

**THE BRAZILIAN AIDS MODEL:
A STUDY OF BRAZILIAN EFFORTS TO COPE WITH AIDS**

APRIL 2001

**SHAWN ACHAR
MICHAEL FLOOD
GALIA SCHECHTER
JESSE SUTHERLAND
ANNE WILLIAMS**

GEORGETOWN

UNIVERSITY

SCHOOL OF BUSINESS

MCCORMICK
School of Business

UNIVERSITY

TABLE OF CONTENTS

<u>EXECUTIVE SUMMARY</u>	1
<u>OBJECTIVE AND METHODOLOGY</u>	2
<u>INTRODUCTION</u>	2
<u>FINDINGS AND OBSERVATIONS</u>	4
<u>HIV/AIDS AND HEALTH CARE IN BRAZIL</u>	4
<u>CULTURAL AND POLITICAL ENVIRONMENT</u>	5
<u>INTERNATIONAL SUPPORT FOR BRAZILIAN HIV/AIDS PROGRAM</u>	7
<u>PROCUREMENT AND DISTRIBUTION</u>	8
<u>CASE STUDY: FAR-MANGUINHOS</u>	9
<u>ANALYSIS AND CONCLUSIONS</u>	10
<u>APPENDIX 1: LIST OF HIV MEDICINES IN BRAZIL</u>	13
<u>APPENDIX 2: SOURCES</u>	14
<u>APPENDIX 3: BIBLIOGRAPHY</u>	15
<u>APPENDIX 4: ABOUT THE AUTHORS</u>	16

EXECUTIVE SUMMARY

Daily news reports document the acrimonious debate over access to HIV/AIDS drugs in developing nations. The ongoing quarrel has centered on pricing, with Multinational Pharmaceutical firms reluctant to accommodate activist demands for subsidized medicines. While many poor nations struggle to combat the pandemic, international development agencies and public policy thought leaders have come to believe that the "Brazilian AIDS Model," based on local production of antiretroviral medicines (ARVs), offers the best solution. However, there is little conclusive evidence as to the effectiveness, sustainability, and transferability of this model.

This paper attempts to address these issues.

First, the paper discusses the uniqueness of the Brazilian model. In short, it is hard to see the transferability of this model to other nations, since Brazil benefits from a unique political and cultural environment. In addition, the disease is far more manageable in Brazil relative to sub-Saharan Africa. While less than 1% of Brazilians are afflicted by the disease, over 11% of South Africans are HIV+.

Second, this paper discusses the actual meat-and-bones of the Brazilian AIDS model. It walks the reader through the pharmaceutical production process and the business model behind the program. This section outlines the limited nature of pharmaceutical production in Brazil, while addressing the mechanics of state-run production through eleven facilities, starting at the main plant, Far-Manguinhos.

Third, this paper discusses the sustainability of the current model. While the model is currently sustainable, it does require trade-offs and significant state subsidies. To increase production of ARVs, Brazil will need to reduce production of other important medicines covered by its national health care system. Further, there are certainly no guarantees for the future financing of the program within Brazil or through international development agencies.

OBJECTIVE AND METHODOLOGY

A team of five MBA students at Georgetown University conducted this study during the spring of 2001 as an international consulting practicum. In addition to a literature review the team conducted informational interviews in Washington, São Paulo, and Rio de Janeiro. Please see Appendix 2 for a list of sources.

INTRODUCTION

By the close of the millennium, the Human Immunodeficiency Virus (HIV) had infected 58 million people worldwide, killing 22 million and leaving the remaining 36 million in need of significant medical care. The deadly disease of unknown origin captured the attention of development organizations, politicians, and global news media, often to the exclusion of other ailments. Epidemiologists carefully studied the spread of HIV, while researchers struggled to find viable treatments for infected patients. Throughout the 80's few medicines offered any hope.

