TREAT Asia Special Report:
Expanded Availability of HIV/AIDS Drugs in Asia Creates Urgent Need for Trained Doctors

July 2004
# Table of Contents

Executive Summary ..................................................................................1  
Overview of AIDS in Asia and the Pacific ..............................................2  
HIV/AIDS Treatment in Asia and the Rise of Generics .........................4  
The Need for Trained Doctors .................................................................8  
A Way Forward .......................................................................................10  
Country Profiles ....................................................................................11  
Cameroon ...............................................................................................11  
China .......................................................................................................12  
India .......................................................................................................12  
Indonesia .................................................................................................13  
Thailand .................................................................................................14  
Vietnam .................................................................................................15  
Appendix 1: Asian Generic ARV Manufacturers ....................................16  
Appendix 2: TREAT Asia Sites ...............................................................22  
Endnotes .................................................................................................23  
Bibliography and Interview Sources ....................................................26
Across Asia and the Pacific, 7.4 million people have already been infected with HIV. Some sources predict that Asia’s epidemic could grow to as many as 40 million infected individuals by 2010. For many years, the sheer size of Asia’s population, and its limited health-care infrastructure, have augured disaster to public health experts. But the human catastrophe that was once the only possible outcome of AIDS in the developing world is no longer preordained. The proliferation of generic and discounted branded antiretroviral drugs provides hope that the lives of millions needing treatment can be saved.

In addition to the growing availability of deeply discounted branded drugs, at least 27 manufacturers now produce locally made generic antiretroviral drugs. On the eve of a global AIDS conference expected to bring focus to the widespread Asian AIDS epidemic and the unmet need for antiretroviral treatment, Asia faces a new series of treatment access challenges that may impede current and proposed treatment delivery programs. An acute shortage of healthcare workers trained to deliver these lifesaving drugs has emerged as a critical gap in providing safe and effective treatment.

China, the most populous country in the world, has fewer than 200 trained doctors for an estimated 840,000 HIV-infected individuals. Estimates that China could face between 10 and 15 million infected individuals by 2010 point toward the tremendous challenge in training physicians to cope with the escalating epidemic. In India, which is expected to surpass South Africa in 2006 as the country with the single highest number of HIV infections in the world, there are only an estimated 500 trained doctors, or roughly one trained doctor for every 10,000 HIV-positive individuals. Dr. N. Kumarsamy of the YRG Centre for AIDS Research and Education in Chennai estimates that only 25 of these doctors can be considered “fully trained” in all aspects of HIV treatment.

In preparing this report, TREAT Asia consulted with top healthcare officials in 15 Asian countries and interviewed dozens of experts from governments, multilateral agencies, NGOs, and pharmaceutical and generic drug manufacturers. The network also utilized the resources of its regional clinicians and researchers to create the first comprehensive analysis of the impact of the proliferation of antiretroviral drugs (ARVs) and the corresponding shortage of trained healthcare workers in Asia.

Key findings of this report include:

- According to the Joint United Nations Programme on AIDS (UNAIDS), 1.3 million of the 7.4 million people in Asia infected with HIV need antiretroviral treatment. Yet it is estimated that fewer than 100,000 are currently receiving treatment.

- Treatment for HIV/AIDS is becoming increasingly available throughout Asia and the Pacific. In addition to discounted branded medicine, it appears that generic drugs or the active pharmaceutical ingredients (APIs) of these drugs are now produced by at least 27 manufacturers in Asia, compared with only one generic manufacturer in all of Africa.

- Most Asian nations have far too few doctors trained to administer complicated ARV regimens. The discrepancy in physician preparedness ranges from one doctor per 24 people infected with HIV in Japan to one doctor per nearly 11,250 infected people in Vietnam.

- The combination of increasingly available drugs to treat HIV disease and the lack of trained doctors to administer them could lead to widespread misuse and eventually to drug resistance, eradicating years of progress in treatment and prevention of HIV/AIDS across the region.

The American Foundation for AIDS Research (amfAR) is one of the world’s leading nonprofit organizations dedicated to the support of AIDS research, AIDS prevention, treatment education, and the advocacy of sound AIDS-related public policy. Since 1985, amfAR has invested nearly $220 million in support for its programs and awarded grants to over 2,000 research teams worldwide.

TREAT Asia (Therapeutics Research, Education, and AIDS Training in Asia) is a network of clinics, hospitals, and research institutions working to ensure the safe and effective delivery of HIV/AIDS treatments throughout Asia and the Pacific. Through education and training programs developed by experts in the region, TREAT Asia seeks to strengthen HIV/AIDS care, treatment, and management skills among healthcare professionals.
Asia is facing an exploding HIV/AIDS epidemic. Between 1980 and 1990, only 855 HIV cases were known throughout the region. The crisis progressed slowly through the 1980s and 1990s, but has steadily grown over the past ten years. UNAIDS reports that in 2003, more than one million people were newly infected with HIV in Asia and the Pacific, bringing the total number of people living with HIV/AIDS in the region to 7.4 million. Epidemiologists predict that by 2010, 20 million people will be infected in India, and 10-15 million in China.

Today the prevalence of HIV in some countries remains relatively low, but with a population that is roughly 60 percent of the world total, even low prevalence translates into huge numbers of infected people. Of course, the prevalence of HIV varies widely between countries [see Table 1] and within countries, and vulnerable segments of the population have disproportionately high HIV infection rates. Male and female commercial sex workers (CSWs) and injection drug users (IDUs) were the first groups to be seriously affected by HIV/AIDS in most of Asia and the Pacific and remain critical engines of the epidemic. But the epidemic is not contained within these at-risk populations. HIV is spreading rapidly to sex industry clients (including sex tourists) and to the sexual partners of both sex workers and IDUs.

Social forces are at the root of Asia’s HIV/AIDS epidemic. The economic upheaval of the past two decades has resulted in increased population and environmental degradation encouraging people to move to cities in search of better opportunities. Sexual transmission of HIV is exacerbated by this mobility, with migrant workers spending long periods of time away from home and frequently visiting commercial sex workers, then returning home to infect their spouses, who in turn pass the virus to their children. Throughout the region, HIV is spreading along truck routes, among traveling sexmen, sailors, soldiers, fisherman, and migrant workers, and within the sex industry, which is itself fueled by economic upheaval.

Growing poverty among those who have not benefited from Asia’s active role in the global economy is also driving increased injection drug use, and few countries have mounted an effective response to the drug-related HIV epidemic either through peer educa-
The spread of HIV/AIDS is compounded by the prevalence of other diseases, such as tuberculosis (TB), and persistent malnourishment in many parts of Asia. Mounting an effective response to the epidemic in Asia and the Pacific will require increasing the level of resources committed to HIV/AIDS programs and balancing the need for continued prevention efforts with the growing demand for HIV treatments. As the millions of HIV-infected Asians progress to symptomatic AIDS, the demand for treatment and trained doctors will inevitably increase, posing a significant challenge to both national healthcare budgets and existing healthcare infrastructures.

As the millions of HIV-infected Asians progress to symptomatic AIDS, the demand for treatment and trained doctors will inevitably increase...

**Notes on the Data**

This report includes novel data gathered from interviews with regional experts and government officials, and statistics and qualitative analysis collected from TREAT Asia sites throughout the region. Although all data are current as of July 2004, epidemiological information is continually shifting. Information about generic drug and API manufacturing is similarly fluid. This has been collected through a broad range of available multilateral and NGO reports, as well as personal interviews with developing country health officials, representatives of generic pharmaceutical companies, and local clinicians. Part of the changing landscape of HIV/AIDS in Asia, this information provides a context for understanding the scope of treatment manufacture and treatment access in Asia.

Local variations in terminology have required TREAT Asia to use consistent definitions of terms such as: “treatment” and “receiving ARVs.” “Treatment” has been defined by TREAT Asia to include all common and accepted antiretroviral drugs. “Receiving ARVs” has been defined as taking a consistent supply of appropriately prescribed therapeutics. To avoid any possible confusion, TREAT Asia maintained standard language throughout all questionnaires and interviews, gathered a variety of sources to compare for each region studied, and rejected extreme outlying data.

This preliminary report is the first comprehensive study of its kind. Updates and revisions will be posted on the TREAT Asia Web site at www.treatasia.org.

**Regional Distinctions**

It is important to note the differences between developed Asian economies, such as Hong Kong, Japan, Singapore, and Taiwan, and the rest of the continent. In general, these economies have lower HIV prevalence [see Table 1] and much higher levels of treatment. Japan and Taiwan both offer antiretroviral treatment free of charge or heavily subsidized to all citizens who qualify, and have launched widespread education and prevention campaigns targeted at the general population. In addition, groups with the greatest vulnerability to HIV, such as commercial sex workers, IDUs, and migrant workers, are not large populations in these developed economies.

**Table 1. HIV Prevalence by Country**

<table>
<thead>
<tr>
<th>Country</th>
<th>Total population</th>
<th>Estimated total HIV+</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>137,400,000</td>
<td>13,000</td>
<td>0.02%</td>
</tr>
<tr>
<td>Cambodia</td>
<td>13,100,000</td>
<td>164,000</td>
<td>2.66%</td>
</tr>
<tr>
<td>China</td>
<td>1,300,000,000</td>
<td>840,000</td>
<td>0.12%</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>7,400,000</td>
<td>3,000</td>
<td>0.06%</td>
</tr>
<tr>
<td>India</td>
<td>1,064,750,000</td>
<td>4,580,000</td>
<td>0.43%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>212,100,000</td>
<td>125,000</td>
<td>0.11%</td>
</tr>
<tr>
<td>Japan</td>
<td>127,100,000</td>
<td>12,000</td>
<td>0.02%</td>
</tr>
<tr>
<td>Laos</td>
<td>4,600,000</td>
<td>1,350</td>
<td>0.05%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>22,200,000</td>
<td>41,000</td>
<td>0.35%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>49,000,000</td>
<td>550,000</td>
<td>1.22%</td>
</tr>
<tr>
<td>Nepal</td>
<td>23,000,000</td>
<td>60,000</td>
<td>0.26%</td>
</tr>
<tr>
<td>Philippines</td>
<td>75,700,000</td>
<td>6,000</td>
<td>0.02%</td>
</tr>
<tr>
<td>Singapore</td>
<td>4,000,000</td>
<td>3,000</td>
<td>0.15%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>24,000,000</td>
<td>5,000</td>
<td>n/a</td>
</tr>
<tr>
<td>Thailand</td>
<td>62,800,000</td>
<td>670,000</td>
<td>1.08%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>78,100,000</td>
<td>225,000</td>
<td>0.52%</td>
</tr>
</tbody>
</table>

**Methodology:** Data on national HIV prevalence has been collected from recent UNAIDS and WHO reports, as well as from local TREAT Asia sites. Where conflicts in data emerged, researchers have taken the mean of divergent data. All original statistics are cited in the endnotes.
More than 1.3 million people in Asia currently need antiretroviral treatment. As indicated in Table 2, most countries in the region are administering antiretroviral medications to fewer than 25 percent of their HIV-infected populations.

