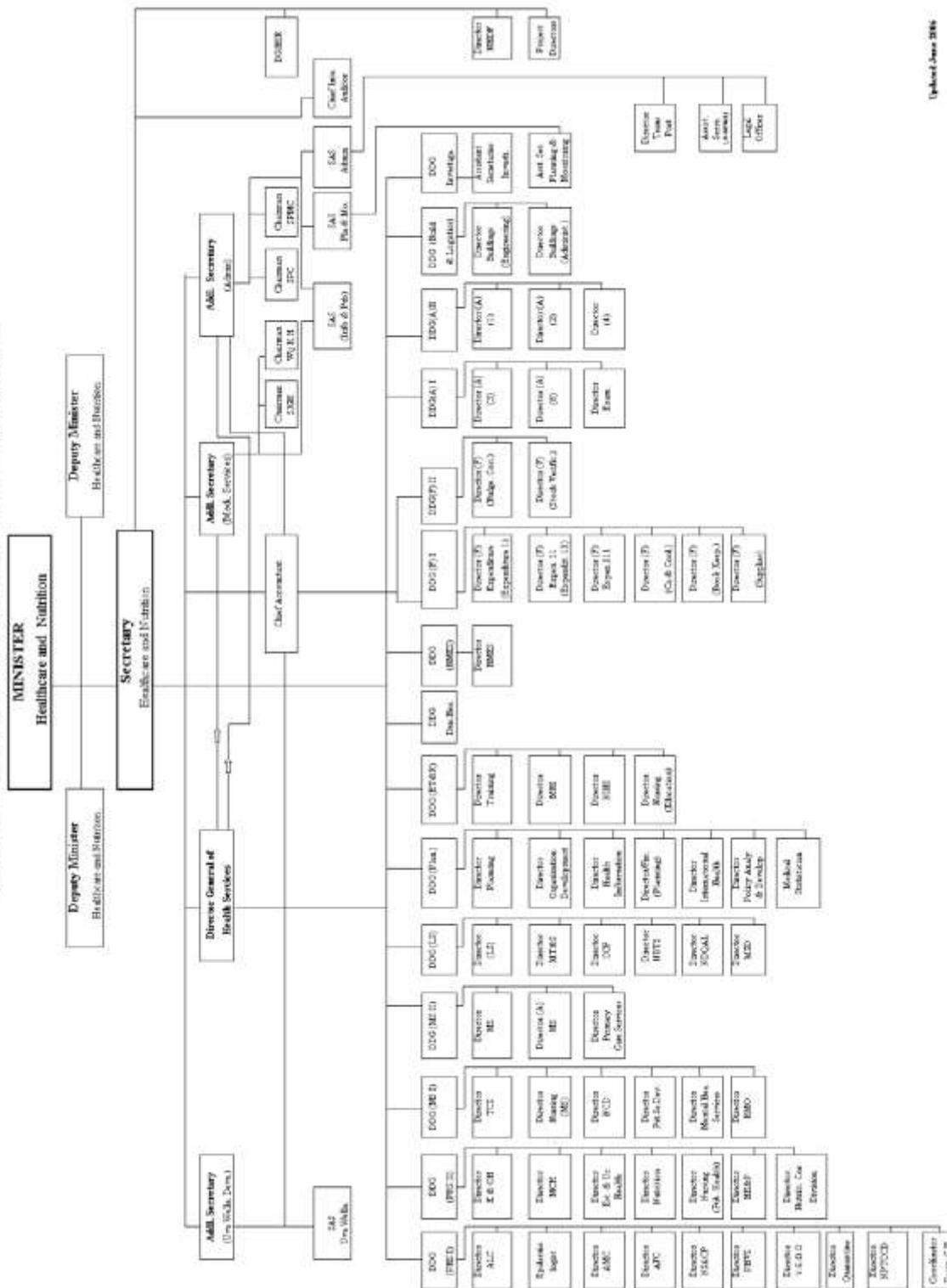
Source: World Bank 2008.

ADL = activities of daily living.

The concentration index for age–sex standardized self-assessed poor health is -0.10, which indicates prevalence of the perception of having poor health is higher in poorer quintiles, but chronic disease was associated with a positive concentration index indicating greater prevalence in higher quintiles. These results are consistent with the findings reported on the patterns in mortality by socioeconomic status in Chapter 2.

