

AIDS in sub-Saharan Africa and the Failure of Medical Technology Transfer:

An analysis of the problem and an assessment of proposed solutions

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The growth of the global AIDS epidemic has been compared to the spread of the Black Death and its effects on 14th century Western Europe; indeed, few events in recorded history can adequately parallel the physical destruction, social upheaval, and hindrances to economic growth and welfare that it has already caused. According to the most recent *Report on the Global AIDS Epidemic* published by the United Nations, an estimated 18.8 million people have lost their lives from AIDS since it first appeared in the 1980's, and a further 34.3 million people are estimated to be living with HIV across the world.¹

Yet, the global burden of the AIDS epidemic has been borne disproportionately by the people of sub-Saharan Africa. Of the total individuals estimated to be currently living with HIV, 24.5 million of them reside in areas south of the Saharan desert, and average death and mortality rates of countries in this region have soared as a result.² The social and economic effects of such a short-lived population and the potential loss of a generation of workers are disastrous, and its no small wonder why many are explicitly citing the region's experiences with the AIDS epidemic as "the greatest public health challenge of our time."³

Perhaps the most startling development of the AIDS problem is that in recent years, the technology for curbing the symptoms of HIV/AIDS has become available, and pharmaceutical companies in the United States have developed treatments that have been

¹ *Report on the Global HIV/AIDS Epidemic* (June 2000) Geneva: UNAIDS, 2000.

² Ibid.

³ John C. Caldwell, Pat Caldwell, and Pat Quiggin. "The Social Context of AIDS in sub-Saharan Africa." *Population and Development Review* 15, no. 2 (June 1989): 185.

shown to extend lives. However, the transfer of such technology through international markets is not occurring, and millions are suffering as a result. This paper seeks to further explore the AIDS epidemic and its effects on sub-Saharan Africa, and it attempts to explain why the status quo of patent regimes prevent the spread and transfer of the desperately needed medical technology to other countries. It then seeks to analyze current policy proposals for ameliorating this situation and assesses their strengths in the hopes of finding a suitable way to alleviate this problem.

AIDS AND SUB-SAHARAN AFRICA

The Acquired Immune Deficiency Syndrome (AIDS), is a disease contracted during the final stages in a series of biological chain reactions sparked by a person's infection with the Human Immunodeficiency Virus (HIV). Once contracted, the virus attacks the cells that make up a vital part of the body's immune system, and the virus renders those cells unable to produce antibodies that help fight off exposure to a number of other diseases. As the virus continues to grow and thrive, the victim's immune system gradually deteriorates, and increasingly he or she becomes more susceptible to illness and harm from other diseases. This general inability for the body's immune system to fight off common colds and infections slowly progresses into what the medical literature understands as AIDS, and eventually death is caused as a result of the body's inability to fend off disease.⁴

Perhaps the most deadly aspect of the HIV/AIDS epidemic is that it can take years before symptoms of HIV fully present themselves, and since the virus can be transmitted sexually and through blood transfusions, infections can occur without the knowledge of either party involved. The lags that exist from the time of one's initial contraction of HIV to the time when physical signs of having AIDS become apparent create a window of time that

⁴ Renee Sabatier. "AIDS in the Developing World." *International Family Planning Perspectives* 13, no. 3 (September 1987): 96-103.

is often large enough to result in multiple infections, and the disease can spread to potentially thousands of people, all of whom would be completely ignorant as to whether or not they have the virus.

In many ways, the experience of the sub-Saharan with the AIDS epidemic has been a consequence of this blind, uninformed pattern of infections, and its effects on the population and economic growth of the region have been brutal, to say the least. According to studies conducted by the World Health Organization, of the estimated 17.2 million deaths that AIDS had caused as of 1994, 9.7 million of them, or over 56 percent, occurred in sub-Saharan Africa. The huge devastation that the African population has suffered as result of AIDS is further exhibited by worldwide totals, which show that the proportion of adults infected by AIDS in sub-Saharan Africa is 2.5 percent, compared with the global proportion of only 0.4 percent.⁵

However, these broadly sweeping figures greatly conceal the differences between countries of the region. As Figure 1 shows, even within the sub-Saharan region, some countries were more brutally hit than others by the AIDS epidemic, and the estimated levels of prevalence seem to be most highly concentrated in a select number of countries, some of which include Rwanda, Uganda, Zimbabwe, Kenya, and Botswana.⁶ And yet, within countries, disparities grow even further. Most of the infected populations reside in the larger urban areas, and as a 1991 study conducted on Rwanda shows, 25% of adults in urban areas were infected with HIV, whereas only 2 percent of adults who lived in rural areas were infected.⁷

As one might expect, the characteristics of those infected within a given geographic

⁵ John Bongaarts. "Global Trends in AIDS Mortality." *Population and Development Review* 22, no. 1 (March 1996): 21-23.

