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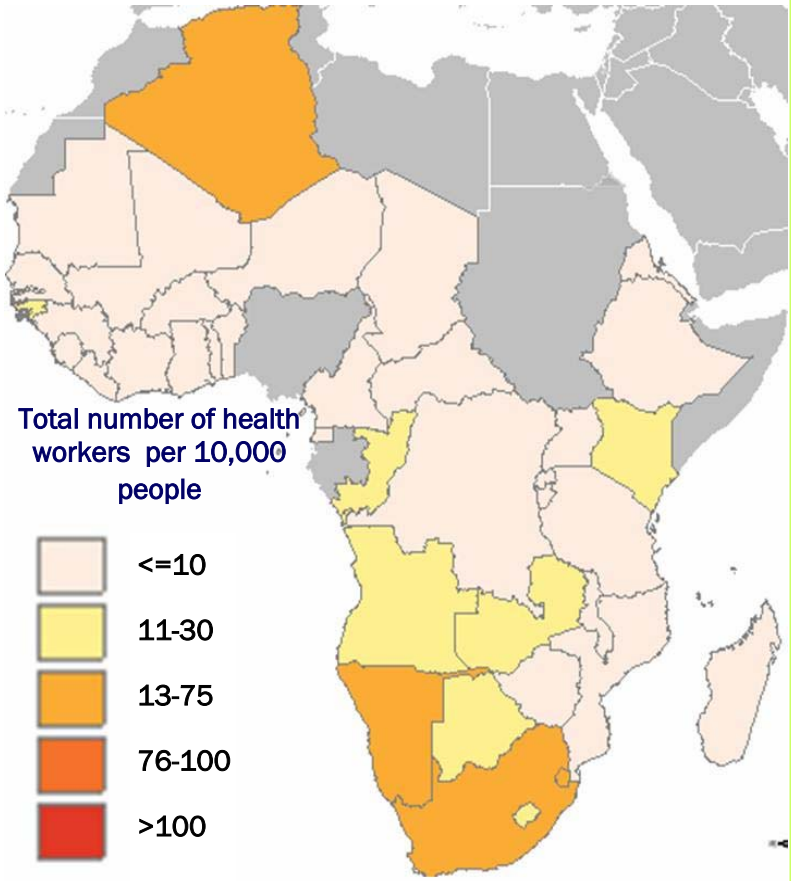


"Sickness comes on horseback, but goes away on foot"
(William C. Hazlitt)

## HIGHLIGHTS:

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Cover picture: ATDF, based on WHO data

# THE RIGHT TO HEALTH: A DUTY FOR WHOM?

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## Abstract

The economic, social, and cultural human rights catalogue, including the "right to health," gained increasing importance with the rising popularity of the "rights-based" rhetoric permeating many political and social movements. Rights-based development policy concepts place the respect, protection, and fulfillment of all human rights in the center of the development debate. For many business enterprises, the nature of a human rights obligation that includes affirmative steps to respect, protect, and fulfill human rights in their sphere of influence remains uncharted territory. This induced Novartis to carefully examine and decide on the nature, dimension and limits of its corporate obligations. The following article will outline the current challenges of public health in Africa and the contribution of Novartis in meeting these challenges.

## Introduction

No other indicators demonstrate the North-South gap in the physical quality of life as dramatically as health-related ones. There is a fundamental relationship between health deficits and poverty. Poor people who lack education on health matters and have limited or no access to adequate nutrition, safe water, and sanitation also are not likely to have the purchasing power to buy basic health services. There are four broad mechanisms which are responsible for and contribute to the perpetuation of health disparities:

*social stratification* – the very fact that people are poor;

*differential exposure* – a greater exposure to multiple health risks (malnourishment, unsafe water, lack of health knowledge, etc.);

*differential susceptibility* – greater vulnerability due to the interactions among multiple health risks; and

*differential consequences of disease* – potentially catastrophic income loss, loss of land or livestock, school dropouts, or other illness-produced disadvantages that keep the vicious poverty-illness circle intact.

Corporations are unable and politically unauthorized to address these factors. Yet, they all affect the realization of the *right to health* to which Novartis is committed to contribute. However defined, the *right to health* is interrelated with and interconnected to progress in the realization of all other rights, predominantly "the right to food, housing, work, education, human dignity, life, non-discrimination, equality, the prohibition of torture, privacy, access to information, and the freedoms of association, assembly and movement. Therefore, Novartis may only be able to make a difference in improving public health in the developing world if it can count on the cooperation of other stakeholders, in particular national and international NGOs as well as federal and local governments in developed and developing countries.

Sustainable progress in the state of health necessitates more than just appropriate health policy and appropriate allocation of resources to a ministry of health. Sustainable health progress depends on and is instrumental for poverty alleviation. Poverty reduction strategies can only be successful if they are followed through by a number of synergistic measures and complementary approaches that respect, protect, and fulfill human rights, including but not limited to the right to health.

***…..disparities with fatal consequences are due to cultural mindsets……..***

Many of the greatest disparities with fatal consequences are due to preventable conditions and cultural mindsets (social discrimination and prejudices). They result in no or severely impaired access to food, health care, education, and employment. A concerted effort to guarantee the respect, protection, and fulfillment of human rights would not cost a great deal or many additional resources and would save millions of lives.

High-tech solutions such as the most modern pharmaceuticals are rarely needed to combat typical poverty-related diseases. Better nutrition education for mothers (including the motivation to breast-feed), mass vaccination campaigns, access to basic antibiotics, bed nets for malaria prevention, and condom use programs to prevent the spread of HIV/AIDS and other sexually transmitted diseases are inexpensive – the combination of these well-known interventions would have a dramatically positive impact on the health of the poor.

Without "development" in the true and comprehensive sense, however, the state of the world's health could deteriorate due to continuing population growth, for despite all the successes reached through social and technological changes, the world's population is likely to reach nearly 9 billion people by 2050 – and about 99% of the population growth will be in the poor regions of the world.

## 2. Bearers of Duties

A meaningful discussion of rights must deal with the respective duty-bearers. Drawing attention to the legitimate sequence of legal duties for the respect, protection, and fulfillment of the right to health is necessary at least for two reasons:

1) by calling to account those who are the first and foremost duty-bearers, to help avoid pushing the debate to side issues, thus giving rise to wrong priorities; and

2) to avoid the development of unrealistic expectations

about sustainable deliverables from the private sector, especially pharmaceutical corporations.

As seen in the context of the heated debate about the "UN Norms on the Responsibilities of Transnational Corporations and Other Businesses on Human Rights," many individuals and major business associations are concerned that where states are incapable or unwilling to fulfill their duties, human rights obligations of the state are pushed on to non-state actors, especially on multinational business enterprises.

***2.1. Individual Duties:*** The state of health of a person and the risks of falling ill are to a great extent determined by individual habits and lifestyles. Individuals must accept their part of responsibility for their own health. Individual commitment and corresponding actions can never be replaced by communities or governments and even less by the international community. Duties in the context of the right to health begin at home.

***2.2 Community Obligations:*** Local communities can do much to improve their members' perception of health risks and to reduce them. Functioning communities regard it as their essential obligation to analyze health-related problems and determine their needs and to initiate community efforts and mobilize community resources that will improve health-related infrastructure. Even poor communities can achieve a great deal, such as encouraging health-promoting behaviors (breast-feeding, use of mosquito nets, cooking of unsafe water) and developing peer pressure against health risks (unsafe sex, excessive alcohol consumption, violation of women's reproductive rights by men of the community).

***2.3 State Obligations:*** States have clear and binding obligations under human rights law. As a matter of fact, all human rights are *above all* incumbent on States and their institutions. States thus do have the prime responsibility to respect, protect and fulfill their people's right to health. This is interpreted to mean the following:

*Obligations to respect* (e.g. refraining from denying or limiting equal access for all persons to preventive, curative and palliative health services)

*Obligations to protect* (e.g. ensuring that privatization of the health sector does not constitute a threat to the availability, accessibility, acceptability, and quality of health facilities, goods, and services).

*Obligations to fulfill* (e.g providing adequate health infrastructure and an functioning and socially acceptable insurance system)

*Obligation to avoid human rights violations* (e.g. outlawing torture, violence against children, and harmful traditional practices).

***2.4. Obligations of the International Community***: Where the primary duty of the state is neglected – whether due to a lack of resources (incapability) or deficits in governance (unwillingness) – first and foremost the international community ought to be called to account. The international community is expected to take joint action to achieve the full realization of the right to health through development assistance and the right incentive structure.

In the Millennium Declaration, 147 Heads of State and Government "recognize that, in addition to our separate responsibilities to our individual societies, we have a collective responsibility to uphold the principles of human dignity, equality and equity at the global level.

Even before that declaration was made, in December 1986 the General Assembly adopted a resolution with regard to the "Right to Development" and proclaimed among other matters that "States have the duty to co-operate with each other in ensuring development and eliminating obstacles to development. States should realize their rights and fulfill their duties in such a manner as to promote a new international economic order based on sovereign equality, interdependence, mutual interest and co-operation among all States, as well as to encourage the observance and realization of human rights." The practical consequences of the commitments made were less than impressive, however.

Per capita GNP <$760. GNP $761–3,030. [c] GNP $3,031– 9,360. GNP > $9,360.

Source: WHO Commission on Macroeconomics and Health.

Today, only about 10% of official development assistance goes to health issues – equal to just a penny, 1 cent, of every $100 of donor countries' GNP. This is too little to meet even the basic health needs of poor countries.

**Donor Assistance on Health, Annual Averages, 1997–99**

| Income Group | Per Person (dollars) | Total (million dollars) |
|---|---|---|
| Least developed countries | 2.29 | 1,473 |
| Low-income countries[a] | 0.94 | 1,666 |
| Lower-middle income countries[b] | 0.61 | 1,300 |
| Upper-middle income countries[c] | 1.08 | 610 |
| High-income countries[d] | — | 2 |
| All countries | 0.85 | 5,052 |

The Commission on Macroeconomics and Health demands that the lack of donor funds not be the factor that limits the capacity to provide health services to the world's poorest people and asks for the commitment of massive additional financial resources for health. The commission estimates that the commitment of an additional $31 billion per year in donor assistance for health by 2015 could – if properly invested – avert 8 million deaths a year, with economic benefits in the order of magnitude of $360 billion annually. Newer studies suggest an even higher impact of health improvements in the GDP of poor countries.

*2.5 Obligations of The NGO Community:* NGOs – in particular, emergency NGOs and religious organizations – rate well in responsiveness and trust among the poor. They have a role in facilitating the voices of poor people and they can be helpful in supporting the formulation and implementation of policies that actually benefit the poor. While NGOs should not be considered as the "silver bullet" for solving all grassroots health problems, they are an important link in the chain. For a sustainable and successful cooperation between NGOs and any other actor – including the private sector – a mutual understanding about respective roles and a perfect "match" is as important as an appropriate climate. Single-issue advocacy pressure groups might not necessarily be among the first partners for cooperation. Whenever pharmaceutical corporations are de-nounced as a greedy, irresponsible, and socially insensitive crowd of "couldn't-care-less" capitalists, it becomes difficult to expect that the same corporations will queue up to commit their funds and technology. What is needed for sustainable solutions is the pooling of resources, skills, and experience and a spirit of "cooperation in good faith."

### *2.6 The Private Sector*

The prime responsibility is to respect, protect, and contribute toward fulfillment of human rights in the context of *normal business activities* and to strive to ensure that a company's activities do not contribute directly or indirectly to the violation of the obligation to respect, protect, and fulfill the right to health. Successful pharmaceutical companies contribute in particular through the results of their research and development endeavors and through resulting innovative ways and means to cure diseases and prevent premature mortality.

## 3 The Novartis Approach to the Right to Health

Sincere corporate commitments in the context of the right to health – being a positive right whose respect, protection, and fulfillment may require material support beyond what the state is capable or willing to make available – face two important challenges:

There is a structural problem, as private enterprises – being market-oriented and profit-driven – run up against limits in cases of market failure; things turn even worse if market failure and state failure come together and create negative synergies for the poor, leaving them defenselessly exposed to premature death and preventable sickness.

The situation being as it is presents a challenge and an opportunity for moral leadership and corporate vision. The issue at stake is not "doing something or nothing" but "how much," "in what areas," "for whom," "in partnership with what stakeholders over what period of time," and so on.

A sustainable corporate citizenship approach will carefully examine and decide on the nature and dimension of corporate obligations. A suitable distinction can be drawn among:

- essential responsibilities required of any corporation for the respect of the right to health (the "*must*" dimension);
- additional corporate citizenship standards beyond what is legally required, but excluding corporate philanthropy (the "*ought to*" dimension); and

special corporate citizenship endeavors (the "*can*" dimension).

### *3.1 The "Must" Dimension*

With regard to respect for the right to health, as with all other human rights Novartis complies within its own sphere of influence with all laws and regulations concerning healthy workplaces, environmental protection, and the safety of products and services. Moreover, the results of cutting-edge research, development, and manufacturing of high-quality drugs allows for a reduction of premature mortality, the prevention or cure of diseases that are susceptible to drug therapy, a general increase in the quality of life of sick people and cost-reductions through a lower number of hospitalizations.

Under constructive political and social conditions (good governance"), these corporate contributions are of major instrumental value in enabling individuals to lead a healthy life and the state to bear its right-to-health duties.

### *3.2 The "Ought to" Dimension*

Novartis, through implementation of its corporate citizenship philosophy, delivers more than just the essentials. This is particularly important in countries where the legal standards are low or not enforced. Through its corporate citizenship endeavors, Novartis strives to make sure that questionable labor standards and environmental practices are avoided. The company adheres to its self-imposed corporate citizenship norms even if local laws and regulations would allow for lower standards. As a responsible company, Novartis aims to avoid benefiting from unhealthy working conditions or unsafe workplaces of third parties within its sphere of influence and to provide assurances about this as far as possible through declarations on the business practices of customers and suppliers.

Novartis is willing to adapt on a case-by-case basis the prices of life-saving medicines for patients living in individual or collective poverty. (Examples of this include the Novartis-WHO cooperation on malaria, which makes the product Coartem available at production cost, and the Gleevec patient's assistance program.) And in an effort to protect participants of clinical trials all over the world, Novartis adheres to the ethical principles of the Declaration of Helsinki on clinical trials. Last but not least, Novartis is on record for helping out with donations in cases of acute emergency.

**Some examples of initiatives undertaken by Novartis**

***1. Projects to de-stigmatize and eventually eliminate leprosy***

The UN Special Rapporteur on the Right to Health describes the world's leprosy situation as follows: "Leprosy remains a serious public health problem, essentially (but not exclusively) in the developing countries of Asia and Africa. The disease is closely linked to poverty. Every year 600,000 new cases are diagnosed. Untreated, leprosy causes immense physical suffering and disability, as well as social stigmatization and discrimination born out of ignorance and prejudice. Today [in 2003] it is estimated that tens of millions of people are unfairly and irrationally treated on account of leprosy."

Novartis and its Foundation for Sustainable Development have been actively engaged in the fight against this biblical disease since 1985 and have since 2000 alone contributed to the cure of more than 2.5 million patients by initiating social marketing campaigns to de-stigmatize the disease and by donating the multi-drug therapy to WHO (a practice that will continue until leprosy is eliminated).

**2. Projects to improve access to and compliance with tuberculosis treatment**

Tuberculosis kills about 2 million people every year – more than any other infectious disease in the world. According to WHO estimates, more than one-third of the world's population is infected with the TB bacillus and about 8.8 million people suffer from TB annually. If left untreated, a person with active TB will infect about 10–15 people every year. HIV co-infection greatly increases the risk of the disease progressing from latent to active TB by weakening the immune system. In fact, TB is the leading cause of death among people who are HIV-positive.

TB can be cured with DOTS – daily observed treatment, short course. DOTS cure patients, prevent the development of drug resistance, and reduce the transmission of TB. However, only 27% of people with infectious TB are treated in DOTS programs. In December 2003, Novartis signed a Memorandum of Understanding with WHO committing itself to donate the WHO gold-standard DOTS treatment for half a million patients over five years. This consists of the rifampicin-based fixed-dose combinations for the intensive and continuation phase of treatment, thereby reducing the duration of treatment from eight to six months. The drugs will be provided in blister packs within patient kits.

**3. Projects to support AIDS orphans**

The HIV/AIDS pandemic is not only an individual tragedy for the affected and their families; it is also a societal and economic catastrophe. According to UN estimates, the number of AIDS orphans – as a result of 24 million deaths due to HIV/AIDS – is expected to rise from 13.4 million today to 25.3 million in 2010.

In light of this alarming development, the Novartis Foundation supports different initiatives to improve the livelihoods and future prospects of AIDS orphans through individual counseling to help them cope with their situation and capacity building of teachers, social workers, and other caregivers as well as social and economic empowerment (skills development, access to credit, and income-generating activities).

**4. An initiative to improve communities' financial access to basic health care services:**

Approximately a third of the population in developing countries does not have adequate access to basic health care services. In view of the lack of obligatory health insurance in most developing countries for decades to come, the Novartis Foundation initiated the setting up of a mutual health insurance scheme to improve access for rural populations in Mali. The principle of collective provisions makes it possible to save for health at a time when more resources are available and at the same time to pool the resources of several people. Through this communal provision, the financial costs associated with health risks are "distributed" between community members, with each member paying an insurance premium.

In order to make the mutual health insurance scheme and its services attractive, the project also improves the supply and quality of clinical care. Finally, the project contains a preventive component that should allow households – in conjunction with the insurance scheme – to reduce health care costs and thus those of the scheme itself.

**5. A project to understand and improve access to effective malaria treatment**

Despite decades of intense fight against malaria, this infectious disease remains a major health burden for developing countries that hinders individual well-being as well as economic development. Some developing countries lose up to 1.3% of GDP annual growth due to malaria.

Together with Tanzanian and Swiss partners, the Foundation aims to identify and analyze the main obstacles to effective malaria treatment and to address them by designing appropriate interventions. Future challenges of this project include motivating people to seek treatment at public health facilities in the event of fever episodes, improving advice and treatment in private drug shops, and improving access for people spending months away from home during cultivation periods.

**6. Providing state-of-the-art training facilities for higher health care personnel:**

Poor quality of care is a major obstacle to effective diagnosis and treatment as well as to patients' compliance and satisfaction with treatment outcome. Poorly trained and motivated health care staff is at the heart of poor quality of care, as they are the interface between the health care system and the patient.

