

Non-Communicable Chronic Diseases In Latin America and the Caribbean

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Table of Contents

Acronyms

Glossary of Terms: Alternative Ways To Measure Burden Of Disease

Executive Summary

- I. Burden of Disease for Non-Communicable Chronic Diseases (NCD) in Latin America and The Caribbean (LAC)
- II. NCD Activity in the LAC Region
- III. Model Programs for USAID to Consider
- IV. Conclusions

Annex 1 – Countries Allocated to Regions in LAC

Annex 2 – YLLs Due to NCDs, CDs, and Injuries by LAC Region

Annex 3 – Percentage of Deaths by Cause by LAC Region

Annex 4 – NCD Programs in LAC

Annex 5 – Data by Country

ACRONYMS

CD	Communicable Disease
CVD	Cardiovascular Disease
DALY	Disability Adjusted Life Years
HALE	Healthy Life Expectancy
HIC	High-Income Countries
INF	Infectious Diseases
INJ	Injuries
LAC	Latin America and the Caribbean
MIC	Middle-income Countries
NCD	Non-communicable Chronic Disease
PAHO	Pan American Health Organization
SDR	Standardized Death Rates
WHO	World Health Organization
YLL	Years of Life Lost

Alternative Ways To Measure Burden Of Disease:

The data presented in this report will be analyzed using several different indicators to provide information on the burden of disease associated with non-communicable chronic diseases (NCDs). Each indicator measures a different aspect of burden of disease. The indicators as well as their significance to the analysis are described below.

Life Expectancy At Birth

Life expectancy is perhaps the most familiar burden of disease measure. Life expectancy at birth measures the number of years a person born in the current year is expected to live on average. There are often differences between the life expectancy for men and for women. Countries differ substantially in their life expectancy at birth, and many international aid agencies use this measure to help define the health of the population. A problem with life expectancy as a measure of burden of disease is that many things in addition to medical care can influence life expectancy, such as income.

Years of Life Lost (YLL)

This indicator is an alternative way to measure life expectancy. It does so by establishing a threshold (typically 70, 75, or 80 years) and then counts the number of years a person dies before that threshold is reached as years of life lost. In this way, people dying in childhood have very large values and people dying in their 60s have much smaller values. People dying after the threshold age are not counted as having a year of life lost. One reason for using this measure of burden of disease is to illustrate that an early death has a greater economic impact than deaths occurring at older ages.

Healthy Life Expectancy

Healthy life expectancy (HALE) is a refinement of the life expectancy indicator. It combines mortality (life expectancy) and morbidity (disability) measures. It is preferred by epidemiologists and other experts in public health because it incorporates morbidity into the calculation, in recognition that people want to be healthy for as long as possible. HALE reduces

overall life expectancy by the number of years lived in less-than-full health due to disease and/or injury. There are many medical conditions that are not life threatening but severely impact the quality of life and the productivity of a country. Perhaps the best example of this is mental illness.

Disability Adjusted Life Years (DALY)

Disability adjusted life years (DALYs) are perhaps the most common burden of disease measurement used by economists and epidemiologists. DALYs take into account the age at death and whether the person is living with a disability. DALYs are the sum of the years of life lost due to premature mortality and the years of life lost due to disability. One DALY represents the loss of one year of full health. DALYs are averaged over the entire population to get a mean value for the population or are aggregated to get the sum for the entire population. DALYs are significant because they give an estimate of the burden of disease on society including both premature death and disability. Cost effectiveness studies routinely use DALYs to measure the cost of interventions per DALY averted. When used as part of a measure of cost effectiveness, the cost per DALY averted is often interpreted as the cost to achieve an additional year of healthy life.

Adult Mortality Rate

The adult mortality rate is the probability that a 15-year-old person will die before reaching 60 years of age. The rate of adult mortality is an important indicator since adult's ages 15–60 has the greatest economic productivity. This indicator measures only mortality and does not measure the lost productivity due to early retirement or increased sick days caused by poor health.

Executive Summary

This report begins by assessing the personal, clinical, and economic burden of non-communicable chronic diseases (NCDs) in the Latin American and Caribbean (LAC) region. Half of all years of life lost in the LAC region are attributable to NCDs. People in the LAC region are as equally likely to die prematurely from just one NCD, i.e., cardiovascular disease, than from all communicable diseases combined. NCDs affect people of all ages, including children and women of childbearing age. NCDs are more likely to affect the poor because they often do not have the ability to prevent or treat NCDs. NCDs also have a tremendous economic cost that can inhibit economic growth. From an economic perspective, the most productive years are those between age 15 and 60. Unfortunately, 20 percent of men and 11 percent of women who live to age 15 in the LAC region will die before they are 60. Most of these premature deaths are associated with NCDs. The economic cost associated with diabetes is more than double the economic cost of HIV/AIDS in the LAC region, and the cost of cardiovascular disease is even higher.

There is little doubt that the levels of chronic diseases will substantially increase in the near future in the LAC region, as they are doing in other parts of the world. Much of the increase in the prevalence of NCDs is linked to preventable activities such as inappropriate diet, lack of exercise, smoking, and alcohol abuse. In Mexico, for example, almost 30 percent of adults are now overweight or obese, and approximately 14 percent of adults in Mexico now have type II (adult onset) diabetes, which is closely related to obesity and exacerbated by the consumption of sugary foods, including soft drinks.

While several middle-income countries in LAC are making some progress in primary, secondary, and even tertiary prevention, low-income countries in LAC generally do not have sufficient resources to implement programs on their own to prevent or treat NCDs. In low-income countries, health resources remain focused on reducing the burden of communicable diseases and preventable causes of infant and maternal mortality. Many low-income countries suffer from a “double burden” whereby both NCDs and communicable diseases or other preventable causes of infant and maternal mortality represent significant portions of the disease burden. In the future, the challenge will be to have these countries and USAID work cooperatively to prevent and treat all diseases.

Without attention to preventing NCDs, the cost of NCD treatment will continue to rise, diverting resources from other health programs and reducing the effectiveness of communicable disease and maternal and child health programs. For example, the risk of infant and maternal mortality increases dramatically if the pregnant woman is overweight, does not exercise, abuses alcohol, or smokes. Furthermore, most individuals with an infectious disease also have NCDs that complicate their treatment for the infectious disease.

Given their limited resources, cost effective health programs should target the most prevalent and damaging health problems in low-income countries regardless of whether these are communicable diseases, injuries, or NCDs. An assessment of the causes of NCDs can be stratified by population groups in order to focus on the most prevalent and damaging health problems for priority segments of the population, such as women and children. While such an analysis may suggest a reallocation of funding priorities, much can be done within existing programs, given the high prevalence of NCDs within the communicable disease and maternal and child health population.

Many middle-income countries in LAC have already conducted their own burden of disease studies to determine which diseases are responsible for the greatest burden of disease; which diseases are filling their hospital beds and ambulatory clinics; which diseases are having the greatest impact on economic productivity; and which risk factors are associated with the growing prevalence of disease. As a result, many of these countries are investing in the prevention and treatment of NCDs. For example, the World Bank's evaluation of the Brazilian exercise programs reported that it was a "remarkably cost-effective" investment at only \$248 per DALY averted. In contrast with many countries in LAC where smoking rates have been increasing, Uruguay and Brazil have used a number of strategies to reduce the rate of tobacco use substantially over the last 2 decades. Evaluations show that the cost of operating these anti-smoking programs is minimal and that they are highly cost effective.

Despite primary preventive efforts, people will continue to develop NCDs. As a result, there is a need for secondary and tertiary prevention programs that will help to further reduce the costs associated with long-term treatment. Middle-income countries in the LAC region have also developed programs that are successful in identifying people with specific NCDs and then treating them in ways that are low cost, cost effective, and

sustainable, with demonstrated clinical improvement. Both Mexico and Brazil have developed programs to address hypertension that involve media awareness campaigns, self-help groups, clinician training, registries, and other components. The World Bank estimated that the cost of the Brazilian hypertension program is \$1.00 per person, and a published review of the Mexican program concluded that the program was successful at increasing the number of people receiving blood pressure treatment and lowering their blood pressure. Early treatment for people with chronic conditions is much more cost effective than treating complications of more severe illness and could free up existing resources for other purposes.

These existing programs can serve as models for other LAC countries. These programs represent a combination of primary, secondary, and tertiary prevention programs that have been demonstrated to be low cost and cost effective, have demonstrated clinical effectiveness, and are sustainable. Implementation of these programs in combination with existing health and development activities could improve the health and economic status of the poorest countries in LAC. Many of these programs can be applied to address a variety of NCDs and/or risk factors.

I. Non-Communicable Chronic Diseases In Latin America And The Caribbean

The burden of disease associated with non-communicable chronic diseases (NCDs) is greater than the burden of disease associated with communicable diseases or injuries in Latin America and the Caribbean (LAC); however, much less attention has been given to NCDs. In LAC, approximately 50 percent of all years of life lost are related to NCDs, whereas only 30 percent are due to communicable diseases, and 20 percent are due to injuries (Annexes 2 and 3).

Once thought to be an issue primarily involving older people in high-income countries, NCDs are now seen to affect the poor of the poorest countries in LAC. The impact is greatest on the poor in LAC because they are often unable to access the education and services required to prevent and treat NCDs. This is an issue in all low-income countries, not just in LAC, and the international aid community is beginning to take action.

There Is A Growing Burden Of NCDs Throughout The World

The lives of far too many people in the world are being blighted and cut short by non-communicable diseases such as heart disease, stroke, cancer, chronic respiratory disease and diabetes..... This is a very serious condition, both for public health and for the societies and economies affected. Until recently, the impact and profile of non-communicable disease has generally been insufficiently appreciated.... The means of preventing and controlling most non-communicable diseases are already well-established.

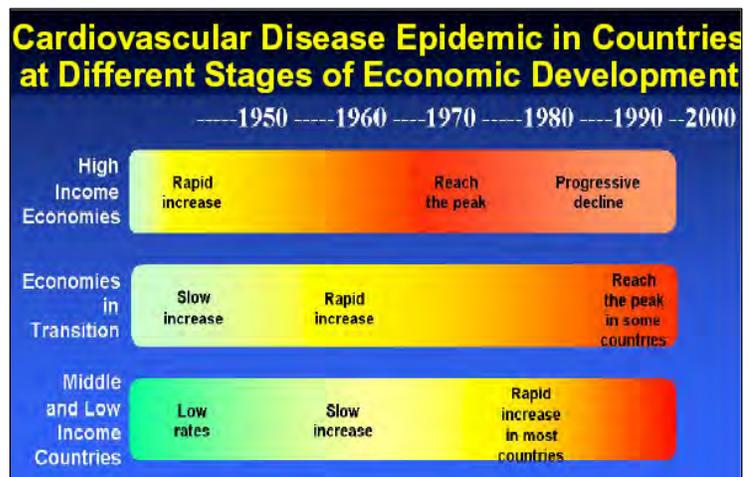
Former Director General of WHO, Lee Jong-Wook

Policy makers are beginning to recognize that an epidemiologic transformation is occurring all over the world. This transformation, which began in high-income countries, has now spread to middle- and low-income countries. The change is from a prevalence of infectious diseases, to one of acute illnesses, and now to chronic conditions. The United States is at the forefront of this epidemiologic transformation. In 2005, almost half the United States population had at least one NCD, and about 1 in 5 Americans had multiple NCDs.¹ Individuals with NCDs are associated with over 85 percent of the health expenditures in the United States. One hundred years ago, nearly all the illnesses in the United States were related to infectious diseases, and 50 years ago most of the burden of disease was associated with acute episodes. Now NCDs are responsible for the greatest burden of disease in the United States.

