

# Executive Summary - The Globalization of Infectious Disease

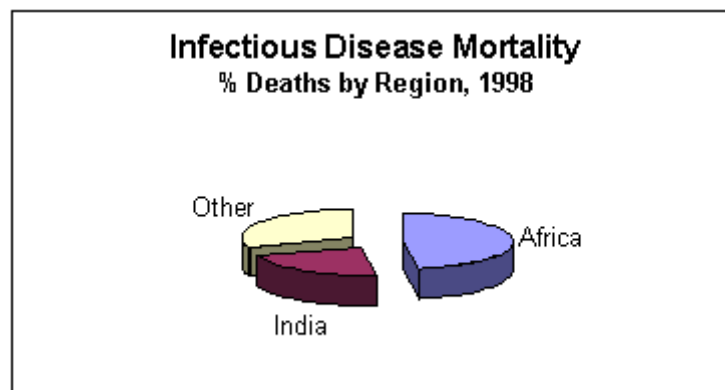
"(We) stand on the brink of a global crisis in infectious diseases. No country is safe from them. No country can any longer afford to ignore their threat." - World Health Organization

## Introduction

Infectious disease is a major public health issue for both developed and developing countries. For developing countries the human cost is immediate and severe in terms of premature deaths, diminished economic productivity, and orphaned children. For developed countries, infectious diseases are a threat on the horizon because of the problem of new and drug-resistant infectious diseases migrating to the industrialized countries. The developed world's stockpile of treatment drugs is being systematically depleted because of microbial evolution, and the increasing resistance to antibiotics and other antimicrobial drugs. The overuse of antibiotics by the U.S. is a big problem in this area.

## Infectious Disease and The Developing World

Most of the immediate burden of infectious diseases is levied on those least able to afford it – the peoples of the developing world. Africa and India both suffer significant population losses each year from infectious and parasitic diseases. Approximately 5 million people in Africa and 2 million people in India – mostly children and young adults – die each year because of these diseases. Africa and India's 7 million infectious disease deaths account for 70% of *infectious disease* deaths worldwide and 13% of *all* deaths worldwide.



**Disease Prevalence.** Causing a total of 10 million deaths in 1998, the infectious diseases most prevalent in the developing world are HIV/AIDS, diarrhoeal diseases (cholera, dysentery, typhoid fever, rotavirus), tuberculosis, malaria and measles.

**HIV/ AIDS** has infected an estimated 42 million people worldwide, orphaned over 8 million children, and killed more than 2 million in 1998 alone.

In Africa, the situation is dire. AIDS has already killed almost 14 million people, and the pandemic is still unfolding. Twenty-two million are currently living with HIV/ AIDS, and during the next decade, life expectancy at birth is expected to drop from 60 years old to about 40 years old and an estimated 40 million children will be orphaned. In some sub-Saharan Africa countries, up to 25% of the adult population has HIV/ AIDS.

Worldwide Deaths, by Disease, 1998 estimates (millions)

Disease	Total Deaths Worldwide	Africa	India	China

	Worldwide			
All Infectious and Parasitic Diseases	9.8	4.7	2.1	0.5
AIDS	2.3	1.8	0.2	-
Diarrhoeal Diseases (Cholera, Dysentery, Typhoid Fever, Rotavirus)	2.2	0.7	0.7	-
Tuberculosis	1.5	0.2	0.4	0.3
Malaria	1.1	1.0	-	-
Measles	0.9	0.5	0.2	-

**Diarrhoeal diseases** claim almost 2 million children's lives worldwide every year, often simply because their bodies are weak from lack of fluids and undernourishment. Africa and India alone lose 1.4 million lives to diarrhoeal diseases such as cholera and dysentery caused by poor sanitation and unsafe water.

**Tuberculosis** has infected 1.9 billion people – almost one-third of the world's population – and roughly correlates with poor economic conditions. This respiratory infectious disease, "consumption" in times of old, still claims 1.5 million victims a year, newly infects another 8 million every year, and is projected to be a major disease burden through at least the year 2020. Africa and India are again hit especially hard. Forty-two (42%) of tuberculosis fatalities occur in these two regions.

