

Policy Brief

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Accelerating Health Research for Africa's Development

An Assessment of the Effectiveness of National Policies in Eastern and Southern Africa

Why investing in health R&D and innovation matters in Africa

Health is a fundamental human right enshrined in international law and national constitutions. It is essential for national security and promotion of development in Africa.

While Africa has 15% of the world's population, it accounts for 55% of global deaths from infectious and parasitic diseases. Diseases such as cholera, malaria, tuberculosis, measles and HIV/AIDS kill millions of people each year in Africa. 90% of all malaria cases are in sub-Saharan Africa where the disease kills at least 3,000 children a day. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), there were 23.5 million people living with HIV/AIDS in sub-Saharan Africa in 2011. There is also a rapid increase in death rates from non-communicable diseases, particularly cancer and diabetes in the region.

The high burden of disease undermines the security and stability of African countries. It also limits their ability to meet international human rights obligations. Governments need to strengthen their national health systems to ensure the realization of the right to health. This should be a fundamental goal of governments' policies and programmes.

Africa's long-term economic growth and sustainability are threatened by high burden of disease. Sustaining and spurring growth will require more investment in public health, including health research and development (R&D).

Some countries in Africa are experiencing unprecedented economic growth. According to the African Development Bank (AfDB) and the World Bank, the continent's gross domestic product (GDP) grew at 4.5% in 2012 and is projected to grow at 4.8% in 2013. However, economic prosperity has not always translated into improvements in public health and the high burden of disease threatens the sustainability of economic growth in Africa. It is estimated that since 1990, HIV/AIDS has reduced economic welfare by 1.7% per year in Africa; countries with particularly high HIV burdens offer a good illustration of the economic cost of poor public health. For example, Botswana has experienced more than 5% decrease in economic welfare per year in the past decade due to HIV/AIDS.

Latin America and Asia offer examples of how the implementation of relevant policies for public health and health research and development (R&D) can help to sustain long-term economic growth. The recent economic

history of countries such as Brazil, China and India shows that improvements in public health and investments in health R&D for innovation helped to stimulate economic growth and industrialization. Indeed these countries are rapidly industrializing and integrating their economies into the global economy, in part, because of the investments that they are making in health R&D for innovation.

Study aims

Health research and development (R&D)—**scientific inquiry into the nature and causes of diseases and the subsequent use of scientific knowledge to develop vaccines, diagnostics and medicines**—is critical to reduce the burden of disease and improve public health in Africa. Health R&D advances the understanding of specific diseases thereby improving prevention, diagnosis and treatment and reducing the cost of healthcare.

The East Asian 'miracle'

"There is a growing body of evidence that the East Asian countries that sustained high rates of economic growth in the second half of the 20th century did so largely thanks to high rates of factors inputs—labor, physical capital, and human capital—rather than increases in factor productivity. One reason for the rapid increase in labor supply per capita in East Asia has been the effect of better health. Improvements in health, feasible at modest cost, preceded and helped catalyze the so-called miracle."

Bloom, D., Canning, D., and Jamison, D. (2004), 'Health, Wealth and Welfare', p. 12 in Finance and Development March 2004.



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Health R&D is an economic investment when products are commercialized. Africa, compared to other regions, has not effectively invested in, nor reaped the benefits of, health R&D.

Many African countries have developed explicit and implicit policy instruments for promoting health R&D. The effectiveness of these policy instruments in accelerating R&D and stimulating health product development is largely unknown. We have evaluated the effectiveness of these policies for promoting health R&D for innovation¹ in six countries with significant health R&D portfolios in Eastern (Kenya, Uganda, and Rwanda) and Southern Africa (South Africa, Botswana and Zambia)

Review of health R&D policies in Eastern and Southern Africa

International and regional declarations

To help reduce the burden of disease, meet constitutional obligations and spur economic growth, African countries need to increase their investments in health research and innovation.

The importance of R&D in addressing public health challenges has been emphasized by African governments and non-governmental bodies in many international and regional declarations.