- Deaths associated with NCDs**
- 59% of deaths worldwide
 - 87% of deaths in high-income countries
 - 40% of deaths in low-income countries
- DALYs associated with NCDs**
- 47% of DALYs worldwide
 - 85% of DALYs in high-income countries
 - 33% of DALYs in low-income countries

The same changes are now taking place in low- and middle-income countries. NCDs such as heart disease, stroke, cancer, and diabetes are the leading causes of morbidity and mortality worldwide, including in most low- and middle-income countries.² In particular, the impact of cardiovascular disease on low- and middle-income countries is rapidly increasing and is responsible for the most deaths in many of these countries.^{3 4} As low-income

countries move through this epidemiologic transition, they are often faced with a “double burden” of having to simultaneously address NCDs, communicable diseases (CDs), and other causes of preventable mortality. Because each illness can affect other illnesses, the impact of



international aid resources directed toward communicable diseases and other preventable causes of maternal and infant mortality can be

diminished by the prevalence of these NCDs. For example, the risks associated with infant and maternal mortality increase dramatically if the woman is overweight, does not exercise, abuses alcohol, or smokes. The same applies to people with a combination of NCDs and infectious disease.⁵

Key Facts about NCDs Worldwide:

- Twice as many deaths will occur from NCDs as from all infectious diseases (including HIV/AIDS, tuberculosis, and malaria), maternal and perinatal conditions, and nutritional deficiencies combined.
- One quarter of all deaths from NCDs occur in adults under the age of 60.
- Eighty percent of all heart disease, stroke, and type II diabetes and 40% of all cancers can be prevented.
- The economic impact of NCDs is large and growing. Countries such as China, India, and the Russian Federation could lose between \$200 billion and \$550 billion in national income over the next 10 years simply from inappropriate attention to heart disease, stroke, and diabetes.

Source: WHO

The growing burden of NCDs is also evident in risk factor analysis. An analysis of Table 1, developed in a 2002 study by the World Health Organization, shows that many of the top 10 “risks to good health” are associated with NCDs (alcohol abuse, high blood pressure, smoking, obesity, tobacco, cholesterol, low fruit intake, and physical inactivity). Countries in LAC are just beginning to address these risk factors.

This table also illustrates the “double burden” for countries that are only beginning the epidemiologic transition and that must address risk factors associated with both NCDs and infectious diseases or other preventable causes of mortality.

Economic Impact Of NCDs

In nearly all countries in the world, the economic burden associated with NCDs has surpassed the financial burden associated with infectious diseases. In many low- and middle-income countries, the economic impact of NCDs is increased by their financial and social burden on impoverished families; their impact on already over-stretched health care systems; and the shortening of the active and productive years of the population. People in low- and middle-income countries tend to develop NCDs at younger ages, suffer longer—often with preventable complications—and die sooner

than those in higher-income countries. The poor in low-income countries are especially vulnerable. The economic consequences are greater because NCDs do not just affect the person with the disease; they can affect the entire family. NCDs also impact the effectiveness of the entire health care system since people are seeking care for NCDs in a system that is not organized to care for them, reducing the overall productivity of that system.⁶

Table 1.

	Low- and Middle-income Countries with High Mortality		Low- and Middle-income Countries with Low Mortality ⁷	
	Risk Factor	% DALYs	Risk Factor	% DALYs
1	Alcohol	5.7%	Alcohol	11.7%
2	Underweight	5.5%	Overweight	4.3%
3	Unsafe Sex	4.9%	Blood Pressure	4.1%
4	Water, Sanitation	4.5%	Tobacco	3.8%
5	Overweight	2.5%	Cholesterol	2.4%
6	Blood Pressure	2.3%	Unsafe Sex	2.2%
7	Iron Deficiency	2.0%	Lead Exposure	2.1%
8	Indoor Smoke	2.0%	Low Fruit Intake	1.9%
9	Zinc Deficiency	1.9%	Water Sanitation	1.6%
10	Illicit Drugs	1.6%	Physical Inactivity	1.5%
	In LAC: Bolivia, Ecuador, Guatemala, Nicaragua, Perú		In LAC: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Brasil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, México, Panamá, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Surinam, Trinidad and Tobago, Uruguay, Venezuela	

Common Myths About NCDs Are Not Supported By Evidence

The conventional bit of wisdom states that international health programs should focus their resources on infectious diseases and maternal and child health programs because, once these are controlled, the countries themselves will be able to address NCDs with their own resources. But there are several problems with this idea. First, these international health programs often neglect the major causes of mortality and morbidity in priority populations. For example, worldwide cardiovascular (CVD) deaths among women aged 15–34 are 4 times greater than the pregnancy-related deaths, and female CVD deaths in the decade after prime childbearing years are 20 times greater than all maternal deaths in the 2 decades of prime childbearing.⁸ Second, NCDs have already become prohibitively expensive for the health systems of developing countries. Third, refocusing resources on preventing and treating NCDs could be cost effective and could positively affect traditional programs. There are a number of other myths about NCDs, as shown in Table 2.

Table 2. Additional Myths Related to NCDs

MYTH	FACT	Response
Chronic diseases mainly affect high-income countries	4 of 5 deaths from NCDs occur in low-- and middle-income countries	Focus more international aid on NCDs, especially in low-income countries
Low- and middle-income countries should continue to focus on communicable diseases based on burden of disease calculations	In most countries in LAC, NCDs have a greater burden of disease than communicable diseases. For example, in Peru and El Salvador ,the percentage of years of life lost are nearly the same for NCDs and CDs, while in the Dominican Republic, the burden for CDs is higher (33% NCDs vs. 56% CDs) <i>The numbers for all countries in LAC are shown in Annex 5</i>	Use burden of disease analysis and cost effectiveness analysis to allocate donor funding for health Consider whether the “double burden” of disease suggests that it would be more cost effective to overall health and development outcomes to address both NCDs and communicable diseases or other causes of preventable maternal and infant mortality together
Chronic diseases mainly affect rich people	In all counties in LAC except for Haiti, poor people are more likely to develop chronic diseases than rich people in that same country	Include NCDs in anti-poverty programs because NCDs affect poor people and poor countries and because inadequate attention to NCDs complicates anti-poverty efforts
Chronic diseases only affect old people	50% of people between age 30 and 60 have at least one NCD, and these NCDs often impact their ability to raise children and be productive in the workforce and can lead to premature death	Address NCDs as part of efforts to improve economic productivity because NCDs are a main contributor to work loss in working age adults
Chronic diseases mainly affect men	Deaths from coronary heart disease and many other NCDs affect men and women almost equally	Include attention to NCDs in traditional maternal and child health programs because pregnant women and mothers can develop NCDs during pregnancy and childbearing years ⁹
Chronic diseases cannot be prevented	The major causes of chronic disease (smoking, alcohol abuse, poor diet, lack of exercise, obesity) are well known, and programs to address these issues can be sustained at low cost	Implement low-cost programs to address the risk factors for NCDs as a means of improving overall health system efficiency because many people have the “double burden” of both NCDs and communicable diseases
Chronic disease prevention and treatment is too expensive	Many interventions are very inexpensive per DALY averted	Implement primary prevention programs and selective secondary and tertiary prevention programs with demonstrated cost effectiveness

Data on NCDs and Risk Factors in LAC

Life expectancy is higher in the United States than it is in the LAC region overall and in each of the LAC subregions (Figure 1). How the countries are allocated to subregions is shown in Annex 1. Life expectancy averages 75 years for women and is almost 70 years for men in the LAC region. The subregion with the lowest life expectancy is the Latin Caribbean.

In the LAC region, the average healthy life expectancy (HALE) is slightly less than 60 years for males, compared with 68 years in the United States (Figure 2). This shorter healthy life expectancy impacts a country's economic productivity since it reduces the number of years a person can be productive and work. There is relatively little variation in HALE across the different LAC regions, with a range from 57 to 62 years. For women in the LAC regions, the average HALE is 63 years, with a range of 60 to 67 years, compared with 71 in the United States (Figure 3).

Figure 1
Life Expectancy at Birth in Latin America Regions
Population Weighted

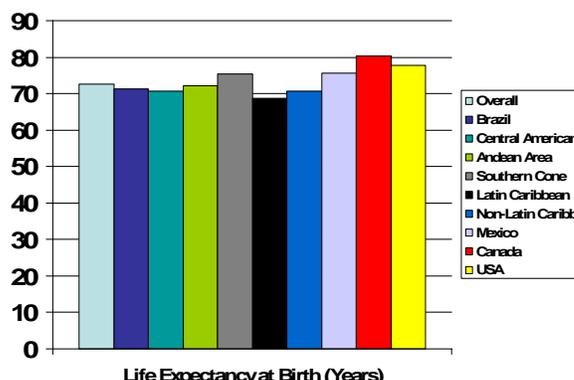


Figure 2
Healthy life expectancy at birth in Latin America Regions
- Males Population Weighted

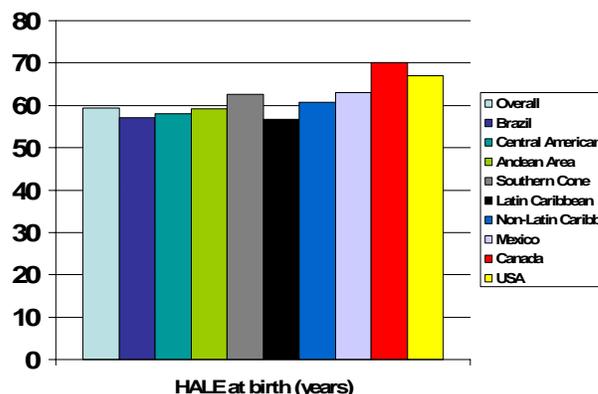
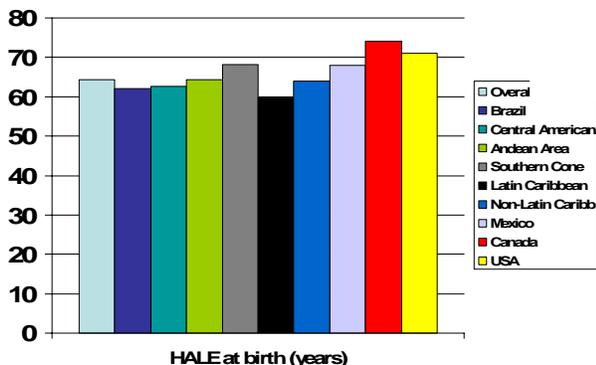


Figure 3
Healthy life expectancy at birth in Latin America F
- Females Population Weighted



Source: WHO, World Health Statistics

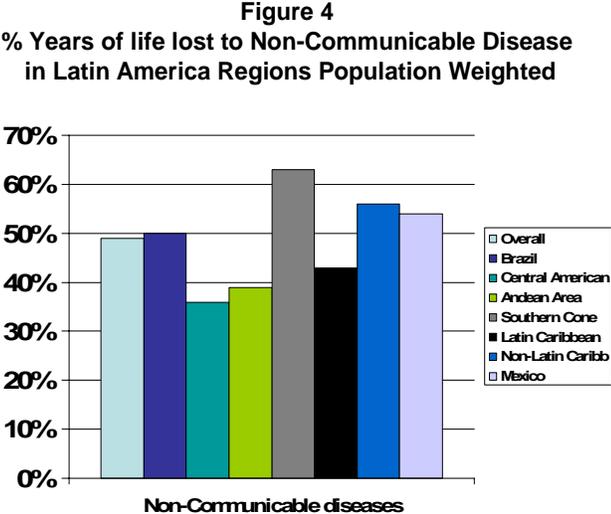
NCDs Are Responsible For Most of the Burden of Disease in LAC

Table 3 shows the disability adjusted life years (DALYs) associated with certain diseases. It shows that NCDs were responsible for two thirds of the DALYs in 2001.