In order to strengthen human resource development in the health sector in Tanzania, the Novartis Foundation for Sustainable Development and its partners are currently renovating and upgrading an Assistant Medical Officer Training Centre (buildings, training equipment, new specialized staff, and so on). Assistant Medical Officers are a priority cadre for the Ministry of Health as they enhance the quality of essential primary health care services, especially at the district level. Thus an adequate teaching and learning environment will contribute substantially to improved medical expertise, which in turn is needed to improve the overall health situation of the population, especially in rural areas.

## Conclusion: The Fulfillment of the Right to Health as a Multi-stakeholder Task

Given the huge dimension and complexity of the global health problems in the twenty-first century and taking into consideration the tragic human misery associated with premature death and preventable diseases, the right to health debate is expected to gain importance. If one considers "health care" as a right, national governments and international institutions are the primary duty bearers to make all reasonable efforts to respect, protect, and fulfill this right. Responsible governments will start with their commitment by making informed decisions to what extent, given the resources available:

*excess mortality and morbidity can be reduced*, for example by focusing on interventions that can achieve the greatest health gains possible within the prevailing resource limits – the vast majority of preventable diseases are the result of a relatively small number of identifiable deficits, and hence a focus on communicable diseases, health awareness programs, and immunization programs can dramatically improve health and reduce premature mortality;

*potential threats to health can be countered*, for example by social marketing, with the goal of changing unhealthy environments and reducing risky behavior (e.g. environmental measures against vector-borne diseases like malaria as well as promotion of mosquito nets, the use of condoms as prevention against sexually transmitted diseases);

*more effective health systems can be developed*, for example by setting priorities according to actual needs and giving incentives to improve health sector performance (e.g. high priority for the known and cost-effective interventions against the diseases that cause 50% of preventable deaths among the poor); and

*investments in expanding the knowledge base can be assured,* for example through the analysis of the known "best practices" to learn from existing comparable national/local problems, and adopt cost-effective applications of what is useful, instead of "re-inventing the wheel": Successful programs and best practices on a variety of significant primary health issues are known to UNAIDS as well as to UNICEF and UNFPA, and they could be implemented if and when the political will to do so can be mobilized. Wherever known low-cost strategies to prevent or treat infectious diseases have been implemented, dramatic progress has been achieved—and yet, many countries still prefer not to follow World Health Organization (WHO) recommended policies.

Second in the line of duty is the international community. A reality check shows that we are far from being on track with regard to the achievement of the Millennium Development Goals in general and – even more – with regard to health. Midway through the period 1990–2015, the general child and maternal mortality goals are projected to remain unmet almost universally, with sub-Saharan Africa lagging behind most significantly. While part of this can be attributed to lack of good governance, the industrial countries have failed to keep the promises they made at UN conferences in New York (at the World Summit for Children, 1990), Cairo (the International Conference on Population and Development, 1993), Copenhagen (the World Summit for Social Development, 1995), Beijing (the World Conferences on Women, 1995 and 2000), Istanbul (the UN Conference on Human Settlements, Habitat II, 1996), and Rome (the World Food Summits, 1996 and 2002). While more than $900 billion is spent for military purposes and nearly $500 billion for protectionist purposes, less than $60 billion goes to development assistance.

*Is there a right to health that poor people can call on pharmaceutical companies to sustainably respect?* Yes, corporations all over the world and from all sectors have respective social and ecological legal duties within their normal business activities. Is there a right to health that poor people can call on pharmaceutical companies to sustainably *protect*? Yes, enlightened corporations strive to make sure that questionable labor standards and environmental practices are avoided in their sphere of influence. Novartis adheres to its self-imposed corporate citizenship norms even if local laws and regulations would allow for lower standards. Is there a right to health that poor people can call on pharmaceutical corporations to sustainably *fulfill*? Yes, for those who are employed by the company, through a fair remuneration. But beyond that?

The answer to this key question depends on whom you are asking. There is a widespread moral recognition of deliverables beyond the supply of markets, the respect of law and proper norms, and the provision of productive employment. Novartis does accept such responsibilities through the "can-dimension" of its corporate citizenship commitment. On its own, however, this cannot be more than a very limited contribution to overcome the challenges that we all face on a global level.

The huge mortality and morbidity burden can, however, only be brought down with a concerted strategy that is supported globally with financial resources as well as know-how on good practices and with national and community efforts to increase the access of the world's poor to essential health services. The international community's credibility will be measured in its willingness to deliver on commitments to increase external resources for development.

While it is reasonable and fair to expect that business enterprises who do not commit, become complicit, or benefit from violations of the political and civil rights of human beings anywhere in the world, the assessment of what is their reasonable and fair contribution to the respect, protection, and fulfillment of economic, social, and cultural rights remains more difficult. This is especially true for the right to health. Novartis' largest and most sustainable contribution toward this end is and will continue to be through its normal business activities: research, development, manufacturing, and selling pharmaceutical compounds to prevent premature mortality, to cure or alleviate diseases, to prevent or shorten hospitalization, and to contribute to the quality of life of sick

people. To do this while adhering to laws and regulations as well as being in harmony with internationally accepted labor and environment standards contributes further to the right to health of individuals and enables the state to fulfill its duties.

One thing is, however, obvious: Single actors on their own will face narrow limits with regard to their impact on global development and health problems. Solutions of multifaceted problems of global dimensions must be approached with a multi-stakeholder approach. This is why all actors of society – be they state or non-state – are called on to contribute to solutions according to their obligations, abilities, and enlightened self-interest. The watershed for the credibility for all societal actors will be their willingness to make resources available and to cooperate in meeting all the Millennium Development Goals – and in fulfilling the right to health.

## Endnotes

1. The article is based on a larger version that was published in the UN Global Compact Quarterly, June 2005.
2. See http://www.enewsbuilder.net/globalcompact/e_article000375786.cfm?x=b4J1cSV,b3hPg0VQ
3. Article 1 of the Declaration on the Right to Development, adopted by General Assembly resolution 41/128 of 4 December 1986, reads "....States have the duty to co-operate with each other in ensuring development and eliminating obstacles to development. States should realize their rights and fulfill their duties in such a manner as to promote a new international economic order based on sovereign equality, interdependence, mutual interest and co-operation among all States, as well as to encourage the observance and realization of human rights."
4. For an interesting way to deal with this issue, see UNHCHR: *Human Rights Approach to Poverty Reduction Strategies*, at www.unhchr.ch/development/povertyfinal.html; see also OHCHR: *Human Rights and Poverty Reduction. A Conceptual Framework*. New York / Geneva 2004.
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9. See, for best practices, www.sarvodaya.org.
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11. UNDP: *Human Development Report 2003. Millennium Goals: A Compact Among Nations to End Poverty*. Oxford University Press, New York 2003, p. 101.
12. Commission on Macroeconomics and Health: *Macroeconomics and Health: Investing in Health for Economic Development*. WHO, Geneva 2002, Foreword.
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14. I owe this definition to Interim report of the Special Rapporteur of the Commission on Human Rights on the Right of Everyone to Enjoy the Highest Attainable Standard of Physical and Mental Health, Paul Hunt (A/58/427), United Nations, New York 2003, the 2003 Interim report of Paul Hunt, the UN Special Rapporteur for the Right to Health, p. 13.
15. For details, see the project sites on www.novartisfoundation.com.
16. Interim report of the Special Rapporteur of the Commission on Human Rights on the Right of Everyone to Enjoy the Highest Attainable Standard of Physical and Mental Health, Paul Hunt (A/58/427), United Nations, New York 2003, p. 21.
17. See the joint report on orphans estimates and program strategies by UNAIDS, UNICEF, and US Agency for International Development: *Children on the Brink 2002*. Washington DC 2002.
18. Carrin and James calculate that for the countries in Africa with GDP per head of less than $1,000, 45–50 years must elapse before the institution of compulsory universal coverage. This is particularly the case for the population of the agricultural and informal sector, as these groups have fluctuating incomes that are difficult to estimate for a regular contribution. See Carrin G. and James Chr.: *The Determinants of Universal Coverage: An Empirical Analysis*. WHO, unpublished document. Geneva 2000, pp. 205ff.
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20. See Sachs, J. and P. Malaney: The Economic and Social Burden of Malaria. In: *Nature*. Vol. 415 (2002), pp. 680–85.
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23. See WHO: Removing Obstacles to Healthy Development, Geneva 1999, pp. 18ff.
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# Respiratory conditions among workers in a cotton spinning mill in Zambia

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## Abstract

Cotton dust, when breathed in, irritates the lungs and exposed workers experience the following symptoms: difficulty in breathing, chest tightness, coughing and wheezing. The current analysis was limited to the objective of determining the proportion of workers experiencing difficulty in breathing, chest tightness, coughing, wheezing and phlegm. A cross sectional study was conducted among workers in a cotton spinning mill. A convenient sample was selected by the management from all work-areas. A structured questionnaire enquiring about the respiratory health was administered to the employees.

A total of 297 employees took part in the study of whom 274 (92.3%) were males. The median age ($Q_1$, $Q_3$) for males [29 (26, 34)] was significantly greater ($p<0.001$) than that for females [24 (23, 28)]. The majority of the workers had been in employment for less than one year (46.1%). Fifty (16.8%) of the 297 workers smoked cigarettes (all the 23 females were non-smokers). Wheezing was recorded in 4.4% of the workers, chest tightness (14.5%), cough (19.9%), phlegm (11.4%) and breathlessness (5.7%).The observed generally low rates of respiratory conditions may have been partly due to under-reporting and partly due to sampling bias. An annual medical check-up is recommended for all employees.

## Introduction

Cotton dust which is generated through the handling and processing of the cotton causes ill health to the workers. The dust is produced through the process of fabric production from the opening of cotton bolls in the field, harvesting and storing of seed cotton, separation of lint from seed, processing of yarn through to weaving or knitting into fabric. We are concerned in this paper about the effect of the cotton dust that is produced at the textile mills on the health of the workers.

Cotton dust is a colourless, odourless solid. It may contain substances such as: non-cotton matter, bacteria, fungi, soil and pesticides which may have accumulated during the growing of the plant, harvesting of the crop and subsequent processing and storage periods.

Breathing in cotton dust can cause serious, permanent lung damage. The following respiratory conditions are associated with exposure to cotton dust: difficulty in breathing, chest tightness, coughing and wheezing. These conditions are particularly noticeable in workers on the first day at work after being off duty over the weekend or after being off duty for a few days. Workers in cotton mills may also cough phlegm or mucous.

To our knowledge the extent of respiratory conditions associated with cotton dust among workers in cotton spinning mills in Zambia has not been documented. It was, therefore, the objective of this study to determine the prevalence rates of respiratory conditions among workers in cotton textile spinning mills in Zambia.

## 2. Materials and methods

***Study population:*** The study population was comprised of workers in a cotton spinning mill. The workforce numbered about 1200. Recently an industrial action led to most of the workers being dismissed. As a result most of the workers had been in employment for a few years at the time of the survey.

**Study design:** Cross sectional study.

### 2.1 Data collection

***Questionnaire:*** A structured questionnaire was used to obtain information on socio-demographics, and on the signs and symptoms of respiratory conditions.

Sample size and Sampling

We did not have reliable information on the prevalence of respiratory conditions. Upon considering a prevalence of 50±5% in a population size of 1200 workforce, the required minimum sample size was 291. A stratified non-random sample was drawn. The work-area was considered as a stratum. The number of employees selected from each work-area was proportional to the size of the workforce in that work-area.

**Data processing and analysis:** Data was entered in a computer using Epi data. Range and consistency checks were incorporated in the data entry program. The duplicate files were validated. The completeness of the questionnaires was checked while in the field.

The Yates' corrected Chi-squared test was used to determine associations of qualitative variables. The Epi Info program was used in the analysis. The cut off point for statistical significant was set at 5%.

## 3 Results

A total of 297 workers took part in the study of whom 274 (92.3%) were males. Male participants (median age = 29; $Q_1$=26, $Q_3$=34) were significantly ($p<0.001$) older than the female participants (median age = 24; $Q_1$=23, $Q_3$=29). Table 1 shows the distribution of the length of stay in employment. The majority of the workers had stayed in employment for less than one year (46.1%).

Concerning the smoking status of the participants, 50 (16.8%) smoked cigarettes, while 66 (22.2%) of the 297 employees had ever smoked cigarettes.

The major dust control measure limiting the amount of dust in the air was the ventilation system. Dry sweeping

Table 1. Length of stay in employment (Total=297).

| Length of stay (years) | number | % |
|---|---|---|
| <1 | 137 | 46.1 |
| 1-4 | 91 | 30.6 |
| 5+ | 69 | 23.2 |

the floor increased the amount of dust in the air. The amount of dust breathed-in was limited by wearing of mask. Asked how often the workers wore the mask, 222 (74.7%) reported that they always wore the mask, 68 (22.9%) sometimes, and 7 (2.4%) never wore the mask. At the time of the survey, only one person was observed to have a respirator in the dustiest place of the mill but was not using it.

Associations of age, length of stay in employment and wearing of mask with respiratory conditions are shown in Table 2. No significant associations were observed. Overall, wheezing was reported in 13 (4.4%) of the workers, chest tightness 43 (14.5%), cough 59 (19.9%), phlegm 34 (11.4%) and breathlessness 17 (5.7%).

## Discussion and conclusion

The current study is the first one to document the extent of respiratory conditions in a cotton spinning mill in Zambia. The study was conducted in a workforce with the majority of the employees having worked for a few years. It is against this background that the results of the study should be interpreted. The major findings were that the most common respiratory conditions were a cough (19.9%) and chest tightness (14.5%). Wearing of masks was not significantly associated with respiratory conditions. These results from the current study may be considered as baseline findings for subsequent studies in the monitoring of the effect of cotton dust on the health of the employees in the present population.

The reported prevalence rates of the respiratory conditions might have been underestimated. The selected sample was non-random. It was selected by the management of the cotton spinning mill and might have comprised of "healthy" looking employees. Furthermore, some respiratory conditions might not have been noticeable in the workers because workers were only given one day off duty in a week. Respiratory conditions are more noticeable in workers on the first day at work after being off duty over the weekend or after being off duty for a few days. In addition, because the conditions were self-reported, bias might have been introduced in the results. It is likely that the respondents might have under-reported the conditions in fear of victimization by management.

In a study conducted in Guangzhou in China among workers exposed to cotton dust in factories that processed purely cotton, 18.2% of the employees reported having a cough or phlegm (Jiang *et al*. 1995). The finding in the current study of 19.9% of the workers having reported a cough compares with the above result but is in variance with the finding of Fishwick et al. (1996), who found that 3.5% of their participants reported having had

Table 2. Associations of age, wearing of mask and length of stay in employment with respiratory conditions.

| | | Wheezing | Chest tightness | Cough | Phlegm | Breathlessness |
|---|---|---|---|---|---|---|
| Age | Total | n (%) | n (%) | n (%) | n (%) | n (%) |
| <25 | 54 | 2 (3.7) | 11 (20.4) | 10 (18.5) | 4 (7.4) | 3 (5.6) |
| 25-29 | 109 | 3 (2.8) | 11 (10.1) | 24 (22.0) | 16 (14.7) | 8 (7.3) |
| 30+ | 134 | 8 (6.0) | 21 (15.7) | 25 (18.7) | 14 (10.4) | 6 (4.5) |
| | p-value | .459 | .186 | .778 | .346 | .633 |
| **Length of stay in employment** | | | | | | |
| <1 | 137 | 3 (2.2) | 16 (11.7) | 27 (19.7) | 13 (9.5) | 7 (5.1) |
| 1-4 | 91 | 5 (5.5) | 15 (16.5) | 13 (14.3) | 9 (9.9) | 4 (4.4) |
| +5 | 69 | 5 (7.2) | 12 (17.4) | 19 (27.5) | 12 (17.4) | 6 (8.7) |
| | p value | 0.202 | 0.441 | 0.115 | 0.208 | 0.467 |
| **Wears mask** | | | | | | |
| Yes or always (222) | | 10 (4.5) | 31 (14.0) | 43 (19.4) | 21 (9.5) | 12 (5.4) |
| Sometimes or never (75) | | 3 (4.0) | 12 (16.0) | 16 (21.3) | 13 (17.3) | 5 (6.7) |
| | p value | 1.000 | 0.808 | 0.841 | 0.101 | 0.774 |

work related persistent cough. The current results also contradict findings from another study by Wang *et al*. (2002) among female cotton textile workers who did not smoke and were followed up at three and twelve months, and showed that by three months, 3.6% of the participants had usual cough with phlegm, and 6.7% had usual dry cough.

Findings from a study by Fishwick et al (1996) that 5.3% of their participants had work related chest tightness is significantly lower than our result of 14.5%. Differences in reported rates of respiratory conditions may be as a result of differences in definition of chest tightness, different climatic conditions prevailing in the study areas as well as differences in dust control measures in the mills. Meanwhile, the result of Fishwick *et al* (1996) that 5.3% of their respondents had work related wheeze compares favourably with our finding of 4.4%.

Although the lower rates of respiratory conditions in the current study may be attributed to the shorter period of exposure to cotton dust of less than one year, findings from a study on new employees in a cotton textile mill found that at their early exposure to cotton dust, workers complained more cough and other respiratory irritation symptoms, and the frequency of chest tightness reached the peak one year after exposure and remained at higher level later (Ma *et al*., 1997).

Because no significant associations were observed of age, wearing of mask and length of stay in employment with respiratory conditions, interventions for reduction of prevalence rates for respiratory conditions should be applied to all workers. The impact of wearing of mask on the reduction of the prevalence rates of respiratory conditions was not significant. This finding supports the importance of having workplace dust control measures than personal dust protective equipment.

Only one worker was seen with a respirator in a waste room but was not wearing it. Although workplace dust controls are better than personal protective equipment, workers carrying out maintenance work on the ventilation system must wear respirator. Other workers who must wear respirators are those working in the dusty areas such as the waste room. However workers must be taught how to use, clean and maintain respirators because improper use of them can be dangerous.

In hot climate, respirators become too uncomfortable to be worn. There is a need to develop a respirator which is suitable to be worn in hot conditions.

Prevalence rates of respiratory conditions among workers in cotton mills can be reduced by reducing the amount of dust in the air. The mill had in place engineering dust control (ventilation control) equipment. However, during clean-up more dust was released into the air by dry sweeping. Wet sweeping is recommended for reducing further releasing of dust in the sir. Dust levels must be frequently monitored in the mill so that interventions to further control dust levels in working areas with high dust levels can be put in place. Workers, working in high dust level areas, who develop severe respiratory conditions could be transferred to work areas with less dust.

About one in five (16.8%) of the workforce smoked cigarettes. Smoking can cause lung cancer and other respiratory problems. It may worsen respiratory conditions caused by cotton dust. Stopping smoking will reduce the risk of developing respiratory conditions.

