

Economic determinants of HIV transmission in Latin America

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6 June 2000

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HIV/AIDS has developed under diverse conditions around the world with consequent variations in the mode of transmission and the rate of transmission. In the industrialized countries, what began as an epidemic among gays and then needle-sharing drug users, is now increasingly concentrated in poor and marginalized sectors of the population. In Africa and South Asia, the AIDS epidemic is almost entirely among heterosexual non-drug-users. In Eastern Europe, HIV is spreading rapidly among intravenous drug users. Latin America represents a composite of the industrial and developing worlds both in its economic performance and in its HIV epidemics.

Most Latin American and Caribbean countries are ranked as middle-income and of medium human development. Rather than representing an intermediate stage between developing and industrialized countries, that ranking results from averaging the affluence of Latin America's modern sector and the extreme poverty and economic and political instability on which it uneasily rests. Latin America has the most unequal distribution of income of any world region, a fact that influences every aspect of its society and economy. That inequality has contributed to the stagnation of Latin economies and the volatility of its politics. It produces a health profile that has been termed an epidemiological accumulation, rather than an epidemiological transition (Franco Agudelo, 1988). Diseases of the poor – infectious and parasitic diseases – continue to claim a large percentage of lives, while the so-called diseases of affluence – chronic and degenerative diseases – contribute increasingly to morbidity and mortality, at higher age-adjusted rates among the poor than among the rich. Latin America and the Caribbean also have a dual HIV profile that mirrors the industrialized world among men who have sex with men and people who share needles, and a rapidly spreading heterosexual epidemic, as in sub-Saharan Africa and South Asia.

International AIDS policy, understandably, has been influenced by the epidemics in the industrialized world and tends to emphasize behavioral factors, primarily sexual behavior and intravenous drug use, in prevention strategies. Economic and biomedical factors that promote HIV transmission, especially among poor people, are overlooked when policy is narrowly framed in behavioral terms. Sub-Saharan Africa has been the main focus of AIDS policy in the developing world because the epidemic has emerged at higher levels there than seen so far in Latin America and Asia. AIDS policy for Africa relies heavily on condom provision and secondarily on treatment of

sexually transmitted diseases (STDs), reinforcing the commonly accepted notion that the high prevalence of HIV in Africa is primarily due to very high rates of partner change (and the presence of cofactors that are also the result of high rates of partner change). Such a conclusion ignores a wealth of epidemiological, clinical, and laboratory evidence that demonstrates that transmission of infectious diseases – and HIV is no exception – is greatly influenced by host factors, such as malnutrition, parasitosis, and stress. The absence of a generalized heterosexual AIDS epidemic in the industrialized countries, in spite of epidemics of other sexually transmitted infections, compels us to look at host factors to understand AIDS in developing countries. For low-income countries and for middle-income countries with a significant minority of extremely poor people, it is poverty and poor health that promote HIV, not fundamentally different frequencies of sexual contact or types of sexual behavior.

In this paper, I examine the implications of the generalized heterosexual epidemic of AIDS in Africa for Latin America. A dangerous situation exists in “exceptionalizing” the African case. If we assume that Africa has much higher levels of HIV because African behavior is so different from that of Latin America and Asia, then we can conclude that we will not see an “African-level” AIDS epidemic elsewhere in the developing world. If we look at a wider range of host factors contributing to AIDS in Africa, then we must conclude that the possibility exists for much more serious epidemics in Latin America and South Asia than we have seen so far.

I begin with a brief review of the findings of my work on HIV transmission in Africa that forms the basis for my critique of the “exceptionalist” view. Then I examine the economic and health conditions in Latin America that contribute to the AIDS epidemics there. The AIDS literature in the social and biomedical sciences clearly demonstrates the importance of a broad array of factors in the spread of HIV, including gender relations, labor migration, malnutrition, parasitosis, and poor access to hygiene and curative care for STDs. All of those factors are seen in Latin America, and other factors as well, including the very large numbers of street children involved in prostitution and the use, in some countries, of intravenous drugs and crack. Finally, I present the results of statistical analysis showing the correlation of economic factors and levels of HIV in Latin America, and I discuss the path that I expect the epidemic will take in the region.

