Chronic Disease in the Developing World:
The Emergence of a Global Threat

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April 14, 2007

A Master’s paper submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Public Health in the School of Public Health, Public Health Leadership Program.

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I. Introduction

Since the turn of the century, tremendous strides have been made in public health practices throughout the world to control death and disability related to communicable diseases. The development of vaccines, the introduction of antibiotics, improvements in maternal and infant care and improvements in public sanitation, have all served to lower mortality rates related to communicable diseases. This trend has been especially true in high-income countries, but has also occurred in low to middle income countries. Coupled with this trend has been the emergence of chronic diseases, or non-communicable disease, as an increasing threat to the health and well being of the developing world. These diseases are characterized by a long latency period, a mixture of casual factors including well-known risk factors, a prolonged course of illness, a non-contagious origin, functional impairment and incurability. Cardiovascular disease, diabetes, cancer, strokes and chronic pulmonary disease have now become the most common causes of death worldwide except in sub-Saharan Africa and the Middle East. If this rate continues at its current pace, by the year 2020 non-communicable disease will account for 80% of the global burden of disease, causing seven out of ten deaths in developing countries. Once thought to be the scourge of the developed, “westernized” world, chronic disease is now the largest cause of mortality in the developing world and will only continue to escalate unless significant interventions are implemented at both the individual and population level. This development is of major significance in low to middle income countries because they are ill prepared to respond to this threat through either prevention or treatment. They lack the health infrastructure to both provide care under the increasing pressure that will be placed on their delivery systems and their
public health capabilities are not sufficiently developed to implement programs that will address the underlying determinants of this growing problem. There will also be financial consequences that develop as a result of the impact of this illness burden on a country’s workforce and macroeconomic development. Heart disease, diabetes and stroke, for example, are estimated to reduce the gross domestic product by 1 to 5% per year in low to middle income countries. The combination of lower birth rates and increasing life expectancy in developing countries will increase that segment of the population that is susceptible to chronic disease. This increases the importance of crafting appropriate strategies and programs to respond to this growing problem. This paper will present an overview of the extent of the problem, explore the determinants behind the rise in non-communicable disease and discuss possible solutions. While there will be discussion of the global consequence of this problem, the focus will be on Latin American countries.

II. The Burden of Chronic Disease

There are three communicable diseases that attract a majority of attention from international aid agencies: HIV/AIDS, tuberculosis and malaria. Data from the World Health Organization (WHO) shows that these diseases account for only 12% of the deaths in low-income countries and 11% of the Disability Adjusted Life Years (DALY) lost. In contrast, cardiovascular disease alone accounts for a 27% mortality rate and 9% of DALY lost in low-income countries. Disability Adjusted Life Years is an approach to measure the impact of chronic disease that combines the Years of Life Lost to premature death and the Years Lived with Disability to paint a picture of the years lost of a healthy
life. Using this method, the burden of adult chronic disease will account for 80% of the DALY lost in developed countries and 70% in middle-income nations.\textsuperscript{7} The WHO's statistics show that non-communicable accounts for 60% of the deaths worldwide each year and almost half of the global burden of disease. This translates into an estimated 35 million deaths worldwide in 2005 attributable to chronic disease, which is double the number that died from all infectious disease, maternal and prenatal conditions and nutritional deficiencies combined.\textsuperscript{4} These deaths are expected to increase by 17% over the next ten years.\textsuperscript{4}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Global Mortality From Chronic Diseases\textsuperscript{8}}
\end{figure}

This trend is especially alarming in Latin American countries where chronic diseases are the leading cause of premature death and disability, accounting for 44% of the deaths among men and women below the age of 70 and contributing to almost 50% of the DALY lost in the region.\textsuperscript{4} Cardiovascular disease is a major killer in these countries, causing 31% of the deaths and it is predicted that ischemic heart disease and stroke rates will nearly triple over the next two decades.\textsuperscript{4} Cancer deaths have experienced a 33% increase since 1990 resulting in 20% of the chronic disease mortality.\textsuperscript{4} This number is only expected to increase. The WHO estimates that 56% of all cancer deaths in 2000 were in developing countries.\textsuperscript{7} Diabetes is on the increase worldwide with estimates of 366 million cases in 2030, 298 million of whom will live in developing countries.\textsuperscript{8} Chronic respiratory disease is also increasing at an alarming rate in the developing world, primarily as a result of smoking. By 2020, chronic obstructive pulmonary disease (COPD) is expected to become the third leading cause of mortality across the world.\textsuperscript{7} The graph below highlights the distribution of these causes.