In the absence of trained healthcare workers, a significant number of people are likely to begin “self medicating,” independently purchasing antiretroviral drugs in local pharmacies and haphazardly taking drugs with little or no direction. Stories abound of patients who have taken incorrect combinations of drugs, shared limited drug supplies with infected family members, or taken medications for just a few days or weeks each month. Prescriptions from unqualified healthcare workers have left many people with little or no instruction on the safe and proper use of ARVs. In place of an organized delivery and education system, the potential for treatment anarchy threatens the region.

The consequences of widespread “self medication” can be catastrophic. As patients under-medicate or treat HIV with incorrect dosages, the potential for the emergence of drug resistance is significant. Even patients on appropriate medications often develop drug-resistant HIV due to inconsistent supplies of medication.

The need for antiretroviral drugs varies widely throughout the region, mainly in direct relation to the age of the epidemic. Newer epidemics have higher percentages of recently infected people, and therefore populations with lower viral loads. Older, more established epidemics have a much larger percentage of patients in need of ARVs.

### Table 2. The Unmet Need for Antiretroviral Treatment

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated total HIVs</th>
<th>Need ARVs ( # )</th>
<th>Receiving ARVs ( # )</th>
<th>Receiving ARVs (% of need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>13,000</td>
<td>1,800</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cambodia</td>
<td>164,000</td>
<td>22,000</td>
<td>3,400</td>
<td>15%</td>
</tr>
<tr>
<td>China</td>
<td>840,000</td>
<td>300,000</td>
<td>7,800</td>
<td>3%</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>3,000</td>
<td>1,200</td>
<td>1,100</td>
<td>92%</td>
</tr>
<tr>
<td>India</td>
<td>4,580,000</td>
<td>702,000</td>
<td>16,700</td>
<td>2%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>125,000</td>
<td>12,200</td>
<td>800</td>
<td>7%</td>
</tr>
<tr>
<td>Japan</td>
<td>12,000</td>
<td>6,000</td>
<td>3,000</td>
<td>50%</td>
</tr>
<tr>
<td>Laos</td>
<td>1,350</td>
<td>n/a</td>
<td>40</td>
<td>n/a</td>
</tr>
<tr>
<td>Malaysia</td>
<td>41,000</td>
<td>9,500</td>
<td>2,100</td>
<td>22%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>550,000</td>
<td>60,000</td>
<td>1,000</td>
<td>2%</td>
</tr>
<tr>
<td>Nepal</td>
<td>60,000</td>
<td>8,000</td>
<td>&lt;100</td>
<td>1%</td>
</tr>
<tr>
<td>Philippines</td>
<td>6,000</td>
<td>300</td>
<td>100</td>
<td>33%</td>
</tr>
<tr>
<td>Singapore</td>
<td>3,000</td>
<td>1,000</td>
<td>600</td>
<td>60%</td>
</tr>
<tr>
<td>Taiwan</td>
<td>5,000</td>
<td>3,900</td>
<td>3,900</td>
<td>100%</td>
</tr>
<tr>
<td>Thailand</td>
<td>670,000</td>
<td>124,300</td>
<td>40,800</td>
<td>33%</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>225,000</td>
<td>45,000</td>
<td>&lt;2000</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Methodology:** Data on the need for antiretroviral treatment has been collected from a variety of TREAT Asia sites, as well as annual UNAIDS and WHO reports. Some of the data in the table represent mean figures derived from several sources. Please refer to the endnotes for all included sources.

### Generics

Generic antiretroviral drug manufacturers have proliferated in Asia in recent years, radically altering the regional treatment landscape. Together with the increasing availability of affordable branded drugs, this proliferation has created the potential for widespread access to treatment across the region. Unlike Africa, where only one generic antiretroviral manufacturer exists on the entire continent, 27 companies are currently manufacturing antiretroviral drugs or the components of these drugs in eight countries in Asia.

The biggest challenge in ARV production is not producing final formulations, but producing the active pharmaceutical ingredients (APIs) necessary to produce final formulations. ARV production is feasible for most manufacturers, while APIs are enormously expensive and difficult to produce, requiring substantial inventories of raw ingredients and costly equipment. “If I need to treat 100 million patients, at 200
Table 3. Generic Antiretroviral Manufacturers in Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Company</th>
<th>Export</th>
<th>Products*</th>
<th>APIs**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>Cambodia Pharmaceutical Enterprise*</td>
<td>N</td>
<td>lamivudine (3TC), nevirapine (NVP), stavudine (d4T), zidovudine (AZT), 3TC/AZT, 3TC/d4T</td>
<td>n/a</td>
</tr>
<tr>
<td>China</td>
<td>Northeast General Pharmaceutical Factory*</td>
<td>Y</td>
<td>3TC, d4T, AZT</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Shanghai Desano Biopharmaceutical Company*</td>
<td>Y</td>
<td>didanosine (ddI), d4T, nevirapine (NVP)</td>
<td>Y</td>
</tr>
<tr>
<td>China</td>
<td>Top Pharma*</td>
<td>Y</td>
<td>Information unavailable</td>
<td>Y</td>
</tr>
<tr>
<td>China</td>
<td>Xiamen Mchem Pharma Group*</td>
<td>Y</td>
<td>AZT</td>
<td>Y</td>
</tr>
<tr>
<td>China</td>
<td>Zhejiang Huahai Pharmaceutical Co. Ltd*</td>
<td>Y</td>
<td>ddl, indinavir (IDV)</td>
<td>Y</td>
</tr>
<tr>
<td>India</td>
<td>Aurobindo Pharma Ltd*</td>
<td>Y</td>
<td>ddl, efavirenz (EFV), IDV, 3TC, nelfinavir (NFV), NVP, d4T, AZT, AZT/3TC, d4T/3TC, AZT/3TC/NVP</td>
<td>ONLY</td>
</tr>
<tr>
<td>India</td>
<td>Cipla Ltd*</td>
<td>Y</td>
<td>ddl, EFV, IDV, NFV, NVP, r, 3TC, AZT, 3TC/d4T, AZT/3TC, 3TC/3TC, NVP, 3TC/3TC/NVP</td>
<td>ONLY</td>
</tr>
<tr>
<td>India</td>
<td>Dr. Reddy’s*</td>
<td>n/a</td>
<td>ABC, ddl, efavirenz (EFV), IDV, 3TC, NFV, d4T, AZT, 3TC/d4T/NVP, AZT/3TC</td>
<td>n/a</td>
</tr>
<tr>
<td>India</td>
<td>EAS-SURG*</td>
<td>n/a</td>
<td>ABC, ddl, efavirenz (EFV), IDV, 3TC, NFV, d4T, AZT, 3TC/d4T/NVP, AZT/3TC</td>
<td>n/a</td>
</tr>
<tr>
<td>India</td>
<td>Emcure Pharmaceuticals*</td>
<td>n/a</td>
<td>ABC, atazanavir, delavirdine, EFV, IDV, 3TC, NFV, NVP, r, SQV, d4T, tenofovir, AZT, ABC/3TC/AZT, 3TC/AZT, 3TC/d4T/NVP, 3TC/NVP/AZT, r/LPV</td>
<td>Y</td>
</tr>
<tr>
<td>India</td>
<td>Hetero Drugs Ltd/Genix Pharma Ltd*</td>
<td>n/a</td>
<td>APIs: ABC, atazanavir, delavirdine mesylate, ddl, EFV, IDV, LPV, NFV, NVP, r, 3TC, d4T, tenofovir, AZT</td>
<td>Y</td>
</tr>
<tr>
<td>India</td>
<td>IPCA Laboratories Ltd*</td>
<td>n/a</td>
<td>3TC, AZT</td>
<td>n/a</td>
</tr>
<tr>
<td>India</td>
<td>Matrix Laboratories Ltd*</td>
<td>Y</td>
<td>APIs: ABC, EFV, IDV, 3TC, LPV, NFV, NVP, r, SQV, d4T, AZT</td>
<td>ONLY</td>
</tr>
<tr>
<td>India</td>
<td>Ranbaxy Laboratories Ltd*</td>
<td>Y</td>
<td>ABC, ddl, EFV, NVP, d4T, 3TC/d4T, AZT</td>
<td>Y</td>
</tr>
<tr>
<td>India</td>
<td>Samarth Pharma PVT Ltd*</td>
<td>n/a</td>
<td>AZT</td>
<td>n/a</td>
</tr>
<tr>
<td>India</td>
<td>Strides Arcolab Ltd*</td>
<td>n/a</td>
<td>IDV, 3TC, NFV, r, SQV, d4T, AZT, 3TC/AZT, 3TC/d4T, 3TC/d4T/NVP</td>
<td>N</td>
</tr>
<tr>
<td>India</td>
<td>Sun Pharmaceuticals Ltd*</td>
<td>n/a</td>
<td>APIs: EFV</td>
<td>ONLY</td>
</tr>
<tr>
<td>India</td>
<td>Zydus Cadila Healthcare Ltd/ Zydus Biogen*</td>
<td>Y</td>
<td>3TC, AZT, 3TC/AZT</td>
<td>Y</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Kimia Farma*</td>
<td>n/a</td>
<td>NVP, AZT, 3TC</td>
<td>N</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Duopharma*</td>
<td>n/a</td>
<td>NVP</td>
<td>n/a</td>
</tr>
<tr>
<td>South Korea</td>
<td>LG Chemicals/ LG Life Sciences*</td>
<td>Y</td>
<td>APIs: AZT</td>
<td>ONLY</td>
</tr>
<tr>
<td>South Korea</td>
<td>Korea United Pharma*</td>
<td>Y</td>
<td>APIs: AZT</td>
<td>ONLY</td>
</tr>
<tr>
<td>South Korea</td>
<td>Samchully Pharm Co., Ltd*</td>
<td>Y</td>
<td>APIs: AZT</td>
<td>ONLY</td>
</tr>
<tr>
<td>Thailand</td>
<td>Government Pharmaceutical Organization*</td>
<td>Y</td>
<td>ddl, 3TC, NFV, NVP, d4T, AZT, 3TC/d4T, 3TC/d4T/NVP</td>
<td>n/a</td>
</tr>
<tr>
<td>Thailand</td>
<td>T.O. Chemical*</td>
<td>n/a</td>
<td>AZT</td>
<td>n/a</td>
</tr>
<tr>
<td>Vietnam</td>
<td>MST*</td>
<td>n/a</td>
<td>3TC, AZT</td>
<td>n/a</td>
</tr>
</tbody>
</table>