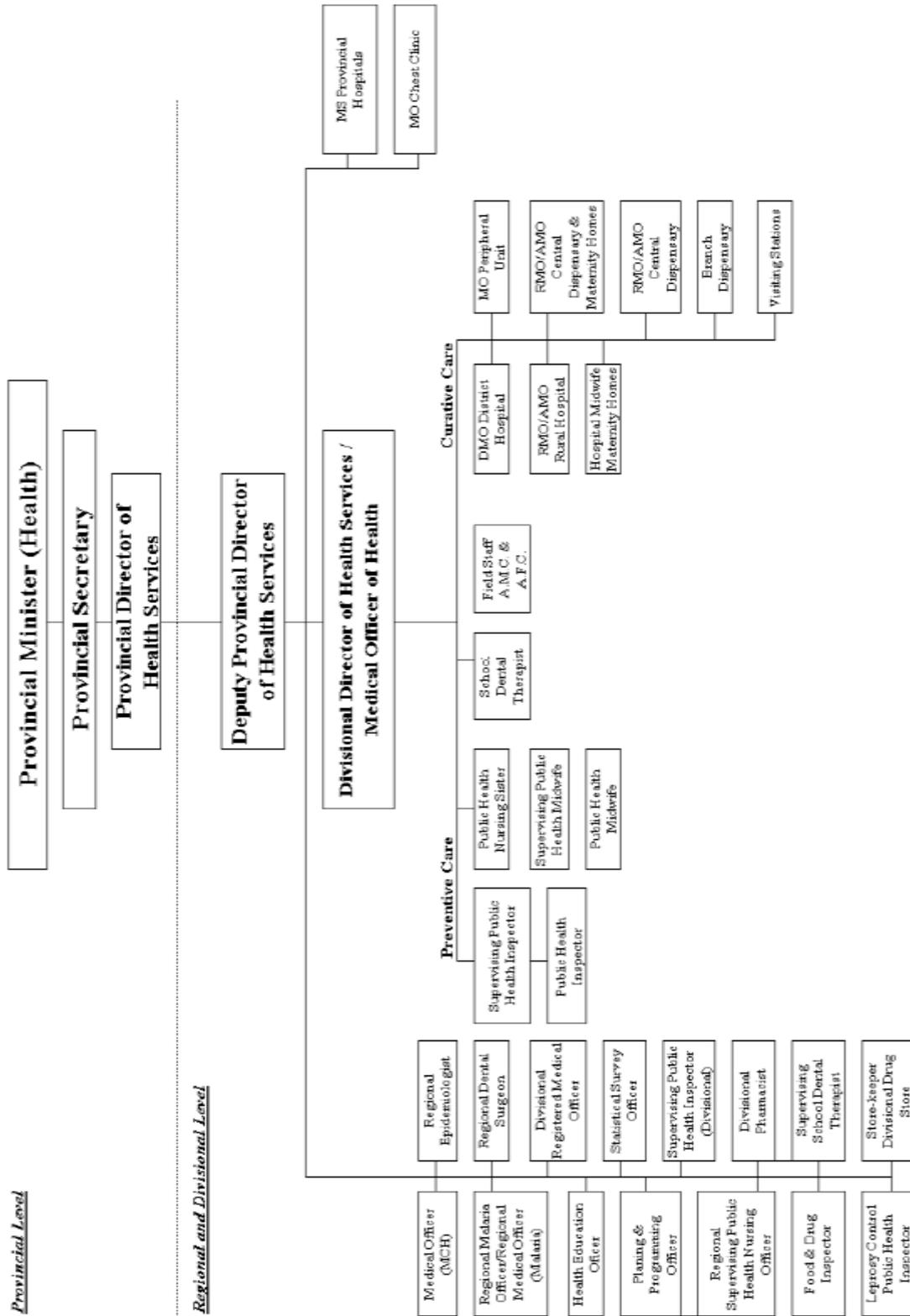
Appendix 5: The Organization Structure of the MOH and Provincial MOH

ORGANIZATION CHART - MINISTRY OF HEALTHCARE, AND NUTRITION



Updated June 2016

Organization Chart for the Health Services Under Provincial Councils



Appendix 6: Administrative Decentralization in Health

The first allopathic hospitals were military and specialized hospitals established by foreign rulers initially in the 1600s. In 1801 the first Civil Medical Department (CMD) was created for control of small pox. By the Health Services Act of 1952 on “Reorganization of the Health Department” a Director of Health Services (DHS) and three Deputy Directors of Health Services, to be in charge of medical services, public health services and laboratory services, were appointed. The public health services were further strengthened by the creation of the specialized campaigns for the control of infectious diseases, and services. The DHS was assisted in the periphery by 15 Superintendents of Health Services, who were in charge of 15 health regions.