However, recent improvements in the therapeutic treatment of HIV/AIDS have proven effective at controlling the progression of symptoms. Though these multi-drug cocktails have greatly reduced mortality of patients in developed nations, such treatments are both costly and complicated. While the pandemic threatens the health and prosperity of all the people of the world, the majority of HIV+ individuals reside in the poorest developing nations of the world, with particularly high concentrations in sub-Saharan Africa. Currently, the poorest sufferers have little or no access to these treatments, though it is important to note that poverty is not the only obstacle in their path.

Ironically, private sector pharmaceutical research, which has brought hope to sufferers, has also brought acrimony to the industry. Whereas earlier, infected persons had little or no treatment options, now pharmaceutical breakthroughs promise to control the disease and protect the immune systems of victims. HIV/AIDS activists, hopeful that anti-retroviral drugs will prove equally effective in developing nations, have demanded increased access to treatment. However, governments in these nations claim that they are wholly unable to finance such purchases and thus demand reduced prices from

private multinational pharmaceutical companies. Pharmaceutical companies counter that they should be reimbursed for their unprecedented investments in researching HIV and recognized for their contributions in the fight for a cure. Further, ultimatums that demand medicines at marginal costs could threaten the very viability of intellectual property business models and stifle any future developments in treating HIV/AIDS.

At the core of this complicated debate is the pricing of HIV/AIDS drugs that are under patent and the recent ultimatums issued by governments in developing nations threatening to void these very same patents. This paper will focus on this issue as it relates to Brazilian efforts to broaden access to antiretroviral treatments. More specifically, this paper will address the capabilities, capacities, and sustainability of the "Brazilian AIDS Model". Popular news media and international AIDS organizations have lauded this model as the model for HIV and AIDS treatment across the world, yet there has not been a comprehensive analysis of the model and its transferability.

To understand the context better, UNAIDS estimates that there are approximately 500,000 HIV+ Brazilians (diagnosed and undiagnosed), less than 1% of the total population. In contrast, 1 out of 9 South African has HIV and the epidemic remains unchecked. Further, HIV infections in Brazil are concentrated in Sao Paulo and Rio de Janeiro. These two cities have developed health care infrastructure to deal with the disease. Of the estimated 500,000 HIV infected individuals, 160,000 have been diagnosed, of which approximately 70,000 have died. In 1999, 90,000 Brazilians received ARV treatment through the state system¹.

¹ AIDS Drug Policy – Brazilian Ministry of Health

FINDINGS AND OBSERVATIONS

HIV/AIDS AND HEALTH CARE IN BRAZIL

As the 10th largest economy in the world, boasting a population of approximately 168 million people², Brazil plays a significant role in international debates over public policy. Even more so, the country is known for its impressive strides in health care, with the median life expectancy of its citizens increasing from 45 in 1950, to 67 today³. This success is partly attributable to the national health care system, which guarantees medical care to the entire population in accordance with the 1988 constitution. A growing minority of Brazilians pay for private medical treatment or receive care through employer sponsored HMOs.

Socialized Health Care

The Ministry of Health, in coordination with state and municipal governments, funds and administers a network of 7,000 hospitals containing 290,000 beds⁴. The government fully subsidizes inpatient care but limits pharmaceutical benefits for outpatient treatment. However, current regulations do guarantee no-cost (to the patient) medicines for the outpatient treatment of AIDS, tuberculosis, diabetes and leprosy. Approximately 10 million people do not have ready access to the national health system.

Private Health Care

Approximately 40 million Brazilians seek treatment from private sector health care providers, which compliment (or supplant) government offerings. While the majority of these individuals have health care insurance provided by their employers, current policies do not provide pharmaceutical benefits⁵. Nonetheless, competition amongst

² US Foreign Commercial Service Estimate. <http://www.usatrade.gov/website/ccg.nsf/CCGurl/CCG-BRAZIL2001-CH-10:-0061DBCB>

³ Antiretroviral Therapy and Public Health: A Balance of the Brazilian Experience.

⁴ Antiretroviral Therapy and Public Health: A Balance of the Brazilian Experience.

