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LOCAL PRODUCTION OF HEALTH SYSTEM INPUTS RELATED TO HIV/AIDS

NC/RAF/94/02D

REGIONAL AFRICA

Report

Prepared for the Governments of Regional Africa
under UNDP-financed TSS-1 facility

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Abbreviations

Abbreviation	*Name*
ADB	African Development Bank
AFTH	African Federation for Technology in Healthcare
AIDS	Acquired Immunodeficiency Syndrome
AZT	Azidothymidine
CAD	Computer-aided Design
CCISD	Centre de Coopération Internationale en Santé et Développement
CDC	Centres for Disease Control and Prevention
CFA	African Franc, stands for Communauté Financière Africaine
CIDA	Canadian International Development Agency
COMESA	Common Market of Eastern and Southern Africa
CSM	Condom Social Marketing
CSW	Commercial Sex Workers
ECCAS	Economic Community of Central African States
ECOSOC	Economic and Social Council
ECOWAS	Economic Community of Western African States
EPI	Extended Programme for Immunisation
FDA	Food and Drug Administration
GATT	General Agreement on Tariffs and Trade
GCA	Global Coalition for Africa
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
HIV	Human Immunodeficiency Virus
IDA	International Development Assistance
IMF	International Monetary Fund
IMPM	Institut de recherche Médicale et d'Etude des Plantes Médicinales
JPO	Junior Professional Officer
NIH	National Institutes of Health
OAU	Organisation of African Unity
PATH	Program for Appropriate Technology in Health
QALY	Quality Adjusted Life Years
SADC	Southern African Development Community
UCD	UNIDO Country Direction
UMA	Maghreb Arab Union
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations International Children's Fund
UNIDO	United Nations Industrial Development Organisation
WHO	World Health Organisation
WTO	World Trade Organisation
ZDT	Zidovudine

1. OVERVIEW

The increasing threat of the AIDS epidemic and its consequences on social and economic development has led to several programmes combining their efforts in preventing the spread of this disease. However, prevention has often been inadequate; pursued largely for socio-economic and political reasons. An expanded response to HIV/AIDS was needed based on a broad-based and multi-sectorial initiative, including all aspects of human development and economic planning. The purpose of such a combined programme was to strengthen national capabilities and to sustain an expanded response to the epidemic. [1]

Such an internationally co-ordinated response to HIV and AIDS was endorsed by the Economic and Social Council (ECOSOC) on 26 July 1994, as it adopted without a vote a resolution sponsored by 50 countries. This resolution was in a form of a co-sponsored United Nations programme involving six organisations.

Co-sponsors of the Joint Programme are the United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Health Organisation (WHO), United Nations Educational, Scientific and Cultural Organisation (UNESCO), and the World Bank. It is UNIDO's intention to contribute to the internationally co-ordinated efforts with the subject project.

A programme for the local production of health sector inputs in the countries of Sub-Saharan Africa was prepared in the first quarter of 1993 and endorsed by the Programme and Project Committee on 22 July 1993 for further development. In the final work plan of UNDP for 1994-1995, this thematic study with some modification was assigned to UNIDO for implementation.

1.1 Target beneficiaries

The primary target beneficiaries will be the governments of the Sub-Saharan African countries covered by the study who will be provided strategic advice for development, establishment and promotion of local or regional production of pharmaceuticals and allied products used for prevention, diagnosis and treatment of HIV infections and AIDS.

Secondary beneficiaries will be those institutions, enterprises, investors, etc., who will directly use the study for preparing pre-feasibility or opportunity studies. Indirectly the programme will be beneficial to the population of the Sub-Saharan region. In particular the young and women, who are at a higher risk of being infected by HIV, will benefit.

1.2 Objectives

1.2.1 Development objectives

The development objectives of the programme, taking into account the UNDP's global priorities and the development objectives of UNIDO's medium-term plan, aim at contributing to the achievement of the following development target:

1. Sustainable development and promotion of local production of health care system inputs related to HIV infection and AIDS;

2. Capacity building for increased availability and quality of primary health care and basic hospital services;

3. Strengthened capacity and content of national AIDS programmes and an increased impact;

4. Environmentally and financially sustainable development of the manufacturing sector (health and pharmaceutical industries) related to the production of healthcare system inputs.

1.2.2 Immediate objectives

The immediate objective of the study is to investigate market demand for pharmaceuticals and allied products used in the diagnosis, treatment and prevention of AIDS and AIDS-related diseases or conditions in Sub-Saharan African countries and to identify opportunities for local production of these goods needed in sufficiently large quantities at country or regional level.

1.3 Inputs

Several UNIDO staff members have collected data for the preparation of the study and the project profiles. UNIDO Consultants were involved in field visits to various Sub-Saharan countries to establish and identify current situations with regard to the project programme. Data was collated from other studies to identify and establish a strategy for the development and promotion of the local production of health care system inputs related to HIV infection and AIDS.

Government authorities in many of the target countries have co-operated with UNIDO consultants in the collection of relevant market data for the TSS-1 project by facilitating and providing information for and completing the questionnaire designed for this project programme.

1.4 Outputs

A study on a UNIDO strategy for development, establishment and promotion of financially sustainable local/regional production of health care system inputs (pharmaceuticals and allied products) related to HIV infection and AIDS.

1.5 Activities

1.5.1 Scope of activities

The project is complimentary with the relevant on-going activities of UNIDO in Africa. The experience of other organisations, particularly WHO will be utilised. The scope of the first phase was to investigate and analyse possible market demand for products used in the diagnosis, treatment and prevention of AIDS and AIDS-related diseases or conditions in Sub-Saharan African countries, and to identify opportunities for local production of these goods needed in sufficiently large quantities at country or regional level.

In the next phase workshops will be held to discuss findings of the study, finalise a programme towards the enhancement of UNIDO's technical co-operation with developing countries in the manufacture of pharmaceuticals and allied products used in the prevention and treatment of AIDS and AIDS-related diseases and conditions.

1.5.2 Organisation and scheduling of activities

- The members of the project team are identified and the responsibilities distributed. Implemented by UNIDO. This was completed by August 1994.

- Milestones for the project are agreed upon. Implemented by UNIDO. Completed by September 1994.

- In-house data collection, database structure and related methodological issues, e.g. questionnaires for demand and priority survey at country level, list of products and product profiles, etc. are decided. Implemented by UNIDO. Completed by November 1994.

- Data collection through UNIDO Country Directors (UCD) and Junior Professional Officers (JPO), UNIDO consultants assigned for programmes/projects related to the health sector, WHO and different regional organisations in Africa is commenced. Implemented by UNIDO. Completed June 1995.

- International consultants are assigned and they start data collection. Implemented by UNIDO/ consultants. Completed by July 1995.

- Missions to the selected countries organised and fielded. UNIDO missions visited Kenya, Tanzania and Uganda as anglophone and Cameroon, Central African Republic and Gabon as francophone countries. Nigeria is covered by a separate TSS-1 project. Zambia was visited as the host of the Preferential Trade Area (PTA) countries (PTA has recently been transformed to the Common Market for Eastern and Southern Africa - COMESA). South Africa was also selected as an excellent information source on HIV infection and AIDS related industrial demand in several African countries. Implemented by UNIDO/consultants. Completed by August 1995.

- Based on the results of the data collection phase (i) the market demand was estimated for certain manufactured products used in the diagnosis, prevention, care and counselling of AIDS and AIDS-related diseases and conditions in Africa; and (ii) the opportunities for local production of goods needed in sufficiently large quantities at country or regional level was identified. Implemented by UNIDO/consultants. Completed October 1995.

- Preparation of the draft study in co-operation with the international consultants in Vienna. Implemented by UNIDO/consultants. Completed by October 1995.

- Review of the drafts and the final study is agreed upon. Implemented by UNIDO/consultants. Completed by October 1995.

2. A PROPOSED STRATEGY

2.1 Introduction

The Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) pandemic has had a devastating effect on society, especially in Sub-Saharan Africa which is the current epicentre for the spread of the disease. Predictions are that this devastation will continue well into the 21st century. Despite great strides made through research, availability of commercially viable vaccine products is a long way off. Even lengthier time frames are needed to achieve widespread distribution in developing countries after initial approval; 15 years for the polio vaccine, 15-20 years for the measles vaccine, and over ten years for the plasma-derived hepatitis B vaccine. Prevention therefore is the cornerstone of current HIV/AIDS control programmes.

An internationally co-ordinated response to the pandemic, in the form of a co-sponsored United Nations programme involving six organisations, was endorsed by the Economic and Social Council on 26 July 1994 as it adopted without a vote a resolution sponsored by 50 countries. It is UNIDO's intention to contribute to this internationally co-ordinated effort.

2.2 Two-pronged strategy

The strategy adopted by UNIDO to meet the combined objectives of industrial development of Sub-Saharan Africa, and prevention of further spread of HIV/AIDS in the region must also address problems associated with doing business in Africa - the so called local realities, which are described in section 2.10 below. The strategy should therefore be two-pronged.

1. An immediate response should aim at improving access to and affordability, of products used in prevention programmes (condoms, latex gloves, syringes, HIV-1/2 test kits), therapeutic interventions (pharmaceuticals) and appropriate platforms for IEC (communication technologies) through local development of manufacturing capability for these products.

2. Development of an "Enabling Industrial Environment" (EIE) in Sub-Saharan African countries, through promotion of appropriate policy options and support for creation of service industries, thus reducing traditional barriers to industrial productivity in the region. EIE is described in further detail in section 2.10 below.

2.3 Collateral (supporting) strategies

In order to buttress these, and to ensure that donor support to the fight against HIV/AIDS leaves behind industrial growth as a by-product - with the gradual transfer from donor to recipient countries of the requisite health systems inputs - three collateral strategies are needed.

3. The programmes will be articulated around four development poles (Cameroon, Côte d'Ivoire, Kenya and Namibia). The poles, based in four subregional economic groupings (ECCAS, ECOWAS, COMESA and SADC respectively), capitalise on

existing structures which facilitate intercountry trade in order to improve markets and the viability of local products against imports.

4. Whereas promotion of GMP could result in improved product quality, higher yields and greater production efficiency, the realities of the business environment in Africa greatly limit the potential impact of these practices. Problems with banking and finance, inadequacy of transportation and communications, lethargic bureaucracies and government over-regulation, among other hurdles, require different corrective measures. Significant effort should be aimed at breaking down these barriers to industrial growth in Sub-Saharan Africa, thus creating an "Enabling Industrial Environment (EIE)".

5. The return of South Africa to the international community opens it up as an attractive development pole in the region. The programme should take advantage of internationally competitive production and marketing capacity available in the country.

2.4 International aspects

UNIDO should encourage governments to correct internal policy misdirections which led to the weakening of industrial production in Africa during the decade of the 1980s and so far in the 1990s. i.e.

- Discourage heavy reliance on imported inputs for import substitution investment, and excesses in both market intervention and public industrial investment.

- On the other hand, support private sector investment and improved use of available capacity and GMP, to reduce production costs to internationally competitive levels.

The Organization should also promote policy options for mitigating the impact of HIV/AIDS, as suggested by the World Bank through introduction of labour saving technologies into sectors of the economy which will experience labour shortages as a result of the pandemic.

UNIDO should promote private sector, national and regional, capitalisation for new ventures aimed at producing health system inputs in Sub-Saharan Africa. In this regard, governments should be urged to share the financial, political and human risks and as well as the expected benefits.

Finally, UNIDO should promote the following priorities consistent with the proposals from the Strategic Meeting on Development and Accessibility of Preventive Technology including Vaccines and Microbicides for HIV/AIDS Paris, 15-16 September 1994, by urging Governments to:

1. Maintain or increase their current level of commitment to HIV/AIDS prevention and allocate resources commensurate with the epidemic's status as one of the world's most urgent public health problems.

2. Identify and resolve product liability issues that could hamper local production and distribution of HIV preventive products in the region.

3. Accelerate efforts towards subregional and regional cross licensing and/or registration of products.

4. Promote the availability of products used in prevention programs, in particular by reducing tax and import duties.

5. Create conditions necessary for more effective and efficient working in partnership with NGOs, community-based organisations and people living with HIV/AIDS.

2.5 Collaboration with international agencies

UNIDO should work with the newly created World Trade Organization (WTO) to promote implementation of the accords of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), as concerns liberalisation of trade in Africa, particularly across subregional economic zone boundaries, through reduction of tariff rates and lowering of non-tariff barriers.

The Organization should participate actively in the Joint UN Programme, with a particular mandate to rapidly develop manufacturing capability in Sub-Saharan Africa, for technologies proved through research to be effective in the prevention or cure of HIV/AIDS.

UNIDO should continue to seek international financial support for investment in production schemes on the African continent. These investments stand to yield significant gains not only in the fight against AIDS but also in sustained development in general. As the Executive Secretary of the United Nations Economic Commission for Africa puts it: "...It is now when – African countries are embarked on market-friendly reforms, establishing democratic polity, and showing commitment to promoting social justice – that aid is most needed to buttress these promising developments."

2.6 Immediate action

There is need for immediate action, particularly as concerns the accelerated production of healthsystem inputs used in HIV/AIDS prevention programmes. Experience has shown that the same programs introduced early have a greater impact than those which start later. The non-linear nature of the disease is also such that a 50% reduction in transmission has more than twice the impact of a 25 % reduction.

2.7 Other preventive products

Although vaccines have been the cornerstone of public health success against other infectious diseases, such as smallpox and poliomyelitis, female-controlled barriers to HIV (and possibly other sexually transmitted pathogens) such as vaginal microbicides may lend themselves to faster development than a vaccine. UNIDO has already been approached to provide support for developing one such invention into a marketable product [2]. The strategy should apply equally to these still to be tested products, and vaccines if and when they become viable.

2.8 Distribution

UNIDO should promote an approach which capitalises on conventional distribution points (pharmacies, dispensaries, health centres), while reinforcing other distribution mechanisms which have been used effectively in condom social marketing, such as through large companies, voluntary associations, hotels, bars, night clubs, street vendors and traditional healers.

2.9 Environment

The flagship of any implementation program for this strategy should be small and medium scale enterprises and industries (SMEs/SMIs), "the missing middle between imported and local technology, and a breeding ground for the local entrepreneurs needed to take the lead in private sector industrial initiative" SMEs/SMIs are the key to revival of the industrial sector in Sub-Saharan Africa and should be given greater support, particularly in connection with this HIV/AIDS strategy.

2.10 An Enabling Industrial Environment (EIE)

UNIDO should address problems associated with doing business in Africa - the so called local realities - which mitigate the impact of purely technical improvements such as can be attained by the promotion of GMP. Some of these latent constraints to industrial productivity are outlined below.

- Information, a major resource in any undertaking, is not readily available
- In some countries many suppliers to government institutions spend inordinate amounts of resources to extract payment for their goods and services.
- Transport infrastructure is poor and is compounded by inefficient operation. This, together with customs clearance and other transit problems, causes delays in the supply of manufacturing inputs and delivery of products, thereby increasing costs. Air travel is fraught with perennial problems of delayed flights, late arrivals, overbooking and flight cancellations, for both people and freight.
- Communication by post is slow and often unreliable. Telephone service, which may be good within a city or town particularly where there are new digital exchanges, is hampered by limited long distance capability.
- Utilities are not always to be taken for granted, as there are frequent cuts of electricity and water.
- Maintenance and repair problems are a fact of daily life in most countries, and by some estimates 50 percent of the equipment is nonfunctional at any one time.
- In some countries there are strong disincentives to local production as raw materials are taxed more heavily than finished goods.

- Instability of banking institutions and foreign exchange restrictions cause long delays in both local and outside financial transactions.

- Finally, corruption particularly in the public sector, raises the cost of every aspect of business.

Project profiles generally do not take into account these hidden constraints to industrial productivity, which often are the cause of project failure. Significant effort should be aimed at breaking down these barriers to industrial growth in Sub-Saharan Africa, thus creating an "Enabling Industrial Environment (EIE)"[3].

Examples of activities which UNIDO could undertake to provide an EIE are:

- To promote reforms in the area of policy, which drives the process, aimed at streamlining bureaucracies and in a general way minimizing Government's interference in business.

- To support the creation of commercial information services to provide data on items such as; commodity prices, interest rates, industrial statistics, consumer price index, inflation rates, and stock market prices where trading exchanges exist. Information centers could provide access to the Internet, provide connectivity and networking facilities for SMEs, and link NGOs and community-based organisations, thus promoting industry in rural areas. Such information centers could collaborate with the new UNDP global initiative called the Sustainable Development Networking Programme.

- To advocate less stringent requirements on use of the frequency spectrum, and deregulation of telecommunications, to allow small private sector long distance carrier services based on send-receive satellite antenna systems. Parabolic antennas for satellite television reception are already assembled locally in some countries of the region. A good example of such a process is the long distance carrier market in North America, where deregulation has led to open competition and steady decreases in the cost to consumers. Rates for local telephone service, which have not been subject to the same deregulation, have either stayed constant or increased.

- To encourage the creation of registries for instruments and maintenance services for equipment and instruments.

- To assist in establishing technical consultancies attached to centers of knowledge generation, such as training and research institutions, to advice industry and facilitate the transfer of technology. Examples exist in Ghana, Tanzania, Nigeria and Cameroon. Such centers could also provide testing and verification services for quality control and monitoring of conformity to international standards such as ISO 9000.

- To promote the creation of networks for supply and distribution of goods, with appropriate facilities such as refrigerated trucks, moving vans, etc.

There are enormous benefits to be derived from investment in these industries, which traditionally require low capital and thus entail low risk to the investor with regard to fixed assets.

3. SITUATION ANALYSIS

3.1 The Sub-Saharan economy

Economic performance on the African continent as a whole has been rather poor during the decade of the 80's and so far in the 90's. The last few years serve to illustrate the situation. Estimated growth in African national economies in 1994 was 2.8 percent, up from 1.1 percent in 1993 and -0.3 percent in 1992. However, GDP declined at a rate of nearly 1.5 percent per year during the period 1990-1994. The proportion of the population living under conditions of poverty has therefore increased at an even faster rate, in urban as well as rural areas. [4]

Despite these modest gains in economic growth, Africa's share of total world economic output is on the decline. Although Africa's population growth rate is almost twice that of the world, her share of world economic output continues to shrink, and lags behind other developing regions.

Domestic consumption grew by 0.5 percent, down from 1.7 percent in 1993. Fixed capital formation, including changes in stocks was projected to grow by 5.2 percent, an increase from the 1993 value of 1 percent.

Growth has been varied among the subregion, as shown in Table 3.1. The number of countries with negative growth rates decreased from 17 in 1993 to 11 in 1994, while the number of countries with growth rates in excess of 5 percent remained constant at 12 (see Table 3.2).

Table 3.1
Economic performance by sub-region

Sub Region	Number of Countries	Growth Rate (1993)	Growth Rate (1994)
North Africa	6	0.8	2.5
West Africa	16	2.6	3.2
East and Southern Africa	21	1.5	3.7
Southern Africa	7	1.2	3.8
Central Africa	10	4.8	-0.2
Least Developed	32	1.6	1.7
Oil Exporting Countries		1.7	2.0

Source: UNECA

The large raises in commodity prices notwithstanding, export revenues in 1994 were expected to increase by only 4.26 percent to US$95.2 billion, from the US$91.3 billion recorded in 1993. Export volume grew by 2.0 percent up from 1.1 percent in 1993. The rise in export values was attributable to impressive surges in the prices of almost all primary commodities, especially coffee, cocoa, tea, cotton and minerals during the year. Offsetting these gains was the fall in oil prices of about 7.6 percent.

Table 3.2
Frequency distribution of countries by growth rate

Year	Number of countries			
	Negative	0 and 3 percent	3 and 5 percent	>5 percent
1993	17	14	10	12
1994	11	17	13	12

The signing of the Final Act of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) by more than 120 countries in April 1994 will have a significant impact on trade in the region. The agreement is aimed at liberalising international trade through a reduction of tariff rates by more than one-third and through lowering non-tariff barriers. Furthermore, for the first time, trade in agriculture and services are brought under the umbrella of the GATT, and its newly created institutional successor, the World Trade Organisation (WTO). Some studies estimate that Africa stands to lose as much as $2.6 billion annually from the Uruguay Round agreement as a result of lost preferences under mandatory revisions to the Generalized System of Preferences (GSP) and Lome Convention as well as increased food import bills. Diversification through massive investments are required.

3.1.1 Fiscal measures

In order to contain monetary expansion, some African countries have financed the bulk of their fiscal deficits by issuing treasury securities rather than directly resorting to borrowing from their Central Banks. Fiscal measures have also included currency reforms. The devaluation of the CFA franc in January 1994 by 100 percent, from 50 CFA F to 1 FF to 100 CFA F to 1 FF, involved 14 countries in two regions, West and Central Africa, plus the Comoros. The CFA franc devaluation was negotiated as an overall package including the cancellation of some of the public debt owed to France, plus new resources from the IMF, the World Bank and other development partners in support of a range of macro-economic reforms.

The impact of the CFA devaluation's appears to have "shifted the domestic terms of trade in favour of tradable *vis a vis* non-tradable, as well as in favour of industries which utilise local inputs versus those heavily dependent on imports."[3] This underscores UNIDO's emphasis on promoting industries which use local inputs, rubber and plastics in the case of the strategy against HIV/AIDS.

Progress in the area of privatisation is hampered by several factors including the low levels of domestic savings. At the same time external debt remains high. During the period from 1991 to 1994, 21 African countries negotiated debt rescheduling agreements amounting to US$7.14 billion of their debt. However, at the end of 1993, the aggregate external debt owed by African countries, including South Africa, was US$301.8 billion. The debt to GDP ratio for the continent (excluding South Africa), climbed to 95 percent, more than three times the value of exports.

3.1.2 The African Economic Community

The treaty on the African Economic Community, which came into force in May 1994 holds great promise for African economies. If the commitments made in the treaty are matched by relevant actions, the Community could become a major player in a new world economic order. The treaty proposes the strengthening of the regional economic communities, notably, the Maghreb Arab Union (UMA), the Economic Community of Western African States (ECOWAS), the Economic Community of Central African States (ECCAS), the Common Market of Eastern and Southern Africa (COMESA), and the Southern African Development Community (SADC).

3.1.3 South-South co-operation

As donors are increasingly less inclined to provide aid to Africa, south-south co-operation will become progressively more important and self-reliance on local products and manufactured goods will be paramount.

3.2 Health issues in Africa

3.2.1 Overview

Basic indicators

With the re-admission of South Africa and the affiliation of Eritrea, the African region of the World Health Organization now comprises 46 countries, 29 of which are among the world's 47 least developed countries.

Basic health indicators for Africa in 1992 show that life expectancy was 52 years for women and 49 years for men. Infant mortality was 104 per 1,000 for the continent, while maternal mortality ranged from a low 80 per 100,000 live births in Zimbabwe to 2,300 per 100,000 in Mali. The male adult mortality rate was 381 per 1,000 In 1990 while the female mortality was 322, in the 15-59 age group. The major cause of mortality were acute respiratory infections, diarrhoea, tuberculosis and malaria [5]. As seen from the infant mortality rates, regional averages mask the wide variations found from one country to another.

Although the region has shown improvement in life expectancy and under-five mortality over the past decades, Sub-Saharan Africa still lags behind all regions of the world.

Pressure due to population growth

Sub-Saharan Africa population distribution in 1993 showed 42 percent of the population were under age 15, 48 percent in the 15-49 age group, and roughly 10 percent are 50 and above. Some estimates placed the number of people 60 years and above at about 5 percent of the total population The population growth rate from 1950 to 1990 was between 2.2 percent and 3.3 percent, resulting in a population increase from 170 million to 500 million in that period. The annual population growth outstrips average annual rates of economic growth and food production. As nutrition and basic food security are cornerstones to good health this situation has had a negative impact on health in the region.

Low levels of spending on health

Per capita expenditure on health is very low in Sub-Saharan African countries, ranging from US$3.50 to a maximum of US$290 in 1994 [5]. Economic hardship has led to poor access to health care and healthcare facilities, a condition which is exacerbated by the lack of skilled human resources in the healthcare sector and the continued brain drain of professionals. Although health coverage is increasing, it remains inadequate, and neonatal care is often lacking. Most women go through childbirth without the benefit of trained assistance. Health infrastructures are underfunded and poorly managed. In general, referral facilities are poorly staffed and not well equipped.

Management problems

Health policies based on the district health concept, and which lay emphasis on primary health care, have been accepted in principle by the countries of the region. However, practical implementation is plagued by lack of strategic planning and proper management at central, provincial and district levels. Poor management is particularly acute as concerns maintenance of facilities and supporting technologies, leading to wastage of limited resources. Experience has shown that the key to success lies essentially in good district health management and well defined priorities.

All the countries of the region have adopted the essential drugs strategy and the majority have essential drugs lists. However, economic and financial mismanagement in both public and private sectors has led to inefficiency in drug supply, and significant wastage and shortages at many facilities. Only US$12 out every US$100 allocated for drugs actually gets to the patient [6].

Pressures due to rapid urbanisation

Between 1980 and 1993 the urban population increased at an annual rate of 5 percent, from 83 million to 162 million. Municipal authorities are hard pressed to meet basic needs in housing, education, health, water supply and waste disposal.

The refugee problem

During 1993 alone close to 16 million Africans were refugees or displaced due to political conflict and natural disasters. This put added pressures on health care systems to cope with disease outbreaks and malnutrition, which in its severest form, affected an estimated 1 million refugees.

Falling immunisation coverage

The polio-free zone in eastern and southern Africa is expanding, and considerable progress has been made towards the elimination of leprosy and dracunculiasis. However, falling immunisation coverage in many countries during the past three years has resulted in increases in the incidence of several diseases. Epidemics of yellow fever, meningitis, cholera and bacillary dysentery have not abated.

3.2.2 AIDS in Sub-Saharan Africa

3.2.2.1 Epidemiology of HIV/AIDS in Sub-Saharan Africa

The prevalence of AIDS in Africa, in general, and Sub-Saharan Africa in particular has reached pandemic proportions. Significant increases in HIV infections, involving people at all socio-economic

levels, have been reported in recent years from all countries in the subregion. AIDS is gradually shifting from a disease prevalent in the industrial world to a disease of developing countries.

HIV and AIDS statistics are plagued by problems of extensive under diagnosis, under-reporting, and reporting delays. Reported infections and cases of full-blown AIDS represent in general around 20 percent of the estimated total cases. This is largely because of infrequent epidemiological surveys and paucity of diagnostic facilities. By 1992, more than 120, 000 AIDS cases had been reported in the region. However, the World Health Organization estimates that by then close to 1 million adult AIDS cases had probably occurred in Sub-Saharan Africa, or around two-thirds of the estimated global total. About 70 percent of the total number of HIV-infected persons now live in Africa, and two-thirds of all new cases of HIV are reported in this region. Current estimates by WHO place the world-wide total at 20 million HIV-infected persons, an increase of 60 percent since 1993, and 4.5 million people (children and adults combined) have developed AIDS since the start of the pandemic. 6000 new HIV infections occur each day, 60 percent of them in the 15-24 age group, and AIDS kills 100,000 people annually. Projected figures for the year 2000 are, 40 million infected people, and 10 million AIDS cases with some 400,000 dying annually due to the disease.[7]

HIV/AIDS and children

So far about 1 million children in Africa have been infected with the virus, and world-wide around half a million have died from the disease, almost all of them in Africa. Nine million children will be orphaned in the 1990's due to the AIDS pandemic [8]. As many as 4-8 million children could be infected by the end of the century.

HIV/AIDS and women

The numbers of HIV infections in men and women are more or less equal. As with other sexually transmitted diseases, there is a slight excess of women infected with HIV, for a variety of sociological and biological reasons: the male to female ratio is approximately 1:1.2. Surveys conducted during 1994-95 have revealed disturbing trends in HIV prevalence. 16-24 percent of sexually active females in Botswana were tested sero-positive. Many women of childbearing age are infected, and HIV transmission from an infected woman to her foetus or infant before, during, or shortly after birth (prenatal transmission) is a widespread and increasing problem in Sub-Saharan Africa.

HIV/AIDS and other diseases

High rates of other sexually transmitted diseases (STDs), particularly those which cause ulcerative lesions such as chancroid and syphilis, are believed to be important factors that have facilitated heterosexual transmission of HIV in this region. Data obtained from a study in Nigeria showed that 22 percent of STD patients were seropositive.

HIV infection is also implicated in the increase of tuberculosis (TB) infections, particularly in Sub-Saharan Africa where there is a high rate of latent TB infection. Bronchoalveolar lavage of HIV-infected persons demonstrated the presence of a factor which enhanced the attachment of tubercle bacilli to AMs by three-fold compared to a normal control population. [9]

3.2.2.2 Major factors influencing HIV epidemic in Africa

Two types of HIV are recognised, HIV-1 and HIV-2. The predominant virus involved in most of the African countries is HIV-1. However, extensive spread of HIV-2 infections are seen in the countries of West Africa. Due to the fact that there are two distinct types of HIV (which are serologically different) and that the virus variability is very high even in a geographically restricted area, there is no single HIV epidemic in Africa; rather, there are several different, often overlapping epidemics. The major demographic, economic, political and socio- cultural and demographic factors fuelling the HIV epidemic are as follows:

1. the youthfulness of the African population;
2. labour migration and urban expansion;
3. the challenge to traditional family life;
4. the social and economic inequalities experienced by women;
5. political instability and deterioration of economy;
6. sexuality and the social patterning of sexual behaviour.

A necessary step is the recognition of the inextricable link between individual high-risk behaviour and the social and economic order, and concomitantly, public sector policies. It is predicated that this recognition facilitates policy decisions necessary to address each country's particular demographic, political, economic and socio-cultural factors fuelling its epidemic and to respond effectively with planning, research and resources.

3.2.2.3 Prevention and control of HIV Infection

Strategies identified for prevention and control of HIV/AIDS infections in the Sub-Saharan region have been well established in the majority of countries. Although the strategies are tailored for each country they generally include the following aspects. These are listed below and discussed briefly in Annex 5.

1. Sensitising and educating the public at all levels on HIV infection and AIDS;
2. Prevention and treatment of other sexually-transmitted and AIDS - related diseases;
3. Condom promotion;
4. Early diagnosis of HIV infection;
5. Prevention of transmission through contaminated blood.

3.2.3.4 Cost of prevention

The cost of prevention is subject to variations, depending on how the calculations are made. Health care interventions in one prevention programme in Kenya included condom promotion, STD treatment, general health education and counselling. A study based on the programme covered a cohort of 1,000 mostly HIV-infected commercial sex workers. It estimated that around 12,000 HIV infections were averted per year, among clients as well as contacts of clients. The entire programme cost US$70,000. Thus the cost of one HIV infection averted was about US$6.00 [19]. By comparison, per capita spending on health in Kenya in 1990 was US$16. Thus the cost of averting one case of HIV was 37.5 percent of the per capita spending in health.

Using a different approach in a study on Tanzania, prevention costs were estimated in terms of a couple-year of protection against HIV infection. Two groups, a core and a non-core group participated in the study. In each case the annual cost of protection was calculated using the formula: Cost of a condom x number of contacts per year. For the core group this gave US$456 (US$0.38 per condom x 4 contacts per night x 25 nights per month x 12 months per year), while for the noncore group the figure was US$45.60 (US$0.38 per condom x 10 contacts per month x 12 months per year) [11]. Estimated couple-year of protection provided under condom social marketing efforts as part of family planning programme in Honduras and Bangladesh are US$15 and US$6.50, respectively [14]. Even the US$6.50 value exceeds the 1990 per capita spending for health in Burundi, Ethiopia, Mozambique, Sierra Leone, Tanzania, Uganda and Zaire. Assuming that on a per capita basis 10 percent of health spending goes towards prevention programmes only 4 of the 39 countries listed in the tables in Annex 2 could afford it: Botswana, Gabon, South Africa and Swaziland.

3.2.3 The impact of HIV/AIDS

There are at least four characteristics of HIV and its epidemiology that distinguish it from other diseases [12] ;

1. HIV infection leads to AIDS which is fatal.
2. A large proportion of infected persons are in their productive years.
3. AIDS strikes at all strata of society and in urban as well as rural areas.
4. It is now the major cause of adult mortality in many Sub-Saharan African countries. This has led to a doubling or tripling of the adult mortality rate.

AIDS has a severe impact on most aspects of society. Although we shall touch briefly on the social aspects of this pandemic, for the purposes of this report we shall limit ourselves to the economic aspects and the costs given in the next section.

3.2.3.2 Cost of coping and economic impacts of HIV/AIDS

Estimates of the economic impact of HIV/AIDS are difficult to make. Models differ and patterns vary from country to country. However, numerical data is available which can be translated into economic impact through various models. The qualitative impact of HIV/AIDS has been treated in the literature, see for example, Over (1992), and Ainsworth (1993). Our particular interest here concerns their impact on industry.

The economic and social impact of a disease that kills people in what should be their most productive years will be immense. "The selective impact on young and middle-aged adults, who include members of social, economic, and political elite's, could lead to economic disruption and political turmoil."

Impact on business and industry

The negative impact of AIDS will be felt most by industries which rely on skilled labour, because of the small labour pool, and the high HIV prevalence among itinerant workers. It is estimated that

due to the high number of AIDS cases within the economically active population group, significantly lower productivity, higher absenteeism and a reduced number of trained and skilled work force will be available. Training costs and job turnover will increase, for example up to 10 percent of the Uganda Railway Corporation's 5600 employees have been lost to AIDS during the last decade. Attrition of the skilled work force in the mining industry in Zambia due to AIDS has led to the need to train approximately 2-3 times as many persons as there are positions to be filled.

Business will be subjected to greater contribution for healthcare, funeral and death benefits. Cost for both public and public sector benefits for employees has risen sharply and hospitalisation costs for beneficiaries has increased significantly. In Uganda the cost per hospitalised patient has risen from US$69 in 1988, to US$ 300 in 1992. The viability of pensions and insurance schemes will be affected. It is estimated that AIDS will *cost* the business sector more than the eventual death of the worker. [13]

Impact on education

Results from a World Bank study suggests that in Tanzania, worst case scenario projected losses of teachers to AIDS will be 14,460 by 2010 and 27,000 by 2020, compared to a non-AIDS scenario. Decrease in the number of school-aged children is projected to be 22 percent for primary school aged children and 14 percent for secondary school aged children by 2020. The cost of training replacement teachers for 2020 is estimated at US$37.8 million (1991 dollars).[14]

Impact on health expenditure

The demand on health expenditure will rise dramatically, as the cost of caring for an AIDS patient has exceeded the current financial per capital spending on health in some countries. There will be a shift in providing a more cost-effective healthcare service. This will impact on all involved in providing this health care, including the suppliers, manufactures and users of healthcare.

In East and Central Africa, more than 50 percent of the medical ward beds in many urban hospitals are occupied by AIDS patients. This has resulted in hospitals being unable to cope with the demand for admission. One hospital in Kinshasa now charges the equivalent of several months of average salary for a single admission of an AIDS patient. One study in the Kangara region in Tanzania estimates the cost of care for AIDS victims at US$65 on drugs prior to death compared to US$47 for adults who died of other causes [15]. The estimated cost in US$ for the treat of AIDS in certain countries is given in Table 3.3.

Table 3.3
Estimates of the direct treatment cost of AIDS

Country	Year	Low	Mean	High
Rwanda[16]	1988-90		358	
South Africa [17]	1991	1850		11800
Tanzania[18]	1987-88	104		671
Zaire[18]	1987-88	132		1585
Zimbabwe[17]	1991	64	614	2574

Impact on children

It is estimated that about 1 million HIV-infected infants have been born in Africa, and almost all of the estimated half-a-million children who have died of AIDS world-wide were in Africa. The projections for HIV-infected infants are based on a prenatal transmission rate, currently about 30 percent, but which may increase with time. Thus up to 70 percent of infants of HIV-infected mothers will be born uninfected. Most of their HIV-infected mothers will die of AIDS within 5-10 years of their birth. It is projected that as many as 9 million children in the region will be orphaned during the 1990s as a result of maternal AIDS [8]. This is in agreement with WHO which projects that there will be 10 million maternal orphans due to AIDS in the world by 2000, 90 percent of them in Sub-Saharan Africa. [19]

Projected infant and child deaths from AIDS may increase child mortality rates by as much as 50 percent in much of Sub-Saharan Africa during the 1990s. In many countries this would wipe out the gains in child survival achieved over the past two decades.

Impact on adult population

During the 1990s, the impact of AIDS will be greatest in large urban areas of Sub-Saharan Africa, especially in East and Central Africa. In such cities, AIDS deaths in young children and in those aged 15-49 may well reduce expected population growth by more than 30 percent. The adult mortality rate may more than triple. However, the population in these countries is expected to continue growing during the 1990s.

"Even if prevention strategies are effective, the current levels of HIV infection and the long incubation period for AIDS suggest that the economic impact of the disease will be a major constraint to development well into the 21st century."

4. NEEDS ASSESSMENT

This section takes a look at potential market demand for pharmaceuticals and allied products used in the diagnosis, treatment and prevention of AIDS and AIDS-related diseases or conditions in Sub-Saharan African countries, and identifies opportunities for local production of these goods in sufficiently large quantities at country and sub-regional level.

4.1 Continued emphasis on prevention strategies against HIV/AIDS

Five major strategies used in HIV/AIDS prevention programmes in Sub-Saharan Africa were identified in Section 3. These have been successful to varying degrees in the fight to control the spread of the disease.

4.1.1 Information, education and communication (IEC) success stories

Information Education and Communication (IEC) aimed at bringing about lifestyle modification is an approach which, as part of a broad prevention programme, has recorded major success in the Sub-Saharan Africa. A few examples are cited below.

A massive television/radio campaign against AIDS was launched in Zaire, between 1988 and 1990, through the combined efforts of the Ministry of Health, musicians and the media. In surveys taken before and after the campaign, the percentage of respondents spontaneously citing fidelity as an HIV prevention strategy increased from 29 percent to 46 percent and the percentage of condom use increased five fold. The campaign is thought to have contributed to the levelling off of HIV prevalence observed among adults in Kinshasa [22]. The video "It's not Easy", of an HIV infected person, has had a significant positive impact on the acceptance and use of condoms in Uganda, other African countries, the Caribbean, Asia and the USA.

4.1.2 Condom promotion

Condom promotion is another essential component of any HIV prevention strategy. IEC campaigns inform the public not only about the virus and the disease, but also on how to protect themselves against infection, notably through the use of condoms. STD prevention and condom promotion targeted at commercial sex workers (CSW) in Kinshasa contributed to a decrease in HIV incidence within this group from 18 percent to 3 percent in only 3 years [22]. During the Zaire campaign from 1988 to 1991, condom sales shot up by 1000 percent, from 900,000 in 1989 to 18 million in 1991.[20]

Condom social marketing (CSM), which is defined as "promotion and sale of condoms at subsidised prices using private and informal distribution networks, energy and salesmanship" [21] has shown some success in Africa, and the number of programmes which employ this approach has increased from 1 in 1986 to 31 countries, as shown in Annex 2. A significant advantages of the approach is that it taps into existing commercial systems and increases access to affordable condoms of good quality. Also such

programmes include cost recovery, and therefore require fewer resources to be sustainable, although they are unlikely to be self-sustaining.

National commitment is the key to the success of the CSM approach. The programme in Zaire which began with one province in 1988 had been extended to 10 of the 11 provinces by 1991. Distribution was initially from conventional distribution points; pharmacies, dispensaries, health centres. This was later enlarged to reach other strata of society; through large companies, voluntary associations, hotels, bars, night clubs, street vendors and traditional healers, a practice which is now widespread in the region. A social marketing program in Zambia recorded 440,000 sales during the first 19 days. In Burkina Faso 2,7 million were sold in 4 months through 68 wholesalers and over 800 retailers, while annual sales in Côte d'Ivoire had reached 6 million by 1993. [21]

Condom promotion is clearly important. But the figures above, impressive as they are, when compared to the target population and their sexual activity show that condom promotion as a stand alone approach to prevention is insufficient. Even so, condoms should be considered in the same light as items on the list of essential drugs, and made universally available.

Early introduction must be advocated as experience has shown that the same programs introduced early have a greater impact than those which start later. And the non-linear nature of the disease is such that a 50 percent reduction in transmission has more than twice the impact of a 25 percent reduction. [22]

4.1.3 Prevention of other STDs and control of AIDS-related diseases

Because of the strong correlation between the spread of conventional STDs and HIV transmission, prevention strategies aimed at influencing sexual behaviour in order to reduce the spread of STDs have the potential to limit transmission of HIV. Therefore, STD services should be included in the set of basic services provided by health centres. This approach to prevention is recommended particularly to countries with high STD prevalence but low levels of HIV infections, as the potential for increased infections is highest in these environments.

4.1.4 Prevention of perinatal transmission and through contaminated blood

In African countries heterosexual intercourse remains the primary method of HIV spread, accounting for around 80 percent of all transmissions. (It can reach as high as 90 percent or more, in Niger, Guinea and Madagascar.) Mother to fetus transmission is next, and ranges between 8 and 12 percent, while blood transfusions account for most of the rest.

Blood screening must be accompanied by serious efforts to reduce blood transfusions in general. Specific national guidelines are needed on when transfusions are required and when other methods are more appropriate.

4.2 HIV testing

The benefits of screening have been the subject of some debate. The issue often is, what can be done with the knowledge that a person has the virus? Would conscience lead to more responsible social behaviour by infected persons, and thus impact positively on the spread?. Or would the spread of the virus be limited by saturation phenomena to about 20-40 percent of the sexually active population no matter what, as some argue? The conventional wisdom is that knowledge is important. The tendency is therefore to go ahead with testing for HIV, even if it is not clear what should be done with this knowledge. However, perinatal infection is one area in which there is clear indication of the advantages of testing.

4.2.1 HIV testing of pregnant women

The Centres for Disease Control and Prevention (CDC), Atlanta, Georgia has published guidelines which urge medical professionals to provide HIV counselling and voluntary testing for all pregnant women. Results from a National Institutes of Health (NIH), Betnesda, Maryland AIDS Clinical Trials Group Protocol show that zidovudine (ZDT or AZT) could reduce perinatal HIV transmission between mother and fetus, by as much as 67.5 percent in some women. (published in the New England Journal of Medicine in November 1994). The Food and Drug Administration (FDA), the regulatory agency for pharmaceutical products in the United States, has approved AZT use for pregnant women, and the US Public Health Service has issued guidelines on use of the drug during pregnancy.

4.2.2 HIV testing of tuberculosis patients

There are strong links between HIV and tuberculosis. Infection with HIV is the most significant factor in the resurgence of tuberculosis in Africa. Annual risk of tuberculosis among persons with HIV and tuberculosis co-infection is 5-10 percent, while lifetime risk is around 50 percent. In 1990 4 percent of tuberculosis infections were attributable to HIV infection. This is projected to increase to as much as 14 percent by the year 2000. In an effort to assist policy makers and programme managers on the issue of testing for HIV in patients with tuberculosis, the WHO Global Tuberculosis Programme and the Global Programme on AIDS have put out a joint statement to the effect that, whereas there is no need for mandatory testing, they recommend voluntary and confidential testing. Guidelines for unlinked anonymous HIV testing of tuberculosis patients for surveillance purposes have been issued previously by WHO. This is of particular interest to Sub-Saharan Africa where there is a large percentage of latent tuberculosis infection.

Inputs required to support these prevention approaches should constitute the basis of the immediate response aspects of the proposed UNIDO strategy. And as shown in the box item (see box 4.1) successful transfer of technology for producing HIV/AIDS related prevention products to sites in Sub-Saharan Africa is achievable.

Box 4.1

Transfer of HIV-1/2 dipstick technology to Cameroon[31]

The World Bank, suggests that a priority area for R&D work is low-cost and efficient diagnostic technologies for use in health centres in developing countries [23]. Walsh [24] proposes the following desirable features for such diagnostic tools:

1. *simplicity of use*
2. *adaptability to local conditions*
3. *stability*
4. *minimal need for instrumentation, can be performed in home of community health worker*
5. *lowest possible cost*
6. *speed (for patient care less than one hour, longer time acceptable for epidemiological surveys)*
7. *accuracy*

HIV Dipstick Technology

In response to the need for a diagnostic tool for the detection of HIV-1 and HIV-2 antibodies, which meets the developing country requirements cited above, The Program for Appropriate Technology in Health [25] has developed a low cost high sensitivity and specificity dipstick. The test, which has a sensitivity of 99.5 percent or greater and a specificity of 98.2 percent or more, uses "HIV peptides attached to a comb-shaped piece of plastic to capture specific HIV antibody in serum, plasma or whole blood". [25] A red spot on the plastic dipstick indicates the specimen is positive.

The technology is particularly attractive to developing countries as the targeted manufacturing cost is about US$0.50 per test or less, compared to US$2.00 or more for commercially available tests. The test takes approximately 20 minutes, about one-sixth the time required for ELISA methods. A corporate decision at PATH was made not to manufacture the test but to transfer the technology to developing countries for local production.

Chronology of Events

In late 1990 the prime mover of the project suggested that the AIDS program at the Centre de Coopération Internationale en Santé et Développement (CCISD) at Laval University, Quebec, Canada support the transfer of dipstick technology to Cameroon. In November 1990, CCISD opened discussion with PATH, and an initial visit by a team from PATH and CCISD was made to Cameroon March 1991 to ascertain local interest and possible collaborators. This led to a needs/feasibility assessment mission in August 1991. The mission did an analysis of the health context, financial and market issues, technical requirements (staff, equipment, supplies, facilities, reporting, regulatory), administration and management structures. Three alternative hosts for the new technology were considered. The private sector in Cameroon has better management skills than the public sector but, as of now, does not have the technical know to support such a technology. The Ministry of Health has some know-how but an HIV dipstick project based there would be fraught with management problems. A good compromise was found to be a university or research organisation. The Institute for Medical Research and the Study of Medicinal Plants (IMPM in French) has both technical know how and some management expertise. The one drawback, however, is that like the ministry, it suffers from problems with marketing and sales capability. To overcome statutory constraints on the kinds of activities in which a research institute can be engaged, a joint venture company, "Camdiagnostix" has since been registered as a formal instrument to produce and market the kits.

In February 1992 a proposal was made to CCISD. This received initial approval in April 1992 and in September of that year the project work plan was approved and funds released. The work plan was revised and the budget reduced in May 1993, due to cut backs at the Canadian International Development Agency (CIDA) who are funding the project.

Local Production

Although most of the materials are produced in Cameroon, some components are bought from abroad because they are less expensive and of better quality than if they were made locally. One such item is packaging, due to the poor quality of locally available paper.

Financing

The total budget for the project is CAD $1 million divided equally among three headings:

1. *facilities and local use*
2. *equipment*
3. *purchase of components*

The project is wholly funded by CIDA.

Outcomes: A high-tech tool appropriate for the developing world

What sparked initial interest in the HIV dipstick project in Cameroon are considerations similar to those cited above. It is a diagnostic test designed to meet specifications for developing countries:

1. *stability at room temperature (no refrigeration required)*
2. *ease of use*
3. *high insensitivity to humidity*
4. *long storage periods - up to six months*
5. *small sized packages, not large bulky ones.*

The test kit includes ten items, from peptide antigen combs, through various control sera, to reagents and wash tray. Use of the kit requires additional items such as timer, disposable latex gloves, pen and pencil. There is also a nine-step test procedure for administering the test and a decision tree for interpretation of results.

4.3 Cost implications of AIDS

4.3.1 Financing

HIV/AIDS in Africa is not a problem for the Africans alone. AIDS has proved that it does not discriminate on any basis. With the world reduced to a "global village" international travel enhances the spread of infection from one continent to another. Southeast Asia in now poised to become the epicentre of the pandemic in the next century. A tremendous amount of goodwill has been shown by the

international community already. The recognition of AIDS as a global threat and that a parochial approach to the disease is unworkable, has prompted a public sector-pharmaceutical industry response to the needs of developing countries which go beyond "business as usual", or purely profit and loss considerations (source WHO/GPA/RES/93.1, 1993). It is estimated that by the year 2000, developed countries will have invested billions of dollars of public and private funds in the search for AIDS drugs and vaccines, and for the development and marketing of products used in prevention and coping strategies. Even so, Africans must take primary responsibility for the fight in the area of prevention programmes. And whereas declarations are important in manifesting political will, demonstration of true commitment is when actions are taken, even when they involve political, financial and human risks and short-term sacrifices. African countries must stake their claim to a share of the overall financial responsibility for reducing the spread of HIV and AIDS on the continent. Bilateral and multi-lateral donors and international finance and development agencies appear willing to provide financing assistance. The World Bank, for example, has already financed projects in the region worth nearly 100 million US dollars (see Table 4.1).