In the Bamako Communiqué and Algiers Declaration, governments committed **to invest at least 2% of their national health budgets in health R&D**. However, this target has not yet been met by countries surveyed. South Africa's health R&D expenditure is estimated to be 0.8% of its total annual health budget while Kenya's is about 0.2%. Estimates for the other countries are not available because there are no published health R&D statistics or indicators. Countries also fall short on the 2007 African Union Summit pledge of spending at least 1% of GDP on R&D. In 2008, Botswana's expenditure on R&D was 0.5% of GDP, Kenya 0.4%, South Africa 0.9%, and Zambia 0.37%. Data or statistics are not available for Rwanda. However, most interviewees indicated that the country is spending less than 1% of its GDP on R&D. These numbers can be compared to Brazil, China and India, with 2007/2008 expenditure levels as follows: Brazil: 1.10%; India: 0.8%; and China: 1.5%.

Health R&D policy statements

Declaration	Examples of Policy Statements
Bangkok Declaration on Health Research for Development (2000)	Health research is important for improvements in social and economic development; and R&D is critical for the attainment of health as a fundamental human right.
African Union Summit (2007)	Heads of States and governments pledged to increase expenditure on R&D to at least 1% of GDP.
Bamako Communiqué of the Global Ministerial Forum on Research for Health (2008)	At least 2% of national health budgets devoted to research; all countries should establish mechanisms to monitor financial flows to research; countries should develop national research and innovation strategies that include research for health; and countries should integrate health R&D into their National Poverty Reduction Strategies.
Algiers Declaration of the Ministerial Conference on Research for Health in the African Region (2008)	Countries should allocate at least 2% of national health expenditure and at least 5% of external aid for health projects to research and research capacity building

Sources of health R&D funding

The six countries included in this analysis rely on a narrow range of funding instruments for health R&D and related innovation activities. These instruments are characterized as national/domestic and external/foreign donors.

National sources are mainly public with limited private sector funding. With the exception of South Africa, the ESA countries do not have instruments such as venture capital and tax credits or relief for R&D. South Africa has a policy of tax credits to stimulate private sector funding for R&D. However, many private companies find procedures for application of tax relief to be cumbersome. **The six countries rely largely on external donor funding for their health R&D.** In each of the countries greater than 50% of the funding for health R&D comes from external donors such as the US National Institutes for Health (NIH), USAID, the Bill and Melinda Gates Foundation, UK Wellcome Trust and the European Union.

Health R&D programs and actors

African countries need to strengthen their R&D and innovation capabilities in order to reduce the burden of disease.

The six ESA countries examined have health R&D activities focusing on HIV/AIDS, malaria, tuberculosis and other infectious diseases, including national institutes engaged in clinical trials of vaccines. However, the countries have variable levels of R&D activities, human resources capacity, levels of expenditure on R&D, and scientific productivity.

- South Africa has the largest R&D portfolio being conducted in its national science councils such as the Medical Research Council (MRC), the Council for Scientific and Industrial Research (CSIR) and more than 10 public universities. Compared to the other five countries, it has the largest number of fulltime researchers and generates more scientific publications in biomedical research and clinical medicine.
- Kenya and Uganda have relatively similar health R&D portfolios. In Kenya R&D activities are concentrated in the Kenya Medical Research Institute (KEMRI) and the University of Nairobi while in Uganda the Uganda Virus Research Institute, Makerere University and the Joint Clinical Research Centre (JCRC) are the key institutes engaged in R&D.
- Botswana, Rwanda and Zambia have smaller R&D portfolios. Clinical trials for HIV/AIDS and tuberculosis constitute a significant portion of their R&D efforts.

Most of the R&D activities in all the six countries are being undertaken in partnership with international partners such as the US-CDC and Wellcome Trust of the United Kingdom (UK).

Analysis of national policy instruments

The six ESA countries examined have both implicit and explicit policies for health R&D. There needs to be more attention to the promotion of health R&D for innovation and a renewed focus on policy implementation.