\textit{World Health Report, Shaping the Future. Chapter 6, WHO}\textsuperscript{9}
Cardiovascular disease, diabetes and cancer will be used to discuss and illustrate the issues that developing countries face as a result of this chronic disease epidemic.

**Cardiovascular Disease**

Cardiovascular disease is the leading cause of death in developing countries, accounting for twice the number of deaths from HIV/AIDS, tuberculosis and malaria combined. As was mentioned previously, this is especially true for Latin American countries, accounting for a third of all deaths and only expected to increase. Developed countries are experiencing a decline in age-adjusted death rates for CVD, even though the overall disease burden is increasing. This is the result of an aging population that has access to prevention and treatment resources allowing people to either delay the onset or live longer with their chronic illness. As a result, nearly 80% of the CVD deaths in the developed world occur after the age of 60, while this occurs in only 42% of the deaths in the developing world. This morbidity and mortality is primarily occurring during the population’s working years, with the resultant decline in a country’s productive workforce.

The epidemiological transition as described by Omran in an article from the Millbank Quarterly in 1971 defined four stages that countries move through as they progress from death due to infectious disease and malnutrition towards deaths due to CVD and other chronic illness. Stage one is characterized by malnutrition and infectious diseases and stage two by improvements in nutrition and sanitation, with the beginning emergence of some chronic diseases and hypertension. Stage three represents an increase in chronic diseases with greater tobacco use, increased fat and caloric intake that leads to more chronic disease deaths than from malnutrition and infectious causes. Stage four occurs
when deaths from CVD and cancer predominate, but prevention and treatment avoids early deaths and prolongs survival. This transition has been compressed in developing countries, resulting in an anticipated 120% increase in CVD for women and 137% increase for men between 1990 and 2020. The majority of Latin America falls into stage three, with some of the poorer countries falling into stage two where they are still at risk for malaria and dengue fever. This description is significant in that countries continue to face the “double burden” of increasing cardiovascular disease along with the challenges posed by communicable disease problems that are still a reality.

The risk factors that have lead to this epidemic of cardiovascular disease are well known. Tobacco use continues to play a major role, as well as increasing rates of obesity and lack of appropriate physical activity. These factors also promote the development of hypertension, diabetes and hyperlipidemia, all precursors to the development of CVD. The consumption of tobacco products and exposure to tobacco smoke is considered to be the world’s leading causes of preventable death, responsible for about 5 million deaths a year, mostly in developing countries including those in Latin America. At least 30% of these deaths are from cardiovascular disease. It is estimated that 2 million men and 380,000 women who die from tobacco products are in developing countries. Unless appropriate interventions are put in place, the death toll related to cigarettes will continue to rise. Tobacco projected deaths are expected to decline in the developed world, but to nearly double over the next three decades in the developing world. Globalization of tobacco products has made finding a solution especially difficult. Liberalized trade policies, global marketing and advertising, sponsorship, direct foreign investment and movement of contraband cigarettes have all served to fuel this increase in consumption.
Hypertension is also an important risk factor for cardiovascular disease and its prevalence is growing in low to middle income countries. Mexico has reported an increase in the disease from 26% in 1993 to 30% in 2000.\textsuperscript{4} There is a trend in developing countries towards increasing urbanization which is also associated with higher rates of hypertension. Urbanization is associated with an increased dependence on motorized transportation, more sedentary jobs and less physical activity. There are also dietary changes that often involve increased caloric intake from sugars, energy-rich carbohydrates, saturate fats and higher sodium intake. The combination of lower levels of awareness in the population and less than adequate treatment resources have resulted in an increasing morbidity from this condition. Men have a higher prevalence of the disease and are less well treated than women.\textsuperscript{14} This may also have an impact on the workforce as a consequence of increasing cardiovascular mortality. There is some thinking that an adverse environment during fetal life and early infancy may predispose an individual to risk factors for CVD. This would place the populations of developing countries at higher risk due to the previous decades of poorly nourished infants who will now survive into adulthood with increased susceptibility to vascular disease.\textsuperscript{14} This association between low-birth weight infants and later development of chronic disease is a true phenomenon, but the explanation may be more genetic than exclusively environmental.\textsuperscript{18} As developing countries do progress through the epidemiological transition and move towards greater “Westernization”, the incidence of hypertension will also be expected to increase.

