

EXPANDING HEALTHCARE IN AFRICA: CURRENT STATUS AND POSSIBLE OPTIONS

Victor Konde

Abstract

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

Introduction.

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

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

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

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

Good health is important for economic and social development of any country. The sick are unlikely to actively participate in the economic, social and political activi-

ties of their country and/or take advantage of any available opportunities to improve their welfare or contribute to the welfare of others. Consequently, investment in healthcare should be seen as investment in the development of countries.

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

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

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

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

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

Source: WHO, 2004

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

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

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

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

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

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

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

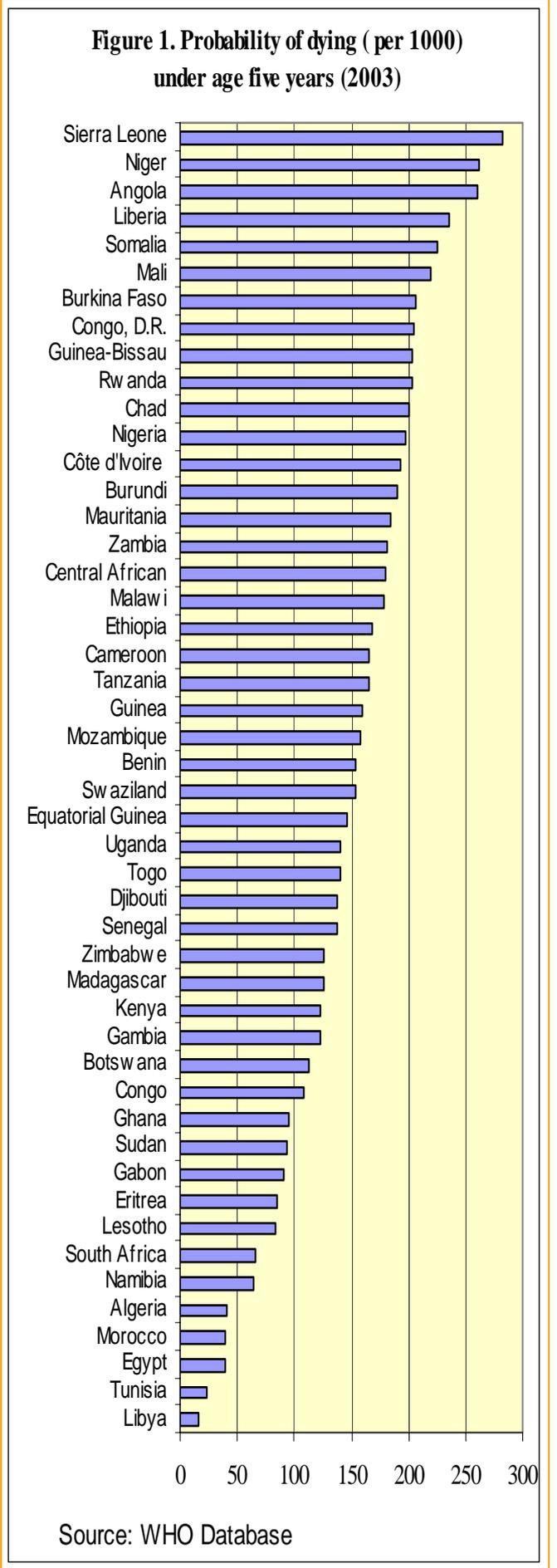
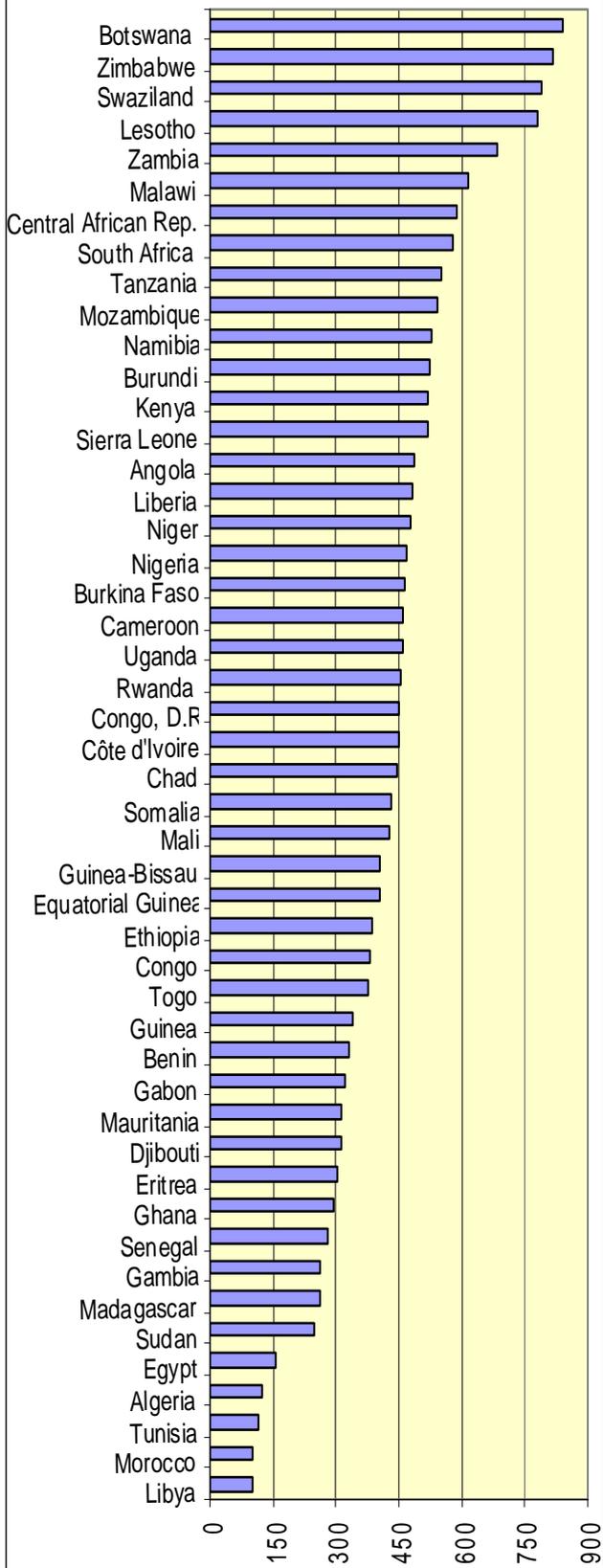
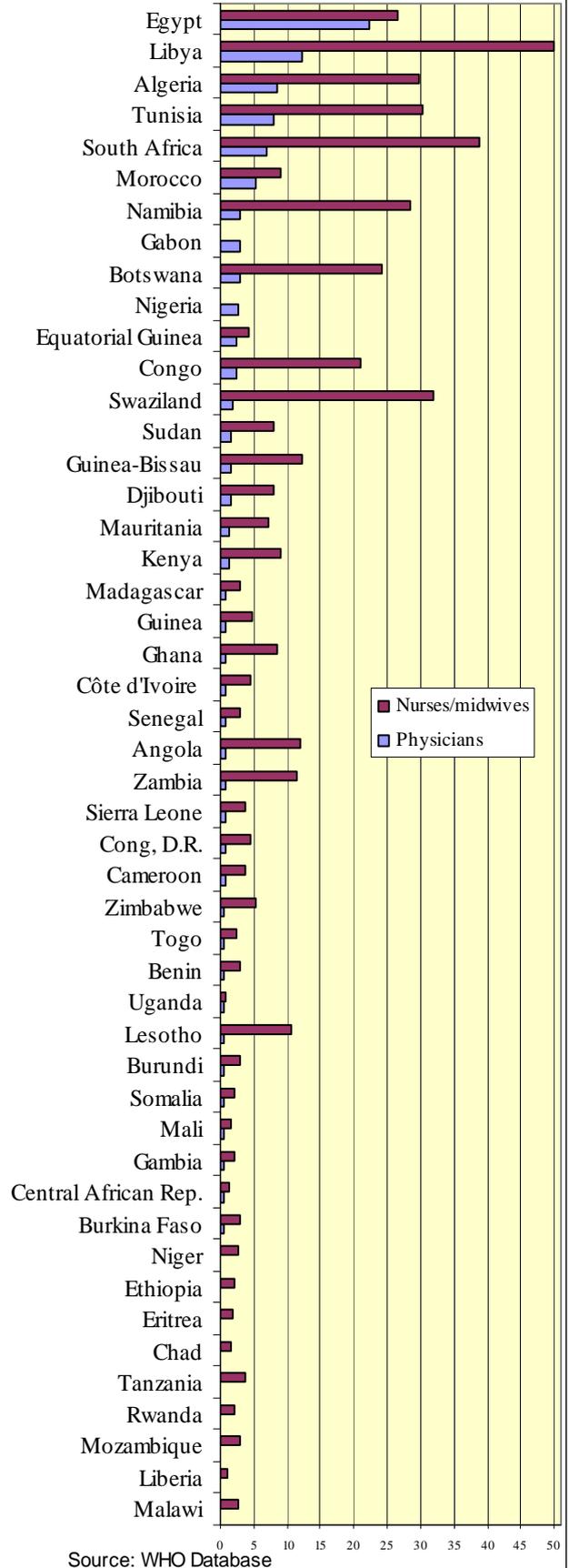