⁶ Ibid. See Appendix for more details.

⁷ Ibid, 25.

area are correlated with the nature of how the disease spreads from one person to another. The highest concentration of prevalence rates occur within the younger age groups of adults, as these age groups are the most sexually active and often foster the most “high-risk” types of behavior. According to the UN *Report on the Global HIV/AIDS Epidemic*, those who were of ages 25-31 were hit hardest, as an estimated 4 out of every 5 deaths in this age group in Africa occurs as a result of AIDS.⁸ As such, the effects of AIDS have been exceptionally brutal on the population of sub-Saharan Africa. Death and infant mortality rates have skyrocketed, in some instances doubling over the last 20 years, while life expectancies have fallen to new lows.

The economic implications for such a decrease in the anticipated life-spans are overwhelming. Since HIV is, in a large part, “responsible for a massive increase in the death among men and women in their most productive years,” according to the UN report, the advent of the AIDS epidemic has been detrimental to the growth of the labor force. Both the market for the consumption of goods and services and the labor inputs required for the production of goods and services have been reduced as a result.⁹ This shrinkage in the size of the market reduces the potential for economic growth, as it reduces the life expectancies of entrepreneurs, workers, and consumers alike. Moreover, as the populations most likely to be affected by the AIDS epidemic are those in urban areas, as African countries attempt to develop, successful urbanization becomes more difficult to achieve, and development is hindered. The outcomes resulting from a decrease in population are as varied as they are malignant; anything from a loss of certainty, a decrease in the potential for innovation, and disruptions in demographic trends could occur, all of which have devastating effects on development and welfare.

⁸ *Report on the Global HIV/AIDS Epidemic* (June 2000) Geneva: UNAIDS, 2000.

⁹ Ibid.

In considering the HIV/AIDS epidemic and its destructive implications for sub-Saharan Africa, one has to wonder what has caused the outbreak in the region to be so much more devastating than it has been for other regions of the globe, such as the United States or Western Europe. As the transmission of HIV is principally a result sexual intercourse, many of the potential explanatory factors cite differences in sexual practices the chief reason why the epidemic has been so great in Africa. One study cites a highly significant correlation between the number of AIDS infections and the number of un-circumcised males in a society, while others cite the lack of condom use and the consequent prevalence of other sexually transmitted diseases as a cause for the growth of the AIDS problem.¹⁰ Anthropological studies concentrate on the degree of divergence in sexual practices between the Africans and the West, as in many societies, abstinence is not regarded as a virtue as it is in Western culture, and religious values associated with sex focus more on the need for procreation than the need for chastity.¹¹

While these factors most likely have significant impacts on the growth and spread of the disease, many of them are difficult to quantify, and the absence of data makes it difficult to gain any insight into precisely how significant these divergences may be. Perhaps what is more important in the problem of the AIDS epidemic is the lack of preventative measures taken by most countries to try and stop its growth. Educational programs to help the populous learn what causes AIDS and how it can be contracted have worked remarkably well in the West, but the lack of infrastructure and suitable educational systems in many African countries undoubtedly contributes to problems of prevention. Without such preventative measures, the hopes of eradicating the sub-Saharan region from the perils of HIV and AIDS will never be fully realized.

¹⁰ Bongaarts, 25.

¹¹ Caldwell et al., 194-195

PHARMACEUTICALS: A NEW HOPE IN FIGHTING THE EPIDEMIC?

However, in recent years, new hopes of alleviating the AIDS devastation and fighting its spread have been discovered. While such a hope may not be the final solution to this problem, given the need for preventative measures, if fully implemented, it could potentially lay the foundations for the road to an eventual eradication of HIV from Africa.