This “Westernization” may also be responsible for the increasing prevalence of obesity in the developing world, which has tripled in the past 20 years.\textsuperscript{2} This pattern can
be linked to both changes in diet and the level of physical activity. Energy-dense foods with higher carbohydrate content are readily available and less expensive. The sugar content of the world’s food supply is increasing and there has been an increase in the consumption of animal-source foods. This trend has also been accompanied by a decrease in fresh fruits, vegetables, whole grains and legumes as part of a regular diet. There is an increase in the use of motorized transport and energy-saving devices, more sedentary employment as the population moves away from agricultural work into service sector jobs and less engagement in physical exercise. The availability of video games, computers and television certainly contribute to this more sedentary lifestyle. These “Western” lifestyle and dietary changes are not completely linked to urban environments, but can also be found in the rural environment as well. In Latin American countries surveys from 2002 showed that 50 to 60% of adults and 7 to 12% of children were overweight or obese. This increase in obesity and lack of physical activity is especially concerning in children and adolescents, as these patterns of behavior tend to persist into adult life. The fact that obesity has such a significant contribution to the disease burden in the developing world is directly linked to this association with hypertension, diabetes and ultimately cardiovascular disease.

**Diabetes**

This rise in overweight and obesity has led to an epidemic in the prevalence of type II diabetes in the developing world. Type II diabetes tends to occur in adulthood, is associated with diminished insulin sensitivity and impaired glucose tolerance, and most commonly occurs in those who are overweight and sedentary. The WHO predicts that by
the year 2025 80% of all the new cases of diabetes will be in the developing world.

Seven out of ten countries with the highest number of people living with diabetes are in the developing world.\textsuperscript{16} In Latin American countries, 35 million people are currently affected with the disease and this number is expected to double by the year 2025. There were close to 300,000 deaths in this region that could be attributed to diabetes in 2003. The societal costs were also estimated to approach $65 billion in 2000.\textsuperscript{4}

The health care infrastructure in developing countries is ill suited to meet the demands of this growing epidemic. Low and middle-income countries will account for less than 15% of the global diabetes spending despite this increase in prevalence of the disease. Said another way, more than 80% of the medical care for diabetes occurs in the world’s wealthiest countries.\textsuperscript{19} Those that are in greatest need of care are least able to provide the resources or have the ability to pay for it. Direct health care costs related to diabetes range from 2.5% to 15% of annual health care budgets in countries that already struggle to provide health care to their citizens.\textsuperscript{20} There is also the indirect cost to the economy of decreased worker productivity.

The cost to individuals and their families is also staggering. Diabetes is a chronic condition, requiring long-term medical care and often resulting in long-standing morbidity and disability. Most medical care in developing countries is financed with out-of-pocket spending, often leaving families with the choice of food and shelter over health care. The WHO reports that in developing countries, 80% of people will pay directly for some or all of their medicines. In Latin America, families will have to pay between 40-60% of diabetes care costs from their own funds.\textsuperscript{16} This creates unique problems for patients with chronic illnesses due to their need for long-term medications and ongoing
medical care. There is also a lack of access to appropriate health care which can lead to a delay in the diagnosis of diabetes with the resultant increase in complications. This is especially damaging to those with type I diabetes due to their requirement for insulin, which is frequently unavailable. It has been reported that only 3% of patients are treated with insulin in the developing world as opposed to 13% in the developed world.\textsuperscript{16} Without appropriate treatment using insulin, these patients will suffer premature disability and death.