Table 4.1

Major AIDS/STD Financing by World Bank Loans/Credits in Africa

Country	Date Approved	Project Title	Major AIDS/STD Components	Aid (millions US$)
Niger	1986	Health Project	Laboratory Equipment	0.15
Burundi	1987	Population and Health Project	IEC, Blood screening	0.19
Kenya	1988	Health Rehabilitation Project	Research, Supplies	1
Guinea	1988	Health Services Development Project	IEC, Laboratory Equipment	1
Uganda	1988	First Health Project	IEC, Supplies	1
Zaire	1988	AIDS Control Project	All Components	8
Lesotho	1989	2nd Population Health Nutrition (PHN) Project	STD Prevention and Control	0.9
Nigeria	1989	Imo State Health and Population Project	IEC, Disease Surveillance	1
Tanzania	1990	Health and Nutrition Project	STD Program, Training Drug Procurement	10
Malawi	1991	PHN Sector Credit	IEC, Training	0.4
Zimbabwe	1993	Sexually Transmitted Infections Project	Drug Procurement, Supplies	7.5

Source: World Bank, AIDS and African Development, 1993

4.3.2 Investment now will result in major savings later

Investment in prevention measures should be made now rather than later. Estimates by both WHO and the World Bank indicate that by increasing the current health expenditure in developing countries,

estimated at £170 billion, by a mere 1 percent in 1993, the number of HIV infections expected by the year 2000 could be cut in half. A total of between US$1.5 billion and US$2.9 billion would have been needed to finance such prevention activities as widespread promotion of condoms, treatment of STDs and other measures which reduce the spread of HIV/AIDS. WHO estimates that the investment would save US$90 billion in the cost of coping and managing the disease before the end of the century. [26]

4.4 Products for manufacture of pharmaceuticals for HIV/AIDS programmes in Sub-Saharan African countries

UNIDO's strategy should focus on the following:

1. Production and marketing of condoms, at affordable prices as condom use is the approach with the greatest impact in preventing the spread of HIV and AIDS, as part of an IEC campaign and in CSM programmes.

2. Products used in prevention of other STDs and control of AIDS-related diseases because of the strong correlation between the spread of conventional STDs and HIV transmission.

3. Products for blood screening and handling, to prevent transmission through contaminated blood which accounts for anywhere from 6 percent to 10 percent of HIV transmission in Sub-Saharan Africa.

4. HIV diagnostic kits for testing of pregnant women so as to reduce the number of transmissions from mother to foetus, through counselling and use of FDA approved drugs such as zidovudine (ZDT or AZT). The kits will also be used in testing for HIV among tuberculosis patients. The strong links between HIV and tuberculosis make HIV infection the most significant factor in facilitating the resurgence of tuberculosis in Sub-Saharan Africa where there is a large percentage of latent infection.

5. A radio which runs on spring power (much like a spring-wound clock) to facilitate wider reception of broadcasts in IEC campaigns, especially in rural areas.

4.5 Potential market

Although AIDS awareness levels are high, low prevalence rates for condom use (around 1 percent), and especially limited purchasing power make it unlikely that local production programmes targeted at national markets alone will become viable. For these reasons, estimates of potential market size are made for sub-regions and the entire region. The emphasis is on potential, as actual markets need to be developed. Private sector spending on health remains very low. Short term respite may be found in the donor support currently available for HIV/AIDS prevention programmes.

4.5.1 Projected needs for condoms

Condom social marketing (CSM) programmes are expected to increase the usage rate for the prophylactic, and thus the demand, from the roughly 84 million in 32 countries in 1990 and 135 million in 1991, to between 810 million (5 percent usage) and 1.6 billion (10 percent usage) by the year 2000. Even in the unlikely event that usage rate remains low (1 percent) the demand would still be around 162 million condoms in the 39 countries covered by the study in the year 2000. More detailed projections by sub-region and under varying hypotheses on usage are given in Annex 1.

4.5.2 Projected needs for syringes

Immunisation of children alone gives some indication of the potential market for syringes. WHO aims at 80 percent coverage of children through the Expanded Programme on Immunisation (EPI), undertaken largely through UNICEF. Annual needs for syringes by the year 2000, assuming a three-shot course, is about 61 million. Coverage has dropped in the past few years, and so a more realistic rate might be around 40 percent, leading to a total need of the order of 30 million syringes per year for EPI alone.

4.5.3 Projected needs for HIV testing

The number of projected diagnostic tests needed to confirm presence of AIDS is pegged to the estimated number of new cases, which will increase by about 5.5 million world-wide in the next five years.. From Africa's 70 percent share of the disease burden and the growth rate, the estimated number of tests required annually in the region by the year 2000 will be around 1.2 million.. The cumulative total needs in the next five years (1996-2000) will be about 3.5 million tests.

Rough estimates for the number of HIV tests needed for pregnant women alone put the figure at somewhere between 1.6 million and 8.5 million in the year 2000. Testing is recommended but voluntary, and will be greatly influenced by the success of neonatal programmes.

4.5.4 Latex gloves

Unlike condoms for which the potential market consists of the general public, latex gloves are targeted primarily at health care workers, the majority of whom are employed by government. The glove market is therefore supported largely by the public sector, either from the national budgets or through donor aid. However, health care workers play a major role in both prevention and coping strategies. Programmes designed to protect them and products used in such programmes should be given equal emphasis.

The desperate need for latex gloves is illustrated by the situation in a 120-bed hospital in Southern Africa, where health care workers wash and boil latex gloves for reuse. [27]

4.6 Opportunities for local production

Indicators for the manufacturing sector in Tropical Africa (a UNIDO region which includes most of Sub-Saharan Africa) are encouraging. After a precipitous drop from 3.5 percent in 1990 to 0.2 percent in 1991 and 0.1 percent in 1992, MVA growth rate was expected to increase to 2.7 percent in 1993 and 3.3 percent in 1994. [22] And although rubber and plastic products and industrial chemicals have only a 5.1 percent share of total MVA (Manufacturing Value Added), there is pharmaceutical manufacturing capability in the region; in Cameroon, Kenya, Namibia, Tanzania, South Africa, Zambia and Zimbabwe, to name a few. This capability consists of managerial know-how, equipment, skilled labour, and supply of raw materials.

Service industries, such as consultancy firms which do studies and provide technical advice, producers of packaging materials, storage facilities, distribution networks, and maintenance and repair workshops, are also available in many countries. These need to be developed further, as capital investment requirements are generally low. Financial institutions need to be sensitised to the enormous potential benefits that may obtained from these service industries.

Four target development poles are proposed, as discussed further in chapter 5 (Major Issues). These are Cameroon, Côte d'Ivoire, Kenya and Namibia. The following criteria were used to select the countries:

1. The need for a subregional approach and to promote balanced development favour a division along the lines of existing subregional economic groupings, namely, the Economic Community of Western African States (ECOWAS), the Economic Community of Central African States (ECCAS), the Common Market of Eastern and Southern Africa (COMESA), and the Southern African Development Community (SADC).

2. As to individual countries within the trading blocks, political stability is, quite naturally, a major consideration.

3. The potential to successfully carry out the project based on availability of production, distribution, sales, and managerial know how. These attributes can be estimated from existing pharmaceutical production facilities

4. The acuity of HIV/AIDS in the subregion and country and governments commitment to deal with it.

5. The potential for spread of HIV: Countries with known high levels of STDs but low levels of infection, are prime targets for rapid growth of the pandemic. 12 countries belong in this category - Cameroon, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Lesotho, Madagascar, Nigeria, Somalia, Swaziland. [7]

6. One aspect of balanced development in the African context is linguistic balance

Other considerations were as follows:

1. UNIDO has prepared a project entitled "Integrated Development Programme to Diminish the Incidence (Spread) of HIV/AIDS Through the Development of Local Production of Disposable Medical Articles and Pharmaceuticals Formulations" for Tanzania. The project was costed at US$580,000 in 1993, and has been in the pipeline since then. Informal reports say there are limited prospects for success of a manufacturing venture in Tanzania at this time.

2. A project is under way in Cameroon to produce dipsticks for HIV 1 and 2 under license from PATH. (See box 4.1 in section on Situation Analysis, page 22.)

It should be noted that the choice of these countries is based on existing conditions in September 1995. Should economic, market, political and other conditions change significantly for the worse, other countries will be selected.

Human and financial resources, as well as technical capacity available in South Africa, which is expected to return to the UNIDO fold in the near future, could be used to provide technical assistance, and promote joint ventures in the four development poles.

4.7 Economic co-operation and trade agreements

The objectives and agreements within ECOWAS, which are outlined below, are typical of the four trading zones in which the selected development poles are located.

ECOWAS has envisaged the following:

- common and uniform commercial policies,
- customs union,
- liberalisation of trade; exchange of products originating in the community,
- no customs duty or "non-tariff" barriers on community's products,
- common customs tariffs,
- elimination within ten years after the treaty comes into force of all restrictions and prohibitions on goods produced in the Community,
- each country grants to others "most favoured nation" status as concerns trade and commerce,
- co-operation in transport and communications

Monetary and financial co-operation includes a fund

- for co-operation, among other objectives, to ensure mobility of funds within the Community by integration of financial markets and stock exchanges,

- to guarantee foreign investment made in member states,
- to supply appropriate means for facilitating constant mobilisation of resources from within and outside the Community.

The member states also agree to:

- harmonise their industrial policies to promote uniform industrial development,
- communicate to each other the feasibility studies and reports on products being carried out in their countries,
- communicate to each other on request reports on the results obtained by technical partners who have carried out similar projects on their territory,
- communicate to each other on request reports concerning foreign companies operating on their territory,
- communicate to each other on request reports on experience acquired in industrial projects and to exchange consultants and information concerning industrial research,
- where appropriate to carry out joint studies to determine adequate industrial projects to be carried on within the community,
- where appropriate to jointly finance research related to technical transfer, the development of new products by use of raw materials common to all member countries or to some of them, and to specific industrial project.

4.8 Sustainability

4.8.1 Modelling sustainability of transferred technologies

The life cycle of a technology shows the following phases: [29]

1. Innovation
2. Early diffusion.
3. Incorporation
4. Wide utilisation
5. Abandonment

In the case of technology transfer, the term "introduction" is more appropriate than "innovation" as a descriptor for the initial phase. Optimal and efficient technology transfer, in particular in the health care sector is achieved only if all the elements or phases of the technology transfer process are functional. This was demonstrated at health facilities in Southern Africa [30].

In the case of developing countries, abandonment is likely to correspond to the end of donor support. Problems of doing business in Africa, described elsewhere in this report, are to blame.

4.8.2 A model for sustainability of a transferred technology

The above considerations suggest a model for sustainability, based on four factors: [31]

- availability of human resources,
- flow of manufacturing inputs,
- diffusion or market penetration,
- institutional, support or the existence of an enabling industrial environment.

Human resources bring to the process know how in the form of production and managerial skills, as well as competence needed to maintain production facilities. Raw materials are the lifeline of the process. Their availability depends not only on cost but also on the existence of supply networks, which in turn depend on good transport and communications infrastructure. Diffusion of the products (market penetration), which is conditioned by availability and affordability (cost), positively impacts on sustainability. Wide utilisation and diffusion generally mean:

1. a broad market base due to successful commercialisation
2. deep penetration levels geographically or, in terms of societal strata,
3. existence of mechanisms for promoting the products

4.8.3 Long term sustainability requires growth

Long-term sustainability depends on commercial response to market forces, and this requires growth. Pharmaceutical needs for HIV/AIDS prevention programmes will grow as the pandemic is projected to expand in the foreseeable future. And as prevention strategies are currently based not on vaccines, but on lifestyle modification, the needs are destined to be continuing. The potential market is thus assured. Production should also adapt to changing needs. For example, as prevention programmes spread and storage and distribution systems improve, package sizes may need to change. The capability to diversify is another aspect of growth which would be beneficial to local production schemes. The HIV dipstick, for example, is a good generic technology, which can be adapted to detection of parasitic diseases in general, onchocercaisis for example, when biotechnology research delivers the appropriate methods of gene expression and isolation.

4.8.4 Nurturing environment for sustained local production

The key element in the model for sustainability described above is institutional support. In a developing country, this usually means government commitment as demonstrated in practice by financial and other support. Government backing can support training programs and facilitate access to information on production methods, thus promoting know-how. National programmes

or campaigns based on a health care product are the most common ways of ensuring wide utilisation for it. Institutional backing could accord "orphan technology" status to a product. The two conditions for this status are:[32]

- commercial viability criterion, local production would not be promoted by private sector due to lack of commercial viability,
- cost-benefit criterion; the benefit to be derived exceeds the cost of development and production.

Publicly mandated products such as those used to fight AIDS would fall in this category and thus qualify for special financing considerations. Generally, only government can ensure an enabling industrial environment in which industry's competence and skill nurture and sustain a product or technology. Political commitment is, again, an indispensable prerequisite at national, regional and international levels.

4.9 Products for long-term control of HIV/AIDS

Through research great strides have been made in understanding the aetiology and pathogenesis of AIDS, and the first generation of candidate vaccines have been brought to Phase I/II clinical trials, although it is not yet known if these are effective in protecting against HIV infection. [33] However, many hurdles remain to the development of commercially viable products. These include:

1. Scientific uncertainty due to insufficient understanding of the pathogenesis of the disease and how to block HIV transmission and infection.

2. Intellectual property concerns arising from competing claims regarding patent rights, or curtailment of the period of protection;

3. High development costs due to clinical trials required for preventive products, which are generally expensive.

4. Market potential in general, and especially for products needed in some parts of the world which may have limited commercial appeal in other parts

5. Concerns about liability arising from adverse effects especially for preventive products such as vaccines and microbicides. [33]

Even when products are available there are often interminable delays in getting them to the developing world. From initial approval to large-scale distribution in developing countries, it took around 15 years for the polio vaccine, 15-20 years for the measles vaccine, and over ten years now for the plasma-derived hepatitis B vaccine.

UNIDO is in a position to mitigate the effects of other factors which impede the development of commercially viable products in the North.

1. HIV/AIDS products are publicly mandated to provide universal coverage. It is likely that industry will come under public pressure to institute a differential pricing structure with lower developing countries prices threatening higher prices set for developed country markets.

2. There are strong disincentives to entering developing country markets, due to insufficient international regulatory harmonisation, inadequate distribution systems, and the risk of parallel imports, counterfeiting and piracy.

4.10 Other preventive products

Although vaccines have been the cornerstone of public health success against other infectious diseases, such as smallpox and poliomyelitis, female-controlled barriers to HIV (and possibly other sexually transmitted pathogens) such as vaginal microbicides may lend themselves to faster development than a vaccine. UNIDO has already been approached to provide support for the development of a commercially viable product based on the invention of one such prevention agent.

5. MAJOR ISSUES

There are questions associated with this initiative. The first is, whether or not industries for the production of pharmaceutical and other health care inputs used in the fight against HIV/AIDS should be developed in Sub-Saharan Africa. If so, other issues need to be addressed; the different types of industries to be promoted, candidate countries to host these production facilities, and the technologies to be used. Finally, it is important to examine existing regional and subregional co-operation arrangements in terms of their possible impact on the initiative.

5.1 Potential market

There is a large potential market, as illustrated by the need for condoms. Over 84 million were distributed in 1990 in the 32 Sub-Saharan African countries for which data is available. This figure rose to 135 million in 1991. Assuming an average of 120 sexual contacts per annum (by males between the ages of 15 and 49), this would imply a usage rate of about 1 percent in 1993 in Cameroon. Under these conservative assumptions 162 million condoms would be needed in the 39 countries covered by the study in the year 2000. Condom Social Marketing (CSM) programmes are expected to increase the usage rate, and thus the demand.

Using projected data on crude births and under various scenarios for the pregnancies-to- crude birth ratio (from 1.1:1 to 1.5:1), and the percentage of pregnant women who undergo the recommended testing for HIV (from 5% to 20%), the number of tests which will be needed in the year 2000 ranges between 1.6 million and 8.5 million.

5.1.1 Prospects for local production

The accent in the preceding market scenario is on "potential". Actual markets need to be developed, particularly as local purchasing power is limited. The current market for these products (condoms, syringes, surgical gloves, HIV test kits, etc.) is largely dominated by foreign manufacturers and suppliers. The World Bank, while concluding that pharmaceutical markets in Africa are not efficient, equitable or sustainable, allows that the best chances for success in local production lie in those countries where there is a nucleus of pharmaceutical manufacturing. It could also be argued that manufacture of health system inputs to the fight against AIDS should not be dictated by market forces alone, but must have a social and developmental dimension. Self empowerment and poverty reduction should be addressed. The latter is one of the priorities in WHO's Ninth Programme of Work (1996-2001). This consideration would promote local production even if initially the cost of such locally produced goods would be more than that of imports. Foreign aid in the form of "tied aid" should be restructured to allow more flexibility in its use, for instance to finance purchase of locally manufactured products. Fallout benefits to local manufacture in terms of employment, and especially development of local production capacity, and improvement of Good Manufacturing Practices (GMP) outweigh the short-term disadvantages.

Local production in facilities owned (at least partially) by nationals would also portray HIV/AIDS prevention programmes in Sub-Saharan Africa as demand driven. This is not the impression given now by heavy dependence on financial and technical assistance from donors and on imported products to support the programmes. The prospects are that local production would positively influence acceptance of and participation in the campaigns.

More quantifiable advantages are linked to transportation, and especially storage. In Zambia, for example, condoms supplied through donor assistance remained largely unused. For economic reasons, bulk shipments were made and less than half were distributed, leading to wastage. The remainder were stored under poor conditions and distributed infrequently. Local manufacture would result in significant savings on intercontinental transportation costs, as well as reduce storage requirements.

It has been stated elsewhere in this report that much of the health care in Sub-Saharan Africa is financed by the private sector and donor support. In particular bilateral and multi-lateral aid accounts for the majority of the recurrent cost in the fight against HIV/AIDS. The report also indicates general development goals of this initiative that go beyond limiting the spread of HIV/AIDS. Successful local industrial development would strengthen the consumers' ability to pay for health care and directly contribute to better health. And as the World Development Report 1993 clearly points out, health is one commodity in which it is very much worth investing.

5.1.2 Service industry

Attention should not be limited to production industries. Service industries, such as consultancy firms to do studies and provide technical advice, packaging firms, storage facilities, distribution networks, and maintenance and repair workshops should be promoted as well. They are likely to impact positively not only on local production of HIV/AIDS inputs but on the pharmaceutical industry as a whole.

It is in this field of service provision that the highest return on investment measured in term of health impact will be achieved. The process of technology transfer in Sub-Saharan Africa is clearly neglected and requires immediate attention. Public and individual lobbying often prescribe the market for this industry.

Capital investment in this sector is traditionally low, and thus the risk to the investor is diminished with regard to fixed assets. Although, there is a clear market potential for this type of industry, the market is unexplored and poorly established in most Sub-Saharan African countries. Both the public sector and financial institutions have to be sensitised to the enormous benefits that may result from this industry.

5.2 Target development poles

Local production should be focused on four subregional development poles, namely Côte d'Ivoire (ECOWAS), Kenya, (COMESA non SADC), Namibia (SADC) and Cameroon (ECCAS). Existing trade agreements among the member countries already circumscribe them into large single markets, although SADC is entirely contained in COMESA. ECOWAS represents 36 percent of the population of Sub-Saharan Africa, SADC has a 23 percent share, COMESA (non SADC) 25 percent, and ECCAS is the smallest at 16 percent. Except for ECCAS, the sub-regions have posted positive economic growth rates in the last two years. MVA growth rate was expected to increase to 2.7 percent in 1993 and 3.3 percent in 1994 in Africa as a whole.

There is already pharmaceutical manufacturing capability in the sub-regions, and emphasis should be placed on strengthening existing industries. In Cameroon, for example, a Rhone Poulenc facility is currently running at one-third capacity, and a production unit for HIV-1/2 dipsticks is ready to start assembly of test kits The entire line of products (condoms, syringes, surgical gloves, HIV test kits, etc.) should be produced at each pole, as potential market size would be sufficient to justify the capital investment. This approach would encourage balanced development of the pharmaceutical industry in the region, by limiting dominance of the market by a single giant.

A special case is South Africa, which is expected to return to the UNIDO fold in the near future. Given current growth projections, the private sector pharmaceutical industry in South Africa is likely to enter the market on its own. As concerns this initiative, the human and financial resources, as well as technical capacity available in the country could be used to provide technical assistance, and promote joint ventures in the four development poles.

5.3 Sources of raw materials

Each pole would produce for the subregion with raw materials from within. This will shorten transport routes and minimise communications infrastructure problems along with those linked to trade across zone boundaries. Raw materials are available, as rubber and plastic products and industrial chemicals already account for a modest 5.1 percent share of total MVA. South Africa could also produce raw materials for pharmaceutical products.

5.4 Technology to be promoted

Various technologies are in use in the region. These include production of injectable solutes, tablets and capsules, orally administered liquids, and latex manufacture. Import substitution industries have succeeded in Africa when they did not depend on imported raw materials. The mineral water industry is a prime example. Available rubber and latex production would provide raw materials for the manufacture of condoms, which will constitute the largest component of the product mix, in terms of both volume and sales.

5.5 Co-operation and collaboration

This is not to gloss over the real problems associated with local industry, and business as a whole, in Africa. An enabling industrial environment needs to be created by government for the scenario above to be played out successfully. One possibility would be to initially give these industries a head start through preferential agreements on supply of their products to programmes in the region. This would be followed by progressively decreasing these "protective" measures and gradually opening up the process to free market forces, thus allowing an incubation period for the fledgling industries to take root.

Close collaboration between countries, international organisations, donor agencies and the pharmaceuticals industry is essential. The influence of international organisations such as UNDP, UNIDO and especially WHO will be useful in facilitating the process of obtaining regulatory approval from national and international agencies and promoting the sales of locally produced goods.

6. RECOMMENDATION

Now that a clear strategy has emerged from this study, additional technical field activities to better support the planned investment promotion seminars are recommended. The following outputs are expected from these complementary activities:

1. Detailed technical plans and cost estimates for expanding production lines to cover condoms, syringes, surgical gloves, HIV test kits, and other HIV/AIDS related inputs, at existing pharmaceutical manufacturers in Cameroon, Cote d'Ivoire, Kenya and Namibia.

2. In-depth evaluation of existing service industries, essential to an EIE, in the ECCAS, ECOWAS, COMESA and SADC sub-regions, to cover:

   - information services related to industry and commerce,
   - consultancy firms which undertake studies and provide technical advice,
   - packaging firms,
   - storage facilities,
   - supply and distribution networks for manufacturing inputs and finished products, and
   - maintenance and repair workshops.

3. Plans to strengthen specific establishments involved in the above service industries so as to support the pharmaceuticals industry in general and production and marketing of HIV/AIDS related products in particular.

4. A data bank of pharmaceutical subsector firms and individuals in South Africa susceptible to be called upon to provide technical assistance within the framework of this programme.

There are compelling reasons for recommending these activities in preparation for investment promotion seminars to be held, probably, at the four development poles.

1. Not all countries in Sub-Saharan Africa are expected to produce the required health system inputs, yet coverage must be universal in the region. This points to the important role which management and distribution must play if programme goals are to be met. Projects have failed in the past because they focused largely on production and did not take into account the silent partners to manufacturing success. Marketing, sales, distribution and maintenance are indispensable supporting activities to any sustainable manufacturing activities. The pharmaceuticals supply chain in Africa has losses at each stage. Distribution problems alone account for a loss of $19 out of every $100 allocated to the supply of drugs.[5] The World Bank concludes that, "The reality in many African countries is that pharmaceutical markets are not efficient, equitable or sustainable."[6] Project profiles for ventures into this subsector must therefore be backed by detailed field studies such as recommended above. Secondly, a parallel effort must address the installation of adequate service industries to support manufacturing.

2. Service industries, besides helping to create an EIE, are a mechanism for economic growth in their own right, and have been the cornerstone of some national economies. Botswana, for instance, posted a growth rate of 10.1 percent in 1992. with services accounting for 43 percent of GDP. [34] In Namibia services contribute 62 percent of the GDP in 1992. [2]

3. Potential investment sought in the programme, is likely to be of the order of ten million US dollars or more. Programme investment for studies thus far has been $100,000. Additional funds would be well spent if this helped to identify conditions which would improve the chances of success of the proposed production activities, and thereby ensure the soundness of the huge investments which are anticipated through the programme.

7. COMPLEMENTARY TECHNICAL ACTIVITIES PREPARATORY TO INVESTMENT PROMOTION SEMINARS

7.1 Introduction

An internationally co-ordinated response to the Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) pandemic, in the form of a co-sponsored United Nations programme involving six organisations, was endorsed by the Economic and Social Council on 26 July 1994 as it adopted without a vote a resolution sponsored by 50 countries. It is UNIDO's intention to contribute to the internationally co-ordinated efforts with the subject programme/project.

A programme concept on integrated development programme for the local production of health sector inputs in the countries of the Africa region was prepared in the first quarter of 1993 and endorsed by the Programme and Project Committee on 22 July 1993 for further development. In the final workplan of UNDP for 1994-1995, the subject project with some modification was assigned to UNIDO for implementation.

The implementation plan focuses on Sub-Saharan Africa, currently the epicentre of the spread of HIV/AIDS. A study, completed in October 1995, has proposed a strategy for the implementation, estimated potential markets in four sub-regions of Sub-Saharan Africa, and identified four development poles for local production sites. A subregional approach is proposed as very few Sub-Saharan African countries have a large enough actual market to support local production for national consumption only. In 1993 the countries of the region spent less that $2 per capita on pharmaceuticals.[35] This consideration and the need to take advantage of existing conventions and trade agreements, have led to the selection of Cameroon, Côte d'Ivoire, Kenya and Namibia, as four development poles. These countries are members of ECCAS, ECOWAS, COMESA non SADC, and SADC, respectively. Except for ECCAS, the sub-regions have posted positive economic growth rates in the last two years. MVA growth rate was expected to increase to 2.7 percent in 1993 and 3.3 percent in 1994 in Africa as a whole, and there is already a nucleus of pharmaceutical manufacturing capability in each of the sub-regions. The approach calls for each pole to produce the entire line of products (condoms, syringes, surgical gloves, HIV test kits, etc.) for the subregion with raw materials from within, as potential market size would be sufficient to justify the capital investment. Available rubber and plastic products and industrial chemicals already accounted for a modest 5.1 percent share of total MVA in 1992. This approach would encourage balanced development of the pharmaceutical industry in the region, by limiting dominance of the market by a single giant.

South Africa could also produce raw materials for pharmaceutical products. This will shorten transport routes and minimise communications infrastructure problems along with those linked to trade across zone boundaries

The proposed UNIDO strategy will be used in the next phases of the programme as outlined in the Programme Concept endorsed by the PPRC on 22 July 1993. UNIDO will organise a regional workshop/seminar with particular reference to promote local production of health care inputs related to HIV infection and AIDS by local private entrepreneurs/investors. Detailed investment profiles are needed to get strong commitments at the workshop.

7.2 Problem to be addressed

There is a large potential market in Sub-Saharan Africa, as illustrated by the need for condoms. Estimated needs for the year 2000 range from 162 million (1% usage) to 3.2 billion (20% usage) depending on use. The number of HIV tests which will be needed in the year 2000 alone is estimated at somewhere between 1.6 million and 8.5 million, depending on the scenario used. Prevention strategies in the subregion use Information Education and Communication (IEC) campaigns and condom social marketing (CSM) programmes. These are expected to increase the demand for HIV/AIDS related inputs (condoms, syringes, surgical gloves, HIV test kits, etc.). As of now the market for these products is largely dominated by foreign manufacturers and suppliers, despite the fact that manufacturing capacity (infrastructure, skilled labour, and managerial know-how) exists to produce them locally.

The pharmaceuticals industry in the subregion also suffers from the poor state of service industries which support production, such as, consultancy firms, packaging firms, storage facilities, distribution networks and maintenance and repair workshops.

7.3 Objectives

The immediate objectives of the project are:

1. To promote local production of condoms, syringes, surgical gloves, HIV test kits and other pharmaceuticals and allied products used in the diagnosis, treatment and prevention of AIDS and AIDS-related diseases or conditions, in sufficiently large quantities at pharmaceutical manufacturing facilities in Cameroon, Cote d'Ivoire, Kenya and Namibia, as part of a UNIDO strategy for development, establishment and promotion of financially sustainable local/sub-regional production in response to the AIDS pandemic.

2. To promote, in the Sub-Saharan Africa region, the development of service industries, such as:
   - information services related to industry and commerce
   - consultancy firms to do studies and provide technical advice,
   - packaging firms
   - storage facilities
   - distribution networks, and
   - maintenance and repair workshops

to support not only production of HIV/AIDS inputs, but the pharmaceutical industry as a whole.

7.4 Outputs

7.4.1. Activity 1

Study of the existing manufacturing operations with particular emphasis on requirements for expanding production lines to include any or all of the following as appropriate; condoms, syringes, surgical gloves, HIV test kits, infussion fluids and drugs for fighting opportunistic infections.

7.4.1.1 Output 1

Detailed technical plans and cost estimates for expanding production lines to cover condoms, syringes, surgical gloves, HIV test kits, and other HIV/AIDS related inputs, at the pharmaceutical manufacturers in the target poles.

7.4.2 Activity 2

An in-depth evaluation of existing service industries in the COMESA, ECCAS, ECOWAS and SADC subregions:

- information services related to industry and commerce
- consultancy firms which undertake studies and provide technical advice,
- packaging firms,
- storage facilities,
- distribution networks for pharmaceuticals,
  and
- maintenance and repair workshops.

7.4.2.1 Output 2

Plans for strengthening specific establishments involved in the above activities so as to support the pharmaceuticals industry in general and production and marketing of HIV/AIDS related products in particular.

7.4.3 Activity 3

Collection of data and statistics on pharmaceutical subsector firms and individuals in South Africa susceptible to be called upon to provide technical assistance within the framework of this programme.

7.4.3.1 Output 3

A data bank of pharmaceutical subsector firms and individuals in South Africa.

7.4.4 Activity 4

Study of manufacturing practices in pharmaceutical manufacturing facilities in Cameroon, Cote d'Ivoire, Kenya and Namibia, with a view to improving their efficiency and productivity.

7.4.4.1 Output 4

Plans for promoting Good Manufacturing Practices (GMP) at the identified production sites.

7.5 Simplified work plan

Activity	To be completed after project approval by	Responsible project staff
Identify team members	month 2	UNIDO staff (team leader)
Consultants appointed	month 2	UNIDO staff
Study of the existing manufacturing operations with particular emphasis on requirements for expanding production lines to include any or all of the following as appropriate; condoms, syringes, surgical gloves, HIV test kits, infussion fluids and drugs for fighting opportunistic infections.	month 3	Consultant
In-depth evaluation of existing service industries in the ECCAS and ECOWAS subregions	month 3	Consultant
In-depth evaluation of existing service industries in the COMESA and SADC subregions	month 3	Consultant
Collection of data and statistics on pharmaceutical subsector firms and individuals in South Africa.	month 3	Consultant
Study of manufacturing practices in pharmaceutical manufacturing facilities in Cameroon and Cote d'Ivoire.	month 3	Consultant
Study of manufacturing practices in pharmaceutical manufacturing facilities in Kenya and Namibia	month 3	Consultant
Writing of final report	month 5	Consultants and UNIDO staff

7.6 Inputs

1. Government inputs None

2. UNIDO inputs

Budget Line	Description	m/m	US$
	Consultants	4.0	60,000
	Travel		20,000
	Staff time	0.2	3,000
	Equipment		14,000
	Sundries		2,000
	Total	4.2	99,000

3. Reporting and evaluation requirements. expected follow-up

7.7 Consultants

7.7.1

Post title Short term consultant
Duration 0.2 w/m
Date required month 2
Duty station Vienna
Purpose of mission To develop and promote local production/ availability of health care system inputs related to HIV infection and AIDS

Duties: As a member of the team :

1. To participate in reviewing of the study prepared on the subject project.
2. To be the focal point for contacting of UCDs in the four countries and the relevant subregional organisations in Africa (ECCAS, ECOWAS, COMESA and SADC) for co-operation in the follow-up.

Qualifications University degree in engineering or economics

Background information

An internationally co-ordinated response to the Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) pandemic, in the form of a co-sponsored United Nations programme involving six organisations, was endorsed by the Economic and Social Council on 26 July 1994 as it adopted without a vote a resolution sponsored by 50 countries. It is UNIDO's intention to contribute to the internationally co-ordinated efforts with the subject programme/project.

A programme concept on integrated development programme for the local production of health sector inputs in the countries of the Africa region was prepared in the first quarter of 1993 and endorsed by the Programme and Project Committee on 22 July 1993 for further development. In the final workplan of UNDP for 1994-1995, the subject project with some modification was assigned to UNIDO for implementation.

A study, completed in October 1995, has proposed a strategy for the implementation, estimated potential markets in four sub-regions of Sub-Saharan Africa, and identified four development poles for local production sites. These are Cameroon, Côte d'Ivoire, Kenya and Namibia. Further work consists of field studies in these four countries to identify specific pharmaceuticals manufacturing facilities which could be expanded to produce any or all of the following: condoms, latex gloves, syringes, and HIV-1/2 test kits. Specific equipment and infrastructure requirements to permit volume production will be determined and costed. Service industries such as consultancies, packaging, storage, distribution and maintenance and repair need to support production, will be identified and estimates made of their participation in the programme.

The just completed study also proposes use of production know-how available in South Africa in technical assistance to support production sites at the four development poles. A short-term consultant will be recruited to compile a data bank of pharmaceutical subsector firms and individuals in South Africa susceptible to be called upon to provide technical assistance within the framework of this programme.

7.7.2

Post title	Short term consultant
Duration	1.0 w/m
Date required	month 3 with 0.25 w/m mission to Vienna in month 4
Duty station	Abidjan, Douala, Nairobi, Windhoek and Vienna

Purpose of mission To develop full financial plans for expanding production at pharmaceuticals manufacturing facilities in four countries, Cameroon, Côte d'Ivoire, Kenya and Namibia, to cover condoms, latex gloves, syringes, and HIV-1/2 test kits. The plans should include specific equipment, infrastructure and personnel requirements to permit volume production in sufficient quantities to supply the sub-regions. Service industries such as consultancies, packaging, storage, distribution and maintenance and repair need to support production, marketing and sales of these

products throughout the subregion will be identified and estimates made of their participation in the programme.

Duties: As team leader :

1. To identify members of the team and organise their work.
2. To prepare terms of reference.
4. To participate in field work, visiting the four countries.
5. To participate in preparing and reviewing the field studies. Particular attention should be paid to:
   * plans to expand existing capability to cover the proposed new product lines,
   * plans to strengthen associated service industries.
6. To prepare investment project profiles for follow-up by all interested parties particularly by local entrepreneurs.

Qualifications MD or PhD, Health care technologist with working experience in the development and production of biologicals and pharmaceuticals

7.7.3

Post title Short term consultant
Duration 1.0 w/m
Date required month 3, 0.25 w/m mission to Vienna in month 4
Duty station Abidjan, Douala and Vienna

Purpose of mission To develop full financial plans for expanding production at pharmaceuticals manufacturing facilities in Cameroon and Côte d'Ivoire to cover condoms, latex gloves, syringes, and HIV-1/2 test kits. The plans should include specific equipment, infrastructure and personnel requirements to permit volume production in sufficient quantities to supply the sub-regions.

Duties: As a member of a team:

1. To review strategy and data available from the earlier study
2. To undertake field work, visiting Francophone countries, to obtain information needed to develop expansion plans for local pharmaceutical companies and service providers.
3. To participate in preparing investment project profiles for follow-up.

Qualifications Industrial pharmacist, pharmaceutical industry microeconomist and manager with a working knowledge of French

7.7.4

Post title	Short term consultant
Duration	1.0 w/m
Date required	month 3, 0.25 w/m mission to Vienna in month 4
Duty station	Abidjan, Douala and Vienna

Purpose of mission To develop plans for promoting service industries such as consultancies, packaging, storage, distribution and maintenance and repair need to support production, marketing and sales of cover condoms, latex gloves, syringes, and HIV-1/2 test kits throughout the ECCAS and ECOWAS sub-regions. To identify specific service industries in these sub-regions which contribute to the objectives of the programme and draw up plans to strengthen them.

Duties: As a member of a team:

1. To review strategy and data available from the earlier study
2. To undertake field work, visiting Francophone countries, to obtain 0.1.information needed to develop promotion plans for local service industries relevant to local production pharmaceuticals.
3. To participate in preparing investment project profiles for follow-up.

Qualifications Health care technologist, expert in automation and control with a working knowledge of French

7.7.5

Post title	Short term consultant
Duration	1.0 w/m
Date required	month 3, 0.25 w/m mission to Vienna in month 4
Duty station	Nairobi, Windhoek and Vienna

Purpose of mission To develop full financial plans for expanding production at pharmaceuticals manufacturing facilities in Kenya and Namibia to cover condoms, latex gloves, syringes, and HIV-1/2 test kits. The plans should include specific equipment, infrastructure and personnel requirements to permit volume production in sufficient quantities to supply the sub-regions.

Duties As a member of the team:

1. To review strategy and data available from the earlier study
2. To undertake field work, visiting Anglophone countries, to obtain information needed to develop expansion plans for local pharmaceutical companies.

3. To participate in preparing investment project profiles for follow-up.

Qualifications Industrial pharmacist, pharmaceutical industry microeconomist and manager

7.7.6

Post title Short term consultant
Duration 1.0 w/m
Date required month 3, 0.25 w/m mission to Vienna in month 4
Duty station Nairobi, Windhoek and Vienna

Purpose of mission To develop plans for promoting service industries such as consultancies, packaging, storage, distribution and maintenance and repair need to support production, marketing and sales of cover condoms, latex gloves, syringes, and HIV-1/2 test kits throughout the ECCAS and ECOWAS sub-regions. To identify specific service industries in these sub-regions which contribute to the objectives of the programme and draw up plans to strengthen them.

Duties: As a member of a team:

1. To review strategy and data available from the earlier study
2. To undertake field work, visiting Francophone countries, to obtain information needed to develop promotion plans for local service industries relevant to local production pharmaceuticals.
3. To participate in preparing investment project profiles for follow-up.

Qualifications Expert in health care technology promotion and transfer

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9. ANNEXES

ANNEX 1

TECHNICAL NOTES

The countries covered by the tables in Annex 2 are part of the WHO/AFRO region. Countries excluded from the tables (due to lack of data) are Eritrea, Guinea, Liberia, Mauritania, Sao Tome and Principe, Reunion and Sudan. Unavailable data are denoted by -.

The principal sources of the data are: World Bank and United Nations Development Programme, 1992; African Development Indicators; the World Bank's Population, Health and Nutrition Department; World Development Report 1993 (WDR93); the World Health Organization,-Geneva (WHO) and African Regional Office (WHO/AFRO); the United Nations (UN); and the United Nations Children's Fund (UNICEF), United Nations Industrial Development Organisation (UNIDO) and Country Statistics Reports of Botswana, Namibia, Zambia, Swaziland, Kenya, Tanzania and Cameroon. Data were also collected by UNIDO JPO's.

Table on country information

Total Population numbers for 1975 to 1993 are UNIDO estimates. Data for projected total population for the years 2000 and 2025 are world bank estimate These projections are from the most recent population censuses or surveys.

Annual population growth rates are calculated from the midyear population by the exponential method. The rates are expressed in percent.

Population age structure for under fifteen and for sixty-five and over is expressed as the percentage of total population. Data are from the World Bank, (1993); and the UN (World Population Prospects, the 1992 Revision, UN 1993).

Data on urban population as a percentage of total population are from the UN World Population Prospects, the 1992 Revision, supplemented by data from the World Bank. Because these estimates are based on different national definitions of what is urban, cross-country comparisons should be interpreted with caution.

The adult literacy rate is the proportion of the population fifteen years old and over who can read and write a short, simple statement on their everyday life. The data are from WDR93.

Table on economic indicators

GDP per capita (constant 1980) figures in US dollars are obtained from UNIDO - INSTAT3 database. GDP measures the total output of goods and services for final use produced by residents

and non-residents, regardless of the allocation to domestic and foreign claims. The data are from WDR93 and country reports.

Average annual growth rate of GDP. Growth rate of GDP in percent. The data are obtained from national sources, reports and the world bank..

GNP per capita Gross national product (GNP) measures the total domestic and foreign value added claimed by residents. It consists of gross domestic product (GDP, the total dollar value of all goods and services produced in the country), with adjustments for the value of goods and services produced by nationals abroad and by foreigners residing within the country. Data are from WDR93.

Share of manufacturing in GDP figures in percent and are obtained from UNIDO - INSTAT3 database. GDP manufacturing share measures the percentage of contribution of the manufacturing sector as a fraction of total GDP.

Consumer price index, exchange rate and average annual rate of inflation is obtained from the UNIDO - INSTAT3 database.

Table on health expenditure

Health expenditures include outlays for prevention of disease, health promotion, rehabilitation, and personal and public health care services; population programs; nutrition activities; program food aid; and emergency aid specifically for health. In this table, health expenditures do not include water and sanitation. Per capita expenditures are based on World Bank midyear population estimates. Total health expenditure is expressed in official exchange rate US dollars.

Data on public and private health expenditure are from national sources, supplemented by Government Finance Statistics (published by the International Monetary Fund), World Bank sector studies, and other studies. Public expenditures include government health expenditures and parastatal expenditures. They do not include aid flows. Private expenditures are based on household surveys carried out by the ILO and other sources, supplemented by information from United Nations National Income Accounts, World Bank studies, and other studies published in the scientific literature.

Aid flows represent the sum of all health assistance to each country by bilateral and multilateral agencies and by international nongovernment organisations (NGOs). National NGOs were not included because the available information was not separately available by recipient country. The estimates of aid in this table were prepared for WDR93 by the Harvard Centre for Population and Development Studies.

Table on health indicators

The total fertility rate represents the number of children that would be born per woman, if she were to live to the end of her childbearing years and bear children at each age in accordance with currently

prevailing age-specific fertility rates. Data are from the World Bank and country reports.

Women of childbearing age are those in the 15-49 age group.

Births attended by trained health personnel. Trained personnel include physicians, nurses, midwives, trained primary health care and other health workers, and trained traditional birth attendants. National coverage levels are drawn from official estimates and sample surveys. Where no direct figures were available, the percent of births in health care institutions has been substituted as a conservative estimate. The data are from the Health for All data base, WHO 6192; Global Health Situation and Projections, WHO 1992; WHO/AFRO computer printout, 1990; and WHO/AFRO country reports.

The infant mortality rate is the number of infants who die before reaching one year of age, per thousand live births in a given year. The data are from the UN as well as from the World Bank.

Life expectancy at birth is the number of years a new-born infant would live if subjected throughout life to the current age-specific mortality rates. Data are presented for males and females separately. The sources of data are the UN and the World Bank.

The crude birth rate and crude death rate, respectively, indicate the number of live births and deaths occurring per thousand population in a given year. They are World Bank estimates, based on various sources, including the United Nations.

The maternal mortality rate refers to the number of female deaths that occur during childbirth, per 100,000 live births. Because deaths during childbirth are defined more widely in some countries than in others, and many deaths are never recorded, the figures should be treated with extreme caution. The data are drawn from diverse sources: WHO/AFRO country reports; Maternal and Child Health, WHO/AFRO, 1990; UN Demographic Yearbooks; UNICEF; and mostly from Maternal Mortality, A Global Factbook, WHO 1991.

Prenatal health care coverage rate is the percentage of pregnant women who attended prenatal care clinics in a given year. The data suggest the service was used but do not imply that coverage was adequate or effective. The data are from the Health for All data base, WHO 6192; Global Health Situation and Projections, WHO 1992; WHO/ AFRO computer printout, 1990; and WHO/AFRO country reports.

Food supply: calories per capita per day were calculated by dividing the caloric equivalent of the food supplies in a country by the population. Supplies include domestic production, imports less exports, and changes in stocks. The data are from the Food and Agriculture Organization Yearbook (Production), 1991.

Food supply: protein per capita per day (grams) indicates one of the nutrient elements of food supply. Data are from the FAO Yearbook, 1991.

Babies with low birth weight (percent). Ratio of babies with a birth-weight less than 2500g.

Immunisation - Data are from the Health for All data base, WHO 6/92; Global Health Situation and Projections, WHO 1992; WHO/AFRO computer printout, 1990; UNICEF data file 1993; and Adi92.

Immunisation coverage is the percentage of children in a given year who were fully immunised against each disease or group of diseases by age one. The requirements for full immunisation depend on the type of disease. The vaccination schedule recommended by WHO, which is used in this table to measure full immunisation, is as follows:

- Tuberculosis: one injection Of BCG vaccine (Bacterium CalmetteGuerin), which can be given at the time of birth.

- Diphtheria, Pertussis, Tetanus: three injections with DPT vaccine (DPT 3) before age one; the first is recommended six weeks after birth followed by two more at one-month intervals.

- Polio: at least three doses of oral polio vaccine (POL 3) before age one, given one month apart. In areas where polio is endemic, the first dose is recommended at the time of birth, followed by three more doses at the same time as the DPT injections.

- Measles: one injection of measles vaccine, given after nine months of age.

Pregnant women immunised for tetanus is the percentage of women giving birth in a given year who received tetanus toxoid injections during pregnancy. The data are from the Health for All data base, WHO 6192; Global Health Situation and Projections, WHO 1992; WHO/AFRO computer printout, 1990; and WHO/AFRO country reports.

Table on health demographics

Doctors are graduates of a medical school or faculty actually working in any medical field (practice, teaching, administration, research, laboratory, etc.). Practitioners of traditional medicine are not included in this category.

Paramedics are staff whose medical training is less than that of qualified physicians but who nevertheless dispense similar medical services, including simple operations.

Nurses (professional, high level) are graduates of a nursing school working in any nursing field (general nursing, specialised clinical nursing services in mental health, paediatrics, cardiovascular diseases, public health or occupational health, teaching, administration, research, and so on). These personnel are qualified and authorised to provide the most responsible and competent professional nursing service. Also included in this category are midwives (professional, high level), who are graduates of a midwifery school actually working in any field of midwifery.

Technicians are graduates of health technical school. They perform duties in laboratories, X-Ray departments, dental departments, pharmacies, environmental health, and so on.

Assistant nurses (middle level) are personnel who provide general patient care of a less complex nature in hospitals and other health services, in principle under the supervision of a professional nurse. These personnel do not have the full education and training of a professional nurse. Also included in this category are assistant midwives (middle level), who are personnel carrying out the midwifery duties of normal obstetric care, in principle under the supervision of a professional midwife. Assistant midwives do not have the full education and training of professional midwives.

Assistant technicians (middle level) are health services personnel carrying out duties other than those of assistant nurses or assistant midwives. In principle, they work under the supervision of a technician. These personnel do not have the full education and training of a professional technician.

Population per doctor or per nurse represents the number of people served by one doctor or by one nurse. The data show only the average available for the population as a whole and must be interpreted with caution because of the concentration of highly qualified health staff in urban areas.

Hospitals are establishments permanently staffed by at least one physician that offer in-patient accommodation and provide medical and nursing care. Establishments providing principally custodial care are not included.

Central regional hospitals are hospitals-other than local or rural hospitals-that provide medical and nursing care for several medical disciplines.

District/rural hospitals are, in principle, first-referral facilities, usually in rural areas, permanently staffed by one or more physicians, that provide medical and nursing care of a more limited range than that provided by central or regional hospitals.

Health centres are, in principle, the first point of contact of the population with the formal health care system. They are not permanently staffed by physicians but by medical assistants, nurses, midwives, and so on. Usually, they are small units (sometimes also known as rural health centres) that offer limited in-patient accommodation and provide a limited range of medical and nursing care.

Others include maternaties, dispensaries, and health posts. They furnish a very limited range of medical and nursing care not provided by professional staff.

Beds. A hospital bed is situated in a ward or a part of the hospital where continuous medical care for in-patients is provided. The total of such beds constitutes the normally available bed complement of the hospital. Cribs and bassinets maintained for use by healthy new-born infants who do not require special care are not included.

Population per bed represents the number of people served by one hospital bed or other health care facility bed in the country. It is only an average and must be interpreted with caution because of the concentration of health care facilities with beds in urban areas.