The hope is namely this: recently, a number of pharmaceutical companies in the United States have succeeded in developing drugs that help to retard the growth and speed of HIV's attack on the immune system. Merck & Co., one such firm, has successfully developed Crixivan, a protease inhibitor that fights HIV and reduces one's chances of getting illnesses associated with the virus.¹² Bristol Myers Squibb Co. has produced another protease inhibitor, and their drug, Sustiva, can help to both reduce the amount of HIV in a patient's circulatory system and also to increase the number of antibody producing T-cells.¹³ Other companies, including Glaxo Smith Kline PLC have brought their HIV treatments to the market successfully as well. While the drugs available for sale do not actually cure HIV, they do help to combat its effects and reduce the patient's likelihood of infecting others, both of which are crucial ingredients in containing the spread of the epidemic.

In developed countries, such drugs have helped to treat AIDS patients with significant successes, and given time, they will most likely play a large role in the eventual eradication of the disease from many continents. However, most developing nations have no experience with the drugs and cannot benefit from them as a result of their exorbitant prices. Until recently, the price of a year's supply of Crixivan was around \$6,016 in the United States, while the same supply of Glaxo's drug, Combivir, sold for \$6,289.¹⁴ While

¹² Crixivan Online. "Crixivan: Patient Information about Crixivan for HIV infection." (<http://www.crixivan2.com/patient/product/english/ppi.htm>).

¹³ Sustiva Online. "Sustiva: Patient Information." (<http://www.sustiva.com>)

¹⁴ Gardiner Harris. "AIDS Gaffes in Africa Come Back to Haunt Drug Industry at Home." *The Wall Street Journal* 237, no. 79 (April 23, 2001).

the prices of these drugs are falling slightly, and world prices have dropped in response to public pressure to reduce drug prices for developing countries, they remain well above the reserve prices of many in the developing world. Until they become affordable for the people of the sub-Saharan region, the medical technology that these drugs possess will not be transferred, and suffering will continue needlessly.

PHARMACEUTICAL COMPANIES AND PATENTS

While there are a number of cost related arguments that one could make regarding the prices of these drugs, the fundamental reason why they remain so exorbitant is because of a lack of competition in the production of similar drugs that fight HIV. Pharmaceutical companies in the United States have secured this lack of competition through their access to patents, and it is because of the inflexibility of these protections and the international patent regime that drug prices have not been reduced.

Patents are legal protections of inventions or ideas that, upon securing the agreement from a government, provide the holder with the exclusive right to produce, market, and sell the protected product. They make it illegal for rival firms to produce the same product as those which are patented, and in the absence of international patent agreements, they are enforceable only by the governments that grant them. Bestowment of such property rights to inventors dates back to the 15th and 16th centuries, as the governments of Venice and England both attempted to spark innovations by providing their inventors with the rewards and monetary gains associated with a monopoly on the production of the goods that they invented.

International protections of domestically held patents have gradually come about as international trade and globalization have increased over the last century. The international law of patents and property rights evolved over the passage of a series of treaties, the first of which was ratified in the late 19th century. The Paris Convention for the Protection of

Industrial Property of 1883 was the first statute to address international concerns of global respect for domestically held patents, and it was amended throughout the 20th century to include not only the protection of industrial property but also the protection of literary works, artistic works, industrial designs, trademarks, and integrated circuit designs.¹⁵

In 1993, a marked change from the old global patent regime occurred with the signing of the TRIPS agreement at the Uruguay round of multilateral trade negotiations. While the Agreement on Trade Related Aspects of Intellectual Property Rights afforded its signatories protection for the very specifics outlined by the amended Paris Convention, differences in enforcement provisions make it a generally more coherent and more coercive agreement. Article 3 of the agreement stipulates that each member should “accord to the [products] of other members treatment no less favorable than it accords to its own [products] with respect to intellectual property.”¹⁶ And, as the respect of the stipulations of this agreement was made contingent for a country’s entry into the World Trade Organization, the TRIPS agreement made the protection of internationally held patents far more crucial and necessary for a country to participate in trade.

There are a number of arguments in favor of a strong international patent system. One such argument, commonly dubbed the “reward by monopoly” thesis cites the need for the global society to reward its inventors for the benefits that their innovations provide. The grant of a monopoly in the production and sale of an inventor’s ideas in the global marketplace is often viewed as sufficient to these ends.¹⁷ Since innovations can generate significant positive externalities, and since the “total benefits to society [from the consumption of the innovation] may greatly exceed the benefits indicated by market

¹⁵ Michael P. Ryan. *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property*. Washington DC: Brookings Institution Press (1998): 91-93.

¹⁶ Ryan, 113.