In 1982 the Director of Health Services became the Director-General of Health Services, and the Deputy Directors of Health Services as Deputy Directors-General of Health Services. The Superintendents of Health Services were redesignated as Regional Directors of Health Services and were in charge of districts. Their numbers were increased to 25. Within each district under the Regional Director of Health Services, health services were delivered by medical officers of health who were in charge of delivery of health in the designated health areas in each district.

In 1987 with the devolution of administrative powers to the provinces, provincial ministries of health were created. In each provincial council, under each of the Provincial Health Secretaries in each of the Provincial Health Ministries, the Provincial Director of Health Services post was created and the total responsibility for delivery of health care to the respective province was vested in that post. The earlier designation of Regional Directors of Health Services was replaced with Deputy Provincial Directors of Health Services (DPDHS) and they were now responsible for the delivery of health services to the respective district in each of the provinces directly under the Provincial Director of Health Services.

In 1992 decentralization was further extended and each of the Medical Officer of Health areas delivering mainly preventive health care were designated as Divisional Directors of Health Services (DDHS) and were directly under the respective DPDHS in each of the districts in the respective province.

In addition to the Provincial Health Ministry through its administrative structure of Provincial Director of Health Services, DPDHS and DDHS /Medical Officer of Health unit manages the curative and preventive health delivery system, the local government system, and also delivers important aspects of health delivery related to sanitation, water supply and solid waste issues. The municipalities/urban councils/*pradeshiya sabha* are responsible for managing these aspects of health care in their respective areas in each of the provincial councils.

Following the establishment of provincial councils in 1987, the institutions involved in delivering public health in Sri Lanka encompassed several tiers of government. Table A6.1 describes the roles and responsibilities of each of those tiers.

Table A6.1 Responsibilities in Public Health in Sri Lanka Vested by Decentralization in 1987

Institution	Responsibility
<p>Central Ministry of Health</p>	<p>Responsible for subjects and functions relating to health specified in list II (reserved list) and those specifically excluded from list I (Provincial Council list) and inferred to come within the scope of list II and some of the functions specified in Section 9 Health in list III (concurrent list) of the ninth schedule to the constitution formulated under article 154A of the 13th Amendment.</p> <p><u>Central Government List II—Reserved List</u></p> <ul style="list-style-type: none"> • National policy on all subjects and functions • Teaching hospitals and hospitals established for specified purposes • Procurement of drugs <p>(the last two of the above three categories implicitly fall under list II as these functions are specifically excluded from list I)</p> <p><u>List III Concurrent List—Section 9 Health</u></p> <p>9.1 Schools for training of auxiliary medical personnel</p> <p>9.2 The supervision of private medical care, control of nursing homes and of diagnostic facilities within a province</p> <p>9.2 Population control and family planning</p> <p>9.3 Constitution of Provincial Medical Boards</p>
<p>Provincial Councils</p>	<p>Established under Article 154A promulgated by the 13th Amendment to the Constitution and administered by provisions in the Provincial Councils Act No.42 of 1987 and responsible for the subjects and functions relating to health specified in section 11 of list I (Provincial Councils list) of the ninth schedule to the Constitution formulated under Article 154A of the 13th Amendment.</p> <p><u>Provincial Councils (List I)—Section 11, Health</u></p> <p>11:1 The establishment and maintenance of public hospitals, rural hospitals, maternity homes, dispensaries (other than teaching hospitals, and hospitals established for special purposes)</p> <p>11:2 Public health services, health education, nutrition, family health, maternity and child care, food and food sanitation, environmental health</p> <p>11:3 Formulation and implementation of Health Development Plan and of the Annual Health Plan for the Province</p> <p>11:4 The provision of facilities for all institutions referred to in 1 above within the Province, excluding the procurement of drugs</p> <p>11:5 Awarding of scholarships for post graduate education within Sri Lanka to personnel attached to public health institutions</p>
<p>Municipal Councils, Urban Councils, Pradeshiya Sabhas</p>	<p>Municipal Councils established under the provisions in the Municipal Councils Ordinance Cap 576 of Volume XVIII (revised edition) of the Legislative Enactments and responsible for subjects and functions relating to health.</p> <p>Urban Councils established under the provisions in the Urban Councils Ordinance Cap 577 of Volume XVIII (revised edition) of the Legislative Enactments and responsible for subjects and functions relating to health.</p> <p><i>Pradeshiya Sabhas</i> established under Act No.15 of 1987 and responsible for subjects and functions relating to health specified in Part IV—sections 78–128—Powers and Duties as to Public Health.</p> <p>Local authorities’ powers and duties in public health cover drainages, latrines, conservancy and scavenging, unsanitary buildings, nuisances, public utility service, and water supply and markets. Ordinance relating to Markets and Sale of Articles also address issues of public health in an indirect manner.</p>