The medical complications associated with diabetes are also devastating. The association with cardiovascular disease has been discussed earlier. Diabetes is responsible for over one million amputations a year, at least 5% of worldwide blindness and the largest cause of chronic kidney failure.\textsuperscript{16} Chronic kidney disease progresses to kidney failure, or end-stage renal disease, which requires dialysis treatment or kidney transplant. It is estimated that by the year 2030, more than 70% of the patients with end-stage renal disease (ESRD) will be from developing countries.\textsuperscript{17} Diabetes is responsible for between 9 to 20% of ESRD in the developing world. In 2003 diabetic kidney disease was the most common cause of ESRD in 9 out of 10 Asian countries.\textsuperscript{2} In China, the proportion of cases of ESRD caused by diabetic nephropathy increased from 17\% in 1990 to 30\% in 2000.\textsuperscript{2} The developing world does not possess the necessary resources to care for ESRD patients. There are often insufficient dialysis resources, essential medications such as erythropoietin, vitamin D and statins are not readily available and patients often have coexisting malnutrition and hepatitis infections.\textsuperscript{17} This places an incredible burden on families that are already stretched to their limits to care for these chronically ill patients. Chronic kidney disease also increases the risk of cardiovascular
disease, which is especially important in patients that are most likely suffering from diabetes and hypertension.

**Cancer**

Cancer is following the same path as other chronic illnesses in the developing world, with major increases in both mortality and incidence. The WHO estimates that the cancer death toll could reach 9 million by 2015. A large percentage of these deaths will occur in the developing world, as evidenced by the nearly 60% that were thought to have occurred in 2005. This increase is significant in Latin America and the Caribbean where there were 479,000 cancer deaths in 2002, a 33% increase from 1990. The same factors that are responsible for the increase in other non-communicable disease are also at play with this increase in cancer diagnosis and death. The population is becoming more “Westernized” and there is growing urbanization, both of which are associated with increasing tobacco use and changes in dietary habits. By the year 2020, the total number of new cases in the developed world is expected to increase by 29%, but in the developing world an increase of 73% is forecast.

The “double burden” of disease; the increase in chronic disease while still feeling the impact of communicable disease, is also mirrored in the growing cancer incidence. Low to middle income countries have a higher rate of cancers that can be attributed to infectious diseases in addition to those associated with the developed world. Cervical cancer in women, stomach and liver cancer all have etiologies that are linked to infectious causes. The public health practices that are necessary to respond to these illnesses are woefully lacking in the developing world. There are insufficient funds and resources to provide screening when appropriate and treatment options for those newly
diagnosed are far below those available in the developed world. This is true for adult as well as childhood malignancies.

Cervical cancer in women serves to illustrate this point well. This is the leading cause of death in women in Latin America and the Caribbean, accounting for 37,600 deaths a year. There is a strong association between certain types of the HPV virus and cervical cancer. The developed world has experienced a significant decline in mortality from this disease through regular screening of women with pap smears. A new HPV vaccine is now available that is given to adolescents before they become sexually active that will result in even a greater decline in the incidence of cervical cancer. Developing countries are limited in their economic and healthcare infrastructure and are not well equipped to offer these services. More that 80% of the new cases of cervical cancer will occur in the developing world and will account for up to 250,000 deaths annually. Patients often have incurable disease when they first present for treatment as a result of the lack of access to adequate preventive care. There may also be regional differences in the malignant potential for certain HPV viruses. HPV31 and HPV58 virus types are more likely to advance to cervical cancer in Latin America and China when compared to the experience in Europe.

Other infectious diseases also add to the cancer burden. Almost 90% of the liver cancer burden occurs in the developing world. This is primarily due to chronic infections with the hepatitis B virus, in spite of the fact that a hepatitis vaccine has been available for several decades. Developing countries also have a higher incidence of nasopharyngeal cancer and lymphoma that can be attributed to infections with Epstein Barr virus. HIV/AIDS patients also have a higher incidence of cancers caused by viruses,
such as Kaposi’s sarcoma and non-Hodgkin’s lymphoma. Add these cancers to cases of breast, lung, colon and prostate that are more often seen in the developed world and it is no wonder that developing nations are struggling with this problem.