Sources of funding for health R&D (HIV/AIDS, tuberculosis and malaria)

Country	% Domestic Funding	Domestic Sources	Foreign Funding Sources
Botswana	30-40	MOH	WT, USAID, BMGF, EU, CDC, DFID, NIH
Kenya	25-30	NCST, MOPH&S (channel for KEMRI funding) and CNHR	WT, USAID, BMGF, EU, CDC, DFID, NIH. Govt. of Japan
Rwanda	< 10	MOH and MOE	WT, USAID, BMGF, EU, CDC, DFID, NIH
South Africa	35-45	NRF, MRC, TIA	WT, USAID, BMGF, EU, CDC, DFID, NIH, Govt. of France
Uganda	25-30	UCST	WT, USAID, BMGF, EU, CDC, DFID, NIH
Zambia	<10	MOST	WT, USAID, BMGF, EU, CDC, DFID, NIH

Key:

MOH	Ministry of Health	NRF	National Research Foundation	EU	European Union (EU)
MOE	Ministry of Education	MRC	Medical Research Council	CDC	US Centres for Disease Control
NCST	National Council for Science and Technology	TIA	Technology Innovation Agency	DFID	Department for International Development
MOPH&S	Ministry of Public Health and Sanitation	UCST	Ugandan Council for Science and Technology	NIH	US National Institutes of Health
CNHR	Consortium for National Health Research	WT	Wellcome Trust	UCST	Ugandan Council for Science and Technology
		USAID	United States Agency for International Development	MOST	Ministry of Science and Technology
		BMGF	Bill and Melinda Gates Foundation		

To govern and accelerate health R&D for innovation, governments formulate and implement a wide range of policies, regulations and legislation. They use implicit policy instruments such as national constitutions, budgetary statements and foreign direct investment (FDI) regulations. Governments also use explicit instruments such as national health research policies and national science, technology and innovation policy regimes. The extent to which they are successful in spurring health R&D for innovation depends on the quality of their policy instruments and how well they implement specific policy measures.

With the exception of Zambia, **the countries' national constitutions have provisions that can be invoked to promote health R&D.** Their national development vision documents also contain implicit policies for health R&D.

The six countries' explicit national science, technology and innovation (STI) policy documents have provisions for promoting health R&D. Botswana, South Africa, Kenya and Uganda have identified health R&D priorities to include the development of vaccines for HIV/AIDS, tuberculosis and malaria. Kenya has a National Health Bill

that contains provisions for improving the regulation of clinical trials.

The countries also have intellectual property protection legislation. South Africa's and Kenya's have explicit reference to health R&D and provide for the use of patent information to promote scientific research in both public and private sector institutions. Access and use of patent information is important because it enables scientists and their institutions to have access to cutting edge scientific information and tends to reduce the costs of R&D. However, **there is limited uptake of patent information** by local researchers in these countries.

The explicit policy instruments reviewed have not emphasized **innovation**. Most of the instruments make passing reference, but do not expound on, the importance of health innovation—turning R&D results into products and processes or using scientific knowledge to prevent or treat diseases. With the exception of South Africa's Ten Year Innovation Plan, none of the existing R&D policy instruments used by the countries contains specific policy measures for innovation such as financing product development, commercialization and

public-private partnerships. This can result in 'stunted technologies' or products stuck in the innovation pipeline.

Strong support for entrepreneurial and innovation-oriented health R&D is essential to ensure commercialization of African-generated knowledge and technologies.

In the six countries, **policies for health R&D are located in various sectoral instruments and administered by different government agencies, and are not all active or current.** Some countries, for example Botswana and Zambia, do not have umbrella or overarching national health research policy documents. Uganda has a draft national research policy yet to be adopted. South Africa's health research policy is ten years old and needs to be reviewed. Kenya has deposited policies for R&D in its 2012-2030 health policy and a draft National Health Bill 2012. In all the countries health R&D policies are in national science, technology and innovation policies and plans. **There is need to consolidate policies and increase institutional coordination in order to reduce policy conflicts and incoherence and to maximize institutional synergies and efficiencies.**