Appendix 7: Drug Availability Across the Three Health Facility Levels for CVD, Diabetes, Asthma, and Cancer

Table A7.1 Essential drugs available at public sector hospitals by category of hospital, Sri Lanka, 2009

Name of drug / group of drugs	Primary level	Secondary level	Tertiary level
CVD/HT-related drugs			
Digoxin	+	+	+
Isosorbide dinitrate, Glyceryl trinitrate	+	+	+
Diazepam	+	+	+
Thiazides	+	+	+
Propranalol	+	+	+
Aspirin	+	+	+
Frusemide, Spironolactone	-	+	+
Atropine	-	+	+
Methl Dopa, Nifedinie, Verapamil,	-	+	+
Codeine Phosphate, Pethidine, Morphine	-	+	+
Amiodaraone, Procainamide Hydrochloride	-	-	+
Mexiletine	-	-	+
Atenolol, Carvedilol, Metoprolol, Bisaprolol	-	-	+
Hydralazine, Sodium Nitroprusside	-	-	+
Phenoxybenzamine Hydrochloride, Prazosin hydrochloride	-	-	+
Phentolamine mesylate	-	-	+
Captopril, Enalapril, Losartan Pottasium, Trimetaphan camsylate	-	-	+
Gemfibrozil, Atorvastatin	-	-	+
Amlodipine, Diltiazem	-	-	+
Dobutamine, Dopamine	-	-	+
Isoprenaline hydrochloride	-	-	+
Heparin, Warfarin, Enoxaparin and Protamine sulphate	-	-	+
Clopidogrel, Dypiridamole	-	-	+
Streptokinase	-	-	+
DM-related drugs			
Glibenclamide, Tolbutamide	+	+	+
Insulin soluble—human and biphasic isophane insulin	-	+	+
Metformin	-	+	+
Asthma-related drugs			
Salbutamol	+	+	+
Theophylline	+	+	+
Adrenalin	+	+	+
Prednisolone	+	+	+
Aminophylline	-	+	+
Inhalers—Ipratropium bromide, Fluticasone propronate, salbutamol, Beclomethasone, salmeterol, Xinafoate	-	-	+
Ephidrine	-	-	+
Montelukast	-	-	+
Volumetric spacer and baby mask	-	-	+
All cancer drugs			
	-	-	+

Source: Computed by World Bank from data provided by the Ministry of Health, Medical Supplies Division and Noncommunicable Diseases Unit, 2009.

Appendix 8: Results of the Behavior Risk Factor Surveillance Study conducted in Five Districts using the WHO STEPS Methodology

Table A8.1 Prevalence of NCD risk factors, Sri Lanka STEPS survey 2007

Risk factor	Both sexes	Males	Females
<i>Tobacco use</i>			
Currently smoke tobacco daily (%)	11.5	22.8	0.3
Smoke manufactured cigarettes (% of smokers)	85.8	85.7	94.4
Mean number of cigarettes smoked a day (smokers)	9.2	9.1	13.7
<i>Alcohol consumption</i>			
Current drinkers (drank alcohol in the past 30 days, %)	13.5	26	1.2
Drank alcohol on 4 or more days in the last week (%)	16.7	17.4	1.5
<i>Fruit and vegetable consumption (in a typical week)</i>			
Mean number of days fruit consumed	3.7	3.6	3.7
Mean number of servings of fruits consumed a day	1.1	1.1	1.1
Mean number of days vegetables consumed	6.7	6.6	6.7
Mean number of servings of vegetables consumed a day	2.2	2.2	2.1
Ate less than 5 of combined servings of fruit and vegetables/day (%)	82.4	81.4	83.3
<i>Physical activity</i>			
Low levels of activity, defined as <600 MET-minutes/week (%)	25	17.9	31.9
<i>Physical measurements</i>			
Percentage (%) who are obese (BMI \geq 30 kg/m ²)	4.8	3.6	5.9

Source: NCD Unit, Ministry of Health.