¹⁷ Robert P. Benko. *Protecting Intellectual Property Rights: Issues and Controversies*. Washington DC: American Enterprise Institute for Public Policy Research (1987): 2-4.

compensation,” rewards of monopoly pricing might serve to adequately compensate innovators for the externalities that their inventions create.¹⁸

Another common argument is one of economic incentives; it states that without protections, innovations and inventive activity would not be profitable on the global marketplace. If we fail to protect the knowledge attained from innovation, it becomes a public good, and as such, it becomes increasingly difficult to prevent people worldwide from consuming such knowledge without paying for it. Furthermore, since the distribution costs of knowledge are near zero, once produced, the market price for the innovative knowledge would become zero in the absence of patent restrictions. Since no incentives to produce knowledge goods exist if profits cannot be maintained, the incentives granted by patents are necessary to foster an environment where innovations continue to occur.

A final argument for the need for international respect of domestic patents rests in the notion that technology transfer would not occur were patents not respected. Since the technology is patented domestically, and the patents are owned by the companies that developed the technology, such technology is only obtainable if the firms who make it are willing to sell their products. In the absence of international patent protection, many firms would refuse to sell their products rather than sacrifice monopoly profits, thus rendering a system of international patents “a necessary, not sufficient condition” for technology transfer.¹⁹

While many arguments in favor of international patent systems exist, there are many who would argue against them. In many ways, the large attacks against patent systems come down to a question of whether or not patents and their protections signify a *just* reward for the inventor. Some would argue that in most cases, the financial gains obtained

¹⁸ Ibid, 15.

¹⁹ Edith Penrose. “International Patenting and the Less Developed Countries.” *The Economic Journal*. (Sept. 1973): 771.

through an inventor's patent bear little relation to the inventor's costs incurred in creating the product. Moreover, since innovations are often based upon the prior stream of intellectual advances that have taken place generations before, in many ways, the rewards of patents occur unfairly.

Yet, the ultimate problem with any system of patent protection is that contradictions in the goals and achievements of such a system exist inherently. While patents are designed to protect the growth of new innovations, they result in monopolies, which through restrictive pricing power, prevent the diffusion of such technology from occurring. Thus, the very rewards that patents offer, motivated by the need to compensate inventors for their contributions to society, can explicitly prevent society from getting access to the innovations and undermine the invention's overall societal contribution.

In regard to the pharmaceutical industry, the international patent system is fully representative of this tradeoff between innovation and prices. While patents are designed both to reward pharmaceutical producers for the positive externalities that their inventions create and also to pay for the research and development costs, the monopoly power granted to pharmaceutical companies raises the prices of their drugs and thereby removes potential consumers from the very benefits that patents are intended to reward. Thus, while patents might be a necessary condition for the transfer of medical technology to developing countries, because of the exorbitant prices that the drug companies charge for their products, the technology is not transferred anyway. In the case of pharmaceuticals, the loss of technology transfer is potentially causing the loss of thousands of lives, and it is for this reason that the system must fundamentally change.

One way of gauging the extent of the lack of medical technology diffusion is by assessing the level of monopoly profits that pharmaceutical companies accrue through the sale of their products. In once such examination, the average return on equity (ROE) for

pharmaceutical companies was shown to be around 18.4 percent from the years 1960-1991. Compared to an average ROE for other industries of 11.4 percent for the same period, it is obvious that pharmaceuticals are highly profitable companies.²⁰

Yet, there are still a number of unusual features of pharmaceutical products that can make the industry as a whole appear more profitable than others. Demand for products relating to health and well-being is notoriously price inelastic in the developed world. Moreover, doctors, by writing prescriptions, affect the demand for a particular drug, while the insurance system in the U.S. is such that insurance companies often pay a substantial amount of the cost of the drug when it is purchased. As a result of these factors relating to U.S. medical institutions, demand is even more inelastic for drugs than it is for other goods and services.

While revenues remain high for pharmaceutical companies and could lead one to think that patents offer unjust rewards, some would argue that the costs and risks associated with research and development require such elevated levels of revenue streams. Recent studies suggest that in order for successful drug research to take place, a pharmaceutical company must spend an average of \$73 million in preliminary research, and another \$53 million during the product's clinical testing phase as it waits for regulatory approval.²¹ While drug companies are on average more profitable than other industries, the disparities between profit levels of pharmaceutical companies are wide, and such disparities are mainly a result of the differences in winners and losers of the "high stakes, high risk" game of R&D.²²

However, from the perspective of developing countries, if the goal of a pharmaceutical company is to maximize its profits, international patent protection is truly

²⁰ F.M. Schrer. "Pricing, Profits, and Technological Progress in the Pharmaceutical Industry." *Journal of Economic Perspectives* 7, no. 3 (1993): 102-104.