Table 3. Burden of Disease (DALYs) by Major Condition, 2001¹⁰ (see Annex 2 for more details)

21% - Communicable, Maternal, Perinatal, and Nutritional Conditions	10% - Infectious and Parasitic
	2.0% - HIV/AIDS
	0.4% - Childhood Cluster
	1.3%- Maternal Conditions
	6.2%- Perinatal Conditions
	1.5%- Nutritional Deficiencies
66% - Non-communicable Diseases	7% - Malignant Neoplasm
	3% - Diabetes
	18% - Mental Illness
	5% - Diseases of Sense Organs
	12% - Cardiovascular Disease
	5% - Respiratory Disease
	5% - Digestive Diseases
13% - Injuries	2% - Road Accidents
	5% - Violence

In the entire LAC region, almost half of all years of life lost are due to NCDs (Figure 4).



Source: WHO, World Health Statistics

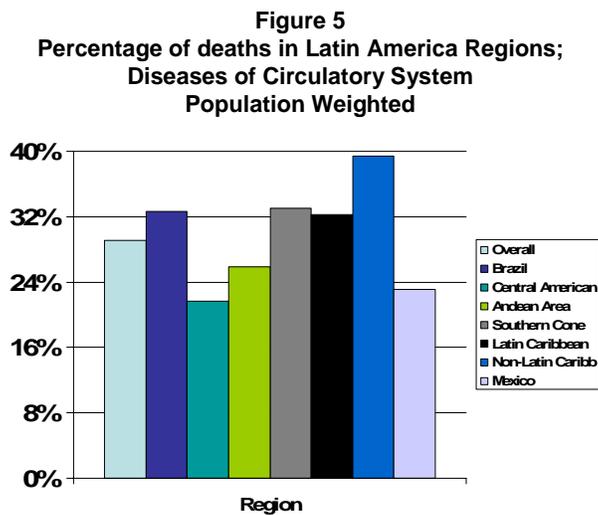
Deaths from NCDs occur at all ages, and thus NCDs can have a major impact on years of life lost when they affect people at younger ages. NCDs are responsible for a greater proportion of years of life lost than communicable diseases in all subregions except Latin Caribbean and the Central American Isthmus, suggesting that these subregions suffer most from the double burden discussed above. The percentages of years of life lost due to NCDs are higher than the percentages associated with communicable diseases in nearly all countries in LAC (Table 4).

Table 4. Percent NCDs by Country

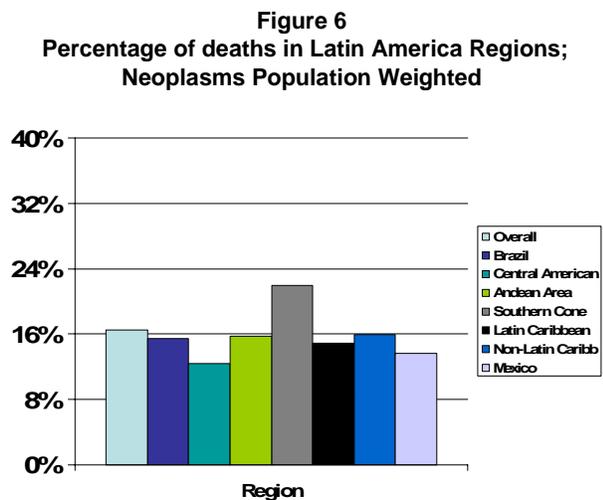
Country	Percent NCDs
Antigua and Barbuda	69.0%
Argentina	66.0%
Bahamas	45.0%
Barbados	65.0%
Belize	41.0%
Bolivia	34.0%
Brazil	50.0%
Chile	64.0%
Colombia	35.0%
Costa Rica	57.0%
Cuba	73.0%
Dominica	68.0%
Dominican Republic	33.0%
Ecuador	42.0%
El Salvador	38.0%
Grenada	66.0%
Guatemala	27.0%
Guyana	30.0%
Haiti	15.0%
Honduras	35.0%
Jamaica	66.0%
Mexico	54.0%
Netherlands Antilles	85.0%
Nicaragua	36.0%
Panama	44.0%
Paraguay	39.0%
Peru	42.0%
Saint Kitts and Nevis	62.0%
Saint Lucia	63.0%
Saint Vincent and the Grenadines	60.0%
Suriname	45.0%
Trinidad and Tobago	50.0%
Uruguay	72.0%
Venezuela	45.0%

Source: PAHO

If burden of disease were used as the criterion to allocate resources, then certain diseases would receive a much larger share of the international assistance pie. The largest cause of death in the LAC region is diseases related to the circulatory systems, followed by cancers (Figures 5 and 6). For the entire LAC region, circulatory diseases are 3 times more likely to be the cause of death than all communicable diseases combined. Cancer is the second largest cause of death in every subregion except for the Central American Isthmus, where the combination of all communicable diseases is larger. The cause of death is relatively consistent by LAC subregion (Annex 3).



Source: PAHO



Source:
 PAHO

Risk Factors Associated with NCDs in LAC

With any disease, it is more effective to prevent it than to treat it. Activities designed to address the risk factors associated with developing NCDs are known as primary prevention programs. In most countries in the LAC region, blood pressure, high cholesterol, tobacco use, alcohol abuse, and high body mass index are the risk factors responsible for causing the diseases that account for more than 40 percent of DALYs. These risk factors are correlated to NCDs in several ways:

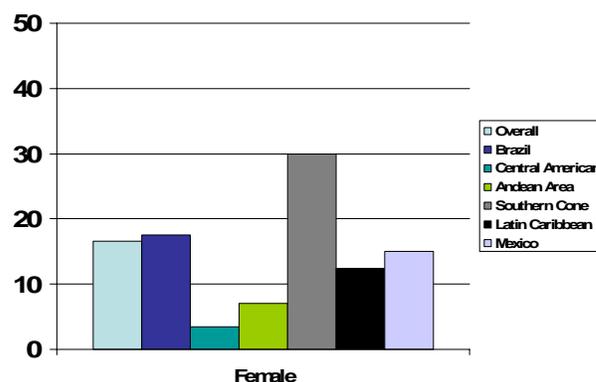
- Smoking causes certain types of cancer and certain respiratory diseases such as chronic obstructive pulmonary disease (COPD).
- Alcohol abuse leads to numerous illnesses in the digestive system.
- Obesity is associated with many diseases, with the most common being circulatory diseases and diabetes.
- High cholesterol is related to cardiovascular disease.

Smoking

The percentage of women smoking in the LAC region is 17 percent, with wide variations across the subregions (Figure 7). The Southern Cone has the highest percentage of women smokers (30%) and Central America the lowest (4%). For men, the percentages are higher, with 31 percent of men smoking, ranging from a low of 18 percent in Latin Caribbean to a high of 44 percent in the Southern Cone (Figure 8).

In 1970, the Americas (North and South) had the highest rate of cigarette consumption (over 2500 cigarettes per person per year) in the world. Since 1980, the tobacco consumption levels in the Americas have continuously declined. Most of the reduction occurred in the United States and Canada, with many of the countries in LAC experiencing increases in

Figure 7
Prevalence of current tobacco smoking among adults (15 years and older) (%)
Females; Latin America Regions Population Weighted

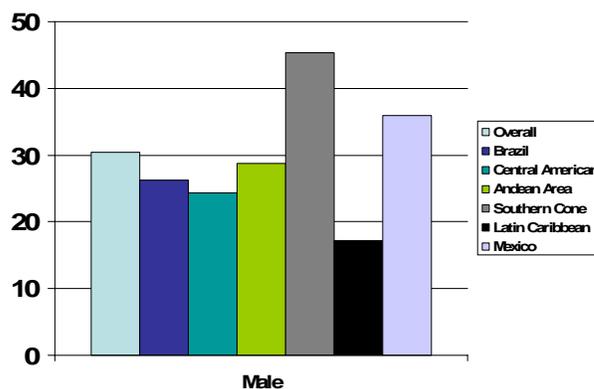


Source: WHO, World Health Statistics

tobacco consumption during this period.¹¹ There were notable exceptions, such as Brazil and Uruguay (see below), that were able to reduce tobacco consumption through aggressive efforts.

Perhaps most disturbing, smoking has become increasingly prevalent among the poor in many LAC countries. This trend is highlighted in one study that tracked population smoking patterns in Argentina and found that, “during the 1990s, the majority of the smoking population was composed of individuals from the middle- and high-income segments. At the

Figure 8
Prevalence of current tobacco smoking among adults (15 years and older) (%)
Males; Latin America Regions Population Weighted



Source: WHO, World Health Statistics

end of the review period, as a result of growing social consciousness, the majority of the smoking population was composed of low-income consumers.” Another study found that, in Brazil, there was a 5-fold difference in smoking rates between uneducated and secondary school educated adults; in Mexico, there was a 3.4-fold difference between workers and professionals; and in Guatemala, there was a 3.0-fold difference between unskilled and skilled workers.¹² The poor are most likely to benefit from efforts to increase the cost of purchasing tobacco because they are most likely to reduce consumption as the result of higher prices.¹³

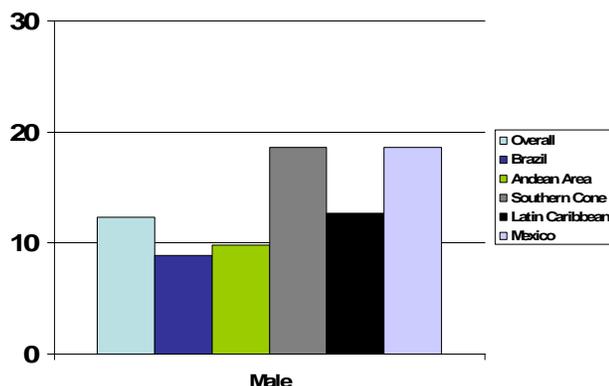
Alcohol

Alcohol abuse is one of the leading causes of death and disability worldwide and is a major risk factor in Latin America. According to the 2002 World Health Report, it is the 5th leading risk factor after being underweight, unsafe sex, high blood pressure, and tobacco use. A World Bank study in Brazil showed that 4.9 percent of males in Rio, 13.0 percent in Sao Paulo, and 16.0 percent in Porto Alegre were dependent on alcohol. Alcohol abuse contributes to a variety of health and social problems, including depression, injuries, cancer, cirrhosis, dependence, family disruptions, and loss of work productivity. Alcohol related mortality is often highest among the poorest people and is a particular risk to adolescents and young adults.