**Malaria**, a parasitic disease, is another major killer of children. Forty-five percent of the world's population lives in areas with high risk of malaria, 275 million are infected and between 1-1.5 million die every year. In 1998, malaria claimed approximately one million lives, the vast majority of them in Africa. Every day 3,000 people die from malaria - three out of four of them children. Additionally, the WHO and World Bank report that the global malaria situation is becoming worse with the problems of drug-resistant strains and recent epidemics linked to climate change. Sixty percent of the world's population could be at risk from malaria by the end of the 21<sup>st</sup> century.

**Measles** is a third major killer of children, also claiming almost a million victims a year. Of the estimated 888,000 deaths worldwide from measles in 1998, 78% occurred in Africa and India.

**Summary.** For developing countries, the human and economic costs of infectious diseases are immediate. Millions of people – mostly children - die every year, and millions more endure the symptoms. In pure economic terms, sub-Saharan Africa's malaria alone is estimated to cost the region \$500 million annually.

## Spread of Infectious Disease: A Credible Threat to Industrialized Countries

*"And if it's a problem for the rest of the world, it's a problem for us."* -US Public Health Service

In a world where nations and economies are increasingly interdependent, developing world infectious diseases are industrialized world infectious diseases. With the advent of increasing globalization, the developing world health problems caused by urbanization, poverty, environmental degradation and inadequate public health infrastructures are increasingly industrialized countries' health problems also.

The US is not immune. In recent times, the US has seen first hand the effects of infectious and parasitic diseases – the AIDS epidemic, outbreaks of Lyme disease, and drug-resistant tuberculosis, to name a few. And the resistance of diseases to antimicrobials has accelerated in the past decade.

**Drug Resistant Strains.** The misuse and abuse of antibiotics in the industrialized world, evolution of microbes, and the resulting drug resistant strains make infectious diseases an increasing risk for the industrialized world's public health. Cholera, dysentery, malaria, and tuberculosis have all become increasingly difficult to control. Tuberculosis, for example, highlights the problem and costs of the decreasing effectiveness of antimicrobial drugs.

**Tuberculosis.** While tuberculosis cases have been generally decreasing over the decades in the US and other industrialized countries, multi-drug resistant tuberculosis (MDR-TB) and its 70% case-fatality rate are increasingly found in Eastern Europe, the Dominican Republic, Argentina, and parts of China and India. In these "hot zones", MDR-TB can amount up to 25% of the tuberculosis cases. And in an era of globalization, of increased travel and migration, the impact on the United States is direct.

U.S. Centers for Disease Control (CDC) data show that the foreign-born are a disproportionately high percentage of the carriers of tuberculosis. In Los Angeles, for example, 72% of the 1998 tuberculosis cases were found in the foreign-born. In New York City, 55% of the cases were found in the foreign-born.

The Institute of Medicine estimates that it costs \$25,000 per person for conventional tuberculosis treatment, \$250,000 per person for multi-drug resistant tuberculosis treatment, and a total of US \$1 billion every year for tuberculosis treatment. The total US bill for infectious diseases in the US is estimated to be in excess of \$120 billion every year.

## "Solving" the Infectious Disease Problem

*"We have a window of opportunity to make dramatic progress against ancient diseases, and to establish an early warning system to protect us from new and unexpected diseases. If we fail, increased drug resistance and the emergence of new bacteria and viruses threaten to make the control of infectious diseases both scientifically and economically unlikely in the future."* – World Health Organization

"Solving" the problem mandates a long-term commitment to a two-pronged approach. First, the *majority* of infectious disease deaths can be prevented with existing, cost-effective strategies.