Table on HIV AIDS and programmes

ANNEX 2

Statistical Summary

Country Information

	Total Population (thousands)								
	1975	1980	1985	1990	1991	1992	1993	2000	2025
Angola	6 110	6 993	7 976	9 194	9 524	9 888	10 276	12 325	26 104
Benin	3 033	3 459	3 988	4 633	4 779	4 930	5 086	6 375	10 931
Botswana	759	906	1 077	1 276	1 317	1 359	1 401	1 694	2 699
Burkina Faso	6 202	6 957	7 879	8 987	9 239	9 502	9 772	12 047	22 745
Burundi	3 680	4 130	4 750	5 503	5 672	5 847	6 026	7 305	14 041
Cameroon	7 526	8 655	9 971	11 526	11 853	12 184	12 522	15 604	28 655
Cape Verde	278	289	310	341	350	360	370	470	726
Central African Republic	2 057	2 313	2 595	2 927	3 001	3 077	3 156	3 867	7 330
Chad	4 030	4 477	5 018	5 553	5 692	5 846	6 010	7 353	13 622
Comoros	316	383	455	543	564	585	607	674	1 366
Congo	1 447	1 669	1 923	2 232	2 300	2 371	2 443	3 162	6 474
Cote d'Ivoire	6 755	8 194	9 933	11 974	12 412	12 860	13 316	16 878	33 140
Equatorial Guinea	225	217	312	352	360	369	379	525	839
Ethiopia	34 310	38 750	43 835	50 505	52 016	53 584	55 204	67 465	143 568
Gabon	637	806	985	1 146	1 179	1 213	1 248	1 515	2 986
Gambia	548	641	745	923	963	1 002	1 042	1 167	2 219
Ghana	9 831	10 735	12 839	15 020	15 484	15 959	16 446	20 334	36 221
Guinea-Bissau	627	795	873	964	984	1 006	1 028	1 197	1 938
Kenya	13 741	16 632	19 980	23 613	24 496	25 431	26 391	34 091	72 853
Lesotho	1 187	1 339	1 563	1 792	1 841	1 891	1 943	2 282	3 647
Madagascar	7 787	9 063	10 632	12 571	12 990	13 417	13 854	15 336	25 850
Malawi	5 244	6 183	7 247	9 367	9 776	10 163	10 520	11 555	24 409
Mali	6 169	6 863	7 915	9 212	9 507	9 816	10 135	11 430	23 760
Mauritius	-	-	926	1 002	1 100	1 202	1 318	1 539	2 143
Mozambique	10 498	12 095	13 541	14 187	14 430	14 735	15 102	20 768	43 063
Namibia	900	1 030	1 178	1 349	1 385	1 423	1 461	2 100	3 000
Niger	4 771	5 586	6 608	7 731	7 991	8 264	8 550	10 737	24 286
Nigeria	62 770	72 024	83 068	96 154	99 087	102 129	105 264	127 806	216 900
Rwanda	4 384	5 163	6 056	6 986	7 174	7 363	7 554	8 762	16 701
Senegal	4 806	5 538	6 375	7 327	7 518	7 709	7 902	9 809	17 918
Seychelles	-	-	-	-	69	71	72	74	97
Sierra Leone	2 931	3 236	3 582	3 999	4 094	4 194	4 297	5 370	10 076
South Africa	25 669	29 170	33 043	37 066	37 913	38 778	39 659	47 300	69 500
Swaziland	482	560	649	744	765	787	809	1 137	2 179
Tanzania	15 900	18 581	21 797	25 600	26 398	27 204	28 019	32 901	58 850
Togo	2 285	2 615	3 028	3 531	3 645	3 763	3 885	4 960	9 294
Uganda	11 183	13 120	15 111	17 949	18 595	19 261	19 940	22 551	48 223
Zaire	23 251	27 009	31 701	37 436	38 674	39 939	41 231	50 856	100 287
Zambia	4 841	5 738	6 862	8 150	8 412	8 674	8 936	10 867	20 739
Zimbabwe	6 143	7 126	8 392	9 903	10 191	10 469	10 739	12 360	17 613

Country Information

	Annual rate of population growth (percent)			Age Distribution 1993 (percent)			Population Age Structure 1990 (percent) *2025			
	1992	2000	2025	0-14	15-49	>50	0-14	>65	0-14*	>65*
Angola	2.8	3.2	2.5	47	43	10	47	3	41	3
Benin	3.0	2.8	1.6	47	43	9	48	3	40	3
Botswana	3.0	2.6	1.3	45	45	9	46	3	31	5
Burkina Faso	2.9	2.9	2.0	45	45	11	45	3	39	4
Burundi	2.9	2.9	2.1	46	45	9	46	3	38	4
Cameroon	3.0	3.0	1.8	44	45	11	45	4	37	4
Cape Verde	2.3	2.2	1.4	44	46	11	44	4	27	4
Central African Republic	2.5	2.7	2.2	45	44	12	42	3	39	3
Chad	2.5	2.7	2.0	43	45	11	42	4	37	4
Comoros	3.5	3.4	2.1	49	43	8	48	2	40	3
Congo	3.3	3.2	2.4	46	44	10	45	4	39	3
Cote d'Ivoire	3.6	3.3	2.0	49	42	9	48	3	43	3
Equatorial Guinea	2.3	2.3	1.5	43	45	12	40	4	37	4
Ethiopia	3.4	3.3	2.6	45	44	10	46	3	40	3
Gabon	2.8	3.0	2.3	34	49	17	36	5	37	4
Gambia	2.9	2.8	2.2	44	45	11	44	3	36	4
Ghana	3.2	3.0	1.7	45	45	9	47	3	36	4
Guinea-Bissau	2.0	2.1	1.6	41	46	13	43	3	37	4
Kenya	3.3	3.4	2.6	48	44	8	49	3	35	4
Lesotho	2.5	2.5	1.3	41	46	12	43	4	32	6
Madagascar	2.8	2.6	1.6	46	45	10	45	3	39	3
Malawi	3.1	3.0	2.7	49	42	9	47	3	41	3
Mali	2.9	3.2	2.5	48	48	4	47	3	40	3
Mauritius	1.1	1.0	0.6	28	57	15	30	5	20	13
Mozambique	2.7	3.0	2.5	45	45	11	44	3	39	4
Namibia	3.0	3.2	2.8	44	45	11	45	5	34	4
Niger	3.3	3.5	2.9	48	43	9	48	2	41	3
Nigeria	2.9	2.7	1.6	47	44	9	47	2	38	4
Rwanda	2.2	2.7	2.0	50	42	8	49	2	42	2
Senegal	2.7	2.9	1.8	45	45	10	45	3	36	4
Seychelles	0.9	1.0	1.0	29	56	25	34	7	23	8
Sierra Leone	2.6	2.7	2.1	45	45	11	43	3	39	3
South Africa	2.5	2.0	1.8	37	56	7	37	4	34	5
Swaziland	3.6	3.3	2.0	43	47	10	45	3	33	5
Tanzania	3.0	2.8	1.7	48	44	9	47	3	41	3
Togo	3.2	3.0	1.9	46	44	10	45	3	38	4
Uganda	3.3	3.2	2.7	49	44	8	49	3	40	2
Zaire	3.0	3.1	2.1	48	43	9	47	3	41	3
Zambia	3.1	2.9	2.1	48	44	8	48	2	40	2
Zimbabwe	2.6	1.8	1.1	45	47	9	45	2	32	4

Country Information

	Urban Population (percent)				Urban Population (thousands) 1993		Literacy Rate (percent) 1990	
	1970	1990	1993	2000	Rural	Urban	female	male
Angola	15	28	31	36	7 131	3 145	29	56
Benin	18	38	40	46	3 042	2 044	16	32
Botswana	18	29	27	37	1 018	383	65	84
Burkina Faso	6	15	18	24	8 045	1 727	9	28
Burundi	2	5	6	7	5 681	345	40	61
Cameroon	20	40	43	49	7 130	5 392	43	67
Cape Verde	20	29	33	36	249	121	-	-
Central African Republic	30	47	51	55	1 559	1 597	25	52
Chad	12	32	35	42	3 918	2 092	18	42
Comoros	19	28	29	34	428	179	-	-
Congo	33	41	42	47	1 413	1 030	44	70
Cote d'Ivoire	27	40	42	47	7 659	5 657	40	67
Equatorial Guinea	27	29	30	33	266	113	-	-
Ethiopia	9	12	13	15	48 146	7 058	-	-
Gabon	26	46	49	54	631	617	49	74
Gambia	15	23	22	29	816	226	16	39
Ghana	29	34	35	39	10 635	5 811	51	70
Guinea-Bissau	15	20	21	25	810	218	24	50
Kenya	10	24	26	32	19 625	6 766	59	80
Lesotho	9	19	21	27	1 538	405	-	-
Madagascar	14	24	25	31	10 442	3 412	73	88
Malawi	6	12	13	16	9 164	1 356	-	-
Mali	14	24	25	30	7 601	2 534	-	-
Mauritius	42	41	34	42	868	450	-	-
Mozambique	6	27	32	41	10 306	4 796	21	45
Namibia	10	28	32	42	992	469	20	21
Niger	9	20	21	27	6 712	1 838	17	40
Nigeria	20	35	43	43	60 462	44 802	40	62
Rwanda	3	6	6	8	7 097	457	37	64
Senegal	33	40	41	45	4 623	3 279	25	52
Seychelles	55	59	60	63	29	43	-	-
Sierra Leone	18	32	36	40	2 745	1 552	11	31
South Africa	48	59	60	68	15 864	23 795	-	-
Swaziland	10	26	29	36	572	237	-	-
Tanzania	7	21	23	28	21 446	6 573	-	-
Togo	13	29	30	34	2 725	1 160	31	56
Uganda	8	11	12	14	17 640	2 300	35	62
Zaire	30	28	29	31	29 442	11 789	61	84
Zambia	30	42	42	45	5 158	3 778	65	81
Zimbabwe	17	29	31	36	7 407	3 332	60	74

Economic Indicators

	GDP per capita (constant 1980)							GDP annual growth rate (percent)			
	1975	1980	1985	1990	1991	1992	1993	1975-80	1980-85	1985-90	1990-93
Angola	548	495	493	498	502	499	458	-1.9	-0.1	0.2	-8.0
Benin	308	336	378	346	352	355	356	1.8	2.5	-1.7	1.0
Botswana	650	1 007	1 383	1 884	1 987	1 977	1 975	11.0	7.5	7.2	1.6
Burkina Faso	175	185	182	180	179	175	171	1.0	-0.3	-0.2	-1.7
Burundi	225	230	254	260	257	256	245	2.4	2.1	0.5	-1.9
Cameroon	666	771	1 006	790	753	695	643	3.2	6.1	-4.3	-6.2
Cape Verde	456	492	621	734	753	757	766	1.6	5.2	3.6	1.5
Central African Republic	357	344	330	310	302	288	274	-0.7	-0.8	-1.2	-3.9
Chad	322	224	306	303	291	284	268	-6.1	7.3	-0.2	-3.9
Comoros	434	362	374	331	324	318	310	-3.3	0.7	-2.3	-2.1
Congo	1 040	1 022	1 487	1 261	1 242	1 244	1 181	-0.3	9.1	-3.0	-2.1
Cote d'Ivoire	1 090	1 241	1 073	844	828	799	763	2.8	-2.7	-4.3	-3.2
Equatorial Guinea	425	199	154	152	153	170	178	-10.6	-4.5	-0.3	5.7
Ethiopia	105	105	91	95	91	82	86	0.0	-2.7	0.9	-3.2
Gabon	6 908	5 311	4 414	2 765	2 739	2 600	2 590	-4.6	-3.4	-7.5	-2.1
Gambia	398	373	429	408	409	398	389	-1.3	3.0	-1.0	-1.6
Ghana	464	446	364	397	400	402	409	-0.8	-3.7	1.8	1.0
Guinea-Bissau	249	193	195	225	227	228	230	-4.5	0.2	3.1	0.7
Kenya	380	426	412	456	446	432	420	2.4	-0.7	2.1	-2.6
Lesotho	193	274	252	313	309	310	320	8.4	-1.6	4.8	0.7
Madagascar	392	360	290	278	251	246	243	-1.6	-3.9	-0.8	-4.2
Malawi	174	201	194	174	180	158	170	3.1	-0.7	-2.1	-0.8
Mali	208	237	236	253	245	245	255	2.8	-0.1	1.4	0.3
Mauritius	-	-	-	-	-	-	-	-	-	-	-
Mozambique	228	199	141	159	163	158	184	-2.5	-5.8	2.6	5.2
Namibia	2 035	1 948	1 631	1 646	1 685	1 697	1 617	-0.9	-3.3	0.2	-0.6
Niger	344	454	322	303	299	271	265	6.4	-5.8	-1.2	-4.2
Nigeria	1 236	1 224	1 023	1 147	1 166	1 178	1 177	-0.2	-3.3	2.4	0.9
Rwanda	183	225	222	204	200	200	201	4.6	-0.3	-1.6	-0.5
Senegal	586	536	540	553	543	537	513	-1.7	0.1	0.3	-2.4
Seychelles	-	-	-	-	-	-	-	-	-	-	-
Sierra Leone	343	340	355	359	359	344	328	-0.2	0.9	0.2	-2.9
South Africa	2 594	2 658	2 510	2 424	2 361	2 260	2 234	0.5	-1.1	-0.7	-2.6
Swaziland	915	968	1 005	1 080	1 050	1 035	1 026	1.2	0.8	1.5	-1.7
Tanzania	280	276	244	251	253	254	259	-0.3	-2.3	0.6	1.1
Togo	422	432	348	370	373	327	277	0.5	-3.9	1.3	-8.4
Uganda	204	144	141	153	153	153	157	-5.9	-0.4	1.7	0.9
Zaire	293	227	209	195	183	158	141	-4.5	-1.6	-1.3	-9.2
Zambia	803	676	579	533	513	484	502	-3.2	-2.9	-1.6	-1.9
Zimbabwe	833	750	784	800	816	731	727	-2.0	0.9	0.4	-3.0

Economic Indicators

	GNP per capita (US$)			Share of manufacturing in GDP (percent)						
	1990	1991	Annual growth rate 1980-91	1975	1980	1985	1990	1991	1992	1993
Angola	-	-	-	4	2	3	1	1	0	0
Benin	350	380	-0.9	10	6	4	5	5	5	5
Botswana	2 040	2 530	5.6	7	4	3	4	4	4	4
Burkina Faso	330	290	1.2	12	11	9	9	9	10	10
Burundi	210	210	1.3	7	9	8	9	9	10	10
Cameroon	960	850	-1.0	10	9	12	17	17	17	17
Cape Verde	-	750	2.3	5	5	6	5	5	6	0
Central African Republic	390	390	-1.4	10	8	9	10	10	9	9
Chad	190	210	3.8	6	9	10	6	6	6	6
Comoros	-	500	-1.0	5	3	3	3	4	4	4
Congo	1 010	1 120	-0.2	7	7	9	9	9	8	8
Cote d'Ivoire	750	690	-4.6	11	11	12	12	12	12	12
Equatorial Guinea	-	330	2.8	0	0	1	0	0	0	0
Ethiopia	120	120	-1.6	9	10	13	12	9	9	10
Gabon	3 330	3 780	-4.2	7	7	7	7	8	8	7
Gambia	-	360	-0.1	6	6	7	7	7	0	0
Ghana	390	400	-0.3	10	7	6	6	6	6	6
Guinea-Bissau	-	180	1.1	6	7	6	3	3	3	3
Kenya	370	340	0.3	9	12	12	13	13	13	13
Lesotho	530	580	-0.5	7	6	10	11	12	14	14
Madagascar	230	210	-2.5	12	11	8	7	7	7	7
Malawi	200	230	0.1	15	13	12	14	13	15	13
Mali	-	280	-0.1	4	4	7	7	7	8	0
Mauritius	2 250	2 410	6.1	-	-	-	-	-	-	-
Mozambique	80	80	-1.1	36	31	22	23	24	23	20
Namibia	-	-	-	4	3	4	5	4	4	0
Niger	310	300	-4.1	7	3	7	7	7	8	8
Nigeria	290	340	-2.3	3	5	5	4	5	4	0
Rwanda	310	270	-2.4	14	15	14	13	13	13	0
Senegal	710	720	0.1	13	14	15	17	17	16	16
Seychelles	4 980	5 110	3.2	-	-	-	-	-	-	-
Sierra Leone	240	210	-1.6	7	7	6	3	2	3	0
South Africa	2 658	2 750	0.1	21	23	20	20	20	20	19
Swaziland	1 023	1 050	3.1	18	21	20	25	25	28	28
Tanzania	110	100	-0.8	10	10	7	7	7	7	0
Togo	410	410	-1.3	8	8	7	7	7	7	5
Uganda	220	170	-	6	4	3	4	4	4	4
Zaire	220	220*	-	3	2	2	2	2	0	0
Zambia	420	420*		18	18	20	26	26	29	28
Zimbabwe	640	650	-0.2	22	24	22	24	24	23	0

Economic Indicators

	Consumer Price Index (CPI) per capita - 1980 = 1000							Ann..al Consumer Price Index change (percent)		
	1975	1980	1985	1990	1991	1992	1993	1980-85	1985-90	1990-93
Angola	-	-	-	-	-	-	-	-	-	-
Benin	-	-	-	-	-	-	-	-	-	-
Botswana	571	1 000	1 678	2 728	3 050	3 541	4 048	14	13	16
Burkina Faso	601	1 000	1 463	1 426	1 462	1 433	1 440	9	- 1	0
Burundi	473	1 000	1 521	2 073	2 260	2 361	2 590	10	7	8
Cameroon	604	1 000	1 813	2 232	2 275	2 306	-	16	5	-
Cape Verde	-	-	-	-	-	-	-	-	-	-
Central African Republic	571	1 000	1 713	1 574	1 530	1 514	1 470	14	- 2	- 2
Chad	-	-	-	-	-	-	-	-	-	-
Comoros	-	-	-	-	-	-	-	-	-	-
Congo	638	1 000	1 701	1 830	1 997	2 040	2 078	14	2	5
Cote d'Ivoire	464	1 000	1 314	1 610	1 637	1 695	1 744	6	5	3
Equatorial Guinea	-	-	-	-	-	-	-	-	-	-
Ethiopia	481	1 000	1 441	1 539	2 089	2 309	2 391	9	1	18
Gabon	544	1 000	1 292	1 755	1 762	1 594	1 603	6	7	- 3
Gambia	617	1 000	1 880	4 936	5 359	5 869	6 249	18	33	9
Ghana	74	1 000	9 091	35 746	42 191	46 446	58 031	162	59	21
Guinea-Bissau	-	-	-	-	-	-	-	-	-	-
Kenya	544	1 000	1 870	3 038	3 640	4 715	6 875	17	12	42
Lesotho	509	1 000	1 863	3 505	4 125	4 833	5 467	17	18	19
Madagascar	643	1 000	2 493	5 072	5 508	6 310	6 938	30	21	12
Malawi	641	1 000	1 849	4 443	5 003	6 140	7 344	17	28	22
Mali	-	-	-	-	-	-	-	-	-	-
Mauritius				-	-	-	-	-	-	-
Mozambique	-	1 000	2 610	29 467	39 162	56 989	81 034	32	206	58
Namibia	-	1 000	1 814	3 371	3 772	4 440	4 820	16	17	14
Niger	504	1 000	1 437	1 233	1 137	1 086	1 073	9	- 3	- 4
Nigeria	473	1 000	2 404	7 060	7 978	11 536	18 130	28	39	52
Rwanda	584	1 000	1 370	1 529	1 829	2 005	2 252	7	2	16
Senegal	721	1 000	1 752	1 765	1 733	1 731	1 723	15	0	- 1
Seychelles				-	-	-	-	-	-	-
Sierra Leone	527	1 000	7 763	178 254	361 320	597 864	730 663	135	439	103
South Africa	571	1 000	1 925	3 923	4 523	5 151	5 649	19	21	15
Swaziland	531	1 000	2 012	3 505	3 884	4 202	4 918	20	15	13
Tanzania	508	1 000	3 735	12 704	15 537	18 967	29 375	55	48	44
Togo	603	1 000	1 378	1 436	1 442	1 462	1 447	6	1	0
Uganda	-	1 000	14 215	708 321	907 132	1 382 854	1 466 890	264	977	36
Zaire	74	1 000	5 127	115 744	2 608 682	-	-	103	358	-
Zambia	493	1 000	2 525	42 279	81 429	242 174	699 637	31	315	518
Zimbabwe	621	1 000	2 009	3 676	4 533	6 440	8 220	20	17	41

Economic Indicators

	Exchange rate: local currency / 1000 $US						
	1975	1980	1985	1990	1991	1992	1993
Angola	25 407	29 917	29 917	29 919	57 999	442 839	-
Benin	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Botswana	731	776	1 887	1 860	2 017	2 132	2 141
Burkina Faso	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Burundi	78 749	89 999	120 689	171 259	181 509	208 299	242 779
Cameroon	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Cape Verde	25 542	40 174	91 631	70 030	71 407	68 017	80 426
Central African Republic	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Chad	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Comoros	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Congo	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Cote d'Ivoire	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Equatorial Guinea	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Ethiopia	2 069	2 069	2 069	2 069	2 069	4 999	4 999
Gabon	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Gambia	1 799	1 718	3 893	7 882	8 802	8 887	9 128
Ghana	1 149	2 749	54 364	326 329	367 829	437 089	649 060
Guinea-Bissau	25 542	33 810	159 619	2 184 999	3 658 999	6 933 999	10 081 999
Kenya	365	371	821	1 145	1 375	1 610	2 899
Lesotho	731	777	2 190	2 585	2 755	2 849	3 263
Madagascar	214 309	211 279	662 479	1 494 099	1 835 399	1 863 999	1 913 799
Malawi	863	811	1 718	2 728	2 803	3 603	4 402
Mali	428 639	422 599	898 519	544 519	564 219	529 379	566 319
Mauritius	-	-	-	-	-	-	-
Mozambique	27 239	32 399	43 179	929 089	1 434 469	2 516 549	3 874 239
Namibia	731	777	2 190	2 587	2 761	2 852	3 267
Niger	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Nigeria	614	546	893	6 037	9 908	17 297	22 064
Rwanda	92 839	92 839	101 259	82 599	125 139	133 349	144 249
Senegal	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Seychelles	-	-	-	-	-	-	-
Sierra Leone	899	1 049	5 093	151 445	295 339	499 439	567 459
South Africa	731	777	2 190	2 585	2 755	2 849	3 263
Swaziland	731	777	2 190	2 585	2 755	2 849	3 263
Tanzania	7 366	8 196	17 471	195 059	219 159	297 709	405 269
Togo	214 309	211 279	449 259	272 259	282 109	264 689	283 159
Uganda	74	74	6 720	428 849	733 999	1 133 799	1 194 999
Zaire	499	2 799	49 872	718 579	15 586 999	-	-
Zambia	642	788	2 713	28 985	61 727	156 249	434 782
Zimbabwe	567	642	1 611	2 447	3 427	5 094	6 472

Economic Indicators

	Exchange rate changes (percent)				Average annual rate of inflation (percent)	
	1975-80	1980-85	1985-90	1990-93	1970-80	1980-91
Angola	-18	-	-	-1380	-	-
Benin	1	-113	39	-4	10.3	1.6
Botswana	-6	-143	1	-15	11.6	13.2
Burkina Faso	1	-113	39	-4	8.6	3.8
Burundi	-14	-34	-42	-42	10.7	4.3
Cameroon	1	-113	39	-4	9.8	4.5
Cape Verde	-57	-128	24	-15	9.4	9.4
Central African Republic	1	-113	39	-4	12.1	5.1
Chad	1	-113	39	-4	7.7	1.1
Comoros	1	-113	39	-4	-	-
Congo	1	-113	39	-4	8.4	0.4
Cote d'Ivoire	1	-113	39	-4	13.0	3.8
Equatorial Guinea	1	-113	39	-4	-	-0.9
Ethiopia	-	-	-	-142	4.3	2.4
Gabon	1	-113	39	-4	17.5	1.5
Gambia	5	-127	-102	-16	10.6	18.2
Ghana	-139	-1878	-500	-99	35.2	40.0
Guinea-Bissau	-32	-372	-1269	-361	5.7	56.2
Kenya	-2	-121	-39	-153	10.1	9.2
Lesotho	-6	-182	-18	-26	9.7	13.6
Madagascar	1	-214	-126	-28	9.9	16.8
Malawi	6	-112	-59	-61	8.8	14.9
Mali	1	-113	39	-4	9.7	4.4
Mauritius	-	-	-	-	15.3	8.1
Mozambique	-19	-33	-2052	-317	-	37.6
Namibia	-6	-182	-18	-26	3	14.0
Niger	1	-113	39	-4	9.7	2.3
Nigeria	11	-64	-800	-175	15.2	18.1
Rwanda	0	-9	18	-75	15.1	4.1
Senegal	1	-113	39	-4	8.5	6.0
Seychelles	-	-	-	-	16.9	3.5
Sierra Leone	-17	-386	-2874	-275	12.5	59.3
South Africa	-6	-182	-18	-26	13.0	14.4
Swaziland	-6	-182	-18	-26	12.3	10.3
Tanzania	-11	-113	-1016	-108	14.1	25.7
Togo	1	-113	39	-4	8.9	4.4
Uganda	0	-8981	-6282	-179	-	107.0
Zaire	-461	-1682	-1341	-	31.4	60.9
Zambia	-23	-244	-968	-1400	7.6	48.0
Zimbabwe	-13	-151	-52	-164	9.4	12.5

Health Expenditure

	Health Expenditure (1990) millions of US$					Health Expenditure as a percentage of GDP (1990)				Donor Aid 1990	
	Public	Aid	Private	Total	per capita (US$)	Public	Aid	Private	Total	as a percentage of total health expenditure	per capita (US$)
Angola	-	28.0	-	-	-	-	-	-	-	-	2.8
Benin	20.8	29.6	30.4	80.8	17.0	1.1	1.6	1.7	4.4	37	6.4
Botswana	120.0	32.0	42.0	194.0	155.0	3.8	1.0	1.3	6.2	16	25.1
Burkina Faso	21.3	158.0	43.6	222.9	25.0	0.8	6.1	1.7	8.6	71	17.6
Burundi	15.3	3.4	6.2	24.9	5.0	1.4	0.3	0.6	2.3	14	0.6
Cameroon	75.5	34.1	199.2	308.8	26.0	0.7	0.3	1.8	2.8	11	3.0
Cape Verde	3.6	9.3	5.1	18.0	48.0	1.3	3.4	1.9	6.6	52	27.3
Central African Republic	14.5	19.7	21.4	55.6	18.0	1.1	1.5	1.6	4.2	35	6.7
Chad	20.9	36.0	18.9	75.8	13.0	1.7	3.0	1.6	6.2	47	6.5
Comoros	6.1	3.2	3.8	13.1	26.0	2.5	1.3	1.6	5.4	24	5.9
Congo	53.4	13.7	43.5	110.6	49.0	1.9	0.5	1.5	3.9	12	6.1
Cote d'Ivoire	161.9	11.3	161.0	334.1	28.0	1.6	0.1	1.6	3.4	3	0.9
Equatorial Guinea	4.2	4.9	2.2	11.3	27.0	2.8	3.3	1.4	7.5	43	13.9
Ethiopia	94.6	43.1	97.8	235.5	5.0	1.6	0.7	1.6	3.9	18	0.9
Gabon	108.9	13.3	73.1	195.3	172.0	2.2	0.3	1.5	3.9	7	11.6
Gambia	7.2	13.0	4.9	25.1	29.0	2.1	3.8	1.5	7.4	52	14.1
Ghana	71.5	26.9	105.6	204.0	14.0	1.2	0.5	1.8	3.5	13	1.8
Guinea-Bissau	5.0	7.9	2.7	15.6	16.0	2.6	4.1	1.4	8.0	51	8.2
Kenya	150.1	83.1	142.1	375.2	16.0	1.7	1.0	1.6	4.3	22	3.5
Lesotho	18.5	17.0	12.8	48.4	27.0	3.2	2.9	2.2	8.3	35	9.5
Madagascar	22.8	16.9	39.0	78.7	7.0	0.7	0.6	1.3	2.6	21	1.3
Malawi	32.4	21.5	38.6	92.5	11.0	1.7	1.2	2.1	5.0	23	2.3
Mali	32.5	37.0	60.8	130.3	15.0	1.3	1.5	2.4	5.2	28	4.0
Mauritius	-	-	-	-	-	-	-	-	-	-	-
Mozambique	17.7	45.1	24.0	86.8	6.0	1.2	3.1	1.7	6.0	52	3.2
Namibia	-	-	-	-	-	-	-	-	-	-	-
Niger	43.5	43.0	38.2	124.6	16.0	1.7	1.7	1.5	4.9	35	5.6
Nigeria	330.9	55.2	573.7	959.8	10.0	1.0	0.2	1.7	2.9	6	0.6
Rwanda	11.0	29.2	38.2	78.4	11.0	0.5	1.4	1.8	3.7	37	4.2
Senegal	96.4	36.2	87.6	220.1	30.0	1.7	0.6	1.5	3.8	16	4.9
Seychelles	-	-	-	-	-	-	-	-	-	-	-
Sierra Leone	4.3	10.8	6.8	21.9	5.0	0.5	1.2	0.8	2.4	49	2.7
South Africa	3101.3	2.0	2569.7	5671.0	158.0	3.5	0.0	2.9	6.4	-	-
Swaziland	24.7	19.4	11.8	55.9	70.0	3.2	2.5	1.5	7.1	35	26.1
Tanzania	15.7	59.0	41.6	116.3	5.0	0.7	2.6	1.8	5.0	51	2.3
Togo	27.1	14.2	26.7	68.0	19.0	1.7	0.9	1.6	4.2	21	4.0
Uganda	12.6	32.0	50.2	94.8	6.0	0.5	1.2	1.8	3.4	34	1.8
Zaire	15.2	47.8	159.0	222.0	6.0	0.2	0.6	2.1	2.9	22	1.3
Zambia	76.5	4.8	35.8	117.1	14.0	2.1	0.1	1.0	3.2	4	0.6
Zimbabwe	167.7	45.8	202.9	416.4	42.0	2.5	0.7	3.0	6.2	11	4.6

Health Indicators

	Total fertility rate per woman (child bearing age 15-49)			Number of women of child bearing age 15-49 (1990)		Births attended by trained health personnel (percent)
	1992	2000	2025	1000's	percent of total pop	1985-90
Angola	6.6	6.8	4.5	2 087	23	16
Benin	6.2	5.6	2.9	1 068	23	45
Botswana	4.7	3.9	2.1	299	23	79
Burkina Faso	6.5	6.4	3.5	2 065	23	33
Burundi	6.8	6.7	3.8	1 252	23	16
Cameroon	5.8	5.5	2.9	2 480	22	25
Cape Verde	4.3	3.7	2.1	94	28	49
Central African Republic	5.8	6.2	4.0	715	24	66
Chad	5.9	6.1	3.8	1 323	24	21
Comoros	6.7	6.1	3.2	104	19	24
Congo	6.6	6.6	3.8	506	23	45
Cote d'Ivoire	6.6	6.2	3.3	2 527	21	65
Equatorial Guinea	5.5	5.4	2.9	84	24	-
Ethiopia	7.5	7.4	4.5	10 174	20	9
Gabon	5.9	6.4	3.7	269	23	80
Gambia	6.5	6.5	4.1	200	22	65
Ghana	6.1	5.5	2.0	3 287	22	42
Guinea-Bissau	6	6.0	3.7	233	24	39
Kenya	6.4	5.9	4.0	4 980	21	54
Lesotho	5.1	4.5	2.2	410	23	40
Madagascar	6.1	5.5	2.9	2 542	20	71
Malawi	7.6	7.6	5.2	1 946	21	41
Mali	7.1	7.0	4.2	1 959	21	14
Mauritius	2	2.0	2.0	306	31	90
Mozambique	6.5	6.9	4.5	3 653	26	29
Namibia	3.3	3.4	2.9	334	25	68
Niger	7.4	7.5	5.2	1 704	22	21
Nigeria	5.9	5.0	2.8	25 726	27	45
Rwanda	6.2	6.2	3.8	1 515	22	22
Senegal	6.1	5.9	3.2	1 645	22	40
Seychelles	2.7	2.3	2.1	17	-	99
Sierra Leone	6.5	6.5	4.1	945	24	25
South Africa	3.3	3.3	2.8	9 745	26	63
Swaziland	6.6	6.0	3.1	172	23	67
Tanzania	6.3	5.8	3.0	5 844	23	60
Togo	13	5.9	3.0	823	23	56
Uganda	7.3	7.3	4.9	3 789	21	25
Zaire	14	6.2	3.5	8 092	22	-
Zambia	17	6.7	3.9	1 800	22	43
Zimbabwe	8	3.5	2.2	2 282	23	65

Health Indicators

	Infant mortality rate per 1000 live births		Life expectancy at birth 1992		Crude birth rate 1991	Crude death rate 1991	Maternal mortality per 100 000 live births	Prenatal health care coverage rate (percent)
	1970	1992	female	male	per 1000	per 1000	1980-92	1985-90
Angola	180	123	48	45	47	19	-	27
Benin	155	87	48	45	46	16	800	64
Botswana	101	59	64	58	36	6	250	74
Burkina Faso	178	117	50	47	47	17	800	49
Burundi	138	105	50	46	46	17	800	30
Cameroon	126	62	58	55	42	12	450	56
Cape Verde	87	39	69	67	36	7	110	99
Central African Republic	139	104	49	45	42	18	600	68
Chad	171	121	49	46	44	18	1 000	22
Comoros	141	88	57	56	47	11	500	69
Congo	126	82	54	49	49	16	900	-
Cote d'Ivoire	135	90	53	50	45	12	1 000	50
Equatorial Guinea	165	116	50	47	41	18	450	15
Ethiopia	158	121	49	46	52	18	500	14
Gabon	140	93	55	52	43	15	200	77
Gambia	186	131	47	44	47	20	1 500	72
Ghana	111	80	58	54	44	12	1 000	65
Guinea-Bissau	185	139	45	42	46	25	700	29
Kenya	102	65	61	57	45	10	200	90
Lesotho	134	78	63	58	36	10	370	50
Madagascar	181	109	57	54	42	14	400	76
Malawi	193	141	45	44	53	21	420	76
Mali	204	-	50	47	50	18	2 300	11
Mauritius	60	21	74	67	18	7	100	90
Mozambique	171	145	49	45	46	19	300	54
Namibia	100	69	60	58	43	11	270	84
Niger	170	123	48	45	52	19	700	33
Nigeria	139	95	55	51	43	14	800	78
Rwanda	142	110	48	45	40	17	400	85
Senegal	138	79	51	49	43	16	950	21
Seychelles	-		68	61	23	7	98	99
Sierra Leone	197	142	45	42	48	22	450	30
South Africa	76	45	66	59	31	9	84	73
Swaziland	140	72	60	57	49	12	130	76
Tanzania	132	101	52	49	45	15	340	90
Togo	134	84	57	53	3.2	45	720	83
Uganda	109	103	43	41	52	19	550	85
Zaire	125	92	53	50	3	44	800	85
Zambia	106	84	45	43	3.1	48	150	80
Zimbabwe	96	59	57	54	2.6	34	80	83

Health Indicators

	Daily per capita calorie intake (calories)		Daily per capita protein intake (grams)		Babies with low birth weight (percent)
	1980	1989	1980	1990	1985-90
Angola	2 100	1 725	-	-	15
Benin	2 145	2 383	51	56	10
Botswana	2 155	2 260	71	69	8
Burkina Faso	1 815	2 219	58	68	12
Burundi	2 059	1 948	69	56	18
Cameroon	2 340	2 208	59	55	13
Cape Verde	2 587	2 778	68	05	-
Central African Republic	2 136	1 846	43	46	18
Chad	1 762	1 852	-	-	11
Comoros	1 783	1 760	38	38	13
Congo	2 235	2 295	41	47	12
Cote d'Ivoire	2 844	2 568	60	54	15
Equatorial Guinea	-	-	-	-	10
Ethiopia	1 777	1 658	-	-	13
Gabon	2 243	2 396	-	-	10
Gambia	2 101	2 290	50	57	10
Ghana	1 973	2 144	44	46	5
Guinea-Bissau	1 797	2 690	-	-	12
Kenya	2 148	2 064	57	56	18
Lesotho	2 354	2 121	69	60	10
Madagascar	2 472	2 156	60	52	10
Malawi	2 273	2 043	66	59	11
Mali	1 898	2 259	57	41	10
Mauritius	2 701	2 897	62	59	8
Mozambique	1 951	1 605	33	64	11
Namibia	-	-	-	-	-
Niger	2 224	2 239	64	74	20
Nigeria	2 129	2 200	46	70	17
Rwanda	2 064	1 913	52	31	16
Senegal	2 415	2 322	69	45	10
Seychelles	2 282	2 356	65	48	10
Sierra Leone	2 096	1 899	45	43	13
South Africa	-	-	-	-	12
Swaziland	2 462	2 634	64	39	7
Tanzania	2 239	2 195	54	61	13
Togo	2 266	2 269	49	59	20
Uganda	2 114	2 178	50	63	10
Zaire	2 133	2 130	35	55	13
Zambia	2 186	2 016	59	53	14
Zimbabwe	2 180	2 256	56	51	6

Health Indicators

	Immunization per 100 children under one year - 1980				Immunization per 100 children under one year - 1991				Pregnant women immunized for tetanus (percent)
	BCG	DPT3	POL3	Measles	BCG	DPT3	POL3	Measles	1985-91
Angola	47	9	7	17	54	27	26	40	36
Benin	37	20	45	6	81	68	68	60	83
Botswana	76	70	71	68	92	86	82	78	62
Burkina Faso	16	2	2	23	60	38	38	36	26
Burundi	65	38	6	30	88	83	89	75	56
Cameroon	8	5	5	16	48	34	34	35	35
Cape Verde	64	31	39	54	99	87	88	76	90
Central African Republic	22	13	13	14	79	46	45	46	50
Chad	-	-	-	-	59	20	20	32	42
Comoros	56	31	32	30	99	94	94	87	53
Congo	92	42	42	49	88	74	74	64	60
Cote d'Ivoire	-	42	34	28	47	37	37	47	35
Equatorial Guinea	28	3	4	11	97	80	80	79	84
Ethiopia	6	3	3	5	57	44	44	37	06
Gabon	50	14	44	58	96	78	78	76	86
Gambia	92	80	53	71	97	85	89	87	77
Ghana	9	7	7	15	55	39	39	39	33
Guinea-Bissau	38	15	11	35	94	63	63	52	44
Kenya	-	-	-	-	50	41	45	38	37
Lesotho	81	56	54	49	76	75	74	76	-
Madagascar	23	34	8	15	67	50	49	40	17
Malawi	86	58	28	49	96	81	78	78	76
Mali	19	18	0	10	68	34	34	39	09
Mauritius	88	87	87	34	87	91	91	88	77
Mozambique	46	56	32	32	63	42	42	50	30
Namibia	-	-	-	-	-	-	-	-	-
Niger	28	6	6	19	26	17	17	23	44
Nigeria	23	24	24	55	57	44	44	46	58
Rwanda	51	17	15	42	94	85	85	81	88
Senegal	22	34	34	22	69	51	51	46	33
Seychelles	67	13	16	29	98	82	82	89	98
Sierra Leone	34	13	10	29	71	56	57	54	77
South Africa	-	-	-	-	-	-	-	-	-
Swaziland	59	30	22	30	71	86	87	80	63
Tanzania	69	55	50	49	89	79	74	75	40
Togo	44	9	9	47	79	61	61	51	81
Uganda	18	9	8	22	99	76	76	73	31
Zaire	34	18	18	24	65	32	31	31	29
Zambia	71	44	50	21	96	65	70	69	68
Zimbabwe	64	39	38	56	87	83	81	83	60

Health Demographics

	Number of health facilities Hospitals			Number of health facilities Health Centers and Other			Number of beds			Population per bed (1990)		
	Central	District	Total	Health centers	Others	Total	Hospital only	Other	Total	Hospital only	Other	Total
Angola	53	-	-	226	1 231	1 457	-	-	-	-	-	850
Benin	12	9	21	364	392	756	-	-	-	-	-	-
Botswana	38	7	45	37	299	336	-	-	2 200	-	-	500
Burkina Faso	2	5	7	59	8 005	8 064	2 700	2 900	5 600	3 300	3 400	1 400
Burundi	34	21	55	218	114	332	3 100	2 700	5 800	1 800	2 200	900
Cameroon	-	-	-	528	1 006	1 534	-	-	29 000	-	-	400
Cape Verde	2	3	5	4	37	41	-	-	-	-	-	-
Central African Republic	15	26	41	56	77	133	1 600	2 400	4 000	1 800	1 300	700
Chad	9	22	31	26	363	389	-	-	4 000	-	-	1 363
Comoros	5	-	-	7	72	79	-	-	-	-	-	-
Congo	45	-	-	92	515	607	5 700	1 600	7 300	400	1 500	300
Cote d'Ivoire	20	71	91	-	690	690	7 000	2 700	9 700	1 700	4 900	1 100
Equatorial Guinea	15	37	52	-	-	-	-	-	-	-	-	-
Ethiopia	86	42	128	140	1 820	1 960	-	-	-	-	-	3 500
Gabon	27	-	-	33	423	456	3 100	2 200	5 300	400	600	200
Gambia	2	4	6	19	67	86	-	-	-	-	-	-
Ghana	9	124	133	180	-	-	-	-	-	-	-	700
Guinea-Bissau	7	10	17	126	181	307	-	-	-	-	-	-
Kenya	-	-	-	282	1 535	1 817	31 000	1 000	32 000	800	26 400	650
Lesotho	20	-	-	-	-	135	2 250	-	-	800	-	-
Madagascar	7	72	79	99	581	680	-	-	-	-	-	1 100
Malawi	51	-	-	44	610	654	7 550	5 050	12 600	1 200	2 100	600
Mali	10	4	14	333	2 144	2 477	2 500	2 500	5 000	3 700	4 100	1 500
Mauritius	17	4	21	24	129	153	2 750	200	2 950	-	-	350
Mozambique	10	26	36	223	948	1 171	6 300	6 700	13 000	2 300	2 300	1 000
Namibia	-	-	-	-	-	-	-	-	7 175	-	-	-
Niger	9	1	10	43	597	640	-	-	3 200	-	-	2 250
Nigeria	-	-	-	705	6 604	7 309	61 000	30 000	91 000	1 600	3 500	1 200
Rwanda	30	22	52	170	74	244	10 300	-	-	700	-	-
Senegal	-	10	-	47	1 117	1 164	3 450	2 050	5 500	2 100	3 900	1 250
Seychelles	-	-	-	-	-	-	-	-	-	-	-	-
Sierra Leone	51	37	88	57	163	220	3 200	700	3 900	1 200	6 100	950
South Africa	49	316	365	3 141	1 053	4 194	98 863	27 561	126 424	400	1 400	-
Swaziland	9	-	-	8	113	121	-	-	-	-	-	-
Tanzania	26	104	130	300	10 453	10 753	-	-	-	-	-	900
Togo	23	-	-	317	402	719	5 300	-	-	700	-	-
Uganda	75	-	-	404	-	-	-	-	-	-	-	1 250
Zaire	-	153	-	1 095	3 983	5 078	60 000	-	-	600	-	-
Zambia	12	66	78	555	-	-	-	-	-	-	-	-
Zimbabwe	26	155	181	-	-	999	4 600	-	-	2 200	-	500

Health Demographics

	Doctors 1985-90	Para-medics 1980-88	Nurses 1985-90	Tech-nicians 1980-88	Assistant Nurses 1980-88	Assistant Tech-nicians 1980-88	Prenatal health care coverage rate (percent) 1985-90
Angola	480	-	1 200	-	-	-	27
Benin	280	-	1 700	50	1 000	300	64
Botswana	240	10	2 500	700	900	1 709	74
Burkina Faso	130	160	1 800	30	1 600	280	49
Burundi	280	130	1 200	50	450	90	30
Cameroon	940	2 000	6 000	300	5 000	300	56
Cape Verde	100	500	250	20	150	30	99
Central African Republic	110	150	500	70	500	100	68
Chad	135	30	150	200	1 000	30	22
Comoros	70	2	300	so	550	-	69
Congo	500	30	2 000	250	3 800	300	-
Cote d'Ivoire	700	-	3 300	-	-	-	50
Equatorial Guinea	100	-	200	-	-	-	15
Ethiopia	1 500	220	3 500	850	7 000	-	14
Gabon	420	80	1 500	-	-	-	77
Gambia	60	-	700	200	700	-	72
Ghana	130	-	550	180	1 300	400	65
Guinea-Bissau	120	20	300	150	1 800	800	29
Kenya	3 100	-	10 000	300	13 000	500	90
Lesotho	110	-	550	50	500	-	50
Madagascar	1 400	1 700	5 000	450	8 000	550	76
Malawi	260	350	550	250	1 600	650	76
Mali	440	90	1 100	500	3 700	300	11
Mauritius	900	-	3 300	530	500	80	90
Mozambique	280	100	3 700	280	350	850	54
Namibia	-	-	-	-	-	-	-
Niger	220	40	2 500	280	9 500	200	33
Nigeria	16 000	-	97 000	4 200	16 000	1 200	78
Rwanda	160	350	300	680	1 500	420	85
Senegal	410	50	1 100	400	7 000	-	21
Seychelles	30	-	350	-	-	-	99
Sierra Leone	260	150	1 300	160	250	-	30
South Africa	27 923	30 002	100 910	3 219	49 217	-	40
Swaziland	80	-	1 300	-	100	-	76
Tanzania	770	950	5 700	200	1 400	-	90
Togo	260	150	1 700	730	1 300	200	83
Uganda	600	600	6 800	1 000	-	550	85
Zaire	2 500	150	5 100	1 100	13 000	200	85
Zambia	880	1 300	4 300	450	4 000	550	80
Zimbabwe	1 400	3 500	8 600	900	10 000	250	83

Health Demographics

	Population per Doctor		Population per nurse		Nurses to doctor ratio
	1970	1985-90	1970	1985-90	1985-90
Angola	8 500	15 000	4 500	6 000	3
Benin	29 000	13 000	4 000	2 500	6
Botswana	15 000	4 000	-	500	1
Burkina Faso	96 000	50 000	15 000	4 000	14
Burundi	59 000	15 000	14 000	4 000	4
Cameroon	30 000	11 000	4 000	2 000	6
Cape Verde	12 000	4 000	4 000	1 500	3
Central African Republic	44 000	25 000	2 500	5 000	5
Chad	62 000	35 000	-	30 000	1
Comoros	15 000	6 000	9 000	1 500	4
Congo	10 000	4 000	1 500	1 000	4
Cote d'Ivoire	16 000	15 000	3 000	3 000	5
Equatorial Guinea	12 000	4 000	-	2 000	2
Ethiopia	92 000	29 000	21 000	12 000	2
Gabon	5 000	3 000	-	800	4
Gambia	25 000	13 000	2 000	1 500	12
Ghana	51 000	40 000	-	10-,000	4
Gui-ea-Bissau	18 000	6 000	5 000	2 000	3
Kenya	8 000	6 000	2 000	2,-500	3
Lesotho	30 000	16 000	3 000	3 300	5
Madagascar	10 000	8 000	9 000	2 000	4
Malawi	77 000	27 000	5 000	14 000	2
Mali	45 000	18 000	6 500	7 000	3
Mauritius	4 500	1 200	520	320	4
Mozambique	19 000	50 000	5 000	4 000	13
Namibia	-	-	-	-	-
Niger	60 000	35 000	11 000	3 000	1.1
Nigeria	21 000	6 000	2 000	1 000	6
Rwanda	60 000	35 000	10 000	20 000	2
Senegal	16 000	16 000	1 500	7 000	3
Seychelles	4 500	2 500	170	200	12
Sierra Leone	18 000	13 000	3 500	3 000	5
South Africa	2 000	1 370	452	249	4
Swaziland	8 000	9 000	500	600	16
Tanzania	23 000	29 000	3 000	4 000	7
Togo	29 000	10 000	2 500	2 000	7
Uganda	9 000	18 000	13 000	2 500	11
Zaire	28 000	14 000	4 600	7 000	2
Zambia	14 000	7 000	4 300	2 000	5
Zimbabwe	6 500	6 000	750	1 000	6

HIV - AIDS

	HIV Infection first reported	HIV antibody testing			Number of HIV cases reported		
	Year	Central	Provincial	District	Latest Year	Reported	Estimated
Angola	1 985	X	X				
Benin	1 985	X	X				
Botswana	1 985	X	X	X			
Burkina Faso	1 985	X	X	X			
Burundi	1 983	X	X	X			
Cameroon	1 985	X	X	X			
Cape Verde	1986	X	X				
Central African Republic	1984	X	X				
Chad		X	X				
Comoros	1988	X	X				
Congo	1986	X	X				
Cote d'Ivoire	1985	X	X				
Equatorial Guinea	1988	X	X				
Eritrea		X					
Ethiopia	1984	X	X	X			
Gabon	1986	X	X				
Gambia	1986	X	X	X			
Ghana	1986	X	X	X			
Guinea-Bissau	1989	X	X				
Guinea		X					
Kenya	1980	X	X	X			
Lesotho	1986	X					
Liberia		X					
Madagascar	1987	X	X				
Malawi	1985	X	X	X			
Mali	1985	X	X				
Mauritius	1987	X					
Mozambique	1986	X	X				
Namibia	1986	X	X	X			
Niger	1987	X	X				
Nigeria	1986	-	-	-			
Reunion		X					
Rwanda	1983	X	X				
Senegal	1986	X	X	X			
Seychelles	1987	X					
Sierra Leone	1987	X	X	X			
South Africa		X	X	X			
Sao Tome & Principe		X					
Swaziland	1986	X					
Tanzania	1983	X	X	X			
Togo	1987	X	X	X			
Uganda	1983	X	X	X			
Zaire	1986	X	X	X			
Zambia	1985	X	X	X			
Zimbabwe	1985	X	X	X			
Totals							