Obesity

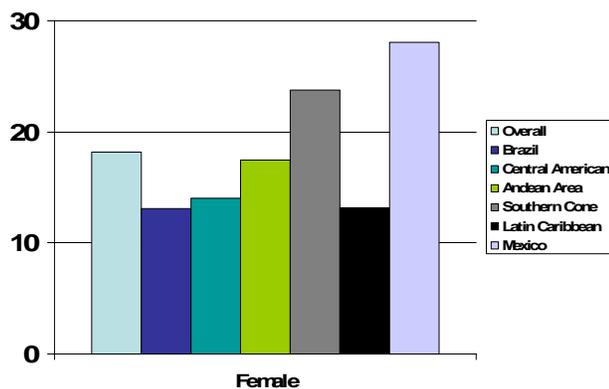
Overall, 18 percent of women and 12 percent of men are considered obese in the LAC region. Obesity in women in Mexico is of particular concern where 28 percent of the women are obese (Figures 9 and 10). Studies have consistently shown a correlation between complications associated with pregnancy and obesity.¹⁴ Annex 5 shows data for individual countries.

Figure 9
Prevalence of adults (15 years and older) who are obese (%)
Males; Latin America Regions Population Weighted



Source: WHO, World Health Statistics

Figure 10
Prevalence of adults (15 years and older) who are obese (%)
Females; Latin America Regions Population Weighted

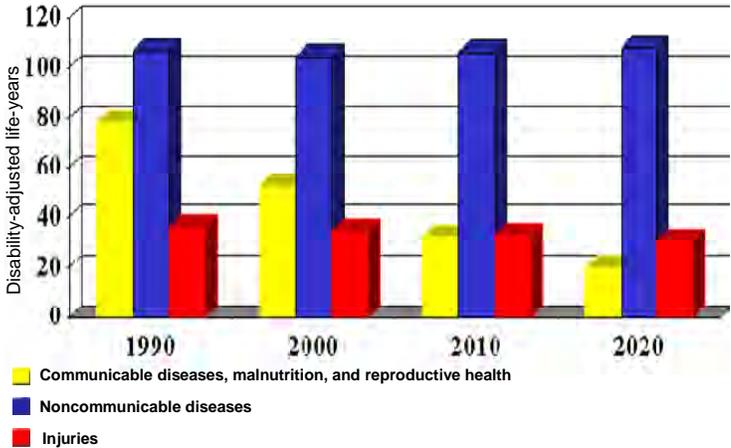


Source: WHO, World Health Statistics

Projections Of Burden Of Disease In LAC

Over the past 40 years, countries in LAC saw an accelerated urbanization process that may have contributed to an increased exposure to NCD risk factors. Figure 11 shows a slowly increasing trend in DALYs for NCDs, a rapidly declining burden of disease for communicable diseases, and a slightly declining burden of disease for injuries. In 2020, non-communicable diseases will produce 5 times the burden of disease of communicable diseases and 4 times the burden of disease of injuries.

Figure 11
Trends in Disability-Adjusted Life-Years (DALYs) for Selected Diseases and Injuries in LAC



Source PAHO Unit of Non-communicable Diseases. <http://www.paho.org/english/ad/dpc/nc/nc-home.htm>

NCDs Have A Major And Growing Economic Cost In LAC

Personal health expenditures are often defined as catastrophic if spending requires more than 40 percent of household income to be spent on health after basic subsistence needs are met.¹⁵ On average, out-of-pocket expenditures represent 39 percent of total health expenditures in Latin America, and most of these expenditures are related to NCDs. The economic cost of diabetes alone is calculated at \$10.7 billion in LAC compared with \$4.1 billion for HIV/AIDS and \$1.8 billion for tuberculosis.¹⁶ Although these comparisons do not show the economic cost of cardiovascular disease, that is likely to be even greater.

These costs have a real impact on people and families in LAC. Two examples given below illustrate the problems that NCDs can cause if people have difficulty accessing the health care system, how people will incur greater costs if more attention is not given to primary, secondary, and tertiary prevention of NCDs, and, perhaps most important, how NCDs affect families.

Luis worked in a factory, earning enough to support his wife and child until undiagnosed hypertension resulted in cardiovascular disease. His son, Jesus, was forced to leave school to work as a janitor to help his mother pay for the drugs and supplies his father needed for the rest of his life. The family worries that Jesus is developing chronic respiratory diseases as a result of the dust and chemicals used in his job and that he will develop COPD. Jesus was a good student and the computer classes he was taking would likely have allowed him to earn a better living than his parents had. Now it is unlikely that Jesus will be able to return to school.

Maria was working as a stock broker in an international firm and was able to maintain a comfortable lifestyle for herself and her husband and their three children. Her worsening vision, a result of poor control over diabetes, left Maria unable to see the computer screen. When she lost her job, Maria also lost her health insurance. She can no longer afford the simple diabetes drugs that allow her to maintain her health. Maria is doing part-time work, but this means that the children do not have enough to eat and the family needs to move to another neighborhood. Her husband had to sell his delivery van to repay the debts he incurred the last time Maria was hospitalized. It is likely that Maria will die prematurely, leaving her husband to care for their children as a single parent.

The economic consequences of NCDs are seen most clearly in the percentage of men above 15 years of age who will die before reaching their 60th birthday (Adult Mortality Rate): 20 percent (Figure 12). A substantial percentage of men die prematurely in the LAC region, ranging from 15 percent in the Southern Cone to 25 percent in the Latin Caribbean region. For women, the figures are lower but still substantial (Figure 13). These indicators correlate directly with a loss of productivity even without

accounting for forced early retirement due to disability and the costs to families and society that are associated with early disability or death.

Burden of disease studies examine the cost of specific diseases and consider not only the direct medical costs (drugs, hospitalizations, consultations, etc.) but also the indirect costs (foregone earnings, loss of productivity, etc.). One study examined the direct and indirect costs of diabetes in LAC,¹⁷ and showed that, In 2000, there were 339,035 deaths that were attributable to diabetes. Many of these individuals died prematurely, and the study estimated a loss of 757,096 life years. More significant from an economic perspective, the number of years associated with permanent disability and diabetes was 12,699,087 and 136,701 with temporary disability. Total costs were estimated to be \$10,771 billion in direct medical costs and a staggering \$54,496 billion in indirect costs. This shows the tremendous cost of just one illness in LAC as well as the tremendous indirect cost of one chronic disease. The cost of cardiovascular disease and cancer is probably much greater, but such burdens of disease studies have not been published.

II. Confronting NCDs

The growing burden of disease due to NCDs has not elicited a significant response from international aid agencies in the LAC region even though NCDs represent a significant burden and have a large economic impact. Some middle-income countries have taken up the challenge on their own, and as a result, provide model programs that could be used as paradigms for international assistance directed at NCDs.

The Disease Control Priorities 2 (DCP2) report identifies cost effective ways to prevent and manage disease and includes a number of chapters specifically related to NCDs. Programs highlighted as best practices in primary prevention include ones to prevent smoking, prevent alcohol abuse, increase the level of physical activity, and improve diet. The report also recommends several cost effective secondary and tertiary prevention programs, noting that

- The use of aspirin and beta blockers to treat myocardial infarction costs less than US\$25 per disability adjusted life year (DALY).^{18, 19} With a combination of inexpensive drugs, secondary prevention for individuals with high-risk cardiovascular disease can be typically provided for under US\$300 per DALY averted.^{20,21}

- Glycemic control of diabetes using a combination of insulin and lifestyle changes can be cost saving for individuals with poor baseline control (HbA1c above 9%).²²
- Education in proper medication use for asthmatics is a cost effective intervention, particularly in low-income countries, where timely access to emergency care may be unavailable.²³

These are important guidelines for USAID and countries in the LAC region to consider, but it is also important to consider what is working in the LAC region. Our review of programs suggests that there are 80+ ongoing NCD programs in the LAC region. These programs represent the full spectrum of primary, secondary, and tertiary prevention. Annex 4 provides data on several aspects of each program, including location, dates, disease(s) addressed, program description, and outcomes. It also provides information on whom to contact for more information and how we identified the programs. It allowed us to focus on programs that met four criteria:

- low cost per person,
- low cost per DALY averted,
- significant improvement in health outcomes,
- program was sustained once initial funding ended.

Model Interventions

In this section, we illustrate specific model programs that international aid agencies and countries can consider to prevent or manage NCDs in LAC. We developed models in seven areas:

- Exercise Promotion
- Tobacco Control
- Nutrition Programs to Prevent Obesity
- Hypertension Detection and Treatment
- Prevention of Kidney Disease
- Self-Help Groups to Increase Patient Compliance with Guidelines
- Asthma Control Using a Team Approach

These programs focus on risk factors that cause NCDs or are secondary and tertiary prevention programs for NCDs with high prevalence in the LAC region. Note that some important risk factors and NCDs are not on the list. Although alcohol abuse is an important risk factor and cancer and mental illness are considerable sources of significant disability in the LAC region, we could not identify any low-cost, cost effective programs already operating in the LAC to suggest as models.

Many of these programs can be modified to apply to other primary, secondary, or tertiary prevention programs. For example, exercise programs can be modified to be used as smoking cessation programs, and cardiovascular programs can be modified to be used as diabetes programs. It is important to see these programs as applicable to a wide range of behaviors and diseases. Many programs can address a wide range of risk factors or NCDs. In fact, the programs are more likely to be cost effective if they address more risk factors or a wide range of diseases. Given that USAID does not currently have resources dedicated directly to NCDs, suggestions are offered as to how model programs could fit into existing USAID efforts in LAC.

1. Exercise Programs

Demonstrated Success In LAC

Exercise can reduce the incidence of chronic disease, especially for cardiovascular disease and diabetes but also for certain types of cancer. The challenge is to design exercise programs that impact health status and are cost effective. The following program types were found to be successful in LAC:²⁴

- "point-of-decision" prompts to encourage exercise;
- community-wide information campaigns;
- school-based physical education;
- social support in community settings;
- individually adapted health behavioral change;
- and programs that enhance access to places offering physical activity combined with outreach activities.