Just as it does with cardiovascular disease, tobacco use is the single greatest environmental threat to the incidence and mortality of cancer in the developing world. While the rate of smoking is declining in some industrialized countries, it continues to climb in low to middle income countries, particularly in young people and women. The rate of breast cancer is much higher in the developed world, but delayed detection and poorer access to effective treatments have resulted in worse outcomes in the developing world. Dietary factors are thought to have some bearing on the development of colon cancer. As the developing world adopts more of a “western” dietary pattern consistent with less fiber, whole grains and fruits, the incidence of colon cancer will increase. The overweight and obesity epidemic is expected to also result in an increase in pancreatic, endometrial and prostate cancers that are associated with this risk factor.

III. Prevention and Control

Multiple risk factors and socioecological determinants will require consideration in order to address this growing burden of non-communicable disease. While the ultimate expression of disease is at the individual level, prevention and control measures must also be developed within the context of population management, cultural understanding, economic policy and political agendas. The constellation of risk factors that manifest themselves as chronic disease, including tobacco use, obesity and decreased physical activity, can be traced back to increasing urbanization, globalization and poverty. The
response of government and society to these emerging issues will require changes in policy, improvements in infrastructure and concerted public education programs in order to realize improvements in health. These are challenges that the developing world is ill suited to meet and the international community has been slow to acknowledge.

One of the more significant societal and environmental changes has been the migration of populations from rural to urban areas. The lure of employment, improved educational opportunities and the possibility of an enhanced lifestyle have helped to contribute to this demographic transition. This movement is occurring across the globe and is expected to increase. The world population living in urban areas increased from 36.6% in 1970 to 44.8% in 1994 and is expected to reach 61.1% by 2025. This change is associated with movement to a more Western environment with the concomitant changes in diet and level of physical activity. Diets that are higher in saturated fat, sodium content and carbohydrates have been coupled with the decrease in grains, fresh fruits and vegetables. These foods tend to be less expensive, are easily available and have been marketed more extensively, particularly to the younger population. Interestingly enough, this dietary change experienced in the urban environment has also had an influence on rural areas as well. Marketing efforts, television, the increased availability of processed foods and the desire to appear more “modern” has resulted in changing dietary patterns in these areas as well.

Encouraging individuals to make changes in their lifestyle and diet is an important component of addressing this problem, but this approach will fall short of achieving measurable gains in attacking the underlying problems. Policy changes that regulate or provide incentives to food manufacturers to change their products in a healthier direction
can be effective. Changing the types of fats in food by reducing the trans-fatty acid content has been an effective and relatively inexpensive approach. As an example, the Netherlands was able to reduce the trans-fat content of the food supply from about 6% of the energy content to approximately 1% in a single decade. Legislation could also be introduced to decrease the salt content of manufactured food products helping to decrease the prevalence of hypertension.

Education will also be an important component of this population approach. Government agencies, such as Ministries of Health, in combination with schools, work sites and community groups will be important in delivering the message about adopting a healthier diet and lifestyle. The message should also be linked with action plans that include offering healthier meals at schools and promoting non-motorized transportation at work sites. In developing countries that are stretched for resources, these interventions have been shown to be cost-effective according to the Disease Control Priorities Project of the WHO. Coronary artery disease events could be reduced by 4% through community media campaigns and efforts to replace saturated fats with monounsaturated fats in manufactured food products. The total cost is estimated at US$1.80 to US$4.50 per capita per year depending on the region. The incremental cost-effectiveness ratio would range from US$1,865 per DALY averted in South Asia to US$4,012 per DALY saved in the Middle East and North Africa. These same assumptions hold true for substitution of polyunsaturated fat for trans-fat and for reducing the salt content of foods.

Urban design and transportation policy initiatives can also have an effect on the level of physical activity in the population. The move to urban areas has resulted in more sedentary jobs and the reliance on motorized transportation. Enacting policies that
discourage automobile use and encourage walking and bicycle transportation can have a positive impact. The contrast between Singapore, where policies have been enacted that discourage automobile use and promote walking and cycling, and China, where families have incentives to purchase automobiles through lower taxes and foreign financing, is emblematic of the challenge facing low to middle income countries. 13

The past several decades have seen the development of global markets for goods and services that has spread to both developed and developing countries. In the industrialized world this has lead to improvements in national income levels, but the same cannot be said of the low to middle income countries. 22 This failure of globalization to improve the national income levels of developing countries has indirectly impacted both their government’s ability to provide health related resources and the individual’s ability to access healthcare services. The marketing and production of tobacco and other products with adverse impacts on health has also taken on a global approach.