Figure 2. Probability of dying (per 1000) between ages 15 and 60 years



Source: WHO Database

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



Source: WHO Database

2 Improving access to healthcare

2.1 Human resource availability and training

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

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

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

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

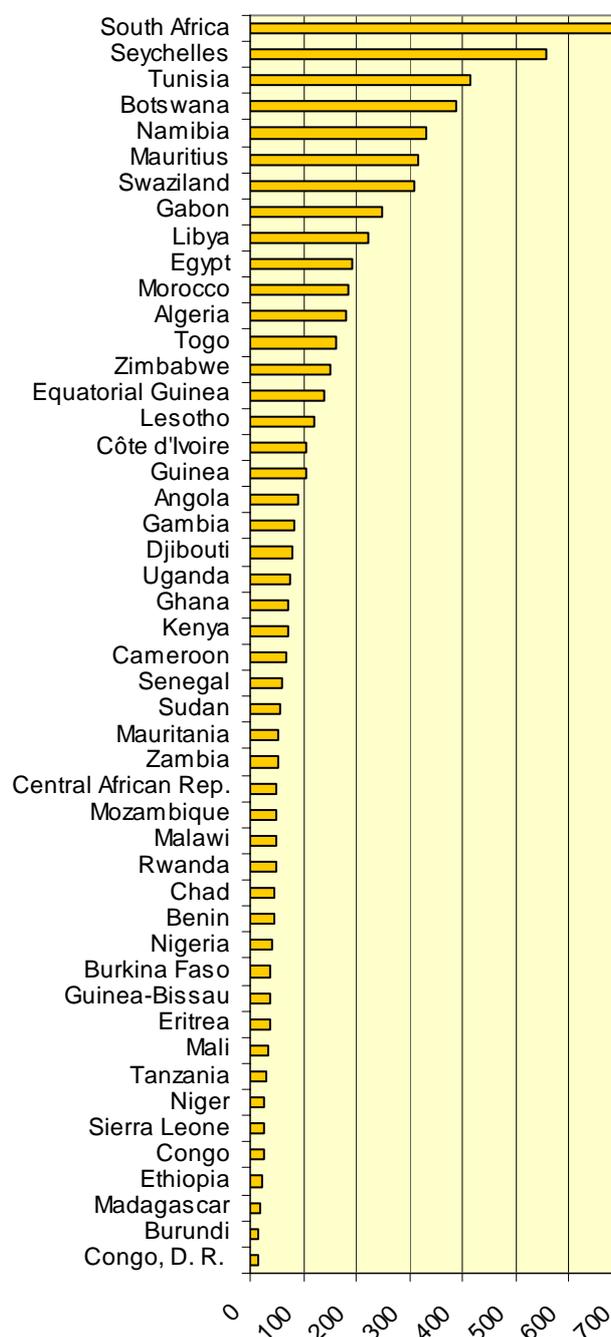
It is not just doctors and nurses that are important in providing good healthcare services. For example, qualified medical pharmacists play an important role in detecting prescription errors (e.g. contraindicated ones), substituting unavailable prescribed drugs with available ones and alerting doctors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

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

doctor per 10,000.

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

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



Source: UNDP, 2004

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

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

2.2 Access to medicine

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

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

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

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

2.3 Impact of attitudes of health workers on access to healthcare

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

It is difficult to accurately measure discrimination. However, a recent survey of 1,021 health-care professionals in Nigeria found that 9% had refused caring for HIV/AIDS and 9% had refused a patient with HIV/AIDS admission to a hospital [8]. More worrying, 59% expressed the need for a separate ward and 91% preferred health workers be informed when a patient had

HIV to enable them protect themselves. About 40% believed healthcare professionals with HIV/AIDS should not be allowed to work in any area of healthcare requiring patient contact. Furthermore, 20% thought HIV/AIDS patients deserved their infection.

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

3. Expanding healthcare delivery

3.1..Empowering and promoting community participation

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

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

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

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

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

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

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

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

3.2 Integrating traditional medicine and use of knowledge

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

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

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

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

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

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

Source: UNCTAD 2005, based on WHO

and generates approximately \$200 million annually. [13]. This makes traditional medicine a significant proportion of the South African health sector and economy.

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

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

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

3.3. Harnessing emerging technologies to expand healthcare

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

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

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

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

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

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

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

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

4 Investing in health

4.1 Promoting research and development

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

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

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

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

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

4.2 Investment in specialized health centres

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

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

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

4.3 Health insurance

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

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

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

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

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

4.4 Investing in preparedness and monitoring

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

About 217 deaths and infection cases of Marburg virus were recorded with two months in Uige, Angola in 2005. It killed about 90% of its victims- which is unexpectedly high. Yet when it broke out in German in 1967 (named after the German city Marburg) only 7 of the 25

infected people died and the disease was quickly contained. [26] Therefore, the need to develop sufficient capabilities to detect and contain emergencies cannot be overemphasized.