Agita São Paulo is a combination public awareness and improving-access program operating in São Paulo, Brazil. It is designed to appeal to a wide range of age groups including children, working age adults, and seniors. The program gets people to appreciate the benefits of exercise and then facilitates their access to exercise by redesigning parks, making gyms more accessible, or redesigning the school curriculum to include exercise. The cost of this program is estimated at 1 cent per person (the range is 0.4 to 6 cents per person, depending on the specific program). One evaluation found that the frequency of moderate physical activities increased from 3.5 to 5.0 days per week, and the duration increased from 40 to 120 minutes per day. Another evaluation found that among school-aged children, the proportion achieving the recommended threshold (150 minutes per week)

increased from 20 percent to 40 percent for boys and from 4 percent to 42 percent for girls. An economic evaluation found that the Agita program was remarkably cost effective at only \$248 per DALY averted.

An exercise program in Chile that focused on children of low socioeconomic status was proven to be cost effective.²⁵ This program consisted of three 90 minute sessions a week. Each session consisted of three steps: minimum activity with no weight transfer, stretching and non-strenuous arm, leg, and trunk movement followed by weight transfer activities incorporating dynamic large muscle movements such as fast walking, running, and jumping; and conclusion with sports practice. Different sports were conducted in units of 10 consecutive weeks. Similar exercise programs have also been successful in other countries in LAC:

- Colonia-Recreovia and Ciclovia programs in Bogota, Colombia are community-wide programs that promote recreational activity and active transportation for citizens by encouraging the use of public space (parks, avenues, and bicycle paths).
- VIDA CHILE is a program organized in over 30 regions and overseen by more than 2 dozen Chilean organizations. This national program uses a variety of strategies to promote physical activity for improved health and quality of life for all Chileans.

Model Exercise Program In LAC

The key aspect of all successful exercise programs is to require physical exercise for 30–90 minutes a day for a minimum of 3 days per week. Exercise programs that begin early in life and motivate children to exercise are typically the programs with the most long-term impact. Exercise and nutrition programs that prevent obesity in children are very effective in preventing diabetes. In addition to health benefits, youth-focused exercise programs have been shown to reduce involvement in gangs and to increase youth educational attainment.²⁶

One evaluation of physical education programs operating in schools in LAC concluded that school-based physical education is a good strategy to increase physical activity in school children and adolescents and recommended the implementation and maintenance of quality school physical education programs and policies throughout LAC.²⁷ The challenge is to develop programs that encourage students who are not good at sports to participate since they are the children least likely to exercise.

The SPARK program²⁸ originated in the United States and then spread to many other countries, including several countries in LAC. This program improved the level of exercise in 97 percent of children who participated in it in a wide range of counties and locations.²⁹ In the SPARK program, children begin with warm-ups such as walking in place while the teacher provides instructions about what's going to happen for the remainder of the class. The program can be operated by a physical education teacher or the regular classroom teacher. After warm-up, the first part of the class is geared toward participation in a sports-related fitness activity, with children learning skills related to volleyball, softball, soccer, etc. However, competition is not the major focus. In soccer, for instance, after one child kicks the ball, each member of the team must kick the ball at least once before it is sent to the other team. This gets every child involved. The final part of the class creates a transition to health fitness activities such as strengthening exercises, sit-ups, or walking related activities. As part of the walking program, children learn imagination games to keep them entertained while walking.

Outside the school setting, there are various ways to make exercise more interesting for children by changing the social climate to be more responsive to exercise, encouraging supportive behaviors, adopting policies to increase the availability of exercise resources, and offering financial incentives for parents to involve their children in physical activities. In some locations, the natural or constructed environment has been modified to make it more conducive to exercise. Programs in Brazil, for example, market the active lifestyle, modify the natural and constructed environment (parks and/or gyms), and link disease intervention with the provision of health services.

Potential USAID Involvement In Exercise Programs

Exercise activities that USAID could support and that build on existing initiatives include programs that are part of youth-focused activities aimed at reducing gang violence or increasing workforce development.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Exercise programs for adults and seniors
- Anti-smoking programs that involve changing the community environment to prohibit smoking in public places

- Alcohol treatment programs that involve changing the community environment to prohibit drinking in public

2. Tobacco Control

Demonstrated Success In LAC

The World Health Organization has identified characteristics of successful programs that help people stop smoking and prevent children from starting to smoke. The following components have been demonstrated to be effective and obtainable in many countries including several in LAC:

- Increase tobacco taxes. Tobacco taxes should be increased to a level that severely discourages consumption of tobacco. The appropriate taxation level will be determined by the final cost of consumption. In some countries, the acquisition cost is relatively low. The funds derived from these taxes could be used to fund anti-smoking campaigns or assist people who have developed cancer, congestive heart failure or congestive obstructive pulmonary disease, or other smoking related illnesses.
- Develop and enforce laws and regulations to ban tobacco consumption in workplaces and other public places.
- Develop mass media campaigns.
- Ban all tobacco advertising and promotion.
- Control tobacco sales to minors. The most successful countries have targeted minors and have focused their efforts on keeping children from starting to smoke.
- Ban all free cigarette distribution.
- Ban vending machine sales of cigarettes.
- Control smuggling. A constant concern in all the countries visited was that of smuggling. In many countries, one third of all cigarettes are smuggled into the country without taxes paid on them.

- Enact individual smoking cessation programs. These are often the least cost effective programs, but once a country has the other components listed above in place, this is the next step.

Two countries that have adopted these principles and have had the most rapid declines in smoking prevalence over the past 20 years are Uruguay and Brazil. Mexico has recently passed anti-tobacco legislation, and preliminary evidence suggests tobacco use in Mexico is beginning to decline. The Brazilian experience is even more impressive considering that Brazil is the 3rd largest producer of tobacco in the world and the largest exporter of tobacco.

Uruguay

The National Program for Tobacco Control (NPTC), a part of the Ministry of Health, is the central coordinator of several federal agencies partnering to reduce tobacco use in Uruguay. The NPTC is also a member of the National Alliance for Tobacco Control, which coordinates governmental and non-governmental efforts to reduce tobacco smoking. The alliance is an independent group of governmental and non-governmental organizations such as the "Junta Nacional de Drogas" (National Drug Administration), "Fondo Nacional de Recursos" (National Fund for Resources), local NGOs, hospitals, academic institutions, and physicians. The key to success is to include all parties that could influence smoking rates.

The key elements of the national program in Uruguay are

- Creating and maintaining an alliance between the state, the public, and NGOs to coordinate activities in order to deliver a consistent effort and message;
- Providing information to politicians, businesses, and other stakeholders on the impact of tobacco smoke and the international efforts to reduce smoking;
- Sensitizing the public to the impact of smoking;
- Building support among the press and local sports figures;
- Implementing policy changes such as increased taxation on tobacco products, placement of package warnings, and promotion of smoke-free public spaces;
- Establishing clear conditions for punishment and enforcement of penalties;
- Providing counseling and medications to assist current smokers in quitting.

A fundamental component in the success of the Uruguayan initiative was the political decision to engage with other stakeholders early in the process. For example, it was evident from the experience of other countries that bars, restaurants, and nightclubs would oppose any legislation that limited smoking in their establishments. As a concession to these businesses, the government liberalized regulations regarding terraces on public sidewalks, effectively allowing businesses to expand their space to public areas from which they were previously prohibited. Small business owners actually became allies in advocating for a 100 percent ban on smoking indoors rather than for regulations that would designate separate smoking and non-smoking areas because, for many small establishments, such a division of areas would be too costly. In spite of concerns that it would hurt business, an evaluation of the measure has shown that there has been no statistically significant decrease in restaurant and bar sales since its implementation.³⁰

The Ministry of Public Health also assuaged business owner's fears that they would be fined for the behavior of customers who ignored the legislation by making the requirements for businesses very clear.. If business owners removed ashtrays from their business and posted signs prohibiting smoking, they would not be fined if inspectors found a customer smoking in their establishment. Businesses were thus guaranteed that if they complied with the regulations, they would not be punished for factors outside their control. On the other hand, the Ministry of Public Health was allowed to establish strong fines for those businesses that did not comply.

The success of the smoke-free policy is evident in all public spaces, and Uruguay's air quality ranking has gone from among the worst in the world to being second in a study of 32 countries.³¹ It is difficult to calculate the full economic costs of the policy effort, but there can be little doubt that it is small compared with its national impact on health. The overall effort requires a full-time staff of 6 (2 MDs, 2 secretaries, 1 lawyer, 1 sociologist).

In Uruguay, the cessation clinics function as a separate effort. They are funded in part by the National Fund for Resources. The National Fund pays for free nicotine gum and Wellbutrin for any citizen who chooses to participate. In a recent effort to control costs, Wellbutrin has been limited to 6 months per patient, after which a physician must request an extension of the patient's prescription coverage. There is no absolute limit to the time a particular patient may qualify for free medications or nicotine gum. Some

funding for the cessation clinic staff is also provided by the National Fund, but many other staff people are either volunteers or are paid by the health centers in which the clinics are based.

Depending on the clinic, smoking cessation counseling takes place as group therapy or individual counseling. The therapist or physician collects data on each participant and develops a plan for smoking cessation. Patients complete an 8-week course of counseling on smoking cessation strategies and work toward individualized objectives for reducing consumption. Twenty-five percent of patients who have participated have achieved abstinence for greater than 1 year, and 56 percent of patients have achieved abstinence at some point. Data on the cost effectiveness of the clinical counseling or smoking ban as it relates to actual morbidity or health care costs is not available, although administrators are eager to partner with international organizations to conduct such an analysis.

Mexico

In 2002, 23.5 percent of the population aged 12–65 in Mexico smoked, with an increasing trend of young women smoking.³² An estimated 25,000 deaths were caused by tobacco in 2000.³³ Recent years have seen the application of a range of policies aimed at reducing tobacco consumption, including the prohibition of television and radio advertising for cigarettes, the mandatory placement of warning labels on the backs of cigarette boxes, a ban on smoking in restaurants and bars, and an increase in cigarette taxes.

In 2005, the tax rate for cigarettes was set at 110 percent, equivalent to 45.5 percent of the price to consumers. If the value added tax (VAT)—levied on nearly all goods and services in Mexico—is also included, the tax rate for cigarettes was equivalent to 59 percent of the price to consumers. As a result of the tax increase, the price of cigarettes in Mexico is relatively high in comparison with other countries in Latin America.³⁴ Because these changes are recent, it is too soon to calculate the impact on smoking rates or the economic impact. The preliminary evidence is, however, positive.

Brazil

There is evidence of a significant reduction in smoking between 1989 and 2003 in Brazil. One study showed a 35 percent reduction between 1989

and 2003, or an average reduction of 2.5 percent per year. Even more important, the largest decline occurred among younger age groups.

Brazilian tobacco control efforts began in earnest in 1987 with the establishment of the National Tobacco Control Program (NTCP) at the National Cancer Institute (INCA). In 1987, businesses that supported workplace smoking bans were recognized publicly; cigarette packs were required to display warnings; and the media discussed the hazards of second-hand smoke. Once these programs were established, the tobacco growers were engaged in the process, and alternatives to tobacco cultivation were developed. In 1995, legislation restricting tobacco advertising was passed, and states became actively involved in tobacco control efforts. Research demonstrated a decline in tobacco consumption and identified the characteristics of people who were still smoking. This resulted in more specific targeting of anti-smoking efforts.