⁵ World Bank, "Second AIDS and STD Control Project"

HMO providers in the affluent city of Sao Paulo is likely to lead to increasing pharmaceutical benefits for privately insured Brazilians.

CULTURAL AND POLITICAL ENVIRONMENT

The 1980's marked a period of social and political activism in Brazil. In this context, NGOs and AIDS groups spoke out about HIV/AIDS and demanded solutions to the growing need for care and treatment. Other factors—including government commitment at the federal, state and local levels, innovative medical research, support from international agencies, and political stability—also contributed to Brazil's unique response to the HIV/AIDS crisis. For example, Brazil's political system encourages free speech, non-discrimination of differences and civic participation. This enabled aggressive media campaigns and influential cross sector partnerships to voice their perspectives in the battle against AIDS. Whereas in many other AIDS-troubled countries victims are often shunned and the topic is taboo, the Brazilian culture encourages respect and dignity for people with the disease. Moreover, this open approach to the illness facilitates patient identification and treatment, as well as effective prevention and awareness programs.

Development of the Brazilian HIV/AIDS Response – Historical Overview

In addition, the government commitment to universal health care also explains the success of the AIDS initiative. Starting in 1986, the Ministry of Health founded the National Committee for AIDS, now known as the National Program for STD and AIDS. This program initiated procurement and distribution of anti-retrovirals and medication for opportunistic infections as early as 1991.

In the following decade the government restructured and broadened the national response by building the capacity of state and municipal teams and committing resources to the cause. Beginning in 1994, the Ministry of Health implemented the STD and AIDS Control Project (AIDS I) with a \$250 M loan from the World Bank (including \$90 M in matching funds from the national treasury). A second World Bank loan arrived in 1998 for the AIDS II project, with the aim of strengthening institutional capacity (see

p. 8 for details about donor support). Civil participation continued to gain momentum through partnerships between the Ministry of Health, NGOs and community organizations.

The announcement of new treatments in 1996 heralded a new era of treatment for people with HIV/AIDS in Brazil. In particular, the former Minister of Health, Adib Jatene, advocated a political commitment to make anti-retroviral drugs available to those in need. Free medication became a right in 1996 with the enactment of a Presidential decree. When this law was drafted, the politicians saw it as window dressing and the government didn't expect to actually follow it. Court decisions, however, forced the government to meet its legal obligations. The end result is that the government must pay for all AIDS medications, even if the recipient is wealthy. See Appendix A for a list of HIV/AIDS medicines in use.

In 1997 the government started a national network of laboratories for CD4 and viral load testing as well as the National System of Quality of Laboratory Tests for STD and AIDS. In August 1998, the government instituted the division of costs whereby the federal government would purchase anti-retrovirals while the states and municipalities would be responsible for medication to treat AIDS-related illnesses. As of July 1999, Brazil had 70 CD4 labs (with an annual capacity of 252,000 tests) and 55 Viral Load labs (with an annual capacity of 165,000 tests)⁶. Many laboratories are run in cooperation with universities that participate in the National System of Quality Tests for AIDS.

In 1999, the Ministry of Health implemented the National Network for the study of resistance of Anti-retrovirals to HIV. The Ministry also developed SILCOM, a separate national database designed to manage, plan, procure, distribute, and dispense HIV/AIDS drugs through a national pharmaceutical system. As of July 1999, 111⁷ of the 574 dispensaries used SILCOM. As of March 2001, these databases remain separate, although there are plans to unite them in the future. This will be particularly useful for monitoring and evaluating patient contacts and therapeutic adherence.

In addition to implementing and managing the government's response to HIV/AIDS, the Ministry of Health also provided direct financial support to more than 400 projects under 267 NGO to develop comprehensive awareness and treatment solutions. In fact, for almost 20 years different sectors of civil society, including trade unions, philanthropic and religious entities, university research centers and most particularly AIDS NGOs played a key role as conductors and catalysts of civil society's response to the pandemic.