²¹ Schrer, 98-99.

²² Ibid.

ineffective in achieving these ends, since demand in developing countries for pharmaceutical products is highly price elastic. As drug prices rise for consumers in developing countries, demand for drugs falls substantially. Thus, attempts at trying to raise revenue in developing areas of the world is fruitless, and desire for patent protection only serves as a barrier in prohibiting the transfer of medical technology as it does little to affect profits.

PROPOSED SOLUTIONS: PRICE CONTROLS, COMPULSORY LICENCES, AND LANJOUW'S PROPOSAL

A number of solutions have been proposed in attempts to solve the difficulties that exist in dealing with international patent systems and pharmaceuticals. Some states have offered the idea that price controls could be an adequate way to reduce the costs of drugs for developing countries, and government subsidies could be paid to corporations whose drugs are sold on world markets at depressed costs.

Price controls achieve the desired end of lowered prices, but they could result in some serious inefficiencies. Government subsidies are notoriously much lower than market levels, and research and development could suffer as a result. Moreover, price controls could potentially cause shortages, as the amount of the product supplied could be less than the amount demanded at the given price. Yet, perhaps most important is the issue that controls on prices are not respected by international treaties, which could cause serious enforcement problems.

Another proposed solution, which is stipulated as a possible way to combat the problem of technology transfer in the TRIPS agreement, is the use of compulsory licences. Compulsory licences are non-exclusive licences granted to producers in developing countries that allow the use and marketing of patented innovations in return for substantially reduced royalty fees. Advantages of compulsory licences are that they effectively reduce

prices by enabling domestic producers to market and sell modified versions of these products at prices respected by developing country markets. However, compulsory licence would hardly work in sub-Saharan Africa, because in order for a firm to be able to take advantage of such licences, it must have the manufacturing capacity and the technical knowhow required to produce the most basic of drugs. Pharmaceutical companies do not exist in the sub-Saharan, and the advantages of compulsory licences could never be fully realized as a result.

Jenny Lanjouw, an economist from Yale, has recently proposed a third solution to the problem of medical technology transfer in attempts to combat global diseases. Citing the fact that “almost all of the potential market for global diseases is found in the West,” Lanjouw makes the proposition that a pharmaceutical company, upon its creation of a drug should choose either to have its patent respected in developing countries or to have its patent respected in developed countries.²³ Her argument rests on the notion that for global diseases, the profits expected to come from developing countries are minuscule in comparison to those expected to come from developed countries, and significantly small increases in prices can effectively shut out potential consumers of drugs in developing countries, whereas in the developed world, demand for pharmaceuticals is much more inelastic.²⁴

Her proposed policy is full of advantages, as pharmaceutical companies by choosing to have the respect of patents by only the developed world would cause prices to fall for the once protected products. Thus, the transfer of medical technology would be achieved by the development of generic drugs in the countries of the developing world that are capable of making pharmaceutical products. However, her policy suffers from the fact that in

²³ Jenny Lanjouw. “A Patent Policy Proposal for Global Diseases.” The Brookings Institution (<http://www.brook.edu/views/papers/lanjouw/20010611.htm>): 2-4.

²⁴ Lanjouw, 26.

countries with little or no infrastructure, taking advantage of a lack of patent rights to a specific pharmaceutical innovation is difficult. A firm has to possess the manufacturing capacity to employ the innovations created by the developed country's pharmaceutical companies, and without such capacity, her proposal does little good.

Of the three policy proposals, it seems that Jenny Lanjouw's program is the most effective. While it requires a great deal of manufacturing and R&D capacity on the part of developing countries, there is a great deal of learning by doing that can occur from a transformation of pharmaceutical knowledge into a more public exposition of how to produce drugs, and her approach to the issue is clearly a step in the right direction.

CONCLUSION

It seems evident that the status quo of international patent regimes is prevent the transfer of medical technology from the pharmaceutical companies of the West to the dying populations of sub-Saharan Africa. The high prices of the drugs resulting from patent protected monopolies are pushing millions of consumers in the developing world out of the ability to make use of medical technology, and if something is not done to lower drug prices, needless suffering will continue.

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