* WHO pre-qualified

Methodology: Information on generic manufacturers has been gathered from a broad range of healthcare institutions and NGO reports, as well as personal interviews with developing country health officials, representatives of generic pharmaceutical companies, and local clinicians. This situation is changing rapidly, with many manufacturers hurrying to introduce new drugs in advance of WTO regulations.
million pills per day, that’s no problem,” says Yusuf Hamied, the founder and CEO of the Indian generic pharmaceutical manufacturer Cipla. “The problem is who will supply the active ingredients. If there’s no predictability of demand, who’s going to produce APIs and keep stocks?”

Currently, China and India produce the vast majority of bulk APIs, but do so inconsistently due to shifts in demand for these medications. Hamied called on the international community, including NGOs, the World Bank, the Global Fund, and World Health Organization (WHO), to create a predictable demand for ARV medications, which would allow ARVs and APIs to be produced on a sustainable basis—an important consideration for drug regimens that require rigid adherence over a period of years.

Source for African manufacturers:

Source for Latin America manufacturers:
WHO. Sources and prices of selected medicines and diagnostics for people living with HIV/AIDS. June 2003.

The risk of unqualified manufacturers

While generic antiretroviral manufacturers have provided immense hope that widespread treatment may soon be available, many questions linger about the relative safety and consistency of these drugs. Currently, only three generic manufacturers in Asia — the Indian companies Cipla, Ranbaxy and Hetero/Genix — meet the WHO’s benchmark quality standards. The 24 other companies in Asia either have not been reviewed by WHO or do not meet WHO standards and are therefore not monitored for the quality or quantity of medicines produced. The Cambodian Pharmaceutical Enterprise, for example, produces and sells four AIDS drugs without formal documentation, leaving international officials in Cambodia with no access to data on production or consumption.

In the absence of such basic manufacturer information, substandard AIDS medications can easily be sold to the general population. WHO reports that counterfeiting of treatments for tuberculosis, malaria and AIDS is widespread in Cambodia, China, Laos, Myanmar, Thailand, and Vietnam. A WHO study in Southeast Asia in 2001 revealed that 38 percent of 104 antimalarial drugs on sale in pharmacies did not contain any active ingredients. No regional studies have been done to assess the efficacy of available ARVs, but random testing of drug samples in Vietnam and Myanmar showed that 8 percent and 16 percent respectively were substandard, according to WHO.

Given the lack of available data, a regional database of generic manufacturers is urgently needed. Without such a database, it is impossible to determine which medications are available in a given country, evaluate the quality of those medications, or accurately gauge unmet medication needs among the HIV population.

Challenges

The paucity of healthcare infrastructure in many countries, and the acute shortage of trained doctors in particular, have impaired the ability of governments to set up long-term, lifelong treatment programs for millions of people with HIV.

In addition, many generic manufacturers have focused on the international market over the needs of locally affected populations. For example, in Thailand an estimated 84,000 people need antiretroviral treatment and are not receiving it; yet the Thai Government Pharmaceutical Organization (GPO) reportedly exported US$3 million worth of HIV/AIDS medications to other countries in Asia and in Africa in 2003. “We have a production capacity for AIDS medicine of about 200 million tablets per year,” said Parichart Claewplodtook, a GPO spokesperson. “Africa is a new market which we are beginning to explore.” In the first seven months of 2003, the company exported AIDS medications valued at US$300,000 to neighboring Cambodia.

In addition to producing antiretroviral drugs, an increasing number of manufacturers have turned to producing APIs. These companies export APIs to
other generic producers, allowing them to avoid World Trade Organization rules forbidding the production of patented drugs.

“India and China will take on an increasingly important role in exporting APIs in the future. They are exporting now, but the range of API products that are produced is very limited,” said Peter Graaf of the WHO AIDS Medicines and Diagnostic Service Department.

### Signs of progress

Many governments, such as those in Thailand, India and China, have recently launched new treatment access programs, promising to expand critical healthcare infrastructure throughout the region. But these government programs also face challenges. Within weeks of the launch of China’s free treatment program for 5,000 people with HIV, more than 20 percent of patients had already stopped taking medications, creating fertile ground for drug resistance. Observers reported seeing healthcare workers “simply handing patients bottles of pills” without counseling.

To prevent the spread of drug-resistant strains of HIV, the region requires a vast expansion of healthcare infrastructure, as well as a regional prevention education campaign aimed at high-risk populations. These programs should be included in a coordinated, multifaceted approach to HIV prevention and treatment.

**Within weeks of the launch of China’s free treatment program for 5,000 people with HIV, more than 20 percent of patients had already stopped taking medications, creating fertile ground for drug resistance.**
The need for trained doctors

The capacity of Asian and Pacific nations to address escalating HIV epidemics rests not only on the availability, cost, and effectiveness of ARVs. The healthcare infrastructure of these countries, and their human resources in particular, will also play an important role in the region's ability to prevent HIV/AIDS from overwhelming Asia.

Though most regions of Asia have a cadre of healthcare professionals, few have a sophisticated understanding of HIV/AIDS. Fewer still understand complicated treatment regimens and know how to administer appropriate combinations of ARVs while promoting adherence, monitoring viral load and T-cell counts, treating side effects, measuring resistance, and disseminating information on the broader epidemiological issues among affected and infected populations. The role of the physician in treatment scale-up cannot be overstated. Yet across Asia, trained doctors remain few and far between.

Consider the case of Thailand, which in October 2003 was among the first non-Western countries to begin to offer free ARVs to some people living with HIV/AIDS. Although Thailand boasts one of the more sophisticated healthcare systems in Southeast Asia, there are only an estimated 100 physicians trained to treat HIV/AIDS in the country. If one considers the WHO estimate of the number of HIV infected people in Thailand, there is a single physician for every 6,700 patients infected with HIV.

Thailand is in better shape than most Asian nations. As Table 4 indicates, most countries in Asia lag far behind in physician preparedness. Again, there is a pronounced discrepancy between wealthy and resource-limited nations. In Japan's well-controlled HIV epidemic, a single physician trained in HIV/AIDS treats an average of 24 HIV-infected patients, while in India, the conservative sero-prevalence figure of 4.5 million suggests that one trained doctor exists for nearly 10,000 patients.

The role of the physician in treatment scale-up cannot be overstated. Yet across Asia, trained doctors remain few and far between.

### Table 4. Trained Doctors

<table>
<thead>
<tr>
<th>Country</th>
<th>Total HIV+ (#)</th>
<th>Trained doctors (#)</th>
<th>HIV infected people per doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>163,500</td>
<td>50</td>
<td>3,270</td>
</tr>
<tr>
<td>China</td>
<td>840,000</td>
<td>200</td>
<td>4,200</td>
</tr>
<tr>
<td>Hong Kong, China</td>
<td>3,000</td>
<td>10</td>
<td>300</td>
</tr>
<tr>
<td>India</td>
<td>4,580,000</td>
<td>508</td>
<td>9,016</td>
</tr>
<tr>
<td>Indonesia</td>
<td>125,000</td>
<td>27</td>
<td>4,630</td>
</tr>
<tr>
<td>Japan</td>
<td>12,000</td>
<td>500</td>
<td>24</td>
</tr>
<tr>
<td>Malaysia</td>
<td>41,000</td>
<td>31</td>
<td>1,323</td>
</tr>
<tr>
<td>Myanmar</td>
<td>547,500</td>
<td>225</td>
<td>2,433</td>
</tr>
<tr>
<td>Philippines</td>
<td>6,000</td>
<td>7</td>
<td>857</td>
</tr>
<tr>
<td>Singapore</td>
<td>3,000</td>
<td>8</td>
<td>375</td>
</tr>
<tr>
<td>Taiwan</td>
<td>4,613</td>
<td>50</td>
<td>92</td>
</tr>
<tr>
<td>Thailand</td>
<td>670,000</td>
<td>100</td>
<td>6,700</td>
</tr>
<tr>
<td>Vietnam</td>
<td>225,000</td>
<td>20</td>
<td>11,250</td>
</tr>
</tbody>
</table>

**Methodology:** These figures are based primarily on interviews with TREAT Asia researchers and clinicians at local sites, Asian government officials, and Asian NGO and international agency officials. Some of the data in the table represent mean figures derived from several sources. Please refer to the endnotes for all included sources. The chart uses doctors as the standard measure of regional health capacity, though it should be noted that a variety of healthcare professionals and others, including nurses, paraprofessionals, clergy and family members, are involved in the distribution of ARVs in Asia. The complex nature of HIV treatment regimens and the sophisticated monitoring that is required make a strong case for training doctors as primary caretakers wherever possible.

Note: Sufficient data on number of trained doctors was unavailable for Bangladesh, Laos, and Nepal.

The doctor gap

The pronounced lack of trained doctors has had profound consequences beyond the delivery of antiretroviral drugs and monitoring disease progression. “In most of the world, physicians take on responsibilities far afield from practicing medicine,” said Dr. Kenneth Mayer, of Brown University Medical School, who has worked extensively with clinicians in India. “In places where HIV is understood by very few people, doctors are called upon to be prevention experts, mentors, and even community activists battling pervasive ignorance about AIDS and other infectious diseases.”