No other product has benefited to the extent that tobacco has from the globalization of the world’s economy. It has been said that tobacco is the only consumer product that, when used as recommended by its manufacturers, eventually kills half of its regular users. 22 No where is this more true than in the developing world. Marketing strategies that have been banned in the developed world are allowed to continue in the developing world. Young people and women are often the target of these marketing campaigns. Policies in developed countries that produce tobacco continue to promote the growing and sale of tobacco. The EU spends about 1 billion Euros on agricultural subsidies for tobacco and only about 10-20 million Euros on agricultural diversification and tobacco control programs. 22 Trade agreements between the USA and several Asian countries in
the 1980s resulted in an overall increase in tobacco use, especially in poor countries. The availability of illicit tobacco products over the Internet and online marketing efforts to promote tobacco products have grown, often with the support of tobacco companies. There is variability in the political willingness and capacity to implement the tobacco control policies of the World Trade Organization in developing countries.

Because of its addictive nature, prevention is the best way to control tobacco use. Several interventions have been successful in achieving this goal and in reducing tobacco consumption. Increasing the tax on tobacco has been one such effective approach, especially on lower-income groups and youth. Studies have suggested that the effect of raising taxes and increasing the price of tobacco may be twice as high in low to middle income countries as in higher income countries. Tobacco use has also been restricted in public places causing a reduction in secondhand smoke and creating barriers for current smokers. This also serves to stigmatize smokers, making the practice socially unacceptable. Public policy that either bans or places strict controls on marketing of tobacco products can be combined with public awareness campaigns to highlight the dangers of smoking and encourage quitting. The adverse health effects of smoking are still not widely known and accepted in the developing world. It has also been shown that efforts to reduce the demand for tobacco are cost effective. A 70% increase in the price of tobacco could avert 10 to 26% of all smoking related deaths worldwide, especially in low to middle income countries. In low to middle income countries, a 33% price increase translates to a cost-effective ratio of US$3 to US$42 per DALY averted. Despite its usefulness, this approach to tobacco control has been underutilized.
Considering adjustments for purchasing power, the cost of tobacco products actually fell in most developing countries from 1990 to 2000.\(^{13}\)

Prevention and control efforts are dependent on an adequate healthcare delivery system and an appropriate public health infrastructure to provide effective interventions and surveillance activities. Developing countries will continue to experience the “double burden” of responding to both the continued communicable disease burden and the increasing prevalence of chronic disease. The approach to chronic disease entails responding to multiple problems over an individual’s lifetime and requires an integrated approach that cuts across multiple medical specialties, patients, families, and the community. Typically, those individuals who are at the greatest risk for contracting disease and experiencing significant morbidity and mortality receive the most attention from the healthcare system. Patients with diabetes and hypertension, for example, consume a large part of the healthcare dollar. On the contrary, risk factors are widely distributed throughout the population and addressing these will require a different approach. The greatest impact will come from prevention and control of these risk factors, requiring collaboration across multiple sectors of society in these low to middle income countries. The capacity of developing nations to respond to non-communicable disease prevention is weak and their ability to increase capacity is limited.\(^{22}\) Health care spending by developing countries as a percentage of their gross domestic product is half that spent on health care in developed countries. Low to middle income countries spend about $74 per capita on health care, compared with $2,700 in high-income countries.\(^{5}\) Most health systems in these countries continue to focus on treatment rather than prevention and control. Even when there are effective treatments available, the ability to
implement them is limited. An adequate healthcare workforce is lacking and access to health services is limited by one’s ability to purchase those services. As an example, lower cost options do exist in the area of secondary prevention of cardiovascular disease, but they are underutilized. The generic, multi-drug regimen of an aspirin, a statin for cholesterol management, metoprolol, a beta blocker for its cardio-protective effects, and lisinopril, an ACE inhibitor for hypertension control, has been shown to effectively reduce the morbidity of CVD. The combination could produce a cost-effectiveness ratio of US$310 to US$390 per QALY gained, but only 10 to 20% of those who would potentially benefit are given these medications. Cancer is another area where diagnosis and treatment are often delayed as a result of poor resources. Patients do not often seek treatment until their disease is far advanced and incurable. In developed countries, 80% of patients with cancer of the breast, cervix and mouth are diagnosed at an early stage, whereas in developing countries the figure is only 20%. This lack of early detection and prevention is largely responsible for the disparity in mortality experienced by the developing world, an almost 5-fold increase in death rates.