In conclusion, the low prevalence rates of respiratory conditions we found in the current study might have been under-reported. It is recommended that workers must undergo annual medical check-up.

## Ethical consideration

The project was approved by the Ethical Committee of the University of Zambia. Further approval was granted by the factory managers and employees. The employees might not have freely participated in the study as they were selected by the management.

## Acknowledgements

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# Expanding healthcare in Africa: Current status and possible options

Victor Konde

**Abstract**

Africa faces many challenges in providing adequate healthcare to a fast growing population while also facing an increasing disease burden. This paper addresses some of the factors that affect access to healthcare and explores how African countries could improve access to and expand health services by, among others, harnessing emerging technologies, integrating traditional medicines and investing in human resource development.

## Introduction.

Three of the eight United Nations Millennium Development Goals (MDGs) address health concerns. These include targets to reduce child mortality (Goal 4), improve maternal health (Goal 5) and combat HIV/AIDS, malaria and other diseases (Goals 6). These goals reflect the importance attached to health and its role in national development and the recognition by world leaders of the suffering inflicted on individuals by disease and their desire to improve healthcare.

There are fears that these goals are not likely to be met by most African countries. For instance, mortality of children under the age of five in Sub-Saharan Africa (SSA) has only reduced from 195 per 1000 live births to 172 per 1000 live births between 1990 and 2003. There is growing recognition that infant mortality is unlikely to reduce to a rate of about 65 deaths per 1000 live births in SSA by 2015 if more robust measures are not adopted. [1]

Maternal mortality remains very high in SSA (920 deaths per 100,000 live births, twice the developing country average). Even this high maternal mortality rate hides the fact that many women in Africa have to give birth many times in their lifetime. This increases the risk of a mother dying during childbirth in her lifetime in SSA to about 1 in 16 which is much higher than 1 in 3,800 for developed countries. [1]

Most of the deaths in Africa could be reduced or eliminated by inexpensive preventive and treatment measures. Measures such as improving access to medicines, expanding healthcare delivery systems and improving public health services could help save lives of children, make motherhood safer and limit infections among adults. Similarly, inexpensive oral rehydration salts, antibiotics, bed nets, immunization, trained birth attendants and maternity clinics, and access to health information could help save lives.

Good health is important for economic and social development of any country. The sick are unlikely to actively participate in the economic, social and political activities of their country and/or take advantage of any available opportunities to improve their welfare or contribute to the welfare of others. Consequently, investment in healthcare should be seen as investment in the development of countries.

This could reduce the exposure of large sections of the African population to health risks and save millions of people from dying of preventable diseases. For example, although Africa accounts for roughly 10.8% of the global population, its share of total global deaths is about 19% (See table 1). In 2002, Africa accounted for over half of all the global deaths due to infectious and parasitic diseases.

**Table 1. Percentage of global population, deaths and deaths by cause (2002)**

| As percent of global | Africa | Europe | S . E . Asia |
|---|---|---|---|
| Population | 10.8 | 14.1 | 25.6 |
| Total deaths | 18.7 | 16.8 | 25.7 |
| *Infectious and parasitic disease* | 51.6 | 1.8 | 26.8 |
| *Non-communicable disease* | 6.7 | 24.5 | 22.1 |

**Table 2. Deaths by cause by region, 2002 (as percentages)**

| | Africa | Europe | S. E. Asia |
|---|---|---|---|
| *HIV/AIDS* | *20.4* | *0.5* | *2.6* |
| Diarrhoeal diseases | 6.5 | 0.2 | 4.1 |
| *Childhood-cluster diseases* | *6.7* | *0.1* | *2.5* |
| *Malaria* | *10.1* | *0.0* | *0.4* |
| Respiratory infections | 9.9 | 2.9 | 9.5 |
| Maternal conditions | 2.1 | 0.0 | 1.2 |
| Nutritional deficiencies | 1.3 | 0.1 | 1.3 |
| Malignant neoplasms | 3.8 | 19.2 | 7.9 |
| Cardiovascular diseases | 9.6 | 51.2 | 26.8 |
| Injuries | 6.9 | 8.5 | 10.0 |
| Other causes | 22.6 | 17.3 | 33.7 |
| Total | 100.0 | 100.0 | 100.0 |

Source: WHO, 2004

In terms of diseases, HIV/AIDS and malaria caused about 20% and 10% of all deaths in Africa in 2002,, respectively (see table 2). In addition, childhood and diarrhoeal diseases accounted for about 13% of the total deaths in Africa. If the numbers of death due to malaria and HIV/AIDS are subtracted, Africa ratio of deaths due to infectious and parasitic diseases still remains higher.

Many of these diseases have been controlled or eradicated in developed countries and could be classified as diseases of poverty. A striking example is the spread of cholera in Africa. In 1995, Africa accounted for 34% of the cases reported, 60% of the deaths and 27 countries reporting cholera outbreaks globally. [2] By 2004, Africa accounted for 94% of the cases, 99% of the deaths and 55% of the countries reporting cholera outbreaks. The number of Africa countries reporting cholera outbreaks has increased from 21 in 1994 to 31 in 2004.

Many countries have eradicated cholera by following very simple hygienic procedures such as cleaner surroundings, access to safer water and adequate sanitation. Although encouraging homes to boil or treat drinking water with chlorine is useful, it can not substitute the provision of adequate sanitation and safe water.

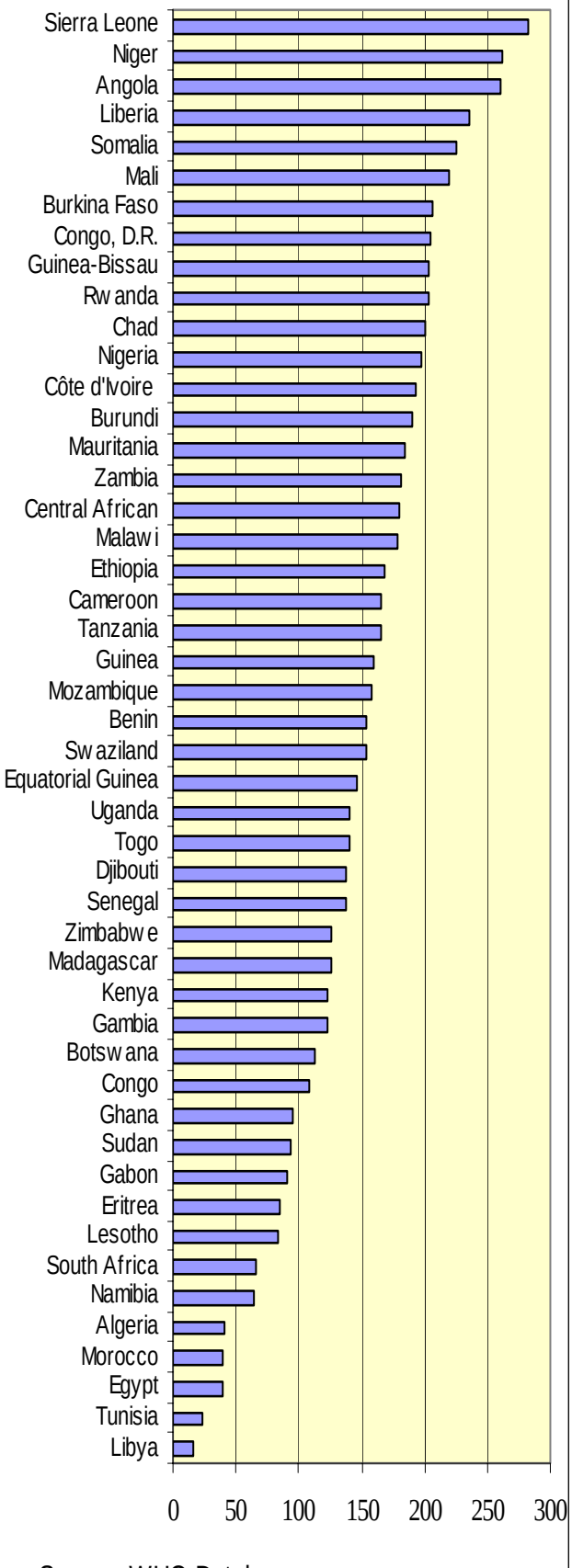
These measures are difficult to maintain in the sprawling and unplanned high density urban shanty compounds of African cities and neglected African villages. They are also unaffordable to most people who live on less than a $1 per day. Research has shown that most people in Kenya, Nigeria and Tanzania were willing to pay only half the price of insecticide treated bed nets on the local markets (about $5) and the poor were unlikely to own any bed net. [3].

The link between poverty and poor health is not in question. The ability to invest in training and retaining of medical personnel, establishment of health centres, access to good nutrition and proper sanitation, and provision of health-related information, among others, are influenced by national wealth and ability of citizens to pay for the services.

Therefore, it is not surprising that over 250 out of 1000 live babies born in Sierra Leone or Niger will die before the age of five (see figure 1). There are only about 12 countries in Africa where the chance of a child to live past his/her fifth birthday is 9 in 10. By contrast, out of a thousand babies born in Norway and Netherlands, only 4 to 6 are likely to die before the age of five. This difference is partly accounted for by the difference in availability of healthcare.

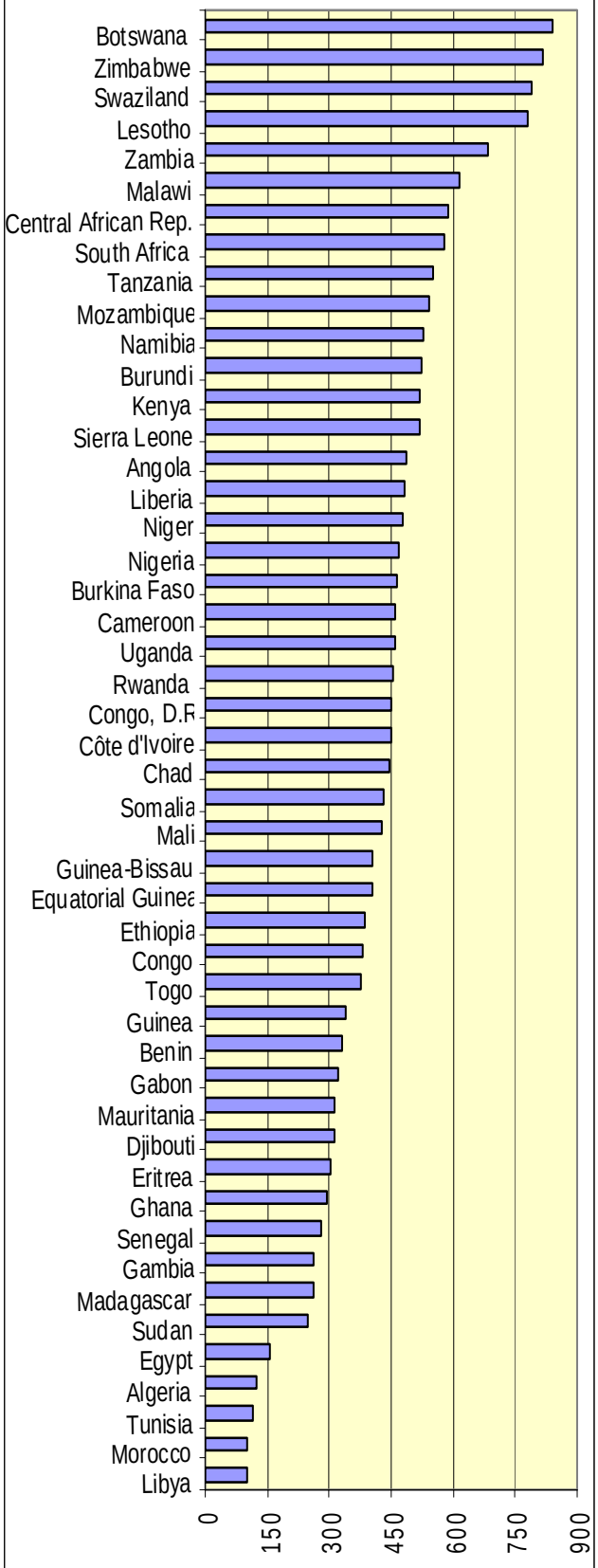
High mortality in Africa is not restricted to children under the age of five. Africa's active population is disappearing very quickly too. The chance of dying between the ages of 15 and 60 in Angola, Botswana and Zimbabwe is about 8 out of 10 (see figure 2). There are roughly about 14 countries where the chance of a person dying between the age of 15 and 60 is above half. In other words, most people are dying well before the age of 60.

**Figure 1. Probability of dying ( per 1000) under age five years (2003)**



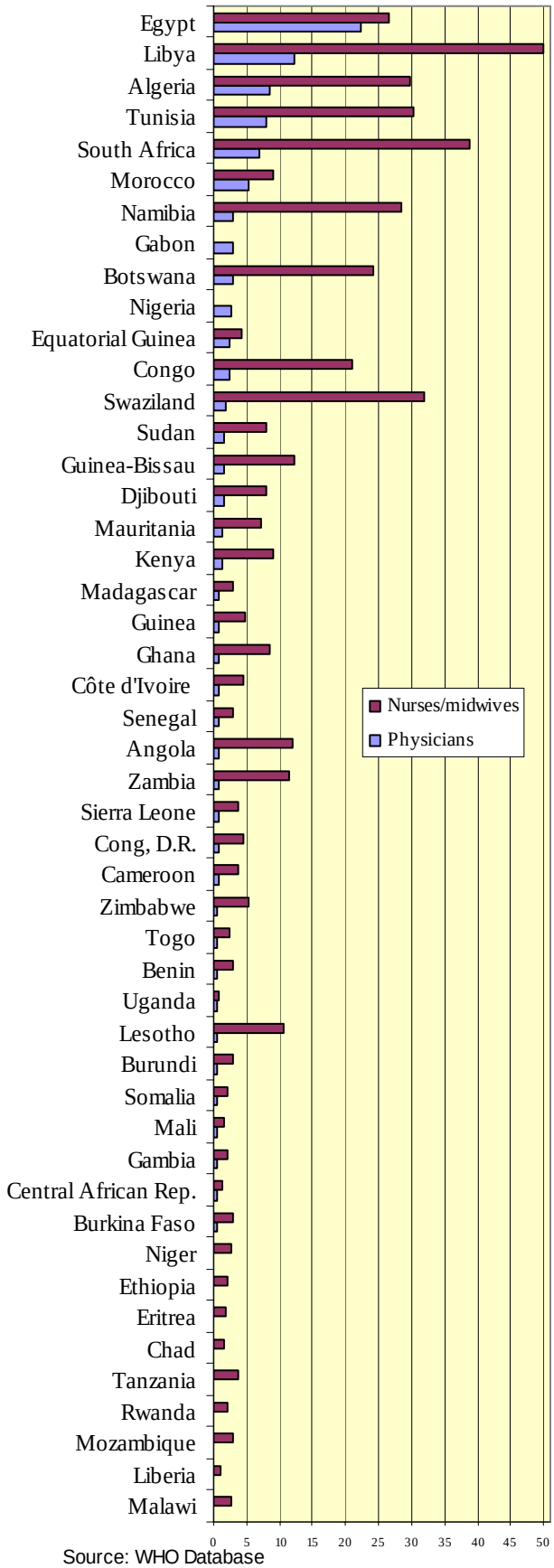

Source: WHO Database

**Figure 2. Probability of dying (per 1000) between ages 15 and 60 years**




**Source: WHO Database**

**Figure 3. Number of physicians and nurses/midwives per 10,000 population**




Source: WHO Database

## 2 Improving access to healthcare

### *2.1 Human resource availability and training*

Africa faces a critical shortage of medical personnel at almost all levels. Sub-Saharan Africa is estimated to have about 1 physician per 40,000 people. There are roughly about 12 African countries with 2 or more doctors per 10,000 of the population and an additional 5 countries with a ratio of equal to or more than one per 10,000 (see figure 3). The rest of the countries, more than 30, have less than one doctor per 10,000.

In addition, there are about 10 countries with about 10 or more nurses and midwives per 10,000 people. The ratio of doctors to nurses also varies very widely from more than 1:20 for Lesotho and Malawi to less than 1:2 for Uganda and Egypt. In general, countries with few doctors have more nurses/midwives. With a few exceptions (7 countries), all countries with less than 1 doctor per 10,000 people have a doctor to nurses/ midwives ratio of more than 1:5 while only 1 (South Africa) of the countries with more than 5 doctors per 10,000 people have a similar ratio.

The ratio of doctors to nurses is a deliberate policy by poorer countries to find ways of quickly supplying medical personnel. It is relatively cheaper and faster to produce nurses than medical doctors and many of the general health needs of patients could adequately be met by experienced nurses. For these reasons, countries with minimal resources have invested most in training of nurses/midwives and clinical officers.

However, the availability of doctors is critical to health. For example, they often determine the type of medical tests to be performed on patient-samples, carry out surgeries and prescribe the appropriate medication. Their deficiency in the health system may lead to higher errors in diagnosis and prescription [4,5] Such medical errors are likely to increase especially in countries where a doctor may be responsible for the management of an entire hospital, serving all the inpatient wards as well as consult for ambulant patients. But an even grave situation arises when majority of patients do not have access to a doctor.

It is not just doctors and nurses that are important in providing good healthcare services. For example, qualified medical pharmacists play an important role in detecting prescription errors (e.g. contraindicated ones), substituting unavailable prescribed drugs with available ones and alerting doctors of new drugs on the market. Similarly, qualified laboratory technicians play an important role in diagnosis, developing disease detection methods and maintaining medical devices.

In order to improve health services, realistic training program and meaningful incentives to retain medical professionals have to be developed. For example, Malawi is estimated to have about one physician per 100,000 people. Its only medical school graduates about 17-22 doctors per year. Between 1992 and 2002, Malawi produced about 168 doctors of which 9 have left the country. [6] Malawi, with 12 million people, may require about 50 years, at this rate, to get to 1 doctor per 10,000.