Workplace prohibitions on smoking began in the Ministry of Health building and were rapidly expanded to all workplaces. In 2000, legislation was passed allowing tobacco advertising only in locations where tobacco was being sold, and in 2001, legislation was passed limiting the amount of tar, nicotine, and carbon monoxide allowed in cigarette smoke.

The one area where Brazil has been less active is taxation. Despite relatively high tax rates, Brazilian cigarette prices are low by international standards. For example, the price of 20 Marlboro cigarettes was only \$1.23 in Brazil compared with \$1.73 in Argentina, \$2.02 in Chile, \$3.71 in the United States, and \$4.02 in Canada in 2001. One commonly expressed reason for keeping the tax rates at current levels is smuggling, a practice that is made more lucrative when the price of cigarettes is high. One estimate is that 40 percent of all cigarettes in Brazil are sold on the black market.

Model Anti-Smoking Programs In LAC

The first thing all countries in LAC can do is to ratify the WHO Framework Convention on Tobacco Control (WHO FCTC), as most countries in LAC have done. It is the first treaty that was negotiated under the auspices of the World Health Organization and contains many aspects of successful anti-smoking programs implemented in Uruguay, Brazil, and Mexico. Four of the countries in the LAC region that still have not signed the treaty are the Dominican Republic, El Salvador, Haiti, and Nicaragua.

Countries can also work on implementing the components of successful anti-smoking programs that they have not adopted. Countries that have already raised taxes, prohibited smoking in public areas, prohibited advertising, and made it difficult for minors to obtain access to tobacco products can start programs designed to help smokers quit. Efforts need to begin with children and the poor so that poor children never start smoking.

Potential USAID Involvement In Anti-Smoking Programs

- The appropriate taxation level for anti-smoking policies should be determined by the final cost of consumption. USAID can provide the technical support to perform these calculations, especially if tax revenues would be used for other development programs that USAID supports.
- With these taxes, USAID can fund studies in each country to identify programs that would have the greatest health benefits.
- USAID can implement activities to control smuggling of tobacco and other illicit products.
- USAID can sponsor regulations that include those related to smoking in support of developing or enforcing general public health regulations.
- USAID can sponsor anti-smoking policies to improve air quality.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Alcohol abuse programs could be created in similar ways to the anti smoking programs. Guatemala, for example, has a liquor tax that the government uses to purchase contraceptives for its citizens.³⁵
- The anti-smoking and illicit drug programs could be better integrated. For example, smuggling programs for tobacco and illicit drugs could be integrated. Many of the lessons learned in smoking cessation can be applied to illicit drug use and visa versa.
- The anti-smoking programs could be integrated with certain alcohol abuse programs.

3. Nutrition Programs To Prevent Obesity

Demonstrated Success In LAC

Nutritional programs in LAC have historically centered on malnutrition, but the high rates of obesity (Figures 9 and 10) in LAC calls for nutrition programs that include obesity prevention. A new body of research in Latin American suggests that the urban poor are the most severely affected by the relationship between malnutrition and obesity when they eat foods high in fat but that lack essential nutrients.³⁶ Fruits and vegetables need to be added to the diet.

We know that food is an integral part of local environment and culture, and there are important variations across regional and ethnic communities. For example, highly arid climates may be able to produce corn and beans but are less propitious for green vegetable growth. The sometimes held idea that overweight children are healthier than thin children is an example of the importance of cultural constructs.

One program that has already gained regional popularity is the “Five a Day” program, in part because it can be adjusted to address multiple cultural, economic, and environmental contexts. The initiative was first launched in the late 1990s by the National Cancer Institute in the United States. It has since been adopted by WHO and FAO, and, in turn, approximately 40 countries have launched programs to increase consumption of fruits and vegetables. In Latin America, participating countries are Chile, Colombia, Peru, Brazil, Argentina, Panama, Venezuela, Uruguay, and Bolivia. In some countries, the program has remained at the level of national media campaigns, while in others it has spurred innovations in program partnerships and educational interventions.

Colombia is the first country to assess the impact of a Five a Day intervention, although Chile and Mexico are also currently conducting evaluations. Evidence of demonstrated success in the nutrition programs is sparse, and there is a need for additional demonstrations and further evaluation in the region.

Colombia

The Colombian program uses a social marketing strategy to raise awareness of the health benefits of fruits and vegetables. The objective is to replace foods high in fats with fruits and vegetables in order to reduce the level of obesity. In some areas, preventing malnutrition is also an objective. With Ministry of Health support, Colombia created an independent NGO to facilitate a public-private partnership with multiple

stakeholders, including producers and exporters of fruits and vegetables, supermarkets, farmers' markets, schools, employers and community organizations, etc. Each of these sectors tailors its messaging to its specific setting and constituents. Colombia has also tackled the issue of access to and cost of fruits and vegetables by increasing outdoor markets in urban areas and arranging direct sales by producers. In addition, educational programs for school-age children and their families have been central to Colombia's approach.

The Colombian intervention includes

- A "training the trainers" course on infant nutrition and food preparation for children and adults.
- Cooking classes with families.
- Daily conversations with families at the start of the school day about their lunch and dinner plans.
- In-school activities with children including songs, poetry, and games that emphasize fruits and vegetables.
- School hand-outs to all families, as well as posters, etc., in and around the schools.

An evaluation of the program followed 139 families over a 10-month period and found a positive impact in terms of increasing consumption of vegetables but not of fruit. Lack of refrigeration was viewed as a major impediment to increased consumption. A randomized trial to evaluate a similar educational campaign in Chile is also currently underway, with results expected in 2009.³⁷

Model Nutritional Programs In LAC

The Five a Day program demonstrates the potential of developing educational programs that build on positive messaging to address obesity. Obesity tends to begin at school age, so this is the appropriate age to begin the effort. The program also suggests the value of partnering with the school system to reach both school-age children and their parents. By building on existing resources, such an approach is likely to be low cost. In addition, it is the kind of program that can be implemented regardless of the accessibility of medical services, making it appropriate for poor and remote areas that may lack medical care.

Potential USAID Involvement In Nutrition Programs

- USAID could expand nutrition work within maternal and child health programs to include mothers and children who are overweight, in addition to those who are underweight, to promote healthy eating. Healthy eating begins with children and mothers.
- USAID could examine the obesity profile and nutritional needs of people with communicable diseases. The objective is to make sure that they are able to maintain a healthy weight and are eating healthy foods.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Smoking programs could use some of the same marketing approaches.
- Exercise programs could follow a similar approach, getting people to exercise 150 minutes per week by clearly stating the program goals and then using a media campaign and selected interventions to promote the goals.
- Maternal nutrition programs could be incorporated into the Five a Day program

4. Hypertension Control Programs

Demonstrated Success in LAC

Hypertension is a major risk factor for several different types of chronic disease, especially cardiovascular disease. Numerous countries in LAC have already undertaken programs to detect and treat people with hypertension. Two of the more successful programs are found in Mexico and Brazil, and these could serve as models for other countries.

Mexico

Progresas (Program de Educacion, Salud, y Alimentacion) provides cash transfers to poor rural households, on condition that their children attend school and family members visit local health centers. After 7 years of operation, the Progresas program was renamed Oportunidades and its mission slightly changed. All the evaluations made were done for the Progresas program so that name will be used in this report. The Progresas

program provides a 125-Peso (about \$US12) monthly food transfer per family if each child receives 2–4 checkups annually, adults receive 1 annual checkup, and pregnant women receive 7 pre- and postnatal checkups.

There have been several evaluations of the Progresa reform showing a positive impact in certain areas. An evaluation found a statistically significant increase in visit rates to public clinics, which continued to grow as more localities were included in the program. The rate was estimated to be more than double the number of such visits by non-Progresa families. In addition, the study found a significant increase in the number of kilometers that participants 18–50 years of age were able to walk without getting tired. For those over 50, Progresa beneficiaries had significantly fewer days of difficulty with daily activities, days incapacitated, and days in bed due to illness.³⁸ This translates to a major economic impact because people are able to work longer.

One study specifically examined the impact of the Progresa program on individuals with hypertension. While control of hypertension was not a specific goal of the Progresa program, it was a requirement that people go to a primary care provider where their blood pressure would be monitored. People participating in Progresa were found to have higher rates of anti-hypertensive treatment and blood pressure control than those who did not participate, possibly due to contact with an increased number of clinicians trained in the diagnosis and treatment of hypertension and the availability of screening and treatment programs at minimal or no cost.³⁹

Brazil

Brazil approved the Arterial Hypertension and Diabetes Mellitus Care Reform Plan in 2001. This program has both preventive and treatment components. The components are (1) a “train the trainers” campaign among clinicians in primary care; (2) a media campaign and identification of suspected disease cases; (3) a confirmation of diagnosis; (4) registration and referral of confirmed cases to primary care facilities; and (5) financial incentives for primary care clinics to detect and treat people with diabetes and hypertension.

In Brazil, as in many LAC countries, the challenge is to implement programs that receive adequate resources to carry out the program’s mission. People with a disease want access to all possible services;

however, these services are often unaffordable. In order to identify the most cost effective services, the Ministry of Health relies on the Ministry of Science to develop a list of services that have demonstrated clinical effectiveness for hypertension and diabetes services. The Science Ministry begins with the recommendations of the National Institute for Clinical Excellence (NICE) in the United Kingdom and modifies these recommendations for the Brazilian context. The Science Ministry also employs health economists to evaluate the cost effectiveness of the various options in the Brazilian context. This information is submitted to the Ministry of Health, which makes a decision on which drugs and services are to be covered. The impressive aspect of this process is that services are actually provided if they are on the approved list. According to the World Bank, the cost of the hypertension program is approximately \$1.00 per person per year but ranges between 72 cents per person per year and \$2.69 per person per year, depending on how costs are allocated.

Model Hypertension Program In LAC

A common problem in many LAC countries is a financial barrier that limits access to services that would be beneficial to persons with NCDs. Mexico used a targeted approach to directing services to those most in need and was able to expand access to care for individuals while at the same time requiring individuals participating in the program to undertake certain preventive services. The most important component of this program is having the person go to a clinic annually. This allows the person to be screened and receive counseling on how to lower their blood pressure. The Brazilian approach is designed to identify the most important aspects of the prevention/treatment program for each patient and to keep a list of where the services and/or drugs are readily available.

Potential USAID Involvement In Hypertension Programs

- USAID could fund programs that would estimate the benefits and cost effectiveness of certain types of interventions using a program similar to Brazil's.
- USAID could assist countries to modify their anti-poverty programs to provide assistance only if a person engages in certain preventive activities, such as in Mexico.
- USAID could consider including NCD programs in the package of services and/or user requirements for receiving benefits.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Hypertension programs could be redesigned for other chronic conditions. They will be most effective for diseases that are not readily apparent to the person with the disease. An example is high cholesterol. The challenge is to get the person to recognize the seriousness of the disease.
- Anti-poverty programs could be adopted to ensure compliance with many different types of appropriate behaviors. This could be done through primary prevention activities or having patients participate in a program when an NCD is diagnosed.