The response of governing and policy making bodies from around the world to the non-communicable disease epidemic has paled in comparison to the resources committed to communicable disease. Heads of state who attended the G8 summit in 2000 acknowledged that health is a “key to prosperity” and that poor health is associated with poverty, but they failed to commit resources to chronic disease, establishing a Global Fund for HIV/AIDS instead. Heads of state have been reluctant to approve global strategies to control tobacco and reduce sugar consumption for fear of the impact on their farmers. The WHO performed an assessment of the Ministries of Health of 185 countries
from around the world and found a high level of awareness about chronic disease, but there was a decided lack of follow through. Only 33% of countries had budget lines for chronic disease, while most countries lacked comprehensive policies and an integrated approach to prevention and surveillance. The WHO has begun to pay increasing attention to chronic disease care, both as a global entity and through its regional offices. The global strategy on “Prevention and Control of Non-communicable Disease” was published in 2000 and a subsequent report on “Diet, Physical Activity and Health” was released in 2002-2004. The landmark resolution on the “Framework Convention on Tobacco Control” was accomplished in 2003. This was the first time the WHO had used its treaty-making right to address a global public health threat. A report from the WHO Secretariat given to the 120th session of their Executive Board published in January of 2007 outlined a global strategy for prevention and control of non-communicable diseases. In spite of that attention, the resources committed to chronic disease by the WHO are small. The WHO spends only $0.50 on chronic disease (all non-communicable disease except mental health) per death per person compared with $7.50 for leading communicable diseases.

Academic institutions and schools of public health in the United States are instrumental in training large numbers of public health officials from developing countries and yet a review of their curriculum shows a lack of focus on chronic disease in their international health programs. Research support also continues to focus on infectious disease, although there has been some effort to increase funding for chronic disease study. The Fogarty International Center, the international component of the U.S.
National Institute of Health, now allocates one third of its resources to chronic disease research and training in the developing world.\textsuperscript{8}

Aid agencies and donors continue to commit the majority of their funding to communicable disease support. Funding agencies view infectious diseases as treatable with medications and vaccines and as possessing a time course that can have funding limits. Chronic diseases, on the other hand, are life-long problems with multiple determinants. Official Overseas Development Aid to the health sector contributed $2.9 billion in 2002, with only 0.1% allocated to chronic disease. The true figure may be higher since about 30% of Overseas Development Aid goes to basic health services, of which a proportion would benefit chronic disease programs, but the total still falls short of what is required.\textsuperscript{8} There has been some support for tobacco control from the UN foundation and the Rockefeller Foundation, but the Bill and Melinda Gates foundation does not include chronic disease care in its portfolio.\textsuperscript{8}

The World Bank and numerous nongovernmental agencies (NGOs) play a role in assisting developing countries to address problems of poverty, education, health and infrastructure development. These organizations have been slow to focus attention on the problem of chronic diseases in low to middle income countries. In the five years leading up to 2004, the World Bank provided $4.25 billion in loans to countries for health sector work, about 2.5% of which was allocated to “non-communicable disease prevention and control”, all in Eastern Europe.\textsuperscript{8} The Asian Bank is the only Regional Development Bank that includes policies on chronic diseases, but it has been associated with few spending commitments.\textsuperscript{8} The focus has continued to center on communicable diseases while maintaining that individuals are responsible for the prevention and treatment of
chronic disease and this is a function of private markets. NGOs did contribute work to the development of the WHO’s Framework Convention for Tobacco Control, but overall their response to attacking the chronic disease problem has been lacking.