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85
In resource-limited countries, doctors frequently assume an advocacy role for people living with AIDS.

The persistent stigma associated with HIV has caused many people to be rejected by their families or turned out of the workplace. In the absence of doctors, the human rights of people living with HIV are ignored by governments and local communities alike.

The lack of doctors trained in HIV/AIDS has implications for preventing transmission as well. Unlike in developed countries, where community groups and peer educators usually take the lead in prevention efforts, physicians with a sophisticated understanding of HIV transmission in the developing world often serve as the front-line prevention experts. Doctors without training in HIV can, in some instances, exacerbate infection rates through unsafe medical practices. One study estimates as many as 30 percent of HIV infections could be prevented if unsafe medical practices were corrected.86,87

In response to the shortage of AIDS doctors, standard curricula in many Asian medical schools have begun to include AIDS treatment, but the available training is inadequate for the needs of local populations. “The time has come to focus on training doctors and other caregivers in Asia on the fundamentals of HIV and AIDS,” said Dr. Marie Charles, President of the International Center for Equal Healthcare Access (ICEHA), a not-for-profit group that seeks to leverage Western expertise against the overwhelming need for clinical training all over the world. “While the increase in available drug supplies worldwide is a positive step, our work and the work of others suggests that the successful implementation of HIV/AIDS treatment and prevention programs is being severely hampered by the lack of an existing network of health care professionals capable of carrying the caseload. No treatment access program will succeed without trained healthcare providers who understand how to care for an HIV-infected patient, regardless of how inexpensive and plentiful drugs become.”88
A Way Forward

More than 15 years separate the widespread emergence of AIDS in Africa and Asia, and the epidemiological circumstances have changed dramatically. The rapidly growing supply of generic antiretroviral drugs provides hope that Asia may avoid the disastrous path of much of sub-Saharan Africa. However, without a rapid scale-up in training for healthcare workers, these antiretroviral drugs will not have their intended consequence.

Asia urgently requires a rapid expansion of healthcare infrastructure, including research, training, and community education, in order to meet the needs of its growing HIV-positive population. This requires the coordinated effort of local governments, NGOs, multilateral organizations, and the private sector, as well as the ongoing support of international donors.

This report is intended to alert governments and those working in the public health and research communities to the urgent need for continued support and collaboration. As a first attempt to consider the intersection of treatment and physician training, it shows how the potential benefits of treatment scale-up will not be realized without adequate training to complement the increased availability of generic and discounted drugs.

In order for this region to combat the epidemic successfully, it is imperative that patient tracking, observation, and data collection be improved. It is equally clear that the discrepancies in resources that exist in Asia place a burden of leadership, training, and financial assistance on wealthier countries. As no single organization can solve the problem alone, regional research and training can and should be a collaborative enterprise.

TREAT Asia is one important component of this cooperative approach. In 2002 amfAR launched Therapeutics Research, Education, and AIDS Training in Asia, or TREAT Asia, to help stem the tide of HIV/AIDS in Asia and the Pacific. TREAT Asia seeks to strengthen HIV/AIDS care, treatment, and management skills among healthcare professionals through educational programs developed by experts in the region.

Since 2002, the TREAT Asia network has grown to include 24 treatment sites throughout the region, offering clinical care to populations ranging from 200 to 4,000 patients. The recent influx of generic antiretrovirals in Asia, as well as the expanding availability of discounted branded drugs, has bolstered the possibility of treatment for large HIV-positive populations through an infrastructure of these local clinics. This is particularly true in countries such as Thailand, where the Government Pharmaceutical Organization manufactures yearly ARV supplies for thousands of Thais, and Malaysia, where the government has purchased large quantities of brand-name AZT (Retrovir, GlaxoSmithKline) for more than a decade, and has recently signed an importing contract with Indian generic manufacturer Cipla.

Treatment requires both medication production and safe distribution. Asia has risen to the challenge of the first component, but outside help is needed to deliver the second. Even some of Asia’s strongest healthcare systems, such as Thailand’s, lack the specialized knowledge necessary for the effective administration of ARV drug regimens. Without trained doctors, the 7.4 million HIV-positive people of Asia simply cannot receive the treatment that will extend their lives and greatly reduce the impact of the epidemic.
Country Profiles

Introduction: The six countries profiled in this section – Cambodia, China, India, Indonesia, Thailand, and Vietnam – are broadly representative of the wide-ranging characteristics of the HIV/AIDS epidemics in the region. The epidemics in these six countries are driven, to varying degrees, by intravenous drug use, the commercial sex industry, and blood donor populations.

• CAMBODIA

The Shape of the Epidemic
Cambodia's HIV prevalence rate is the highest in Asia, with around 164,000 Cambodians living with HIV, or about 3 percent of the total population.

Cambodia’s epidemic has been spread mainly through heterosexual sex – and sped by Cambodia’s flourishing sex industry. Primary infections in sex workers often spread to their clients, and then to the wives and children of those clients. Hospital-based testing of pregnant women found HIV rates of three percent, evidence that the epidemic is established in the general population. It is predicted that by 2005, Cambodia will be home to an estimated 145,000 AIDS orphans.

Like Thailand, Cambodia reacted quickly to its epidemic and experienced a drop in the number of HIV-positive people from 220,000 in 1999. That decline is attributed to two events – successful prevention efforts, including an NGO-led campaign to achieve 100 percent condom use in brothels (Population Services International, for example, has distributed more than 20 million condoms in seven years to a male population of approximately 6.5 million) and AIDS-related deaths. Only an estimated 10,000 HIV-positive Cambodians are aware of their status, most of whom live in Phnom Penh, where they benefit from NGO care and support.

But the strong emphasis placed on HIV prevention by Cambodian health authorities has left treatment neglected at the national level. Only 100 specialized beds are earmarked for adult AIDS patients in the whole country, 60 of them in the Preah Bath Norodom Sihanouk hospital in Phnom Penh.

Primary infections in sex workers often spread to their clients, and then to the wives and children of those clients.

Treatment Availability
The government healthcare system lacks the infrastructure to establish long-term, lifelong HIV treatment programs for hundreds of thousands of Cambodians, leaving aid organizations scrambling to fill the gaps. According to the National Center for HIV/AIDS, Dermatology, and STDs (NCHADS) and the Ministry of Health, there are 24,189 people living with AIDS who need ARV therapy in Cambodia, while only 3,389 patients are currently receiving it. However, experts in the field question whether the patients who are receiving treatment truly have access to an uninterrupted supply of quality antiretroviral medication. Other reports indicate that fewer than 500 people are receiving properly administered ARV medications, while fewer than 3 percent of people with advanced HIV infection are currently receiving free ARV treatment. Médecins Sans Frontières offers antiretroviral drugs in three Cambodian cities, and currently distributes ARVs to 950 patients. Wealthy Cambodians who know they are HIV positive frequently self-medicate with ARVs purchased over the counter.

Cambodian Pharmaceutical Enterprise, a partially government-owned company, produces the AIDS medications stavudine, lamivudine, and zidovudine. The company is not approved nor monitored by the WHO. A one-month supply of ARVs in Phnom Penh costs $37, and pharmacies in Phnom Penh report a steady trickle of ARV customers.

Physician Preparedness
The Cambodia Ministry of Health reports that 60 doctors have been trained by NGOs to deliver ARV treatments, though the poor training of many Cambodian health personnel has proved to be a stumbling block for HIV treatment efforts. A September 2003 report by the International AIDS Alliance described the need for trained healthcare workers:

“The doctors involved in providing HIV/AIDS care through MSF, MDM, and Center of Hope are receiving full training on ARV treatment. There is no clear training in the use of ARVs provided elsewhere, either in
public or private hospitals, or to those in supervisory positions with the Ministry of Health or with NGOs. Despite this, many doctors have been prescribing ARVs in private practice for several years.”

• CHINA

The Shape of the Epidemic
China’s low national HIV prevalence of 0.12 percent (840,000 HIV-positive people in a country of 1.2 billion) obscures the fact that serious, concentrated epidemics are well underway in some regions and are beginning to emerge in others. Unofficial prevalence estimates vary widely, with some placing the number of HIV infections well over 1.5 million. Epidemiologists predict that by 2010, there may be 10–15 million Chinese living with HIV/AIDS.

The epidemic has been fueled in part by injection drug use. According to UNAIDS, HIV prevalence rates among IDUs in Xinjiang Province range from 35-80 percent. In Guangdong province, 20 percent of IDUs are HIV positive. Yunnan province, which is adjacent to the Golden Triangle’s international drug routes, has the highest infection rate in the country.

Exposure to HIV-contaminated blood and blood products has also been a significant source of HIV transmission in the country. In the rural provinces of Central China, many poor farmers have become HIV-infected through the region’s once thriving blood industry. So-called “blood-heads” obtained samples from these farmers, often using the same needle repeatedly. The donated blood was then pooled and the plasma removed and sold to hospitals and blood banks. Afterwards, many of the donors were reinfused with the pooled blood, a process that allowed them to donate more frequently. In 1994, a blood product later admitted to contain HIV was disseminated to thousands in the general population; as many as 250,000 blood donors were infected in the 1990s.

Treatment Availability
In 2003, the Chinese government initiated cost-free ARV treatment for 5,000 HIV patients. While lauded by the international community, The New York Times classified the program as “already failing” just weeks after launch, when more than 20 percent of patients had already stopped taking medications, and healthcare workers were “simply handing patients bottles of pills” without counseling.

Dr. Taisheng Li, an AIDS doctor at Peking Union Medical Hospital, estimates that there are approximately 300,000 people in China who need ARV treatment, and only 7,800 currently receiving treatment. Official estimates of people receiving ARVs dip as low as 5,000.

Though China is home to three major AIDS medication manufacturers who produce generic versions of ddI, d4T, AZT, indinavir, and nevirapine, the majority of their gross product is exported. In fact, China is expected to become the leader in exporting ARV pharmaceutical ingredients, according to Peter Graaf of the WHO Department of HIV/AIDS.

The largest of the country’s manufacturers is Shanghai Desano Biopharma Co. Ltd, which produces ARVs to treat 500,000 patients each year and exports seven kinds of ARV materials to India, Thailand, and Brazil. Ten additional Chinese companies have recently applied for similar patent permission. A one-year supply of these medicines costs between US $435 and $650 for Chinese patients.