African AIDS is not a special case

An unfortunate intersection of Western notions of Africans and the need to address the spread of HIV as directly and quickly as possible has led to an image of African AIDS as a special case. Western stereotypes of African sexuality are reproduced in academic literature with a much lower standard of evidence than would be required of other academic work. Several hypothetical works on the spread of AIDS in Africa assert high levels of partner change but do not provide data to support their hypotheses. Those hypotheses are then treated as established fact and are referred to as the scholarly foundation for a behaviorally based AIDS policy.¹

The urgency of launching preventive programs is the other (albeit unintended) factor perpetuating a behavioral explanation of high levels of AIDS in Africa. The use of condoms can directly prevent cases of HIV transmission. Consequently, the most immediate short-term program for AIDS prevention is provision of condoms. Given the expense of any prevention program, the complexities of dealing with host governments with differing political agendas, and the seeming enormity of resolving the more fundamental causes of AIDS, prevention essentially stops there.

¹ The data that do exist lead to quite a contrary conclusion. UNAIDS data show remarkable similarity in reported rates of partner change among countries with very different rates of HIV. In both the United Kingdom (HIV rate, 0.09 percent) and Zambia (HIV rate, 19.07 percent), 27 percent of men reported having a non-regular sex partner. Switzerland (HIV rate, 0.32 percent) and Ivory Coast (HIV rate, 10.06 percent) reported virtually identical proportions of men and women with non-regular sex partners (UNAIDS, 1998).

AIDS, like other infectious diseases, is the result of all the complex and interrelated factors that exist in poor countries. Leaving prevention essentially to condom provision (and treatment of STDs) reinforces the notion that HIV transmission is narrowly the result of levels of sexual activity and fails to address other HIV determinants, such as general health, the effects of poverty, and gender relations.

In my work on African AIDS, statistical analysis shows that HIV prevalence is highly correlated with falling calorie consumption, falling protein consumption, unequal distribution of income, and other variables conventionally associated with susceptibility to infectious disease, however transmitted. Malnutrition and parasitosis have long been recognized as depressing immune function. Recent work in cell biology shows the particular mechanisms by which malnutrition and parasitosis depress both specific and non-specific immune response by undermining epithelial integrity and the production of natural killer cells, B cells, and T cells. Protein-energy malnutrition, iron-deficiency anemia, and vitamin-A deficiency are widespread in sub-Saharan Africa and decrease disease resistance by weakening physical barriers, humoral immunity, and cell-mediated immunity. Vitamin A is important for epithelial integrity, playing an important role in protecting from STDs, particularly of the ulcerative type, that facilitate HIV transmission. Malnutrition and the synergistic effects of infectious and parasitic disease increase the risk of contracting HIV with each sexual contact, regardless of the number of contacts. HIV is opportunist, as are other infectious diseases, and finds fertile ground in malnourished persons (Stillwaggon, 2000).

What is also clear is that African levels of malnutrition and parasitosis do exist in South Asia and among a significant minority of the populations of most Latin American countries. African levels of HIV are already appearing in parts of South Asia and in cities and subpopulations of Latin America. The widespread notion that a high prevalence of AIDS is a peculiarly African problem is having a dangerous effect on the pace of prevention in other parts of the developing world.

The context of HIV transmission in Latin America

In Africa, deteriorating economies led to increased labor migration, increased economic insecurity for women (already made difficult by patriarchal land tenure systems), worsening nutritional status, and high rates of parasitosis aggravating a chronically compromised immune

status. Together, these factors have produced epidemic levels of AIDS. How does that situation compare with that of Latin America and the Caribbean? To what extent have we seen, and will we see, AIDS epidemics in the Americas that are generated by the same factors as Africa – malnutrition, declining economies, unequal distribution of income, urbanization, and labor migration?

Latin America is economically diverse, and the AIDS epidemics that are emerging in Latin America are also varied. Argentina, Brazil, and Mexico are middle-income countries but have levels of poverty ranging from 26 to 34 percent of their populations (UNDP, 1999). By the late 1990s, Argentina and Brazil already had HIV rates in the major cities at levels seen in sub-Saharan Africa only a decade earlier (World Bank, 1997). Among the poorest Latin American and Caribbean countries are Haiti, Dominican Republic, and Honduras, all with very serious epidemics, and Ecuador, Bolivia, and Nicaragua, countries that are in serious economic crisis, but with nascent or concentrated epidemics.