Africa could learn from the Latin American experience. A Latin American medical school was created as a regional initiative in 1998. This year (2005), about 1500 physicians were graduated from this school. Established in Cuba, the school takes students that are willing to serve in some of the underserved regions of countries. All the student expenses, such as books and accommodation in Cuba for 6 years, are provided free of charge. The school, with students from 18 countries, had 325 students from

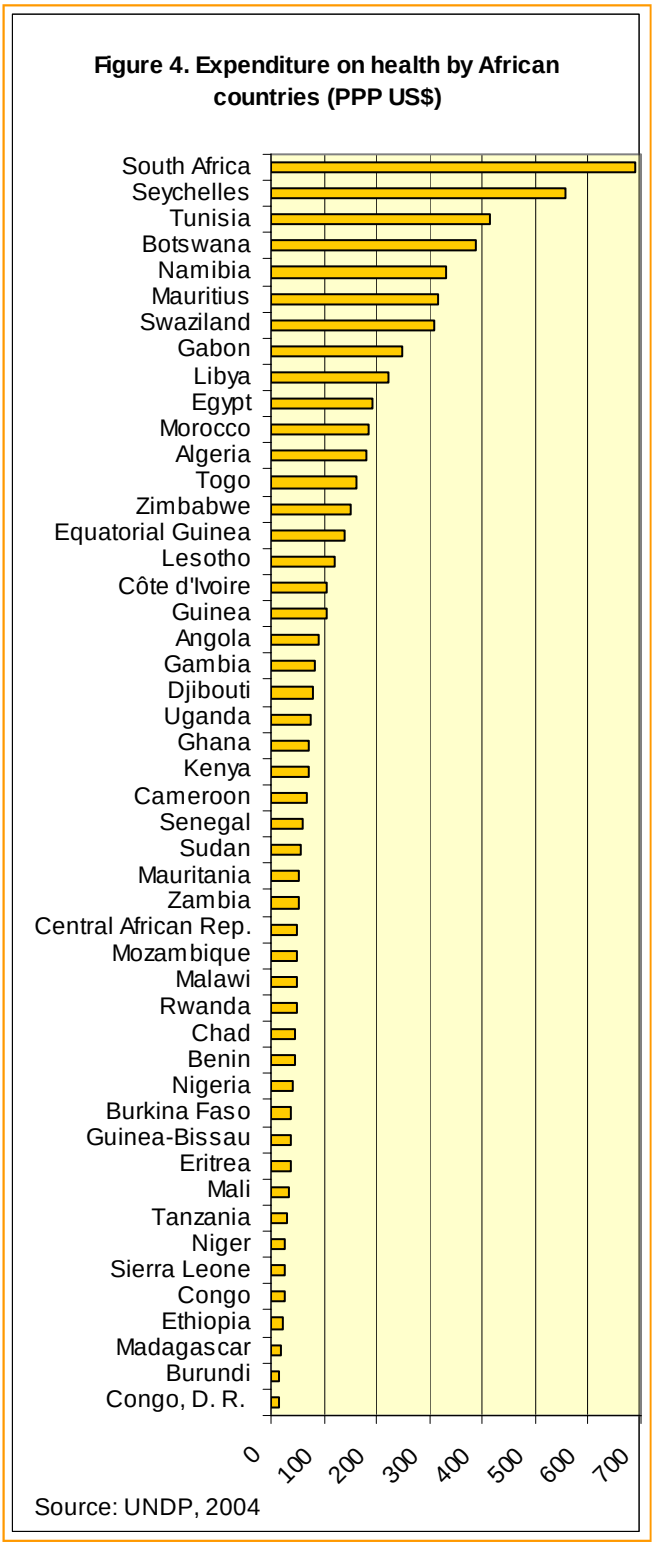



**Figure 4. Expenditure on health by African countries (PPP US$)**

Source: UNDP, 2004

Nicaragua alone in the 1999-2000 cohort. At this rate, these countries are likely to soon increase the availability of physicians.

There is absolutely nothing stopping Southern African countries, hit the most by the HIV/AID epidemic, from quickly reorganizing their medical institutions to train thousands of medical professions needed to manage the current health needs of their citizens. A regional approach could also improve and harmonize the standards of medical training.

### *2.2 Access to medicine*

***…..For most pharmaceutical firms, Africa is a small market…..***

There are many ways why communities may not have access to medicines. The drugs may not be available on the local markets or they may be available in the market but are unaffordable, drug developers may neglect development of treatments of diseases for the poor or small markets and resources meant for purchase of drugs or vaccines may be abused. In addition, world trade rules may also prohibit purchase or reproduction of life-saving medicines protected by intellectual property laws.

For most pharmaceutical firms, Africa is a small market. The combined public and private health expenditure of many African countries is less than $50 per person per year. This is in great contrast to over $2000 per person per year spent by most developed countries. In terms of purchasing power parity (PPP), only 18 countries spend more than $100 equivalent, both public and private, per person per year (see figure 4). Therefore, the money available for expenditure on health is not sufficient to meet the health demands of many African families.

Access to medicine will also remain illusive as long as abuse of funds for medical purchase is not properly accounted. This includes strengthening tender procedures, quality control systems, certifications of drugs store and accountability in public health centres. For instance, fake medicines have been reported in many countries.

### *2.3 Impact of attitudes of health workers on access to healthcare*

Larry Dossey (the author of several books on alternative medicines) said: “The power of love to change bodies is legendary… Throughout history, "tender loving care" has uniformly been recognized as a valuable element in healing”. [7] Therefore, discrimination of the sick is likely to slow their recovery and/or possibly discourage them from seeking medical assistance.

It is difficult to accurately measure discrimination. However, a recent survey of 1,021 health-care professionals in Nigeria found that 9% had refused caring for HIV/AIDS and 9% had refused a patient with HIV/AIDS admission to a hospital [8]. More worrying, 59% expressed the need for a separate ward and 91% preferred health workers be informed when a patient had HIV to enable them protect themselves. About 40% believed healthcare professionals with HIV/AIDS should not be allowed to work in any area of healthcare requiring patient contact. Furthermore, 20% thought HIV/AIDS patients deserved their infection.

HIV represents a unique case in that it has received a lot of public attention and awareness due to the high numbers involved. Many patients afflicted by illnesses such as leprosy, tuberculosis, HIV/AIDS, scabies and plague may be too ashamed or afraid to seek medical advice. In the process, their conditions deteriorate and the chance of transmitting the disease to others increases. One way around this challenge is to create sufficient public awareness. Another alternative is the establishment of specialized wards and clinics as long as they do not feel like mini-prisons.

## 3. Expanding healthcare delivery

### *3.1..Empowering and promoting community participation*

The health of the nation is both a public and private good. The participation of the public in prioritizing their health needs, implementing health strategies and providing health services is important in expanding healthcare. To participate effectively, the community may need access to sufficient technical knowledge, understanding of the problem and alternative solutions. One such effort is the training of traditional birth attendants to improve their knowledge and expertise.

In Southern Sudan, the African Medical and Research Foundation (AMREF) worked with other NGOs and the Sudan People’s Liberation Movement (SPLM) and designed a program to produce clinical officers for the area. A former teacher training school was turned into a clinical officers training institute. The students were selected by the community leaders and many of them never completed secondary education. Each student was sponsored by an NGO for about $7,500 for the three year program.

The school also provides Mathematics, English and Biology courses to those that never completed secondary education. In 2001, the institute graduated the first 17 clinical officers and another 33 in 2004, together accounting for half the number of clinical officers in Southern Sudan. There are at least 91 students currently in training. [9].

Similarly, Tanzania used its primary school teachers to deliver drugs against intestinal worms (helminths) through what is termed “school-based de-worming programme”. [10] About 400 million school-age children get infected by roundworms, hookworms, and whipworms annually globally [10]. Combined with poor nutrition, it quickly leads to malnutrition and iron-deficiency anaemia resulting in stunted growth and increased vulnerability to other infections as well as absenteeism from school.

The children were treated three times a year with mebendazole (a safe drug against worms), administered and records kept by their teachers. The initiative successfully reduced the prevalence of severe anaemia by almost 40%, iron deficiency fell by 20% and the student showed

marked improvement in weight and height gains than those outside the program. It takes roughly half a day to train a class of teachers to administer and keep records of the program.

Tanzania is not alone in using primary schools to fight diseases. [11] Guinea started a de-worming program that was combined with nutritional supplementation covering 200,000 children in 1997. By 1999, significant improvement in both the number of infections and the nutritional status of children was noted. The following year, about 1,600,000 tablets of mebendazole and 2,000,000 of praziquantel were ordered for distribution in 2002.

Indeed, several religious organizations and municipal councils run health centres that are provide healthcare. The use of other professionals (social workers, agricultural experts, teachers, post workers and traders) and their associated institutions, either as supervisors or first-aid centres could help expand access to medical advice and treatment.

### *3.2 Integrating traditional medicine and use of knowledge*

The Organization of African Unity (now African Union) declared 2001-2010 as the decade of traditional medicine at its Summit in Lusaka Zambia in 2001. It is estimated that about 80% of African population use or depend on herbal medicine. Traditional medicine is popular in Africa partly because traditional healers are accessible and live within the community they serve.

It is estimated that the ratio of traditional healer per population in sub-Saharan Africa is about 1:500 while that of doctors is about 1:40,000. [12] For instance, Uganda is estimated to have about 1 traditional healer per 400 people, which is much higher than 1 physician per 20,000 people (WHO, 2002). Similarly, it is estimated that about 30 million of South Africa's 46.9 million people consult and seek treatment from traditional healers. The traditional medicine sector employs about 30,000 people and generates approximately $200 million annually. [13]. This makes traditional medicine a significant proportion of the South African health sector and economy.

**The development of Jeevani drug based on traditional knowledge in India.**

Indian scientists on an expedition in 1987 observed that their Kani guides ate a fruit that energized them. Efforts by the scientists to get hold of the source of the fruits were met with resistance as the Kani traditional knowledge was kept secret and vested in tribal physicians, the Plathi. It took persuasion and skilful negotiation with the tribal leaders to obtain the information.

The scientists from the Tropical Botanical Garden and Research Institute (TBGRI) extracted 12 active ingredients from the Arogyappacha (*Trichopus zeylanicus*) plant. TBGRI licensed the products and their preparation methods to an Indian commercial firm. The firm produced the drug, Jeevani, using raw materials (leaves of the plant) supplied by the community.

The Kanu community was entitled to 50% of the license fee and 50% of royalties gained by TBGRI from the drug. Such work adds value to and expands the market of traditional knowledge.

**Source**: UNCTAD 2005, based on WHO

To tap this wealth of knowledge, the South African Medical Research Council runs a Traditional Medicines Research Unit. The Unit seeks to promote modern research methodologies in the use and understanding of traditional medicines, and attract young scientists into the field of traditional medicine. [14] The Unit works with the University of Cape Town's Department of Pharmacology in the development of anti-tuberculosis drugs from traditional medicines.

In the 1999-2000 period, the Directly Observed Treatment Strategy (DOTS) project, the globally accepted strategy for the control of tuberculosis (TB), involved traditional healers, clinics and other lay persons (shop keepers) in the KwaZulu-Natal. About 89% of those supervised by traditional healers completed treatment compared 67% of those supervised by others. [15] More importantly perhaps, those supervised by traditional healers expressed greater satisfaction because they had easy access to traditional healer (often based in the same location) and found their supervision 'more caring' (18 patients were regularly visited and another 3 got regular food from their supervisors).

Africa is not alone in the need to integrate traditional medicine into the conventional medicine. Countries such as Chile, China and India have developed medicinal products from their traditional knowledge. Chile has a growing market for indigenous medicines. The government has granted permission to entrepreneurs that have developed several traditional medicines from about 47 plants to treat over 50 diseases. [16]

### 3.3. *Harnessing emerging technologies to expand healthcare*

There are several technologies that promise to revolutionize health-care delivery and the development of healthcare products. These include developments in biotechnology, information and communication technology, materials technology and nanotechnology as well as their off shoots. Biotechnology has enabled the bioengineering of plants and animals to produce biopharmaceuticals. Some of the early products include genetically modified (GM) tobacco that produce vaccines against hepatitis B and biological drugs against HIV/AIDS, and GM potatoes that produce reagents to fight cholera and diarrheal diseases [17]

This technological revolution is driven by its potential to drop the cost of drug and vaccine production up to one-tenth of the current cost of conventional chemical methods. It is also much cheaper and easier to scale up acreage of plants or numbers of animals than manufacturing facilities. This could ultimately bring down the cost of treating some diseases. [18]

Information and communication technologies may contribute to the expansion of service delivery through the development of virtual hospitals. It should be possible in the near future for biosensor implants to monitor brain activity, determine sugar levels, assess parasitic

presence and environmental stress of the patient and send an alert to the doctor. This could improve self-diagnosis, early detection of diseases, home-care at a reduced cost, as well as help reduce prescription errors by physicians and assist doctors track the history of their patients. [19]

*The developments in materials technology and nanotechnology are revolutionizing the design and size of medical devices. Several tiny protein and DNA analyzers with the ability to detect a host of infectious organisms, including anthrax, HIV and SARS have been developed. For instance, in 2004 scientists at Purdue University announced the development of a chip-sized version of a common detector used to identify proteins, DNA and other molecules with a potential to radically reduce the size of detection equipment. [20].*

The future trends in health-related technologies are being fuelled by the convergence of these technologies. The convergence of any of these technologies is also spinning off new technologies which promise to have a huge impact on healthcare and quality of life (e.g. bionics and molecular manufacturing). Taken together, these technologies will enable the production of smaller and smarter products that will analyze, identify and communicate with the user. [21]

These opportunities are unlikely to be evenly distributed but will have a positive impact on all. For example, vaccines which could be administered as a single treatment through the use of drug delivery devices that will cut down the need for two to four visits to clinics to get boosters. Combined with increased information dissemination and reduction in cost, complexity and energy needs of diagnostic systems, even rural clinics may benefit.

African countries have a daunting, but not impossible, task in learning, adapting and operating these technologies because they have not invested in the converging technologies (see section 4.1 and 4.2). However, these technologies offer Africa the best chance of expanding healthcare in the face of limited medical personnel, health centres and limited access to electricity. If countries develop clear and predictable regulatory regimes, their institutions and firms may access international resources through strategic alliances.

## 4 Investing in health

### *4.1 Promoting research and development*

The African science enterprise produces quite substantial scientific results but its contribution the generation of health products and services (e.g. drugs, vaccines and medical equipment) remains small and is poorly focused and funded. For poor countries, there is a need for public leadership in defining the character of the character of domestic health research and setting of research priorities that are important to the respective countries. For example, they could encourage development of drugs, devices and vaccines (as Cuba does) or focus on processing and production technologies (as India has done).

For many African countries, their health-related industries do not have sufficient resources to invest in R&D activities while its public institutions depend on donors and foreign collaborators for their R&D activities and training. In a way, they do not just depend on foreign knowledge and technologies but their research and development agendas change with shifting donor interests.

One way to remedy this situation is to encourage collaboration between local industries, health centres and R&D institutions, at least in setting goals and seeking true collaborators, especially in neglected diseases. Governments could provide innovation awards, such presidential awards of excellence to firms and institutions that excel in product/service delivery, technology development, investment and training. Such awards could be used as marketing tools by firms, providing a win-win situation.

Governments and donors could also fund t public research activities while private firms could make available research facilities and personnel. Firms are likely to instil some focus in R&D activities towards product and service delivery and public institutions could provide expertise and human resources, especially universities.

At the international level, African countries may consider entering into international science and technology cooperation agreements (STCAs) to enable their institutions develop international R&D collaboration (IRDC). IRDC agreements, such as cooperative projects, could facilitate technology transfer and capacity-building. For example, the US spends about $4 billion annually on about 3000 collaborative R&D projects. [22] Africa's share of STCAs is not easy but is almost negligible.

### *4.2 Investment in specialized health centres*

While diseases such as malaria, tuberculosis and HIV/AIDS receive some attention, many children, mothers and adults fail to undergo simple lifesaving surgeries, cancer treatments and die from minor pregnancy complications that could be managed if identified early or if facilities were available. Africa already spends large sums of money sending patients abroad for specialist treatment that could be managed at home. African countries have to invest in specialized medical centres to at least provide data on effectiveness of drugs, early identification of emerging epidemics and develop quality assessment capabilities.

An alternative approach is to attract established private and public hospitals to invest in Africa, either in partnership with existing hospital or as independent entities. Such initiatives could also help in the transfer and diffusion of expertise to domestic institutions.

African university teaching hospitals should also be encouraged to specialize in other areas of national interest. Universities have an inbuilt advantage: they have a high concentration of specialized and qualified staff at almost all levels and are kept informed by their graduate research students of technological developments.

### *4.3 Health insurance*

Most people cannot afford the cost of healthcare from their savings. Even in developed countries, health insurance is an important part of healthcare. Medical insurance also ensures healthcare providers and pharmaceutical producers of a potentially larger market.

It is possible to provide commercial health insurance through various medical schemes. However, most such schemes in Africa are unaffordable or loss making for many reasons. If the premium is raised to adequately cover the claims and the expenses of running the scheme, it becomes unaffordable to most people and if it is lowered to increase access it will not raise enough funds to cover claims.

However, there are successful cases of private health insurance providers. Kenya's African Air Rescue (AAR) Health Services, founded in 1984 as an air rescue service, is a premium health insurance organization. AAR provides heath insurance to corporate and international organizations as well as individuals and primary healthcare is offered through its 15 health centres in East and Central African countries including Tanzania, Uganda, Ethiopia, and Rwanda. AAR has a client base of about 100,000. [23] Therefore, with the right regulatory environment and a government push, the private sector could still provide a profitable insurance service in Africa.

However, Africa's health needs cannot be met by private and small community health insurance initiatives alone. Several countries, such as Ghana, Nigeria, Tanzania and South Africa, are experimenting with National Health Insurance Schemes (NHIS). For instance, the Nigerian NHIS was launched in 1997 but remain unimplemented until 2005. [24] The Kenya NHIS established in 1992 covers more than 25% of the population. However, Ghana's NHIS is among the most ambitious as it targets to insure the entire population.

Ownership of health insurance will be determined by the ability of individuals to afford that premium. In the face of many competing needs faced by the poor, the idea paying towards a fund from which you benefit only if one falls ill is secondary. A survey is South Africa demonstrated that poverty reduction, access to education and reducing unemployment is likely to increase access to health insurance. [25]

### *4.4 Investing in preparedness and monitoring*

According to the WHO Communicable Disease Surveillance & Response (CSR): "Every country should be able to detect, verify rapidly and respond appropriately to epidemic-prone and emerging disease threats when they arise to minimize their impact on the health and economy of the world's population." Africa's preparedness remains shaky as seen in Angola.

About 217 deaths and infection cases of Marburg virus were recorded with two months in Uige, Angola in 2005. It killed about 90% of its victims- which is unexpectedly high. Yet when it broke out in German in 1967 (named after the German city Marburg) only 7 of the 25 infected people died and the disease was quickly contained. [26] Therefore, the need to develop sufficient capabilities to detect and contain emergencies cannot be overemphasized.