INTERNATIONAL SUPPORT FOR BRAZILIAN HIV/AIDS PROGRAM

The annual federal public health budget represents approximately \$23 billion, of which \$600 M was targeted for STD/AIDS in 1998.⁶ Based on data provided in the 1999 MOH budget, approximately \$300M⁹ was earmarked for HIVAIDS activities (this includes AIDS II (\$R 106,500,000); and STD/AIDS drugs (\$R 486,914,800), but does not include hospitalizations, personnel, and related expenditures covered under separate budget items). Additional support is provided by a number of international and bi-lateral donors. The following table details on-going donor support for HIV/AIDS activities, amounting to approximately \$50 M annually¹⁰.

⁶ AIDS Drug Policy – Brazilian Ministry of Health

⁷ AIDS Drug Policy – Brazilian Ministry of Health

⁸ World Bank, "Second AIDS and STD Control Project"

⁹ MOH, Execução Orçamentária e financeira – 1999 (www.saude.gov.br "Recursos Financeiros")

¹⁰ <http://www.usatrade.gov/website/ccg.nsf/CCGurl/CCG-BRAZIL2001-CH-10-0061DBCB>

Table 1: Donors support 1998-2002

Donor	Total (In millions)	Period	Annual (In millions)	Activities
USAID	\$7.5	1999 - 2001	\$2.5	Institutional development, Social marketing of condoms
World Bank (IBRD)	\$165	1998-2002	\$33	AIDS II Project ¹¹ Prevention, Diagnosis and treatment, Institutional development)
UNDCP	\$22	1998-1999	\$11	Health promotion, STD/HIV/AIDS and drug abuse prevention , Monitoring and evaluation ¹²

Other bilateral NGOs and UN organizations also support health activities (for example, UNICEF funding of \$11 M supports overall health activities, some of which inevitably benefits the STD/AIDS prevention programs). Although previous donor support may have funded ARV procurement (some of the \$160 M allocated for the initial World Bank AIDS and STD Control Project support drug costs), none of the international donors is currently supporting this type of activity. In fact, the World Bank AIDS II project stipulates that it does not provide financing for drugs. It should be noted that while donor funds are not used to procure ARVs, they do free up government funds for this purpose.

PROCUREMENT AND DISTRIBUTION

Government procurement for high cost strategic drug follows an annual cycle whereby the MOH estimates demand and orders the required quantities from the public and commercial sector (70% and 40%, respectively). Seventy percent of all strategic drugs are ordered from the 11 government-manufacturing facilities registered with the Associação Nacional dos Laboratórios Oficiais . Forty-percent of this amount is

¹¹ Total funding for the AIDS II project is \$300M (\$165M IBRD; \$135M GOB)

¹² www.undcp.org/brazil/aidsproj.html

produced from Far-Manguinhos, the federal level production facility. State-level manufactures produce 30%. In addition to Far-Manguinhos, there are four facilities that manufacture anti-retrovirals in 2000-2001. These include: Fundação Ezequiel Dias (FUNED), Fundação para o Remédio Popular (FURP), Laboratório Farmacêutico de Pernambuco S/A (LAFEPE), and Indústria Química do Estado de Goiás S/A (IQUEGO). The remaining 30% of the total drug requirement is tendered in the commercial sector. It is worth noting that some international aid agencies advocate pooled procurement and other measures to achieve competitive prices instead of public sector pharmaceutical distribution, which can be a heavy strain on limited resources.

CASE STUDY: FAR-MANGUINHOS

In 1956, the Ministry of Health founded the Far-Manguinhos laboratory to research and manufacture pharmaceuticals. Far-Manguinhos has the capacity to produce 800 thousand units per year.¹³ ARVs make up 25% of production although 80% of annual revenue. The staff asserts that the laboratory is capable of producing in three shifts, should this be required to meet increasing demand for ARVs. Furthermore, other government-owned laboratories would be able to produce ARVs or increase existing ARV production, should demand rise sharply. In addition to manufacturing out-of-patent HIV/AIDS drugs, Far-Manguinhos is reverse engineering Efaviranez and Nelfinavir in the hope of obtaining a compulsory license to produce these drugs locally. The staff believes that Far-Manguinhos is the only public sector institution involved in reverse engineering ARVs.