Physician Preparedness
Despite the availability of ARVs within China, a dearth of doctors trained to treat HIV/AIDS contributes to the low numbers of those patients receiving, and adhering to, treatment. “We estimate that there are about 200 doctors trained to deliver ARVs in China at present, which is approximately one doctor for every 5,000 HIV patients,” said Dr. Taisheng Li.

• INDIA

The Shape of the Epidemic
India is experiencing low nationwide HIV prevalence that obscures very serious epidemics occurring in specific populations and locations. Even a low prevalence in a country as populous as India translates into significant numbers of people who are infected. Current estimates of the number of people living with HIV in India vary widely. UNAIDS puts the figure at 4.6 million. However, since 1999, experts have voiced concern that low testing rates produce misleading statistics. If India is allowed to pass 5 percent HIV prevalence, which is a marker of future exponential increases, the disease could quickly spread throughout the country. Already, India is poised to surpass South Africa as the nation with the greatest number of people living with HIV by 2006.
India’s HIV epidemic began in 1986 and has been spread primarily by sexual contact, particularly by truck drivers among whom infection rates have reached 5-10 percent in certain regions.\textsuperscript{115} Sexually transmitted diseases are relatively common across India and facilitate HIV transmission.\textsuperscript{116}

Since 1992, the Indian Ministry of Health has partnered with WHO, USAID, UNAIDS, and the World Bank, under the National AIDS Control Organization, to launch HIV prevention programs focusing on condom use. Though the Supreme Court of India has banned the use of blood from professional blood sellers, the trade still continues and contributes to the epidemic’s spread.\textsuperscript{117}

### The widespread abuse of ARVs is my major concern, particularly with the use of suboptimal regimens. Controlled and rational use of ARVs is the major challenge and has to be tackled by various means.

#### Treatment Availability

By the time most people in India learn they are HIV positive, they are already in need of treatment, according to Dr. N. Kumarasamy of the YRG Centre for AIDS Research and Education in Chennai. “Most of the HIV-infected persons diagnosed in India are sick with one or more opportunistic infections. Many of them need [ARVs].”\textsuperscript{118}

Dr. Sanjay Pujari, an AIDS doctor at Ruby Hall Clinic, estimates that between 500,000 and 1 million HIV/AIDS patients currently need ARVs, of which only 20-30,000 are receiving them. The government recently launched a program to support ARV treatment, though most HIV patients are not poor enough to qualify for the program.

Those who cannot afford professional treatment often self-prescribe ARV medications, which are available over the counter.\textsuperscript{119} India is home to 13 pharmaceutical companies producing ARVs. The companies manufacture a wide variety of AIDS therapies, and are mass exporters of generic drugs and pharmaceutical ingredients to other Asian countries. Cipla and Ranbaxy are the largest and most well known, producing a one-year treatment supply for about $350 in India.\textsuperscript{119} Ranbaxy currently exports ARVs to 35 countries in Africa, Asia, Latin America, and the Caribbean, and is awaiting registration in an additional 25 countries.\textsuperscript{120}

The availability of ARVs coupled with few doctors who are trained to treat AIDS patients is contributing to the growth of drug-resistant HIV. “The country is progressing towards a drug-resistant HIV epidemic,” said Dr. Pujari. “The widespread abuse of ARVs is my major concern, particularly with the use of suboptimal regimens. Controlled and rational use of ARVs is the major challenge and has to be tackled by various means.”

#### Physician Preparedness

Dr. Pujari estimates that there are only 1,000 doctors trained to treat HIV patients in all of India, an average of one doctor for every 5,000 HIV-positive citizens, while Dr. Kochar of the International AIDS Vaccine Initiative estimates that there may only be 500 trained doctors. Dr. Kumarasamy makes the much more conservative estimate that there are only 25 well-qualified AIDS doctors for ARV distribution. What is needed, he says, is increased and continuing training on the usage of ARV therapy.\textsuperscript{121}

### INDONESIA

#### The Shape of the Epidemic

Throughout the 1990s, Indonesia’s HIV prevalence remained low. In 1998, it was estimated to be less than 1 percent, even in at-risk populations such as sex workers, MSM, and IDUs.\textsuperscript{122} But, Indonesia’s HIV-positive population has ballooned over the last five years, spurred by a growing sex industry, low levels of condom use, limited STD treatment services, and high STD rates among sex workers. According to USAID, HIV rates among sex workers and transvestites range from six to 26 percent, and the prevalence of sexually transmitted diseases among sex workers in Jakarta was 53 percent in 2000.\textsuperscript{123}

HIV prevalence in the general population has also increased, fueled by economic and political disruptions that led many people to migrate from rural to urban areas. UNAIDS estimates that there are approximately 130,000 people living with HIV in Indonesia.\textsuperscript{124}
In 2001, Indonesia began a government decentralization initiative that transferred public health services to the domain of local governments. Many programs and services were unstable during the transition, and experts are concerned that, though locally based HIV prevention programs may increase awareness of AIDS and provide locally appropriate programs, they may be unable to address the larger nationwide issues that perpetuate the epidemic.125

Treatment Availability

Until late 2003, Indonesia imported antiretroviral drugs from India and Thailand, at a cost to consumers of $75 per month. In December 2003, the Indonesia Food and Drugs Supervisory Board issued a license for ARV production to local company Kimia Farma. The company began producing ARVs at a cost of $53 per month in early 2004. The Indonesian government offers a medication subsidy of $23 per patient each month,126 at a total cost to the government of $43,000 per year. Much of the ARV treatment is funded by support from the Global Fund to Fight AIDS, TB and Malaria.

Kimia Farma Director Gunawan Pranoto told reporters that his company can produce a supply of medication for 2,000 patients per year.127 The company imports raw materials from South Korea and India, an arrangement that skirts WTO regulations forbidding certain companies to export generic ARV drugs, but allows the export of ingredients.

The company, which produces branded versions of lamivudine, nevirapine and zidovudine, including a combination of lamivudine/zidovudine, and a lamivudine/zidovudine/nevirapine combination, announced that ARV medications would be available at government and private licensed institutions, and that production rates would be determined by requests from those organizations. The Jakarta Post announced that the drugs would also be available at the 300 Kimia Farma pharmacies across the country, where HIV-positive people can purchase the medicines without a prescription, fueling concerns that self-medication without medical supervision will follow.128 There are currently 30 doctors in Indonesia trained to deliver HIV medication,129 causing further worry about future drug resistance in Indonesia.

• THAILAND

The Shape of the Epidemic

Thailand’s ascent to the AIDS pinnacle of Asia was swift. Five cases of HIV were reported in Thailand in 1985.130 That number mushroomed to 750,000 in 2000, with some estimates as high as four million.131 Today, WHO officially estimates that there are 670,000 HIV-positive people in Thailand. HIV prevalence in the country currently hovers below two percent. When AIDS emerged in the 1990s, Thailand, one of Asia’s most prosperous countries, was home to hundreds of international aid organizations. NGOs quickly spearheaded prevention efforts by increasing condom use in commercial sex and decreasing brothel solicitations.132 The government developed a national AIDS policy that allowed foreign researchers and pharmaceutical companies to access Thai viruses and initiated anonymous testing services through the Thai Red Cross.

Those efforts have born fruit. Since 2000, HIV prevalence has dropped to 1.9 percent. Despite that success, condom use has begun to decrease in Thailand, leading to fears that HIV rates may spike again. “It is likely we will have a second-wave epidemic soon,” said Dr. Praphan Phanuphak, Director of the Thai Red Cross Society’s AIDS Research Centre. “We are starting to see this among MSM, IDU, and youths.”

Though prevention efforts continue to focus on brothels, women outside the sex work field constitute the newest HIV risk group. To address increasing infections in that population, the country has launched education programs aimed at long-term couples and so-called “sweetheart” relationships, or long-term relationships between non-married couples.
Treatment Availability
Thailand’s strong focus on prevention has neglected efforts to develop effective distribution methods for ARV medications. WHO estimates that there are currently 98,000 Thais who need ARV treatment and only 13,000 receiving it. Dr. Phanuphak views those estimates as conservative and suggests that more than 200,000 Thais need ARV treatment of whom only 80,000 have access to medicines. WHO aims to treat 48,000 Thai HIV/AIDS patients with ARV therapy by 2005, which will still leave 50,000 HIV-positive Thais without treatment.

Antiretroviral medication is relatively inexpensive in Thailand. The Government Pharmaceutical Organization (GPO) produces a fixed-dose combination of stavudine, lamivudine, and nevirapine that is available to Thais for less than $1 per day. Organizations working in Thailand, such as Médecins Sans Frontières, are able to easily obtain quality generic medications locally. Anecdotal evidence suggests that thousands of Thais purchase ARVs over the counter, a situation in which they receive no guidance on how to properly administer the medications.

Physician Preparedness
Though HIV-positive Thais have access to ARV medication over the counter, it is estimated that Thailand has only 100 doctors trained to treat HIV. “More than half of the patients currently on ARV are getting fixed-dose combination of d4T/3TC/NVP with limited access to viral load and resistance testing,” says Dr. Phanuphak. This means they are not receiving treatment adjusted to their specific HIV strains and stage of disease. “Failure will be detected late, which will make salvage regimens very difficult and very expensive.”

VIETNAM

The Shape of the Epidemic
Vietnam is currently experiencing HIV prevalence of well below one percent. Though known diagnoses of HIV are currently 80,000, unofficial estimates put the number of Vietnamese living with HIV at 320,000, with 45,000 of them in need of ARV treatment.

Sixty-five percent of Vietnam’s HIV infections are occurring among drug users, and HIV prevalence rates ranging from 11 percent to 24 percent have been found among urban sex workers. These numbers indicate localized, raging epidemics that are hidden by Vietnam’s countrywide statistics.

Meanwhile, recent overhauls in the country's healthcare system have resulted in cuts in public funding for all types of HIV care. According to Médecins Sans Frontières, “the Vietnamese government is reducing its investment in public health services and encouraging the private sector to get involved in providing healthcare. As a result, poor rural people and ethnic minorities have little access to quality care, even though the country has experienced an overall improvement in living standards over the past ten years.”