There is also the need to monitor the efficacy of drugs against infectious organisms or the effectiveness of vaccines to protect immunized individuals against the target organisms. Of these, the emergence of drug resistant organisms to drugs threatens to erode the efficacy of effective, safe and affordable drugs. [27] Multiple drug resistant parasites pose one of the greatest challenges as there few treatment options for diseases affecting African countries. [28]

Such data is important in quickly identifying drugs that easily induce drug resistance, monitoring of the use of such drugs and/or where possible, take them off the market to reduce the rate of selecting parasites that have developed resistance. This is the mechanism used in laboratory to induce drug resistance. [29] For instance, there are few anti-retroviral drugs available to treat HIV/AIDS patients. Ensuring that monitoring of the effectiveness of the drugs is important in management of the disease.

Africa also needs to be part of the global mechanisms not just in monitoring but also in responding to potential disasters. The rich countries can afford to respond in a matter of days in terms of purchases and production of needed treatments. Poor countries have to prepare ahead of time. Some countries are currently planning on how to respond to a potential outbreak of bird flue. Africa should adopt similar measures.

## Conclusion

Although there are no quick solutions to fix Africa's health challenges, there is a lot that governments could do to improve access to and delivery of healthcare services. Efforts on manpower training and retention have to be expanded beyond just doctors and nurses. There is a need to improve the availability and skills of medical technologists in engineering, biomedical sciences and information systems.

There is also a need to develop capacity to redirect research activities into areas of interest beyond selected diseases to desired products. Policies should clearly state whether they wish to develop treatment, diagnostic devices or cheap pharmaceutical production technologies. Such targeting is important for countries with limited financial and human resources and could help in identifying and developing R&D collaboration. It could also stimulate private sector interest.

Healthcare will remain beyond the reach of many people in African countries if the economic growth and political stability are not realized. Poverty, as witnessed in Niger, and economic meltdown, as is taking place in Zimbabwe, has had a direct impact on the health of the people. Just as African countries are developing quick response mechanisms to prevent and manage civil conflicts, they should also develop similar mechanisms to respond to public health emergencies that may arise for various reasons.

The potential of emerging and new technologies to bring down costs in Africa remains unexplored. Technologies to improve home-care of patients could be used to improve health services for outlying health centres. It may be possible to integrate all hospitals in many African countries into one virtual healthcare system. It could streamline management, rationalize use of resources and improve access to medical consultants, even in the rural areas.

The integration of traditional medicine in conventional medicines could facilitate drug development and expand healthcare. Traditional medicine could benefit from developments in biotechnology while conventional medicine could benefit from the wealth of knowledge accumulated by traditional healers. In addition, traditional healers could be trained in modern medical practices and participate in community-based healthcare.

Countries also need to quickly find ways of dealing with potential health-related epidemics not only to maintain a healthy population but also to minimize potential trade and development impacts. Outbreaks of some human diseases could have a direct impact on exports and disrupt economic activity, such as tourism, in the affected region. To limit the spread of diseases, improving the surveillance and reporting of diseases is critically needed in many African countries.

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# VIEWPOINT:

# CLINICAL LABORATORY DIAGNOSTICS IN AFRICA

Clement B. Ndongmo

Clinical laboratories play a critical role in the health care delivery system by conducting tests on patient-samples. The results produced by these laboratories are crucial in diagnosing, managing, treating and preventing disease. The capacity of clinical laboratories to adequately perform tests and produce accurate and reliable results depends on many factors namely, the personnel training, the quality of test reagents, availability of lab supplies and equipment, and overall organizational and management controls that cover human resources, information management, and procurement. Any problem arising at any component of the system could affect the overall performance. "The capacity of clinical laboratories to adequately perform tests and produce accurate and reliable results therefore depends on many factors that are interdependent and collectively influence the quality systems.

Medical laboratory technology is a profession of highly trained individuals who perform clinical laboratory tests on patient samples. There are essentially 2 levels of training in the profession: the technician and the technologist levels. Although they often have overlapping job duties in the laboratory, the training for technicians takes about 1 to 2 years with emphasis on practical skills while training for technologists takes 4 years with emphasis on both substantive and managerial skills. The managerial role includes supervision, project management and decision making while the substantive roles include problem solving and data interpretation.

Technicians can prepare samples and use automated machinery to conduct some tests, and they may also do tests manually. They could specialize in a specific field or perform a variety of tests. For example, phlebotomists specialize in blood collection; histotechnicians get tissue samples ready for doctors to analyze the samples through a microscope. Clinical laboratory technologists or managers usually supervise the activities of technicians.

In developed countries, medical services rightly rely on results from individual, patient-directed, diagnostic laboratory tests ordered by clinicians. This system appears effective for industrialized settings and is generally sustainable. Laboratory diagnostic services in some developing countries have been modeled on the practices in industrialized countries. However, such routine laboratory testing becomes unrealistic in these developing countries settings because of lack of adequate resources, unreliable test results if not performed properly and due to low quality control measures and standards. Some developing countries don't have national quality assurance programs.

Source: BBC

Generally in developing countries, laboratories have often been overlooked or not given priority in the healthcare systems and only receive limited funding. Often in addition, laboratory personnel are poorly trained and lack the necessary equipment. The working environment is not conducive and in some instances unsafe. The clinical laboratory profession is characterized by a lack of motivation and low pay, leading laboratory professionals to change profession or emigrate to other countries in search of better working conditions.

In the absence of adequate laboratory services, clinics in African settings sometimes may have to base their diagnosis mostly on symptoms, which could be subjective and challenging given that many endemic diseases present similar symptoms. Sometimes, clinics would request the patients to go and have their tests done in private laboratories where the cost is much higher than in public hospitals. Even though these private laboratories seem to provide better results, their reliability cannot be ascertained due to the lack of national quality assurance programs to certify these laboratories.

Externally funded programs to combat major infectious diseases in developing countries have recognized problems that clinical laboratories are facing; and because the success of these programs obviously depend on good laboratory service support, provisions have been made to strengthen the laboratory capacity in the countries where they are implemented. Two examples of these programs are:

1) the WHO 3 by 5 five initiative introduced on the World AIDS Day in 2003 aimed at providing antiretroviral treatment to three million people living with HIV/AIDS in developing countries and those in transition by the end of 2005; [1]

2) the President's Emergency Plan for AIDS Relief (PEPFAR) [2] which is a US initiative that was instituted in 2003 to substantially increase its support in addressing the global HIV/AIDS epidemic.. Laboratory support activities in these programs include the evaluation of currently available diagnostic technologies; adoption of those technologies that are simple and effective; building of national quality assurance programs; guidance, training and technical support; expansion and strengthening HIV/STI/TB surveillance programs; strengthening laboratory information systems.

Although these programs fund or target only specific disease or area of clinical diagnostics, they can form a model for other areas.

In summary, clinical laboratories in Africa are under funded, understaffed, under equipped and generally lack good quality assurance procedures. Most clinical laboratory professionals in Africa are frustrated by their working conditions and low wage, unlike their colleagues in other parts of the world.

Currently, externally funded health programs in developing countries - mostly targeting the main infectious diseases (HIV/AIDS, STI, TB, and malaria) – are putting a great emphasis in working with the ministries of health to strengthen laboratory capacity in the countries. However these are short-term programs that will terminate leaving the countries to face the usual sustainability problems. In

Increased economic growth in Africa may lead to overall higher investment in the health sector, especially in human resource capacities and laboratory facilities. Any plan to fight global disease must include upgrading of laboratories. Hopefully, laboratories in Africa could benefit from the current political momentum to end poverty in developing countries including through the global initiative and the millennium development goals.

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# AFRICAN HEALTH POLICIES AND TECHNOLOGY TRANSFER WITHIN THE WTO

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**Abstract**

There are many World Trade Organisation (WTO) agreements affecting health. However, the Agreement on Trade Related Intellectual Property Rights (TRIPS) and the work done in that forum in regard to access to medicines has a relationship to health. This article looks at the scope for technology transfer in the TRIPS Agreement as it relates to health, how best African countries can take advantage of the provisions, and at what Africa is doing.

**Introduction**

The TRIPS Agreement has many provisions on technology transfer. The preamble, the principle, and the objectives of the Agreement all acknowledge: the need for the transfer and dissemination of technology; the underlying public policy reasons to protect intellectual property, including developmental and technological objectives; and, that WTO member countries may promote the public interest in sectors important to technological development.

The TRIPS Agreement also requires that developed country Members provide incentives to their companies and institutions to promote and encourage technology transfer to least-developed country (LDC) members to enable them to create sound and viable technological bases. There is also a provision on technical cooperation to facilitate the implementation of the TRIPS Agreement. Under this provision, developed countries are required to provide technical and financial support to developing countries to assist them when they enact intellectual property (IP) laws, and to provide support for them to establish or reinforce their IP offices and agencies, including staff training.

However, the preamble, principle, and objective are qualified by the requirement that measures taken to achieve these goals must be consistent with the provisions of the TRIPS Agreement, balance WTO members countries rights and obligations, and be to the mutual advantage of producers and users of technological knowledge. Moreover, the Agreement is further limited; some of the provisions apply only to LDCs, **not all** developing countries, and the Agreement does not guarantee that the transfer of technology will actually take place. So, for example, companies and holders of IP rights remain free to decide where they will conduct their research and development (R&D) and where they will produce. To this extent, the TRIPS Agreement seems to be more effective in its role as an agreement for the protection of IP rights, rather than in its role as an agreement to facilitate technology transfer. However, this article shows how African countries can make the Agreement achieve its function of transferring technology to their best advantage.

**1 Health and technology transfer**

*…….its easier for poorer countries to import cheap generic medicines under compulsory licensing schemes…..*

These provisions have come into the spotlight in relation to health due to work done in the WTO on access to medicines. In November 2001, at their Ministerial Conference, WTO governments adopted a Declaration on the TRIPS Agreement and Public Health. This was followed upon in a decision on 30 August 2003, wherein they agreed new rules to make its easier for poorer countries to import cheap generic medicines under compulsory licensing schemes, provided that these countries are unable to produce the generic medicines themselves. Generic drugs are copies of medicines that are under patent protection. The decision, which also exempted LDC countries from the obligation to protect pharmaceutical patents until 2016, is being applied as a waiver to the TRIPS Agreement until the Agreement is permanently amended.

This waiver is especially important to Africa in the fight

**Table 1. HIV estimates for different segments of the population**

| | |
|---|---|
| Adult (15-49) HIV prevalence rate | 7.4% (range: 6.9-8.3%) |
| Adults and children (0-49) living with HIV | 25 400 000 (range: 23 400 000-28 400 000) |
| Women (15-49) living with HIV | 13 300 000 (range: 12 400 000-14 900 000) |
| Adults and children newly infected with HIV in 2004 | 3 100 000 (range: 2 700 000-3 800 000) |
| Adults and child deaths due to AIDS in 2004 | 2 300 000 (range: 2 100 000-2 600 000) |

(Source: UN AIDS Regional HIV and AIDS estimates, end 2004)

against diseases such as AIDS and malaria. An estimated one million people in Africa die from malaria each year, and 90% of these deaths occur in sub-Saharan Africa. And according to UN AIDS statistics Sub-Saharan Africa has more than 60% of all people living with HIV even though it has only 10% of the world's population.

The waiver, granted to facilitate the importation of generic drugs, requires that members make detailed notification when they use the system. This notification requires personnel. Hence, the waiver has been criticized as being burdensome, full of red tape and as imposing additional obligations on countries that already have capacity problems. Moreover, no country has used the system.

Hence, Africa must look to the other provisions affirmed in the Doha Declaration on technology transfer and capacity building. This seems to offer a viable long term solution if African countries are to decrease their dependence on external manufacturers of medicines. The 2001 Declaration reaffirmed the commitment by developed countries to provide incentives to companies and institutions to encourage technology transfer to LDCs. Additionally, it acknowledged the desirability of promoting technology transfer and capacity building in the pharmaceutical sector to help poorer countries to overcome their lack of capacity to make/import compulsory licences medicines. WTO members also pledged to pay special attention to the transfer of technology to LDC in the work of the TRIPS Council.

The TRIPS Council is the body in the WTO that monitors the operation of the TRIPS Agreement, and oversees members' compliance with their TRIPS obligations. In addition to its work program on technical cooperation between developed and developing country members, the TRIPS Council reviews each member's law concerning intellectual property and clarify and/or interpret the Agreement. WTO Members also negotiate to improve commitments in the area of intellectual property, and consult with each other on the implementation of their obligations in this forum.

At the time that governments pledged to help poorer countries to make efficient use of compulsory licensed medicines, they also established a working group to examine the relationship between trade and transfer of technology, and to make recommendations on steps to increase flows of technology to developing countries.

Pursuant to its mandate, the working group requested the WTO Secretariat to examine governments' policies on technology transfer. In response, the Secretariat produced the Note "A Taxonomy on Country Experiences on International Technology Transfers," in which it identified some of the major barriers to the acquisition, learning, adaptation and diffusion of technology to developing countries. The factors it identified were: "lack of access to information about the range of technological alternatives; inability to identify the technology best suited to their needs; limited access to finances, inadequate level and quality of higher education and skills; insufficient linkages between universities, research institutes and industry; regulatory constraints; market distortions; and weak and inefficient institutions."

It found that government intervention can be classified into: externalisation-oriented approach (transfer that build domestic capacity by favouring transfers from a multinational company (MNC) to an entity that is not controlled by that enterprise, for example, – in the form of licensing, minority joint ventures, technical cooperation contracts, etc.); internalisation- oriented policy strategy (favour transfers between a parent of a MNC and a foreign affiliate under the ownership and control of the MNC) which can either be a minimal intervention approach or proactive government-driven approach; or a mixed strategy (favours technology flow through all mechanisms - trade, Foreign Direct Investment (FDI) and partnership agreements - and simultaneously builds local technological capabilities to enhance absorptive capacity and technology diffusion within the country).

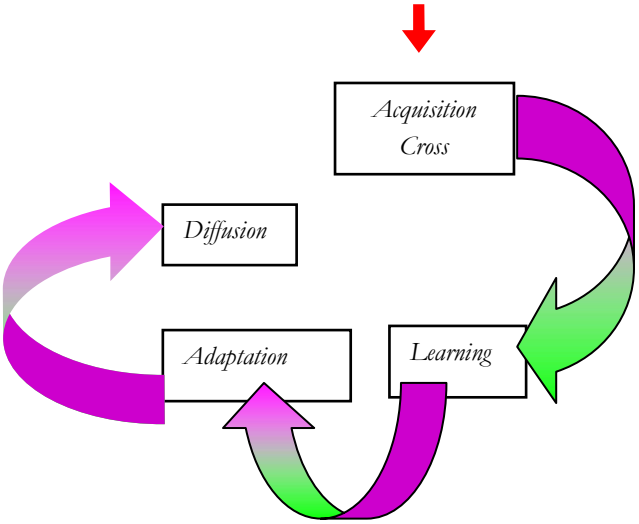
It recommended that governments take account of alternative approaches tailored to their circumstances to acquire technology, but pay attention to factors such as: the type of institution transferring and receiving the technology (government agencies, universities, or private firms); the mechanism through which technology is transferred, including licensing, person-to-person communication, formal literature, trade and FDI; the type of technology, such as product or process-based know-how or scientific knowledge; the characteristics of the market where the technology is destined, including the substitutability with other technology in the domestic market, pre-existence of subsidies or other forms of protections, and degree of competition in the product market; the goal of the transfer policy, i.e. the need to ensure that technology is used and has a positive impact.

40 African countries are members of the WTO, 27 of which are LDCs. Hence the question must be asked whether governments are finding investors for establishing production facilities and whether they are training and retaining health personnel?

### 2. Why Technology Transfer?

Technology transfer is a multidimensional process through which innovation is disseminated; it is the process by which technical information enters the public domain and becomes generally available for use. It takes place in a 4-step process (see diagram page 25 above).

Health related technology transfer allows access to new medicines, prevents/controls new infections, and enables producers to secure and maintain market position, earning desirable foreign exchange. Technology enters a country through: (1) trade in goods with technological input; (2) contracts between private and/or state enterprises (e.g., technology licensing, i.e. the purchase of distribution or production rights or technological know-how to make use of the rights); (3) FDI by firms with knowledge base asset that brings newer or technology to




a country that did not exist previously; (4) education; (5) imitation, reverse engineering, de-compilation of software, trial and error; (6) literature (including the publication of patent applications, subject to the temporal restrictions on its use).

While one does not pay for transfer via imitation, reverse engineering, de-compilation of software, and trial and error -acquisition by these means is slow and pain staking. Patents are granted provided that the applicant files a disclosure explaining the method or process of his invention. For transfer obtained via the publication or grant of patent applications, it is limited as the information disclosed in patents filed with the patent office is minimal; only to the extent

required, and hence does not contain enough information for the invention to be easily copied, even after patent expiry. Hence this article looks only at African health policies in relation to the other means of acquiring technology and not through transfer via imitation, trial and error and the like.

In addition to the *voluntary* means, there is involuntary transfer where governments issue compulsory licences. However, compulsory licensing is only effective where one already knows how to make the product, it does not allow one to acquire know how in a patent. It is thus good where a country already has the capacity to imitate medicines. This helps to explain why the new rules agreed to by WTO government's on access to medicines are not effective for sustainable health policies. The rules make it easier for poorer countries to import cheap generic medicines under compulsory licensing schemes; they do not make it easier for a country to manufacture. Manufacturing and self-reliance is the only long-term solution to prevent dependence on external pharmaceutical companies.

### 3. What is Africa doing?

The WTO's Secretariat report's (see above) survey of the literature and case studies of government policies found that nearly all governments have a technology transfer policy. The justification for this is that governments want research to target particular objectives such as industrial diversification or regional development. They also have policies because of market failures (due to the factors such as high transaction cost), which can act as a barrier to the acquisition and diffusion of technology. Moreover, the evidence also showed that policies that provide incentives to cross border flow and at the same time invest in human capital formation can have positive spin off effects, such as increased employment, better educated work forces, and facilitate the further adoption of newer technology.

Assuming that the end goal for African countries is sustainable health policies, they may wish to enhance cross border transfer, increase absorptive capacity, and facilitate technology diffusion in the health sector. With regard to empirical evidence, all African governments must first adopt a technological transfer policy to best take advantage of the provisions in the TRIPS Agreement.

In the context of IP, health related technological transfer often takes place via contracts with pharmaceutical companies. This is because exporters see these agreements as means of appropriating value of investment in R&D in pharmaceuticals. Hence they wish to establish periods of market exclusivity to recoup value. This is generally done through direct exploitation (production and distribution), as well as by licensing and collection of technology royalties. These agreements sometimes have very restrictive provisions. In their policies, governments can analyse transfer agreement as tools to foster development. Bad transfer agreements can have negative effects on a country such as undue or excessive remittances of royalty payments, restrictive business practices, contracting obsolete or internally available technology, dependency on foreign technology drain on a country's balance of payment. Hence, African countries have to implement laws to facilitate competition and to balance IP rights for the produces and consumers, as restraints in international competition hamper technology transfer.