Although Far-Manguinhos delivers medications to MOH secretariats at the state level, the lab is paid directly by the MOH, which assures a reliable cash inflow. The staff asserts that Far-Manguinhos has been financially self-sufficient for 7 years and that 15% of income is reinvested in R&D. The majority of costs (97%) are associated with procuring raw materials (mostly from India). However, anecdotal evidence suggests that the government's accounting methods may fail to fully capture costs.

¹³ Annual Report, Far-Manguinhos 2000

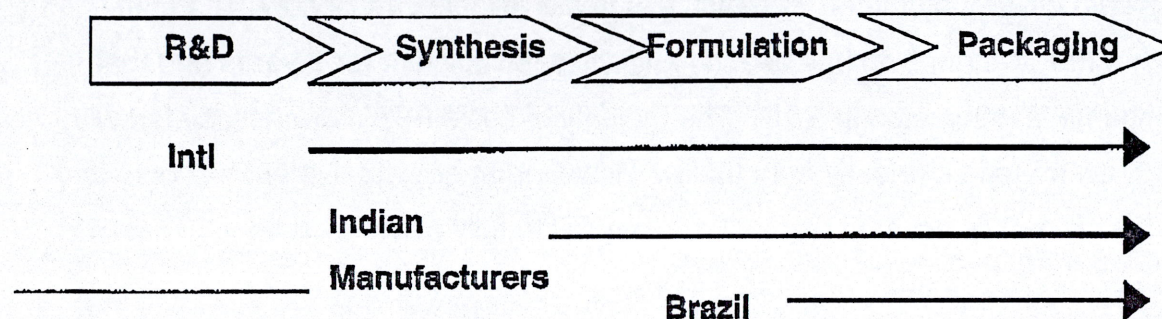
Because it is over 40 years old, the Far-Manguinhos facility requires structural renovations in order to achieve compliance with Good Manufacturing Practices (GMP). The staff anticipates that all such renovations will be completed by July 2001. Nonetheless, the lab has modern equipment, including the ability to conduct bioequivalency and bioavailability testing¹⁴. As is the case for all drugs supplied by the MOH, products produced by Far-Manguinhos must meet standards established by the National Agency for Sanitary Surveillance.

ANALYSIS AND CONCLUSIONS

During the recent public policy debate, Brazil repeatedly threatened to "manufacture" generic versions of certain HIV/AIDS drugs for domestic uses and as an export platform. Because of this threat and the importance of generics to the Brazilian AIDS model, the capabilities, resources and sources of funding for the manufacturers were analyzed. It should be noted that there are two kinds of generic manufacturers in Brazil – state-owned and private companies. Brazil's threat to "manufacture" pharmaceuticals would be carried out by the five state-owned companies, of which Far-Manginos is the largest player. The private companies manufacture off-patent generics and/or generics with patented delivery systems.

In order to fully evaluate Brazil's threat to "manufacture" generic pharmaceuticals, each of the manufacturing steps must be evaluated individually. A simplistic overview of the pharmaceutical manufacturing process is shown in table 2.

Table 2 – Pharmaceutical Manufacturing



¹⁴ There are a total of 12 labs nationwide that are capable of doing bioequivalency and bioavailability testing.

The first step in the manufacturing process is the actual chemical synthesis and/or purification. This step can be asset intensive depending on the product and its process. The two important limiting factors for this step are access to fine chemicals (precursors) and financial capital. A variety of different chemicals may be needed in the synthesis step and can be specific to each product. Often these chemicals are rare and are difficult to source outside of developed countries. Notable exceptions include India and China, which have the chemical manufacturing base needed to supply these chemicals. Interviews with Far-Manguinos, and ALANAC indicated that Brazil's lack of access to these fine chemicals limits their ability to synthesize the active compounds and consequently the state-owned and private manufacturers have little ability to manufacture from base materials. Except for basic syntheses, Brazil must import all of the needed chemicals or, preferably, the already synthesized bulk actives. Anecdotal evidence indicates that Brazil's practice of purchasing bulk actives and chemicals limits their ability to control quality, since the spot market is run by brokers sourcing from numerous countries.