Some countries in Latin America have HIV epidemics that are fed in part by the sharing of needles in intravenous drug use and recent sharp increases in supply of drugs. Successful interdiction of supply lines to the United States have made it more profitable to dump drugs in South America, even at very low prices, than to ship them to the United States (Faiola, 1999). AIDS from intravenous drug use has increased in Brazil from 2.5 percent of all AIDS cases in 1985 to 25 percent in 1998. In Argentina, 42 percent of reported cases of AIDS (1993-1996) were from intravenous drug use (UNAIDS, 1998). In other countries, intravenous drugs are not a factor in the HIV epidemic, including Ecuador, where only 10 of the nearly 2500 cumulative reported cases are from drug use (Ministerio de Salud Pública del Ecuador, 2000), and Mexico, where HIV transmission from injecting drugs is less than one percent of reported cases (Izazola-Licea et al., 2000).

Another important factor in the Latin American epidemics is homosexuality and bisexuality but with great variation between richer and poorer countries. Homosexual transmission accounted for 5 to 7 percent of cases in Suriname, Dominican Republic, and Guyana, but 67 percent in Chile, 73 percent in Costa Rica, and 83 percent in Colombia (UNAIDS, 1998). In Mexico, 60 percent of men with sexually acquired AIDS classified themselves as homosexual, 25 percent as bisexual, and only 15 percent as heterosexual. Reports from all over Latin America indicate that a large proportion of men who have sex with men maintain heterosexual relationships, often in marriage (Izazola-Licea

et al, 2000).

Most HIV/AIDS in Latin America and the Caribbean results from sexual contact. Data on sexual behavior indicate high rates of early initiation into sexual activity and high rates of multipartnering; a high proportion of men in stable relationships who also have relations with sex workers; low rates of condom use, including in high risk situations; high levels of prostitution, including child prostitution of both sexes; and significant numbers of men in heterosexual relationships who also have relations with men. Corroborating evidence comes from the levels of sexually transmitted diseases (including in children) and the proportion of births to adolescents.²

The data clearly show that the sexual preconditions for the rapid spread of HIV are present in Latin America.

My focus, however, is the economic determinants of HIV transmission in Latin America among heterosexuals who do not use intravenous drugs. The characteristics that Latin America shares with Africa are poverty, malnutrition, high rates of parasitosis, and high rates of internal and international labor migration. A feature distinguishing Latin America is the presence of 40 million children who live and work on the street. Child prostitution is increasingly a problem in Latin

² My earlier work demonstrates that the data are not available to show differences in sexual behavior between Africa and the rest of the world that could account for differences in prevalence of HIV. There are much more data on sexual behavior in Latin America, and they seem to show that early initiation, the rate of multipartnering (men in stable relationships having secondary relationships or having relations with sex workers), and intergenerational sex are more extensive than anything reported for Africa.

Examples abound. Dominican Health Ministry studies report that more than 50 percent of men have extramarital affairs, and that 44 percent of boys and 36 percent of girls have had sexual intercourse by age 14 (Abel, 1999). In Peru, in a random sample of pre-employment health screenings, 59 percent of men reported sex with a sex worker, and only 30 percent reported always using a condom with sex workers; 13 percent of the men reported having had urethritis, 19 percent reported genital ulcers, and 3 percent had had syphilis. The mean age of the men was 25, mean age for first sex for men was 16.2 years, and 21 percent had their first sexual experience with a sex worker. These young men reported a lifetime mean of 10.6 partners, and 56 percent had multiple partners in the previous year. Sixty percent of men with a regular partner also reported sex with a casual partner; 27 percent of men with a regular partner reported having sex with a prostitute in the year prior to the interview. None of the figures on women's behavior came anywhere close to the men's, and yet 33 percent of women and 12 percent of men had one or more STDs (Mahler, 1997).

America, attracting sex tourists from the United States and Europe. What also sets Latin America apart from Africa is its greater integration with the world economy. Far more Latins than Africans can afford to travel frequently to industrialized countries, and far more Latins use drugs. Both the wealth and the poverty of Latin America shape the AIDS epidemics there.

Economic determinants of heterosexual HIV in Latin America

The HIV epidemics in Latin America are fueled by two sets of forces. The wealth of one sector gave HIV a foothold in the region. AIDS was first reported in Argentina in 1982. But it is the poverty of the majority (or a significant minority) that keeps AIDS going. Since our focus is the continuation of the epidemic, rather than its origins, the discussion below focuses on poverty, malnutrition, parasitosis, prostitution, street children, and lack of access to health care and health information.