HIV - AIDS

	Number of AIDS cases reported								
	Cumulative reported from 1979-90	1991	1992	1993	1994	1995	Cumulative reported from 1979	Last date reported	Percentage of total reported cases
Angola	251	130	187	135	157	35	895	31/03/95	0.2
Benin	134	113	218	277	114		856	14/12/94	0.2
Botswana	889	0	189	870	968	194	3 110	05/06/95	0.7
Burkina Faso	2 886			836			3 722	31/12/93	0.9
Burundi	3 615	1 565	1 583	117	144		7 024	31/12/94	1.7
Cameroon	340	510	1 347	1 761	1 417		5 375	31/12/94	1.3
Cape Verde	39	13	13	17	10		92	31/12/94	0.0
Central African Republic	2 474	840	416				3 730	30/11/92	0.9
Chad	130	94	363	1 010	1 268	592	3 457	31/05/95	0.8
Comoros	0	1	2		2		5	31/08/94	0.0
Congo	2 405	1 077	1 785	1 206	1 300		7 773	22/04/95	1.9
Cote d'Ivoire	6 898	3 894	3 863	4 015	6 566		25 236	31/05/95	6.1
Equatorial Guinea	5	2	12	24	16	15	74	07/06/95	0.0
Eritrea	369			300	625	245	1 539	31/05/95	0.4
Ethiopia	730	924	3 230	5 124	5 558	2 476	18 042	12/05/95	4.3
Gabon	118	98	177	128	204	156	881	29/05/95	0.2
Gambia	124	56	56	38	53	13	340	31/03/95	0.1
Ghana	6 703	903	2 699	2 371	2 330		15 006	31/12/94	3.6
Guinea-Bissau	142	30	116	165	254		707	31/12/94	0.2
Guinea	677			328	543		1 548	04/01/95	0.4
Kenya	21 065	9 202	6 762	11 560	7 347	637	56 573	25/04/95	13.6
Lesotho	23	28	131	297	36		515	31/12/94	0.1
Liberia	28			163			191	31/03/94	0.0
Madagascar	5	0		6	7		18	31/03/95	0.0
Malawi	- 3 342		4 655	672	609		2 594	10/01/95	0.6
Mali	26 955			4 916	4 732	1070	37 673	05/06/95	9.1
Mauritius	9		6	3	9		27	31/12/94	0.0
Mozambique	162	178	322	164	534	455	1 815	31/05/95	0.4
Namibia	3 622			1 479			5 101	31/12/93	1.2
Niger	307	212	290	453	429		1 691	07/03/95	0.4
Nigeria	423	57	225	256	630		1 591	31/05/95	0.4
Reunion	65						65	20/03/92	0.0
Rwanda	6 578		2 908	1 220			10 706	30/06/93	2.6
Senegal	400	125	323	349	100		1 297	22/11/94	0.3
Seychelles	0	0		1	5		6	12/09/94	0.0
Sierra Leone	4	52	32	23	22	22	155	31/05/95	0.0
South Africa	1 891			1 567	391		3 849	27/07/94	0.9
Sao Tome & Principe	11			2			13	25/03/94	0.0
Swaziland	2	92	156	163			413	15/02/94	0.1
Tanzania	25 784	12 059	4 579	3 327	219		45 968	30/06/94	11.1
Togo	839	628	675	1 330	1 284	353	5 109	08/06/95	1.2
Uganda	25 425	8 706	4 421	2 641	4 927		46 120	31/12/94	11.1
Zaire	17 858	3 120	1 181	588	3 384		26 131	06/07/94	6.3
Zambia	4 202	1 646	1 276	22 610			29 734	20/10/93	7.2
Zimbabwe	10 702	4 557	3 472	9 174	10 647		38 552	31/12/94	9.3
Totals	171 947	50 912	47 670	81 686	56 841	6 263	415 319		

HIV - AIDS

	Prevelance per 1000 population	
	1991	1993
Angola	1	1
Benin	5	2
Botswana	61	66
Burkina Faso	9	
Burundi	2	2
Cameroon	14	11
Cape Verde	4	2
Central African Republic		
Chad	17	20
Comoros		
Congo	56	58
Cote d'Ivoire	28	45
Equatorial Guinea	5	3
Eritrea	...	...
Ethiopia	10	11
Gabon	10	15
Gambia	4	6
Ghana	14	14
Guinea-Bissau	16	24
Guinea	4	7
Kenya	41	25
Lesotho	15	2
Liberia	6	
Madagascar		
Malawi	7	6
Mali	53	49
Mauritius		1
Mozambique	1	3
Namibia	72	
Niger	6	5
Nigeria		1
Reunion		
Rwanda	15	
Senegal	4	1
Seychelles	2	8
Sierra Leone	1	1
South Africa	4	1
Sao Tome & Principe	2	
Swaziland	19	
Tanzania	11	1
Togo	35	33
Uganda	13	23
Zaire	2	8
Zambia	239	
Zimbabwe	86	97
Totals		

Programmes

	AIDS & STD education included in school curricula	Frequency of AIDS messages on radio		television		Supply of condoms			Condoms distributed (thousands)	
	(since)	more often than weekly	less often than weekly	more often than weekly	less often than weekly	through mass media	to vulnerable groups	Social marketing program	1990	1991
Angola	no		X		X	yes	yes	no	-	-
Benin	no		X	X		yes	yes	yes	400	550
Botswana	1992	X				yes	yes	yes	-	2 000
Burkina Faso	1986	X			X	yes	yes	yes	-	-
Burundi	1988	X			X	yes	yes	yes	498	1 000
Cameroon	1991	X			X	yes	yes	yes	2 160	2 160
Cape Verde	no	X			X	yes	yes	no	-	-
Central African Republic	1990	X			X	no	yes	yes	724	1 282
Chad	no		X		X	no	yes	no	74	444
Comoros	no		X			yes	yes	no	14	56
Congo	1991	X		X		yes	no	yes	-	172
Cote d'Ivoire	no		X		X	yes	yes	yes	3 000	4 000
Equatorial Guinea	no	X		X		yes	yes	no	288	288
Ethiopia	no	X		X		yes	yes	yes	3 390	4 454
Gabon	1990	X			X	yes	yes	no	-	-
Gambia	yes	X			-	yes	yes	no	576	834
Ghana	1991	X		X		yes	yes	yes	-	-
Guinea-Bissau	no	X			-	yes	yes	no	-	114
Kenya	1992	X			X	no	yes	yes	10 200	18 400
Lesotho	yes		X		-	yes	yes	yes	367	502
Madagascar	1990		X		X	no	yes	no	800	1 000
Malawi	1991	X			-	yes	yes	yes	5 000	5 000
Mali										
Mauritius	no		X		X	yes	yes	yes	1 316	1 335
Mozambique	no		X		X	yes	yes	no	2 370	2 592
Namibia	no	X		X		yes	yes	no	1 037	1 376
Niger	no	X		X		no	yes	no		2 478
Nigeria	no							yes	1 000	750
Rwanda	no	X				yes	yes	yes	4 000	5 800
Senegal	1991		X		X	yes	yes	yes	1 200	1 500
Seychelles	1988		X	X		yes	yes	no	100	309
Sierra Leone	1990	X				yes	yes	yes	1 008	1 500
South Africa										
Swaziland	1991	X		X		yes	yes	yes	-	-
Tanzania	no		X			yes	yes	yes	20 000	30 852
Togo	1982		X		X	yes	yes	yes		251
Uganda	1989	X		X		no	yes	yes	-	1 800
Zaire	1988		X		X	no	yes	yes	4 140	18 715
Zambia	1992	X		X		yes	yes	yes	-	-
Zimbabwe	no					yes	yes	yes	20 895	24 281

ANNEX 3

FIGURES

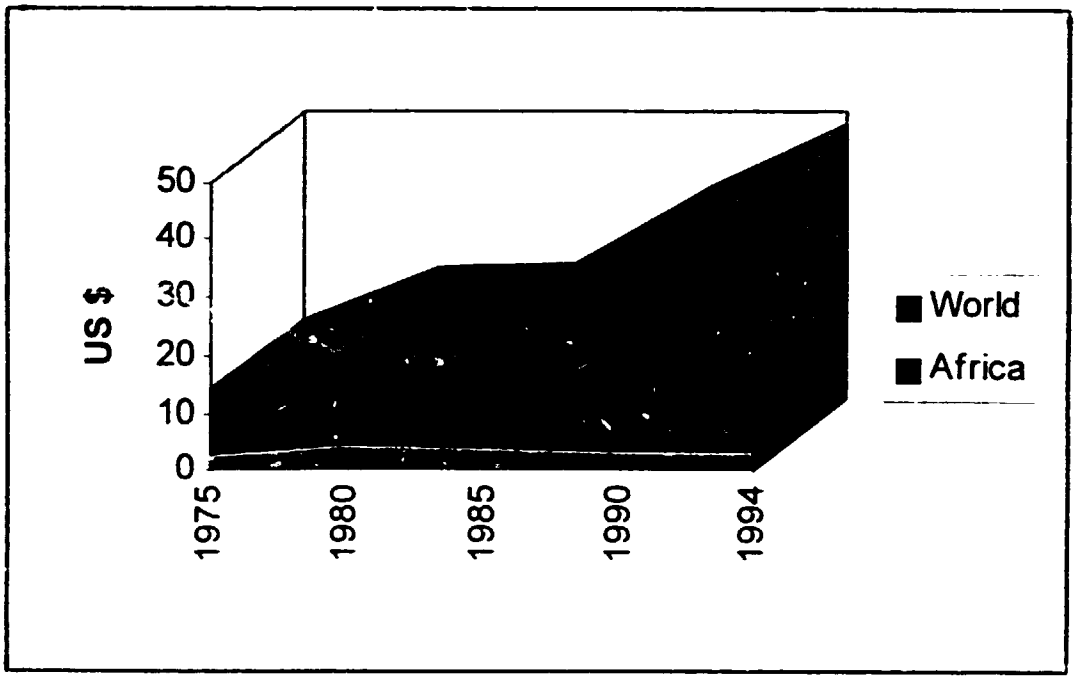

Fig. 1: Pharmaceuticals consumption (Africa and World)

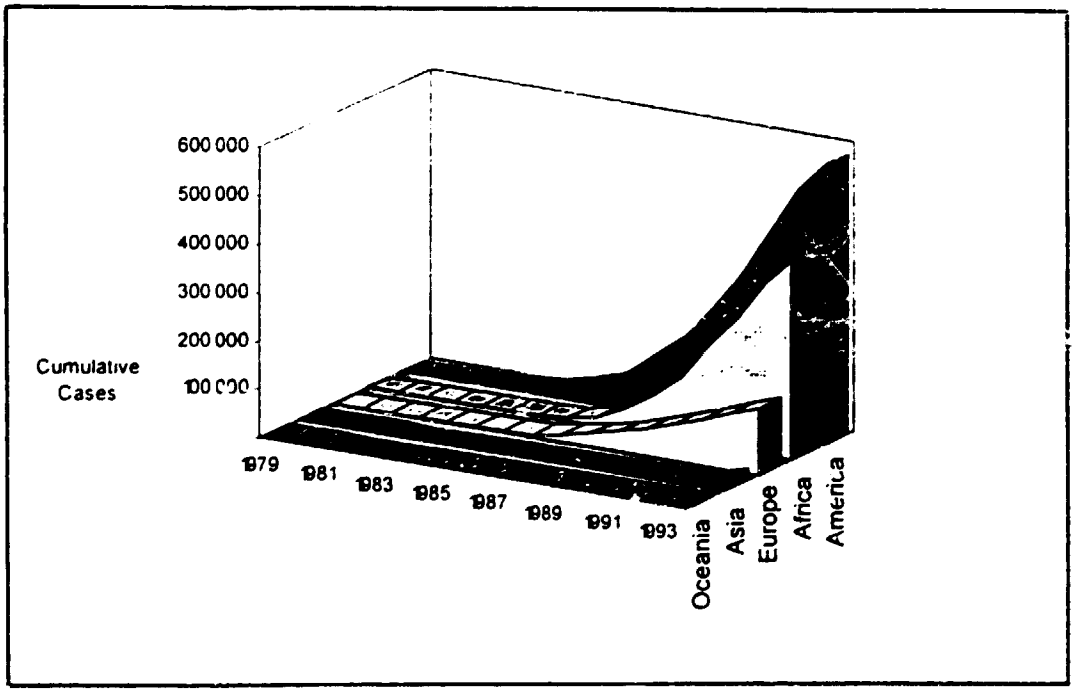

Fig. 2: Cummulative reported cases of AIDS in five regions of the World

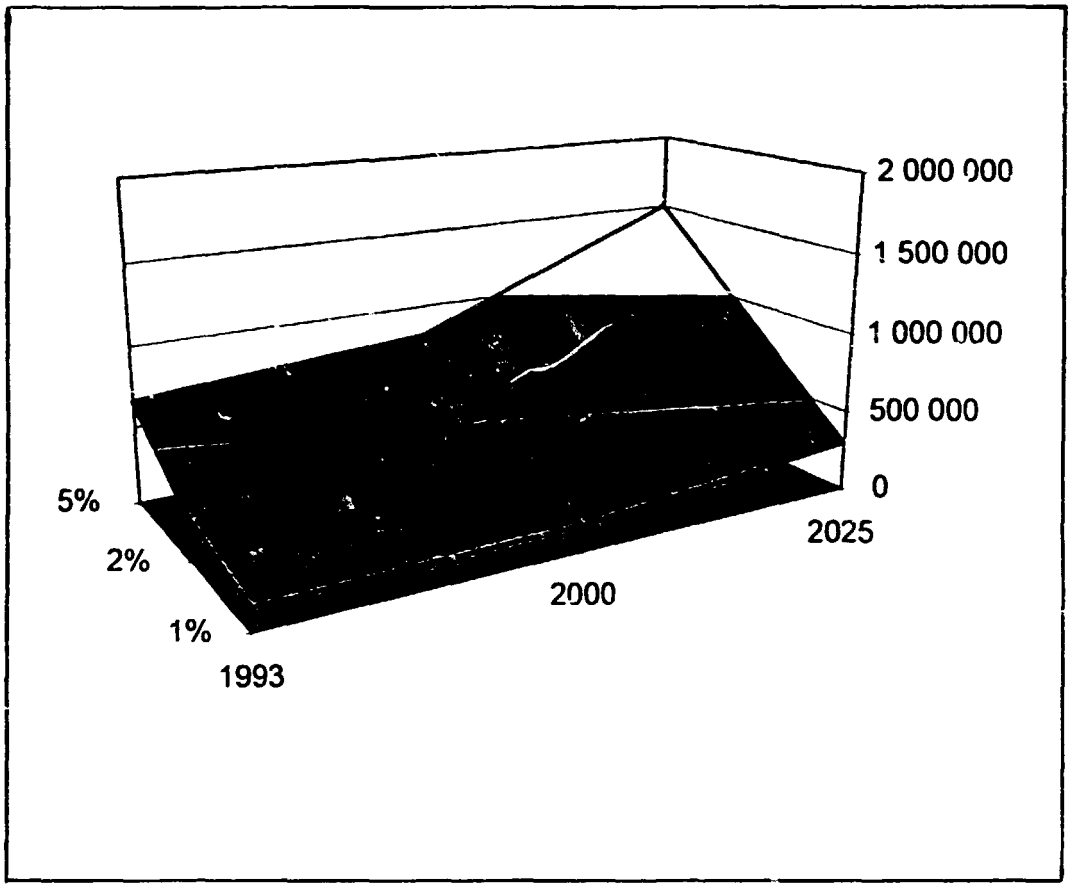

Fig. 3: Projected condom use in Africa

Assumptions: 10 contacts per month of sexually active male population at condom usage rates of 1%, 2% and 5%

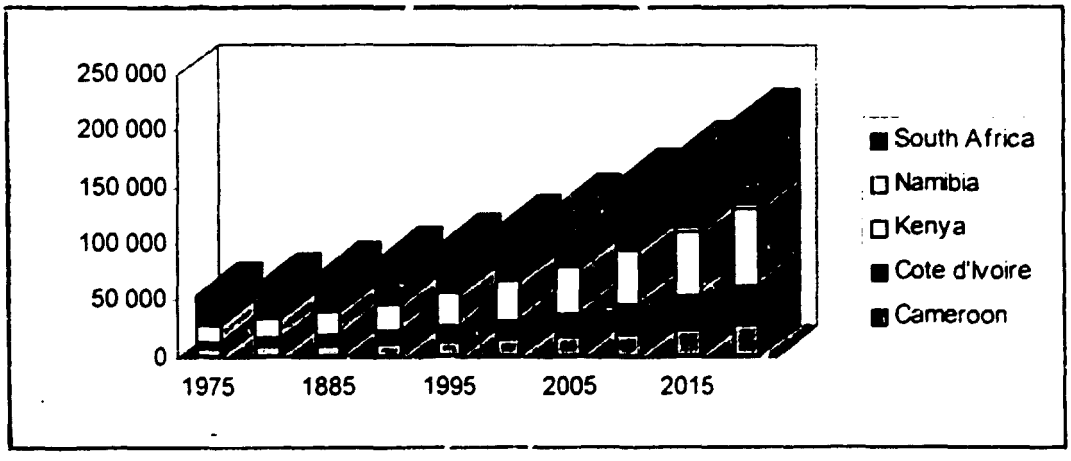

Fig. 4: Projected population growth in the five proposed development poles

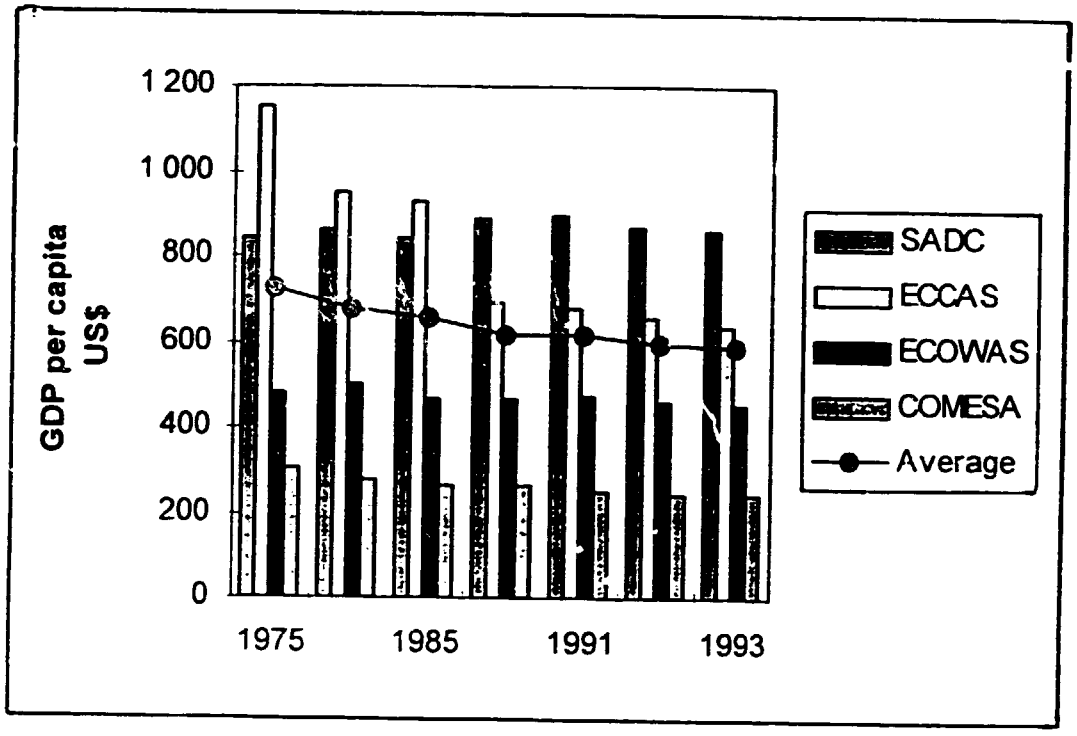

Fig. 5: Growth of GDP for the four economic communities

ANNEX 4

COMPARISON OF HIV TEST KITS AND OTHER TOOLS FOR PREVENTION

Antigen vs Antibody Testing

Generally, in diagnostic testing, tests based on antigen detection represent a major advance over those which rely on antibody detection. The antigen shows presence of the condition whereas antibodies mean that the body either currently has the condition or has had it in the past. Thus an antigen detected at time T means presence of the condition at time T, while an antibody detected at time T means presence of the condition at some time t<=T. Clearly for irreversible conditions there is no difference, as the condition persists once it appears. (Even so, there is anecdotal evidence of women in the Gambia who tested positive for HIV and later tested negative.) Other considerations override any intellectual preference which may otherwise be given to HIV testing based on antigen detection.

Comparison of Various Test Kits

Name	Manufacturer	Technology	Specificity (%)	Sensitivity (%)	Media
HIVA TEST	LUPIN Laboratoies	ELISA Antibody	98.7	100	
PATH DIPSTICK	PATH	Dipstick Antibody	98.2	99.5	Serum Plasma Whole blood
BIOSCREEN Rec VIH	Herber Biotec	ELISA Antibody			Serum Plasma

Table A4.1:

HIV test kits comparisons

Name	Cost/Test	Duration of Test (Minutes)	Storage Conditions	Package Size
HIVA TEST		>120	2-8°C	32T 96T 480T
PATH DIPSTICK	$0.50	20	Room Temperature	
BIOSCREEN Rec VIH		>70	2-8°C	

Table A4.2:

HIV tests kits cost, storage and packaging size. *(source of tables: B. Aylward, J. Loyd, M Zaffran, R. McNair-Scott and P. Evans, "Reducing the risk of unsafe injections in immunization programmes: financial and operational implications of various injection technologies", Bulletin of the World Health Organization, 1995, 73 (4) 531-540.)*

Potential complications

Infectious		Non-Infectious	
Transmission of blood borne pathogens	Iatrogenic infections due to unsterile equipment	Injuries due to improper techniques	Incorrect injection materials
Examples	*Examples*	*Examples*	*Examples*
Hepatitis B	Abscesses	Traumatic paralysis	Toxic injection
HIV	Septicaemia	BCG lymphadenitis	Anaphylactic shock
Dengue	Tetanus		
Malaria			

Table A4.3

Potential complications with invasive technologies i.e. injections

Injection Equipment	Equipment required	Unit Cost[a] (US$)
Sterilizable	Plastic BCG syringe	0.23
	Plastic 0.5-ml syringe (DPT, TT, measles)[b]	0.18
	Hypodermic needle (22-gauge)	0.038
	Steam sterilise (double-rack)	75.26
Disposable	BCG disposable syringe with needle	0.06
	Plastic 2-ml syringe	0.02
	Hypodermic needle (22-gauge)	0.017
	Incinerator disposal box (100 syringes)	0.85
Autodestruct	Autodestruct syringe with needle (includes 1 incinerator box per 100 syringes)	0.08
Jet injector[c]	Jet injector (high workload)	2 991.13
	Spare parts for jet injector	772.76
	Steam sterilise	65.48

Table A4.4

Equipment requirements and unit costs for four injection technologies used to administer injectable vaccines. Costs are provided for purposes of comparison.

a *1994 UNICEF catalogue costs. Low workload jet injectors are not yet available through UNICEF.*
b *DPT = diphtheria-pertussis-tetanus; TT = tetanus toxoid.*
c *UNICEF does not provide disposable equipment for immunization programmes.*

	Transmission route:		
	Patient-to-patient	**Patient-to-HCW[a]**	**Patient-to-community**
Injection equipment	*High risk:* equipment reused without sterilisation	*High risk:* needlestick injuries when cleaning equipment	*Low risk:* needlesticks owing to unsafe disposal of needles
Disposable	*High risk* equipment reuse instead of disposal	*Medium risk* injury during reuse, recapping	*High risk* reuse within and outside of the medical sector or disposal
Autodestruct	*No risk*	*Low risk:* needlesticks during recapping or disposal	*Low risk* needlestick injury owing to unsafe disposal
Jet injector	*Low risk:* continued use with contaminated injector nozzle	*No risk*	*No risk*

Table A4.5
Comparison of the potential risks of transmitting bloodborne pathogens through specific unsafe injection practices with four types of injection equipment.

[a] HCW = health care worker.

	Clinic workload of			
	5 injections per day		**50 injection per day**	
Injection equipment	*Total costs US$*	*Cost per injection US$*	*Total costs US$*	*Cost per injection US$*
Sterilizable	75.12	0.06	108.28	0.01
Disposable	69.55	0.05	695.50	0.05
Autodestruct	104.00	0.08	1040.00	0.08
Jet injector	121.55	0.09	380.00	0.03

Tables A4.6
Estimated total costs and cost per injection of four injection technologies in a routine immunization programme over a 1-year period , by clinic workload (low-workload)[a]

Low workload injectors will soon be available for use in immunization programmes. The manufacturer's price of US $250 per injector was used in the calculations. The addition of a sterile autodestruct cap would increase the cost by approximately US $0.02-0.03 per injection.

ANNEX 5

QUESTIONNAIRE

PART I — Time Series Data

Country:_____

	1975	1980	1985	1990	Latest Year	Projected 2020
Population (1000's)						
GDP/Capita $US						
Consumer Price Index 19..=100						
Exchange rate local currency/$US						
Share of manufacturing in GDP (%)						
Health care expenditure ($US)						

Please return completed questionnaire to:

Ms. B. Riezky
Industrial Statistics and Sectoral Surveys Branch
U N I D O
P.O. Box 300
A1400 Vienna
Austria

PART II - Data for latest available year(s)

Country:_____

Demographic Data:

Population by age group (1000's)	Latest year	0-4	5-14	15-24	24-49	50-60	over 60
Rural/Urban distribution	Latest year		% urban		% rural		
Literacy rate	Latest year		female		male		
Economically active population	Latest		female		male		unemployed

Health indicators:

Infant mortality	Latest year	
Life expectancy at birth	Latest year	female male
Daily p. capita calorie intake	Latest year	
		Per 1000 population
Number of physicians	Latest year	
Number of hospital beds	Latest year	
Number of other health care personnel	Latest year	
Number of pharmacies	Latest year	

Country:_____

Major causes of death

Latest year	1_____	6_____
	2_____	7_____
	3_____	8_____
	4_____	9_____
	5_____	10_____

Number of HIV infections	Latest year	Reported	Estimated
Number of AIDS cases	Latest year	Reported	Estimated
Number of cases of tuberculosis	Latest year	Reported	Estimated

Major diseases

	Name	Incidence	Name	Incidence
Latest year	1_____	_____	7_____	_____
	2_____	_____	8_____	_____
	3_____	_____	9_____	_____
	4_____	_____	10_____	_____
	5_____	_____	11_____	_____
	6_____	_____	12_____	_____

Market data:

Pharmaceuticals and allied products

Sales	Latest year (time series, if available)
Imports	Latest year (time series, if available)

Country:_____

Sales of leading pharmaceutical products

Latest year	Name	Sales
	1_____	_____
	2_____	_____
	3_____	_____
	4_____	_____
	5_____	_____
	6_____	_____
	7_____	_____
	8_____	_____
	9_____	_____
	10_____	_____

Sales of:

	Latest three years		
Hormonal contra-ceptives	19..	19...	19...
product name_____			
product name_____			
product name_____			
Condoms with or without spermicides	19..	19..	19..
Diaphragms with or without spermicides	19..	19..	19..
Intrauterine devices	19..	19..	19..

Country:_____

Government purchases
through tenders ($US)

Hormonal contra-ceptives	Latest three years 19..	19...	19...
product name_____			
product name_____			
product name_____			

Condoms with or without spermicides	Latest three years 19..	19..	19..

Diaphragms with or without spermicides	Latest three years 19..	19..	19..

Intrauterine devices	Latest three years 19..	19..	19..

Sales of other
health care products:

disposable syringes

disposable needles

surgical gloves

other (see specify)

Pharmaceutical manufacturers

Please list names and addresses:
(If room insufficient, please provide separate page)

PART III QUALITATIVE DATA

Awareness of AIDS:

very low	low	medium	high	very high
____	___	____	___	___

Do anti-AIDS campaigns exist?

yes: no:

If yes, state method and frequency:

TV	Radio	Press	Leaflets	Through health-care personnel	Other
___	___	___	___	____	___

If other, please specify:_____

Regular: Intermittent: Special campaigns:

Direct AIDS-related data:

Incidence of AIDS:

known: estimated:

Main sources of AIDS and frequency of transmission:

Source:	Frequency:	Known:	Estimated:
Sexual transmission			
Blood transfusions			
Mother/child infection			
Drug abuse			
Other, please specify			

Is there epidemiological surveillance?

Yes No

If yes, please give details.

Do national programmes exist with respect to AIDS prevention?

Yes No

If yes, please give details.

Is there an AIDS related national budget?

Yes No

If yes, please give details.

Please list international assistance given with respect to AIDS prevention or treatment:

Organization: Frequency: Volume:

Please list organizations dealing with the prevention of HIV infections and AIDS:

Do family-planning campaigns exist?

yes: **no:**

If yes, state method and frequency:

TV	Radio	Press	Leaflets	Through health-care personnel	Other
___	___	___	____	_____	___

If other, please specify:_____

Regular: **Intermittent:** **Special campaigns:**

Condom use:

known: **estimated:**

Diaphragm use:

known: **estimated:**

Use of intrauterine devices:

known: **estimated:**

ANNEX 6

REPORT ON THE MISSION TO: KENYA, TANZANIA AND UGANDA (JUNE-JULY 1995)

by Mr. D. Subrahmanyam

A. INTRODUCTION

The prevalence of Acquired Immunodeficiency Syndrome (AIDS) in Africa, in general, and Sub-Saharan Africa in particular has reached pandemic proportions. Significant increases in Human Immunodeficiency Virus (HIV) infections, implicated to be the causative agent for development of AIDS, have been reported in recent years from all African countries in all socioeconomic levels.

HIV belongs to the Lentivirus group which constitutes a separate genus of the Retroviridae family. HIV-1 isolates were recovered from the blood of AIDS infected patients since 1983. A separate subtype HIV-2 was identified in 1986 in West Africa. Although globally HIV-1 is the major source of infection leading to AIDS, HIV-2 strains have now been detected in AIDS cases from Europe, South America and USA.

AIDS is gradually shifting from a disease prevalent in the industrial world to a disease of developing countries. Globally AIDS cases increased by 60% since 1993. Currently, according to the World Health Organization, 20 million people were estimated to be infected with HIV in the world of which more than a million are children and 4.5 million cumulated cases of AIDS. Some 6000 new HIV infections occur every day. About 45% of the infected are women and this proportion is on the rise. About 70% of the infected live in Africa. AIDS has claimed many lives, particularly of adults in the prime of life. Currently, AIDS kills annually 100,000 people. By the end of the century, HIV infections are predicted to rise to 40 million of which 4-8 million could be children, unless effective measures are taken to contain the infection. There are likely to be 10 million AIDS cases by the year 2000 with some 400,000 dying annually due to AIDS.

More recent picture on the pattern and progress of HIV infection depicts it to be dynamic process. HIV, once introduced, appears to reproduce fast in the infected population. The immune system of the patient wages a constant battle to contain the multiplication of the virus. It is estimated that more than a billion virus particles are produced and destroyed daily in a person with the HIV infection. However, due to, perhaps, rapid genetic variation in the virus and other ill-determined reasons, the immune system eventually fails to contain the multiplication of the virus resulting in AIDS infection and death of the infected individual. The incubation period between the HIV infection and the onset of AIDS depends on the ability of the immune system to cope up with the viral multiplication. Some HIV infected people develop AIDS within two years after they become infected while the other more immune competent individuals may take 10 years or more to develop AIDS. Malnutrition which is highly prevalent in the African population, may lead to rapid progress of HIV infection leading to AIDS. A similar situation is seen in children and in immunocompromised individuals.

In 1988, the African Region of the World Bank adopted an Agenda for action on AIDS in Africa. A re-evaluation of the AIDS situation was undertaken by the Bank in 1992. The review revealed the magnitude of the AIDS problem in Africa as predominantly a sexually-transmitted disease spreading rapidly from a disease of urban population to that of rural areas. The Bank urged the African governments to direct their financial and planning agencies to focus on AIDS and its implications for development.

In 1992, the Organization of African Unity (OAU) signed the Dakar Summit Declaration concerning the AIDS epidemic in Africa and committed for an agenda for action against AIDS. More recently African Development Bank Group devoted their 1993 Annual meetings Symposium at Abidjan on the theme "HIV/AIDS and Development in Africa" and renewed their commitments to fight against the alarming spread of AIDS in Africa. The symposium concluded that AIDS can be prevented with cost-effective interventions starting with community initiatives to certain concrete actions by policy-makers and citizens of Africa.

B. PREVENTION AND CONTROL OF HIV INFECTION

Strategies identified for prevention and control of HIV/AIDS infections in the Sub-Saharan region have been well established in the majority of countries. Although the strategies are tailored for each country they generally include the following aspects :

- Sensitising and educating the public at all levels on HIV infection and AIDS
- Prevention and treatment of other sexually-transmitted and AIDS - related diseases
- Condom promotion
- Early diagnosis of HIV infection
- Prevention of transmission through contaminated blood

Sensitising and educating the public at all levels on HIV infection and AIDS

Many factors influence the spread of HIV/AIDS in the context of Sub-Saharan Africa including social situation, culture and demographics. Close community involvement and social mobilisation that address some of the underlying factors could significantly slow the spread of the epidemic. Free flow of information on sexually-transmitted diseases including HIV infections and on sexually safe behaviour to the public, across different social strata can contribute to an effective prevention programme on HIV/AIDS. NGO's and community groups of women and youths could assist effectively in dissemination of information, in opening communication channels and in distribution of supplies for prevention and care. Incorporation of reproductive health education and HIV/AIDS awareness in curricula and introduction of counselling at the school and college levels, would ensure participation by the youth in the fight against the disease. Appropriate programmes in the area of AIDS control and environmental education can be designed to train the trainers (teachers, community health workers peer educators, etc.). Intensive training programmes could be incorporated in medical

school and nursing education to train the future medical personnel in the fight to effectively stem the tide of HIV/AIDS.

UNDP underlined the importance of some of the above community outreach ideas in a recent project proposal under the sub-regional programme on community-based initiatives in Eastern Africa.

Prevention and treatment of other sexually-transmitted and HIV related diseases

Persons with sexually-transmitted diseases (STD's) are at greater risk of contracting HIV as STDs increase susceptibility to AIDS infection. STD's pose a serious problem in the African continent. Diagnosis and treatment of STD infections should form a priority in the public health programmes of every country. There are reliable and robust diagnostic techniques for detection of STD's and these should be made available. Also, effective chemotherapeutic agents are known to treat these infections. National or regional efforts should therefore be made to produce these drugs in adequate quantities and at affordable prices.

There is at present no effective chemotherapeutic agent against AIDS, although there are few drugs such as AZT that inhibit the multiplication of the HIV and thus prolong the life of the infected individual. However, there is effective armamentarium to combat many of the associated infections such as tuberculosis and opportunistic fungal and parasitic infections that establish and cause increased morbidity and mortality in the immuno-compromized AIDS patient. These too should be made available in the public health programmes of the countries.

Condom promotion

The persistent use of condoms should protect the uninfected individual and thus slow the spread of HIV infection. Condoms are therefore a key component of the principal measures to prevent HIV transmission. Condom use has been reported to be increasing but low in most countries in Africa. Concerted efforts should be made by the African governments to promote availability of good quality condoms in adequate amounts and at affordable prices. Programmes should be devised to educate and motivate men and women to use condoms in risky situations. The public and private enterprises should explore the feasibility of establishing local or regional condom manufacturing facilities for attaining self-sufficiency.

Early Diagnosis of HIV infection

Precise figures on the rapid rate of infection among the population, particularly in African countries are hard to come by because epidemiological surveys are infrequent. It is vital that extensive diagnostic surveys be conducted to monitor the extent of the AIDS epidemic so that effective measures can be implemented to contain the infection. Early diagnosis would help in quickly adopting available measures of intervention in the affected population.

Serological methods are usually most definitive for diagnosis of HIV infection and they are also cost effective. There are several diagnostics kits available but none of these are produced in Africa, and so have to be imported. The prices of most of these kits are still high and not within reach of many African countries. There is a need to stimulate local industry in Africa to develop/adapt the technology and produce diagnostic kits that are relatively less expensive but have high sensitivity and specificity, for use in the surveillance programmes. The technology developed by the International Centre for Genetic Engineering and Biotechnology (ICGEB) for detection of HIV-1 and HIV-2 infections could serve such a purpose.

Similarly, diagnostic tools for detection of sexually-transmitted diseases (STD) should be produced locally made available in Africa.

Prevention of transmission through contaminated blood

Besides sexual contact and mother to foetus transmission, the other main transmission route for HIV infection is through blood transfusion. This could amount to 10% of new HIV infections in certain African countries. Diagnostic facilities should also be available for routine screening against HIV contamination of all blood used in transfusions.

Several reports have emerged in recent years, including some from developed countries, of accidental use of HIV contaminated blood in transfusion, leading to development of AIDS in the patients. All blood banks and blood collecting centres should have facilities for HIV screening. Reuse of non-sterile surgical and dental instruments and accessories should be avoided to prevent transmission of infection. Medical services should have the equipment and supplies necessary to avoid use of contaminated articles.

Production of medical supplies such as plastic ware, gloves, syringes, and needles should be established, as well as facilities for acquiring sterilisation equipment.

Provision should also be made for proper management and maintenance of equipment used in AIDS control programmes.

C. MISSION OBJECTIVES

An Inter-agency co-operation programme has been formed (UNAIDS) towards working on a concrete programme for containment of HIV/AIDS. The purpose of the programme is to advocate global response to the epidemic, guide national and global action against AIDS and build national capability strengthening to contain the infection. The Economic and Social Council in a resolution at its meeting in July 1994 at New York called for participation and contribution of all UN Organizations towards substantive issues of the programme. UNIDO, therefore, has undertaken to contribute substantially to the internationally coordinated efforts in the area. In view of the

magnitude and severity of HIV/AIDS epidemic in Sub-Saharan Africa, UNIDO, to begin with, targeted this project to selected African countries in the region. The immediate objective of the study is to investigate market demand for pharmaceuticals and allied products used in the diagnosis, treatment and prevention of AIDS and AIDS related diseases or conditions in Sub-Saharan African countries and to identify opportunities for local production of these goods needed in sufficiently large quantities at country or regional level. The study intends to provide strategy advice for development, establishment and promotion of local or regional production of these items. The present report forms part of this study and covers the work done during missions to Kenya, Tanzania and Uganda during 19 June - 7 July 1995.

The itinerary of the mission and information on the officials met from the academia, government, industry, NGOs and international organizations etc. is included in Appendix 1.

A list of available reports/references collected on the subject during the mission is appended under Appendix 2.

D. SUMMARY & RECOMMENDATIONS

1. The immediate objective of the mission was to undertake a study on the HIV/AIDS control measures being undertaken in three East African Countries namely, Kenya, Tanzania and Uganda which are greatly affected by the pandemic.

2. The measures related to the extent of local production availability of health care system inputs needed for control of HIV/AIDS such as diagnostics; plastics including condoms, gloves, disposable syringes; absorbents; intravenous fluids; pharmaceuticals particularly those against AIDS-associated opportunistic infections. The study also includes assessing the market demand for these products and identification of opportunities for their local production in large quantities at country / regional level in a financially sustainable manner.

3. The study was conducted in the countries through meetings and in-depth discussions with officials responsible for undertaking the control measures and through site visits. The officials met included senior staff of government ministries (planning, health and industry); private and public sector enterprises; international bodies (UNIDO, UNV, WHO); NGOs and academia.

4. Kenya, Tanzania and Uganda put together represent about 11% of the population of Africa. However, one third of the HIV infections of the continent are estimated to occur in these three countries. Over 20% of the AIDS cases are found in this region. Heterosexual route is the most predominant one in the transmission of the infection. The governments are very transparent on the gravity of the problem and have taken wide measures to bring awareness to the public of the menace. Consequently, over 90% of the public are cognizant of the nature of the infection. However, attempts to bring about changes in the social behaviour in the population to contain the infection met with only marginal success (20-30%). Although

there is no set curriculum approved that is obligatory for high school/university students to undergo, extensive counselling was practised in the countries. The Ministries of Education and Health feel the need for devising appropriate curricula to educate the youth and the general public.

5. For a number of years, aid through several international agencies, NG0s and bilateral arrangements made it possible for getting essential needs to control the infection. But donor fatigue is already seen this year as evidenced by the erratic supplies. The ability of these countries to meet the future requirements through internal resources remains uncertain. Meanwhile, sexually transmitted diseases (STDs) are increasingly contributing to the spread of HIV infection. Tuberculosis, fungal and parasitic infections increased 2 to 3 fold due to HIV infection in the last 3 years.

6. Documents dealing with the National Mid Term Plans (MTP) for HIV/AIDS control and projects of International organizations and NG0s operating in the countries were received and analyzed.

7. There is no local production of diagnostics in the countries. All diagnostic kits are imported from the Western countries through WHO, USAID and other donor agencies. Uganda and Tanzania are facing acute shortage of the kits and therefore diagnostic tests are limited to special situations. Zanzibar, for instance, is conducting the diagnostic tests mainly on samples of blood used for transfusion purposes. All the three countries were keen to use the ICGEB/LUPIN kit for co-marketing with LUPIN. The HIV reference laboratories of the countries requested samples of the kit for evaluation with the local infected serum samples.

8. Of the three countries only Kenya is producing disposable syringes. The major factory in Nairobi is operating below its capacity and could meet only one half the requirements of the country. Due to lopsided levies of duties by the government, the locally made syringes could not compete with the imported variety and this matter was brought to the attention of the Director, Ministry of Industries during the meeting with him. The Director promised to take appropriate steps in this regard and strengthen the industry and help expand its capacity.

9. A number of proposals for local production of health care system inputs needed for HIV/AIDS control have emerged during the detailed discussions with the officials of the Ministries of Industry and Health. Among these the following need particular attention.

9.1. The government of Kenya expressed need and interest in establishing manufacturing facilities in two areas within the context of control of HIV and associated infections. One is manufacture of raw materials needed for pharmaceutical industry in a financially sustainable manner. The other is production of quality condoms using the locally available latex and other components. The Director of Industries wanted assistance from UNIDO for arranging feasibility studies for setting-up these industries and he will soon make such a request to the Organization. In addition, the government wanted UNIDO assistance to start a programme on waste management which includes hospital wastes and outdated pharmaceutical and medical supplies (See Appendix 2, item 12).

9.2. The United Nations Volunteers (UNV) at Nairobi designed a subregional programme on community-based initiatives in Eastern Africa comprising six countries namely, Ethiopia, Kenya, Malawi, Somalia, Tanzania and Uganda. One of the projects relates to providing support to community action to combat the spread of HIV/AIDS. The UNV requested UNIDO collaboration in the implementation of the project, particularly on the aspect dealing with provision of material and technical support to the HIV/AIDS counselling and testing centres (See Appendix 2, item I 1).

9.3. The AIDS Control Programme (ACP), Ministry of Health, Republic of Uganda is keen on setting-up a pharmaceutical unit to manufacture intravenous (i.v.) fluids and absorbents. In addition, the Ministry of Trade and Industry is interested in establishing a condom manufacturing facility. The ACP in coordination with the Ministry of Trade and Industry will send a request for assistance from UNIDO on these projects.

9.4. The Ministry of Health, United Republic of Tanzania wanted to revitalize the syringe manufacturing industry, Pharmaplast at Dar-es-Salaam. Pharmaplast needed strengthening with respect to equipment for large scale manufacture and modem sterilization facilities of the finished product. The Ministry has sent a request to UNIDO for assistance to the projet (See Appendix 2, item 15).

10. Decisions on site location for establishing manufacture facilities of the much needed items identified above must take into consideration the infrastructure existing in a particular country including technical expertise in production, quality control, physical facilities, power and water resources; transport and communication and managerial and marketing capacities. Any such undertaking would be cost effective and economically viable if it is a regional facility covering the East African Region rather than meeting only the national requirement.

11. With the above issues under consideration it seems appropriate to conduct a series of feasibility studies for establishing manufacture of raw materials for pharmaceuticals and condoms in Kenya; I.V. fluids and absorbents in Uganda and syringes and plastic ware in Tanzania.

12. As regards diagnostics, a tie-up with LUPIN to market the kit from Tanzania on a regional basis would be a good beginning. A leading industry in Dar-es-Salaam expressed interest in marketing the product.

E. REPUBLIC OF KENYA

The Republic of Kenya has over 28 million population which is growing at the rate of about 3% annually. Agriculture is the backbone of economic development. Kenya has established the Ministry of Research, Technical Training and Technology and has a relatively large pool of skilled manpower in various fields of science and technology. The National Council of Science and Technology, the Kenya Industrial Research and Development Institute and the Kenya Bureau of Standards and the five national research institutes spearhead the manpower development and the R & D efforts in science

and technology. The government has taken positive steps to accelerate industrial development by introducing trade liberalization, privatization of public enterprises and deregulation of price and exchange controls and import restrictions.

Kenya faces major health-related problems. Among the principal diseases prevalent in the country are malaria, HIV/AIDS and STDs which are sapping the efforts in economic and social development.

According to the HIV/AIDS surveillance data of the U.S. Bureau of the Census, 1992 there was a sero-prevalence of over 10% for HIV-1 infections in the low-risk urban population and over 40% in the high-risk ones. HIV is spreading rapidly throughout the country with an estimated prevalence rate of 9.6% in the urban areas and 5% in the rural population. The reported cumulative cases of AIDS as of June 1994 was 30,126 in the country, a figure which is exceeded only by Uganda, Tanzania and Malawi in Africa. HIV-positive persons were reported to occupy an estimated 40% of hospital beds and HIV prevalence among female sex workers was quoted at a high figure of 61 % in Nairobi. The country is spending 4% of total health budget and 23% of public health spending on HIV/AIDS. The number of HIV infected persons is expected to reach 1.7 million by 1996. AIDS may account for more than 300,000 orphans by 1996.

Gonorrhoea, chlamydia and syphilis are major STDs infections in the country. In some studies positive rates of gonorrhoea of 7-10% was seen in Ante-natal clinic and of syphilis of 20% among blood donors (1993). The incidence of STD in women under 20 years of age was as high as 57%.

Measures being taken to control the epidemic

The Government of Kenya established a National AIDS Committee since 1985, declared AIDS as a national disaster in 1993 and included in the Seventh Development Plan (1994-96) measures to control the HIV/AIDS. The Development Plan recognizes the under-reporting of the actual number of HIV/AIDS cases in the country and noted the problems in the infrastructural, economic and socio-cultural factors confronting the nation. The government has set before it three objectives in control of HIV/AIDS: firstly to take measures to prevent the infection through promotion of behavioural change; secondly to reduce personal and social impact of HIV and thirdly to mobilize and unify national international efforts to contain the spread of the infection. Several bilateral, multilateral and NGOs support Anti-HIV interventions targeting youth. Steps have been taken to augment health education on AIDS, condom distribution, formulation of blood usage guidelines and voluntary counselling and testing. United Nations Agencies such as UNIDO, WHO, UNFPA and UNICEF have been funding projects on capacity building, IEC, health education, planning and monitoring, epidemiological surveys, blood screening and counselling. A Sub-regional Programme in Eastern Africa of the UNIDO has formulated a project to support the Kenya Scouts Association for designing and implementation of an AIDS and environmental education programme and another project to the Community Based Development Agency (COBA) of Kenya on HIV/AIDS and STD prevention and management. A large 5 year project from World Bank on STD prevention and care, IEC interventions and training is being finalized.

In-depth discussions with the officials of the government, industry and academia including the

Director of Medical Services, the Director of Industries, the Chief Pharmacist, the Coordinator of National AIDS/STD Control Programme (ACP), the Head of the AIDS reference laboratory and representative of medical supplies industry revealed the need for new concerted efforts for promoting local health care industry.

There is no manufacturing unit in the country which produces drugs de novo needed to control the opportunistic infections associated with HIV/AIDS. The main reason for this is the lack of manufacturing facilities for raw materials needed for production of pharmaceuticals.

The major industry that makes syringes from imported raw material is Alpha Medical Supplies Ltd. Needles were, however, imported by the Company. Because of higher levies on the raw material, the local industry is not competitive in pricing with the imported product. The Company is functioning at 30% of its capacity because of low patronage by the government. There is thus no large scale manufacturing industry for syringes to meet the national requirement of $ 20 million worth of supplies. The problem of the lopsided levies of duties was brought to the attention of the Director of Industries who promised to take appropriate steps to rectify it. The Company has the potential to expand to be a major producer of syringes for the region.

There is no condom making industry in Kenya to meet the yearly requirement of over 25 million pieces. More than one half of the World Bank loan is being spent in importing drugs, equipment and supplies including condoms.

According to the coordinator, National AIDS/STD Control Programme and the Head of HIV Reference Centre at the Medical School aid from international agencies is practically drying up in meeting the supplies needed for effective control of HIV/AIDS infections.

All diagnostic kits are at present imported and it is getting more difficult to meet the requirements. Kenya expressed interest in the diagnostic kit developed by ICGEB/LUPIN. Kenyan government, however, has a requirement that all HIV diagnostics used in the country should have a prior certification by the WHO. Pending approval by WHO, the ACP requested few sample kits from ICGEB/LUPIN for evaluation with Kenyan samples.

The Director of Industries and the ACP stated that there is an urgent need to establish vital industries where infrastructure and facilities are available within the country. They referred to the need, to begin with, to create manufacturing industries for producing raw materials for pharmaceuticals and for a condom factory in the country. The Director of Industries will approach UNIDO with a request for assistance to arrange for feasibility studies on setting-up these industries.

There is no set curriculum approved that is obligatory for high school/university students to undergo although the need is felt. However, the extensive publicity and counselling (IEC programmed) by the government machinery, NGOs and the international aid agencies resulted in bringing greater awareness (80-90%) in the general population on the cause of AIDS. However, behavioural change in the population consequent to these programmed was low (20%).

The United Nations Volunteers (UNV) programme has several subregional projects one of which

being on HIV/AIDS (project no. 5). The project involves 6 countries namely Kenya, Uganda, Tanzania, Ethiopia, Somalia and Malawi. The UNV requested UNIDO for assistance to one part of the programme dealing with provision of material and technical support to counselling on HIV/AIDS and establishment of testing centres. An outline of the project is attached at Appendix 2, item 11.