Equally important, Brazil's long history of high inflation and interest rates has severely retarded the construction of new plants for synthesis and fine chemicals. Since long-term loans in Brazil have a maturation period of two years¹⁵ and current annual interest rates of 34% to 60%¹⁶ it is all but impossible for private Brazilian companies to finance new plants or equipment. According to Jose Mahalhaes, Executive Director of ALANAC, "[Private] generic drug manufacturers in Brazil are getting killed." While Brazil has entered a period of relative economic and financial stability, it is unclear whether this will enable the financing of new plants or equipment. Of course, the state-owned companies are not dependent upon the private markets for financing, but they do require an extensive specialty chemical industry that will take years to build.

Since Brazil is generally incapable of synthesizing the active compounds, they generally import them in bulk from India or China using brokers as intermediaries. These bulk compounds are then formulated and packaged in Brazil. The interviewees indicated that both the private and public manufacturing companies have substantial capabilities and expertise in formulating and packaging. The state-owned company, Far-Manginos, has the ability to produce and package 800 thousand units per year. Thus, an increase in manufacturing AIDS drugs will necessarily come at the expense of other diseases. Considering the high profile of AIDS in Brazil, this is unlikely to cause great concern and the government can easily outsource the packaging of off-patent drugs for the other illnesses to private companies.

In summary, Brazil's threat to "manufacture" AIDS drugs is very limited by their inability to synthesize compounds, for which they rely heavily on third parties. As long as Brazil has access to these chemicals and/or bulk compounds, they do have the ability to formulate and package pharmaceuticals. However, the threat of Brazil exporting these drugs is highly unlikely since they do not have the cost advantage or expertise needed to compete against the Indian and Chinese companies from whom they source the bulk actives.

¹⁵ Mr. Mahalhaes - ALANAC

¹⁶ Financial Times, 3/23/01 p. 20

APPENDIX 1: LIST OF HIV MEDICINES IN BRAZIL

<u>CATEGORY</u>	<u>DRUGS</u>	<u>PRICE</u>	<u>MNC</u>	<u>DIST. YR.</u>
Nucleoside analogs	Zidovudine (AZT), 100mg caps (Imported)			
	Zidovudine (AZT), 100mg caps (PUBLIC)	\$0.18	Glaxo	1991
	Didanosine (ddI), 100mg tabs (Imported)			
	Didanosine (ddI), 100mg tabs (PUBLIC)	\$0.51	BMS	1993
	Zalcitabine (ddC), 0.75mg tabs (Imported)			
	Zalcitabine (ddC), 0.75mg tabs (PUBLIC)	\$0.08	Roche	1996
	Stavudine (d4T), 40mg caps (Imported)			
	Stavudine (d4T), 40mg caps (PUBLIC)	\$0.28	BMS	1997
Non-nucleoside reverse transcriptase inhibitors	Lamivudine (3TC), 150mg tabs (Imported)			
	Lamivudine (3TC), 150mg tabs (PUBLIC)	\$0.83	Glaxo	1996
	Nevirapine (NVP), 200mg tabs (Imported)	\$2.68	Roxane	1998
	Nevirapine (NVP), 200mg tabs (PUBLIC)			
	Delavirdine (DLV), 100mg tabs (Imported)		Pharmacia	1998
	Delavirdine (DLV), 100mg tabs (PUBLIC)			
	Efaviranez (EFV), 100mg tabs (Imported)	\$1.30	Merck	1997
	Efaviranez (EFV), 100mg tabs (PUBLIC)			
Protease Inhibitor	Saquinavir (SQV), 200mg caps (Imported)	\$0.75	Roche	1996
	Saquinavir (SQV), 200mg caps (PUBLIC)			
	Ritonavir (RTV), 100mg caps (Imported)	\$0.88	Abbott	1996
	Ritonavir (RTV), 100mg caps (PUBLIC)			
	Indinavir (IDV), 400mg caps (Imported)	\$1.72	Merck	1997
	Indinavir (IDV), 400mg caps (PUBLIC)			
	Nelfinavir(NFV), 250mg tabs (Imported)	\$1.36	Roche	1998
	Nelfinavir(NFV), 250mg tabs (PUBLIC)			