Table 3: Overview of national policy instruments for health R&D

Country	Explicit Policy Instruments	Examples of Implicit Policy Instruments
Botswana	2012 National Health Policy: Towards a Healthier Botswana; 1998 National Science and Technology Policy for Botswana; the 2005 Botswana National Research, Science and Technology Plan; and Industrial Property Act 2010	Article 4 of the 1966 Constitution of Botswana; Botswana National Vision 2016;
Kenya	National Science and Technology Act of 1977 (amended 1979 and 2009); 2008 National Science, Technology and Innovation Policy and Strategy; National Health Policy 2012-2030; 2012 National Health Bill; Pharmacy and Poisons Act; and Kenya Industrial Property Act 2001	2010 Constitution of the Republic of Kenya Section 43(1);and Kenya Vision 2030
Rwanda	2005 National Health Sector Policy; and 2005 National Science, Technology and Innovation Policy.	Article 41 of 2003 Constitution of the Republic of Rwanda; Rwanda Vision 2020 and the 2009 Protection of Intellectual Property Law.
South Africa	Ten Year Innovation Plan 2008-2018; South Africa Health Research Policy of 2001; Essential National Health Research (ENHR) Strategy 2006, the National Health Act, 2003 (Act No. 61 of 2003), South African Medical Research Council Act Number 58 of 1991, 1997 White Paper for the Transformation of the Health System in South Africa, South Africa's National Research and Development Strategy of 2002, Patents Act 57 of 1978; and Intellectual Property Rights from Publicly Financed Research and Development Act, 2008	Article 27 of 1996 Constitution of the Republic of South Africa and the National Development Plan: Vision for 2030.
Uganda	National Health Policy (NHP) of 2009, Pharmacy and Drugs Act of 1970; 1993 National Drug Authority (NDA) Act; the National Science, Technology and Innovation Policy (NSTIP) of 2009; and National Health Research Policy 2012-2022.	National Drug Policy (NDP) of 2002, the National Industrial Policy (NIP) of 2008, and the Patents Statute No. 10 of 1991
Zambia	National Health Research Strategic Plan 2008-2011; and the National Science and Technology Act of 1997.	Patents Act CAP 400 of the Laws of the Republic of Zambia; the Pharmaceutical Act (No. 14) of 2004; and the National Health Strategic Plan 2006–2010.

Analysis of scientific productivity and innovation

Scientific publications, number of clinical trials, costs and number of commercially viable innovations are often considered as good proxy measures for scientific productivity. The six countries' scientific productivity in health R&D varies.

Based on indicators and statistics produced by the United Nations Educational, Scientific and Cultural Organization (UNESCO), of the six countries, South Africa produced by far the most peer reviewed scientific publications in biomedical research and clinical medicine, and the number of publications increased more than 60% between 2002 and 2008. While the number of peer reviewed publications in the other 5 countries is substantially lower, each did produce more publications over the 6 year period.

The table at right provides an indication of the scientific productivity of the six countries and compares them to Brazil, China and India.

Publications in biomedical research and clinical medicine 2002 and 2008

Country	Biomedical/Clinical Medicine		Percentage change
	2002	2008	
Botswana	23	41	78%
Kenya	223	426	98%
Rwanda	6	17	183%
South Africa	1322	2143	62%
Uganda	97	261	169%
Zambia	44	98	122%
Brazil	4826	12266	154%
China	6545	22663	246%
India	5268	11335	115%

Source: UNESCO Science Report 2010

A continued increase in **scientific productivity** is needed to match levels of economies such as Brazil, China and India. In 2002 and 2008 each of these non-African countries—Brazil, China and India--produced more scientific publications in

biomedical research and clinical medicine than all the six African countries combined.

The number of clinical trials is another measure of scientific productivity. **There has been an increase in the number of clinical trials** conducted in the six African countries

over the past decade or so. All six countries have had or have trials focusing on vaccines for malaria, TB and HIV and ARV-based pills and gels to prevent HIV.

The countries are growing their capacities to approve and regulate clinical research. With the support of institutions such as the European and Developing Countries Clinical Trials Partnership (EDCTP), scientists have been trained, guidelines developed and laboratory infrastructure has been upgraded. However, there are still gaps in capacities to conduct clinical research that need to be addressed. The cost of conducting trials in these countries remain relatively higher compared to India, China and Brazil.

Some of the national health R&D efforts have generated 'potential' innovations or products. For example, Kenya's KEMRI has developed diagnostic tools for Hepatitis B virus (HBV). However, most of the R&D efforts do not have explicit plans for innovation and commercialization of research outputs. They are 'stunted innovations'. In order to foster an environment that would promote innovation, there is need for:

- increased entrepreneurial capacity;
- increased manufacturing capacity;
- stronger linkages between academia, R&D institutes and pharmaceutical industry;
- increased financial mechanisms for commercializing R&D results; and
- a science culture that promotes innovation.