Treatment Availability
Healthcare budget cuts and new regulations in the past three and a half years have forced Médecins Sans Frontières to abandon AIDS treatment programs in Vietnam, including eliminating a Nha Trang HIV/AIDS clinic that had performed 45,000 consultations in five years. In their absence, it is estimated that less than 2,000 patients (four percent of those who need ARVs) are currently receiving ARV treatment in Vietnam. The Ho Chi Minh Hospital of Tropical Diseases provides treatment to half of those patients.

Two priority groups receive free, state-paid ARV treatment: HIV-exposed healthcare providers, who are given post-exposure prophylaxis, and pregnant women (for the prevention of mother-to-child HIV transmission). This policy leaves the majority of the country with no access to treatment, including the HIV-positive IDU community, which comprises the majority of the epidemic.

The international community is attempting to fill that gap. A recent grant from the Global Fund to Fight AIDS, Tuberculosis, and Malaria is intended to extend ARV treatment to 750 patients by 2005, which will still barely touch the estimated 45,000 who need ARV treatment.

Physician Preparedness
There are an estimated 20 doctors trained to treat HIV in Vietnam—a ratio of one AIDS doctor to every 11,250 HIV patients. The Minister of Health, Tran Thi Trung Chien announced in April: “By 2005, 15,000 of Vietnam’s HIV patients should be able to buy antiretroviral medicines cheaply.” An accompanying distribution infrastructure has not been announced, leading to concerns over the potential for widespread self-medication.
Appendix 1
Asian Generic ARV Manufacturers

Note: This material has been gathered from documents provided by the generic manufacturers.

- CAMBODIA

Cambodia Pharmaceutical Enterprise (CPE)
Products: 3TC, d4T, AZT, 3TC/AZT, 3TC/d4T. EFV and NVP are in development. It is believed that CPE is producing final formulations for the domestic Cambodian market only.

Cambodia Pharmaceutical Enterprise is 48 percent state-owned, with the remaining 52 percent belonging to a Hong Kong company. CPE has a government license to produce pharmaceuticals and complies with internationally-recognized GMP regulations, similar to the ISO 9000. The company is awaiting WHO pre-qualification in order to be eligible for official public distribution. CPE products are available privately, mainly in Phnom Penh. The 3TC/d4T combination costs approximately US$30 per month. d4T alone costs US$4.50/month for 20 mg and US$7/month for 40 mg. Product details and prices listed below.144

<table>
<thead>
<tr>
<th>Product</th>
<th>Dosage</th>
<th>Price (USD/60 tablets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lamivudine</td>
<td>150 mg</td>
<td>$9.50</td>
</tr>
<tr>
<td>stavudine</td>
<td>15 mg</td>
<td>$3.00</td>
</tr>
<tr>
<td>stavudine</td>
<td>20 mg</td>
<td>$3.20</td>
</tr>
<tr>
<td>zidovudine</td>
<td>300 mg</td>
<td>$16.50</td>
</tr>
<tr>
<td>zidovudine/lamivudine</td>
<td>300mg/150mg</td>
<td>$24.50</td>
</tr>
<tr>
<td>Lamivudine/stavudine</td>
<td>150mg/30mg</td>
<td>$12.50</td>
</tr>
</tbody>
</table>

Product Dosage

Didanosine powder 10bag X 250mg 250mg twice daily
Didanosine powder 10bag X 167mg 267mg twice daily
Stavudine capsule 60 X 20mg 40mg twice daily
Nevirapine tablet 60 X 200mg 250mg once daily

Contact information unavailable

- CHINA

Northeast General Pharmaceutical Factory (NEGPF)
Products: 3TC, d4T, AZT. Northeast General produces active pharmaceutical ingredients (APIs) and final formulations for both the domestic Chinese market and for export.

Established in 1946 and based in Shenyang, the state-owned Northeast General Pharmaceutical Factory has over 10,000 employees. Its products are sold to all provinces, municipalities and autonomous regions in China as well as 55 countries and regions worldwide. The annual export sales income of NEGPF totals nearly US$80 million. NEGPF exports API products to developing countries in Africa, Latin America and Asia, including Korea, India and Brazil. In August 2002, the Chinese government approved the domestic production and sale of stavudine (d4T) and zidovudine (AZT). The per-patient cost of treatment is approximately US$360-$600 per year.145

Shanghai Desano Biopharmaceutical Co.
Products: ddI, d4T, NVP. Shanghai Desano produces active pharmaceutical ingredients and final formulations for both the domestic Chinese market and for export.

Shanghai Desano employs 1,600 people and plans to produce enough drugs to supply 500,000 people with combination therapy each year. In September 2002, the company received approval from the Chinese government to produce ARVs for the domestic Chinese market. Treatment costs approximately US$435 - $560 per patient per year. Shanghai Desano also exports seven anti-AIDS compounds to India, Thailand and Brazil. Product details listed below.146

<table>
<thead>
<tr>
<th>Product</th>
<th>Specification</th>
<th>Dosing and Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Didanosine powder</td>
<td>10bag X 250mg</td>
<td>250mg twice daily</td>
</tr>
<tr>
<td>Didanosine powder</td>
<td>10bag X 167mg</td>
<td>267mg twice daily</td>
</tr>
<tr>
<td>Stavudine capsule</td>
<td>60 X 20mg</td>
<td>40mg twice daily</td>
</tr>
<tr>
<td>Nevirapine tablet</td>
<td>60 X 200mg</td>
<td>250mg once daily</td>
</tr>
</tbody>
</table>

Xiamen Mchem Pharma Group
Products: AZT. Xiamen Mchem Pharma Group produces APIs and final formulations for both the domestic Chinese market and for export.

In September 2002, Xiamen Mchem Pharma Group reported that it had signed a five-year contract with the Brazilian Government to become the third appointed manufacturer of antiretroviral compounds for Brazil. The company also exports antiretroviral pharmaceuticals to 13 countries in Africa.147

Zhejiang Huahai Pharmaceutical Co. Ltd.
Products: ddI. Zhejiang Huahai produces APIs and final formulations for both the domestic Chinese market and for export.
In June 2003, Huahai Pharma received approval from the Chinese government to produce didanosine (ddI) and ddI tablets (50mg & 100mg), the first ddI tablets to be produced in China under official authorization. Huahai reports that it will initially produce 200,000 tons of AIDS medications annually and expects to reach a total output of 500,000 tons under full capacity.

Zhejiang Huahai Pharmaceutical Co. Ltd.
Xunqiao
Linhai, Zhejiang 317024
China
www.huahaipharm.com

- INDIA

Aurobindo Pharma Ltd.
Products: ddI, EFV, IDV, 3TC, NFV, NVP, d4T, AZT; AZT/3TC, d4T/3TC; AZT/3TC/NVP. Active pharmaceutical ingredients (APIs): ddI, EFV, IDV, 3TC, NFV, NVP, ritonavir (r), saquinavir (SQV), d4T, AZT.

Aurobindo produces final formulations and is also one of the largest producers of active pharmaceutical ingredients in Asia. Aurobindo produces ARVs and APIs for both the domestic Indian market and for export. Product details are listed below.

<table>
<thead>
<tr>
<th>GENERIC NAME</th>
<th>BRAND NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZIDOVUDINE 100 / 300</td>
<td>ZIDOVEX</td>
</tr>
<tr>
<td>LAMIVUDINE 100 / 150</td>
<td>LAMIVOX</td>
</tr>
<tr>
<td>DIDANOSINE 50 / 100</td>
<td>DIDAVEX</td>
</tr>
<tr>
<td>STAVUDINE 30/40</td>
<td>STAVEX</td>
</tr>
<tr>
<td>ZIDOVUDINE 300 + LAMIVUDINE 150</td>
<td>ZIDOVEX L</td>
</tr>
<tr>
<td>VUDINE 30/40 + LAMIVUDINE 150</td>
<td>STAVEX 30/40 L</td>
</tr>
<tr>
<td>ZIDOVUDINE 300 + LAMIVUDINE 150 +</td>
<td>ZIDOVEX LN</td>
</tr>
<tr>
<td>NEVIRAPINE 200</td>
<td></td>
</tr>
<tr>
<td>STAVUDINE 30/40 + LAMIVUDINE 150 +</td>
<td>STAVEX 30/40 LN</td>
</tr>
<tr>
<td>NEVIRAPINE 200</td>
<td></td>
</tr>
<tr>
<td>INDINAVIR 200 / 400</td>
<td>INDIVEX</td>
</tr>
<tr>
<td>NELFINAVIR 250</td>
<td>NELVEX</td>
</tr>
<tr>
<td>NEVIRAPINE 200</td>
<td>NEVIREX</td>
</tr>
<tr>
<td>EFAVIRENZ 200 / 600</td>
<td>VIRANZ</td>
</tr>
</tbody>
</table>

Aurobindo Pharma Ltd.
Registered & Corporate Office
Plot # 2, Maitri Vihar, Ameerpet
Hyderabad – 500 038
Andhra Pradesh
India
www.aurobindo.com

Cipla Ltd.
Products: ABC, ddI, EFV, NVP, IDV, 3TC, d4T; 3TC/d4T, AZT /3TC, AZT/3TC/NVP, 3TC/d4T/NVP, ABC/3TC/AZT. APIs: EFV, 3TC, NFV, NVP, d4T, AZT. Cipla manufactures active pharmaceutical ingredients and final formulations for both the domestic Indian market and for export.

Cipla Ltd.
Mumbai Central
Mumbai 400 008
India
www.cipla.com

Dr. Reddy’s
Products: APIs: 3TC, AZT.

Dr. Reddy’s produces approximately 100 active pharmaceutical ingredients at six manufacturing facilities in India. It exports both finished products and APIs to the US, Europe, Australia, Africa and Canada, and recently established a research site in Atlanta, Georgia.

In 1994, Dr. Reddy’s announced a plan to enter the HIV pharmaceutical market with an HIV diagnostic kit, following similar announcements from Lupin Laboratories and the Rajiv Gandhi Centre for Biology. The kit failed to reach production, and Dr. Reddy’s has since only produced antiretroviral medications.