Appendix 9: Population-based and Individual-based Interventions for NCDs

Table A9.1 Selected population-based interventions

Condition	Intervention	Intervention description	Intervention setting	Objective	Target population	Cost-effectiveness (US\$/DALY)
Coronary artery disease	Legislation	Legislation replacing 2% of dietary trans fat from partial hydrogenation in manufactured foods with polyunsaturated fat, at a cost of US\$ 0.50 per adult, and assuming a 7% reduction in coronary artery disease	Policy level	Instrument of policy	Adults	48
Coronary artery disease	Legislation	Legislation replacing 2% of dietary trans fat from partial hydrogenation in manufactured foods with polyunsaturated fat, at a cost of US\$ 6 per adult, and assuming a 7–40% reduction in coronary artery disease	Policy level	Instrument of policy	Adults	838
Diabetes, ischemic heart disease, and stroke	Legislation	Legislated reduction in salt content of manufactured foods and an accompanying public education campaign	Policy level	Instrument of policy	All ages	1,937
Diabetes, ischemic heart disease, and stroke	Media	Media campaign to reduce saturated fat content in manufactured foods and replace part of the saturated fat with polyunsaturated fat	Policy level	Instrument of policy	All ages	2,617
Tobacco addiction	Taxation	A 33% price increase due to tobacco taxes to discourage tobacco use, prevent initiation (and subsequent addiction) among youths, increase the likelihood of cessation among current users, reduce relapse among former users and reduce consumption among continuing users	Policy level	Instrument of policy	Adolescents and adults	22
Tobacco addiction	Nonprice	Advertising bans on television, radio, and billboards; health information and advertising in the form of health warning labels on tobacco products; interventions to reduce tobacco supply, such as smuggling control; restrictions on smoking	Policy level	Instrument of policy	Adolescents and adults	353

Source: Laxminarayan, Chow and Shahid-Salles, 2006.

ACE = angiotensin converting enzyme.

Table A9.2 Selected individual-based interventions

Condition	Intervention	Intervention description	Intervention setting	Objective	Target population	Cost-effectiveness (US\$/DALY)
Congestive heart failure	ACE inhibitor and beta-blocker, with diuretics	Use of ACE inhibitor and an optional beta-blocker (metoprolol), incremental to diuretics	District hospital	Secondary prevention	Adults	150
Ischemic heart disease	Aspirin, beta-blocker, and optional ACE inhibitor	Aspirin plus beta-blocker (atenolol) with optional ACE inhibitor (enalapril), with or without hospital availability	District or referral hospital	Secondary prevention	Adults	688
Myocardial infarction	Aspirin and beta-blocker	Aspirin with or without beta-blocker (atenolol)	District or referral hospital	Acute management	Adults	14
Myocardial infarction	Streptokinase, with aspirin and beta-blocker	Incremental use of streptokinase, in addition to aspirin and beta-blocker (atenolol)	District or referral hospital	Acute management	Adults	671
Myocardial infarction	Tissue plasminogen activator, with aspirin and beta-blocker	Incremental use of tissue plasminogen activator in addition to aspirin and beta-blocker (atenolol)	District hospital	Acute management	Adults	15,869
Myocardial infarction and stroke	Polypill	Combination treatment with aspirin, beta-blocker, thiazide diuretic, ACE inhibitor and statin, based on 10-year risk of cardiovascular disease	District hospital	Secondary prevention	Adults	409
Stroke (ischemic)	Aspirin	Aspirin dose within 48 hours of onset of acute stroke	Clinic or district hospital	Acute management	Adults over 15	149
Stroke (recurrent)	Aspirin and dipyridamole	Daily aspirin dose or combination of aspirin and extended release dipyridamole	Clinic or district hospital	Secondary prevention	Adults over 15	81
Stroke and ischemic and hypertensive heart disease	Polypill by absolute risk approach	Combination treatment with aspirin, beta-blocker, thiazide diuretic, ACE inhibitor, and statin based on 10-year risk of cardiovascular disease	District or referral hospital	Primary prevention	Adults	2,128
Tobacco addiction	Nicotine replacement therapy	Smoking cessation treatments in the form of nicotine replacement therapy	Clinic	Primary prevention	Adults	396

Source: Laxminarayan, Chow and Shahid-Salles, 2006.