The Chief Pharmacist, Ministry of Health reminded on the request of his government submitted to UNIDO on 13 March 1995 (Appendix 2, Item 12) for assistance to start a programme on waste management of expired pharmaceuticals and medical supplies. He indicated that the project could include wastes from hospital treating HIV/AIDS infections.

Assistance requested by government from UNIDO during the visit

1. Feasibility study for manufacture of raw materials needed for pharmaceuticals
2. Feasibility study for manufacture of condoms
3. Co-marketing of ICGEB/LUPIN kit
4. Technical assistance to project No. 5. of UNV in establishing counselling and diagnostic facilities to 6 countries of the region
5. Management of Pharmaceutical, Medical & hospital wastes.

Officials met during the mission - Appendix I

List of documents/references Appendix 2

F. UNITED REPUBLIC OF TANZANIA

The United Republic of Tanzania has over 29 million inhabitants comprising about 4% of the African population (730 million). It is one of the East African countries where the rate of urbanization is fairly rapid. 80 % of the population of Tanzania is under 45 years age and is therefore among the most vulnerable age for HIV infection (15-45 years). Increasing spread of HIV/AIDS cases have been reported in the country. Infection rates were reported to be higher among women with office jobs than farmers and housewives. AIDS is considered to be the predominant health problem of the population and is already rated as the major cause of adult death among the economically productive age groups. According to HIV/AIDS surveillance data of the U. S. Bureau of the Census there was a sero-prevalence of 5 - 10% for HIV- I infections in the low-risk urban population and over 40% in the high-risk urban population. It is estimated that by the end 1994 there were more than a million HIV infections in the country which amount to about 10 % of the total prevailing in the continent and some 6 % of global HIV infections. Some 42,000 AIDS cases were officially reported in the country. The actual numbers which unavailable because of infrequent and inadequate diagnostic surveys could be much higher (4-6 fold). In Zanzibar with a population of 750,000, the estimated numbers with HIV infections and AIDS cases were 3750 and 750 respectively at the end of 1994.

The Programme Manager of the National AIDS Control Programme (NACP), Dar-es-Salaam stated that the HIV infections are estimated to reach 1. 6 million by the end of 1995 with over 250,000 cases.

Among the most common diseases associated with HIV/AIDS in the country are STDs and tuberculosis (TB). There was a three-fold increase in tuberculosis Provisional surveys showed that 35-45% of TB patients were HIV positive. It is estimated that 25% of AIDS cases will develop TB.

Measures being taken to control the epidemic

One of the priority areas approved by the UNIDO Governing Council under the UNIDO Fifth Country Programme covering the period 1992-1996 is strengthening of national capacity to respond to the HIV/AIDS epidemic. A National AIDS Control Programme was established with mid-term plans to contain the infection. 23% of total health budget and 41% of the public health budget is spent on HIV/AIDS control in the country.

There is practically no industry producing pharmaceuticals de novo, diagnostics or plastic ware in the country. External assistance in providing supplies is dwindling and the problem is particularly acute for diagnostics. The available imported kits are expensive and are used sparingly. Their use is largely restricted particularly in Zanzibar to screening blood banks.

The Principal Secretary, Ministry of Health and the NACP Manager expressed a dire need to start industries for production of some health care system inputs needed to combat HIV/AIDS in the country, In this context reference has been made for setting-up manufacturing facilities for syringes and plastic ware.

Pharmaplast, the only company making syringes, discontinued its production because of outmoded equipment and sterilization facilities. The Principal Secretary, Ministry of Health proposed to revitalize this industry and approached his finance ministry to send a request to UNIDO for assistance in the matter. The Group General Manager of Pharmaplast submitted a proposal to the Ministry of Health for rehabilitation of his industry which will be forwarded to UNIDO for consideration for technical assistance.

The Ministry of Health is also keen to take steps necessary for making the ICGEB/LUPIN diagnostics available in the United Republic of Tanzania. The Head of the HIV Reference Centre, Muhimbili Medical Centre was requested to screen the local samples and examine the suitability of the kit to Tanzania. Once the Reference Centre approves the kit, a leading industry of Dar-es-Salaam, Cornafric, expressed interest to co-market the product. Alternately, the National Pharmaceutical Company (NAPCO) could serve as a marketing channel for the product.

There is high awareness in the general population on the nature and cause of AIDS but similar to the situation existing in Kenya the behaviour change needed to control the spread of the infection is low, despite extensive IEC programmed operated by the government, international agencies and many NGOs. In this context the UNV project No.5 to which UNIDO was requested to provide technical

assistance would be valuable.

Assistance requested by Government from UNIDO during the visit

1. Rehabilitation and revitalization of Pharmaplast to produce syringes on a large scale
2. Co-marketing of ICGEB/LUPIN diagnostic kit
3. Technical assistance to project No. 5 of UNV in establishing counselling and diagnostic facilities to 6 countries of the region

Officials met during the mission - Appendix 1
List of documents / references - Appendix 2

G. REPUBLIC OF UGANDA

The Republic of Uganda is a landlocked, low income country with over 21 million people of which more than 85% is rural. The country is densely populated (85 per sq. km) and agriculture is the mainstay of its economy. Heavy HIV infections have been reported in the country with nearly 11% of the population being affected. The predominant route of transmission of infection is sex. The mortality attributed to AIDS is 1.7% in the age group of 15-34 with rates higher in women than men. In some villages more than 50% of all deaths seem to be due to HIV. AIDS accounts for a 15% rate of labour turnover in Ugandan industry. Another interesting feature in Uganda is that the speed of progression from HIV infection to death in the population seems twice as rapid compared to that in the West. Increasing malnutrition, inadequate medical care and constant immunostimulation with other infections may play a role in this rapid progression of the disease.

According to the HIV/AIDS surveillance data of the U.S. Bureau of the Census, 1992 there was a sero-prevalence of over 10% for HIV-1 infections in the low-risk urban population and over 40% in the high-risk ones. More recent estimates suggest that 2 million of the population are infected with HIV with 300,000 AIDS cases. The cost of coping with AIDS could reach as much as 13% of GDP in 1995.

Among the most common diseases in the country are STDS, particularly Chlamydia, syphilis, gonorrhoea, herpes simplex infections which could be responsible for greater susceptibility to HIV infections. A sero-prevalence rate of 25% for syphilis was found in a study in a Kampala hospital. In another study the rate of genital ulcer disease was found to range between 6.7% and 19.5% in males and 11.6% to 21.1% in females. In a study 50% of the women presenting to the STD clinic were found to have HIV infections. Tuberculosis is a frequent (about 60%) accompaniment of HIV infections in the population.

Measures being taken to control the epidemic

A National Committee for the Prevention of AIDS was set up in 1986 and a Uganda AIDS Commission was established in 1991. A national plan for the control of AIDS with a five year (1994-98) budget of US $ 457 million was worked out at a National AIDS Consensus Conference in June 1993. A USAID project for US $ 25 million is in operation with aims to reduce transmission and fertility in ten districts of Uganda; promote Information, Education and Communication (IEC) on AIDS; HIV testing and counselling and STD diagnosis. Several other countries, NGOs and United Nations Agencies have projects in Uganda aimed at controlling the spread of AIDS. Uganda is collaborating with the Global Programme on AIDS (GPA) of WHO in conducting clinical trials with candidate HIV vaccines. A Community Health AIDS project of the World Bank with focus on safe sex, condoms, safe blood and Programme Management has been in operation in the country for the last 6 years. Blood banks are subjected to routine screening and service is efficient.

Pharmaceuticals needed for the control of opportunistic infections, condoms, syringes and other plastic ware are all imported. A massive World Bank Loan of US $ 50 million for getting supplies of essential drugs and equipment is helping the country in taking measures to contain the sods. Although currently available through various aid agencies, a long term strategy for supplies of diagnostics, condoms and syringes is not in place.

The Head of the National Medical Supplies opined that full scale manufacture of pharmaceuticals may not be cost-effective because of lack of adequate infrastructure. But production of disinfectants, I.V. fluids and absorbents/dressings on a large scale is feasible. The later industry would be particularly profitable since there is a good cotton industry. The Assistant Director General of the Uganda AIDS Commission endorsed the need for these industries. A visit to the Nakasero Blood Bank underlined the need of the Ministry of Health for a sustained supply of diagnostics for HIV. The Ministry has requested for sending few samples of the ICGEB/HIV kit to the Virus Research Institute, Entebbe which is their HIV Reference Centre for evaluation. The Director of the Institute readily agreed to evaluate the kit.

The Director of Industry and Technology and the Director of the AIDS Control Project are coordinating in sending a request to UNIDO for assistance in establishing manufacturing facilities for I.V. fluids and absorbents.

Awareness on HIV/AIDS is widespread (95-98%) similar to that seen in Kenya and Tanzania but behavioural change is slow. Formal education on prevention of HIV/AIDS through curricula at the high school / university levels is needed but is not in place. The project of UNV relating to the control of HIV/AIDS would be invaluable in providing training in counselling and increasing the diagnostic facilities. The Regional Science Advisor at the French Embassy in Kampala expressed interest in collaborating with the project.

Assistance requested by government from UNIDO during the visit

1. Feasibility study for manufacture of I.V. fluids and disinfectants

2. Feasibility study for manufacture of absorbents
3. Co-marketing arrangements of ICGEB/LUPIN diagnostic kit

Officials met during the mission (Appendix 1)

List of documents / references (Appendix 2)

Appendix 1

OFFICIALS MET DURING THE MISSION AS ORGANIZED BY THE UCDs

Nairobi, Kenya 19 - 23 June 1995

Mr. K.W. Gitu, Director, Ministry of Planning
Mr. J.M. Masila, Director of Industries
Mr. E.N. Kimuri, Assistant Director of Industries
Dr. J.C. Mwnazia, Director of Medical Services
Dr. K.C. Koskei, Chief Pharmacist
Dr. Mboya Okeyo, Coordinator, National AIDS/STD Control Programme
Mr. D.K. Raichenah, Director of Political Affairs
Mr. Mr. Agnesh Patel, Director, Laboratory and Allied Ltd.
Mr. S.P. Datta, Group General Manager, Alpha Medical Supplies
Ms. Karimah lalji, Managing Director, SAL Health care
Prof. Andere, Secretary, National Science Council
Prof. Ndinya-Achola, Department of Microbiology, Medical School
Ms. Nancy Asanga, UNIDO Resident Representative
Ms. Grace Okonji, UNIDO Programme Officer
Dr. P.O. Chuke, Resident Representative, WHO
Mr. F. Stephen O'Brien, Resident Representative, World Bank
Ms. Seko Hilda Phiri, UNV
Mr. G.M. Kahuthia, PATH
Mr. Allan Ragi, Coordinator, Kenya AIDS NGOs Consortium

Dar-es-Salaam/Zanzibar, Tanzania 3 - 7 July 1995

Prof. Idris A. Mtulia, Principal Secretary, Ministry of Health
Dr. R.O. Swai, Programme Manager, National AIDS Control Programme
Mr. Richard T. Dogani, First Counsellor, Ministry of Foreign Affairs
Mr. Adiel A. Nyiti, Director of Heavy Industries and Pharmaceuticals
Mr. R.F. Ivan, Ministry of Health, Zanzibar AIDS Control Programme
Mr. H.S. Nassor, IEC Coordinator, Zanzibar AIDS Control Programme
Mr. C.S. Maniar, Group General Manager, Pharmaplast
Mr. L. Msaki, Marketing Manager, National Pharmaceutical Co., Ltd.
Mr. Ramesh Patel, Managing Director, Comafric Ltd.
Prof. Mahalu, Dept. Microbiol. & Immunol., Medical School
Prof. M.S. Sheya, Director, Commission of Science & Technology
Ms. Angela Trenton, Technical Officer, WHO
Mr. I. Koroma, UNV Programme Officer
Mr. A. Tibakweitira, Executive Director, WAMATA

Kampala, Uganda 26 - 30 June 1995

Dr. Elizabeth Madraa, Director, AIDS Control Project
Dr. Peter Nsubuga, Project Manager, World Bank/STI project
Mr. J.V. Haberer, Director, National Medical Stores
Mr. B.F. Osmond, Senior Pharmacist Advisor, Essential Drugs
Dr. S.P. Kagoda, Director of Industry & Technology
Dr. Peter Mugenyi Director, Joint Clinic Research Centre
Prof. J. Rwomushana, Dy. Director General, Uganda AIDS Commission
Dr. Kasirye-Alemu, Executive Director, National Bureau of Standards
Dr. P.K. Kataaha, Officer-in-Charge, Nakasero Blood Bank
Mr. N. Irumba, Director, Multilateral organizations
Mr. Aziz A. Damani, Managing Director, Kampala Pharmaceuticals
Ms. Haruna Kyamanwa, Assistant Resident Representative, UNDP
Mr. Sam I. Ibanda, National Programme Officer (HIV/AIDS), UNIDO
Dr. Hatib Njie, Resident Representative, WHO
Dr. M.G. Alwano-Edyegu, Director, AIDS Information Centre
Ms. Rossette Mewa, The AIDS Support Organization
Mr. Deryck Omuodo, Resident Administrator, Family Planning Association
Mr. Gambhir Bhatta, Programme Officer, UNV

Appendix 2

List of Documents / References

General

1. The World Bank. Combatting AIDS and other Sexually Transmitted Diseases, 1992
2. African Development Bank Group. Proceedings of Symposium on "The HIV/AIDS and the Development in Africa. Abidjan, 1993
   (i). Executive Summary
   (ii). The HIV/AIDS Epidemic in Africa: An Overview
   (iii). The Impact of HIV/AIDS on African Development
   (iv). Prevention, Control and Coping Strategies
   (v). Political Commitment and Resource Mobilization
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Uganda

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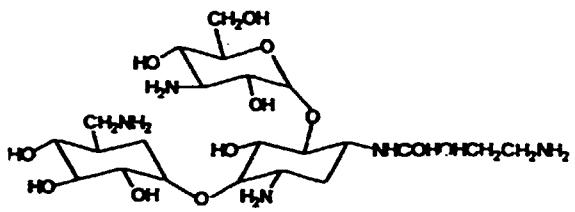
24. Uganda's AIDS agony revealed. New Scientist 12 June 1993

ANNEX 7

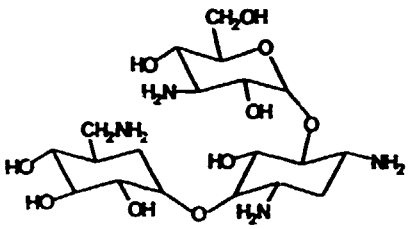
SOME DRUGS USED IN TREATMENT OF AIDS AND AIDS RELATED COMPLEX

by Mr. Heshan Marei, UNIDO Trainee

1. Amikacin and Kanamycin A



Amikacin



Kanamycin A

1.1. Chemical Abstracts Name

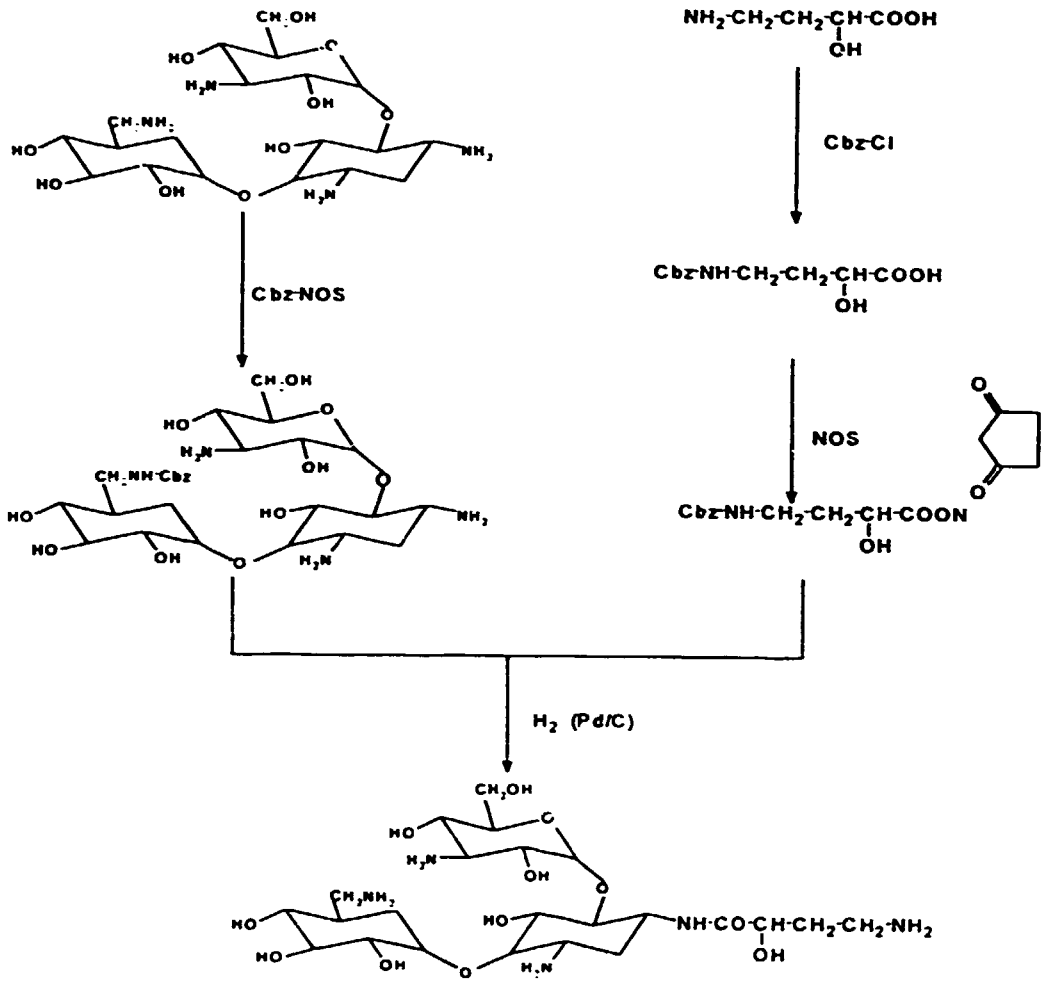
O-3-Amino-3-deoxy-α-D-glucopyranosyl-(1→6)-O-[6-amino-6-deoxy-α-D-glucopyranosy-(1→4)-N[1]-(4-amino-2-hydroxy-1-oxobutyl)-2-deoxy-D-sterptamine. Mol Wt: 781.78

CAS registry numbers of:
Amikacin 37517-28-5
Amikacin Sulfate 39831-55-5
Kanamycin 8063-07-8
Kanamycin Sulfate 25389-94-0

1.2. Drug Synthesis

Kawaguchi et al., J. Antibiot. 25, 695 (1972).

Amikacin, the 1-L-(-)-4-amino-2-hydroxybutyryl derivative of kanamycin, is obtained by acylation of the C-1 amino group of the 2-deoxystreptamine moiety of kanamycin with L-(-)-4-amino-2-hydroxybutyric acid



NOS=N-hydroxy-succinamide
Cbz=CARBOBENZOXY GROUP
Cbz-NOS=N-(benzyloxycarbonyloxy) succinamide

1.3. Separation Process of Kanamycin

Rothrock, Putter, U.S. pat. 3,032,547 (1962 to Merck & Co.).

1.3.1. Preparation of Kanamycin

Murase et al., J Antibiot 14A, 156 (1961). Kanamycin is produced solely by fermentation using Streptomyces kanamyceticus .

1.4. Patent Data

Ger. pat. 2,234,315 corresp to USA pat. 3,781,268 (both 1973 to Bristol-Mayers).

1.5. Pharmaceutical Preparations

Injection: 100 mg/2 mL, 500 mg/2mL, 1 g/4 mL and 1 g/4mL
Main Manufacturer(s): Bristol-Myers

1.6. Pharmaceutical Use

Amikacin is used similarly to gentamycin in the treatment of severe Gram-negative infections. It is given as the sulphate, and is generally reserved for the treatment of severe infections caused by susceptible bacteria which are resistant to gentamycin and tobramycin .

1.7. Dose and Administration:

Intramuscular or intravenous, adults, children and older infants, 5 mg/kg every 8 hr or 7.5 mg/kg every 12 hrs of 7 to 10 days not to exceed 1.5 g a day, except in urinary tract infections. In neonates, initially 10 mg/kg followed with 7.5 mg/kg every 12 hr not to exceed 15 mg/kg/day.

For intravenous administration, 5% dextrose or physiological saline is used. The duration of infusion should be 30 to 60 min, except 1 to 2 hr in infants.

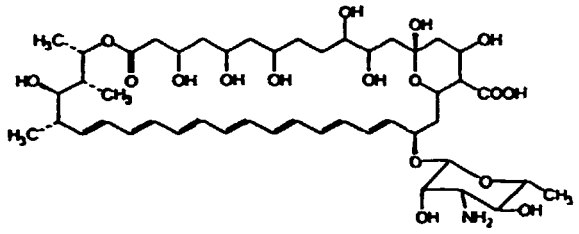
1.8. Summary

Amikacin is a derivative of kanamycin, where kanamycin is produced by fermentation using Streptomyces kanamyceticus.

The drug was first synthesised in 1972, which indicate the absence of any product patent on the drug today. This drug is not listed on "The use of essential drugs" published by WHO.

It is important that this drug be held in reseve to treat only serious infections caused by gram-negative bacteria that are resistant not only to other aminoglycosides but other classes of anti-bacterial drugs .

2. Amphotericin B



2.1. Chemical Abstract Name

-[1R(1R*,3S*,5R*,6R*,9R*,11R*,15S*,16R*,17R*,18S*,19E, 21E, 23E, 25E ,27E, 29E, 33R*, 35S, 36S*, 37S*)]-33-[(3-Amino-3,6-dideoxy-β-D-mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-15,16,18-timethyl-13-oxo-14,39-dioxabicyclo[33.3.1.]nonatriaconta-19,21,23,25,27,29,31-heptaene-36-carboxylicacid. Mol Wt: 924.1

CAS registry number: 1397-89-3

2.2. Drug Synthesis

By the growth of selected strains of streptomyces nodosus in an appropriate medium under controlled conditions of temperature, pH, and aeration. After extracting from the medium, the crude product is purified by treatment with various solvents at controlled acidity.

2.3. Patent Data

Dutcher et al., U.S. pat. 2,908-611 (1959 to Olin Mathieson).

2.4. Pharmaceutical Preparations

Injections: 50 mg/15mL; Cream: 3%; Lotion: 3%; Ointment: 3%
Main Manufacturer(s): Squibb

2.5. Pharmaceutical Use

Intravenous route Amphotericin is an extremely useful drug for therapy of systemic fungous diseases, especially coccidomycosis, cryptococcosis, systemic moniliasis, histoplasmosis, aspergillosis, rhodotorulosis, sporotichosis, phycomycosis and North American blastomycosis .

Amphotericin may be used with flucytosine particularly in the treatment of cryptococcal meningitis[59]. Amphotericin also is used topically in the treatment of superficial monilial infections and by nasal spray in the prophylaxis of aspergillosis in immunocomprimised patients[81]. Amphotericin is also given orally in doses of up to 2 g daily for the suppression of oral or intestinal candidiasis, or for its prophylaxis in immmunocompromised patients

2.6. Dose

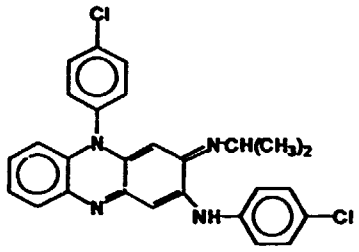
Intravenous infusion, adults, after a test dose of 1 mg to assess tolerance, initially 250 µg/kg a day, increased by daily increments of 5 to 10 mg, if tolerated, up to a maximum of 50 mg a day .

Interathecal, adults, 25 to 10 µg every 48 to 72 hrs, with gradual increments up to a single dose, maximum of 500 µg and total accumulated dose of 15 mg .

2.7. Summary

Amphotericin B is an antifungal drug which is prepared from selected strains of streptomyces nodosus. It is used orally as a prophylaxis in AIDS patients against internal and oral candidiasis. The drug is listed in the official WHO Model List of Essential Drugs .

3. Clofazimine



3.1. Chemical Abstracts Name

N,5-Bis(4-chlorophenyl)-3,5-dihydro-3-[(1-methylethyl)imino]-2-phenazinamine. Mol Wt: 473.4

CAS registry number: 2030-63-9

3.2. Drug Synthesis

Barry et al., Nature 179, 1013 (1957); Barry et al., J. Chem. Soc. 1958, 855. Belton et al., Proc. Roy. Irish Acad. Sect. B 62, 9 (1961), C.A. 58, 4556d (1963).

3.3. Patent Data

Not Available

3.4. Pharmaceutical Preparations

Capsules, clofazimine 10 mg
Manufacturer(s): Geigy UK

3.5. Pharmaceutical Use

In Combination with other drugs, used for the treatment of leprosy and infections caused by Mycobacterium avium in AIDS patients . It is not significantly active against other bacteria.

Clofazimine is used in the management of leprosy reactions, but since the beneficial effect takes several weeks to appear, initial control of symptoms is usually obtained with corticosteroids or, in Type 2 (ENL) reactions, with thalidomide .

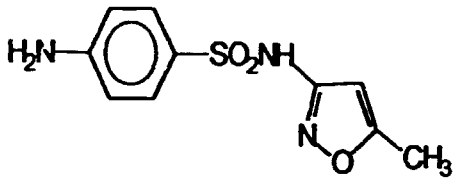
3.6. Dose

Oral, adults, for mycobacterial infections, 50 to 100 mg a day, in combination with other antileprotic drugs; with recurring leprotic erythema nodosum, up to 300 mg a day may be required. Therapy may continue for 2 months to a lifetime--.

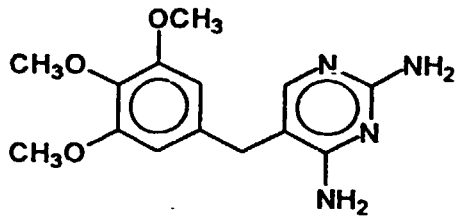
3.7. Summary

Clofazimine was first synthesised in 1957 and it is listed on the official WHO Model List of Essential Drugs as antileprosy drug .

4. Co-trimoxazole



Sulfamethoxazole



Trimethoprim

4.1. Chemical Abstracts Name

1.1. Sulfamethoxazole
4-Amino-N-(5-methyl-3-isoxazolyl)benzenesulfonamide. Mol Wt: 253.31
CAS registry number: 723-46-6

1.2. Trimethoprim
5-[(3,4,5-Trimethoxypehnyl)methyl]-2,4-pyrimidinediamine. Mol Wt: 290.32
CAS registry number: 738-70-5

4.2. Drug Synthesis

2.1. Sulfamethoxazole

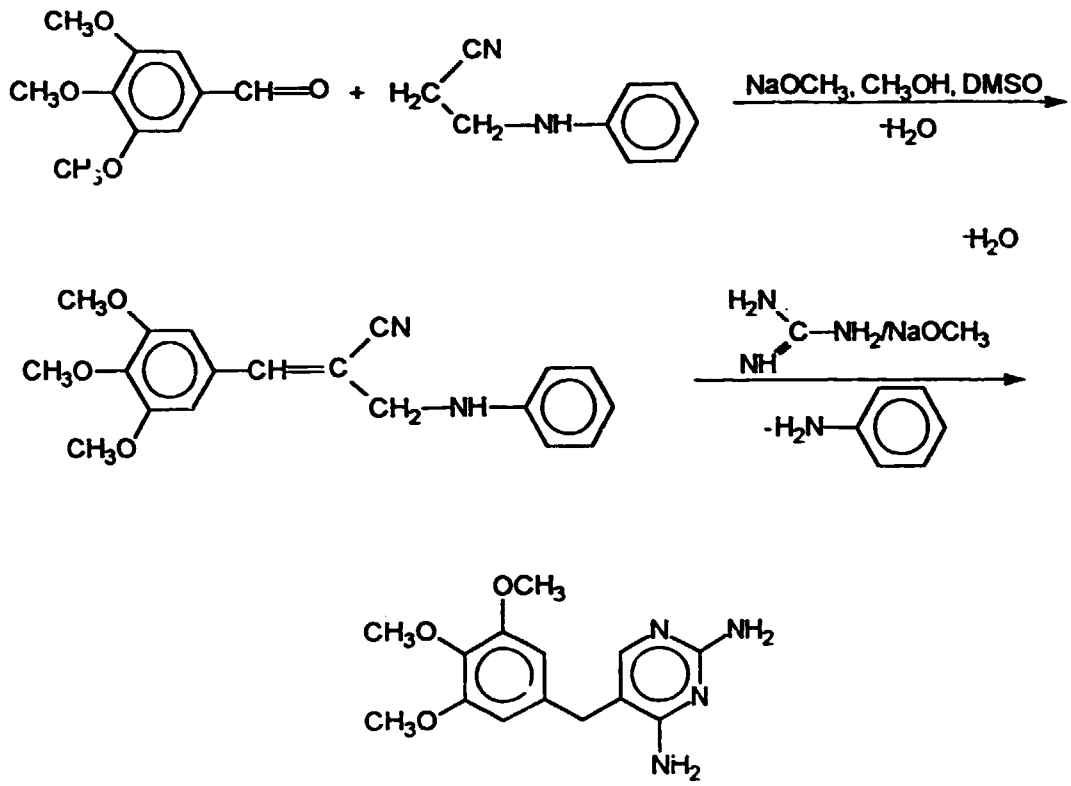
p-Acetamidobenzenesulfonyl chloride, which is the basic intermediate of all sulfonamides, is made by treating acetanilide with chlorosulfonic acid. Then it is coupled with 3-amino-5-methylisoxazole. The latter may be prepared by heating ethyl-5-methylisoxazole-3-carbamate.

2.2. Trimethoprim

From guanidine and β-ethoxy, 3,4,5-trimethoxybenzylbenzalnitrile synthesis B. Roth et al., J Med. Che. 23, 379, 535 (1980)

or

3,4,5-Trimethoxybenzaldehyde + Anilinoproionitrile then condensation with guainide .



4.3. Patent Data

1. Sulfamethoxazole
Kano et al., U.S. pat 2,888,455 (1959 to Shionogi).

2. Trimethoprim
Stenbuck, Hood, U.S. pat. 3,049,544 (1962 to Burroughs Wellcome); Hoffer, U.S. pat. 3,341,541 (1967 to Hoffmann-La Roche)

4.4. Pharmaceutical Preparations of Co-trimoxazole

Co-trimoxazole Intravenous infusion (B.P.)
Strong Sterile Co-trimoxazole Solution (B.P.)
Sulfamethoxazole and Trimethoprim Concentrate of Infection (U.S.P.)
Co-trimoxazole Oral Suspension (B.P.)
Paediatric Co-trimoxazole Oral Suspension (B.P.)
Sulfamethoxazole and Trimethoprim Oral Suspension (U.S.P.)
Co-trimoxazole Tablets (B.P.)
Dispersible Co-trimoxazole Tablets

Manufacturer(s):
1. Sulfamethoxazole
Roche
2. Trimethoprim
Wyeth-Ayerst

4.5. Pharmaceutical Use of Co-trimoxazole

Co-trimoxazole is used similarly to the sulphonamides but in a wider variety of infections. Its indications for use include genito-urinary-tract infections, respiratory-tract infections such as bronchitis and Pneumocystis carinii pneumonia, and enteric infections .

Pneumocystis carinii infections:

The rapidly escalating prevalence of this pneumocystis is mainly due to the epidemic of acquired immunodeficiency syndrome (AIDS) and also due to advances in medical practice causing the population of other susceptible immunosuppressed patients to increase. Differences in the disease have been observed between patients with AIDS and those without AIDS.

Initially, pentamidine was the standard treatment for Pnemocystis carinii pneumonia. However, pentamidine is toxic, and in a comparative study in children with acute leukaemia or other malignancies, cot-trimoxazole was found to be as effective as pentamidine in the treatment of Pnemocystis carinii pneumonia, but also less toxic and is available in oral as well as parenteral forms for administration. Unfortunately, a much higher incidence of adverse reactions to co-trimoxazoel has been noted in patients with AIDS than in other immunosuppressed patients, and also more prolonged therapy is often necessary .

4.6. Dose

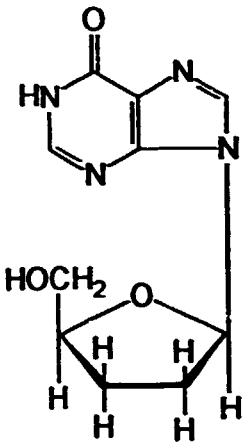
For the initial treatment of Pnemocystis carinii pneumonia, many workers recommend co-trimoxazole 120 mg per kg body weight daily in 3 or 4 divided doses for 2 to 3 weeks in patients with AIDS.

Pentamidine is used for patients with a history of a severe allergy to a sulphonamide or those unable to tolerate, or failing to respond to co-trimoxazole with 4 to 7 days of therapy. Many Patients with AIDS treated for second episodes of Pneumocystis carinii pneumonia do not respond to co-trimoxazole and under these circumstances the more frequent use of Pentamidine may be justified .

4.7. Summary

Co-trimoxazole provides the treatment or prophylaxis of choice for pneumocitis caused by Pneumocystis carinii and entercolitis caused by Isosoproa in immunocompromised patients . The drug is listed on WHO Model of Essential List Drugs.

5. Didanosine (DDI)



5.1. Chemical Abstracts Name

2',3'-Didexoyinosine. Mol Wt: 236.2
CAS registry number:

5.2. Drug Synthesis

R. R. Web et al., Nucleosides Nucleotides 7, 147 (1988)

5.3. Patent Data

G. W. Koszalka, T. A. Krenitstky, Eur. pat. Appl 206,497 (1986 to Wellcome Found.)

5.4. Pharmaceutical Preparations

Chewable/Dispersible Buffered Tablets are available in 25, 50,100 or 150 mg. Buffered Powder for oral solution in 100, 167, 250 or 375 mg. Pediatric powder of oral solution containing 2 g or 4g of didanosine.

Manufacturer(s): Bristol laboratories.

5.5. Pharmaceutical Use

Didanosine (VIDEX®) is indicated for the treatment of adult and pediatric patients (over 6 months of age) with advanced HIV infection who are intolerable of zidovudine therapy or who have demonstrated significant clinical or immunological deterioration during zidovudine therapy

5.6. Dose

The recommended starting dose in adults is dependent on weight as outlined in the following table

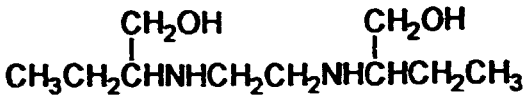
Patient Weight	VIDEX Tablets	VIDEX Buffered Powder
≥ 75 kg	300 mg BID	375 mg BID
50-74 kg	200 mg BID	250 mg BID
35-49 kg	125 mg BID	167 mg BID

The recommended dose in children is dependent on body surface area as outlined in table below

Body Surface Area (m^2)	VIDEX (didanosine) Tablets	VIDEX Pediatric Powder	
		Dose	Vol/10 mg/mL Admixture
1.1-1.4	100 mg BID	125 mg BID	12.5 mL BID
0.8-1.0	75 mg BID	94 mg BID	9.5 mL BID
0.5-0.7	50 mg BID	62 mg BID	6.0 mL BID
≤ 0.4	25 mg BID	31 mg BID	3.0 mL BID

The optimal dose of VIDEX for children has not been established and some investigators recommend dosed of up to 300 mg/m^2/day divided into three doses .

6. Ethambutol Hydrochloride



6.1 Chemical Abstracts Name

2,2'-(1,2-Ethanediyldiimino)bis-1-butanol dihydrochloride. Mol Wt: 277.3

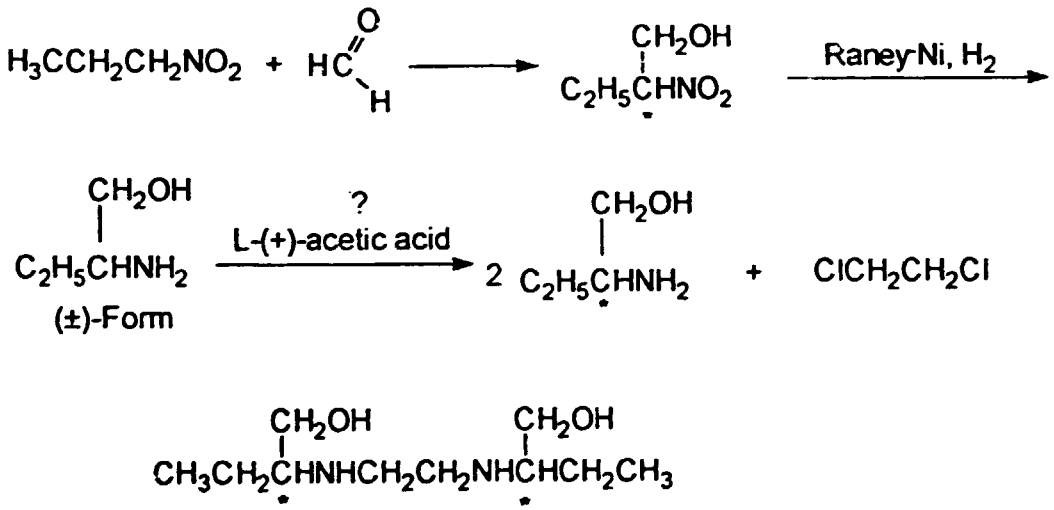
CAS registry numbers of:
Ethambutol 74-55-5
Ethambutol Dihydrochloride 1070-11-7

6.2. Drug Synthesis

Wilkinson et al., J. Am. Chem. Soc. 83, 2212 (1961); eidem, J. Med. Chem. 5, 835 (1962).

(±)-2-Aminobutanol is resolved via its tartrate and the (+)enantiomorph is condensed with 1,2-dichloroethane in an appropriate dehydrochlorinating environment. The ethambutol thus formed is dissolved in a suitable solvent and reacted with HCl .

Or through the following illustrated procedure :
(Fig. 1)



6.3. Patent Data

Ethambutol Dihydrochloride US Pat 3,297,707

6.4. Pharmaceutical Preparations

Film-coated tablets: 100 and 400 mg .

Manufacturer(s): Lederle

6.5. Pharmaceutical Use

A tuberculostatic drug that is effective against tubercle bacilli resistant to isoniazid or streptomycin. In combination with isoniazid or other tuberculostatic drugs, relapses are uncommon. The ethambutol-isoniazid rifampin combinations are now the most frequently used .

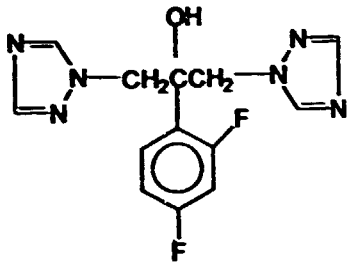
6.6. Dose

Oral, adults, in combination with other tuberculostatic drugs, for initial treatment, 15 mg/kg once a day; for retreatment of relapsed cases, 25 mg/kg once a day for 60 days, then reduced to 15 mg/kg once a day -.

6.7. Summary

Ethambutol is a tuberculostatic drug which is used in combination with isoniazid and rifampin. It was first synthesised in 1961 and is not covered by any patent product any more today. The drug is listed on the official WHO Model List of Essential Drugs as an antituberculostatic drug .

7. Fluconazole



7.1. Chemical Abstracts Name

α-(2,4-Difluorophenyl)-α-(1H-1,2,4-triazol-1-ylmethyl)-1H-1,2,4-triazole-1-ethanol. Mol Wt: 306.3

7.2. Drug Synthesis

K Richardson et al., Brit. pat. 2,099,818; indem, U.S. pat. 4,404,216 (1982, 1983 both to Pfizer).

7.3. Patent Data

K Richardson et al., Brit. pat. 2,099,818; indem, U.S. pat. 4,404,216 (1982, 1983 both to Pfizer).

7.4. Pharmaceutical Preparations

Tablets containing 50, 100 or 200 mg of fluconazole. Injections for intravenous infusion administration are formulated as sterile iso-osmotic solutions containing 2 mg/mL of fluconazole .

Manufacturer(s): Pfizer, UK

7.5. Pharmaceutical Use

Fluconazole is indicated for the treatment of :

1. Oropharyngeal and oesophageal candidiasis. It is effective for the treatment of serious systemic candidal infections, including urinary tract infection, peritonitis and pneumonia.

2. Cryptococcal meningitis.

7.6. Dose

Single oral absorption is rapid and almost complete, the daily dose of fluconazole is the same for oral and intravenous administration. Patients with AIDS and cryptococcal meningitis or recurrent oropharyngeal candidiasis usually require maintenance therapy to prevent relapse.

The recommended dose of fluconazole for oropharyngeal candidiasis is 200 mg on the first day, followed by 100 mg once daily . The

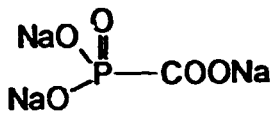
recommended dose of fluconazole for oesophageal candidiasis is 200 mg on the first day , followed by 100 mg once daily. The treatment should be continued for at least 3 weeks to decrease the likelihood of relapse .

For cryptococcal meningitis, the recommended dosage of fluconazole is 400 mg on the firs day, followed by 200 mg once daily. The recommended dosage of fluconazole for suppression of relapse of cryptococcal meningitis in patients with AIDS is 200 mg once daily .

7.7. Summary

Fluconazole is recommended in cryptococcal meningitis patients with AIDS and has the advantage of oral administration over Amphotericin B[58]. However, it cannot be synthesised under any generic names because it is still under product patent. It is worth noting that fluconazole is not mentioned on the Essential Drugs List issued by WHO .

8. Foscarnet Sodium



8.1. Chemical Abstracts Name

Dihydroxyphosphinecarboxylic acid oxide trisodium salt. Mol Wt: 191.95

CAS registry number: 63585-09-1

8.2 Drug Synthesis

P. Nylén, Ber. 57B, 1023 (1924)

8.3. Patent Data

Use as antiviral agent: B. F. H. Eridsson et al., Ger. pat. 2,728,685 corresp to U.S. pat 4,215,113 (1978, 1980 to Astra)

8.4. Pharmaceutical Preparations

Injections

Manufacturer(s): Astra

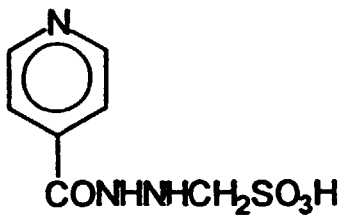
8.5. Pharmaceutical Use

Foscarnet sodium has in vitro activity against herpes simplex viruses 1 and 2, varicella zoster virus, cytomegalovirus, Epstein-Barr virus and human immunodeficiency virus (HIV). Great interest centres on its possible efficacy against AIDS and ARC (AIDS Related Complex) . It is in Phase II investigation sponsored by The National Institute for Allergies and Infectious Diseases and Astra Pharmaceuticals [1].

8.6. Summary

Foscarnet was first synthesised in 1924, however, its' antiviral action was only recently discovered. The drug is still under investigation. It is worth noting that foscarnet is not mentioned on the Essential Drugs List issued by WHO organization[1].

9. Isoniazid Methanesulfonate



9.1. Chemical Abstracts Name

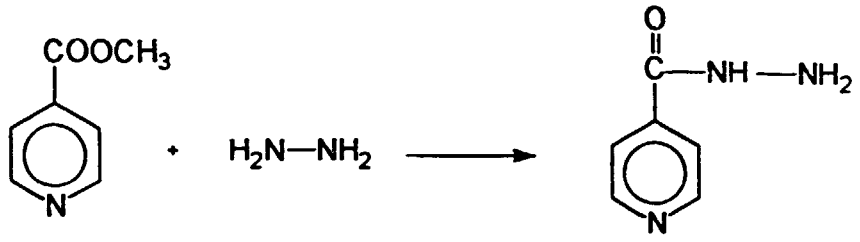
4-Pyridinecarboxylic acid hydrazide. Mol Wt: 231.24

CAS registry numbers of:
Isoniazid 54-85-3
Isoniazid Methanesulfonate 13447-95-5

9.2. Drug Synthesis

Meyer, Mally, Monatsh. 33, 400 (1912); Lock Pharm. Ind. 14, 366 (1952); Urbanski et al., Rocz. Chem. 27, 161 (1953).

By heating isonicotinic acid or its ethyl ester with anhydorus hydrazine[79]. Isonicotinic acid may be synthesized by various oxidative processes starting with 4-methylpyridine .



9.3. Patent Data

Gasson, U.S. pat. 2,830,994 (1958 to Distillers). Composition for combating tuberculosis: H. H. Fox, U.S. pat. 2,596,069 (1952 to Hoffmann-La Roche).

9.4. Pharmaceutical Preparations

Tablets 50, 100 and 300 mg. Injection: 100 mg/mL in 10 mL containers. Powder: 1 pound . Isoniazid Elixir (B.P.C. 1973) Isoniazid 50 mg, citric acid monohydrate 12.5 mg, sodium citrate 60 gm, concentrated anise water 0.05 mL, compound tartarazine solution 0.05 mL, glycerol 1 mL, double-strength chloroform water 2 mL, water to 5 mL .

Manufacturer(s): Some main manufactures: CIBA Pharmaceutical, Merrel Dow and Duramed.

9.5. Pharmaceutical Use

The most potent and selective of the known tuberculostatic antibacterial agents and regarded as the most effective agent in the therapy of tuberculosis. However, the drug is never used alone because of the rapid emergence of resistance .

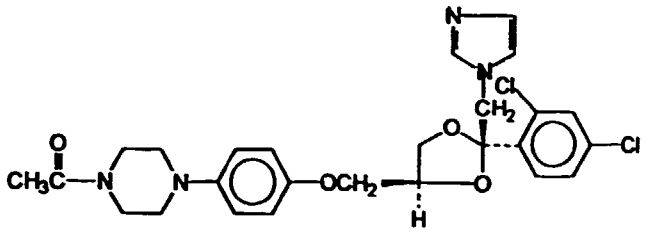
9.6. Dose

Oral, adults, for prophylaxis or treatment, 300 mg once a day. Intramuscular, adults, for treatment, 5 mg/kg once a day up to 300 mg a day. For prophylaxis, 10 mg/kg up to 300 mg once a day .

9.7. Summary

Isoniazid is a hydrazide derivative which is still the mainstay of primary treatment of pulmonary and extrapulmonary tuberculosis. It was first synthesised in 1912 and it is available from a lot of pharmaceutical companies. The drug is listed on the official WHO Model List of Essential Drugs as an antituberculostatic drug .

10. Ketoconazole



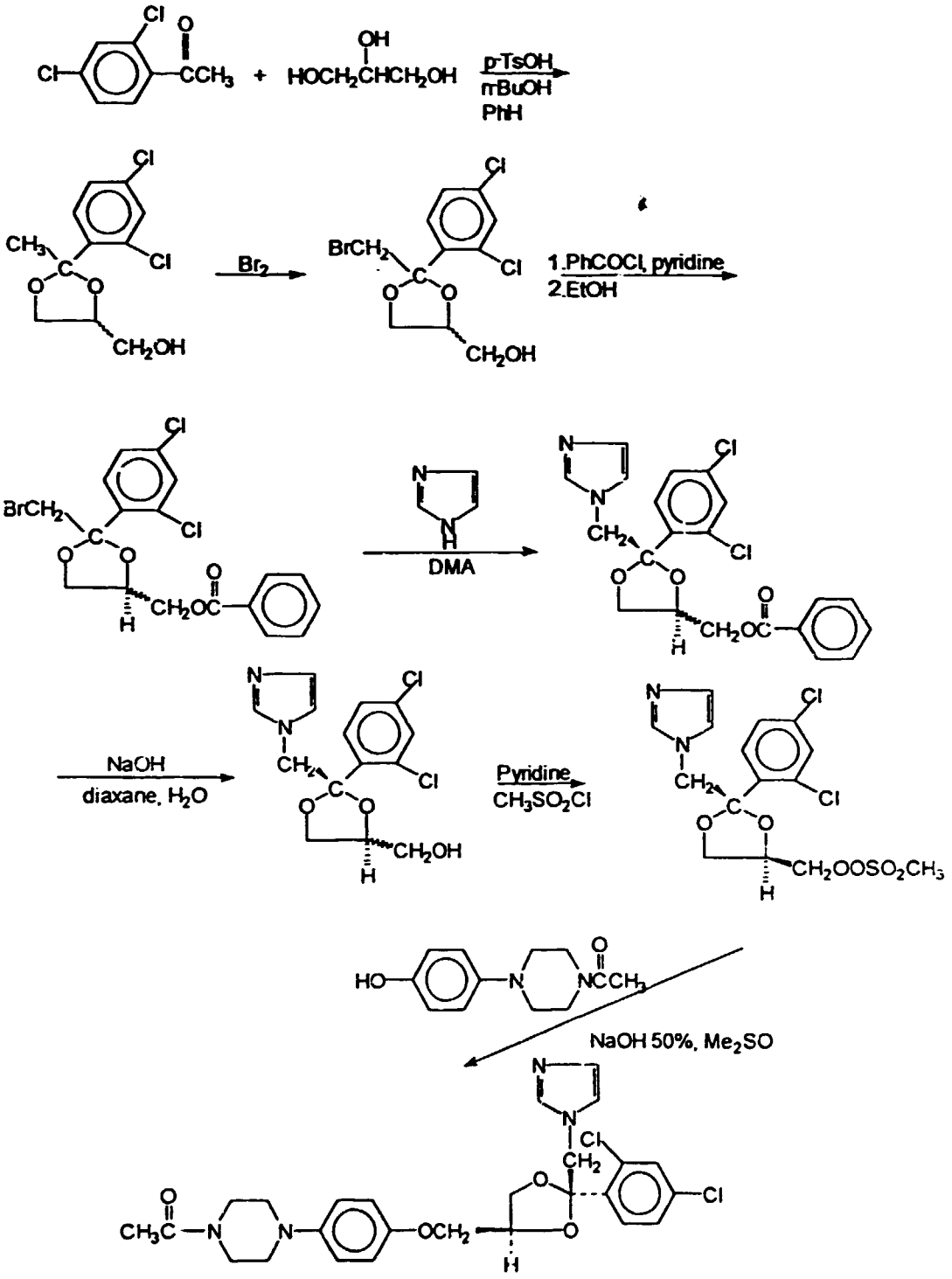
10.1. Chemical Abstracts Name

Cis-1-Acetyl-4-[4-[[2-(2,4-dichlorophenyl)-2-(1H-imidazol-1-ylmethyl)-1,3-dioxolan-4-yl]-methoxy]phenyl]piperazine

Mol Wt: 531.44
CAS registry number: 65277-42-1

10.2. Drug Synthesis

J. Med. Chem. 22, 1003 (1979)



10.3. Patent Data

J Heeres et al., Ger. pat. 2,804,096, eidem, U.S. pats. 4,144,346 and 4,223,036 (1978, 1979, 1980, all to Janssen).