The United Nation’s Millennium Development Goals are eight goals that have been agreed upon by all the world’s countries with a target date of 2015. Goal number 6 proposes to attack “HIV/AIDS, malaria and other diseases”, but there is no mention of non-communicable disease in this statement. The 2006 report publishes achievements in the fight against HIV/AIDS and malaria, but does not address the problems from CVD, diabetes, strokes and cancer that kill a much greater number of people. Other UN initiatives such as the Population Fund and the Children’s Fund also fail to include programs targeted at risk factors for prevention and control of chronic diseases.

There are several persistent misconceptions about chronic disease that may also hamper policy makers when developing prevention and control programs. When viewed from the perspective of the developed world, chronic diseases seem to afflict only the affluent and the elderly. While it is true that chronic disease can develop as a country becomes more “Westernized”, the experience in the developing world is that these are often problems of the country’s most poor residents who have high rates of obesity and tobacco use. Cardiovascular disease affects a much higher proportion of adults during their working years, especially the male population. Chronic disease is also thought to constitute a problem that individuals are responsible for developing as a consequence of their behavior. The same could be said of certain communicable diseases and it is a belief that ignores the role public policy plays in regulating the environment and the marketplace, for example with tobacco and urban planning. Resources are scarce in
developing countries and there is the belief that these resources should be focused on controlling communicable diseases before approaching chronic illness prevention. This approach may not be valid in that certain infectious diseases can cause cancer; tobacco use increases mortality from tuberculosis, and antiretroviral therapy in HIV-infected persons increases the risk of CVD. Chronic disease programs need to be in place along side those dedicated to infectious disease. Tobacco control programs will have an impact here as well as programs to provide vaccination against HPV infections that are linked with cervical cancer. Chronic disease control programs are not overly expensive and interventions can be implemented with proven, cost-effective strategies.

IV. Conclusion

Chronic diseases are the greatest cause of morbidity in the world and nowhere is this truer than in the developing world. This trend is expected to only increase over the next several decades with little hope for improvement. Developing countries are experiencing the epidemiological transition of movement away from morbidity and mortality strictly confined to malnutrition and infectious disease pandemics towards death and disability related to chronic illnesses. This transition is far from complete though, leaving these countries still facing the “double burden” of responding to communicable and non-communicable diseases. Increasing pressure from urbanization, poverty, globalization and poor literacy will continue to burden the governmental systems, social agencies and healthcare systems in the developed world. The development of multiple risk factors such as tobacco use, obesity, poor diets and lack of physical activity, will continue to lead
to an increasing prevalence of cardiovascular disease and diabetes with a subsequent negative impact on the workforce.

The effort to address this global problem will require action on three broad fronts. First, non-communicable disease must occupy a significant place on the agenda of organizations such as the WHO, the United Nations, the World Bank and other NGO's. While the WHO has been a leader in this area, appropriate strategies and funding must be developed and promoted by all these agencies. They will need to collect and provide accurate data about the impact of this problem on the world’s health and economy.

Second, governments in these low to middle income countries will need to develop and implement policies that address the determinants of chronic disease risk factors. This would include tobacco control and food product legislation along with transportation plans that will encourage alternatives to automobile use. Global companies will have to be held accountable for their marketing practices that promote unhealthy behaviors. Funding will be needed for educational programs directed at healthy lifestyles and diet. This should happen in schools, workplaces and in the public sector. These governments will also be in a position to negotiate for access to inexpensive therapies for treatment.

Third, the healthcare workforce will need increased development and training. Prevention and control of chronic illness requires a strong primary care workforce. The approach to chronic illness care is different from medical care needed for acute illness. Evidence-based approaches to chronic illness care will require dissemination and implementation in the provider community. Countries will need a strong public health system that is responsible for ongoing surveillance activities and increased health promotion. This will require integration and collaboration between patients, their
families, the community and the healthcare providers. Countries will need aid and support to develop strategies that allow economic growth in the setting of preserving the ability of all citizens to lead healthy lives and preserve a legacy of health for future generations. Unless we strengthen our efforts to address this growing epidemic, the promise of a better life will continue to be only a dream for an increasing segment of the world’s population.
References

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