Poverty – In rankings of GNP per capita (on a PPP basis), Chile is the highest income country in Latin America (rank 27), just after Greece (25) and Slovenia (26). The poorest country in the Americas is Haiti (rank 101), just ahead of Kenya (102). As can be seen in Table 1, Latin and Caribbean countries intermingle with African countries in the rankings by GNP per capita. But Latin American countries have the most unequal distribution of income in the world. In fact, all countries in the Americas except Jamaica have Ginis greater than the world average of approximately 0.41. All Latin countries with the exception of Jamaica and Uruguay have Ginis higher than would be predicted on the basis of per capita GDP. A characteristic of inequality in Latin America not fully reflected in the Gini coefficient is the extent to which income is concentrated in the top decile. In some countries, including Brazil, Chile, Ecuador, Mexico, and Paraguay, the top ten percent receives almost three times the income of the next decile. Consequently, the higher GDP per capita of the Americas conceals the absence of a sizable middle class (IDB, 1998).

Another aspect of Latin American income distribution is the extreme poverty of the bottom 20 to 40 percent of the population. In Ecuador, the bottom decile of the population receives only 0.6 percent of country's income, and the bottom quintile receives only 2.3 percent. Other countries in which the bottom 20 percent receives less than 3 percent of the national income are Brazil, Panama, and Paraguay. In all four of those countries the top quintile receives 60 percent or more of national

income (IDB, 1998).

Several Latin American countries have sizable indigenous populations who are geographically and/or economically isolated from the rest of the country. There are huge disparities in income, education, and health between indigenous and non-indigenous people. In Bolivia, the under-five mortality rate is 102 per 1000 live births, but for indigenous people it is nearly double that figure. In Mexico, the under-five mortality rate among indigenous people (139 per 1000) is

TABLE 1. Selected Countries of Europe, Africa, and Latin America by GNP rank

COUNTRY	GNP per capita (PPP\$)	RANK
Greece	13080	25
Slovenia	12520	26
Chile	12080	27
Argentina	9950	30
Venezuela	8530	33
Uruguay	8460	34
Mexico	8120	35
South Africa	7490	37
Panama	7070	38
Hungary	7000	39
Colombia	6720	40
Gabon	6540	42
Costa Rica	6410	44
Trinidad and Tobago	6410	45
Brazil	6240	47
Namibia	5440	49
Ecuador	4820	53
Dominican Republic	4540	55
Peru	4390	57
Paraguay	3870	60
Guatemala	3840	62
Jamaica	3470	66
El Salvador	2810	73
Lesotho	2480	74
Nicaragua	2370	78

Zimbabwe	2280	80
Honduras	2200	81
Cameroon	1980	84
Ghana	1790	88
India	1650	92
Cote d'Ivoire	1640	93
Central African Republic	1530	95
Congo Republic	1380	98
Haiti	1150	101
Kenya	1110	102
Uganda	1050	107
Zambia	890	113
Nigeria	880	114

Source: World Bank, *World Development Report, 1998/1999*, Table 1.

more than twice as high as for non-indigenous people. Education levels for indigenous women in all countries are extremely low. In the five Latin American countries with large indigenous populations, the proportion of indigenous women with more than primary education ranges from 2.4 percent in Guatemala, 7.3 percent in Mexico, 14 percent in Peru and Bolivia, to a high of almost 25 percent in Ecuador (Terborgh et al., 1995).

Malnutrition – Considering the importance of nutrition in overall health, there are surprisingly few aggregate data on levels of macro- and micronutrition. PAHO estimates that in 1995 among children less than five years of age, 11 percent were suffering from protein-energy malnutrition. In shantytowns throughout Latin America, however, stunting, wasting, and psychomotor problems in children are not only much higher than official data indicate, but those problems are even more severe in children between five and twelve, an age group that is less often studied (Stillwaggon, 1998).

Micronutrient deficiencies persist throughout the region. Goiter and cretinism are serious problems resulting from iodine deficiency in Dominican Republic, Brazil, and the Andean region. Vitamin-A deficiency varies by socioeconomic class. Overall prevalence of vitamin-A deficiency in Nicaragua is over 31 percent, but higher among poor children. Vitamin-A deficiency is three times higher among children of illiterate mothers in Ecuador than among children of educated mothers, and twice as high (22 percent) in rural areas as in urban areas. Periurban shantytown children in Lima have five times the prevalence of vitamin-A deficiency as children from urban Lima (PAHO, 1998). Iron-deficiency anemia affects more than 50 percent of the population in some countries in the region, affecting work capacity, resistance to disease, and maternal and fetal survival (PAHO, 1998).