10.4. Pharmaceutical Preparations

Tablets: 200 mg, Cream: 2%, Oral Suspension: 100 mg/5mL

Manufacturer(s): Janssen

10.5. Pharmaceutical Use

Ketoconazole blocks the fungal synthesis of ergosterol, which is essential to the integrity of the cell membranes of nearly all the pathogenic fungi. Consequently, it has a broad spectrum of antifungal activity, which includes Blastomyces dermatitidis, Candida spp, Chromomyces, Coccidioides immitis, dermatophytes, Histoplasma capsulatum and Paracoccidioides braseliensis and Pseudallescheria boydii. Aspergillus, Cryptococcus neoformans, and Sporothrix schenckii are affected moderately but Mucor is not. It or amphotericin B is the drug of choice for the treatment of blastomycosis, coccidiodosis, histoplasmosis and paracoccidiodosis .

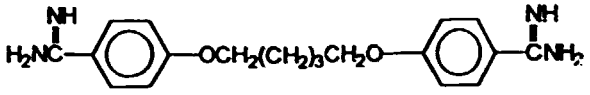
Ketoconazole has been demonstrated to lower serum testosterone. Testosterone levels are impaired with doses of 800 mg per day and abolished by 1600 mg per day. It also decreases ACHT induced corticosteroid serum levels at similar high doses .

Since ketoconazole has been reported to cause hepatotoxicity it should not be administered to patients with pre-existing liver disease .

10.6. Dose

Oral, adults, for vulvovagingal candidiasis or tinea versicolor, 200 mg once a day for 3 to 5 days in candidiasis and 5 to 10 days in tinea; for paronychia, fungal cystitis, urinary tract mycoses or mild to moderate systemic mycoses, 200 to 400 mg once a day; for fungal pneumonia or septicemia, 400 mg to 1 g once a day, not to exceed 1 g a day. For Cushing's syndrome 600 mg to 1 g once a day; for prostatic carcinoma 400 mg 3 times a day not to exceed 1.2 g a day.

11. Pentamidine



11.1.Chemical Abstracts Name

4,4'-[1,5-Pentanediylbis(oxy)]bisbenzenecarboximidamide. Mol Wt: 340.43

CAS registry numbers of:
Pentamidine 100-33-4
Pentamidine Dimethaneslfonate 6823-79-6
Pentamidine Isethionate 140-64-7

11.2. Drug Synthesis

J. N. Ashley et al., J Chem. Soc. 1942, 103; Of isethionate: G. Newbery, A. P. T. Easson, U.S. pat. 2,394,003 (1946 to May & Baker).

11.3. Patent Data

A. J. Ewins, Brit. pat. 507,565 (1939)

11.4. Pharmaceutical Preparations

Inhalation solution and Injection.

Manufacturer(s): Fujisawa

11.5 Pharmaceutical Use

Pentamidine isethionate is indicated for the prevention of Pneumocystis carinii pneumonia in high risk, HIV-infected patients defined by one or both of the following criteria :

7.1. A history of one or more episodes of Pneumocystis carinii pneumonia.

7.2. A peripheral CD4+ (T4 helper/inducer) lymphocyte count less than or equal to 200 /mm^3. Some reports indicate an efficacy equal to that of trimethoprim-sulfamethoxazole and comparable toxicity in patients with AIDS . Pentamidine is also the alternate drug of Suramin for treatment of the hemolymphatic stage of African sleeping sickness (trypanosomiasis) caused by T brucei gambienes and T brucei rhodesiense. It is also an alternative drug for the treatment of kala azar and viceral leishmaniasis .

11.6. Dose

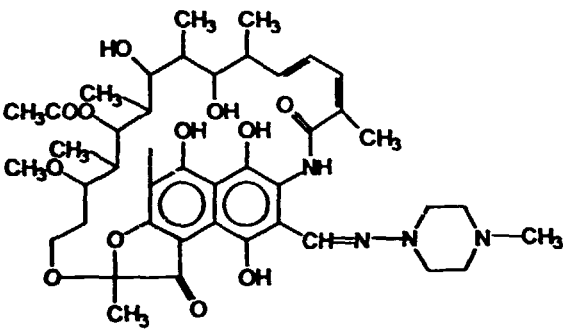
Inhalation, for prophylaxis, 30 or 50 mg twice a month or 300 mg once a month. Intravenous or Intramuscular and children for treatment, 4 mg/kg a day for 10 days for trypanosomiasis and 10 to 21 days for

pneumocystis carinii. Intravenous infusion should last for at least 12 hrs .

11.7. Summary

Pentamidine was first synthesised in 1942 which explains the absence of product patent on the drug. Pentamidine is recommended in case of Pneumocystis carinii pneumonia arising in AIDS patients. Pentamidine is also used in case of trypanosoma and leishmania sickness. WHO has specified a dose of pentamidine base 4 mg per kg to treat African trypanosomiasis. The drug is listed on the official WHO Model List of Essential Drugs as an antituberculostatic drug

12. Rifampin



12.1. Chemical Abstracts Name

3-[[(4-Methyl-1-piperazinyl)imino]-methyl]rifamycin; 5,6,9,17,19,21-hexahydroxy-23-methoxy-2,4,12,16,18,20,22-heptamethyl-8-[N-(4-methyl-1-piperazinyl)formimidoyl]-2,7-(epoxypentadeca[1,11,13]trienimino)-naphtho[2,1-b]furan-1,11(2H)dione 21-acetate. Mol Wt: 822.96

CAS registry number: 13292-46-1

12.2. Drug Synthesis

Semisynthetic antibiotic obtained by reacting 3-formylrifamycin SV with 1-amino-4-methylpiperazine in tetrahydrofuran.

12.3. Patent Data

Neth. pat. Appl. 6,509,961; Maggi, Sensi, U.S. pat. 3,342,810 (1966, 1967 both to Leptit).

12.4. Pharmaceutical Preparations

Capsules: 150 and 300 mg; Tablets: 300 mg

Manufacturer(s): Merrell Dow and CIBA Pharmaceutical.

12.5. Pharmaceutical Use

Rifampin is a broad-spectrum antibiotic effective against most gram-positive bacteria, especially Staph pyogenes, Strep pyogenes, Strep viridans and D pneumoniae, and variably active against gram-negative organisms, especially H influenza and Mycobacterium leprae. Both Mycobacterium tuberculosis and Mycobacterium leprae are very susceptible to the drug. Its clinical use is mainly in the treatment of tuberculosis. Rifampin may be added to isoniazid an pyrazinamide to make a first-choice combination for treatment of infections caused by Mycobacterium tuberculosis to isoniazid for those caused by atypical mycobacteria and to dapsone for leprosy. It also appears to be an excellent drug for prophylaxis of memingococcal meningitis and pneumonia from H influenza Type B and treatment of memingococcal carrier state .

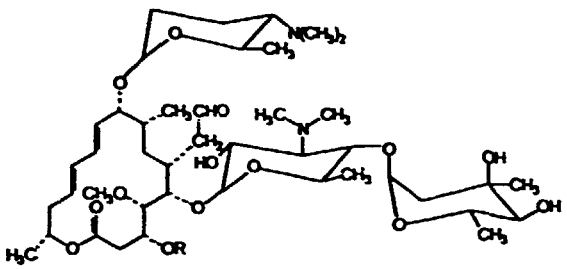
12.6. Dose

The usual dose of rifampin in tuberculosis is 8 to 12 mg per kg body-weight given daily .

12.7. Summary

Rifampin is a broad spectrum antibiotic, however it is mainly used in combination with isoniazid and pyrazinamide to combat tuberculosis. Rifampin is listed on the official WHO Model List of Essential Drugs as an antituberculostatic drug[53]. The drug was first synthesised in 1966-1967 which expains the lack of a product patent on the drug today.

13. Spiramycin



13.1. Molecular Weight and CAS

Mol Wt: 843.1
CAS registry number: 8025-81-8

13.2. Drug Synthesis

It is a mixture of 3 basic substances produced by S ambofaciens from the soil of northern France, spiramycin I (mp about 135°), $C_{43}H_{74}N_2O_{14}$ about 63%; spiramycin II (mp about 132°), $C_{45}H_{76}N_2O_{15}$ about 24% and the remainder, $C_{46}H_{78}N_2O_{15}$ spiramycin III (mp about 130°).

13.3. Patent Data

Charpetier, U.S. pats. 2,978,380 and 3,011,947 (1961 to Rhône-Poulene)

13.4. Pharmaceutical Preparations

Manufacturer(s): It is manufactured under several proprietary names. Some of the major manufactures are Grunenthal, Rhone-Poulenc, May & Baker and Hubber.

13.5. Pharmaceutical Use

Spiramycin is a macrolide antibiotic which is given orally and has been used similarly to erythromycin in the treatment of susceptible infections. It has been used to treat the protozoal infections cryptosporidiosis and toxoplasmosis .

Cryptosporidiosis. Cryptosporidium muris is a coccidian parasite that infects the gastro-intestinal tract. In immunocompetent adults cryptosporidiosis appears as a mild flu-like illness with diarrhoea but in immunocompromised individuals, including those with AIDS or receiving immunosuppressive therapy for transplants or tumours, the disease is often severe and life-threatening. There is thus an urgent need for a safe and effective agent to treat cryptosporidiosis. Of the antimicrobial agents tried spiramycin offers the greatest promise so far .

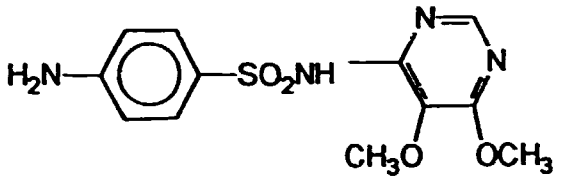
13.6. Dose

The adult dose is 2 to 4 g daily usually in 2 divided doses

13.7. Summary

Spiramycin is active against Cryptosporidium, a protozoan that is increasingly a problem in immunocompromised patients. It is an orphan drug for use in AIDS, in which context is unpredictable

.14. Sulfadoxine



14.1. Chemical Abstracts Name

4-Amino-N-(5,6-dimethoxy-4-pyrimidnyl)benzenesulfonamide. Mol Wt: 310.34

CAS registry number: 2447-57-6

14.2. Drug Synthesis and Patent Data

Belg. pat. 618,639 corresp to Bretschneider et al., U.S. pat 3,132,139 (1962, 1964 both to Hoffmann-La Roche)

14.3. Pharmaceutical Preparations

Sulfadoxine is used in combination with pyrimethamine, in a fixed dose formulation. Scored tablets, containing 500 mg sulfadoxine and 25 mg pyrimethamine .

Manufacturer(s): Roche Laboratories

.14.4. Pharmaceutical Use

Sulfadoxine is principlly used, in the prophylaxis or suppression of malaria caused by chloroquine-resistant P falciparum. However, there are some reports which indicate the success of both pyrimethamine with sulfadoxine to some efficacy for pneumocystis pneumonia unrelated to AIDS. Other preliminary results of a study into the prophylactic use against Pneumocystis carinii in AIDS patients suggest that pyrimthamine-sulfadoxine in a weekly dose is well tolerated and effective .

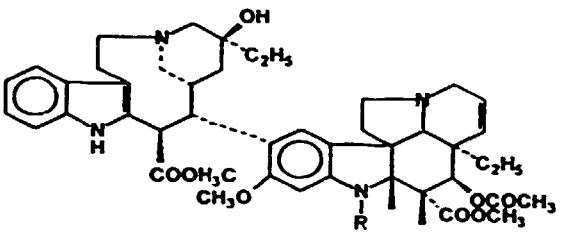
14.5. Dose

Oral, for acute malarial attack, adults, 2 to 3 tablets, alone or in sequence with primaquine or quinine.

14.6. Summary

Sulfadoxine is a long acting sulphonamide which is now rarely used alone due to reports of Stevens-Johnoson syndrome (sometimes fatal) . There are some encouraging reports for the use of a combination of sulfadoxine and pyrimethamine for the prophylaxis of Pneumocystis carinii pneumonia . It is listed on WHO Model of Essential Drugs under antiprotozoal drugs in combination with pyrimethamine[1-].

15. Vinblastine



15.1. Chemical Abstracts Name

Vincaleukoblastine. Antitumor alkaloid isolated from Vinca rosea Linn., Apocynaceae. Mol Wt: 811.00

CAS registry numbers of:
Vinblastin 865-21-4
Vinblastin Sulfate 143-67-9

15.2. Drug Synthesis

By extracting the leaves, bark or stems of Vinca rosea with aqueous or aqueous-alcoholic sulfuric acid, isolating the alkaloid from the extract by the usual precipitation and solvent techniques and purifying by chromatography on aluminium oxide. Conversion to the (1:1) sulfate may be effected by dissolving the alkaloid in an equimolar quantity of dilute H_2SO_4 and either evaporating to dryness or precipitating with a suitable organic solvent.

15.3. Patent Data

Beer et al., U.S. pat. 3,097,137 (1963 to Can. Pats. Dev.); Svoboda, U.S. pat. 3,225,030 (1965 to Lilly).

15.4. Pharmaceutical Preparations

Vinblastine Sulfate (U.S.P.) vinblastine sulphate suitable for parenteral use.

Vinblastine Injection (B.P.) contains vinblastine sulphate in sodium chloride intravenous infusion (0.9)[59]

Proprietary Preparation

Velbe (Lilly, UK) Injection, powder for reconstitution, vinblastine sulphate 10 mg, supplied with solvent.

Manufacturer(s): Lilly, Bull (UK), Lederle (UK).

15.5. Pharmaceutical Use

Vinblastine sulfate is indicated in the palliative treatment of the following :

I. Frequently Responsive Malignancies:
Generalised Hodgkin's disease
Lymphocytic lymphoma
Histiocytic lymphoma
Mycosis fungoides
Advanced carcinoma of the testis
Kaposi's sarcoma
Letterer-Siwe disease

II. Less Frequently Responsive Malignancies

Choriocarcinoma resistant to other chemotherapeutics agents

Carcinoma of the breast, unresponsive to appropriate endocrine surgery and hormonal therapy.

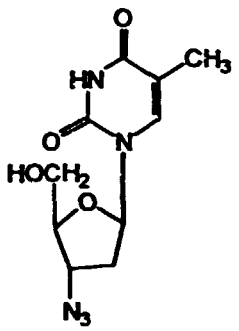
15.6. Dose

Adult, intravenous, initially 0.1 mg(100 µg)/kg or 3.7 mg/m2; 7 days later and each week thereafter the dose is increased by 0.05 mg (50 µg/kg until the leukocyte count falls to 3000 cells/mm3, the tumor regresses, or a maximal dose of 0.5 mg(500 µg)/kg is reached. Thereafter the dose is maintained at a level one increment smaller than the last dose, given to intervals of 1 to 2 weeks.

15.7. Summary

Vinblastine is an alternative drug in case of Kaposi's sarcoma and it is listed on WHO Model List of Essential Drugs under antineoplastic and immunosuppressant drugs. The drug may need specific expertise, diagnostic precision or special equipment as mentioned in WHO Model of Essential Drugs.

16. Zidovudine



16.1. Chemical Abstracts Name

3'-Azido-3'-deoxythymidine. Mol Wt^{80}: 267.4
CAS registry number : 30516-87-1

16.2. Drug Synthesis

J. P. Horwitz et al., J. Org. Chem. 29, 2076 (1964); R. P. Glinski et al., ibid. 38, 4299 (1973). Total synthesis: C. K. Chu et al., Tetrahedron Letters 29, 5349 (1988) .

16.3. Patent Data

Used in treatment of AIDS and AIDS-related complex: J. L. Rideout et al., Ger. pat. 3,608,606 (1986 to Wellcome Found.); eidem, U.S. pat. 4,724,232 (1988 to Burroughs Wellcome) .

16.4. Pharmaceutical Preparations

I.V. infusion, 10 mg zidovudine in each mL. 20 mL single-Use Vial. Zidovudine capsules 100 mg .

Manufacturer(s): Wellcome UK

16.5. Pharmaceutical Use

Zidovudine I.V. infusion is indicated for the management of certain adult patients with symptomatic HIV infection (AIDS and advanced ARC) who have a history of cytologically confirmed Pneumocystis carinii pneumonia (PCP) or an absolute CD4 T4 helper/inducer) lymphocyte count of less than 200 /mm^3 in the peripheral blood before therapy is begun .

Zidovudine is activite against human immunodeficiency virus; consequently, it is used for the treatment of AIDS and AIDS-related complex (ARC). It increases the survival and improves the quality of life of patients with complications, such as severe weight loss, fever pneumocystosis, herpes zoster, herpes or thrush. Because it crosses the blood-brain barrier, it has a favourable effect on the neurological symptoms of AIDS .

16.6. Dose

Oral, adults, initially 2.9 mg/kg or 200 mg every 4 hrs around the clock, except only half this much if there is significant anaemia; subsequent dosage adjustments are made on the basis of haematological indices and /or patients tolerance; children, continuous intravenous infusion, 0.9 to 1.4 mg/kg/hr .

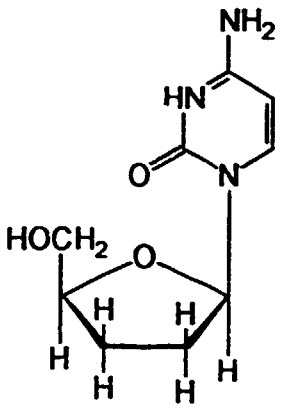
16.7. Summary

Despite the intensive research for Anti-AIDS drugs, zidovudine is still on the top of the list of drugs used in AIDS treatment. However, zidovudine can not be used as prophylaxis against AIDS in case of accidental exposure to HIV-1 virus .

Zidovudine alone or in combination withother drugs are the main drugs used in treatment of AIDS. However, there are side effects which may recommend reducing the dose of zidovudine in AIDS patients. Anemia is one of the main sever side effects which arise with zidovudine use.

The cost of zidovudine is approximately $225.00 per month , which is a very high cost for an HIV-infected patient.

17. Zalcitabine (Dideoxycytidine (ddC))



17.1. Chemical Abstracts Name

2',3'-Dideoxycytidine. Mol Wt: 211.22
CAS registry number:

17.2. Drug Synthesis

J. P. Horwitz et al., J Org Chem 32, 817 (1967). R Marumoto, M Honjo Chem. Pharm. Bull. 22, 128 (1974).

17.3. Pharmaceutical Preparations

Film coated tablets 0.375 or 0.750 mg

Manufacturer(s): Hoffmann-La Roche

17.4. Pharmaceutical Use

Combination Therapy with Zidovudine in Advanced HIV Infection: Zalcitabine (dideoxycytidine) in combination with zidovudine is indicated for the treatment of adult patients with advanced HIV infection who have demonstrated significant clinical or immunological deterioration. This indication is based on limited data from two small studies in which zidovudine-naive patients with a CD4 cell count $\leq$ 300 cells/mm^3 who were treated with zalcitabine plus zidovudine had a greater CD4 response than patients treated with zidovudine alone .

17.5. Dose

The recommended combination regimens is 0.750 mg tablet of zalcitabine orally, administered concomitantly with 200 mg of zidovudine every 8 hours.

18. References

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2. WHO (1992) The use of essential drugs. Geneva : World Health Organization

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4. SALERNI OL (1976) Natural and synthetic organic medicinal compounds. Saint Louis : The C.V. Mosby Company

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THE AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE
(Constitution and By-Laws)

African Federation for Technology in Health Care
Federation Africaine pour les Technologies de Sante
Federacão Africana para Tecnologia para assuntos de Saude

Participating Countries *

Botswana
Cameroon
Chad
Ghana
Ivory Coast
Kenya
Malawi
Mozambique
Mali
Namibia
Nigeria
Senegal
South Africa
Swaziland
Uganda
Zambia
Zimbabwe

* Please note that Angola and Mauritania have submitted their requests for membership

Programmes

	AIDS & STD education included in school curricula	Frequency of AIDS messages on radio		Frequency of AIDS messages on television		Supply of condoms			Condoms distributed (thousands)	
	(since)	more often than weekly	less often than weekly	more often than weekly	less often than weekly	through mass media	to vulnerable groups	Social marketing program	1990	1991
Angola	no		X		X	yes	yes	no	-	-
Benin	no		X	X		yes	yes	yes	400	550
Botswana	1992	X				yes	yes	yes	-	2 000
Burkina Faso	1986	X			X	yes	yes	yes	-	-
Burundi	1988	X			X	yes	yes	yes	498	1 000
Cameroon	1991	X			X	yes	yes	yes	2 160	2 160
Cape Verde	no	X			X	yes	yes	no	-	-
Central African Republic	1990	X			X	no	yes	yes	724	1 282
Chad	no		X		X	no	yes	no	74	444
Comoros	no		X			yes	yes	no	14	56
Congo	1991	X		X		yes	no	yes	-	172
Cote d'Ivoire	no		X		X	yes	yes	yes	3 000	4 000
Equatorial Guinea	no	X		X		yes	yes	no	288	288
Ethiopia	no	X		X		yes	yes	yes	3 390	4 454
Gabon	1990	X			X	yes	yes	no	-	-
Gambia	yes	X			-	yes	yes	no	576	834
Ghana	1991	X		X		yes	yes	yes	-	-
Guinea-Bissau	no	X			-	yes	yes	no	-	114
Kenya	1992	X			X	no	yes	yes	10 200	18 400
Lesotho	yes		X		-	yes	yes	yes	367	502
Madagascar	1990		X		X	no	yes	no	800	1 000
Malawi	1991	X			-	yes	yes	yes	5 000	5 000
Mali										
Mauritius	no		X		X	yes	yes	yes	1 316	1 335
Mozambique	no		X		X	yes	yes	no	2 370	2 592
Namibia	no	X		X		yes	yes	no	1 037	1 376
Niger	no	X		X		no	yes	no		2 478
Nigeria	no							yes	1 000	750
Rwanda	no	X				yes	yes	yes	4 000	5 800
Senegal	1991		X		X	yes	yes	yes	1 200	1 500
Seychelles	1988		X	X		yes	yes	no	100	309
Sierra Leone	1990	X				yes	yes	yes	1 008	1 500
South Africa										
Swaziland	1991	X		X		yes	yes	yes	-	-
Tanzania	no		X			yes	yes	yes	20 000	30 852
Togo	1982		X		X	yes	yes	yes		251
Uganda	1989	X		X		no	yes	yes	-	1 800
Zaire	1988		X		X	no	yes	yes	4 140	18 715
Zambia	1992	X		X		yes	yes	yes	-	-
Zimbabwe	no					yes	yes	yes	20 895	24 281

THE CONSTITUTION

OF THE

AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE (AFTH)

CONSTITUTION OF THE AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE

ARTICLE 1 NAME

The Federation shall be called the AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE, abbreviated to AFTH.

ARTICLE 2 INTERPRETATION

Unless otherwise stated in this constitution:

2.1 FEDERATION refers to the AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE.

2.2 BRANCH refers to a national society of the FEDERATION established under ARTICLE 16 by virtue of valid 'A' membership status.

2.3 AIMS AND OBJECTIVES refers to the specific purpose for which the FEDERATION will be responsible and will endeavour to undertake as described in ARTICLE 3.

2.4 TECHNOLOGY IN HEALTHCARE refers to the knowledge, techniques, equipment and procedures used in the prevention, diagnosis and treatment of disease. It includes the assessment, research, design, development, procurement, utilisation, maintenance, repair and management of:

(a) medical devices and instrumentation and other healthcare-related devices and equipment;

(b) plant, machinery and healthcare facilities; and

(c) associated human resources.

2.5 The term HEALTHCARE TECHNOLOGY RELATED ACTIVITIES includes any activity directly or indirectly related to the introduction and use of technology in healthcare.

ARTICLE 3 AIMS AND OBJECTIVES

3.1 Purpose

The purpose of the FEDERATION is to provide an alliance of professional societies and individuals in Africa who wholly or partially are involved in the activities described in 3.2 below. The FEDERATION shall be an umbrella organisation for promoting the activities of its members.

3.2 Aims and objectives

The FEDERATION shall

(a) promote, develop and facilitate professional co-operation and integration amongst associations, organisations, institutions, other groups and individuals active in health-care technology related fields;

(b) promote and facilitate exchange of experiences, ideas and technical/scientific information amongst its members;

(c) promote the formation of healthcare technology (HCT) related national societies and associations within African states;

(d) affiliate, liaise and collaborate with other relevant regional and international organisations as appropriate;

(e) promote more effective and efficient assessment, procurement, utilisation, maintenance and management of healthcare technology as specified in Article 2.4;

(f) promote and encourage research and development of appropriate and effective technologies in collaboration with industry and relevant stakeholders such as governments and international development and donor agencies;

(g) promote the development of adequate and appropriate education and training in healthcare technology related fields and encourage co-operation in the health, educational and scientific fields;

(h) encourage the creation of research networks in order to reinforce, by wider dissemination of information, the role played by research and other organisations in providing healthcare technology solutions; and

(i) organise, facilitate and support regional and national congresses, seminars, meetings and training courses and provide a forum for publication.

ARTICLE 4 STATUTE

The FEDERATION is an independent, non-political, non-governmental, non-profit organisation, its resources being used exclusively to foster and promote its Aims and Objectives as described in ARTICLE 3. The Federation is established for an unlimited period.

ARTICLE 5 LANGUAGE

The official languages of the FEDERATION shall be English, French and Portuguese. Other languages may be adopted or used by the FEDERATION in accordance with the BYLAWS. This Constitution or other FEDERATION documents may however be translated into other languages as determined by the Executive Council. Where there is a difference of interpretation, the original text shall be considered to be official and binding.

ARTICLE 6 THE EXECUTIVE COUNCIL

6.1 Function

The Executive Council shall be the governing body of the FEDERATION. It shall define the policies and manage the affairs of the FEDERATION. It shall implement decisions and recommendations adopted by the General Assembly.

6.2 Composition

The Executive Council shall comprise the following officers and members:

(a) President

(b) Vice President

(c) Past-President

(d) Secretary General

(é) Treasurer

(f) an additional 8 (eight) elected members at large.

6.3 Terms of office

The President, Vice-President and Past President shall serve for a period of three years. The Vice President will, except under special circumstances, be the President-Elect. The Secretary General and Treasurer shall serve for three years with the possibility of re-election for a second and final term of office. The members-at-large shall serve for a period of 6 (six) years.

6.4 Meetings

The Executive Council shall meet at least once every year and the quorum shall be two-thirds of all members of the Council.

6.5 Voting by Members of the Executive Council

Each Executive Council member shall have one vote. Postal votes and proxy votes are permitted. The President shall have a casting vote.

ARTICLE 7 FUNCTIONS OF THE OFFICE BEARERS

7.1 The President shall

(a) preside over the General Assembly and Executive Council meetings;
(b) represent the FEDERATION in all legal and non-legal matters;
(c) co-sign Meeting and General Assembly Minutes with the Secretary General, and Financial documents with the Treasurer.

7.2 The Past-President shall

(a) be actively engaged in international and regional liaison to further the Aims and Objectives of the Federation;
(b) constitute and chair the Nominating Committee for all elections;
(c) perform such other duties as may be assigned by the President;

7.3 The Vice President shall

perform all duties of the President in the absence of the President and all such duties that may be assigned and/or delegated by the President.

7.4 The Secretary General shall

(a) ensure the safe storage and availability of all AFTH correspondence, communications, minutes and other official documents;
(b) be responsible for the minuting of meetings of the Executive Council, the General Assembly and other official AFTH meetings as determined from time to time;
(c) maintain up-to date membership records.

7.5 The Treasurer shall

(a) keep proper books of the FEDERATION accounts and prepare the annual budget;
(b) be responsible to the Executive Council for all income and expenditure.

ARTICLE 8 SECRETARIAT

The FEDERATION shall have its Secretariat in the country of the serving Secretary-General. The Secretariat shall be actively and primarily responsible for the receipt, distribution and safe storage of documents of the FEDERATION, as listed in Article 7.4 (a), and all communications to members.

ARTICLE 9 MEMBERSHIP CATEGORIES

The categories of membership shall be:

9.1 **'A' MEMBERS:** National societies/associations in Africa engaged in healthcare technology activities.

9.2 **'B' MEMBERS:** Individual members from African countries without societies/associations falling under 'A' members. The 'B' members should be engaged in healthcare technology activities. This category of membership includes students as outlined in the BY-LAWS of the FEDERATION.

9.3 **'C' MEMBERS:** Organisations and societies other than 'A' members but engaged in healthcare related activities.

9.4 **'D' MEMBERS:** Commercial and industrial organisations and companies engaged in healthcare technology and healthcare related activities.

9.5 **'E' MEMBERS:** Honorary Life Membership for individuals who have rendered special and distinguished service to the FEDERATION and/or to the field of healthcare technology.

ARTICLE 10 MEMBERS' RIGHTS AND OBLIGATIONS

10.1 Every member shall have the following rights:

(a) to benefit from any or all rights emanating from the AFTH Constitution;

(b) to order his/her conduct so as to uphold his/her personal reputation and dignity and that of the FEDERATION;

(c) to freely inspect FEDERATION membership records and books or accounts.

10.2 Every member shall nave the following obligations:

(a) to abide by the Constitution of the FEDERATION;

(b) to foster and promote the objectives of the FEDERATION.

ARTICLE 11 ADMISSION, TERMINATION AND RE-ADMISSION OF MEMBERSHIP

11.1 Admission of Membership

Admission shall be considered on application. 'A' members shall be accepted by a simple majority of the General Assembly or by postal ballot of the delegates to the General Assembly.

Admission of 'B', 'C' and 'D' members shall be by simple majority of the Executive Council.

Honorary Life Members ('E' members) shall be nominated by the Executive Council and approved by two-thirds majority of the General Assembly at the time of the General Assembly.

11.2 Termination of Membership

Membership shall be terminated:

(a) upon written notice to the Secretary-General;

(b) upon failing to settle the FEDERATION's dues despite adequate notice as specified in the BY-LAWS;

(c) upon committing professional misconduct which, in the opinion of the Executive Council, brings or attempts to bring the FEDERATION into disrepute;

(d) upon death.

11.3 Re-Admission

'A' Members may be re-admitted upon application for re-admission provided the Executive Council and the General Assembly are satisfied that the reason(s) for termination no longer apply. Other members may be re-admitted upon application by a simple majority vote of the Executive Council.

ARTICLE 12 MEMBERSHIP FEES

12.1 'A' members shall pay joining and annual membership fees as determined, in accordance with the number of members in the societies.

12.2 'B', 'C' and 'D' members shall pay joining fees and annual membership fees as determined.

12.3 'E' members are not liable for joining or annual membership fees.

ARTICLE 13 THE GENERAL ASSEMBLY

The General Assembly is the assembly of delegates of 'A', 'C' and 'D' members - or alternatives - and 'B' members. The General Assembly shall meet once every three years at the time and place of the Regional/Continental congress.

The allocation of General Assembly delegates shall be as outlined in the BYLAWS. Credentials shall be verified by the Credentials Committee.

Quorum is achieved by the presence of two-thirds of 'A' member delegates or their alternatives.

The General Assembly shall elect by simple majority the Vice-President, Secretary General, the Treasurer and 4 (four) Members-at-Large. The election shall be conducted by the Chair of the Nominating Committee.

Voting shall be conducted in accordance with the BY-LAWS.

ARTICLE 14 COMMITTEES / WORKING GROUPS

Standing Committees of the FEDERATION and their functions are covered in the BY-LAWS. The Executive Council may

establish Working Groups to address specific issues. The President of the FEDERATION (or person delegated by him/ her) shall be an *ex-officio* member of any or all such Committee or Working Group.

ARTICLE 15 BUDGET AND ACCOUNTS

The accounting period shall be closed on December 31st of each calendar year. The Treasurer shall submit for the approval of the General Assembly the account of the previous accounting period and the budget for the next accounting period. In the intervening years the account and budget shall be submitted to the Executive Council for approval.

ARTICLE 16 BRANCHES

'A' member societies/associations may be given the status of a BRANCH of the FEDERATION for the purpose of fostering and promoting the aims and objectives of the FEDERATION.

ARTICLE 17 AMENDMENTS

Amendments to this Constitution must be approved by a two-thirds majority of the General Assembly. Proposals for amendments must be submitted in writing to the Secretary General at least six months prior to the next meeting of the General Assembly.

ARTICLE 18 BY-LAWS

All operations/procedures and financial and other details not explicit in these ARTICLES are described in the separate set of BY-LAWS.

ARTICLE 19 DISSOLUTION

By resolution of a two-thirds majority at an Extra-ordinary session convened specifically for this purpose. In case of dissolution, the FEDERATION's assets shall be given to:

(a) African-based international charitable organisations and/or

(b) 'A' members strictly on a pro-rata basis.

BY-LAWS

OF THE

AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE (AFTH)

1. BY-LAWS

The By-Laws and any changes thereof shall be approved by the General Assembly by a simple majority.

2. LANGUAGES OF THE FEDERATION

Languages other than the current official languages may be adopted for official use by a two-thirds majority vote of the General Assembly.

Languages other than the current official languages may be used for regional and/or national conferences or scientific meetings provided that one of the official languages is also used.

3. OFFICE-BEARERS - CONTINGENCY ARRANGEMENTS

In the event of the **President** being unable to complete his/her full term of office, the Vice-President shall assume the office of President. The Vice-President shall continue to serve as President after the next General Assembly for the full three-year term as specified in Article 6.3.

In the event of the **Vice-President** being unable to complete his/her term of office, the duties of the Vice-President will be assumed by the Past-President. A President and a Vice-President/President-Elect will be elected at the next General Assembly.

In the event of either the **Secretary-General** or the **Treasurer** being unable to complete their terms of office, members-at-large will be nominated as replacements by the President and elected by means of postal ballot by the Executive Council. Voting will be in accordance with Article 6.5 of the Constitution.

4. MEMBERSHIP

4.1 Admission shall be by application on the prescribed application form/s.

4.2 Full-time students may join the FEDERATION as 'B' members. Student applicants are to submit an official supporting letter from their organisation, by the first day of the month of May, indicating current full-time registration for each year of Student Membership. Should such confirmation of registration not be received by due date membership status will be changed to that of normal 'B' member.

4.3 Membership fees are due by the first day of the month of May. Membership will be terminated upon failing to settle dues within 6 months after written notice from the Treasurer.

4.4 Membership and joining fees will be determined annually by the Executive

Council on the recommendation of the Treasurer and will be made known to members at time of request for payment for such fees.

5. GENERAL ASSEMBLY

5.1 Composition of the General Assembly

The General Assembly shall comprise individual 'B' members and delegates of the 'A', 'C' and 'D' members as follows:

'A' members: in accordance with the number of members per society and as as specified from time to time by the Executive Council;

'C' and 'D' members: one delegate per member.

5.2 Nominations of Office-Bearers and Members-at-Large

The Nominating Committee shall be responsible for the nomination of candidates for election as officers of the FEDERATION and members-at-large of the Executive Council. The candidates shall be made known to the to the General Assembly delegates six (6) calendar months prior to the date of the General Asembly.

5.3 Voting Procedure for Election of Office-Bearers and Members-at-Large

5.3.1 Voting will be by secret ballot or by postal ballot for those delegates unable to attend the General Assembly.

5.3.2 Members' votes will be weighted according to the following:

'A' members shall constitute 65% of the total vote

'B' members shall constitute 15% of the total vote.

'C' and 'D' members shall each constitute 10% of the total vote

6. STANDING COMMITTEES OF THE FEDERATION

The FEDERATION shall have the follwoing Standing Committees. All members of the under-mentioned committees shall serve for a period of three (3) years.

6.1 Finance Committe

This committee snall be chaired by the Treasurer. Its function is to assume responsibility for and manage the financial affairs of the FEDERATION.

The committee shall comprise appointed present members of the Executive Council.

6.2 Nominating Committee

This committee shall be chaired by the Past-President or a person appointed by the President. Its function is to prepare and conduct elections of the office-bearers and other members of the Executive Council.

The committee shall comprise appointed present and past members of the Executive Council.

6.3 Credentials Committee

This committee shall be chaired by the Past Secretary-General or a person appointed by the President. Its function is to accredit all delegates to the General Assembly.

The committee shall comprise appointed present and past members of the Executive Council.

6.4 Publications Committee

This committee will be chaired by a person appointed by the President. Other members may be drawn from the genral membership. Its function is to promote the Aims and Objectives of the FEDERATION through dissemination of information and news relating to activities of the FEDERATION, its members and other organisations.

6.5 International Liaison Committee

This committee shall be chaired by a person appointed by the President. Its function is to promote the Aims and Objectives of the FEDERATION through the establishment of links with key international organisations and bodies.

The committee shall comprise members appointed from the general membership.

6.6 International Advisory Committee

This committee shall be chaired by the President. Its function is to gather key international figures to advise and assist the FEDERATION in its Aims and Objectives.

The committee shall comprise of persons nominated by the Executive Council.

7. BRANCHES OF THE FEDERATION

'A' member societies/associations in any member state may jointly apply to the Executive Council for granting of Branch status. In the event of a member state having only one 'A' member society/association granting of Branch status to this society/association will be considered.

On successful application the Branch will be known as the AFTH Branch in the member state. Member societies/associations jointly designated as an AFTH Branch shall officially represent the FEDERATION in that member state and may use the FEDERATION logo in conjuction with their own on official stationery.

THE AFRICAN FEDERATION FOR TECHNOLOGY IN HEALTHCARE (AFTH)

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ANNEX 9

THE AFTH/MRC Regional Workshop on Healtcare Technical Services in teh Sub-Saharan Region
by Mr. Peter Heimann

PROCEEDINGS

AFTH/MRC Regional Workshop on Health Care Technical Services in the Sub-Saharan Region

5-6 April 1995
Gallagher Estate, Midrand, South Africa

CONTENTS

Rapporteurs: **Lyn Hanmer and John Roberts**

This report prepared by
Lyn Hanmer
assisted by Patricia Josias

Edited by
Mladen Poluta

September 1995

Medical Research Council
PO Box 19070 Tygerberg 7505
South Africa

MEETING OVERVIEW

The Workshop was organised by the Health Technology Research Group of the South African Medical Research Council (MRC-HTRG) and Mr. Mladen Poluta of the Department of Biomedical Engineering of the University of Cape Town and Groote Schuur Hospital (UCT/GSH), in conjunction with the Division of Strengthening of Health Services of the World Health Organization in Geneva and the African Federation for Technology in Health Care (AFTH).

30 invited attendees participated in the workshop, including representatives of 8 African countries, the GTZ and the WHO, the IEEE-EMBS and St. Bartholomew's Hospital Medical College (UK).

The workshop took place over two days: Wednesday 5 April and Thursday 6 April 1995. It was preceded by a WHO/AFTH Consultation on Healthcare Technology Training on Monday 3 April and one-day parallel conferences of BESSA (the Biomedical Engineering Society of Southern Africa) and SAACE (The South African Association of Clinical Engineers) on Tuesday 4 April. The inaugural General Assembly of the African Federation for Technology in Healthcare (AFTH) was held on Wednesday 5 April 1995.

At the opening session on the morning of Wednesday 5 April 1995, chaired by Mr. Mladen Poluta (Department of Biomedical Engineering, UCT/GSH and Member of the AFTH Executive Council), participants were welcomed by Mr. Peter Heimann (MRC-HTRG and AFTH Secretary-General), Mr. Andrew Obura (Mombassa Polytechnic and AFTH President) and Dr. Andrei Issakov (WHO, Geneva).

Mr. Mladen Poluta introduced the workshop format and method of work, noting that the workshop was intended as a follow-up to the proceedings of the "Healthcare Technical Services" (HCTS) theme at the Workshop on Healthcare Technology in the Sub-Saharan Region: Challenges and Collaboration Possibilities held in Somerset West, South Africa in April 1994. Technology Assessment would also be addressed, since it is very closely linked to the management of healthcare technical services.

Mr. Poluta was elected to chair the Workshop. Ms Lyn Hanmer (MRC-HTRG) and Dr. John Roberts (St. Bartholomew's Hospital, UK) were elected as rapporteurs.

After discussion of the proposed topics, workgroups were separated into the following areas:

1. Policy Issues and Organisational Structure
2. Technology Assessment and Procurement Strategies
3. Maintenance and Operations Management.

Since Information is of general importance, it was agreed that this would be discussed in a plenary session. It was agreed that Training would not be discussed since it had been covered in the WHO/AFTH Consultation on Training for Health Care Technical Services held on Monday 3 April 1995. However, a summary of the report on the Consultation will be included in the final report on the Workshop.

For the late morning and afternoon sessions on Wednesday 5 April, participants separated into the three working groups identified above. Chairpersons and rapporteurs were selected by each working group.

The first plenary session on the morning of Thursday 6 April included reports on HCT training in Botswana, Swaziland and Zimbabwe, since the representatives of these countries had not been able to attend the Training Consultation on Monday 3 April. A brief report on the Consultation was given by Dr. Roberts. Reportbacks from the working groups were given during the second morning session. Each reportback was followed by discussion.

The plenary discussion on Information took place after lunch. In the final plenary session, which included a discussion of the way forward, it was agreed that the most urgent follow-up activity was the drafting and formulation of a regional plan of action for Health Care Technical Services.

Dr. Issakov presented the concluding remarks, and the meeting ended with short addresses by Mr. Poluta, Mr. Obura, Prof. Yunkap Kwankam, and Mr. Heimann.

INTRODUCTION

WELCOME

Peter Heimann, HTRG/MRC, reminded the participants that this Workshop was a continuation of a process and thanked those who had made the meeting possible.

Andrew Obura, AFTH, thanked the SA Medical Research Council for continuing to work with the AFTH. He asserted that the AFTH was now a real federation. South Africa had already become a special place for HCT activities.

Andrei Issakov, WHO, reflected that this was the third meeting in three days and welcomed the participants on behalf of the WHO. He also thanked the MRC, the UCT and the AFTH for their active involvement in developments in SA and beyond in the improvement of HCT. He reminded the meeting that there had been a real breakthrough with the statement submitted to the WHO/AFRO Technical Discussions held in Brazzaville in September 1994. These centered on HCT at the *district* level, which is the focus for health care delivery and the level at which government policy is converted to real action to meet community needs. The resolution adopted at the same meeting and which was supported by 46 Ministers of Health from the African region, was accepted as a policy basis for future activities. The plan for the strengthening of HCTS in the region, based on the output of the workshop, must of necessity be in line with the statement and the resolution of the Brazzaville meeting.

WORKSHOP PROGRAMME / PROCEDURE

Presented by Mladen Poluta, UCT/GSH (Workshop Facilitator)

The motivation for the Regional Workshop on Health Technology held in Somerset West in April 1994 was to establish the status quo of HCT in Africa, and specifically the Sub-Saharan Region. While that meeting addressed five themes, it was felt that follow-up action was needed for the clinical engineering theme, renamed "health care technical services" (HCTS). The purpose of this Workshop was to commence formulation of an action plan for HCTS for the Sub-Saharan Region.

Resource Material for Workshop: Guidelines for 1994 Workshop; 1994 Workshop Report and Meeting Statement; Discussions on HCTS theme at that Workshop; WHO/AFRO Resolution (September 1994 in Brazzaville).

Recommendations for Groups:

A list of core topics was presented. The relevance of technology assessment in the formulation of the plan was questioned. Perhaps technology evaluation was more appropriate - this needed to be taken further. One should also consider the prerequisites for and consequences of implementation of particular technologies. This group must take cognisance of these issues. Nico Walters suggested a different

approach - rather than considering specific topics which may re-inforce existing modes of operation, to consider general issues of "systems, structures, operational issues and training". After some discussion it was decided to proceed with the topics as initially presented. Nico Walters offered to act as resource person for strategic management. It was also suggested that the topics be addressed broadly rather than narrowly.

After discussion, it was decided that the topic Organisational Structure / Policy Issues should not be split into two. The meeting was reminded that we should not repeat discussions which took place at the Somerset West meeting. On the issue of training, presentations from Botswana, Swaziland and Zimbabwe are still outstanding and should be included in the report for the Training Consultation. The issue of information is an important one and needs to be dealt with in depth. Each group should consider specific information needs in their discussions. Networking could be discussed as a general issue.

Yunkap Kwankam noted the need to consider the interface with topics/concerns of other groups within the workshop and outside the scope of the workshop.

REPORTS FROM DISCUSSION GROUPS

GROUP I

POLICY AND ORGANISATIONAL STRUCTURES

Participants

Anneline Bester, Dave Boonzaier, Tony Bunn, Joan Jones, Lutz Kempe, Freddy Kühhirt, Yunkap Kwankam, Gerard Locke, Nico Walters.

Introduction

If one examines the background documents, it is clear that this subject has already been covered in some detail at the Somerset West and other meetings. Major issues, and even some specific issues have been addressed. What is missing is some procedural tool to assist governments in the formulation of policies. The group proposes the algorithm below. It consist of three parts : INPUT, PROCESS AND OUTPUTS.

INPUTS

- Existing National Health policies
- Management systems
- Human resources
- Financial resources
- The health problem
- Time scales
- Format for submission of draft policy
- Stakeholders:
    - Ministry of Health / Local government
    - Technical experts
    - Policy makers
    - Community (the specific group to be identified, based on the health problem)
    - Business
    - Health care providers
    - HCTS personnel
    - Doctors
    - Nurses
    - Professional societies
    - The media
    - Donors/Executing Agencies

THE PROCESS OF POLICY MAKING

A. Define the need for policy i.e. the health problem to be addressed. Draft submission to the appropriate decision-making level; referral for study by Technical Department

B. Consultation within Ministry (Department) including provincial

C. Draft policy, Regulation or Act for comment by stakeholders

D. Evaluation of comments

E. Final document - publication

OUTPUTS

A **Immediate Outputs**

Policies, regulations or acts covering HCTS:

- Organisational structures
- Human resources
- Procurement of technology and equipment
- Management and maintenance of equipment

B **Final Outcomes**

Improved quality and equity of health care through:

- Interfacing and synergy between HCTS personnel and other health professionals
- Uniformity of terminology, procedures and standards
- Improved or better use of resources
- Better distribution of health services
- Better integration

The Role of the AFTH in Health Care Policy Making

INPUT

- The health problem: - identify the health technology needs in Africa
- Promote awareness of the needs among stakeholders

PROCESS

A. Initiate and support the draft policy submission

B. Technical advice

C. Facilitate consultation and provide critical comment

D. Provide expertise

E. Disseminate and promote policies, regulations or acts

OUTPUT

- Monitoring and evaluation of implementation
- Assess the impact

TARGETS

On-going (from now through long term)

1. Increase AFTH membership base (Executive Committee)

Short Term (within 1 year)

2. Official recognition of the AFTH by:
   - national governments (national societies)
   - WHO, and other international organisations, such as ECA, OAU, etc.
   - International societies such as IEEE, IFMBE, IFHE, etc. - (Executive Committee)
3. Promote the role of health care technology policy - (Executive Committee, all member societies)
4. Implement appropriate organisational structure within the AFTH - (national societies)

Medium Term (within 3 years)

5. Formulate and promote a HCTS act - (national societies, Executive Committee)
6. Influence health care budgetary policy (national societies)

Long Term (within 5 years)

7. Position AFTH as a policy instrument in Africa - (Executive Committee, national societies)

DISCUSSION

(Presentation by Gerard Locke)

- There is a need for a procedural tool
- Highlight input/process/output - final outcome
- What could AFTH do? (input/process/output)

Organisational structure requires recommendations for form e.g. of HCTS at district level, but there are already many documents related to this. The important issue is to get the role of HCT and HCTM included on the health agenda.

- Endorsed recommendation of Somerset West meeting
- Recommendations on how to distribute/make available existing material on HCT structures
- Working group will have to collate available information - extract relevant information and draft a plan for the region.