COMMENTS

This table is extracted from a price comparison study conducted by Richard Laing at Boston University.
(http://ddc2.bumc.bu.edu/richard/ARV_Drug_Prices/AIDS_Drug_Prices.htm).

Only selected presentations are listed

The shaded area indicates drugs that are manufactured by government-run laboratories.

Distribution year data is detailed in a document entitled "AIDS drug policy - Ministry of Health/ Brazil)

APPENDIX 2: SOURCES

Management Sciences for Health, Arlington, VA
Tom Moore, Senior Program Associate

Management Sciences for Health, Rio de Janeiro
Karen Lassner, Country Representative

World Bank, Washington, DC
C. Nigel Thomson¹⁷

World Bank – PAHO, Washington, DC
Jillian Claire Cohen, Pharmaceutical Liaison Officer

Far-Manguinhos, Rio de Janeiro
Cristina Mello R. d'Almeida, Center for Planning and Management
Hilbert Pfaltzgraff Ferreira, Production Manager
Mr. Mandelli, Procurement Officer

Associação dos Laboratórios Farmacêuticos Nacionais (ALANAC), Sao Paulo
Jose Mahalhaes, Executive Director

¹⁷ C. Nigel Thompson was on two-year assignment at the World Bank when this interview. Previously, Mr. Thompson was Executive Director, Economic and Development Strategy for Merck & Co., Inc.

APPENDIX 3: BIBLIOGRAPHY

"AIDS Drugs Policy," Ministry of Health, 2000

"Annual Report," Far-Manguinhos, 2000

"Antiretroviral Therapy and Public Health: A Balance of the Brazilian Experience," Ministry of Health.

Cohen, Jillian Claire, "Public Policies in the Pharmaceutical Sector: A Case Study of Brazil" The World Bank, January 2000.

Financial Times, 3/23/01 p. 20

Govindaraj, Ramesh, Reich, Michael R., Cohen, Jillian C., "World Bank Pharmaceuticals Discussion Paper" The World Bank, September 2000.

Impact Evaluation Report, "The Brazil Health System," The World Bank, June 30, 1998.

Ministry of Health PowerPoint presentation from 2000 AIDS Conference in Durban, South Africa

"Project Appraisal Document on a proposed loan in the amount of US\$165 million equivalent to the Federative Republic of Brazil for a Second AIDS and STD control project," The World Bank, July 31, 1998.

Rosenberg, Tina, "Look at Brazil," *Sunday NYTimes Magazine*, January 28, 2001

<http://www.usatrade.gov/website/ccg.nsf/CCGurl/CCG-BRAZIL2001-CH-10:-0061DBCB>

<http://www.saude.gov.br>

<http://www.aids.gov.br>

<http://www.anvisa.gov.br>

<http://www.undcp.org/brazil>

<http://www.usaid.gov/pubs/cp2000/lac/brazil.html>

http://dcc2.bumc.bu.edu/richardl/ARV_Drug_Prices/AIDS_Drug_Prices.htm

APPENDIX 4: ABOUT THE AUTHORS

Shawn Achar, Michael Flood, Galia Schechter, Jesse Sutherland, and Anne Williams are graduating MBA students from the McDonough School of Business, class of 2001. Please see the attached resumes for more information about the authors. For more information about the McDonough School of Business at Georgetown University, please go to <http://www.msb.edu/>

Please direct any queries concerning this publication to sra2@georgetown.edu