Almost all the countries of Latin America and the Caribbean have insecure food systems so that even when supply is adequate, undernutrition is still widespread. In Colombia, Ecuador, and Paraguay, even when food supplies have been 10 percent or more above the FAO minimum, there has still been high prevalence of malnutrition. In Latin America as a whole, 46 percent of the population is poor, and over half of those are indigent, which means that even if the entire family income were spent on food, it would not attain 80 percent of minimum food requirement (Barraclough, 1997).

Parasitosis – Safe supply of drinking water is still lacking for rural and periurban populations throughout the region, and almost 90 percent of sewage is dumped directly into streams and rivers untreated. Intestinal helminths affect 20 to 30 percent of the general population of all the countries in the region and 60 to 80 percent of people in highly endemic regions (PAHO, 1998). If the data were collected by income class, it would show that virtually 100 percent of children in poor neighborhoods, without clean water and sanitary services, have intestinal helminths. Malaria infection plays a very important role in immune suppression in Latin America as it does in Africa. Malaria is endemic in 21 American countries, and 20 percent of people in the region live in areas of moderate and high malarial risk (PAHO, 1998). Malaria is the single most important factor in iron-deficiency anemia in endemic zones. In Latin America, 30 percent of pregnant women are anemic, leading to greater susceptibility to infection and increased likelihood of delivering an underweight baby who will face a life-long disadvantage in immunosuppression (Brundtland, 2000).

Labor migration and dislocation of populations – Among the results of rural poverty and the concentration of land ownership are urbanization and short-term labor migration, both internal and international. The pace of urbanization in Latin America, although not as rapid as that of Africa over the past 30 years, has been steady. Several countries also have had steady streams of international labor migrants, among them Dominican Republic, Ecuador, El Salvador, Guyana, Haiti, Jamaica, and Trinidad and Tobago. Temporary migration is very common; migrants, mostly men, spend a few years in the United States or Europe, sending money home to build houses or start small businesses.

Ecuador is an illustrative example. There are an estimated 500,000 Ecuadorians in New York alone, approximately four percent of the population of Ecuador. There are also large numbers of Ecuadorians in Miami, Chicago, Madrid, and in agricultural areas of Spain. The area around Cuenca, Ecuador, has sent laborers to New York since the late 1960s. A study there in the early 1990s found that over 80 percent of the people who had contracted HIV were economic migrants who had returned from the United States or their partners (Centro Cultural “La Pajara Pinta,” 1996). An NGO in New York reports having tested 7,000 Ecuadorians positive for HIV. Ecuador’s worsening crisis is swelling the migrant stream. From records of the immigration authorities at the Quito and Guayaquil airports, there are 15,000 Ecuadorians a month leaving for Europe and the

United States. The official figures tell only part of the story, since there are thousands more people leaving by small boat for Central America to make their way to the United States. Data on temporary internal migration are scant, but in the central highlands of Ecuador, over 80 percent of men between the ages of 20 and 35 migrate, mostly to Quito, for work. They apparently bring home STDs, according to data from women's gynecological exams.³

A factor in the spread of AIDS in Africa that has been overlooked in the Americas is the dislocation of populations due to war and natural disasters with attendant effects on health status and social cohesion. Colombia alone has more than one million people internally displaced by the guerrilla-paramilitary war, the fourth-largest internally displaced population in the world (Deng, 1999). In Peru, poverty in the countryside and the disruption caused by Sendero Luminoso have driven hundreds of thousands of people into the *pueblos jóvenes*, the shanty towns that crowd around Lima. El Niño hit Ecuador very hard over the years 1997 to 1999. Landslides caused enormous destruction of homes and agricultural areas, resulting in the migration of over 300,000 people to Guayaquil alone. In 1999, eruptions of two previously dormant volcanoes forced the evacuation and permanent dislocation of thousands of people.