According to the 2012 Global Innovation Index (GII) ranking of 141 countries, the six ESA countries' innovation inputs and outputs are relatively low. The GI measures

Innovation capacity ranking (2012)

Country	Score (0-100)	Rank out of 141
Botswana	31.4	85
Kenya	28.9	96
Rwanda	27.9	102
South Africa	37.4	54
Uganda	25.6	117
Zambia	26.4	107

Source: Global Innovation Index (GII) 2012

or assesses countries' investments in R&D, technological readiness or preparedness to procure and adopt new technologies, conditions for creating new technology-based enterprises and the intensity of collaborations between public and private sector institutions.

Evaluation of policy effectiveness to accelerate health R&D and Innovation

The quality of R&D policies is a key factor in effectiveness. The quality of health R&D policies can be assessed in terms of the following:

- **Relevance:** whether measures are focused on addressing priorities or problems of the national health research system.

- **Policy specificity:** what specific product development initiative the R&D is supposed to contribute to.
- **Performance measures:** specific expected outcomes or performance criteria. In ideal cases, performance criteria are built into specific policies and policy regimes.

Analysis of national challenges for policy implementation

In addition to the quality of the policy itself, the effectiveness of policies for R&D are largely dependent on their implementation. The six countries in this study face challenges of implementing their explicit and implicit policies. This has recognized by some of the governments of the six ESA countries as well as by independent analysts.

Policy implementation and effectiveness

Country	Average Rating	Factors Influencing Policy Implementation
Botswana	3	<ul style="list-style-type: none"> • awareness and knowledge of policies, • financial resources for policy activities, • strength of institutions for policy implementation, • monitoring and evaluation of policies.
Kenya	2.5	<ul style="list-style-type: none"> • Coordination of government ministries' programmes, • political leadership for R&D programmes, • funding for ministries responsible for R&D, • civil society and private sector engagement in R&D policy processes, • policy monitoring and evaluation systems in government.
Rwanda	3	<ul style="list-style-type: none"> • skill-levels of personnel in government, • good executive leadership and coordination of policy implementation, • funding for policy activities
South Africa	2.5	<ul style="list-style-type: none"> • capacities of departments of health, and science and technology to coordinate policy activities across government, • Involvement of private sector and civil society
Uganda	2	<ul style="list-style-type: none"> • mechanisms for institutional coordination • clear indicators for monitoring and evaluating implementation, • level of expertise in relevant departments of government,
Zambia	2	<ul style="list-style-type: none"> • relevance of national policies • public awareness of R&D policies, • financial resources, • clear plans for policy implementation, • coordination of institutions for policy implementation

Challenges of policy implementation

In Botswana, “It is a commonly expressed view in Botswana that the problems that exist are in the main not the result of poor policies - rather they are largely the result of a failure to implement the existing policies. For Botswana to realise its Vision, there will be a need to address implementation problems, and to introduce stringent monitoring mechanisms at every level of the public sector. Although Government has recognised this, measures introduced to date such as the Standing Committee on Project Implementation (SCOPI) and Work Improvement Teams (WITS) are yet to bear fruit. These and other pertinent initiatives and structures must be given objectively quantifiable and monitorable targets and implementation schedules.”

Republic of Botswana (2012), National Health Policy: Towards a Healthier Botswana. Ministry of Health.

“Kenya does not seem to be an exception when it comes to difficulties of implementing policies in the health care sector, although policy documents are well supported by accurate data. Implementation of the first National Health Sector Strategic Plan 1999-2004 (NHSSP 1) was far from accomplished. ... One example is the failure to meet the set target of allocating 15 percent of total government spending to the health sector as agreed in the Abuja declaration. Possible explanations of the weak policy implementation during the last decade include insufficient human and financial resources, unrealistic policy targets and that the health sector has suffered from a lack of political commitment, ...”

Glennard, A., and Maina, T., (2007), ‘Reversing the trend of weak policy implementation in the Kenyan health sector?—a study of budget allocation and spending of health resources versus set priorities’, Health Research Policy and Systems 2007, 5.3 doi:10.1186/1478-4505-5-3 www.health-policy-systems.com/content/5/1/3

We asked over 50 interviewees knowledgeable on the subject to rate [on a scale of 1(low) to 5(high)] the level of implementation of policies for health R&D and to outline influencing factors (Table 6). Themes that emerged from these discussions included:

- Limited awareness of the specific health R&D policies by public and civil servants. In most of the countries technocrats responsible for promoting policy implementation are not adequately knowledgeable on the specific policy measures.
- Lack of specificity and accompanying implementation plans. Many of the policies could benefit from increased conceptual clarity, prioritization, specificity and detailed implementation plans.
- Limited engagement of civil society in developing and keeping government accountable for implementation of

health R&D policy: Most countries could benefit from increased engagement with civil society promoting health R&D.