Dr. Reddy’s
7-1-27 Ameerpet
Hyderabad - 500016
Andhra Pradesh
India
www.drreddys.com

Eastern Surgical Company
Products: ABC, ddI, IDV, 3TC, NFV, NVP, d4T, AZT; 3TC/d4T/NVP, AZT/3TC.

Eastern Surgical Company
3791, Daryanganj
New Delhi, 110002
India
www.escoanand.com

Emcure Pharmaceuticals
Products: 3TC, NVP, d4T. Emcure produces ARVs in India and announced an agreement in January 2004 to export combination therapy to Kenya.
Hetero Drugs Ltd/Genix Pharma Ltd

Products: ABC, atazanavir, delavirdine, EFV, IDV, 3TC, NFV, NVP, r, SQV, d4T, tenofovir, AZT; ABC/3TC/AZT, 3TC/AZT, 3TC/d4T, 3TC/d4T/NVP, 3TC/NVP/AZT; r/LPV. APIs: ABC, atazanavir, delavirdine mesylate, ddl, EFV, IDV, LPV, NFV, NVP, r, 3TC, d4T, tenofovir, AZT. Hetero produces ARVs and APIs (Genix produces finished formulations only).

In 2001, Genix Ltd introduced indinavir, the first indigenously made protease inhibitor in the Indian market. The company aims to build up a portfolio of market-oriented products that will reach a substantially large section of Indian population at affordable prices by 2005. Hetero Drugs, which works out of the same facility as Genix Pharma, offers an ARV drug cocktail for approximately US$300 per year. It is one of three companies in Asia that is WHO pre-qualified to produce ARVs. Product details are listed below.\(^{154}\)

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Composition</th>
<th>Pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTIVA 200/600</td>
<td>Efavirenz 200/600 mg</td>
<td>60 Cap/Bottle</td>
</tr>
<tr>
<td>NEVIVIR</td>
<td>Nevirapine 200 mg</td>
<td>60 Tab/Bottle</td>
</tr>
<tr>
<td>NEVIVIR - 2's</td>
<td>Nevirapine 200 mg</td>
<td>2 Tab/Strip</td>
</tr>
<tr>
<td>ABAVIR 100</td>
<td>Abacavir-300mg</td>
<td>60 Tab/Bottle</td>
</tr>
<tr>
<td>HEPTAVIR 150</td>
<td>Lamivudine 150 mg</td>
<td>60 Tab/Bottle</td>
</tr>
<tr>
<td>STAG 30</td>
<td>Stavudine 30 mg</td>
<td>60 Cap/Bottle</td>
</tr>
<tr>
<td>STAG 40</td>
<td>Stavudine 40 mg</td>
<td>60 Cap/Bottle</td>
</tr>
<tr>
<td>ZIDO-H 100</td>
<td>Zidovudine 100 mg</td>
<td>60 Cap/Bottle</td>
</tr>
<tr>
<td>ZIDO-H 300</td>
<td>Zidovudine 300 mg</td>
<td>60 Cap/Bottle</td>
</tr>
<tr>
<td>INDIVIR</td>
<td>Indinavir 400 mg</td>
<td>180 Caps/Bottle</td>
</tr>
<tr>
<td>NELFIN</td>
<td>Nelfinavir Mesylate 250mg</td>
<td>270 Tabs/Strip</td>
</tr>
<tr>
<td>RITOVIR</td>
<td>Ritonavir 100 mg</td>
<td>80 Caps</td>
</tr>
<tr>
<td>SAQUIN</td>
<td>Saquinavir 200 mg</td>
<td>60 Cap</td>
</tr>
<tr>
<td>ZIDOLAM</td>
<td>Lamivudine 150 mg + Zidovudine 300 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
<tr>
<td>LAMISTAR 30</td>
<td>Lamivudine 150 mg + Stavudine 30 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
<tr>
<td>LAMISTAR 40</td>
<td>Lamivudine 150 mg + Stavudine 40 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
<tr>
<td>NEVILAST 30</td>
<td>Lamivudine 150 mg + Nevirapine 200 mg + Stavudine 30 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
<tr>
<td>NEVILAST 40</td>
<td>Lamivudine 150 mg + Nevirapine 200 mg + Stavudine 40 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
<tr>
<td>ZIDOLAM-N</td>
<td>Lamivudine 150 mg + Zidovudine 300 mg</td>
<td>60 Tabs/Bottle</td>
</tr>
</tbody>
</table>

Hetero Drugs Ltd/Genix Pharma Ltd.
Mr. M Srinivas Reddy
Genix Pharma Ltd.
H.No. 8-3-166/7/1
Erragadda, Hyderabad - 500 018
India
www.genixpharma.net
www.heterodrugs.com

IPCA Laboratories Ltd

Products : 3TC, AZT.

IPCA operates in 93 countries globally with five wholly-owned foreign subsidiaries. It is the leading producer of anti-malaria drugs in India.\(^{155}\)

IPCA Laboratories
142 - AB, Kandivli Industrial Estate, Kandivli (West)
Mumbai 400 067, Maharashtra
India
www.ipca.co.in

Matrix

Products: Active pharmaceutical ingredients only: ABC, EFV, IDV, 3TC, LPV, NFV, NVP, r, SQV, d4T, AZT. Matrix produces APIs and intermediates for both the domestic Indian market and for export.

Matrix has more than 1300 employees, including 150 R&D scientists, and several of its plants have been approved by regulatory agencies such as US Food and Drug Administration and the Australian Therapeutics Goods Administration. In October 2003, Matrix announced an agreement with the US-based Clinton Foundation to provide bulk products for the three companies that will manufacture final formulations at highly discounted rates for 13 countries in Africa and the Caribbean.\(^{156}\)

Matrix Laboratories Limited
1-1-151/1, 4th Floor
Sai Ram Towers
Alexander Road
Secunderabad – 500 003
India
www.matrixlabsindia.com

Ranbaxy Laboratories Ltd

Products: ABC, ddI, EFV, NVP, IDV, 3TC, d4T; 3TC/d4T, AZT /3TC, AZT/3TC/NVP, 3TC/d4T/NVP, ABC/3TC/AZT. Ranbaxy produces active pharmaceutical ingredients and final formulations for both the domestic Indian market and for export.

The ninth largest pharmaceutical company in the world and the largest in India, Ranbaxy operates in more than 100 countries. The company is registered to export ARVs to approximately 35 countries and is awaiting registration in 20-25 other countries. Ranbaxy is one of three companies that are WHO pre-certified to manufacture anti-AIDS drugs. The company expects to generate revenues of US$1 billion in 2004.
In October 2003, Ranbaxy was one of three Indian pharmaceutical firms to reach an agreement with the US-based Clinton Foundation to provide a triple-drug regimen for approximately 38 US cents per day in 13 African and Caribbean countries.\(^{157}\)

**Ranbaxy Laboratories Ltd**

19 Nehru Place
New Delhi-110019
India
www.ranbaxy.com

**Samarth Pharma**

Products: AZT.

Founded in 1963, Mumbai-based Samarth Pharma supplies pharmaceuticals to the domestic Indian market and exports to South America, Europe, Africa and the rest of South Asia.\(^{158}\)

**Samarth Pharma**

Samarth House
Ram Mandir Road
Goregaon (W), Mumbai 400-104
India
www.samarthpharma.com

**Strides Arco Ltd**

Products: IDV, 3TC, NVP, d, SQV, d4T, AZT; 3TC/AZT, 3TC/d4T, 3TC/d4T/NVP. Strides Arco produces final formulations only. It does not produce active pharmaceutical ingredients for other manufacturers.

Strides Arco has grown to become one of India’s largest exporters of pharmaceutical formulations with over 350 product registrations in 49 countries. The company’s annual sales totaled nearly US$100 million in 2003-2004. Strides Arco operates eight plants in India, as well as several plants in North and South America. Several of its plants have received approval from government regulatory agencies in the United Kingdom, South Africa and Australia, as well as from UNICEF. Strides Arco is one of the few companies pre-qualified by WHO to supply drugs to the Global TB Drug Facility. The company recently signed a contract to provide ARV treatment for 20,000 patients per year. It has also formed partnerships with other global pharmaceutical companies in order to enter regulated markets. Product details listed below.\(^{159}\)

<table>
<thead>
<tr>
<th>Description</th>
<th>Dosage</th>
<th>Form</th>
<th>Packing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamivudine 150mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Zidovudine 100mg / 300mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Stavudine 15mg/20mg/30mg/40mg/60mg</td>
<td>Capsule</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Nevirapine 200mg</td>
<td>Tablet</td>
<td>6 x 10's Blister</td>
<td></td>
</tr>
<tr>
<td>Indinavir 400mg</td>
<td>Capsule</td>
<td>120/180 HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Lamivudine 150mg + Zidovudine 300mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Lamivudine 150mg + Stavudine 30mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Lamivudine 150mg + Stavudine 40mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Lamivudine 150mg + Stavudine 30mg + Nevirapine 200mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Lamivudine 150mg + Stavudine 40mg + Nevirapine 200mg</td>
<td>Tablet</td>
<td>60's HDPE Bottle</td>
<td></td>
</tr>
<tr>
<td>Saquinavir 200mg</td>
<td>Softgel capsule</td>
<td>180's Bottle</td>
<td></td>
</tr>
<tr>
<td>Ritonavir 100mg</td>
<td>Softgel capsule</td>
<td>84's HDPE Bottle</td>
<td></td>
</tr>
</tbody>
</table>

**Strides Arco Ltd.**

Strides House, Bilekahalli
Bannerghetta Road
Bangalore 560 076
India
www.stridesarco.com

**Sun Pharma**

Products: APIs only: EFV. Sun Pharma produces active pharmaceutical ingredients only. It does not produce final formulations of ARVs.

Founded in 1983, Sun Pharma is one of the five largest pharmaceutical companies in India. The company produces specialty bulk actives and formulations at its sites in India, several of which hold international regulatory approval.\(^{160}\)

**Sun Pharma**

Andheri Kurla Road, Andheri (East)
Mumbai 400 059
India
www.sunpharma.com

**Zydus Cadila Healthcare Ltd/Zydus Cadila Biogen**

Products: 3TC, AZT, 3TC/AZT. Zydus produces active pharmaceutical ingredients and final formulations for both the domestic Indian market and for export to countries in Africa and Asia, including Cambodia.