- The plan must have targets for the region and for the AFTH
- Aim as output:
    - -plan for the Region; what countries should do
    - -plan for the AFTH
    - -plan for other partners

    This is a matter of PACKAGING but AFTH is a good agent for 'prodding' governments into action if it is a viable and credible organisation

GROUP II

TECHNOLOGY ASSESSMENT AND PROCUREMENT STRATEGIES

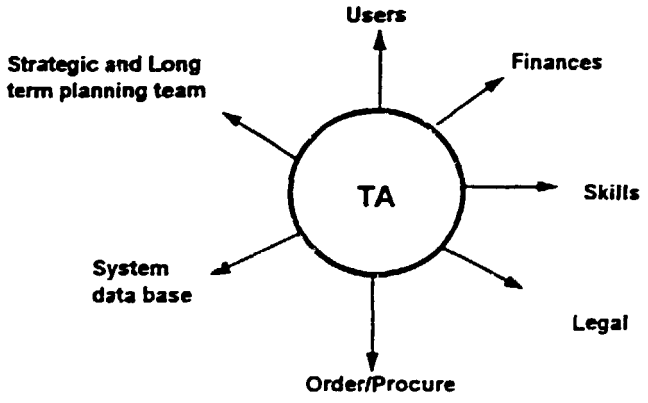
Participants

Ousmane Dia, David Evans, Tidimogo Gaamangwe (Rapporteur), Lyn Hanmer, Keratiloe Moyo (Chair), Bheki Ntshangase, Rosemary Seloro,

Global objective:

To provide decision makers with scientific information that will enable them to select and acquire appropriate technology. HCT is part of the decision making. (Mainly equipment and plant issues were considered.)

Integration process



OBJECTIVES	ACTION	RESOURCE	TIME FRAME	MILESTONE
Technology assessment To promote technology assessment as part of equipment procurement	• Handbook • Training in technology assesesment • Establish a regional HTA Goup to develop a proposal for the establishment of a specific HTA activity within the region	• AFTH • MRC	April 1996	• Availability of handbook • Training program established • Group in excistence
1) To prepare essential equipment list based on services to be provided	• Compile a data base of available documentation • Individual countries compile own list through committee made up of technical personnel and users	• AFTH to coordinate • Technical personnel and medical and nursing	August 1995 to April 1996	• AFTH has lists • Countries have a lists

2) To define guidelines for equipment procurement, acquisition and evaluation	• Each Country to form a committee at a national level	• AFTH Workshop recommendation • HCT MD's and users	August 1995	• Detailed workshop report • Committees established
3) To participate in appropriate technology development	• Performance evaluation • Provide feedback to industry	• HCT's and users	on-going	• Improvements
4) to formulate policies with respect to donations	• Compile database of donor policies. Recommend to countries to formulate own policies	• AFTH WHO, and MRC	August 1995	• Availability of information.

Guidelines for objective #2

1. Compile inventory
2. Determine needs
3. Assess equipment needs at health facility level
4. Specifications
5. Special conditions
   - Standardization
   - Performance history
   - Local service representative
   - Spares and accessories availability
   - Technical back up
   - Training
   - Documentation
   - Delivery period and installation
   - Commissioning
   - Guarantee
   - Recurrent Costs
6. Initiate a record for each piece of equipment after acquisition
7. Evaluation - each country to establish process.

DISCUSSION

- Concentrated mainly on plant and equipment
- Note the process of TA - procurement
- AFTH as co-ordinator/delegator in information collection

MRC as collaborating centre could act as a source of information

- Development of policies will require guidelines as inputs, and other information
  - Possible methods for reducing the influences of doctors;

- use available expertise
- process of dialogue needs to be established
- offer people choices within constraints e.g. essential equipment list
- HCTS nee tostart educating doctors, indicating ability to support, rather than 'abrupt change'

- Note the importance of teamwork
  - there are precedents, especially in small countries; report on experience in an appendix
- Lack of information and guidelines is a major factor in decision making
  - note ECRI evaluation tool EASY
- 'Communication' and 'policy development' must occur concurrently
- Tender system needs to be addressed in SA and other countries
  - this is a wasteful and expensive process
  - this is an expensive process for suppliers also
  - there are tendering processes related to donations too, and thus will need to consider alternative approaches if tenders are not appropriate.
  - existing tender procedures are very awkward
  - review tender process and make recommendations for shortening/changes in procedures. This would be very useful
  - there are some benefits to the concept of tendering
  - can have processes that change depending on costs; there are provisions for limited tenders for accredited suppliers
  - Should steer policies in the region towards' appropriate minimum standards' for the region; should be linked to TDT also
- Donors:
  - need to publish problems experienced; maybe this will make some changes
  - the group noted the importance of generic specifications drawn up by technical people and users
  - it is important for recipients to define requirements as donors are in a learning process
  - Need to look at the quality of documentation supplied with equipment
  - Procurement procedure must allow for refurbished equipment and allow small business to get involved; the problem with the current situation is monopolistic practices.

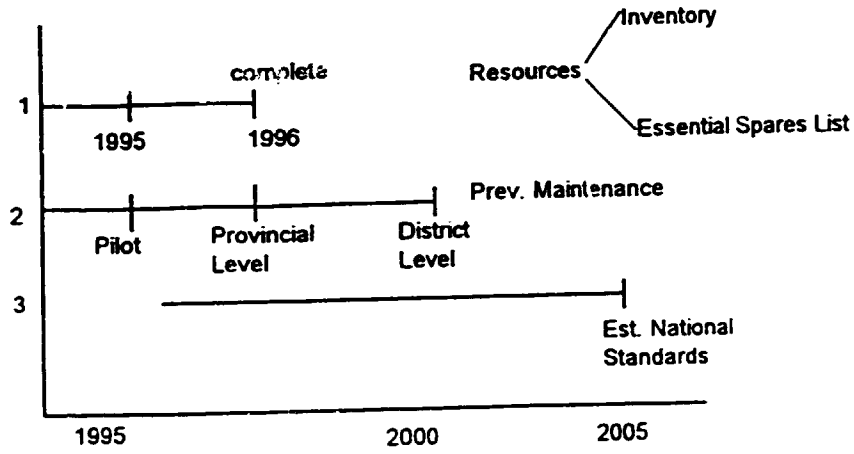
GROUP III

MAINTENANCE AND OPERATIONS MANAGEMENT

Participants

Mike Bredenkamp, Deborah Esch, Laro Fourie, Christopher Konosi, Lucky Kwele, Richard Mhiti (Rapporteur), Moses Murengezi, John Roberts (Chair), John Ruiter, John Wambua

Plan for Maintenance and Operations Management



1 Resources
2 Planned Maintenance
3 Safety

- Documentation - Bibliography
- Training of technicians and staff resources
- Policy for Maintenance
  - Provincial
  - District
- Equipment - Performance record
- Central control office to oversee / monitor maintenance activity at each level
- Budget for maintenance with the ministry
- National, Regional, District unit structure to see to the implementation of the policy in relation to human resources
- Need for technical representation at senior level

It is agreed that doctors are not keen in allowing technical staff to do PPM on their equipment as most of them are only used to equipment being attended to during breakdowns. They must be taught the importance of PPM's and this should be backed by statistics. A policy document is already available and should be consulted as a guideline in deciding on a policy document for PPM.

It is also important that countries lobby for a strong body in order to have their voice heard. A manual or computerized record of PPM is necessary. AFTH must circulate the policy issue in collaboration with WHO. Member countries must also be encouraged to set up in-house maintenance units in each health facility or a central or regional workshop. Depending on the technology involved some equipment maintenance must be contracted out to companies.

As the inventory increases, it calls for extra staff to cope with the increase. PPM implementation must come from the top if it is to succeed.

The establishment of a library, service records and a central control office at headquarters to monitor PPM activities is necessary. Ministries of health must provide sufficient budgets for maintenance to cater for PPM, essential equipment and tools.

Below we shall discuss certain elements of maintenance and operations management. The format adopted is that used by WHO.

TARGET 1

There is a strong need for essential repair capability. This is a prerequisite to the establishment of PPM.

Resources:

Activity 1 — First an inventory system must be introduced and this requires the following tools:

- Inventory cards for information entry
- Computer to store information collected
- Once PPM is implemented, the staff has to be increased to cope with the extra work.
- A vehicle is required to take technical staff to other health facilities to carry out PPM

Activity 2 — Essential spares

Activity 3 — Essential equipment such as tools, test equipment and workshop structures.

Time Frame — For inventory it was proposed that it should be done by the end of 1996 and for essential equipment it will be done in two phases. Phase one till end of 1995 and Phase two which will be comprehensive till the end of 1996.

Activity 4 — A regional workshop to highlight problems and activities common to neighboring countries is necessary and should be encouraged.

TARGET 2

Planned Preventive Maintenance. The aim is to implement a Plan at provincial and district level for PPM.

Resources — Obviously extra staff will be needed
PPM system should be introduced
Training of technical staff is paramount importance if the system is to succeed.

Time Frame — 2-4 years

Milestones

- Initially one Provincial Hospital is to be used for a pilot project till the end of 1995.
- Once this is done all Provincial Hospitals must be done by the end of 1996.
- Finally district level hospitals must be done by the year 2000

TARGET 3

Safety - **The aim here is to establish national standards.**

Activity 1 — First a survey must be carried out.
Members must share information by establishing National guidelines on safety standards on the following :
- electrical
- radiation
- chemistry
- biological hazards
- waste disposal

Activity 2 — It is imperative that all high risk equipment be tested to manufacturers' or local equivalent regulations.

Activity 3 — A policy must be implemented to the effect that sub-standard equipment is boarded off / scrapped / written off.

Time Frame — 5 - 10 years

DISCUSSION

- Note importance of available information, which must be shared and made available.
  - bibliography: need a centralised source, and information available in countries
  - performance records on widely distributed widely dispersed pieces of equipment.

- Collection of information resources should form part of situation analysis.
- Maintenance budgets are normally inadequate; another problem is that equipment is not written off.

Standards :

- Use existing standards ?
- there are SABS (South African Bureau of Standards) Committees linked to IEC
- AFTH could take responsibility for providing information to IEC, for example
- there are mechanisms for feedback to the IEC but feedback is not always provided.
- after standards must have mechanisms to ensure that there is a response if standards are not met.
- AFTH longer term could play a powerful role in ensuring the application of standards through training, e.g. there are mechanisms for feedback available through SABS in South Africa
- note that licensing also takes place in SA
- need general decontamination and other safety standards.

INFORMATION

Janie Fouke: (IEEE-EMBS)

- There are conduits for information sharing
- Maybe use these vehicles to disseminate and share information
- Do not reinvent the wheel e.g. there are documented alternatives to the tender process

- Yunkap Kwankam
- It has been agreed that AFTH will improve communication between member countries, using existing tools, especially EMAIL
- Once people are connected, this opens many possibilities e.g. remote EMAIL searches of NLM databases, CD-ROM databases

Lutz Kempe

- At a lower level: technicians in the field need information - this improves motivation
- need a small, regular newsletter
- note experience in Kenya
- AFTH newsletter would be very valuable

Janie Fouke

- The Latin-American federation has a common EMAIL address which is excellent for communication
- Need to gain information from WHO (Andrei Issakov) and list available documents.
- Available information must be made more readily available e.g. between radiation control (SA) and industry (being worked on in Dept. of Health)
- Industry often has resources too

Problems of Maintenance:

- Need a database of under / unutilized equipment, so that equipment could be redeployed; this application is an EMAIL bulletin board

- What resources are available for follow-up:
- Recommend someone to do a survey of what is available - define guidelines for what is required.

- AFTH could make money available for this type of activity
- Bheki Ntshangase to write up a project proposal
- Members must make proposals

- Proposals:

- barter training for new equipment.

CONCLUSION

WORKSHOP FOLLOW-UP

Mladen Poluta (Facilitator):

Although proposed action areas had been combined for purposes of the Workshop, it was felt that these should nevertheless be addressed in their own right. There would of course be areas of overlap. Contact persons / group co-ordinators were nominated and are listed below. It will be their primary task to review the material in the proceedings pertaining to their designated areas and to co-ordinate additional input and feedback from group participants and other interested parties. These persons would act as the primary interface to the central co-ordinating point or "hub", viz. the HTRG/MRC which is also the AFTH General Secretariat. They would supply collated additional comments or redrafted targets for the action plan. Those groups that have not as yet set the targets and activities in the recommended format are requested to do so. If desirable, groups can once again be combined. It was essential that good communication links were established and that close contact was maintained if the process was to move forward. The aim was to have a draft of the proposed regional plan by August 1995 (!! - *Ed*).

IT IS NOW SUGGESTED THAT THE DRAFT BE MADE AVAILABLE, TOGETHER WITH THE FINAL REPORT, BY THE END OF 1995 - this means that all additional feedback / redrafting of workshop proceedings should be received by the HTRG/MRC by no later than the beginning of December 1995.

Group Contact Persons:

Policy:	Yunkap Kwankam (Cameroon)
Organisation:	Gerard Locke (South Africa)
Assessment:	Lyn Hanmer (South Africa)
Procurement:	Tidimogo Gaamangwe (Botswana)
Maintenance:	Richard Mhiti (Botswana)

Andrei Issakov:

- It is important that working groups be established soon.
- Draft plan should be circulated widely to stakeholders.
- Suggested a further workshop with more representatives.
- Plan of action needs to be forwarded to WHO/AFRO for distribution and ratification by ministries of health.
- Specific project proposals required before funding could be sought.
- Report on the Workshop and the Training Consultation should be a WHO/AFRO document and should be distributed via WHO/AFRO.
- The WHO Regional Director has been informed briefly about the AFTH; he is interested and is waiting for more information on the AFTH and its plans; nevertheless he already promised his support

CONCLUDING REMARKS

Andre Issakov

This workshop has been a part of a important four day process. The significance is that meetings were not only for exchange of information but with practical aims, e.g. development of a regional action plan. Previous meetings (starting with Nicosia, Cyprus meeting) were not so practically orientated. After the Arusha meeting in 1989, the GTZ sponsored meetings and the Somerset West meeting last year, things have started to move - maybe we have reached critical mass. This is only the beginning and much is to be done. The great challenges still lie ahead.

The AFTH can now provide a strong driving force. Thanks were expressed to the organisers (AFTH, MRC, UCT, MEDiC AFRICA) on behalf of WHO. All participants were wished success in the implementation of recommendations arising from the workshop.

Mladen Poluta

- Thanks to MRC, AFTH, funders (notably GTZ), participants and especially rapporteurs.
- We now have the opportunity to make a major contribution to HCT in the region

Yunkap Kwankam

- Thanks from participants, especially to the Chairman.

Andrew Obura

- The drive is on ! The AFTH Executive Council is committed to producing results

Peter Heimann

- Need suggestions on improvements to workshops
- Please keep HTRG updated on changes in addresses, other contact information.
- Thank to facilitator.

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ANNEX 1: LIST OF PARTICIPANTS

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ANNEX 10

Project Profile for the Creation of a Pharmaceuticals Information Network (PIN) in four Sub-Saharan African countries

by Mr. S. Yunkap Kwankam, Centre for Health Technology, Yaounde, Cameroon

1. Introduction

In the absence of a cure for the Acquired Immunodeficiency Syndrome (AIDS), prevention must be relied upon. To this end prevention strategies have been developed to promote lifestyle modification among target populations spanning varying economic levels and social strata. Pharmaceutical and allied health inputs to HIV/AIDS prevention campaigns are condoms, latex gloves, syringes and HIV test kits. Availability of these products at affordable prices would contribute to the success of these programmes. As of now these inputs are mostly imported for the vast majority of Sub- Saharan African countries, despite the fact that in some cases, manufacturing capacity (infrastructure, skilled labor, and managerial know-how) exists. A project aimed at exploiting available capacity in local production and marketing of these goods, as part of a UNIDO strategic response to the HIV/AIDS pandemic, has been proposed and a study completed.

However, there are many peculiar problems associated with doing business in Africa - the so called local realities - which mitigate the impact of purely technical improvements such as can be attained by the promotion of good manufacturing practices (GMP). Whereas GMP could result in improved product quality, higher yields and greater production efficiency, the realities of the business environment in Africa greatly limit the potential impact of these practices. Problems with banking and finance, inadequacy of transportation and communications, lethargic bureaucracies and government over-regulation, among other hurdles, require different corrective measures.

2. Problem to be addressed

Some of these latent constraints to industrial productivity are outlined below.

1. Information, a major resource in any undertaking, is not readily available

2. Transport infrastructure is poor and is compounded by inefficient operation. This, together with customs clearance and other transit problems, causes delays in the supply of manufacturing inputs and delivery of products, thereby increasing costs. Air travel is fraught with perennial problems of delayed flights, late arrivals, overbooking and flight cancellations, for both people and freight.

3. Communication by post is slow and often unreliable. Telephone service, which may be good within a city or town particularly where there are new digital exchanges, is hampered by limited long distance capability.

Project profiles generally do not take into account these constraints to industrial productivity, which often are the cause of project failure. Significant effort should be aimed at breaking down these barriers to industrial growth in Sub-Saharan Africa, thus contributing to an "Enabling Industrial Environment (EIE)".

Examples of activities which UNIDO could undertake in this area are:

- To promote reforms in the area of policy, which drives the process, aimed at streamlining bureaucracies and in a general way minimizing Government's interference in business;

- To support the creation of commercial information services to provide data on items such as; commodity prices, interest rates, industrial statistics, consumer price index, inflation rates, and stock market prices where trading exchanges exist. Information centers could provide access to the Internet, provide connectivity and networking facilities for SMEs, and link NGOs and community-based organisations, thus promoting industry in rural areas. Such information centers could collaborate with the new UNDP global initiative called the Sustainable Development Networking Programme (SDNP).

- To advocate less stringent requirements on use of the frequency spectrum, and deregulation of telecommunications, to allow small private sector long distance carrier services based on send-receive satellite antenna systems. Parabolic antennas for satellite television reception are already assembled locally in some countries of the region. A good example of such a process is the long distance carrier market in North America, where deregulation has led to open competition and steady decreases in the cost to consumers. Rates for local telephone service, which have not been subject to the same deregulation, have either stayed constant or increased.

There are enormous benefits to be derived from investment in these industries, which traditionally require low capital and thus entail low risk to the investor with regard to fixed assets.

(a) Project objectives

a.1 Development objectives

The development objectives of the larger project, in the context of which this information project falls, takes into account the development objectives of UNIDO's medium-term plan, and aims at contributing to the achievement of the following development target:

1) Pharmaceuticals industry and promotion of local production of health care system inputs related to HIV infection and AIDS;

2) Capacity building for increased availability and quality of primary health care and basic hospital services;

3) Strengthened capacity and content of national AIDS programmes and an increased impact;

4) Environmental and financial the pharmaceuticals industry of the manufacturing sector (health and pharmaceutical industries) related to the production of healthcare system inputs.

a.2 Immediate objectives

The immediate goals are concerned with providing information services to support and help sustain local production, sales and distribution of health system inputs used in the fight against HIV/AIDS." The project aims:

1. To build local capacity for development of local information services for commerce and industry;

2. To make information relevant to the production, sales and distribution of goods, with particular emphasis on the pharmaceuticals subsector readily available at affordable prices,

To accomplish these, the following objectives should be attained.

Objective 1. Establish an organizational mechanism for networking stakeholders in the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia.

Output 1. A legal and operational Pharmaceuticals Industry Network (PIN) in each of the four countries.

Objective 2. To develop and/or enhance communications and connectivity between the users and providers of information related to the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia

Output 2.1 A PIN Internet compatible computer network with full Internet connectivity and linking at least 40 stakeholder groups throughout each of the following countries: Cameroon, Cote d'Ivoire, Kenya and Namibia.

Output 2.2 A PIN information server in Cameroon, Cote d'Ivoire, Kenya and Namibia

Objective 3. Capacity established to use and apply technologies for computer mediated communications for informed decision making by the pharmaceuticals industry

Output 3.1 A training programme for PIN hosts and users to provide introductory and ongoing support;

Output 3.2 Operators of PIN nodes trained and end users trained in computer mediated communications, including Internet compatible applications.

Objective 4. To get user and other forms of support, financial and otherwise, to sustain the PIN

Output 4.1 A business plan, including a marketing and communications plan, laying out a strategy for making the PIN operation self sustainable.

Output 4.2 A self sufficient PIN operation in Cameroon, Cote d'Ivoire, Kenya and Namibia

Objective 5. Develop information products and services, including a full Internet link and PIN server, that meet the needs and circumstances of stakeholders for the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia.

Output 5.1 A 'Sourcebook' of information and other resources, including people and their expertise, on the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia prepared and disseminated.

Output 5.2 Information products and services to meet the needs of the pharmaceuticals industry

(c) Activities

1. A campaign to promote awareness and to demonstrate the advantages of computer mediated communications;

2. Develop a high bandwidth (64 kilobytes per second) dedicated telecommunications connection to the Internet through land lines or using very small aperture terminals (VSAT) satellite technology;

3. Work in close association with the UNIDO Country Office in Cameroon, Cote d'Ivoire, Kenya and Namibia, as well as with other bilateral, multilateral and international organisations.

4. Identify and establish PIN linked hosts in sites throughout each of the four countries, and connect them to the PIN country server to develop a continental Internet compatible network;

5. Establish and test dial-in, serial line Internet protocol (SLIP) or point-to-point protocol (PPP) and leased line connections to the PIN Cameroon, Cote d'Ivoire, Kenya and Namibia Internet servers;

6. Develop the capacity to use Internet applications on the PIN server, including email, electronic conferencing (newsgroups), Listservers (electronic mailing lists), logging in to remote CPUs (telnet), file transfer (FTP), Gopher, various information retrieval applications (Veronica, Archie, and others), and the World Wide Web (WWW);

7. Train operators and users;

8. Link users and providers of information and knowledge resources on the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia through the PIN network;

9. Develop and support local user groups;

10. Encourage the creation and/or acquisition and/or linking of Cameroon, Cote d'Ivoire, Kenya and Namibia information resources, especially electronic sources of information relevant to the pharmaceuticals industry;

11. Encourage users and subscribers to load information on the PIN computer server and to use Internet applications to share this information as appropriate;

12. Acquire the resources to permit access to the server throughout each country by negotiating better terms and conditions of access and by encouraging participants to make best use of their own resources to connect to the PIN server.

13. Identify potential trainees and their needs;

14. Identify existing training activities and organizations with which to collaborate in providing training;

15. Develop training modules;

16. Encourage institutions of higher learning in Cameroon, Cote d'Ivoire, Kenya and Namibia to develop educational and/or training programmes on computer mediated communications and computer networking;

17. Run workshops for users and node operators;

18. Provide on-the-job training in collaboration with other organisations including the WB, etc.

19. Characterize the market for information and knowledge resources for the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia. This is an ongoing activity;

20. Characterize the market for greater connectivity to the Internet and other wide are computer networks in Cameroon, Cote d'Ivoire, Kenya and Namibia;

21. Characterize and capitalize on the interest of other groups to use and access the Internet, and seek collaboration with them;

22. Identify key users and providers of information on the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia;

23. Identify and characterize key information and knowledge resources in Cameroon, Cote d'Ivoire, Kenya and Namibia;

24. Develop an understanding of the information needs and circumstances affecting key stakeholders for the pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia;

25. Prepare a plan and strategy to meet these needs in a self sufficient manner, building cost recovery into the operation.

26. Implement the business plan.

27. Develop and/or provide PIN network access to a directory describing key information and knowledge resources that could interest PIN users;

28. Include information about the key stakeholder groups, their nature, objectives, activities. contacts and other relevant information;

29. Create and provide access to an electronic Sourcebook on Pharmaceuticals industry in Cameroon, Cote d'Ivoire, Kenya and Namibia by the end of year one.

30. Update the electronic Sourcebook on Pharmaceuticals industry on an ongoing basis

31. Identify and develop products and services to meet the needs of users and of key stakeholders for the pharmaceuticals industry using computer mediated communications: Electronic conferences, Listserv facilities, and other information services.

32. Encourage users of the PIN network to make available key information in ASCII or machine readable form for access through the PIN network;

33. Provide consultancy services on a fee-for-service basis;

34. Market the products and services.

Project duration: The life of the project is of indefinite duration, but funding is for only the first 3 years.

Appendix: See attached budget

BUDGET FOR THE PIN (each Country)

L/B	Description	Year 1 US $	Year 2 US $	Year 3 US $	Total US $
13	**Salaries and Benefits**				
13.01	Coordinator	18,000	18,900	19,845	56,745
13.02	Network Engineer	12,000	12,600	13,230	37,830
13.03	Administrative Assistant	3,600	3,780	3,969	11,349
13.04	Driver/Messenger	2,400	2,520	2,646	7,566
13.99	**Total Salaries and Benefits**	**36,000**	**37,800**	**39,690**	**113,490**
15	**Local Travel**	**2,000**	**2,200**	**2,400**	**6,600**
17	**Consultants**				
17.01	Legal costs for establishing PIN	600			600
17.02	Accountanting consultant	120	150	180	450
17.03	Annual Audit	500	550	600	1,650
17.04	Consultants/Product development	6,000	6,000	6,000	18,000
17.99	**Total Consultants**	**7,220**	**6,700**	**6,780**	**20,700**
20	**Subcontracting**				
21	Data grade line	1,000	0	0	1,000
22	Telephone	250	0	0	250
23	Water	100	0	0	100
24	Electricity	350	0	0	350
29	**Total Subcontracting**	**1,700**	**0**	**0**	**1,700**
30	**Training and Meetings**				
30.01	Board and Committee Meetings	2,000	2,000	2,000	6,000
30.02	Stakeholders Meetings	2,000	2,000	2,000	6,000
30.03	Staff training (International)	10,000	10,000	10,000	30,000
30.04	User training (Local)	12,000	12,000	12,000	36,000
30.99	**Total Training and Meeetings**	**26,000**	**26,000**	**26,000**	**78,000**
40	**Equipment**				
41	Expendable Equipment	2,000	2,000	2,000	6,000
42.01	Office Equipment	5,000	2,000	2,000	9,000
42.02	Computer Equipment and Software	30,000	5,000	5,000	40,000
42.03	Communications Equipment	5,000	3,000	3,000	11,000
42.04	Vehicle	25,000	0	0	25,000
42.05	Furniture	5,000	0	0	5,000
42.06	Air conditioning	2,000	0	0	2,000
42.99	***Sub Total Durable Equipment***	***72,000***	***10,000***	***10,000***	***92,000***
43	***Premises***				
43.01	Security deposit on premises	2,400	0	0	2,400
43.01	Rent and guard services	6,800	7,000	7,400	21,200
43.99	***Sub Total Premises***	***9,200***	***7,000***	***7,400***	***23,600***
49	**Total Equipment**	**83,200**	**19,000**	**19,400**	**121,600**
50	**Miscellaneous**				
51.00	Vehicle Maintenance	6,500	7,000	7,500	21,000
51.02	Equipment Maintenance	1,000	1,000	1,300	3,300
53	Marketing/Media activities	7,000	5,500	5,000	17,500
54	***Utilities***				
54.01	Electricity	1,200	1,300	1,400	3,900
54.02	Water	240	260	300	800
54.03	Phone/Fax	3,000	3,300	3,600	9,900
54.04	Leased data line	3,000	3,300	3,600	9,900
54.99	***Sub-total Utilities***	***7,440***	***8,160***	***8,900***	***24,500***
59	**Total Miscellaneous**	**21,940**	**21,660**	**22,700**	**66,300**
99	**TOTAL**	**178,060**	**113,360**	**116,970**	**408,390**

ANNEX 11

Project Profile for the Creation of Maintenance and Repair Services to support the pharmaceuticals industry in four Sub-Saharan African countries

by Mr. S. Yunkap Kwankam, Centre for Health Technology, Yaounde, Cameroon

1. Introduction

In the absence of a cure for the Acquired Immunodeficiency Syndrome (AIDS), prevention must be relied upon. To this end prevention strategies have been developed to promote lifestyle modification among target populations spanning varying economic levels and social strata. Pharmaceutical and allied health inputs to HIV/AIDS prevention campaigns are condoms, latex gloves, syringes and HIV test kits. Availability of these products at affordable prices would contribute to the success of these programmes. As of now these inputs are mostly imported for the vast majority of Sub- Saharan African countries, despite the fact that in some cases, manufacturing capacity (infrastructure, skilled labor, and managerial know-how) exists. A project aimed at exploiting available capacity in local production and marketing of these goods, as part of a UNIDO strategic response to the HIV/AIDS pandemic, has been proposed and a study completed.

However, there are many peculiar problems associated with doing business in Africa - the so called local realities - which mitigate the impact of purely technical improvements such as can be attained by the promotion of good manufacturing practices (GMP). Whereas GMP could result in improved product quality, higher yields and greater production efficiency, the realities of the business environment in Africa greatly limit the potential impact of these practices. Problems with banking and finance, inadequacy of transportation and communications, lethargic bureaucracies and government over-regulation, among other hurdles, require different corrective measures.

2. Problem to be addressed

One such latent constraint to industrial productivity is the problem of maintenance and repair in African countries, where - by some estimates - 50 percent of the equipment is nonfunctional at any given time. Project profiles generally do not take into account this constraint to industrial productivity, and this often is the cause of project failure. Significant effort should be aimed at breaking down this barrier to industrial growth in Sub-Saharan Africa, thus contributing to an "Enabling Industrial Environment (EIE)"[1].

Examples of activities which UNIDO could undertake in this area are:

- To promote reforms in the area of policy, which drives the process, aimed at streamlining bureaucracies and in a general way minimizing Government's interference in business. Special attention should be given to facilitating creation and operation of small and medium scale enterprises and industries.

- To encourage the creation of registries for instruments, and maintenance and calibration services for equipment and instruments;

There are significant benefits to be derived from investment in these industries, which traditionally require low capital and thus entail low risk to the investor with regard to fixed assets.

(a) Project objectives

a.1 Development objectives

The development objectives of the larger project, in the context of which this maintenance project falls. takes into account the development objectives of UNIDO's medium-term plan, and aims at contributing to the achievement of the following development target:

1) Sustainable development and promotion of local production of health care system inputs related to HIV infection and AIDS;

2) Capacity building for increased availability and quality of primary health care and basic hospital services;

3) Strengthened capacity and content of national AIDS programmes and an increased impact;

4) Environmental and financial sustainable development of the manufacturing sector (health and pharmaceutical industries) related to the production of healthcare system inputs.

a.2 Immediate objectives

The immediate objectives of this project are concerned with providing maintenance support services to sustain local production. sales and distribution of pharmaceuticals. The project aims:

1. To build local capacity for development of registries for instruments and maintenance services for equipment and instruments;

2. To maintain and repair equipment used in all aspects of the production, sales and distribution of goods. with particular emphasis on the pharmaceuticals subsector.

(b) Outputs

1.1 Output 1

Maintenance and repair facilities for instruments and equipment used in the production, sale and distribution of:

- condoms, syringes and other health system inputs used in the prevention of HIV and AIDS,
- test kits for diagnosis of HIV

in four countries namely. Cameroon, Cote d'Ivoire, Kenya and Namibia.

1.2 Output 2

Registry of instruments and equipment used in the pharmaceuticals subsector in four countries namely, Cameroon, Cote d'Ivoire, Kenya, and Namibia.

1.3 Output 3

Trained maintenance and repair personnel in four countries namely, Cameroon, Cote d'Ivoire. Kenya, and Namibia.

1.4 Output 4

Repair of equipment used in production, sales and distribution in the pharmaceuticals subscetor in four countries namely, Cameroon, Cote d'Ivoire, Kenya, and Namibia.

(c) Activities

Create maintenance enterprise
1. Establish legal entity (framework) for maintenance activities on a fee-for-service basis
2. Register it with appropriate government institution

Set up maintenance and repair facilities
1. Construct workshop building
2. Acquire and install equipment used for maintenance and calibration
3. Create a library of important documents
4. Acquire documentation for each item of equipment or instrument to be maintained:
    - user manuals
    - technical reference manuals
    - maintenance and repair manuals

Train maintenance and repair staff
1. Identify candidates for training
2. Identify training institutions and programmes both in-country and abroad
3. Carry out short-term training locally, or abroad in the case of specialized equipment

Set up of registry of instruments and equipment
1. Carry out a survey to identify instruments to be included in registry
2. Create a computerised data base of instruments identified in the survey

Maintain and repair of instruments and equipment through;
1. Services provided at workshop
2. Maintenance tour undertaken by mobile unit
3. Training of users in proper operation of their equipment

Create a network of maintenance facilities
1. Form an umbrella group for companies and individuals involved in maintenance activities
2. Organise a referral system for maintenance of equipment and instruments.

Appendix: See attached budget

CAPITAL COSTS

(Amounts shown in $US)

Item	Description	For Each Country		Totals
		Main Unit	Each Satellite Unit	
1	Equipment and tools	200,000	80,000	280,000
2	Mobile Unit	75,000	N/A	75,000
3	Workshop building	125,000	N/A	125,000
	Total	400,000	80,000	**480,000**

RUNNING COSTS FOR MAINTENANCE UNITS

EACH COUNTRY

Description	Year 1 $US	Year 2 $US	Year 3 $US	Total $US
Salaries and Benefits				
Maintenance Unit Manager	12,000	12,600	13,230	37,830
Senior Technician	7,200	7,560	7,938	22,698
Polyvalent technician - electrical and mechanical	2,400	2,520	2,646	7,566
Electrician - building and automobile	2,400	2,520	2,646	7,566
Polyvalent technician - plumbing/carpentry/metal work	2,400	2,520	2,646	7,566
Technician - refrigeration/airconditioning	2,400	2,520	2,646	7,566
Administrative Assistant	3,600	3,780	3,969	11,349
Driver/Messenger	1,800	1,890	1,985	5,675
Total Salaries and Benefits	**34,200**	**35,910**	**37,706**	**107,816**
Local Travel	**6,000**	**6,000**	**6,000**	**18,000**
Consultants				
Annual Audit	1,000	1,000	1,000	3,000
Total Consultants	**1,000**	**1,000**	**1,000**	**3,000**
Training				
Staff training - continuing education	5,400	2,700	1,350	9,450
User training - maintenance tours	2,500	2,500	2,500	7,500
Total Training	**7,900**	**5,200**	**3,850**	**16,950**
Premises				
Guard Services	**2,400**	**2,520**	**2,646**	**7,566**
Miscellaneous				
Marketing/Media activities	**2,500**	**1,500**	**1,000**	**5,000**
Consumables	**2,400**	**2,400**	**2,400**	**7,200**
Utilities				
Electricity	1,440	1,440	1,440	4,320
Water	420	420	420	1,260
Total Utilities	**1,860**	**1,860**	**1,860**	**5,580**
TOTAL	**55,760**	**54,890**	**55,462**	**166,112**

Activities at Satellite Units

Description	Year 1 $US	Year 2 $US	Year 3 $US	Total $US
Maintenance technician	2,400	2,520	2,646	7,566
Local travel	1,020	1,020	1,020	3,060
Training for technician	1,395	615	355	2,365
Consumables	840	840	840	2,520
Total (per satellite unit)	**4,815**	**4,155**	**4,021**	**12,991**

ANNEX 12

PROPOSAL ON CHEMILUMINESCENCE ENZYME IMMUNOASSAY HIV 1/2 ANTIBODY TEST IN SALIVA

by Mr. F. Peterfy, Diagnosticum BP, Budapest, Hungary

I. OVERVIEW

THE PROPOSED PROJECT

The immediate and long-term devastating effect of the world-wide AIDS epidemic has resulted in various collaborative efforts throughout the world, all of which are aimed at preventing the spread of the disease. Indeed, such internationally coordinated responses to HIV and AIDS were endorsed by the Economic and Social Council [ECOSOC] on July 26, 1994, at which time a related resolution sponsored by 50 countries was adopted. This resolution was in a form of a co-sponsored United Nations program involving six organizations: the United Nations Development Programme [UNDP], United Nations Children's Fund [UNICEF], United Nations Population Fund [UNFPA], World Health Organization [WHO], United Nations Educational, Scientific and Cultural Organization [UNESCO], and the World Bank.

Current testing for HIV-1 involves drawing two vials of blood since multiple tests may be required; therefore medical personnel must handle numerous blood samples and syringes and deal with the problem of disposal. The removal of the need for such items will result in substantial cost savings for the user. In the area of Safety, medical personnel live with the constant danger of becoming contaminated, and special care is required at all times. In third world countries, the problem of using blood is even more pronounced because the medical technology required to handle and dispose of contaminated blood presents an additional economic burden which may prove insurmountable.

The following proposal results from a studied review of the particularized needs of developing regions, which lack adequate medical facilities necessary to diagnose the HIV virus. In essence, then, it is necessary to "take the clinic to the people". The within described collaborative project between GEM Biomedical Inc. and MGM Instruments Inc. details a mobile laboratory expressly designed to enhance the probability of early detection of the virus through a non-invasive method, thereby minimizing the need for intense technical training to administer the diagnostic procedure.

Succinctly stated, the companies will offer to establish an assembly facility for the manufacture of Diagnosticum kits and associated required instrumentation, thereby minimizing the costs associated with shipping. Component parts of the kits and equipment would be shipped by the company to the assembly site at a location which can be determined at a later date based upon geographic considerations.

THE COMPANIES

MGM Instruments Inc., first materializing in 1977 as MGM Industries, *already a highly successful and profitable Puerto Rican corporation,* manufactures analytical instruments for direct sale. When bioluminescence and chemiluminescence began to be similarly used in about 1987, MGM Instruments Inc. developed two luminometers to count photons given off during such assays; the OPTOCOMP® I instrument is a single determination instrument while the OPTOCOMP® II luminometer can handle 250 or 400 samples automatically. This was an important step for MGM since the use of radioisotopes for assays is being supplanted by luminescent systems because of the hazards of using

radioisotopes and the difficulty and cost of disposing of their waste as well as providing a higher degree of sensitivity.

In addition to selling the luminometers under its own name, MGM manufactures those same instruments, slightly customized, for GenProbe Inc., DiGene Inc., Biotech Gomensoro Inc., Dynatech Inc. and Celsis Inc., who in turn sell them in conjunction with the assays that they have developed or individually as appropriate. These instruments are sold around the world. MGM also sells other small instruments and components to fit the needs of other customers.

GEM Biomedical Inc., a Nevada Corporation, was founded in late 1990 to develop and/or acquire chemiluminescence-based assays to sell in conjunction with the MGM luminometers. It has its research laboratory in Sparks, NV (Reno area); testing of assays is done in the MGM facilities in Hamden, CT. GEM also rents space in a small laboratory in Mexico where initial qualification of assays can be accomplished.

The first internally developed assay detects antibodies to the HIV-1,2 virus using *salvia* as the specimen of choice. This assay has been tested with hundreds of samples and proven to be extremely accurate. To be able to reach this sensitivity, GEM has licensed worldwide patent rights to the "Enhanced Chemiluminescence Technology" owned by the British Technology Group (BTG) of London, UK. Besides being this sensitive, the use of salvia as the sample source does away with the cost and unpleasantness of taking, handling and disposing of blood or serum samples.

Using generally the same proprietary technology developed for the HIV-1 test, tests using *salvia* again as the sample source are in hand for testing for detection of HIV-2, combined HIV-1 and-2 and combined HTLV-1 and -2 (The HTLV viruses are generally harbingers of leukemia). Other assays are in development.

In addition to the BG-1 luminometer, GEM has had MGM develop for it a portable version of that luminometer called the BG-P (See attachment A), for use in conjunction with the Surface Hygiene Test. This latter test is targeted to food processors performing on-the-spot cleanliness checks. Also MGM has developed an inexpensive tube washer for use in conjunction with some of the other assays.

To further develop this market, GEM has formed a technical alliance with **Diagnosticum Ltd.** of Hungary, which was founded in 1989 in Budapest to develop and manufacture antibody based diagnostic test. The company has generated a series of monoclinal antibodies to virus antigens (HIV, HBV, HSV-I, HSV-II, CMV, CAV) mycoplasmas, proteins, etc. Diagnosticum also has technology and know how to produce and stabilize kit components and assemble diagnostic kits. It manufactures ELISA tests for immunoserology and allergy and markets a number of tests in Europe.

In addition, GEM has established a partnership with Lumitech Enterprises Ltd. Of Bombay, India, with an emphasis on HIV testing in that country. India, as well as the remainder of southeast Asia, is plagued with an explosion of AIDS caused by various strains of the virus. The GEM HIV test is extremely suited for adjustment to detect various strains of HIV.

THE KEY PERSONNEL

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Dr. Patrick Harwood, Senior Researcher
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Hungary

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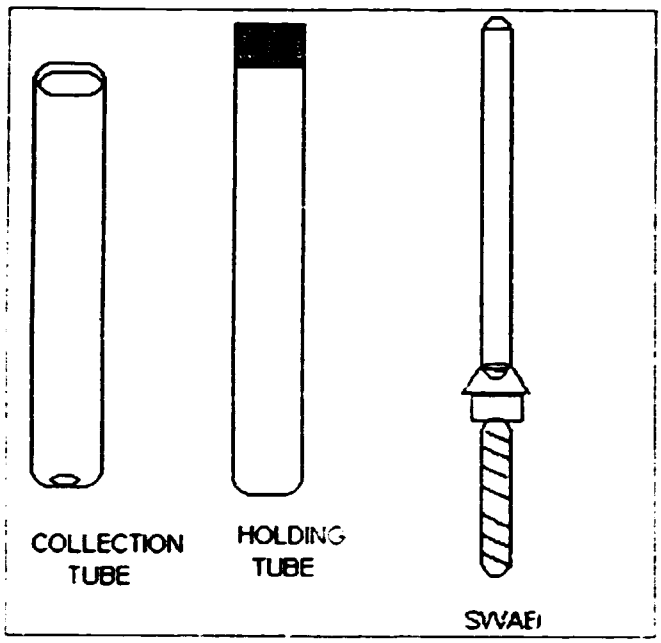
	Fax:	156 0097
Dr. A. Molnar, Dir of Finance	Tel/Fax:	111 2016
Dr. K Rasky, Dir of Prod Dev	Tel/Fax:	161 2402
Mr. S. Lovas, Head Tech Serv.	Tel:	180 4548

II. DESCRIPTION OF MOBILE LABORATORY

The mobile laboratory shall be comprised of an ambulance-like truck, with a driver and at least one other person to administer the diagnostic process. The assigned person would distribute the 3 primary collection devices, which are packaged as one unit, to each of the those individuals desiring to be tested. A specific amount of each patient's saliva would be collected via insertion of the swab device into the upper left portion of the patient's mouth; after the requisite time period, the swab would then be inserted into the holding tube, and the holding tube immediately thereafter inserted into the collection device. Through a series of quick plunging-like movements, the saliva would be naturally extracted from the swab, falling into and through the holding tube into the collection tube/device. The latter tube would be labeled, and set aside for analysis. All other devices used in the process- that is, the swab and holding tube, would be immediately discarded.

III. DESCRIPTION OF INSTRUMENTATION

TESTING KIT



There are only 3 primary components comprising the basic testing kit. There are two tubes, and one swab per kit. One tube acts as a holding container, the other, which has a small hole in its bottom, permits the collected saliva to filter down into the holding tube. The swab is the device actually inserted into the patient's mouth, for the purpose of collecting a saliva specimen.

INSTRUMENTATION

A portable luminometer is required to process the tests. An electric washer, likewise powered by the transformer, would permit processing of 50 tubes in 20 minutes. Alternatively, a manual washer could be utilized, allowing the processing of 1 tube every 3 minutes. Also required would be a water still, set up in a central location to produce approximately 80 liters per hour. 2 liters would cover 200 tests, thereby permitting the processing of 1600 per hour [80 liters per hour x 200 tests]. The still should be located in the city where commercial water is available, and the water could then be carried to the mobile laboratory via 2 liter plastic bottles. A cooler, powered off the truck or by battery, would be supplied by the company, as would the reagent kits which would be situated within the cooler.

IV. TESTING PROCEDURE: CHEMILUMINESCENCE ENZYME IMMUNOASSAY HIV-1,2 ANTIBODY TEST IN SALIVA

The early detection of asymptomatic HIV infected individuals is highly desirable for the prevention of transmission and epidemiological studies.

HIV infection is usually determined by the detection of HIV-specific antibodies in blood specimen, using enzyme immunoassays. On the other hand, the presence of HIV antibodies has been demonstrated in the saliva of infected individuals[1].

For epidemiologic studies, saliva testing is more attractive because it is a non-invasive method; easy to collect; samples are safe to handle; and, there is no risk of needle-stick accidents[2]. Also, findings reported by several authors conclude that saliva is comparable to blood samples for assessing HIV antibodies in epidemiological studies of HIV prevalence in high-risk groups[3].

We have previously reported a sensitive enhanced chemiluminescent enzyme immunoassay [CLEIA] for HIV-1 antibody detection in urine[4].

The methodology for applying this system, the CLEIA HIV-1,2 Test, for the detection of HIV antibodies in saliva collected with a new device is outlined below:

1) Saliva and control specimens are added to individual tubes.
2) After 60 minutes of incubation at room temperature, the saliva and controls are washed off.
3) Then, anti-human antibodies horse radish peroxidase conjugated are added to each tube.
4) After 60 minutes at room temperature and another wash, a chemiluminescent substrate is added
5) Ten minutes later, the light generated is detected in a luminometer in relative light units [RLU]. The cut-off valve is caiculated as five times the mean of the RLU of the negative controls.

1. Archibald, D.W.; Zon, L.; Groopman, J.E.; McLane, M.F.; Essex, M. Antibodies to Human T-Lymphotrophic Virus III (HTLV-III) in Saliva of Acquired Immunodeficiency Syndrome (AIDS) Patients and in Persons at Risk of AIDS. *Blood*, 1986, 67:831-834.

2. Shoeman, R.L.; Pottathil, R.; Metroka, C. Antibodies to HIV in Saliva. *N. Engl. J. Med.* 1989, 320:1145-1146.

3. Frerichs, R.R.; Esikes, N.; Htoon, M.T. Validity of Three Assays for HIV-1 Antibodies in Saliva. *J. Acquired Immune Defic. Syndr.* 1994. 7:522-525.

4. Vicente Ralde, H; Snodgrass, G. Sensitive Enhanced Chemiluminescent Enzyme Immunoassay for Detecting Antibodies Anti-HIV-1 in Urine. *Abstracts* VIII Int Conf. AIDS 1992. TH.POB3621.