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

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

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

Conclusion

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

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

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

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

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

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

References

- UN (2005) The Millennium Development Goals Report 2005, United Nations, New York
- Based on WHO cholera annual summaries (www.who.int)
- WHO (2003) Africa Malaria Report, WHO/UNICEF, Geneva Switzerland
- Hendey GW, Barth BE and Soliz T (2005) Overnight and Postcall Errors in Medication Orders, *Acad Emerg Med*;12:629-634
- Folli HL, Poole RL, Benitz WE and Russo JC (1987) Medication Error Prevention by Clinical Pharmacists in two Children's Hospitals. *Pediatrics*. 1987;79:718-722.
- Broadhead RL, Muula AS. Creating a medical school for Malawi: problems and achievements. *BMJ* 2002; 325: 384-387.
- See <http://www.brainyquote.com/>
- Reis, C., Heisler, M., Amowitz, L.L., Moreland, R.S., Mafeni, J.O., Anyamele, C., and Iacopino, V. (2005) Discriminatory attitudes and practices by health workers toward patients with HIV/AIDS in Nigeria. *PLoM*, 2, 8
- AMREF (2005) Starting with the community, AMREF Annual report 2004 pg 6-7
- Tanzania prevents iron- deficiency anaemia in mothers and children in Zanzibar at <http://www.who.int/inf-new/child4.htm>
- Maier, C. (2000) School Based Health and Nutrition Programmes: Findings from a survey of donor and agency support. *Partnership for Child Development* (<http://www.schoolsandhealth.org>)
- Abdool Karim SS, Ziqubu-Page TT, Arendse R (1994) Bridging the Gap: Potential for a health care partnership between African traditional healers and biomedical personnel in South Africa (supplement). *S Afr Med J*; 84: s1-s16.
- Pefile, S (2005) South African legislation on traditional medicine. *Policy briefs*, SciDevNet.
- See www.mrc.ac.za
- Colvin, M., Gumede, L., Grimwade, K. and Wilkson, D. (2001) Integrating traditional healers into a tuberculosis control programme in Hlabisa, South Africa, *Policy brief* No. 5.
- Chile: Mapuche culture an ingredient in health and cuisine by Daniela Estrada at http://www.ipsnews.net/new_notas.asp?idnews=27588
- UNCTAD (2005) Biotechnology Promise, Capacity Building for the Participation of Developing Countries in the Bioeconomy, UNCTAD (Geneva and New York).
- Roosevelt, M. (2003) Cures on the cob. *Times* (New York) 26 May 2003 pp 56-57
- Gandhi TK, Weingart SN, Seger AC, (2005). Outpatient prescribing errors and the impact of computerized prescribing. *J Gen Intern Med*;20:837-841
- <http://news.uns.purdue.edu/html4ever/2004/040212.Sands.detector.html>
- P.S. Anton et al, (2001) The global technology revolution: bio/nano/materials trends and their synergies with information technology by 2015, RAND
- Wagner, C.S., Yezril, A and Hassell, A (2001) *International Cooperation in Research and Development, Science and Technology Policy Institute*. Arlington, VA: RAND.
- <http://www.microsoft.com/resources/casestudies/CaseStudy.asp?CaseStudyID=16994>
- See <http://www.nigeria-law.org/National%20Health%20Insurance%20Scheme%20Decree.htm>
- Kirigia, J. M, Sambo, L. G., Nganda, B., Mwabu, G. M., Chatora, R. and Mwase, T. (2005) Determinants of health insurance ownership among South African women. *BMC Health Services Research*, 5:17
- See http://www.who.int/mediacentre/factsheets/fs_marburg/en/
- Newton, P. and White, N. (1999) Malaria: new developments in treatment and prevention. *Annu Rev Med*, 50, 179-192.
- Looareesuwan, S., Chulay, J.D., Canfield, C.J. & Hutchinson, D.B. (1999) Malarone (atovaquone and proguanil hydrochloride): a review of its clinical development for treatment of malaria. Malarone Clinical Trials Study Group. *Am J Trop Med Hyg*, 60, 533-541.
- Abraham, A., Certad, G., Pan, X. & Georges, E. (2000) Pleiotropic resistance to diverse antimalarials in actinomycin D-resistant *Plasmodium falciparum*. *Biochem Pharmacol*, 59, 1123-1132.