Ahmedabad-based Zydus Cadila exports 560 products to 43 countries worldwide. Zydus Cadila acquired the company in 2003 from Alpharma, one of the world’s largest generic companies. Zydus Cadila reports that it is exploring the
possibility of establishing bases in markets such as
Indonesia, South Africa, Brazil and Algeria, and aims to
reach sales of US$400 million by 2006.161

Zydus Cadila Healthcare Ltd.
Corporate Headquarters
Zydus Tower
Satellite Cross Roads
Ahmedabad 380015
India
www.zyduscadila.com

• INDONESIA

Kimia Farma
Products: NVP; AZT/3TC. Kimia Farma produces final for-
mulations only, importing active pharmaceutical ingredi-
ents from India and South Korea.

In January 2004, Kimia Farma received a license from the
Indonesian Food and Drugs Supervisory Board to produce
generic antiretroviral drugs for the domestic market. The
company reports that it plans to produce 120,000 ARV
packages per month (1,440,000 annually) to meet the
demand for up to 2,000 people at a cost of approximately
US$60 per month.162

Kimia Farma
Kel Jatinegara- Kec Cakung
Jl. Rawagelam V. Kaw. Industri Farmasi
Jakarta Timur
D.K.I. Jakarta
www.kimiafarma.co.id

• MALAYSIA

Duopharma
Products: NVP. Information on API production and export
unavailable.163

Duopharma SDN BHD
Lot 2599 Jalan Serulung 59, Kaw 3
Taman Klang Jaya
41200 Klang
Selangor Darul Ehsan
Malaysia / 3323-1566
www.duopharma.com.my

• SOUTH KOREA

LG Chemicals/LG Life Sciences
Products: AZT. LG Chemicals/LG Life Sciences produces
APIs and intermediates for export. Information on produc-
tion of final formulations for the domestic Korean market is
uncertain. South Korea’s membership in the WTO prohibits
companies from producing ARVs protected by patents. LG
Chemicals is the leading chemical company in Korea with
annual sales of KRW5.4 trillion and a global workforce of
10,000 employees, 1,000 of which are at LG Life Sciences.

LG Chemicals
Shanna Kim
LG Twin Tower, East Tower
20 Yoido-dong, Youngdungpo-gu, Seoul
South Korea
www.lgls.co.kr

Korea United Pharmaceutical Inc.
Products: AZT. Korea United produces APIs and intermedi-
ates for export. Information on production of final formulat-
ions for the domestic Korean market is uncertain. South
Korea’s membership in the WTO prohibits companies from
producing ARVs protected by patents. Product details listed
below.164

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Brand Name</th>
<th>Generic Name &amp; Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>188</td>
<td>Antibiotic &amp; other Chemotherapeutics Agents</td>
<td>NITED-AZT Caps</td>
<td>1 Cap. Zidovudine 100mg</td>
</tr>
</tbody>
</table>

Korea United Pharmaceutical Inc.
154-8, Nonhyun-dong
Kangnam-gu, Seoul
South Korea
www.kup.co.kr

Samchully Pharmaceuticals
Products: AZT. Samchully produces APIs and intermedi-
ates for export. Information on production of final formulat-
ions for the domestic Korean market is uncertain. South Korea’s membership in the WTO prohibits companies from produc-
ing ARVs protected by patents.

Established in 1983, Samchully works with several leading
pharmaceutical and biotechnology companies, including
GlaxoSmithKline, Bristol-Myers Squibb, Avecia, and ISIS.
The company first synthesized active pharmaceutical
zidovudine in the 1990s. Product details listed below.165

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Ingredients</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azidomine cap</td>
<td>zidovudine</td>
<td>100 mg</td>
</tr>
</tbody>
</table>

Samchully Pharmaceuticals
947-7 Daechi-Dong
Gangnam-Gu, Seoul 135-735
South Korea
www.samchullypharm.com

• THAILAND

Thai Government Pharmaceutical Organization (GPO)
Products: ddI, 3TC, NFV, NVP, d4T, AZT; 3TC/d4T,
3TC/d4T/NVP. GPO produces final formulations for both the
domestic Thai market and for export

The state-owned Government Pharmaceutical Organization
under the Ministry of Public Health has approximately 2000
employees, manufactures 70 products and generated annu-
al revenue of US$98 million in 2003. GPO exports ARVs to
Cambodia, Africa and NGOs including Médecins Sans Frontières. ARV export revenue in 2003 totaled $3 million, with a per person cost of triple combination therapy at approximately $365 per year.\(^{166}\)

**Thai Government Pharmaceutical Organization**

75/1 Rama VI Rd.
Ratchathewi
Bangkok, 10 400
Thailand
www.moph.go.th/gpo

**T.O. Chemical**

Products: AZT. Information on API production and export unavailable.\(^{167}\)

Contact information unavailable

- **VIETNAM**

**MST Trading Pharmaceutical Co.**

Products: 3TC, AZT. Information on API production and export unavailable.\(^{168}\)

MST is a private Vietnamese manufacturer based in Ho Chi Minh City. In December 2002, the company was awarded a contract by the government to provide lamizidivir, a combination of lamivudine and zidovudine. Pregnant women and health workers receive the treatment free of charge in Vietnam, but all others must pay the equivalent of US$900/year for the medicine. MST has previously produced lamizidivir for export to South Africa, using APIs from South Korea.\(^{169}\)

Contact information unavailable.

**Other Companies**

Other companies that may be producing ARVs or APIs include: Top Pharma (China)\(^{170}\) and Vietnam Pharmaceutical Corporation.\(^{171}\) Megah Pharma Pte Ltd. (Malaysia) imports generic ARVs for sale in the domestic market.
Appendix 2
TREAT Asia Site Information

To date, the following clinical centers, hospitals, and research institutions have participated in the planning and development of TREAT Asia:

1. National Center for HIV/AIDS, Dermatology, and STD, Phnom Penh, Cambodia
   Seng Sut Wantha, MD, MPH

2. Preah Bat Norodom Sihanouk Hospital, Phnom Penh, Cambodia
   Senya Chin, MD

3. Beijing Ditan Hospital, Beijing, China
   Zhang Fujie, MD

4. Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing, China
   Li Taisheng, MD, PhD

5. Center for AIDS Control and Research, Municipal Health and Anti-Epidemic Station of Guangzhou, Guangzhou, China
   Chen Xiao Ping, MD, PhD

6. Queen Elizabeth Hospital, Hong Kong, China
   Patrick C.K. Li, MBBS, FRCP
   www.qeh.org.hk

7. Kunming Epidemic Hospital in Yunnan, Kunming, China
   Zhou Zengquang, MD

8. Infectious Disease Hospital of Zhengzhou, Zhengzhou, China
   Zhao Qingxia, MD

9. YRG Centre for AIDS Research and Education, Chennai, India
   N. Kumarsamy, MD
   Suniti Solomon, MD
   www.yrgcare.org

10. HIV Project Ruby Hall Clinic, Pune, India
    Sanjay Pujari, MD
    www.rubyhall.com

11. Kerti Praja Foundation, Bali, Indonesia
    Dewa N. Wirawan, MD
    www.ngo.or.id/ypdps

12. School of Medicine, Udayana University & Sanglah Hospital, Bali, Indonesia
    Tuti Parwati Merati, MD

13. School of Medicine, University of Indonesia & Tjipoto Mangunkusumo Hospital, Jakarta, Indonesia
    Zubairi Djoeberan, MD

14. International Medical Center of Japan, Tokyo, Japan
    Shinichi Oka, MD
    www.imcj.go.jp

15. University of Malaya Medical Center, Kuala Lumpur, Malaysia
    Adeeba Kamarulzaman, MBBS, FRACP
    www.um.edu.my/FU/

16. Hospital Kuala Lumpur, Kuala Lumpur, Malaysia
    Christopher Lee, MD
    www.hkl.gov.my

17. Research Institute for Tropical Medicine, Manila, Philippines
    Rossana Ditangco, MD
    www.ritm.gov.ph

18. Tan Tock Seng Hospital, Infectious Diseases Research Centre, Singapore
    Nicholas I.J. Paton, MA, MD, MRCP, DTM&H, FAMS
    www.tsh.com.sg

19. Institute of Public Health & AIDS Prevention and Research Center, National Yang-Ming University, Taipei, Taiwan
    Yi-Ming A. Chen, MD, ScD
    www.ym.edu.tw/english/History.htm

20. Beijing Ditan Hospital, Beijing, China
    Zhang Fujie, MD

21. Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing, China
    Li Taisheng, MD, PhD

22. HIV-NAT/The Thai Red Cross AIDS Research Centre, Bangkok, Thailand
    Praphan Phanuphak, MD
    www.hivnat.org

23. Ramathibodi Hospital, Bangkok, Thailand
    Asda Vihagool, MD
    www.ra.mahidol.ac.th

24. Oxford University Clinical Research Unit at Hospital for Tropical Diseases, Ho Chi Minh City, Viet Nam
    Jeremy Farrar, FRCP, DPhil

Community Organizations

- Australian Federation of AIDS Organizations (AFAO)
  www.afao.org.au

- Asia Pacific Council of AIDS Service Organizations (APCASO)
  www.apcaso.org

- Asia Pacific Network of People Living with HIV/AIDS (APN+)
  www.xs4all.nl/~gnp/asap.html

- Action for AIDS (AFA)
  www.afa.org.sg

- AIDS Society of Asia Pacific

Advisory Group

- National Centre in HIV Epidemiology and Clinical Research, University of New South Wales, Sydney, Australia
  David A. Cooper, MD, DSc
  Gregory Dore, MB, BS, BSc, FRACP, MPH
  Matthew Law, PhD
  www.med.unsw.edu.au/nchecr


Zhang F, MD. Beijing Ditan Hospital, Beijing, China. Cited in Science, 2004 June 4; vol 304.


Mean of estimates from: Beyrer C, MD. Johns Hopkins University.


Mean of estimates from: Cambodia’s Entry Could Be Panacea—or Bitter Pill.” Inter Press Service. September 12, 2003. (170,000); WHO. HIV/AIDS in Asia and the Pacific Region 2003. (157,000)

Mean of estimates from: Estimated HIV prevalence and ART needs in 2003. 2003. (130,000)

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