V. PRICING

A. Disposable Items (Operating Costs)

Test kits for HIV ½ which will include 200 individual test with coated tubes, reagent, buffer and saliva collecting device for a cost of **$200.00 US.**

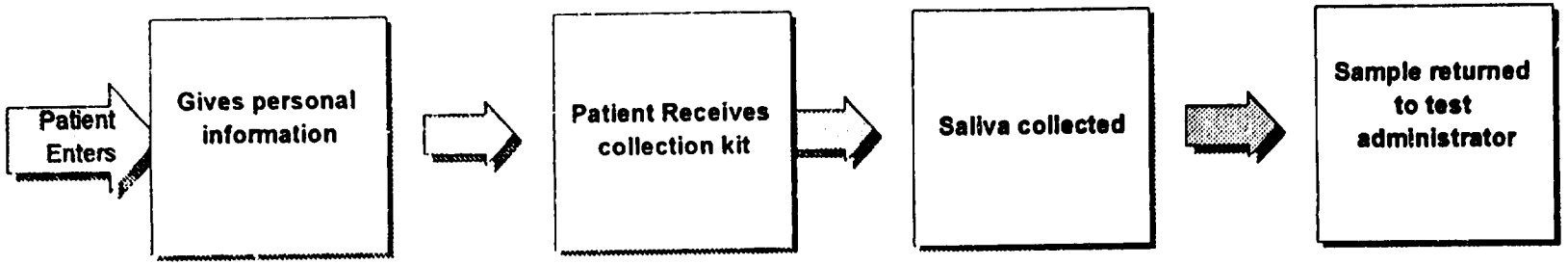
B. Capital Expenditure

BG-P Luminometer (Portable) which includes pipettes and disposable tips **$6900 US.**

Tube Washer used in conducting assays where rigorous washing of tubes is required between assay steps like with the GEM Biomedical Systems assays for HIV-1 and other sexually transmitted diseases for the pathogen assays. This washer will complete 50 tubes in 20 minutes. The cost of this unit is **$3500 US.**.
As an alternate, we can also supply a manual washer which will wash one tube every three minutes at a cost of **$500 US.**

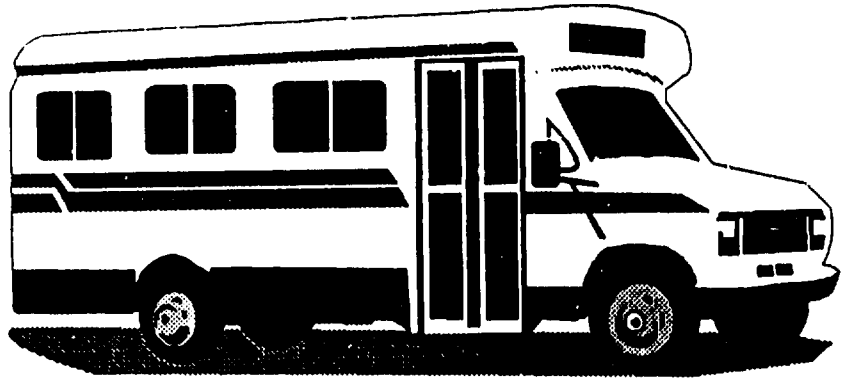
Water Distilling Unit can distill 80 liters of water per hour. This unit does not require any power source and can be centrally located to supply a number of different mobil laboratories. A 200 test kit only utilizes 2 liters of water. This unit can be supplied at A cost of **$3500US.**

Battery Operated Cooler may be needed depending on the distance and time that the Vehicle will be traveling. Under normal conditions the kits can be stored in the normal operating air conditioning of the vehicle for approximately 8 hours. However, if the time and heat is above normal, then a cooler should be utilized. These units will cost **$500 US.**

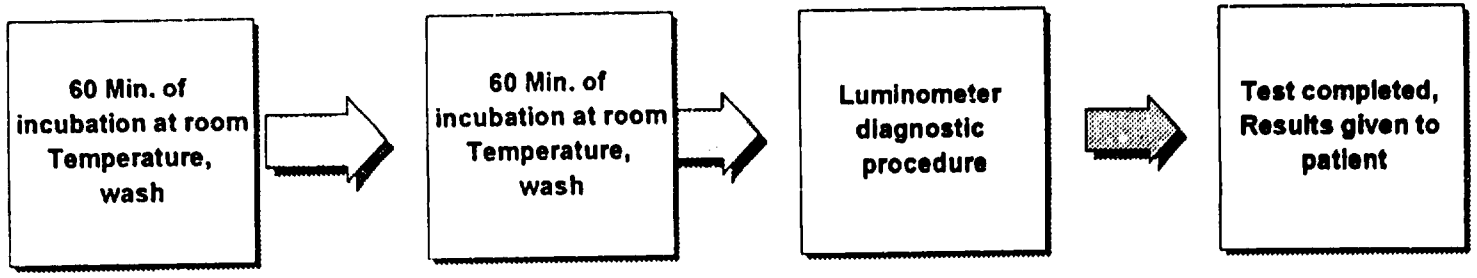


Collection process

Time elapsed 10:00 minutes

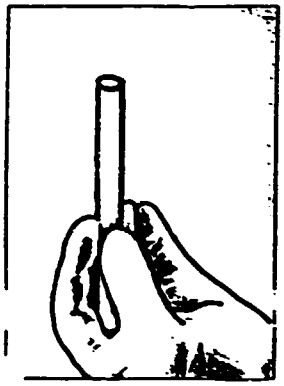


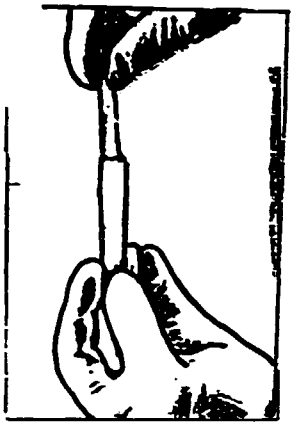
Total Time Elapsed 1 Hour 10 Minutes

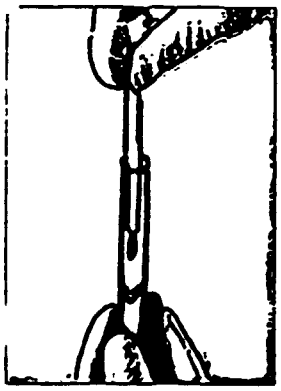


Testing process

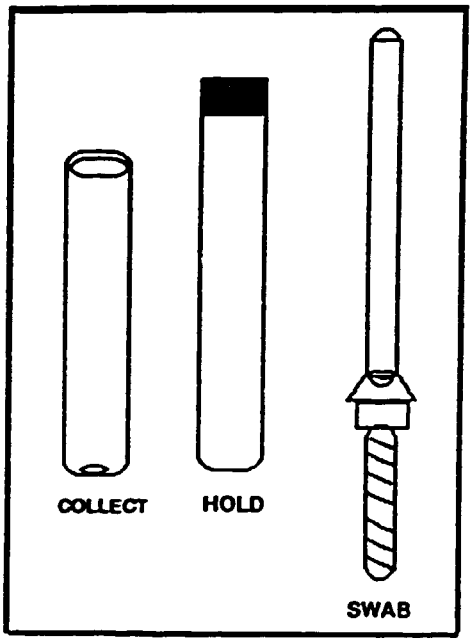
Time elapsed 1Hr 10 Min.







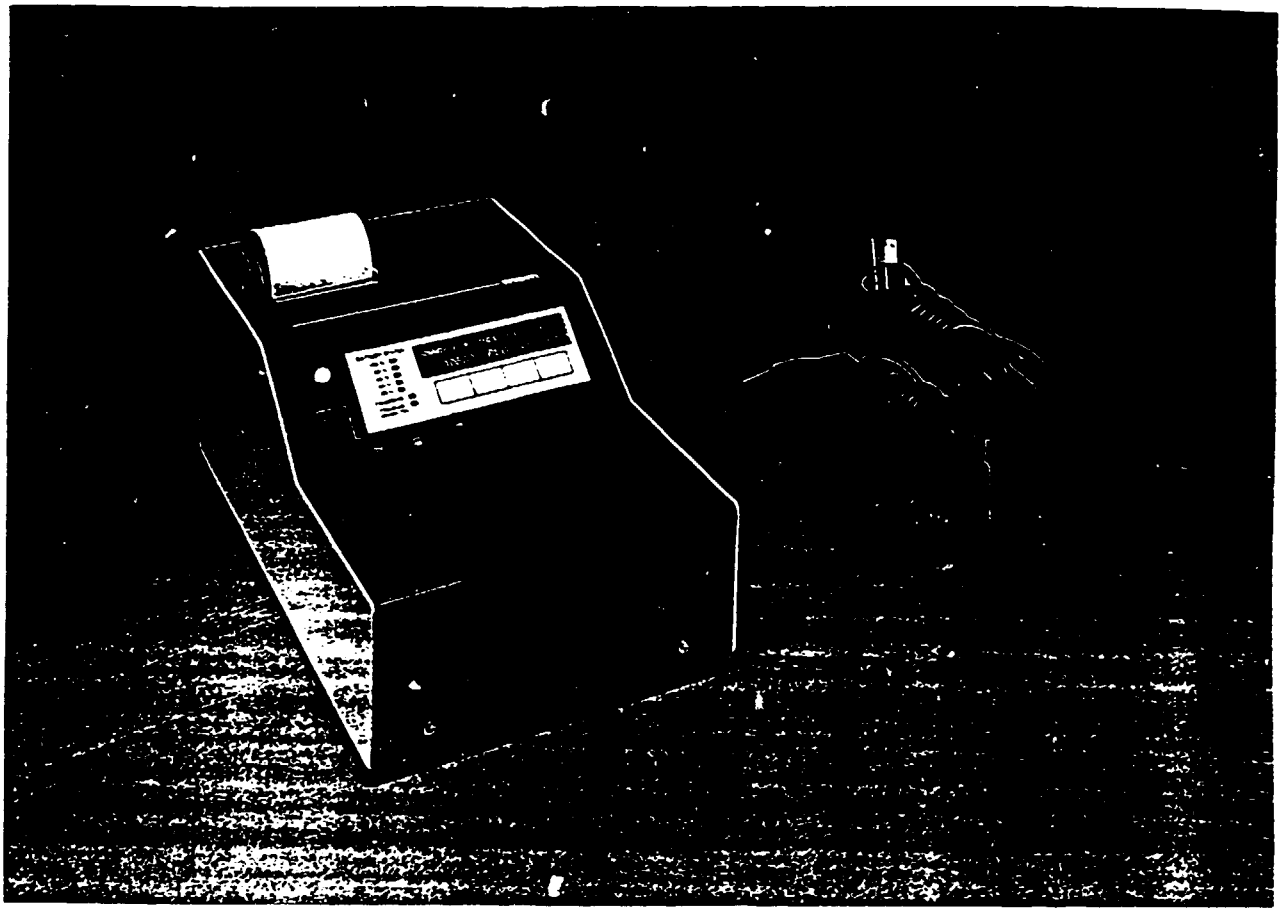
THE COLLECTION PROCESS



Primary Kit Components

OPTOCOMP-P

Benchtop Performance in a Portable!



- 8 HOUR BATTERY OPERATION FOR CONVENIENCE
- PHOTON COUNTING FOR HIGHEST SENSITIVITY
- MENU DRIVEN SOFTWARE FOR EASE OF USE
- BUILT-IN PRINTER FOR DOCUMENTATION
- SMALL FOOTPRINT FOR COMPACTNESS

MGM INSTRUMENTS

OPTOCOMP-P Portable Luminometer Technical Specifications

HARDWARE SPECIFICATIONS

Detector:
Low background, high sensitivity photomultiplier tube, operated in photon-counting mode.

Spectral Response:
Approximately 300-600 nm (at least 10% of peak sensitivity)

Background:
Less than 40 RLU/second at 20°C.

Maximum Count Rate:
1.5×10^6 RLU/second; linear to approximately 1×10^6 RLU/second.

Computer Interface:
Bi-directional RS-232 serial port included for interfacing to external personal computer.

Printer:
Built-in thermal printer (20 characters per line) automatically provides hard copy documentation.

Controls:
The front panel includes a sealed membrane keyboard with four soft keys, a liquid crystal display, and battery indicators which clearly display battery status.

Power:
Built-in battery power; able to run for up to 8 hours of continuous use before requiring recharging, able to run from included battery charger while recharging; recharges in about 2.5 hours. Battery charger is able to operate from 100-240 VAC 50/60 Hz mains.

Size:
7 in. (18 cm) wide by 12 in. (30 cm) deep by 4.75 in. (12 cm) high.

Weight (instrument only):
Approximately 7.5 lbs. (3.4 kg).

SOFTWARE SPECIFICATIONS

Operating assay parameters (count time, sample replicates, parameters used to make negative or positive determinations, etc.) are easily programmed and permanently saved in memory.

Test Printouts include date and time, all programmable test parameters (tube types and number of replicates for each, count time, cutoff factor and marginal factor), and fields in which the operator's name and reagent lot number can be written. The printout identifies each tube by tube type and replicate, and lists the RLU value for each replicate. For multiple replicates, it also includes the mean and coefficient of variation.

Test results are also transmitted through the integral RS-232 serial port in a format which can be easily imported into popular spreadsheet programs.

A **Quality Assurance Protocol** is included, allowing calibration using a Tritium standard.

The Optocomp-P instrument automatically shuts down when left running unattended, to conserve power.

ORDERING INFORMATION:

Catalog No. 122-1 OPTOCOMP-P Luminometer

Please inquire about our OPTOWASH Economy Tube Washer.

To place an order or for information:

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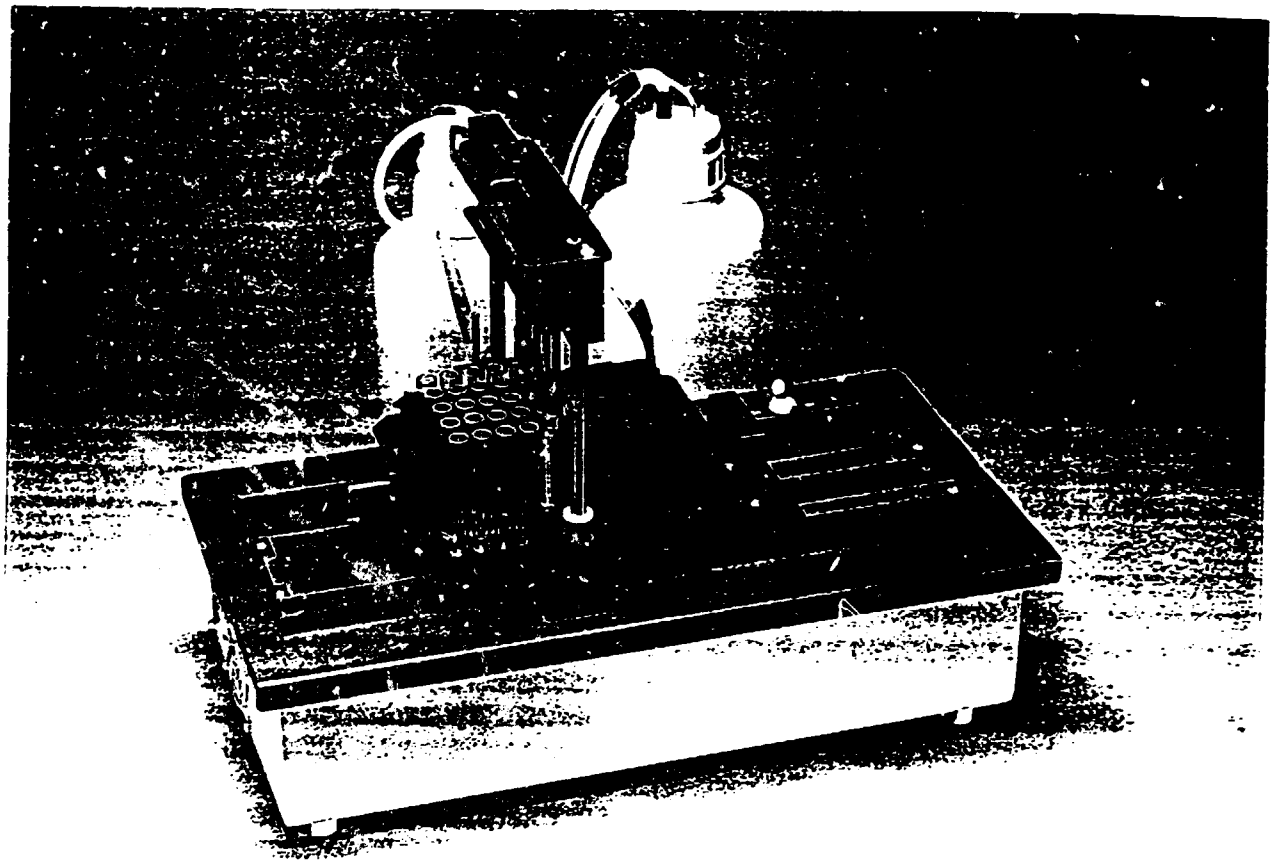
Cost effective washing efficiency!



- COMPACT FOOTPRINT FOR EFFICIENT SPACE UTILIZATION
- 50 TUBE RACK FOR BATCH PROCESSING
- "BACK SUCTION" FOR ELIMINATING CARRYOVER
- MULTI-TIP DESIGN FOR CONVENIENCE

MGM INSTRUMENTS

OPTOWASH Economy Tube Washer Technical Specifications

HARDWARE SPECIFICATIONS

Tube Rack Capacity:
50 tubes

Tube Compatibility:
12x75 mm

Dispensing Volume:
Preset at factory

Power Requirements:
120 VAC, 3 amp

Size:
19.25 in. (49 cm) wide by 10 in. (25 cm) deep by 14 in. (36 cm) high.

Weight (instrument only):
approximately 21 lbs. (9.5 kg).

SOFTWARE SPECIFICATIONS

Programmable parameters:
Dispensing volume

WARRANTY

Each new Optowash Tube Washer is delivered with a one year warranty included in the purchase price. The warranty period will begin 10 working days after shipment of the washer from MGM Instruments. All parts and labor will be covered for repairs necessary due to product failure from normal usage.

ORDERING INFORMATION:

Catalog No. 123-1 Optowash Tube Washer.

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Represented by:

A Proposal to Develop and Industrialise a mechanically-powered radio as part of the Joint Programme for the local production of health sector inputs.

Introduction

The increasing threat of the Acquired Immune Deficiency Syndrome (AIDS) epidemic and the consequences on social and economic development, in particular in the developing world, have led to several multi-national programmes combining their efforts in preventing the spread of this disease. Co-sponsors of this joint programme are the United Nation Children's Fund (UNICEF), the United Nations Populations Fund (UNFPA), the World Health Organisation (WHO), the United Nations Educational, Scientific and Agricultural Organisation (UNESCO) and the United Nations Development Programme (UNDP). This joint programme has an expanded response to the HIV/AIDS epidemic and is based on a broad and multi-sectoral initiative that envisages strengthening of national capabilities through its implementation.

The programme for the local development of health sector inputs in the Sub-Saharan Region was prepared by the Project and Programme Committee and endorsed for further development. The development objectives of this project, referring to the UNDP's global priorities and the development objectives of UNIDO's medium term plans, aim at contributing to the achievement of the following development targets:

- Sustaining noble development and promoting local production of healthcare system inputs related to HIV infection and AIDS;
- Capacity building for increased availability and quality of primary healthcare and basic hospital services;
- Strengthening the capacity and content of national AIDS programmes and increasing the impact thereof;
- Sustainable development (both environmental and financial) of the manufacturing sector, health and pharmaceutical industry and allied products related to the production of healthcare system inputs.

In the absence of a cure for AIDS, prevention is the most effective strategy. The prevention programme must be developed to address the realities of the region taking into account the financial, economic, social and environmental issues. In particular prevention strategies have been developed to promote lifestyle modification among target populations spanning various economic levels and social strata.

Five major strategies used in the HIV/AIDS prevention programmes in the Sub-Saharan African region were identified. These include

- the information, education and communication (IEC) programme;
- the condom promotion strategy;
- the prevention of sexually transmitted diseases (STD) strategy;
- the control of AIDS related diseases, and
- the prevention of peri-natal transmission through contaminated blood strategy.

Information, education and communication aimed at bringing about lifestyle modification is an approach which has recorded major successes in the Sub-Saharan region. Although education through appropriate information transfer has been indicated as one of the key factors in this prevention strategy, the technical infrastructure and environment in which this transfer is to take place are underdeveloped and often lacking. The reality in the Sub-Saharan region is that due to economic and/or financial constraints, information does not reach many of the target audiences and areas it is intended for.

Needs Assessment

Remote education and information transfer, which is an essential part of the HIV/AIDS prevention strategy, requires a specific technical infrastructure. This infrastructure varies greatly for the target areas and people it is directed at. In particular where the target population is situated in the developing world, appropriate mediums have to be used.

Although electronic information dissemination via television and radio is a common occurrence in most of the developing countries in the Sub-Saharan region, access to these is rather limited for a number of reasons - these include economic, socio-political and general infrastructure limitations. Thus for much of the prevention strategy's target population, the printed word is the currently preferred mode of dissemination. Also, women and children have less access to information than men (as a group) and it is these target groups which have to benefit from any new or improved intervention.

However, in many of the developing countries in the Sub-Saharan region the spoken word is the most effective form of communication due to the low literacy rate (for example, the average female literacy rate in many countries is less than 50%).

The need therefore exists to develop and implement a technology which would both promote the local production of technologies and simultaneously strengthen the HIV/AIDS prevention strategy. Technology has to address the realities of the region and should benefit more than one member of the joint programme.

Objective

The objective is to develop and provide a locally produced technology for the Sub-Saharan region which will promote and strengthen the IEC strategy. The implementation process must comply with the TSS1 framework for local production of health system inputs related to the HIV/AIDS programme.

Also, the technology has to comply with local realities within the framework of an *Enabling Industrial Environment* (EIE)[1] and recommendations set out by the TSS1 project on local production of health system inputs[2].

The technology proposed is a mechanically powered **radio**[3] (the energy is derived from a wind-up spring and requires no batteries). This has been prototyped, tested and accepted by the target community, political figures and multi and bi-lateral organisations as being appropriate, useful and effective.

Motivation

Battery-powered devices, while often portable and convenient, are a less than optimal technology for use in developing countries. Issues of cost, quality, storage and availability mitigate against their widespread implementation and use. A not insignificant consideration is the disposal of batteries, particularly in less-developed settings - this often has a negative impact on the environment. Although much work has been and is being done on the application of solar-powered energy generators for use especially in rural areas of developing countries, the use of this technology is not always appropriate. For example, a portable radio requires a continuous energy supply and especially so at night-time when the usage would be greatest.

A mechanical source of energy which is affordable, renewable, environment friendly and can be activated on demand is ideal for portable devices in a rural setting in developing countries.

The Baylis "free-play" Radio®

This radio is powered by the Trevor Baylis generator[3]. It is a high quality radio currently with FM, Medium Wave and Short Wave reception capability (see Appendix B for specifications) The Short Wave (SW) capability is appropriate as this virtually guarantees reception in any part of the African continent, for both local and international transmissions.

The radio is a portable device weighing less than 3 kg in a robust housing suitable for rural conditions. The specifications of the radio are given in the Appendix. The spring has been designed for a life-time of ten thousand winds which corresponds to more than 6000 hours of playing time. Less than 20 seconds of winding will provide 40 minutes of playing time. The spring is packaged in a safe housing to prevent injury.

Currently the radio is being assembled by the BayGen Power company in Cape Town, South Africa from modules supplied from both South Africa and England. The radio consists of two modules: (i) an electronic module radio which is assembled and pre-tuned by a South African sub-contractor specialising in the manufacture of radios and (ii) the spring or power-generator module which is manufactured in the UK and assembled in South Africa. Quality checks are conducted during the manufacturing process.

The device is environmentally friendly and no hazardous materials are used.

Product endorsement

The product has been endorsed by President Nelson Mandela of South Africa and has initially received the financial backing of the British Government through the Overseas Development Administration (ODA). The launch has been supported by the International Committee of the Red Cross, UNICEF and DANIDA.

Market of the free play radio

The potential market for this portable radio is enormous. Since the radio does not have any recurrent costs it could become one of the most important means of communication in the developing world, in particular remote and economically less-developed regions.

Market research throughout Africa has identified a need for over ten million "free play" radios per annum. This market can be increased if the educational component is added. Although the potential market in the Sub-Saharan region is large, the capabilities of governments in the region to absorb and distribute this technology is low due to their financial and infrastructural situations.

Multi-lateral and bi-lateral organisations which presently finance the majority of the HIV/AIDS prevention programmes in the region will have to be targeted to fund this intervention. Multi-sectoral funding between organisations and NGO's will have to be established since the device would benefit a large variety of programmes. In particular, organisations promoting democratisation should be targeted as an alternate source of funding as this may become a effective channel for their message to the people of Sub-Saharan Africa.

Current Producers

The BayGen Power company, which holds the manufacturing rights of the radio, is backed by both the South African and British Governments. The company has been supported by the Overseas Development and Administration (ODA) of the UK and Kagisho Trust and Liberty Life Insurers of South Africa in the initial development phase.

Initial discussions have indicated that the current producers are willing to expand their plant to other countries on the African continent. At present their financial situation prevents any expansion programmes and there is an indication that although there has been significant high-level lobbying of their products, their marketing strategy is incomplete and possibly inappropriate given the realities of the African situation.

Proposed project

It is proposed to simultaneously establish a number of assembly plants within the target areas identified under the TSS1 project, such as Namibia, Côte d'Ivoire, Kenya and Cameroon. A cautious approach is nevertheless desirable and factories in Kenya and Côte d'Ivoire are recommended for the start-up phase.

The scope of the proposed project would include

- the establishment of the assembly sites,
- the training of personnel,
- the provision of venture capital for stocks and spares, and
- the management of the manufacturing process.

The layout costs and capital investment for this project are moderate, since the assembly plants require limited architectural sophistication. No special factory requirements are needed and only the local building regulations (of the target country) have to be met. Sites with a floor space of 500 - 1000 square meters are required for a proposed assembly throughput of 1 to 2.5 million radios per annum. Existing buildings should be used wherever possible.

Limited technology and low-tech calibration devices are needed for the assembly process. Much of the assembly process is based on manual labour and the training can be completed *in situ* during the manufacturing process. A staff contingent of 50-100 is required for a proposed throughput of 1 - 2.5 million radios per annum[4].

A critical factor in the manufacturing process will be the continuity of supplies from sub-contractors. Special arrangements and agreements between the factory, suppliers, transport agencies and governments have to be in place to ensure an optimal manufacturing process. Operations management is critical to the success of this project and will have to be carefully planned and implemented.

Alternate proposal

An alternate proposal would be to strengthen the current initiative in South Africa. This would include the modernisation, enlargement and optimisation of the manufacturing process through the active and expert intervention of UNIDO and its joint partners of the HIV/AIDS programme

The manufacturing process could be supported through venture capital in order to increase its cash flow viability. This is needed to increase its capability to service the expected market demand of the product. Product reserves currently are non-existent and this could seriously influence market performance.

Although the radio has been tested for acceptability by communities, real technical performance and appropriateness of the product will only be established within the near future and any product changes, either in design or manufacture, would have serious financial implications for the current producers without continued and additional support.

The area which could benefit the most through the intervention of UNIDO is the establishment and design of a global marketing strategy for the device. A marketing strategy supported by a multi-national member would carry significant influence in a global strategy for establishing an integrated health information package. UNIDO, the WHO and the UNDP would be ideally suited in promoting this technology together with the other multi-national partners involved in family planning, HIV/AIDS prevention and education.

Time scale

Expertise available within the BayGen Power company and that of international experts can be used to reduce the implementation time of this project. The time scale required for the implementation of the assembly plants is listed below and is subject to the socio-political and economic conditions of the target countries. Financial and multilateral backing is assumed for these projects and certain tasks are assumed to be concurrent.

Table 1: *Time scale for the establishment of an assembly plant.*

Description	Years
Identification of site	0.1
Lobbying and governmental acceptance	0.5
Establishment and construction of assembly plant*	0.8
Training of personnel	0.3
Commissioning	0.5
Total	*1.4*

* *time scale given for existing building.*

Advantages

The Baylis radio offers a new possibility for the local manufacture of technology in the Sub-Saharan region as well as a new tool for the joint programmes in the prevention of HIV/AIDS. The device is relatively simple and robust and can be used to increase the awareness of individuals through a truly affordable enabling technology not available until now.

Implementation

Relatively low cost assembly lines which will assemble finished modules of the product imported from South Africa and the UK would be a key to the success both in terms of the capacity building and in terms of local production. Initial investigations have shown that decentralised manufacturing of components is recommended in order to reduce delivery times and also to strengthen the market impact of the devices within certain regions of Africa.

The implementation phase for such a proposal must be multi-sectoral and should include the following considerations

- The technology and the assembly of the products must be appropriate and the basic; in particular, the realities of each manufacturing site must be considered.
- The assembly sites should be integrated and linked to ensure optimal resource and problem sharing.
- The manufacturing and assembly process must be preceded by a global marketing strategy supported by key partners such as the donor agencies, NGO's and multi-lateral.
- The programme should be linked to key financial institutions such as the World Bank to ensure initial financial backing.

Budget

The financial implications would depend on the size of plant and expected output and on the manufacturing process which would be implemented. The data given in Table 1 and 2 are based on the actual data from the South African plant and purely act as an illustrative example.

Salaries and remuneration are country-dependent and would have to be established for the specific country poles. Factors such as transport costs, import duties and taxation have not been addressed and would have to be identified. These may vary significantly from year to year because of exchange rate fluctuations and other factors.

Table 2 represents the fixed costs of establishing an assembly plant with the current capacity of producing 1 million radios per annum. No development and prototyping costs have been given. The costs include fixed and movable assets, management costs, initial training and bridging finance. Table 3 lists running costs salaries and miscellaneous expenses. Additional costs incurred by international marketing and lobbying for sales are listed in Table 4. Table 5 lists the expected income.

Table 2: *Budget for establishment of an assembly plant (fixed costs). These figures are based on 1995 figures for the South African plant and include a loading factor for the target sites. The total includes the a 6 month inventory and stock holding cost costs.* [4]

Budget Item	US $
Establishment of assembly sites	
Factory infrastructure	75 000
Factory machinery, calibration equipment and accessories	75 000
Office accessories	50 000
Training	
Personnel Training costs (start up phase)	75 000
Management costs	25 000
Capital	
Inventory and stock holding (1 months at 1 million p/a through-put)	2 000 000
Venture and bridging capital (6 months)	500 000
Commissioning Costs	25 000
Miscellaneous Costs	25 000
Total	*2 850 000*

Table 3: *Budget for running costs and the additional expenses required to establish a global marketing strategy. This budget would be purely for the purpose of multi-lateral and bilateral organisations in identifying and promoting the product. Per annum figures are given.*

Description	US $ per annum
Running	
Salaries of all staff (60 staff members)	250 000
Management expenses and salaries	500 000
Telephone, electricity and water	25 000
Insurance	25 000
Transport and postage	125 000
Rent (at $ 4/m^2 per month)	125 000
Miscellaneous	50 000
In-house marketing and sales	
Packaging (8% of budget)	50 000
Marketing (12-15 % of budget)	100 000
Stock	
Components and spares (6 months at 1 million through put)	12 500 000
Sub Total	*13 750 000*

Table 4: *International marketing and implementation*

Description	US $ per annum
International and bi-lateral marketing campaign	
Global marketing strategy for multi-laterals	150 000
Lobbying for procurement capital by bi-lateral	100 000
Expenses	25 000
Total	*275 000*

Table 5: *Expected gross income. Figures given for proposed out puts. The unit price is listed at US $30 for quantities exceeding 5000 units (see Appendix C).*

Description	US $ per annum
Sales	
Current output capacity (1 million)	30 million

1 *Informal notes by S. Yunkap Kwankam and Peter A Heimann, UNIDO, Vienna, October 1995*
2 *Local Production of Health System inputs related to HIV/AIDS, SY Kwankam and PA Heimann, UNIDO, 1995*
3 *BayGen Brochure, BayGen Power Company (Pty) Ltd, 1995, Cape Town, South Africa,*
4 *Informal notes by C Staines and B Barrett, Chief Executive Officers of Bayfis Generators Ltd, December 1995.*

BayGen is the generic name for all companies worldwide which have been licensed to manufacture, market, distribute and sell products powered by the Baylis Generator, the revolutionary, patented invention for personal power generation.

The Baylis Generator: putting power into the hands of ordinary people.

From an idea first hatched on an island in the Thames to an extraordinary commercial venture in Africa.

In the middle of a BBC documentary on AIDS in Africa, inventor Trevor Baylis jumped up from his chair and hurried to his studio on Eel Pie Island in the River Thames.

If poor communication in Africa was a barrier to health education, Baylis reasoned, then he should find a way to improve the information flow. And what was the real obstacle? Batteries.

Before the TV show was over Baylis had produced "a bark of sound out of an instrument". His simple idea for a wind-up radio set in motion what was to become an extraordinary commercial journey back to Africa.

The resulting South African venture has swept up entrepreneurs, non-governmental organizations, development agencies, former anti-apartheid campaigners, disabled groups and a corporate foundation.

Although the first application of the Baylis Generator is in the revolutionary Freeplay® Radio, the world can look forward to the launch of a whole range of small electrical appliances which completely obviate the need for either batteries or mains electricity.

> When Staines saw the radio on the Friday evening programme he sat up all night developing a business plan... "By Monday morning we had the rights to develop the product on a worldwide basis," says Staines. He sought advice from the BBC World Service and raised £143,000 from ODA on the condition that the company exploiting it would be a commercial venture.
> ... finance was raised indirectly from Liberty Life, the country's (South Africa's) largest life insurance company, and Kagiso Trust Investment Co, the business arm of the Kagiso Trust, a non-profit body that helps finance urban and rural development schemes. Together they provided £600,000 of equity.
> **FINANCIAL TIMES**

In the Baylis Generator, an old mechanism opens up a new world of possibilities.

All too often, inventions which could change the world languish unrecognized because of corporate envy or indifference or because they lack financial and organizational midwives. Happily the Baylis Generator is not one of them, thanks to the imagination, drive and entrepreneurial skills of individuals and organizations, notably the following: Rory Stear, CEO, BayGen Power Company (Pty) Ltd, Christopher Staines, CE, Baylis Generators Limited, David Butlion, MD, BayGen Power Manufacturing (Pty) Limited, the British Government's Overseas Development Administration (ODA), and Hylton Appelbaum, who heads Liberty Life Foundation which made the grant to the six organizations for the disabled which will provide the training of workers for the Cape Town factory which will manufacture the Freeplay® Radio.

> The synergies achieved by this unlikely combination of players should serve notice to sceptics that South Africa has the imagination and drive to do business in ways that serve the social needs of a developing country and provide a fair return for sweat and equity.
> **BUSINESS REPORT, Independent Newspapers, South Africa**

The remarkable thing about the Baylis Generator is that it is based on an old and tested principle that to many might seem positively old fashioned. Clockwork is a mechanism which has powered machines since the Middle Ages, now in the Baylis Generator the old mechanism is being adapted to more modern products and a whole new world of possibilities is opening up.

Clockwork - the new key to power.

Simplicity itself, the Baylis Generator harnesses human energy through a winding handle, stores it internally via a spring and delivers it as electricity on demand.

The vision.

To harness the Baylis Generator to power all future portable electrical appliances.

The economic and ecological benefits of the Baylis Generator are very clear.

It is non-polluting in a world in which disposable batteries represent a major source of mercury pollution. As used in the Freeplay® Radio, the Baylis Generator is over six times cheaper than the combined cost of batteries used to run a similar appliance for an equivalent period of time (6,660 hours).

The Baylis Generator contains fully recyclable parts which are easily repaired or replaced.

"What do you do when you can't find a battery in the middle of a refugee camp in Goma? Or maybe you're just sick and tired of listening to Hutu propaganda and you desperately need a dose of the BBC? Well, you wouldn't even be asking these questions if you had the Baylis wind-up radio in your hand."
NEWSWEEK

Where will the Baylis Generator be marketed and sold?

The Baylis Generator will have a significant impact on any market where the cost of either batteries or mains electricity makes the use of electrical appliances prohibitively expensive or where the availability of batteries or mains electricity is restricted or non-existent.

It is obvious that the above markets will be located primarily in the developing world

However, products powered by the Baylis Generator will prove to have enormous potential in first world and other markets, particularly where consumers show concern for the pollutants which batteries produce on disposal and where the concept of free, clean and convenient power for a range of innovative personal appliances has immediate appeal

Western companies that manufacture the cheap and cheerful transistor by the million take for granted that every corner shop will stock the ubiquitous batteries. In Africa there are few corner shops, few batteries and little money to buy them. President Mandela was voicing the congratulations of an entire continent when he shook the inventor's hand.
THE TIMES

First application of the Baylis Generator: THE FREEPLAY® RADIO.

The revolutionary, wind-up, Freeplay® Radio is the first appliance to be powered by Trevor Baylis's ingenious Baylis Generator. It has come about through the inventor's determination to find a source of power for mass communication in the developing world, where there is a desperate need to disseminate information to help prevent the spread of diseases such as Aids. The Freeplay® Radio's potential for widening education will be obvious.

The product has been endorsed by President Nelson Mandela of South Africa and has the financial backing of the British Government through the Overseas Development Administration. It can boast launch customers that include names such as the International Committee of the Red Cross, the British Red Cross, Care, Unicef and Danida, the Danish Aid Agency.
FINANCIAL TIMES

A product which could do more to bring information, education and social progress to the developing world than any other device for a generation.

Excited by the worldwide potential of a radio capable of operating without batteries, the British Government's Overseas Development Administration (ODA) commissioned a team of consultants to work with Baylis Generators Limited to develop a wind-up radio. Consultants were drawn from a number of high profile organizations under the direct management of Baylis Generators Limited. After more than a year's development which included close consultation with many large aid organizations, the Freeplay® Radio was ready for market.

Specifications.

The Freeplay® Radio is a high quality FM/MW/SW radio which incorporates a Baylis Generator. In its current configuration, less than 20 seconds' winding will provide 40 minutes of play time. The spring within the generator is designed to last for 10,000 winds.

The Freeplay® Radio is portable, 335mm x 245mm x 135mm, and weighs 3kg. A winding handle is flipped out for fast winding. When the radio is in operation, this handle slowly unwinds - a unique electronic 'brake' reduces the rate of unwind dramatically to save energy when the radio is not in use.

Designed in the UK and manufactured in durable ABS plastic with recessed controls, the Freeplay® Radio will withstand the harshest conditions while delivering exceptional, distortion-free sound quality at high volume levels.

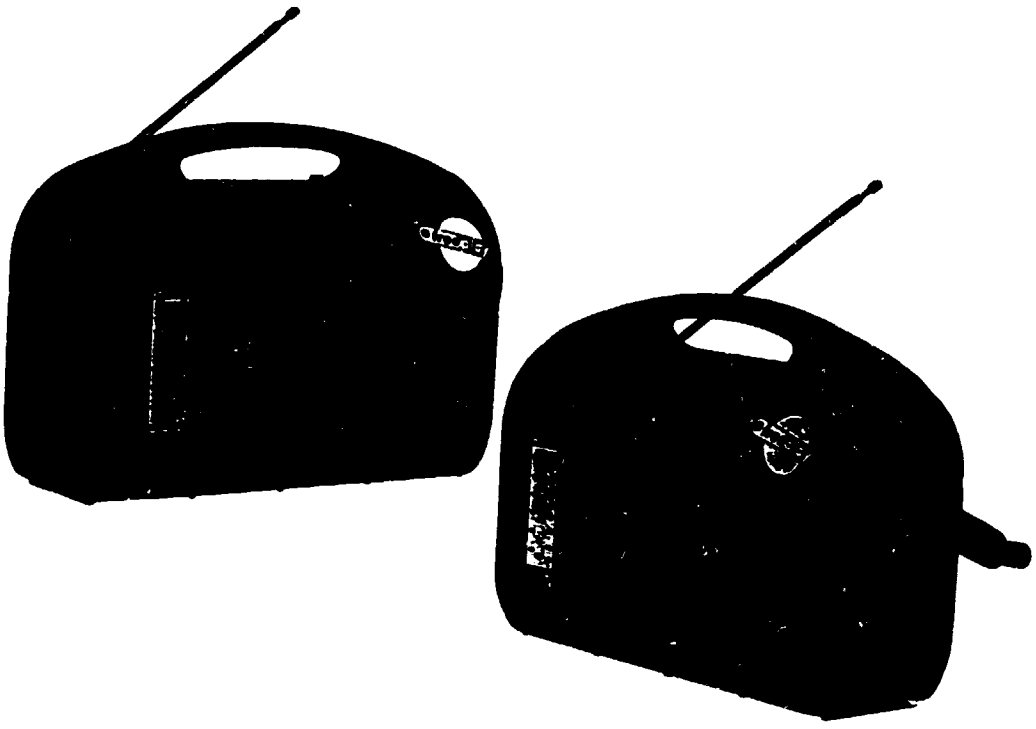
Simply wind up and switch on.

The Freeplay® Radio can be used anywhere without the need for an external source of power. The Baylis Generator is enclosed within the radio casing and is itself sealed against the harshest of environments.

The durable B-motor spring has been designed to deliver at least 10,000 winds (i.e. some 6,660 hours of play time), however, the Baylis Generator unit is easily removed for either repair or replacement. Its tamper-proof design ensures complete safety.

The Freeplay® Radio receives FM, MW and SW and has broad bandwidth specifications to ensure complete broadcaster compatibility wherever it is used.

The wind-up radio project is interesting and promising for many reasons. In South Africa, it will create jobs for the disadvantaged and some of the profits made will be used to finance social projects under the auspices of the organizations backing the BayGen Power Company. In Third World countries, the wind-up radio will increase access to all kinds of information, such as AIDS prevention campaigns, weather reports or adult education programmes. A study made by the John Hopkins University in Washington has shown that the radio is now the most effective way of disseminating information among the inhabitants of developing countries. It has a crucial part to play and important needs to satisfy. Uganda's Ministry of Information estimates that almost three million wind-up radios will be required in that country alone.
THE COURIER



A choice of models and options.

FM-only and three-band models are available. Optional too, but subject to an order for a minimum quantity, is a version with a longer play/longer life Baylis Generator. A DC 9 Volt input is also available.

The promise of a positive impact on living standards.

The Freeplay® Radio is certain to improve the dissemination of information in the developing world. In fact, it should prove to be the vital communication link the under-developed world so desperately needs, providing access to information on matters as diverse as preventive health care, assistance for refugees and migratory populations, aid relief, distance learning, entertainment and marketing communications.

It is no wonder, therefore, that the Freeplay® Radio has received the endorsement of over 20 international humanitarian organizations in London, Geneva, Brussels, Copenhagen, Paris, Atlanta, Washington, New York, Johannesburg, Maputo, Lusaka and Nairobi.

"I hope that this radio... will give many of the world's poorest people access to the information they need to improve their lives and safeguard their families."
BARONESS CHALKER OF WALLASEY,
British Minister for Overseas Development

The market for the Freeplay® Radio.

There is a huge market for a cheap, portable radio which can operate without batteries. Radio is the most important means of communication in the developing world and, although radio ownership is widespread, actual radio usage is severely restricted by the cost and availability of batteries. A mechanism which frees consumers to use their radios as and when they please will revolutionize communication in the developing world.

Independent market research throughout Africa has identified a need for over two million Freeplay® Radios per annum.

It is anticipated that sales throughout Africa and Latin America and through worldwide aid organizations and governments should exceed five million units per annum by the year 2000.

The Freeplay® Radio: a testimony to the seriousness of its backers.

The pedigree of the BayGen Power Company's major shareholders and the backing of both the South African and British Governments attest to how seriously personal power generation is being taken. Through its shareholders, BayGen Power Company has the resources to become the world's leading proponent of alternative energy through personal power generation.

[redacted] will initially concentrate on supplying the radio to humanitarian organizations.

"We intend to sell through retail channels by the middle of 1996," says Stear.

FINANCIAL MAIL

Radio ownership in Africa.

Region	Radios (millions)	%
Northern Africa	33.7	
Sub-Saharan Africa (excl. South Africa)	10.6	
Central Africa	44.4	
Southern Africa	17.6	
TOTAL	106.3	16
Total population	660 (est.)	

Source: IBAR

Looking to the future.

Personal power generation for virtually all electrical appliances.

The BayGen Freeplay® Radio is the first of a range of small electrical appliances to be powered by the Baylis Generator. Currently under development are products which will meet many pressing needs in the developing world. It is envisaged that these products will also enjoy wide appeal in the more developed world - indeed, the reaction from multinationals to the concept of personal power generation for their best selling products has been extremely positive.

In areas such as communication and entertainment, a range of products offering freedom from the constraints of batteries or mains electricity should have enormous appeal to consumers.

It would be no exaggeration to state that the concept of personal power generation embodied in the Baylis Generator is set to revolutionize communication, computation and lifestyles well into the 21st Century.

Corporate profile.

BayGen is the generic name for all companies worldwide which have been licensed to manufacture, market, distribute and sell products powered by the Baylis Generator.

The first licensee:
BayGen Power Company (Pty) Limited.

Johannesburg-based BayGen Power Company (Pty) Limited has been awarded exclusive rights to manufacture, market, distribute and sell products powered by the Baylis Generator to aid organizations, non-governmental organizations and governments worldwide as well as throughout the continent of Africa and Central and South America, including Mexico and the Caribbean.

The company embodies the charitable principles and developmental ethic of the many individuals, organizations, companies and charities which have helped turn the dream of personal power generation into a commercial reality. The aims and objectives of the BayGen Power Company enjoy the unqualified support of President Nelson Mandela and Baroness Chalker of Wallasey, Minister for Overseas Development in the British Government.

BayGen Power Company shareholders.

Included amongst the company's shareholders are The Distance Learning Trust (a non-governmental organization established by the co-financiers of BayGen Power Company, the Liberty Life Foundation, the philanthropic arm of the Liberty Life Group), Kagiso Trust Investments (Pty) Limited (the investment arm of Kagiso Trust, Africa's largest non-governmental organization) and its management.

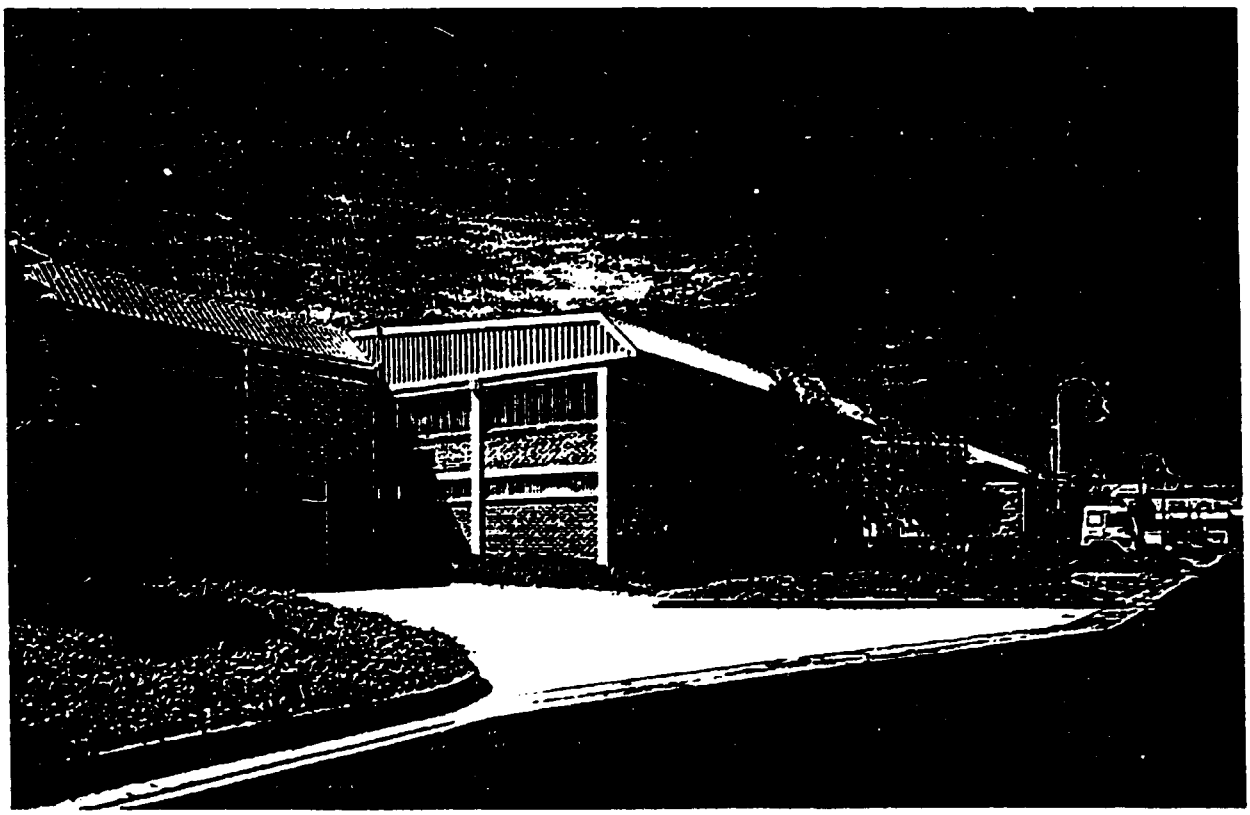
BayGen Power Manufacturing (Pty) Limited.

This company, the manufacturing arm of BayGen Power Company, is located at a 14,000 sq ft ultra-modern factory at Montague Gardens, Cape Town. Assembly of the Freeplay® Radio began here in September 1995. The assembly plant is part owned by the six Disabled Associations of South Africa through Disability Employment Concern (Pty) Ltd and, consequently, employs a high proportion of disabled people within its workforce. The facility has five production lines and a capacity to produce over one million units per annum.

> "We've got a product designed by some of the top people in the world, which will be built by disabled people, owned and marketed by philanthropic aid agencies and sold initially to NGOs."
>
> **BUSINESS REPORT, quoting Rory Stear**

Baylis Generators Limited.

Baylis Generators Limited is the worldwide licensor of the Baylis Generator. The company owns all patents, designs, copyright, trade marks and other intellectual property pertaining to the Baylis Generator. Baylis Generators Limited developed the Baylis Generator and its first application, the Freeplay® Radio, with a grant from the British Government's Overseas Development Administration (ODA). In the spirit of the charitable roots of all participants, a donation will be made to the Red Cross for every product sold which incorporates the Baylis Generator.



BAYGEN FREEPLAY

WIND-UP RADIO

Description

A robust, long life 3 band radio whose only power sources are an internal spring driven generator or alternatively a 3v-9v DC input.

Construction

ABS plastic outer casing with perspex dial scale window. ABS winding mechanism with flip out handle. ABS internal generator and gearbox casing mounted within outer casing. Telescopic antenna.

Specification

Weight	2.69Kg
Volume	335mm X 245mm X 135mm
Wave Bands	MW 520 - 1600 Khz
	SW 3.3 - 12 Mhz OR 6 - 18 Mhz
	FM 88 - 108 Mhz
Wind Time	30 seconds +/-
Play Time	40 minutes per full wind
Spring Life	10,000 - 30,000 winds
	6,666 - 20,000 hours
Power Output	approx 75 mW

Operation

Winding - grip radio handle firmly with left hand with radio facing you, flip out winding handle on right hand side and wind steadily until spring-stop engages (to stop overwinding). Replace winding handle in carriage on winding mechanism and switch radio on. Select wave band, adjust volume and tune to required station. Winding handle will unwind at approximately 1.5 rpm when radio is in use. If radio is switched off before spring has finished unwinding, electronic spring saver will slow spring unwind to approximately 0.1 rpm and hence conserve energy until radio is switched on again.

External DC use - insert DC jack for 3v - 9v power supply into DC socket on rear of radio (where labelled).

Information

Baygen Power Manufacturing (Pty) Limited

Postal address:
P O Box 36709 Chempet 7442
South Africa

Physical address:
Unit 14, Montague Gardens Industrial Park
Montague Drive
Montague Gardens 7441
South Africa

BAYGEN POWER COMPANY (PTY) LIMITED

"FREEPLAY" PRICING (SEPT-DEC 1995)

VOLUME	PRICE US$
Samples	40.00
0 - 480	38.50
480 - 1,320	37.00
1,321 - 3,960	35.50
3,961 - 5,280	33.50
5,280 -	Further volume discounts apply

- Terms are irrevocable sight letter of credit , or cash, with order payable ex-works Cape Town.

n.b Unit sizes are 12 radios per carton, and 110 cartons per container = 1,320 radios per container.

With DC input add US$ 1.00