- Inadequate political leadership and support for health R&D in most of the countries. Bodies such as parliamentary committees on health, science and technology are not actively engaged in promoting policies for health R&D and innovation.
- Insufficient budget allocations. Both the size and duration of budget has historically constrained implementation of policies.

The six countries have various institutional arrangements for implementing policies for health R&D. In general, the *loci of health R&D policy* are diffused across different institutions. It is not easy to hold one particular national institution accountable for policy implementation. In the case of approval and regulation of clinical trials

some of the countries have ambiguous or unclear institutional arrangements.

There is room to *strengthen links between R&D institutes and industry*. In all the six countries the health R&D activities are not directly linked to pharmaceutical companies’ investments and innovation needs. Even in countries such as Kenya and South Africa, where there is a significant presence of international pharmaceutical companies, there are few public-private R&D initiatives and few cases of private sector financing health R&D in public institutes. Increased linkages between public institutes and industry could significantly increase opportunities to turn R&D into health innovations. In order to ensure this, national health R&D policies and programmes should foster public-private sector links including having *industrial policies that are explicitly related to health R&D policies*.

Another institutional challenge relates to the *absence of civil society organizations dedicated to advocating for health R&D and innovations*. Civil society engagement has often led to better prioritization of R&D projects, design and implementation of R&D policies. There are very few NGOs engaged in health R&D policy advocacy. They include the African Networks for Health Research and Development (AFRO-NETS), the Africa Medical Research Foundation (AMREF) and the Kenyan Consortium for National Health Research (CNHR). This study found that there are no organized national health R&D policy advocacy programmes by NGOs in the countries.

Regional and international challenges for policy implementation

There are many regional and international initiatives that support or complement national R&D activities and policy instruments. Some of the regional initiatives include:

- African Biosciences Initiative of the African Union (AU) and its New Partnership for Africa’s Development (NEPAD),
- AU Pharmaceutical Manufacturing Plan,
- East African Community (EAC) Pharmaceutical Manufacturing Business Plan

- Southern African Development Community (SADC) Protocol on Health
- SADC Pharmaceutical Manufacturing Business Plan.

These initiatives aim at promoting the translation of health R&D into pharmaceutical innovations across regions. However, harmonization of national and regional initiatives for maximum impact is yet to be fully realized. The constraints include limited infrastructure, shortage of research scientists, lack of adequate funding and need for stronger political leadership and championship.

Recommendations to strengthen policies for health R&D and Innovation

Lessons from Brazil, China and India

China, Brazil and India have promoted both basic and applied research in and for their research institutes and biotechnology and pharmaceutical companies.

Brazil's experience demonstrates how important investment in health research is for industrial production of medicines, vaccines, and diagnostics and the knock-on benefits for the economy. Between 2000 and 2003 the country devoted 3.3% of public national expenditure to health R&D. International or external funding accounted for only 3.5% of the budget for national health R&D.

In addition to making significant investments in R&D for innovation, governments of the three countries have promoted the emergence and growth of local enterprises for health innovation. They have growing numbers of local private firms in life sciences. India has at least 12 vaccine companies that generated US\$2.5 billion in 2007/8. The emergence of these companies is largely associated with a range of policy incentives, including tax credits that the Government of India introduced. There has also been considerable increase in the number of

firms engaged in health innovation activities in Brazil and China due to incentive measures deliberately introduced by their governments.

The countries have also created innovation mechanisms for funding start-up companies. There are many venture capital firms that have been created to spur health R&D and innovation. Companies such as BioVenda China, DFJ-FIR Capital of Brazil and Biotechnology Venture Fund of India are specifically dedicated to funding R&D and innovation in biopharmaceutical sectors of the countries.

The success of Brazil, India and China is a policy effectiveness success story. It offers three key lessons for Africa. The first pertains to *policy focus and coherence*. The three have modernized their health R&D policy regimes by **putting more emphasis on R&D for innovation**. Health R&D activities are part and parcel of their national innovation systems. Health R&D policies are not standalone instruments.