Lack of access to health care and medicines – As in Africa, an important cofactor for HIV is untreated STDs due to lack of access to health care and lack of medicines. Some countries, such as Argentina, had good public health systems in the past, but decades of economic decline, and policies of the military *Proceso* and the Menem administration left the public health sector in disarray and the population burdened with infectious and parasitic disease. Health centers and public hospitals lack medicines, sterilizing equipment, sinks for washing hands, and reagents for testing

³ The information comes from an Italian NGO that has had a very successful program in gynecology and has much better data on STDs than exist for the country as a whole.

blood. In a shantytown of Buenos Aires with one of the highest rates of drug use, the health center does not even have running water, let alone gloves or disposable syringes (Stillwaggon, 1998). Other countries never had adequate public health facilities, especially in the rural areas, and so STDs that can act as cofactors remain undiagnosed and untreated. Even where there are facilities for gynecological exams, there are no laboratories. In cities, most hospitals do not follow an accepted set of norms. In Quito, for example, only two private hospitals, Hospital Metropolitano and Hospital Voz Andes, follow accepted norms for infection control.

Prostitution – As in many countries, poverty, abuse, and lack of alternatives drive people into prostitution. The economic vulnerability of the sex worker makes negotiating safe sex extremely difficult, except where sex workers are organized. Most sex workers in Latin America and the Caribbean are on the street, and children in particular are at risk. The numbers of people selling sex to live are very high. For example, there are an estimated 60,000 prostitutes in Peru. More than half of prostitutes in Lima have HIV or other STDs. In Dominican Republic, the Health Ministry estimates that more than 200,000 women and men work as prostitutes, especially in the tourist trade (Abel, 1999). Contributing to the prostitution economy in Latin America is the still dominant force of machismo. The custom of fathers bringing their sons to prostitutes for initiation continues to take its toll in lives (Interview at Hospital Voz Andes, Quito, May 2000).

Street children – There are an estimated 40 million children in Latin America who work and live on the street, entering the street on average at age 9. Street children often engage in "survival sex" with adults to secure food, clothing and shelter. Surveys in Honduras found that 85 percent of sexually active street children had been treated for a sexually transmitted disease and that 6 percent of street children were infected with HIV (Scanlon et al., 1998). Over 70 percent of the street girls in Guatemala are prostitutes. A study of 143 Guatemalan street children found that 93 percent of the children had STDs, and none used condoms. In Brazil, over 500,000 prostitutes under the age of seventeen work the streets. In Mexico City, as a result of child prostitution and sexual abuse, five percent of the child population served by the street children's advocates, Casa Alianza, is infected with HIV, and none of the children has access to state health services (Seitles, 1997/98).

Central America has become the new destination for sex tourism, especially for child prostitution, promoted on the Internet to men from North America, Europe, and Latin America

(Kovaleski, 2000). Costa Rica and the Dominican Republic are the main destinations for child-sex tourism, but it is also increasing in Brazil, Guatemala, Haiti, Honduras, Nicaragua, and other countries (UNAIDS, 1999). Governments are doing little to protect the children. Sex tourism is generating an increasing amount of revenue and foreign exchange in Latin America (Seitles, 1997/98). It is difficult to estimate the extent of sexual transmission of HIV among children aged 10 to 14 because 0 to 14 is the grouping for child infections. In Brazil, however, almost 10 percent of AIDS cases in children aged 12 or younger in 1998 were not the result of mother-to-child transmission (UNAIDS, 1999).

Lack of awareness – Although not an economic factor, the lack of consciousness plays an important role in the spread of HIV in Latin America. In Brazil, 80 percent of women and 85 percent of men believe they are not at risk of contracting HIV. Sterilization is the contraceptive method chosen by 40 percent of married women, making it very unlikely that they would use condoms with their husbands (McDaniels, 1998). In a 1995 survey in Guatemala of over 12,000 women, 71 percent had heard of AIDS, but only 36 percent of indigenous women, 41 percent of women without education, and 57 percent of rural women (Remez, 1997). According to a 1994 Haitian Survey of Mortality, Morbidity and Utilization of Services, 98 percent of men and women knew of AIDS, but 69 percent of women and 74 percent of men who knew about AIDS considered themselves at no risk of contracting HIV (anon, 1996).