Countries can make it mandatory to have technology transfer agreements recorded before their patent and trademark offices. IP offices, especially those relating to patent and trademark can have the role of establishing and monitoring patenting and trade secret licensing agreements. This is desirable and provides the office with the legal basis to intervene in technology transfer agreements, to allow the deduction sought by the local recipient of technology. They can also analyse negotiated clauses and verify the compliance to fiscal deduction, royalty remittances, and antitrust legislations.

***…….TRIPS does not prevent countries from adopting friendly IP health policies but restricts their options. ……..***

In the interest of health, they can also implement measures to accelerate and regulate the transfer of technology and establish the best negotiating conditions of utilizing patents. Hence, these offices may compile principles and rules on the drafting and recording of technol-

ogy transfer agreements.

As mentioned in the opening paragraph, technological policies are permissible under the TRIPS Agreement. The Agreement does not prevent African governments from adopting IP health policies, however, it restricts their options. However limited, there are good policies that African governments can adopt.

Admittedly, policy making on technology transfer for health is complex and involves detailed planning and proper execution. Furthermore, the role of IP rights in economic development depends on numerous country specific factors. However, the IP regime adopted by the 40 African WTO members will definitely impact on the mode and effectiveness of transfers. Hence they must ensure that in guaranteeing a certain intellectual property right regime, they adopt one that allows them the most flexibility to take public health measures.

Malawi, with a life expectancy of 39 years, for example, has declared AIDS to be a national emergency and has introduced a policy of providing free, generic antiretrovirals (ARVs) to anyone who needs them. However, as about 20 per cent of the population is thought to have the virus, the government can only provide a basic, three-drug cocktail to HIV-positive patients. Even more limiting in making the medicines available is the lack of/inefficient policy on personnel; the staffing shortage is preventing ARVs from reaching those who need it. A good health related policy should be two-fold (a) training personnel to absorb or diffuse technology, (b) facilitating temporary migration of health workers, students, and technical personnel for the specific purpose of absorbing technology. Malawi staff shortage is in part due to permanent migration. While there are now schemes to top up doctors' salaries, to be effective, the policy must be extended to other health workers like nurses and clinical officers. As a result, while there are about 170,000 people in Malawi in need of ARVs, only 23,000 of them receive medication due to funding and staffing problems. In technological transfer negotiations with the WTO, Malawi can, for example, seek funds to train person and to facilitate technological transfer, or request grants so that their graduates be trained (temporary transfer) to work in the health sector.

Kenya is another African country that has taken a stance in relation to IP and health. In June 2002, to facilitate the importation of a wider choice of cheap ARVs as per the waiver, the Kenyan parliament reversed an amendment to the country's Industrial Property Act that blocked commercial importation of 'generic' medicines into Kenya. Under their July 2001 intellectual-property law it was it possible to import medicines from anywhere in the world. This provision was however changed to state instead that potential importers or producers of generics must seek explicit permission from the patent holder. Due to public pressure this was reversed as it was actually preventing transfer because it is against the patent holder's interest to grant such permission. The new provision is now is in line with the WTO waiver, permitting countries to make efficient use of cheaper generics imports in cases of national emergencies, like the AIDS pandemic in Kenya.

Kenya's amendment is an adoption of an international exhaustion regime. The TRIPS Agreement has always provided a choice to adopt a national or an international exhaustion regime. If a country adopts an international exhaustion system, the patent holder cannot block imports of medicines embodying its patent. This means that a country can import AIDS medicines sold cheaper in another country ("parallel importation"). However, if a country follows national exhaustion, the holder can block parallel imports, preventing importation of cheaper medicines from another country. This decision to adopt a principle of international exhaustion, however, can still be undermined by clauses in licensing agreements that prohibit the licensee from exporting goods to countries with international exhaustion regime. Such clauses should be prohibited as a matter of law, since they exclude competition. Hence, each African country must have a policy on the issue of exhaustion and on competition.

This policy seems to be backed by actions at the international level. In April 2002, Kenya, Mauritius, Tanzania, Uganda, and Zimbabwe along with other countries proposed analysis as well specific issues that they would like to have examined in the Working Group on Trade and Transfer of Technology in order to facilitate technological cooperation.

However, like Malawi, Kenya does not seem to have a holistic regime for technological transfer. According to a 2004 World Intellectual Property Organization WIPO commissioned audit, Kenya is ahead of most African countries in terms of legal framework and policies on IP rights. It has three national offices in charge of IP: Kenya Industrial Property Institute (KIPI; a semi-autonomous department under the Ministry of Trade and Industry), a Copyright Office, and the Plant Breeders Rights Office. However, even with an adequate legal framework, the level of public awareness on IP in Kenya is low. Many people in government, industries, universities and R&D institutions cannot differentiate IP rights and only a few institutions have IP protection provisions in their agreements with donors, suppliers and research collaborators, and even fewer institutions have filed IP application or have commercialised IP rights. The report also showed that while there are centres for research on IP in industrialised countries e.g. Max–Planck Institute in Munich, Franklin Pierce Law Centre in the US, the Canadian Intellectual Property Centre, the Queen Mary Intellectual Property Research Institute, as well as the Korean International Intellectual Property Institute, there is no such institute in Africa.

## Conclusion

Even though the TRIPS Agreement seems best suited to protect IP rights, there are options for African countries on health related technological transfer. IP regimes

must ensure that licensing agreements do not contain clauses that are detrimental to the interests of the licensee or restrict trade opportunities when it comes to the marketing of licensed products on international markets. It must also include policies on competition to prevent and correct market-related abuses, to ensure that technical information, i.e. private appropriation of technology, does not impose unreasonable social welfare costs, and that it enters the public domain appropriately. The end process for Africa has to be local innovation and sustainable health policies.

## Endnotes

Teisha Öberg is a lawyer with specialization in trade issues.

1. See the Decision of 30 August 2003, Implementation of paragraph 6 of the Doha Declaration on the TRIPS Agreement & public health, WTO Document WT/L/540. See also the Doha Declaration on the TRIPs Agreement and Public Health of 14 December 2001, WTO Document WT/MIN(01)/DEC/2 Available on the WTO Website. ADDRESS?? http://www.wto.org/english/tratop_e/trips_e/implem_para6_e.htm and http://www.wto.org/english/thewto_e/minist_e/min01_e/mindecl_trips_e.htm respectively.
2. See http://www.theglobalfund.org/en/in_action/events/africamalariaday/2004/malaria for Global Fund statistics on Malaria.
3. Paragraph 37 of the Ministerial Declaration itself (adopted in November 2001- WT/MIN(01)/DEC/1.
4. WTO Working Group on Trade and Transfer of Technology WT/WGTTT/W/3, 11 November 2002
5. A Taxonomy on Country Experiences on International Technology Transfers - Note by the Secretariat.
6. Ibid.
7. http://news.independent.co.uk/world/africa/article312974.ece.
8. The Kenya Coalition for Access to Essential Medicines Nairobi, 15 August 2002.
9. Challenges Faced by Developing Countries in teaching and Conducting Research on Intellectual Property By Prof. Tom P.M. Ogada, at Moi University.

# HIV/AIDS AND FOOD AND NUTRITION SECURITY: WHAT IS KNOWN AND WHAT CAN BE DONE?

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## Abstract

Despite the major upsurge in interest and research on the interactions between HIV/AIDS and food and nutrition security, significant gaps remain in our current state of knowledge, and guidance is needed to turn what we know into what we do. To address these linked issues, the International Food Policy Research Institute organized the International Conference on HIV/AIDS and Food and Nutrition Security: From Evidence to Action, held in April 2005 in Durban, South Africa. A diversity of stakeholders from Africa and elsewhere discussed three core sets of issues – what do we know about the interactions, how are local communities responding, and what can be done in terms of external support and interventions.

The biggest challenge of all is how to act now, and act at large-scale, when much of the emerging knowledge of what is happening in affected communities is so context-specific, and not necessarily amenable to universal policy prescriptions.

Ultimately, a broad consensus emerged on a three-pronged strategic approach aimed at strengthening household and community resistance and resilience to HIV/AIDS; enhancing and expanding livelihood opportunities for affected communities, and ensuring appropriate safety nets for those households that require them. These three strategies should be pursued simultaneously, based on the different comparative advantages of all stakeholders from households to national governments and international agencies.

## Introduction

We are at a watershed. Knowledge of the interactions between HIV/AIDS and food and nutrition security has been growing in recent years, but the next step of using this knowledge to improve and scale up effective actions – has yet to be taken. The heterogeneity of much recent evidence may preclude generic policy recommendations, but the fact that knowledge gaps remain is no excuse for inaction.

Against this backdrop, the International Food Policy Research Institute (IFPRI) felt there was an important need to bring researchers and practitioners together to review the existing evidence, its implications for future food and nutrition-relevant policy, and to highlight remaining knowledge gaps. In so doing, it also aimed to forge links between countries, sectors, and perspectives, in both research and action.

The "International Conference on HIV/AIDS and Food and Nutrition Security: From Evidence to Action" was thus held 14-16 April in Durban, South Africa. The conference was organized by IFPRI following broad consultation with a range of partners within national governments, the Consultative Group for International Agricultural Research (CGIAR), the United Nations, civil society, academia, along with bilateral and international donors. Around 200 international researchers and practitioners, with a majority from Sub-Saharan Africa, were present for three days (14-16 April 2005) during which 54 papers were presented in a series of parallel and plenary sessions.

Key questions addressed were:

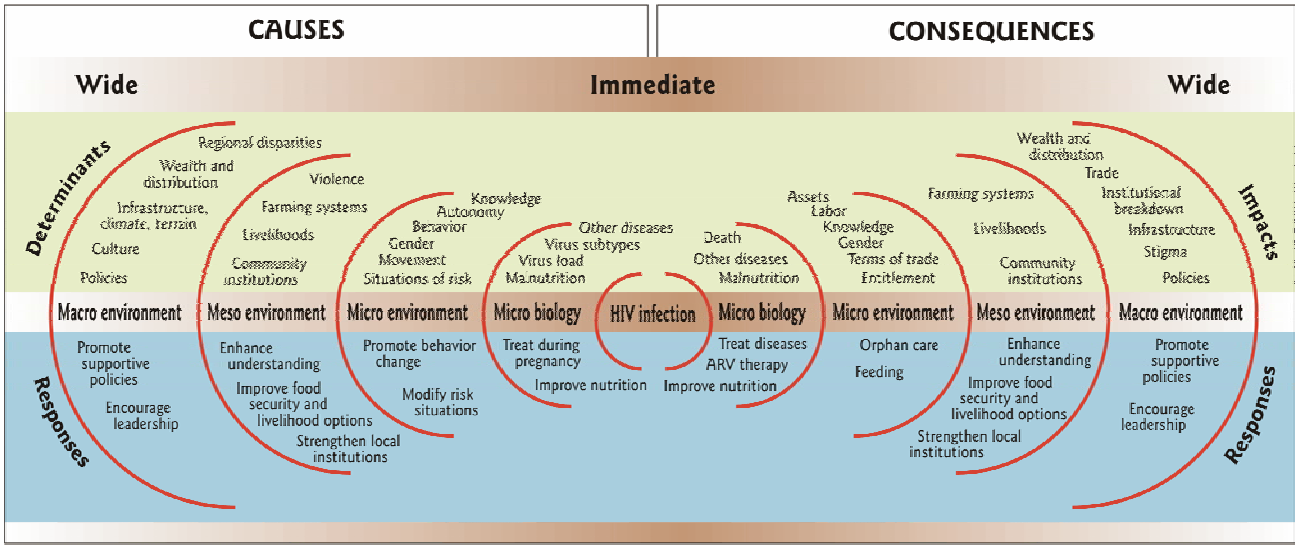
- *Interactions.* What is known about the interactions between agriculture and other rural livelihood systems, the spread of HIV and the impacts of AIDS at different levels?
- *Local responses.* What is known about the capacities and strategies of households and communities to reduce infection risk (resistance) and to respond effectively to the impacts of HIV/AIDS (resilience)? What do these strategies imply for the types of support needed from governments, civil society, the private sector and international agencies?
- *Policies, programs, interventions.* What is known about the processes and impacts of food and nutrition-relevant policies, programs or interventions that have sought to prevent the spread of HIV and/or mitigate the impacts of HIV/AIDS?

In short: what's happening, how are people responding, and how can external support be best applied?

Conceptually, we can view the universe of factors and processes driving the causes and consequences of HIV epidemics as in Figure 1. This shows the waves of determinants of HIV infection, from macro to micro-levels, and the subsequent waves of impacts, from micro to macro (Loevinsohn and Gillespie 2003).

Looking first at the top left hand quadrant, we can see the various levels and sources of *susceptibility* to the HIV virus. Susceptibility has two components: risk of exposure to the virus, and risk of infection. HIV infection of an individual is the epicenter of Figure 1. Following HIV infection, in the top right hand quadrant, we can see the various sources and levels of *vulnerability* to AIDS-related impacts.

Figure 1: HIV/AIDS Determinants, Impacts and Responses




Source: Loevinsohn and Gillespie 2003

## 2 Food and nutrition security, and risk of being infected with HIV

In investigating the risk of an individual being infected with HIV, we need to ask "*what* social, economic, political, cultural factors and processes are responsible for the spread of HIV (and specifically how is food and nutrition implicated, if at all), w*ho* is most susceptible, and *why* are they susceptible? A few important conference papers shed light on these questions though this aspect remains relatively under-researched.

### *2.1 Who is at risk and why?*

In line with earlier evidence of the disproportionate risks faced by women, especially younger women, more than 60% of the prime-age deaths observed in a nationally-representative rural Zambian sample between 2001 and 2004 were women (Chapoto and Jayne 2005). The marginal probability of dying from disease and AIDS-related causes rises steeply from age 15, peaking between ages 30 and 34 for females, and 50-54 for males.

Does poverty put people at greater risk of being exposed to the virus and being infected with it? Consistent with findings in the early stages of the epidemic, Chapoto and Jayne (2005) find that men and women in the upper half of the income distribution in Zambia were actually 44% and 23% *more* likely to die of disease-related causes than men and women from low-income households. Such evidence runs counter to the prevailing view that poverty leads to risky behavior and is the major pathway through which the disease is spread, although it may certainly be one pathway. They also find that single women having some form of salary or wages are 5-10% less likely to die than women with similar socio-demographic characteristics not having wage income -- suggesting that efforts to provide greater income-earning opportunities for women may make at least a modest contribution to reducing female prime-age mortality (Chapoto and Jayne 2005).

The link between poverty and HIV risk may be mediated through the need to move in search of work. Mobility here is not inherently risky, but it is a marker of increased risk. In Zambia, low-income men living one or more months away from home per year are more than twice as likely to die than men living at home (Chapoto and Jayne 2005). In Ethiopia, though there are significantly lower levels of HIV infection in rural communities than in urban areas, the disease is concentrated in higher-risk "bridging populations" that have substantial links with other more risk-averse sub-populations (Bishop-Sambrook et al. 2005).

At the macro level there is no obvious relationship between national wealth and HIV infection prevalence. Southern Africa is richer than other regions in Sub-Saharan Africa but has countries with particularly high prevalences e.g. Botswana and South Africa. Physical dislocation of families, driven by the need to find work, coupled with the ability to move around via relatively good transport routes, probably plays a large part in this. South Africa and Botswana are also heavily reliant on mining which forces men to live away from home for long periods of time, increasing the chances of both partners engaging in commercial or transactional sex. Strong urban-rural economic linkages in southern Africa may thus translate into both higher incomes and higher infection rates.

The links between livelihoods and risk suggest that HIV is an 'occupational hazard' for particular economic categories of people (Bryceson and Fonseca 2005). But again preconceptions may be challenged – for example, Campbell's (2003) South African study found prostitutes to be less vulnerable to HIV infection than miners or youth due to their insistence on condom use.

In Malawi, poverty and HIV risk do seem to be increasingly linked, as major livelihood shifts are underway.

Bryceson and Fonseca (2005) highlight the ongoing collapse of the peasant household's coherence as a unit of production as shifts in household assets and livelihood portfolios have veered from: i) self-sufficient unpaid labor performed within the household (especially by women and children) towards cash-earning piecemeal work (or *ganyu*); ii) from agriculture towards non-agriculture with income-earning turning increasingly to trade and services, including sexual services; and iii) from household towards individualized work, whereby every able-bodied person works, including women and youth, to earn cash to cover their subsistence needs. Women and girls are now doing *ganyu* labor beyond the confines of the village, with poor women at particular risk as transactional sex is increasingly incorporated into *ganyu* contracts (Bryceson and Fonseca 2005).

Another major source of risk – and one that sets HIV apart from most other diseases – is the prior death of at least one adult in the same household. In Zambia, this was found to be the single most important factor influencing the probability that a prime-aged individual would die due to illness and AIDS (Chapoto and Jayne 2005). Irrespective of gender and income status, individuals experiencing a prior death in their household are 6-7 times more likely to die of disease-related causes than individuals in households with no prime-age deaths in the past 8 years.

### *2.3 Malnutrition and ill-health as risk factors*

Nutrition is the pivotal interface between food security and health security. An individual's susceptibility to any disease depends on the strength of the immune system, which among other factors, is affected by nutrition, stress, and the presence of other infections and parasites. The risk of infection with HIV is heightened by high prevalence of such co-factor conditions, which decrease immune response in HIV-negative persons and increase viral load in HIV-infected persons (Stillwaggon 2005). Worms cause malnutrition through malabsorption and intestinal bleeding, and they weaken the immune response by forcing its chronic reaction to the non-self invaders. Infectious and parasitic diseases and malnutrition thus create an environment of enhanced risk.

Occupational hazards extend to domestic environments. Stillwaggon (2005) paints a picture of risk in Africa as a child gathering water for the family in a slow moving stream, or helping with the family laundry at creekside. Any resulting schistosome colonization of the genitourinary tract may render him or her, as an adult, at much higher risk of sexual transmission or acquisition of HIV than a healthy person with similar sexual behavior.

### *2.4 HIV/AIDS impacts on food and nutrition security*

Moving now from a focus on the risk of being infected, to the downstream or post-infection *impacts* (i.e. the top right quadrant of Figure 1). How did the conference enhance our understanding of these impacts and the ways in which households and communities are responding?