ACE = angiotensin converting enzyme.

Appendix 10: Policy Option and Actions

Table A10.1 Policy Options and Actions for NCDs in Sri Lanka

Policy Area	Goal	Options / Actions	General Considerations
Financing	To mobilize adequate resources for prevention and treatment of current and future burden of NCDs, through <ul style="list-style-type: none"> Resources for population-level initiatives Resources for clinical service delivery Resources for drugs 	<ul style="list-style-type: none"> Consider risk-pooling options Increase contributions from the richer quintiles Improve efficiencies Promote public-private partnerships 	<ul style="list-style-type: none"> Make available public funds for public goods/positive externalities Address impoverishing effects of out-of-pocket payments Need to consider equity, pooling of private resources Assure equity and potential for large impact in high risk populations (poor) Ensure that additional resources are not at the expense of infectious diseases and MCH
Social determinates	To address causative and risk enhancing social factors for NCDs	<ul style="list-style-type: none"> Coordinate and facilitate intersectoral actions to lower social determinates working with Education, Social Services, Agriculture, Environment, Labor, Commerce, Law and Justice, Urban Development, Home Affairs, Finance, and Planning 	<ul style="list-style-type: none"> Each ministry will have a niche where opportunities exist Vulnerable populations including the poor, disabled, and the elderly need consideration Efforts should align with and inclusive growth development agenda
Focus on Specific NCDs	To target initial efforts on high-burden NCDs with effective interventions	<ul style="list-style-type: none"> Establish an intensified national NCD program, focusing first on selected NCDs Address undernutrition and overnutrition as risk factors for NCDs 	<ul style="list-style-type: none"> Build on current efforts and refining focus; expand later to other conditions Reinforce efforts to address maternal and infant/child undernutrition services Simultaneously need to balance undernutrition and overnutrition efforts
Organizational Structure	To ensure that structure is optimal for effective response to NCDs	<ul style="list-style-type: none"> Set up an intensified national NCD program with high enough authority, but not a vertical program Integrate curative and preventive care—or at least find mechanisms for better coordination; prioritize comprehensive prevention—not just primary prevention Bring better quality services closer to the 	<ul style="list-style-type: none"> Facilitate coordination across several tasks and assure implementation Secure greater use of specialist clinics, outpatient departments, and medical officers of health Focus on major tasks for central and provincial roles Assure effective implementation in clinics Increase use of lower-level capacity more Introduce better triaging

Policy Area	Goal	Options / Actions	General Considerations
		<ul style="list-style-type: none"> clients • Push through with fuller decentralization and more effective referral system 	<ul style="list-style-type: none"> system for inpatient care
Human Resources	To assure adequate workforce with the experience and skill to tackle NCDs	<ul style="list-style-type: none"> • Carry out a human resource needs assessment • Improve education curricula • Launch in-service training • Apply national clinical guidelines across the country 	<ul style="list-style-type: none"> • Address both workforce size and skill level • Institutionalize existing guidelines
Information systems and surveillance	To assure availability of critical information for planning, implementing, monitoring and evaluating	<p>Areas covered:</p> <ul style="list-style-type: none"> • Behavioral risk factors • Inpatient and outpatient morbidity • Mortality • National Surveillance System 	<ul style="list-style-type: none"> • Build on past efforts and develop and national ongoing survey • Expand data to individual level morbidity and patient characteristics • Improve timeliness • Collate, analyze, and report national NCD profile
Public–Private Partnerships	To develop mechanisms to leverage the private sector to contribute to public health goals.	<p>Areas covered:</p> <ul style="list-style-type: none"> • Risk pooling • Financing • Service delivery • Regulation, accreditation, and use of national guidelines • Morbidity information • Referral system 	<ul style="list-style-type: none"> • Review current and future role of private sector in delivery services • Look at private sector role in financing, especially for the richer • Assure quality of private sector care • Track total morbidity and substantial proportion uses private sector • Improve outcomes, patient satisfaction, and service delivery efficiency

Source: Authors.



HEALTH, NUTRITION,
AND POPULATION



HUMAN DEVELOPMENT NETWORK

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