5. Prevention Of Kidney Disease

Demonstrated Success In LAC

Most of the initiatives we have presented here involve primary or secondary prevention. These programs are most appropriate for low-income countries because they tend to be the least costly and tend to have the greatest benefit for the most people. For some people, however, primary prevention does not keep them from developing a disease. These people will need to be treated, and it may be difficult for them to access appropriate care. Successful tertiary programs involve dispensing of medicines and treatment, programs that are generally more expensive to operate. These are more appropriate for middle-income countries that have already implemented the primary and secondary prevention programs. Tertiary prevention programs should be considered by some middle-income countries if these countries believe they can help lower overall health spending through preventing even more serious illnesses.

Tertiary care programs can illuminate a common problem encountered when addressing NCDs: many people have multiple NCDs. In response, Uruguay has a tertiary prevention program that responds to the needs of people with multiple NCDs. The country initiated this program because it covered renal dialysis as part of its basic benefits package but saw that the costs of that program were rapidly increasing as a result of associated NCDs

Uruguay

Empirical evidence suggests that a program in Uruguay developed to keep people from needing renal dialysis is cost effective, although more rigorous evaluation of the program is needed. Even though renal disease is not a principal cause of death anywhere in the world, treatment is very expensive. The most common co-morbidities and causes of death among patients with kidney disease are cardiovascular disease. The goals of prevention of both kidney and cardiovascular disease overlap: control of blood pressure initially through diuretics, beta-blockers, and ACE inhibitors and decreases in LDL cholesterol. An evaluation of the renal dialysis program found the following demographics for the people entering the program:

- 86.5% had hypertension
- 54.8% had high cholesterol
- 36.7% had diabetes

The National Program of Renal Healthcare (NPRH) in Uruguay consists of screening for patients who show signs of kidney failure and then provision of good nutrition, social work, renal protective drugs, and regular care by a nephrologist for those individuals at risk of renal failure. The program has produced educational materials and workshops to instruct primary care providers on the early signs of renal failure. It has also added specific tests to the health screening that is required of all workers in order to receive a “worker card” (the equivalent of the social security card in the United States). Labs in public hospitals screen all results for samples that meet enrollment criteria. When a blood sample meets these criteria, the name and contact information of the patient is entered into a database or notebook. A social worker then contacts the patient to set up an appointment with a nephrologist, social worker, and nutritionist.

A nephrologist meets with the patient and determines a preventive treatment plan including renal protective drugs. These drugs are free or subsidized depending on whether the patient has public or private insurance. A nutritionist also meets with the patient and provides education about dietary changes, while a social worker helps the patient overcome barriers to therapy compliance. Patients generally meet with the nephrologist twice a year to monitor their kidney status and update their treatment plan as necessary. To obtain their medications, patients are assigned a prescription card. When stamped by the nephrologist as requiring “chronic medications,” the patient can take the card to the pharmacy up to 3 times for 30 days worth of medication each time. After 90

days, the patient must stop by the nephrologist's office to request a prescription for another 90-day period. A database provides reminders when a patient has not returned for an appointment; the social worker then calls the patient to find out why he/she was unable to make the appointment and to schedule a new one.

When patients' kidney function has decreased to the point that they need dialysis, they transition to the pre-dialysis clinic at a hospital. There, a team consisting of a vascular surgeon, nephrologist, nurse, nutritionist, psychiatrist, and social worker work with the patient in order to transition them to dialysis on an outpatient basis. The alternative is acute inpatient dialysis, which is much more expensive and generally has a poorer outcome.

By relying on commonly requested blood and urine tests, the program screens patients with minimal additional costs. The incremental costs are primarily the cost of medications. Our cursory evaluation of clinics suggests widespread recognition of the program among clinic staff and excellent compliance with established protocols. In addition, patients were actively engaged in the process and desirous of additional information. There are also media events staged to acquaint the public with the program. For example, during Renal Health Day, individuals were screened for blood pressure, and educational materials were disseminated through local hospitals. Currently, the major challenge is training a sufficient number of nephrologists to address the need for appropriate care.

Most clinical indicators improved once people were enrolled in the program, including, most importantly, a 22 percent reduction of patients in "clinical remission" and a corresponding reduction in the mortality rate. The intervention lowers the probability of a late referral because people can be identified at an earlier stage of the disease.

Model Tertiary Care Program In LAC

The Uruguayan program illustrates the key elements of a model tertiary care NCD program:

- reliance on an existing health system;
- education of patients and primary care providers;
- inexpensive and reliable screening that can be conducted with basic laboratory capacity;
- focus on inexpensive therapy for patients at high risk.

Potential USAID Involvement In Tertiary Care Programs

- Many people with a communicable disease also have NCDs. USAID could fund a study examining the overlap in CDs and NCDs.
- USAID could fund a study investigating whether compliance and success of communicable disease programs is complicated by the presence of NCDs in their populations.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Almost any NCD disease could be a candidate for this type of program.
- Some of the most logical candidates are breast cancer screening programs, drug maintenance programs following a stroke, and asthma treatment programs.

7. Self-Help Groups

Demonstrated Success In LAC

Many individuals with one or more NCDs have difficulty complying with the activities necessary to keep themselves healthy. One successful type of program for increasing compliance is self-help groups that allow individuals with common concerns to meet to discuss the problem and share suggestions. This works especially well for people with multiple NCDs. Investigators in Mexico have documented the intercorrelation of risk factors for NCDs. For example, 52.5 percent of hypertensive individuals also have high cholesterol levels, and 46 percent of diabetic patients also have high blood pressure. In response, the Mexican government established mutual self-help groups to help people prevent and treat a wide range of chronic conditions.

These self-help groups complement the treatment provided by the clinical teams. They provide education about the disease process and positive feedback for those with the disease as well as promote discussions concerning metabolic control and co-morbidities. The mutual self-help groups promote individual and family health promotion activities. Much of the effort in Mexico is focused on obesity because recent studies suggest

that 30 percent of the population is obese, and obesity leads to a wide array of NCDs. In their obesity program, the Mexican public health officials focus on the waist circumference of a person instead of the more commonly used body mass index (BMI) because they believe that waist measurements are easier for the public to understand. Evaluations of the self-help program in Mexico were generally positive. For example, there was a statistically significant improvement in both men and women's glycemic levels, blood pressure, and obesity levels.

The self-help programs in Mexico operate on principles similar to other self-help programs. First, an organization guide is drafted outlining the objectives and structure of the program. Self-help groups are then established in primary health care centers. The Ministry of Health then develops certification criteria for each unit, and the groups are given technical assistance to achieve these standards. The certification standards are rigorous and are used to measure compliance with the national guidelines by the group members. Prizes are given to the self-help groups that achieve the standards and those that show the most progress.

Model Self-Help Program In LAC

This is a variant on the more familiar “train the trainers” model used extensively in health care. The government establishes goals for specific self-help groups to achieve and provides technical assistance to help them achieve these goals. An example of a goal is to get 95 percent of the people in the self-help group with diabetes to check their blood sugar or blood pressure daily. Self-help groups that achieve standards are given recognition by the local government or some type of prize.

Potential USAID Involvement In Self-Help Programs

- USAID can sponsor programs that promote self-help groups as part of initiatives to develop civil society.
- USAID can evaluate the cost effectiveness of self-help groups in various settings and for different types of behavior.
- USAID can integrate existing self-help programs in communicable diseases with self-help programs for NCDs.

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- The most common diseases used for train the trainers programs are diabetes, hypertension, cancer, and asthma.
- The train the trainers model has also been used in injury control and communicable diseases.

8. Asthma Control Using A Team Approach

Demonstrated Success In LAC

The most effective way to prevent and to treat NCDs is a team approach, as outlined in the chronic care model developed by Ed Wagner.⁴⁰ This model incorporates various aspects of good chronic care. The model shows that it is important for all the professionals involved in caring for a patient to communicate with each other and develop a common treatment plan.

In Bahia, Brazil, asthma affects over 10 percent of the population and represents the third most common cause of hospitalization after cardiovascular disease and cancer. Clinical trials have demonstrated that regular use of inhaled corticosteroids reduces asthma symptoms, thereby preventing asthma related exacerbations, hospital admissions, and deaths. The challenge has been to get clinicians and patients to agree on a treatment protocol, to identify sufficient funding for the intervention, and to get patient compliance. In addition, psychological support, patient education, and self-management are often needed.

The state of Bahia developed a program that offers full medical assistance to patients with asthma. This program offers free medication, medical treatment, psychological treatment, pharmacologic services, and education on the symptoms and treatment of asthma. An evaluation of the program found a statistically significant reduction in the number of school/work days missed, emergency room visits, and hospital admissions.⁴¹ Substantial reductions were registered, including an 85 percent reduction in emergency room visits, 90 percent reduction in hospital admissions, and 86 percent reduction in missed days from school/work. The Ministry of Health estimates that the annual cost of treating one patient with severe asthma is approximately \$1600 or one third of total family income. A cost

effectiveness study of the program showed a savings of \$1395 for families and the government. This represents an 87 percent reduction in costs, similar to the reduction in hospital admissions and emergency room use.

Model Team Care Program In LAC

Care for people with multiple NCDs often requires a team approach. The first step is to establish a set of standards for effective treatment. The standards need to reflect both effective medical practice and financial constraints. One possibility is to have clinicians and advocates develop an optimal medical practice and have scientists use the clinical literature and health economists use cost effectiveness analysis to determine what is cost effective. Next, it is necessary to determine which patients are most likely to benefit from team care and how to best find them. For example, the easiest place to identify people with asthma is generally the hospital emergency room. For other NCDs, there would be different entry points.

Once the standard treatment protocol is established, a team approach is developed to assist the patient in disease management. For asthma, a pulmonologist, an otorhinolaryngologist, and a patient educator are part of the team. Drugs to treat asthma need to be provided free or at a reasonable cost. For mild to moderate asthma, primary care physicians, nurses, pharmacists, and social workers can be trained to manage these patients. In addition, educational sessions need to be established. Different NCDs will require different teams of clinicians, but the principles in organizing them will be the same.

Potential USAID Involvement In Asthma Care

- The development of standards for the prevention and treatment of NCDs
- The creation of protocols for team care of people with specific NCDs
- An evaluation of team approaches to prevent and care for people with NCDs
- Incorporation of teams to treat NCDs in primary health clinics
- Development of models that incorporate team approaches to treat people with both NCDs and CDs

Other NCD Or Risk Factors Which Could Be Addressed Through Similar Programs

- Team care is especially important for people with multiple NCDs because they need care from a wide range of clinicians. Patients with cancer, for example, often need team care to address their multiple needs.