The literature on impacts of HIV/AIDS has grown very rapidly in recent years (numerous studies are reviewed in Gillespie and Kadiyala 2005). Impacts are multiple and often inter-related. Onyango et al. (2005) for example, found a variety of impacts on rural agricultural households in western Kenya struggling with the illness or death of an adult. Total mean annual expenditure of death-affected households was US$462, as compared to $199 for illness-affected households and just $21 for non-affected households. Illness-affected and death-affected households spent 56% and 61% respectively of the amount spent by non-affected households on agricultural inputs.

Many impacts are revealed in responses that households and communities make in the face of HIV/AIDS. How are households and communities responding, and how effective are these responses? Where households are not subject to additional stresses such as drought, and when viewed over a relatively short reference period (e.g. a couple of years), there are indications that traditional rural Africans' coping strategies can mitigate the worst effects of AIDS (e.g. De Waal et al 2005). But complex factors determine the success of these strategies. These include the sex, age and position in the household of the ill/deceased person, the household's socio-economic status, the type and degree of labor demand in the production system, the availability of labor support to affected households, other livelihood opportunities, available natural resources, the availability of formal and informal sources of support including credit and inter-household transfers, the length of time that the epidemic has been impacting upon the rural economy, and the existence of concurrent shocks such as drought or commodity price collapses (De Waal et al 2005; Gillespie and Kadiyala 2005).

HIV/AIDS is different in several important ways to other shocks and stresses. But where it is most prevalent, in sub-Saharan Africa, it is one among many concurrent stresses. An increasing number of households and communities are struggling to respond to multiple overlapping vulnerabilities and interacting processes of change. Vulnerability is not a static condition, it is enmeshed in a dynamic cycle, and generated by exposure to change, by the inability to respond to change, and by the outcomes of these processes (Quinlan et al. 2005). We need to learn more about these interactions.

AIDS is one of many stresses, but it is a distinct one that can exert its effects over a relatively long period of time while rendering other stresses/shocks both more likely and more severe in their effects. Following a shock to household income, households in Malawi affected by HIV/AIDS were found to take up to 18 months to stabilize, with a new equilibrium income that was about half the pre-shock income levels (Masanjala 2005). Similar findings had been reported earlier in Kenya (Yamano and Jayne 2004). Such limited resilience is likely to increase vulnerability to other shocks. In Tanzania, the cumulative impacts of such overlapping and interacting vulnerabilities in certain parts of the country are driving communities into a long-term structural crisis, similar to the 'triple

crisis' of HIV/AIDS, food insecurity and lack of government capacity identified by the United Nations (De waal et al 2005).

AIDS can thus be viewed as a "long wave crisis" (Barnett 2005), where people don't recover well in between crises (as in "classic" emergencies); as a "slow-onset disaster" (Wisner et al. 2004) as well as an urgent development challenge that requires massive short- and medium-term support and capacity strengthening.

### *2.5 Broader impacts on the agricultural sector*

Using demographic projections and household survey evidence, Jayne et al (2005) consider the likely consequences of the HIV/AIDS pandemic for the agricultural sector of the hardest-hit countries of Eastern and Southern Africa. They suggest that, while AIDS is projected to erode population growth to roughly zero in the seven hardest-hit countries, the net result is a roughly stable number of working age adults over time. AIDS-related agricultural labor shortages are likely to induce labor migration out of the urban informal sector into agriculture. For poorer smallholder households, they state, land is likely to remain a primary constraint on income growth. There are strong reasons for anticipating that AIDS will progressively decapitalize highly-afflicted rural communities, meaning a loss of savings, cattle assets, draft equipment, and other assets. Such decapitalization may come to pose the greatest limits on rural productivity and livelihoods for these communities (Jayne et al 2005).

Using data from Malawi, Dorward and Mwale (2005) highlight the challenges in determining the nature and magnitude of broader impacts of HIV/AIDS on labor markets and wages. Although affected households may face increased labor shortages, widespread reductions in household incomes and increased cash constraints will also depress labor and non-tradable demand in rural communities with high HIV/AIDS incidence. Reductions in family labor may also lead to a shift out of more labor demanding cash crops. The multiplier effects of this depressed demand could cause reductions in labor demand to the extent that wages also fall, posing serious problems even for poor households not directly affected by HIV/AIDS. They find some evidence for a mild loosening of the market in Malawi in that the highest modelled incidence of morbidity and mortality leads to a 5% fall in wages. Where HIV/AIDS does depress unskilled wages, this is likely to increase inequality within rural communities and impose further pressures on poor people and their livelihoods. Such new evidence cautions against the prescription of any universal response such as labor-saving technology, and highlights the need to investigate the critical stresses of those affected.

### *2.6 Macro-economic impacts, poverty and inequality*

At a macro-level, the impacts of HIV/AIDS are not clear – at least not using current models. Several researchers have criticized the use of per caput GDP growth rate as a metric of AIDS impacts, along with the assumptions underlying common macroeconomic models (e.g. McPherson 2002). Earlier models tended to assume an early peak in the epidemic and they omitted households that dissolved because of AIDS. Many important aspects of development are econometrically invisible e.g. women's work, the loss of information in social systems including intergenerational knowledge fracture, the loss of social capital as networks and information channels erode, relational goods, misery/happiness etc. What, for example, is the long-term cost to communities and nations of millions of psychologically damaged, poorly socialized children growing up as orphans? Put another way, looking at Figure 1, the indicators conventionally used at the macro-level often fail to pick up the aggregated effects of changes at the meso- and micro level environmental levels.

Due to the long incubation period between HIV and AIDS no country has yet reached the peak of AIDS impacts. A full timeline of impacts is thus not even available to use as a basis for projections in other countries (notwithstanding the possible problems in extrapolating from one country to another). Possible social unraveling as the AIDS impact waves hit, suggests the development of macro-economic effects may be non-linear, and it may be some way off.

Given that our concern is with food insecurity and malnutrition, we should not however be overly focused on aggregates or means that effectively mask sub-national differentials. There is strong evidence first that inequalities (socio-economic, gender) drive the spread of HIV infection, and second that HIV/AIDS itself increases these inequalities – a potentially vicious cycle that is not captured by measuring income means. AIDS may simultaneously promote land acquisition from poor to wealthy leading to aggregate production increases at "community" level, while increasing inequality, poverty and malnutrition.

De Waal et al (2005) address the apparent paradox of robust macro-performance coexisting with multiplying indicators of distress in Tanzania, pointing to the creation of a new (and largely invisible) underclass of disadvantaged people, particularly vulnerable children, women, and the elderly who have been plunged into poverty by the impact of AIDS at the household level.

Even AIDS *programs* can increase inequality. Chopra (2005) cites the example of settings where breast milk substitutes are made available, free of charge, to HIV+ mothers who meet the AFASS criteria (formula feeding is "affordable, feasible, acceptable, safe and sustainable") Those who don't meet these criteria, including many poor, disadvantaged women who live in the most insanitary environments, are being further marginalized by their inability to access this source of support for their infants. Moreover, because they are lactating, such women will have greater nutritional needs than the non-lactating women receiving food support. Chopra provides a rough cost-estimate demonstrating that it costs 1200 rands to provide free formula to the 'better-off' mothers for 6 months, while at the same time, poorer mothers are expected to spend 600 rands (from their own resources)

to meet their increased nutritional needs. In addition, it is normally the non-poor, urban dwellers who have the best access to antiretrovirals.

While HIV/AIDS contributes to poverty it is by no means the only or even always a major cause. The earlier discussion of multiple vulnerabilities is clearly relevant here.

The majority of studies of HIV/AIDS impacts are household-level studies, As well as suffering from an inability to track the dynamics of interactions over time household-level effects do not relate well to more aggregated impacts e.g. sector level or national level (GDP). Nor do they shine a clear light on what is happening *within* households e.g. intra-household division of labor, caregiving and other resources – especially impacts on women and children.

### *2.7 Orphanhood and vulnerability*

Conventional wisdom holds that orphan-fostering households are particularly vulnerable. But some studies have shown that these are not necessarily the poorest households (Seaman and Petty 2005; Senefeld and Polsky 2005). Fostering households may be better-off households who can afford to take in extra dependents.

In a meta-analysis of national nutrition and health surveys undertaken in Sub-Saharan Africa over the last five years (Rivers et al. 2005), households with more than one orphan reported significantly more food insecurity and hunger than households with only one orphan or no orphans at all. While households can manage to absorb one orphan without being impacted significantly, they cannot continue to take on orphans without affecting their livelihood. As mortality rates increase and the population of orphans continues to rise, more and more households are going to be faced with the decision to foster more than one orphan or leave them to fend for themselves. Both options lead to increased vulnerability.

In the same study, orphaned children -- regardless of the way they were defined -- did not appear to be consistently more malnourished than nonorphaned children (Rivers et al. 2005). For monitoring purposes, these findings provide two important implications. First, it is necessary to define vulnerability more specifically, looking for specific pockets of vulnerability within the group of "orphans and vulnerable children". Second, it may be necessary to use other indicators, such as psychosocial development or educational attainment, to monitor the progress or relative disadvantage of orphans. Orphan populations are known to be older on average than non-orphan populations simply because the probability of a parental death increases as a child grows older (Rivers et al. 2005).

### *2.8 Child growth failure*

During the food crisis of 2001-3, Mason et al. (2005) showed that child nutrition deteriorated substantially in many areas (provinces or districts) of Malawi, Mozambique, Zambia and Zimbabwe. The pattern was usually one of child underweight prevalences increasing more rapidly in better-off areas – at first sight a counter-intuitive observation, but one that was later attributed to the fact that HIV infection is more common near transport routes and places where trade is more common, which tend to be the more socio-economically advanced areas with less malnutrition. Underweight prevalences appeared to increase more rapidly in areas with high HIV prevalence affected by drought, than with either HIV or drought alone (Mason et al, 2005).

Are these effects concentrated on certain ages of children? Using surveys from the previous ten years or so from Malawi, Zambia, and Zimbabwe, growth failure was found to persist more frequently at older ages, with the largest effect seen on children between 18 and 59 months of age who are unable to bounce back after substantial (yet expected) declines in nutritional state in the first two years of life (Hudspeth et al. 2005). The most likely reason cited was reduced household/caregiver capacity to care for these children. Analysis of the changing growth patterns by areas within countries revealed that in the case of both Zimbabwe and Zambia urban children were most affected.

## 3 What can be done ?

### *3.1 Community-driven responses*

The Durban conference further highlighted the differentiated impacts of HIV/AIDS on communities and the variety of attempts they make to improve their resistance to HIV spread and their resilience to HIV/AIDS impacts. Communities have responded in innovative ways -- strategies reviewed in Gillespie and Kadiyala (2005) include labor sharing, orphan support, community based childcare, community food banks, credit schemes for funeral benefits and new ways of reducing the time and energy of domestic tasks e.g. fuel and water collection, food preparation etc.

In a study in Malawi, resilience of households in different agriculture systems was conceptualized by Ngwira et al. (2005) as deriving from four core components of well being: opportunity; capability, security and empowerment, with outcomes or indicators being grouped similarly. Programs to help such households need to be responsive to the nuanced needs in communities and households. As well as strengthening sources and types of resilience, the environmental context may be modified through policy change to make it more enabling.

In the context of high HIV prevalences, and associated stigma, community-driven approaches, with their advantages of local knowledge, may represent an untapped resource for addressing the HIV/AIDS—food insecurity nexus. Like the problem itself, community-led approaches are naturally more "multisectoral" and cross-cutting. Unlike vertical sectoral programs that tend to

focus narrowly on infected individuals, they focus on affected communities.

But the issue of *capacity to respond* is critical, particularly as AIDS itself is eroding local capacity. In the keynote address, Tony Barnett spoke of the need to beware of "installed capacity" -- the fact that certain vertical program infrastructures are in place, does not mean these are the most appropriate ones to employ. Binswanger et al. (2005) pointed to evidence from the field on the existence of latent community-level capacity e.g. unemployed or underemployed youth. Resources could be applied to developing appropriate community responses to AIDS, thus obviating personnel constraints experienced in scaling up vertical programs. Investing in local institutions through support to decentralization could go a long way in addressing remaining evidence gaps too, as communities have local knowledge, but they often lack power and resources. To support such new approaches, donors need to alter their time horizons and they need to be more flexible.

Responses need to recognize the diversity of impacts, but they also need to be large-scale. In a study of a community-led program in Malawi (Kadiyala 2004), the importance of contextual factors for scaling-up, including an enabling policy environment and a strong governmental commitment. The adoption of a community mobilization model through capacity strengthening of district, community, and village AIDS committees, a commitment to documenting and disseminating lessons learned, and the drive to reach more affected populations through establishing partnerships were key organizational factors. Community-specific factors include leadership within the community, whether the communities are urban or rural (rural communities are easier to mobilize), the nature of livelihoods, and the history and culture of the communities with respect to collective action. Joint planning with communities for a phasing down of NGO presence and scaling up of the role and responsibilities of the local AIDS committees and funding mechanisms were also identified as critical in enabling and sustaining the scaling up of collective action (Kadiyala 2004)

### *3.2 Enhancing learning and innovation*

The large-scale, long-wave and crosscutting nature of HIV epidemics have challenged both learning and implementation processes. It has created tensions between research and action, between researchers and activists – as well as between proponents of different strategies e.g. prevention vs treatment. In the face of complex interactions, researchers are hesitant in generating policy recommendations. And yet, the epidemic (or “endemic”, as Barnett terms it) continues regardless.

There are lags between HIV and AIDS and there are lags between policy change and results. Because many policies and programs take years to implement and provide tangible results, there is urgency to put in place an appropriate set of public investments and programs that can cushion the blow by the time the long-wave impacts of AIDS are in full force (Jayne et al. 2005). To facilitate this, research should be better linked with action, both ways – with research informing action, while implementation generates challenges and questions for operational research. This is the essence of action research. One example of research linking directly with action through evolving national networks of researchers and policymakers is the Regional Network on HIV/AIDS, Rural Livelihoods and Food Security (RENEWAL), now active in eastern and southern Africa .

Part of the shift "from evidence to action" will come through a wider adoption of learning-by-doing approaches. Policy needs to support and encourage timely and locally-relevant community responses that naturally respond to diversity. But for the 'doing' to actually be accompanied by real-time 'learning' , good systems of process and outcome monitoring, and communications are required.

In his keynote address, Tony Barnett spoke of a 5-10 year window of opportunity presented by the ongoing (albeit slow-moving) antiretroviral drug rollout. Due to likely difficulties for large numbers of people meeting and sustaining drug adherence thresholds of greater than 95%, there is a significant likelihood that viral resistance will develop and spread, undermining the efficacy of existing drug regimes. During this window of time, Barnett asks -- how do we literally get ahead of the epidemic curve, and promote/enable the development of innovations that will be useful for current and future AIDS control? Such innovations moreover will need to be for collective, not simply personal, gain.

The Farmer Life Schools approach is one example of an innovative modification of any earlier approach to agricultural extension (Ou Chhaya et al 2004). Farmer Life Schools originated from Farmer Field School discovery-based learning approaches to help groups of farmers gain a deep understanding of ecological concepts as well as their practical implications. In the Farmer Life Schools adaptation this was extended to human ecology, and the same processes have been translated to HIV/AIDS and other livelihood issues.

### *3.3 Agriculture*

Conventional wisdom prioritizes technologies and crops that save labor in the context of HIV/AIDS. Jayne et al. (2005) however believe this to have been overgeneralised, although such technologies may be appropriate for certain types of households and regions. Dorward and Mwale (2005) concur, arguing that labor-saving technologies may even be harmful if they further drive down wage rates that are already falling due to HIV-induced cash-constraints on ability to hire. Emphasis may need to be placed on other ways of assisting these households, such as cash transfers to help them with labor hire.

But what type of modifications are needed to ensure that agriculture is “HIV-responsive” and that it plays its part in strengthening resistance and resilience to HIV/AIDS?

Bishop-Sambrook et al (2005) address this through applying an HIV/AIDS lens to the commercialization of agriculture in Ethiopia. Initiatives to strengthen the market orientation of agricultural production present both an opportunity and a threat in the context of a rural HIV/AIDS epidemicWhilst any contributions towards reducing poverty and the need to migrate may reduce susceptibility to HIV/AIDS, the authors state there are very real risks that the additional cash and the stimulus to travel further afield to market produce could result in increasing the risk of exposure to HIV. Hence activities associated with promoting the marketing of agricultural products need to be designed with care to ensure they play a role in arresting, rather than hastening, the spread of the disease in rural communities – for example, avoiding evening markets that often require traders to stay overnight.

### *3.4 Public health and environmental health*

"AIDS is a development issue" may be an often-repeated mantra, yet even in the health sector itself, accumulated knowledge and experience in the field of public health has hardly influenced AIDS policy and programming. Stillwaggon (2005) argues that the same conditions that promote high prevalence of other infectious diseases and parasites are responsible for the spread of the AIDS epidemic in poor populations. She calls for an AIDS policy to address the mundane risks of growing up in environments that burden people with sickness and make them more vulnerable to HIV. Programs to prevent HIV transmission will thus be unsuccessful unless they address the underlying causes of the spread of AIDS. HIV prevention must be based on scientific evidence regarding co-factor conditions, not, as they currently are, on unproven assumptions about the primacy of behavioral factors. In addition to food security, deworming, schistosomiasis prevention and treatment, and malaria control programs should thus be integrated as critical components of a broad-based approach to HIV prevention (Stillwaggon 2005).

### *3.5 Nutrition*

Home gardening offers potential for households to raise income and ensure access to nutritious food, close to home. In their work in Lesotho, Abbot et al. (2005) cite a fourfold rationale for the selection of homestead gardens as a key intervention strategy: 1. almost every household has access to land for a homestead garden on its residential plot – while many, often including the most vulnerable, lack fields. Water for supplementary irrigation is also more likely to be available in residential areas than in the fields.

2. being close to the house and relatively small, homestead gardens can help labour-scarce households continue at least some food production and to maintain comparatively labour-intensive production techniques.

3. homestead gardening, with its emphasis on a range of vegetable crops rather than the single grain staple usually grown in fields, has important potential for enhanced household nutrition, especially significant for HIV-positive household members with special nutritional needs.

4. there is significant scope for marketing homestead garden produce, enabling vulnerable households to raise some cash income (Abbot et al. 2005).