They are linked to other forms of innovation policies such as education and industrial policies. The policies and regulations for R&D such as clinical trials are clear and coherent **with the aim of fast-tracking approvals**. For example, India's policies require that applications for clinical trials be reviewed within 45 days from date of submission.

The second lesson is about **building and endowing national centres of excellence** in health R&D for innovation. The three countries have invested significantly in establishing world class research institutes specializing in different areas of R&D. For example, Brazil has the Oswaldo Cruz Foundation (Fiocruz) that has more than 1200 full-time researchers and a budget of more US\$250 million. Less than 5% of the country's health R&D budget is funded by external international donors.

The third lesson is about **leadership for health R&D**. In the three countries there is executive and political leadership for R&D. For example, in China the Chinese

Academy of Sciences works with the office of the president and the national parliament to determine R&D priorities and allocation of budgets. In the African countries the national academies are not actively engaged in health R&D policy development. The exception is in South Africa where the Academy of Sciences of South Africa (ASSAf) has been recently involved in conducting policy analysis on clinical trials regulatory mechanisms.

Health R&D for innovation in Brazil

Brazil's health sector accounts for "7.5% to 8% of the country's gross domestic product (GDP). Around 40% belongs to the public sector. It encompasses a huge network of services and an important industrial complex responsible for the production of medicines, diagnostics, health equipment and vaccines. This complex is quite technology-intensive although currently R&D activities are performed mainly abroad. A recent survey on financial flows for health research in Brazil, sponsored by the Ministry of Health, revealed that between 2000 and 2002, mean annual expenditures on health R&D "reached US\$ 573 million

Source: Guimarães, R., et. al. 'Health technology and innovation: 'a Brazilian experience

Priority actions for more effective policies and policy impact

There are a number of actions or measures that should be taken in order to improve the effectiveness of policies for health R&D in general and to promote R&D for innovation in Africa. The table (previous page) outlines recommended actions or measures.

Summary recommendations

Need	Recommendations
Health R&D capacities of the six countries (human resources and infrastructure) need to be strengthened, particularly in areas related to biomedical research and clinical medicine	Conduct an assessment of national health R&D capacity needs and design specific national programmes for capacity strengthening with emphasis on training and infrastructure development. The countries need to establish and fund centres of excellence in health R&D.
Consolidation of R&D policies into one core or main framework or document.	Each country should review its existing implicit and explicit policies for R&D and develop a coherent national health R&D policy framework .
Increased focus on innovation	Each country should design a National Health Innovation Strategy (NHIS) that contains explicit policy actions for turning R&D into products, processes and economically useful knowledge on diseases and health systems. This NIS should be part of the national health R&D policy framework.
Monitoring and evaluating the implementation of existing national policies for health R&D	Each country should ensure that its national health R&D policy framework and the proposed integral NIS have clear monitoring and evaluation indicators .
Increased spending on health R&D	Institutions such as COHRED, AMREF, AU and NEPAD would develop an African framework and indicators for monitoring health R&D expenditure . Each country should have a specific budget line for health R&D integrated into annual national budget framework. Each country should be required to prepare a biannual report on health R&D status and financing
Increased capacity of regulatory frameworks and institutions	There is need to conduct a comprehensive study on the status, trends and economics of clinical trials in Africa . Such a study will provide empirical evidence needed to adjust policies and reform regulatory frameworks in order to enlarge the economic potential of clinical trials in Africa. Each country should review and reform its institutional arrangements—including procedures—to ensure that they provide incentives and are cost effective for health R&D.
Increased leadership and public constituencies for health R&D	To strengthen political and legislative leadership, workshops on promoting health R&D policy should be organized for parliamentary committees on health, science and technology, finance and planning, etc. in each of the countries Existing health-sector NGOs' capacities should be strengthened to integrate health R&D policy advocacy into their programmes.

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This policy brief is based, in part, on a recent study on the effectiveness of policies for health R&D in six African countries: Botswana, Rwanda, Kenya, South Africa, Uganda and Zambia. For detailed and individual country analysis, see Mugabe, J. et al. (To be published in 2013), *Turning Health Research and Development into Innovations in Africa: An Assessment of the Effectiveness of National Policies in Eastern and Southern Africa*.