Second, the issue of new and drug-resistant infectious diseases must be addressed through a public health infrastructure that detects, responds to and monitors emerging diseases; and develops new treatments through applied research. None of this is inexpensive. The research and development costs of new vaccines alone, for example, normally cost \$400 million to \$500 million per new vaccine. And with 29 new diseases and 20 reemerging diseases having been identified in the past two decades, the total costs are considerable and will continue to be considerable into the foreseeable future. At the same time, the diagnosis of HIV in Asia and Africa is a death sentence, and a vaccine is really the only hope for this epidemic.

<b>Disease</b>	<b>Causes for Concern</b>	<b>Medical Cure</b>	<b>Preventative Measures</b>	<b>Cost</b> (Annual cost per capita, 1990)
AIDS	<ul style="list-style-type: none"> <li>*High incidence &amp; fatality rates in developing countries</li> <li>* Significant fatality rate in industrialized countries</li> <li>*No known cures</li> </ul>		*Condoms	<ul style="list-style-type: none"> <li>* \$0.20 (Treatment of Sexually Transmitted Infections/ STI)</li> <li>* \$1.70 (prevention)</li> </ul>
Diarrhoeal Diseases (Cholera, Dysentery, Typhoid Fever, Rotavirus)	<ul style="list-style-type: none"> <li>* Developing countries' poor sanitation and resulting contaminated water is a breeding ground</li> <li>* 25%-50% of typical cholera cases are fatal, if untreated</li> <li>* Growing antimicrobial resistance (Cholera, Dysentery)</li> </ul>	<ul style="list-style-type: none"> <li>* Integrated Management of Childhood Illness (IMCI)</li> <li>Note: IMCI includes Rehydration, Antibiotics, Antimalarial drugs, Nutritional supplements</li> </ul>		* \$1.60 (IMCI)
Tuberculosis	<ul style="list-style-type: none"> <li>*High incidence &amp; fatality rates in developing countries</li> <li>*Multi-drug resistant TB in both developed and developing countries</li> </ul>	<ul style="list-style-type: none"> <li>* Directly Observed Therapy Short-Course (DOTS) strategy</li> <li>Note: DOTS uses 4 drug antibiotic regimen</li> </ul>		* \$0.60 (DOTS strategy)
Malaria	<ul style="list-style-type: none"> <li>* Very high incidence &amp; fatality rate in developing countries</li> <li>* Drug-resistant strains</li> </ul>		*Bednet treated with insecticide	TBD
Measles	<ul style="list-style-type: none"> <li>* Major cause of childhood deaths in developing countries</li> </ul>		* Immunization	* \$0.50

## Summary

Infectious disease is a major policy issue that transcends national boundaries. It affects both the developing countries and developed countries. And while non-industrialized countries bear the brunt of the current suffering and death, industrialized countries, including the US, are increasingly paying a heavy cost.

Developing countries' urbanization and poverty, characterized by a lack of clean water, sanitation and medical infrastructure, are breeding grounds for emerging and reemerging infectious diseases. The threat of these diseases is not self-contained.

With the advent of increasing globalization, new and drug-resistant infectious diseases are migrating from these developing countries' cities to industrialized countries on board human hosts (travelers, immigrants, refugees), food hosts, and other traded goods. The issues of infectious disease and public health are being globalized. Infectious disease is a policy issue that increasingly disregards a sovereign state's ability to control what occurs in its territory.

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This executive summary was written by Steven Durand of the Population Resource Center in February 2000 and reviewed by Dr. Charles Westoff of Princeton University and Dr. Alan Rosenfield of Columbia University. Sources include: Centers for Disease Control; National Academy of Science, Institute of Medicine; World Health Organization; and the White House National Science and Technology Council, Committee on International Science, Engineering and Technology (CISET) Working Group on Emerging and Re-Emerging Infectious Diseases. For further information, please contact the Population Resource Center at (202) 467-5030; 1725 K Street, NW, Suite 1102, Washington, D.C. 20006; [prc@prcdc.org](mailto:prc@prcdc.org); or (609) 452-2822; 15 Roszel Road, Princeton, NJ 08540.