Few, if any, AIDS treatment programs have incorporated nutrition care, yet most prescription refills are followed by instructions to take drugs after meals. In recognition of this fact, the Academic Model for Prevention and Treatment of HIV/AIDS (AMPATH) – an interesting Kenyan/US university partnership -- has developed the HAART 'n' Harvest Initiative (HHI) in western Kenya (Siika et al. 2005). The HHI is an innovative system of small scale, low cost, high production farms that use locally available technology. All HIV-infected patients undergo comprehensive nutritional assessment and those found to be malnourished or food insecure are given nutritional counseling and a "nutrition prescription". Prescriptions are presented at the HHI farms or distribution points for supply of fresh, locally acceptable food, calculated to meet the needs of the patient and their household. Additionally, patients and the surrounding community receive education on nutrition, agriculture as well as on HIV prevention, treatment and care. The impact of HHI on food insecure HIV-infected patients is currently under study.

In Guinea, Africare is using an adaptation of the Positive Deviance-Hearth approach to rehabilitate severely malnourished children infected or affected by HIV/AIDS. In the PD-Hearth model, "positive deviant caretakers" whose household caring and feeding practices, despite poverty, result in well-nourished children work with trained volunteers to teach other caretakers how to sustain nutritional practices and adopt appropriate behaviors regarding prevention and care for HIV/AIDS affected children. Links are made to health services for deworming, immunizations and micronutrient supplementation. A study by Kadio et al. (2005) demonstrated significant results in reducing malnutrition among children.

The WHO Consultation on Nutrition and HIV/AIDS in Africa (10-13 April 2005?) that preceded the IFPRI conference, concluded with several key recommendations aimed at:

- strengthening political commitment and improving the positioning of nutrition in national policies and programs;
- developing practical tools and guidelines for nutritional assessment for home, community, health facility-based and emergency programs;
- expanding existing interventions for improving nutrition in the context of HIV;
- conducting systematic operational and clinical research to support evidence-based programming; strengthening,
- developing and protecting human capacity and skills, and incorporating nutrition indicators into HIV/AIDS monitoring and evaluation plans

### *3.6 Linking short-term with long-term approaches*

AIDS has been referred to as a slow onset disaster and a long-wave crisis. It has been addressed as a humanitarian issue (notably during the 2001-2 food crisis in southern Africa) and an ongoing threat to development. In recent years, discussion has turned to whether these two perspectives need to be better linked. The notions of "developmental relief", "relief in development" and a *contiguum* approach (as opposed to an emergency to development continuum) have been floated a lot recently. Barnett (2005) argues for the need to review current paradigms of development and relief and strengthen the ability to switch rapidly between activities as people's needs and priorities change. Oxfam too is firmly behind such a contiguum approach, viewing the concept of a development path periodically interrupted by short emergencies as a fiction in the context of AIDS. At all times in all places people require access to support and interventions in relief, rehabilitation and development to ensure their basic needs are covered in the short term while longer term development opportunities are made available.

## Conclusions

*"The past is no guide to the future" [Tony Barnett, April 2005]*

In many ways, HIV/AIDS is exposing the fragility of people's livelihoods – this fragility derives from multiple sources of vulnerability, many of which interact and are worsened by AIDS. Poverty, malnutrition and hunger have been around a lot longer than the virus. We should thus not be blind to AIDS, but nor should we blinded by it. Any move toward 'AIDS exceptionalism' will not improve understanding of these important interactions, and may thus close off some important opportunities for effectively responding.

We thus need to keep the focus on three overlapping sets of problems: HIV/AIDS, food insecurity and malnutrition. Not only do these problems overlap significantly, they interact too. We need to keep track of the nature, magnitude and outcomes of these interactions - so that responses are appropriate and effective in the context of high or rising HIV prevalences.

The conference concluded with an urgent call for large scale responses that can cope with the diversity, complexity and context-specificity of the interactions between HIV/AIDS and food and nutrition security. Diversity of impacts needs to be matched by diversity of researchers, working collaboratively. In order to come to grips with this new universe, and effectively fill these knowledge gaps, bridges need to be built between social scientists, epidemiologists, public health specialists, nutritionists and agricultural economists. Only in this way will the causes and consequences of HIV/AIDS be mapped in ways that build the evidence base, in ways that ultimately lead to more effective action.

Greater emphasis needs to be placed on supporting and enabling community-driven responses and innovations. Communities have better, more relevant information (that responds to the diversity and context-specificity) and they often have latent, untapped capacity. Transparency and accountability may also be enhanced through local peer-oversight. Communities have incentives to act and they are responding – albeit not always optimally. But in general there's a need to start with an understanding of which community-driven responses are working, before looking at ways to provide relevant support where local capacity is exceeded.

In the face of the challenges posed by the interactions between HIV/AIDS, food and nutrition security, there is no convenient magic bullet intervention and no blueprint. The fact that "business as usual" is not working however does not mean that everything needs to change. Rather, a truly multisectoral involvement is required. This is fundamentally different to simply adding more (usually vertical) HIV activities on to sectoral plans. Mainstreaming starts with decisionmakers internalizing HIV/AIDS as a development issue, leading in turn to a critical review of existing policies and programs through the lens of their growing knowledge of AIDS interactions. It is a process involving continual reflection, and the progressive application of principles and processes for responding -- rather than pulling pre-designed interventions off the shelf.

We must not fall into the "evidence trap" – a lack of knowledge is rarely an impediment to action. While gaps remain in the literature that will require dedicated research to address, the conference clearly called for a shift in emphasis toward "learning-by-doing" – or action research. For the "doing" to be accompanied by learning, as mainstreamed programs come on stream, the development and maintenance of good systems of HIV-relevant monitoring, evaluation and communications will be crucial.

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# SPECIAL FEATURE

## FOREIGN DIRECT INVESTMENT IN AFRICA REMAINS BUOYANT, SUSTAINED BY INTEREST IN NATURAL RESOURCES

Inflows of foreign direct investment (FDI) to Africa last year remained stable, at US$ 18 billion, according to UNCTAD´s World Investment Report 2005: Transnational Corporations and the Internationalization of R&D (1) , released today. The levels were relatively high in historical terms but still a mere 3% of such investment globally.


The report features a special section on transnational corporations and the internationalization of research and development.

FDI in Africa´s natural resources was especially pronounced in 2004, buoyed by high oil and mineral prices on world markets, the report states. Investment inflows increased in 40 of the region´s 53 countries and declined in 13. North Africa attracted about 30% of the total, or US$ 5.3 billion - about the same as in 2003 - with the focus on natural resources. FDI flows to Central Africa and East Africa were also relatively stable, but West Africa boasted an increase of 14%, to US $3.6 billion. Southern Africa fell by 18%, to US$ 1 billion. Egypt saw the biggest rise on the continent, as liberalization and privatization attracted new foreign investment in a wide range of industries.

Nigeria, Angola, Equatorial Guinea and Sudan - all rich in natural resources - joined Egypt as Africa´s top FDI recipients, all of them registering inflows of more than US$ 1 billion. The five countries together accounted for almost half of African FDI in 2004 (fig.1). FDI flows to many small African countries, by contrast, especially those poor in natural resources and classified as having least developed economies, were less than US$100 million each last year. Many of these nations, especially the least developed countries (LDCs), have small domestic markets, lack skilled workers and struggle with supply capacity problems. The report finds that these difficulties have hampered some of the market-access initiatives put into place at the international level to encourage investment in export-oriented industries.

As in 2003, FDI inflows to many African countries last year were tilted towards the primary sector, particularly the petroleum industry, the report notes. The oil sector accounted for more than 60% of FDI to Angola, Egypt, Equatorial Guinea and Nigeria, and also made up large shares of such investment in Algeria, Libya and Sudan.

Spurred by higher prices for natural resources, transnational corporations (TNCs) maintained relatively high levels of investment in new exploration projects in Africa and increased their cross-border activities in mergers and acquisitions in the mining industry, says the new UNCTAD report. Several large deals were concluded in that industry, where cross-border M&As totalled US$ 3 billion last year - more than three times the 2003 total.

On the outward side, Africa´s FDI outflows more than doubled in 2004 but, at US$ 2.8 billion, remained very low by global standards. Over half that total came from South Africa, reflecting the fact that all four African TNCs on UNCTAD´s list of the top 50 TNCs based in developing countries (see UNCTAD/PRESS/PR/2005/039) are from South Africa (fig. 2).

While the persistence of critical developmental problems in many African countries has hampered their ability to attract and retain FDI, the overall situation lends itself to a cautiously positive view on the prospects for FDI in Africa. The significant rise in commodity prices that began in 2004 - and the resulting high profitability of investments in the sector - should fuel continued increases in foreign direct investment on the continent this year, the report predicts

# ATDF NEWS

## Syngenta Foundation Supports The Development of ATDF Business Plan

Following a meeting between the Executive Director of Syngenta Foundation for Sustainable Agriculture (http://www.syngentafoundation.org/) and ATDF Management Team on 20 May 2005, Geneva, The Foundation and ATDF have recently signed an agreement to facilitate the development of ATDF Business Plan. The Foundation will provide financial support to meet some of the costs of consultancy during the development of this work.

The main goal is to help develop some of ATDF's main ideas into concrete proposals and integrate them into a business plan that might be supported by other development agencies.

Some of the initiatives being developed include:

### Science, mathematics and engineering learning materials of universities.

The aim of the project is to develop high quality and reliable science-related learning and teaching materials for African universities. ATDF wishes to harness the talent of Africans abroad and at home as well as the experiences of international experts to develop learning, teaching and research materials or manuals, and recommend how ATDF will raise sufficient awareness and interest among scientists and effectively distribute the learning materials to universities with limited access to the internet.

### Improve ATDF outreach and information dissemination.

The main objective is to improve the usefulness, expansion and reach of the ATDF Journal and the ATDF Website into premier sources of science, technology and development-related information. ADTF is also seeking to find ways to improve the performance and broaden the scope of the ATDF Journal as well as their sustainability.

### Technology Guardian Program: Entrepreneurship and business incubation.

The Technology Guardian initiative seeks to promote technology entrepreneurship and business incubation. The project would recommend and develop concrete plans how ATDF could effectively mobilize R&D centres, professional associations, interested private firms and development partners to serve as incubator managers and business advisors to the SMES and start-ups.

### The SMEs development and support project

This project focuses on mobilizing entrepreneurship at African universities and to facilitate the development, expansion and efficiency of Small and Medium-sized Enterprises that participate in and eventually emerge from the project. For this purpose it will set up business-assistance institutions at local universities that are run by local entrepreneurs for local entrepreneurs.

This activity is expected to take three months and the main document should be available in January 2006

The ATDF Management wish to thank Syngenta Foundation for its support for this project and interest in the development of ATDF.

# ATDF NEWS

## ATDF Welcomes Two More Editors to its Editorial Board and a BIG "Thank you" to All.

The Management Team of ATDF wishes to welcome Anna Atherton-Griggs and Teisha Öberg to the ATDF Editorial Board. The Management Team also wishes to thank most sincerely all the members of its Editorial Team, including our editors that have opted to remain anonymous, for their valuable contributions.

The launch of this health issue of the journal also marks ATDF's first year. For this reason, we wish to thank all the people that have contributed their time and resources in running ATDF. Through your efforts we have been able to reach over twenty thousand people every month.

### Anna Atherton-Griggs

Anna Atherton-Griggs is a project officer for the UNEP/UNCTAD Capacity-Building Task Force on Trade, Environment and Development (CBTF) in Geneva. She is currently working on a project aimed at promoting production and trading opportunities for organic agricultural products in East Africa. She has previously worked on natural resource management in developing countries, the protection and promotion of traditional knowledge and biodiversity preservation.

### Teisha Öberg

Teisha Öberg works at the International Centre for Trade and Sustainable Development (ICTSD) as Programme Associate to the Africa and Legal Affairs Programme. She is a lawyer with specialization in trade issues. She earned her Bachelor of Laws with Honours at the University of the West Indies, a Certificate of Legal Education from the Norman Manley Law School and a Masters in Business and International Trade Law from Yokohama National University in Japan.

# Health Science in the News

## A focus on malaria

### Chloroquine Is Born Again

Chloroquine - which is far cheaper than more modern malaria drugs - was hugely successful in combating the disease when launched in the 1950s – it works by blocking the way the parasite breaks down human haemoglobin contained in red blood cells. But the malaria parasite gradually became resistant to Chloroquine. The resistant forms of the parasite neutralise the drug by developing a mechanism that drains chloroquine away from the key area, preventing it from reaching the necessary concentration.

Researchers have found combining the chloroquine with another preparation, Primaquine, seems to restore its effect. Combination of chloroquine with chlorpheniramine proved effective in treating children and pregnant women with chloroquine-resistant infections.

http://www.who.int/tdr/research/finalreps/no44.htm

### HIV Drugs Block Malaria In Tests

The powerful drugs used to treat HIV have been shown to also be effective in treating malaria. According to scientists at the Queensland Institute of Medical Research, Australia, antiretroviral drugs stopped the parasite that causes malaria from growing. The HIV drugs also worked on parasites that had developed resistance to common malaria drugs as demonstrated in laboratory tests. The findings are important in Africa where people are likely to be infected with both HIV and malaria.

As demonstrated by other studies, six of the five protease inhibitors used to treat HIV were also found to kill *Plasmodium falciparum*. Dr Savarino from the Catholic University in Rome has patented potential drug treatment combinations. This finding also demonstrates that there potential drug targets in the parasite that have not yet been exploited.

(See Story from BBC News) (6/27/05)

### "Perfume" to Lure Mosquitoes and Control Malaria

Female malaria mosquitoes “smell” with specialized receptors in their antennae and are drawn to particular human odors that say “dinner.” While the mosquito feeds on blood that is needed for its egg production, parasites from the mosquito enter and infect the human. When an infected person is bitten again, the parasite can be transmitted to an uninfected mosquito and spread further. To stop the transmission a perfume is being developed by an international team of scientists at Yale University to redirect mosquitoes with odor cues. The project is one of the 43 "groundbreaking" research projects to improve health in developing countries. The aim is to reduce the population of malaria transmitting mosquitoes by identifying effective “perfumes” that act as attractants to traps or as mosquito repellents. The institutions involved include the Ifakara Health Research and Development Centre in Tanzania and the Medical Research Council Laboratories in Gambia (Africa).

(See Story from EurekAlert!) (7/1/05)

http://www.yale.edu

### Fungus "May Help Fight Malaria

A common fungus could be the newest weapon in the fight against malaria. A UK team found that it can prove fatal to mosquitoes which come into contact with the fungus when it is sprayed onto surfaces. A type of fungus from the species Beauveria bassiana was sprayed onto cage mesh. When a mosquito comes in contact with the spores, the fungus germinates, penetrates the mosquito and grows within it, eventually killing it. The study in Science showed over 90% of mosquitoes were killed within 14 days of being infected. In laboratory tests, fungal infection reduced malaria transmission in the laboratory by 98%.

(See Story from BBC News) (6/10/05)

### The cost of malaria

Malaria costs Africa USD12 billion a year in monetary terms and between 350 and 500 million cases and an estimated 1.5 million deaths in human lives annually. In addition, it is holding back economic and social development in Africa by slowing down economic growth, discouraging investment (local and foreign) and tourism, discouraging the development of internal trade and adversely affects people’s choice of economic activities, while depleting human resources.

# Did you Know!

## Characteristics and owners of HIV Drugs?

| Nucleoside Reverse Transcriptase Inhibitors (NRTIs) | | | |
|---|---|---|---|
| **Brand Name** | **Generic Name** | **Manufacturer Name** | **Approval Date** |
| Combivir | lamivudine and zidovudine | GlaxoSmithKline | 27.sept.97 |
| Emtriva | FTC, emtricitabine | Gilead Sciences | 02.juil.03 |
| Epivir | lamivudine, 3TC | GlaxoSmithKline | 17.nov.95 |
| Epzicom | abacavir/ lamivudine | GlaxoSmithKline | 02-Aug-04 |
| Hivid | zalcitabine, ddC, dideoxycytidine | Hoffmann-La Roche | 19.juin.92 |
| Retrovir | zidovudine, AZT, azidothymidine, ZDV | GlaxoSmithKline | 19.mars.87 |
| Trizivir | abacavir, zidovudine, and lamivudine | GlaxoSmithKline | 14.nov.00 |
| Truvada | tenofovir disoproxil/emtricitabine | Gilead Sciences, Inc. | 02-Aug-04 |
| Videx EC | enteric coated didanosine | Bristol Myers-Squibb | 31.oct.00 |
| Videx | didanosine, ddI, dideoxyinosine | Bristol Myers-Squibb | 09.oct.91 |
| (generic version) | Didanosine (ddI) Delayed Release capsules | Barr Laboratories, Inc. | 03-Dec-04 |
| Viread | tenofovir disoproxil fumarate | Gilead | 26.oct.01 |
| Zerit | stavudine, d4T | Bristol Myers-Squibb | 24.juin.94 |
| Ziagen | abacavir | GlaxoSmithKline | 17-Dec-98 |

| Nonnucleoside Reverse Transcriptase Inhibitors (NNRTIs) | | | |
|---|---|---|---|
| **Brand Name** | **Generic Name** | **Manufacturer Name** | **Approval Date** |
| Rescriptor | delavirdine, DLV | Pfizer | 4-Apr-97 |
| Sustiva | efavirenz | Bristol Myers-Squibb | 17.sept.98 |
| Viramune | nevirapine, BI-RG-587 | Boehringer Ingelheim | 21.juin.96 |

| Protease Inhibitors (PIs) | | | |
|---|---|---|---|
| **Brand Name** | **Generic Name** | **Manufacturer Name** | **Approval Date** |
| Agenerase | amprenavir | GlaxoSmithKline | 15-Apr-99 |
| Aptivus | tipranavir | Boehringer Ingelheim | 22.juin.05 |
| Crixivan | indinavir, IDV, MK-639 | Merck | 13.mars.96 |
| Fortovase | saquinavir | Hoffmann-La Roche | 07.nov.97 |
| Invirase | saquinavir mesylate, SQV | Hoffmann-La Roche | 6-Dec-95 |
| Kaletra | lopinavir and ritonavir | Abbott Laboratories | 15.sept.00 |
| Lexiva | Fosamprenavir Calcium | GlaxoSmithKline | 20.oct.03 |
| Norvir | ritonavir, ABT-538 | Abbott Laboratories | 01.mars.96 |
| Reyataz | atazanavir sulfate | Bristol-Myers Squibb | 20.juin.03 |
| Viracept | nelfinavir mesylate, NFV | Agouron Pharmaceuticals | 14.mars.97 |

| Fusion Inhibitors | | | |
|---|---|---|---|
| **Brand Name** | **Generic Name** | **Manufacturer Name** | **Approval Date** |
| Fuzeon | enfuvirtide, T-20 | Hoffmann-La Roche & Trimeris | 13.mars.03 |

Source: US FDA