Statistical analysis of economic factors in Latin American AIDS

I estimated a multivariate ordinary least squares regression using the number of reported AIDS cases (per 100,000 population) as the dependent variable and several factors suggested by the foregoing discussion as independent variables. The independent variables are per capita GDP (measured on a PPP basis for 1995), a measure of urbanization (the percentage change in the urban population between 1970 and 1995), a measure of international migration (the percentage of national population living outside the country, 1991), and a measure of nutritional status (per capita daily supply of calories as a percentage of the average in industrialized countries in 1995).⁴ The regression

⁴ GDP, urbanization, and calorie data (UNDP, 1998); migration data (PAHO, 1998); AIDS data (UNDP, 1999).

was computed for all Latin American and Caribbean countries for which data were available. The sample size is 20. The results of this regression are presented in Table 2. The R-squared for this regression is .828. All of the regression coefficients are significant at the 99 percent level of confidence or better except for the coefficient on calorie supply, which is significant at the 96 percent level.

Table 2. AIDS Cases and Income, Urbanization, Migration, and Calorie Supply

<i>Independent Variable</i>	<i>Regression Coefficient</i>	<i>t statistic</i>	<i>Significance</i>
<i>Constant</i>	-113.8	-0.40	.70
<i>Real Per Capita GDP</i>	0.059	8.15	.00
<i>Urbanization</i>	86.83	2.92	.01
<i>International Migration</i>	18.41	3.62	.00
<i>Calorie Supply</i>	-6.04	-2.20	.04

Dependent Variable: AIDS cases per 100,000 population. (N = 20)

The statistical analysis shows very clearly the duality of the AIDS epidemics in Latin America and the Caribbean. HIV is strongly correlated at a high level of significance with higher real GDP per capita, and at the same time with variables that represent the weaknesses of Latin economies – urbanization, labor migration, and low calorie intake all reflect the poverty of the bottom half of the population. HIV is very highly correlated with migration because migrants bring back HIV from countries where rates are higher. The rate of urbanization has the same effect as migration but on a domestic scale and is also highly correlated with HIV. Finally, the level of calorie supply is highly correlated with HIV levels. Malnutrition compromises immune response, and it is also a proxy for the poverty that fuels the abandonment of children, prostitution, and child prostitution.

There are a few outliers. Honduras has a much higher level of AIDS than predicted. In fact,

Honduras, and specifically its business center, San Pedro Sula, is the epicenter of Central American AIDS. Honduras has an exceptionally large population of street children, many of whom sell sex to live and to pay for drugs. With a population of fewer than one million, San Pedro Sula has had 500 deaths a month from AIDS in the past year (Varney, 2000).

Another consistent outlier is Ecuador. With its high level of migration (considerably higher than what is shown in the official data that I used) and its high levels of malnutrition, the model predicted high levels of HIV. The UNDP data (for 1997 for most countries) that I used gave a rate of 5.2 cases per 100,000 for Ecuador, which would have been about 650 cases, or the cumulative number of reported cases in Ecuador in 1993. What the model predicts for 1997, 97 cases per 100,000 (about 12,000 cases), is very close to the actual number of cases in 1997 estimated by AIDS experts in Ecuador.

What can we expect in the HIV epidemics in Latin America and the Caribbean?

In countries such as Argentina and Brazil, we may expect that more affluent people will have access to information that will result in a leveling off of new infections, much as in the United States. But the epidemic in those countries will more and more take on the characteristics of other Third World HIV epidemics with a greater percentage of heterosexual and maternal-child transmission. The proportions have already shifted dramatically in Latin America. In the middle-income countries, we can expect to see semi-generalized epidemics, that is, generalized among the poor. As in the United States, transmission is now predominantly in poor and marginalized populations. The same is occurring increasingly in Latin America and the Caribbean, but the proportion of extremely poor people in the population is higher than in the United States.

In very poor countries, we may see generalized epidemics for the same reasons they have occurred in sub-Saharan Africa. Based on economic determinants and on recent trends, I would expect that if we were to estimate these same variables five years from now, real GDP per capita would be a much less significant variable, and calories would be much more significant. Migration and urbanization would continue to be important determinants of HIV. Exceptions to the pattern of a “poor-only” epidemic could be countries, such as Ecuador, where there are no preventive programs, so that even affluent people with access to education are still in denial about the presence

of AIDS in their midst. And poor people will continue to become infected because of lack of information, lack of access to health care and medicines, malnutrition, and lack of alternatives to prostitution.

Acknowledgments

This research benefitted from the generous support of the Fulbright Senior Scholars Program, the Comisión Fubright del Ecuador, and Gettysburg College. Larry Sawers provided very helpful comments.

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