Conclusion

NCDs have a major impact on the morbidity and mortality in LAC. They are responsible for half of the premature deaths in the LAC region, and these premature deaths have a major impact on the economy. Death and disability from NCDs affect people at every age, both genders equally, in all countries of the LAC region. The cost of not addressing NCDs also has important implications for existing USAID programs. Many women and children in maternal and child health programs have NCDs, as do people in communicable disease programs. It is more expensive and often more difficult to manage people with NCDs, something that reduces the effectiveness of existing USAID programs.

In response to the growing human, social, and economic costs, many middle-income countries in LAC have begun funding programs to prevent and treat chronic conditions. Evaluations have identified inexpensive, cost effective programs that have been successfully implemented and sustained in the LAC region. Programs for exercise, tobacco control, and nutrition support have demonstrated cost effectiveness. In addition, programs for hypertension, cardiovascular disease, kidney disease, asthma, and diabetes are examples of highly successful NCD programs that could be easily and inexpensively replicated and integrated into existing primary care systems.

Middle-income countries would benefit from assistance in evaluating other programs since many of them are operating without rigorous evaluation. More specifically, technical assistance is needed to help them bring demonstration programs to full scale. Information gathered on programs operating in other countries to see if those programs can be replicated in similar countries would also be useful. In most cases, the assistance provided can be minimal and well-targeted.

Low-income countries are heavily dependent on international aid programs to fund their health systems. Currently, there is very little international aid for NCDs in low-income countries in spite of the high burden of disease and economic cost. We recommend that USAID and other international donors

give consideration to interventions that will prevent or manage NCDs and thereby increase the healthy productive years and decrease the economic and social costs of NCDs for people in low-income countries.

ACKNOWLEDGMENTS

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REFERENCES

- ¹ Wu, S., Green, A. "Projection of Chronic Illness Prevalence and Cost Inflation." RAND Corporation, October 2000.
- ² Murray, C.J.L., Lopez, A.D. "Global Health Statistics." Global Burden of Disease and Injury Series. Boston, MA: Harvard School of Public Health.
- ³ Mensah, G. "International Trends in Cardiovascular Disease and Stroke in Women." 2nd International Conference on Heart Disease and Stroke in Women, Orlando, Florida, Feb. 17–20, 2005.
- ⁴ Jamison, D., et al. "Disease Control Priorities in Developing Countries." 2nd Edition (DCP2), 105.
- ⁵ Yach, D., Hawkes, C., Gould, C.L., Hofman, K.J. "The Global Burden of Chronic Diseases Overcoming Impediments to Prevention and Control." JAMA. 2004;291:2616–2622.
- ⁶ World Health Organization. Chronic Respiratory Disease Asthma is the Most Common NCD for Children and has a Major Impact on children and Their Families. <http://www.who.int/respiratory/asthma/en/>. For a general recognition on this see Yach, D., Hawkes, C., Gould, C.L., Hofman, K.J. "The Global Burden of Chronic Diseases Overcoming Impediments to Prevention and Control." JAMA. 2004;291:2616–2622.
- ⁷ Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Grenada, Guyana, Honduras, Jamaica, Mexico, Panama, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.
- ⁸ "A Race Against Time." Columbia University and the University of Sydney, 2004;36.
- ⁹ Kaaja, R., Greer, I. "Manifestations of Chronic Disease During Pregnancy." JAMA. 2005;294:2751–2757.
- ¹⁰ The Burden of Disease and Mortality By Conditions. DCP2.org/pubs/GBD/3/Table/3.C4.

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- ¹¹ Bobak, M., Jha, P., Nguyen, S., Jarvis, M. "Tobacco Control in Developing Countries." Poverty and Smoking. Oxford, England.
- ¹² Bobak, M., Jha, P., Nguyen, S., Jarvis, M. "Tobacco Control in Developing Countries." Poverty and Smoking. Oxford, England.
- ¹³ Efroymsen, D., Ahmed, S., Townsend, J., Alam, S.M., Dey, A.R., Saha, R., Dhar, B., Sujon, A.S., Ahmed, K.U., Rahman, O. "Hungry for Tobacco: An Analysis of the Economic Impact Of Tobacco Consumption on the Poor in Bangladesh." Tobacco Control. 2001;10:212–217 (autumn).
- ¹⁴ Cedergren, M. "Maternal Morbid Obesity and the Risk of Adverse Pregnancy Outcome." Obstetrical and Gynecological Survey. 2004;59(7):489–491.
- ¹⁵ Xu, K., Evans, D.B., Kawabata, K., Zeramdini, R., Klavus, J., Murray, C.J.L. "Household Catastrophic Health Expenditure: A Multicountry Analysis." Lancet. 2003;362:9378.
- ¹⁶ USAID Issue Brief: Latin American and Caribbean Health Programs Affect Economic Growth.
- ¹⁷ Barcelo, A., Aedo, C., Rajpathak, S., Robles, S. "The Cost of Diabetes in Latin America and the Caribbean." Bulletin of the World Health Organization 2003,81(1).
- ¹⁸ DCP2, 48.
- ¹⁹ According to WHO, the DALY measurement combines the time spent living with a disability and the time lost due to premature mortality. One DALY can be interpreted as one lost year of healthy life.
- ²⁰ DCP2, 54.
- ²¹ Interventions at similar costs include salt iodization or breast feeding promotion at less than US\$25 per day according to: "Social Protection in Asia and the Pacific." Development Bank, 2001. Similarly, the lifetime cost of protective footwear for leprosy patients is around US\$300 per DALY averted, according to: G, S., Saunderson, P., Currie H. "Footwear for Farmers Affected by Leprosy." Leprosy Review. June 1998.

²² DCP2, 595–596.

²³ DCP2, 689.

²⁴ Kahn, L., Ramsey, R., Brownson, G., Heath, E., Howze, K., Powell, E., Stone, M., Rajab, P., Corso, P. “The Effectiveness of Interventions to Increase Physical Activity. A Systematic Review.” *American Journal of Preventive Medicine*. 22;4:73–107.

²⁵ Bonhauser, M., Fernandez, G., Püschel, K., Yañez, F., Montero, J., Thompson, B., Coronado, G. “Improving Physical Fitness and Emotional Well-Being in Adolescents of Low Socioeconomic Status in Chile: Results of a School-Based Controlled Trial.” *Health Promotion International*. 2005;20(2):113–122.

²⁶ Seefeldt, V.D., Ewing, M.E. “Youth Sports in America: An Overview, Role of Organized Sport in the Education and Health of American Children and Youth.” Carnegie Corporation of New York, 1996; <http://www.fitness.gov/youthsports.pdf>.

²⁷ Hoehner, C.M., et al. “Physical Activity Interventions in Latin America: A Systematic Review.” *American Journal of Preventive Medicine*. 2008;34(3);224–233.

²⁹ Sallies, J.F., McKenzie, T.L., Alcatraz, J.E., Cloudy, B., Faucets, N., Hovel, M.F. “The Effects of a 2-year Physical Education Program (SPARK) on Physical Activity and Fitness in Elementary School Students. Sports, Play and Active Recreation for Kids.” *American Journal of Public Health*. 87(8):1328–1334.

³⁰ Ramos, A., Curtis, D. “Economic Evaluation of the Impact Due to the 100% Smoke-Free Act in Hospitality Sector in Uruguay.”

³¹ Hyland, A., Travers, M.J., Dressler, C., Higher, C., Cummings, K.M. “A 32-Country Comparison of Tobacco Smoke Derived Particle Levels in Indoor Public Places.” *Tub. Control* published online, 26 Feb 2008.

³² Capuano, J.C., Hernandez, M., Same, J.M., Mendez, I., Tapia, R., Sepulveda, J. “Comportamiento de los Fumadores en México Según las Encuestas Nacionales de Adicciones 1988 a 1998.” In: Valdes, R., Lozano,

E.C., Hernandez, M., eds. Primer informe sobre el combate al tabaquismo. Cuernavaca: Instituto Nacional de Salud Pública, 2005. ["Smoking Behaviour in México According to the National Addiction Surveys 1988 to 1998." In: The First Report on Tobacco Control: Mexico and the Framework Convention for Tobacco Control.

³³ "Valdés Las Cifras de la Epidemia: Daños a la Salud y Mortalidad Atribuible." In: Valdés, R., Lazcano, E., Hernández, M., eds. Primer informe sobre el combate al tabaquismo. Cuernavaca: National Public Health Institute, 2005:29–41. [Figures from the Epidemic: Health Effects and Attributable Mortality."] In: The First Report on Tobacco Control: Mexico and the Framework Convention for Tobacco Control.

³⁴ Guindon, G.E., Tobin, S., Yach, D. "Trends and Affordability of Cigarette Prices: Ample Room for Tax Increases and Related Health Gains." Tobacco Control. 2002;11:35–43.

³⁵ USAID Guatemala State of the Practice Brief. "Ensuring a Voice and a Choice For Women." October, 2006.

³⁶ Stables, G., Heimendinger, J., eds. "5 a Day for Better Health Program Monograph." Bethesda, MD: National Institute of Health, National Cancer Institute, 1999.

³⁷ Zacarías, I.H, Pizarro, T.Q., Rodríguez, L.O., González, D.A., Domper, A.R. "Five a Day Program to Promote Fruit and Vegetable Consumption in Chile" Rev Chil Nutr. 2006;33(Suppl 1). Accessed 8-13-08 http://www.scielo.cl/scielo.php?pid=S0717-75182006000300010&script=sci_arttext&tIng=es#back. Zacarías, I., Rodríguez, L., Hill, R., Domper, A., González, D. "Impact Evaluation of a «5 a Day» Educational Campaign to Increase the Consumption of Fruits and Vegetables." In: Healthy Lifestyles, Healthy People: A Project of the Pan American Health Organization, International Life Sciences Institute and the Centers for Disease Control and Prevention. Santiago, 2005. Prada, G.E., Dubeibe-Blanco, L.Y., Herrán, O.F., Herrera-Anaya, M. "Evaluation of the Impact of a Community Intervention on the Consumption of Fruits and Vegetables in Colombia." Salud Publica México. 49(1). Cuernavaca ene./feb. 2007 ISSN 0036-3634. Accessed 8-13-08. http://scielo.unam.mx/scielo.php?script=sci_arttext&pid=S0036-36342007000100003&Ing=es&nrm=iso32.

³⁸ Gertler, P. "Progesa: An Economic Evaluation Published by the International Food Policy Research Institute." Completed in November 2000.

³⁹ Bleich, S., Cutler, D., Adams, A., Lozano, R., Murray, C. "Impact of Insurance and Supply of Health Professionals on Coverage of Treatment for Hypertension in Mexico: Population Based Study." *BMJ*. 2007;335:875 (27 October), doi: 10.1136/bmj.39350.617616.BE (published 22 October 2007).

⁴⁰ Von Korff, M., Gruman, J., Schaefer, J., Curry, S.J., Wagner, E.H. "Collaborative Management of Chronic Illness." *Annals of Internal Medicine*. 1997;127(12):1097–1102.

⁴¹ Franco, R., et al. "Cost-Effectiveness Analysis of a State Funded Programme for Control of Severe Asthma." *BMJ Public Health*. 2007;7:82:2458.