

# Expenditures on health research in sub-Saharan African countries: results of a questionnaire-based survey

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## Summary

**Objective:** To estimate the sources of funds for health research (revenue) and the uses of these funds (expenditure).

**Design:** A structured questionnaire was used to solicit financial information from health research institutions.

**Setting:** Forty-two sub-Saharan African countries.

**Participants:** Key informants in 847 health research institutions in the 42 sub-Saharan African countries.

**Main outcome measures:** Expenditure on health research by institutions, funders and subject areas.

**Results:** An estimated total of US\$ 302 million was spent on health research by institutions that responded to the survey in the World Health Organization (WHO) African Region for the biennium 2005–2006. The most notable funders for health research activities were external funding, ministries of health, other government ministries, own funds and non-profit institutions. Most types of health research performers spent significant portions of their resources on in-house research, with medical schools spending 82% and government agencies 62%. Hospitals spent 38% of their resources on management, and other institutions (universities, firms, etc.) spent 87% of their resources on capital investment. Research on human immunodeficiency virus/tuberculosis and malaria accounted for 30% of funds, followed by research on other communicable diseases and maternal, perinatal and nutritional conditions (23%).

**Conclusions:** Research on major health problems of the Region, such as communicable diseases, accounts for most of the research expenditures. However, the total expenditure is very low compared with other WHO regions.

## Keywords

health research expenditure, health research finance, health research institutions, health research in Africa

the Organisation for Economic Co-operation and Development and Latin American countries can and have estimated national health research expenditures using data from their general research and development surveys. But even up to 2004, there had been limited similar measurement activities carried out in low- and middle-income countries, particularly in Africa. The Global Forum for Health Research (the Global Forum), the Council on Health Research for Development and the World Health Organization (WHO) have been working jointly to rectify the situation.

The motivation to promote the tracking of financial flows for health research in low- and middle-income countries came after many international, regional and national organisations, including the Global Forum, argued that a major mismatch exists in research funding in relation to the burden of disease and the locations of the populations who experience this burden. This imbalance is referred to as the ‘10/90 gap’ where only 10% of the world’s research funds are estimated to address 90% of the diseases or populations that experience this health burden.<sup>3</sup>

The Global Forum reported that the world spent an estimated US\$ 84.9 billion in 1998 and US\$ 125.8 billion in 2003 on health research.<sup>4</sup> Of these total values, about US\$ 3.6 billion in 1998 and US\$ 4.1 billion in 2003 were spent in low- and middle-income countries, with the latter including mainly Latin American and Asian countries. The sources of funds for low- and middle-income countries in 2003 were estimated as follows: 59% public (including donors), 34% private for-profit firms and 7% private not-for-profit organisations. The low- and middle-income countries’ health research spending in 2003 by type of performer was estimated as follows: 41% government, 38% private for-profit firms, 20% higher education institutions and 1% private not-for-profit organisations.

This study was conducted to describe the financial dimension of health research in the WHO

## Introduction

In the past decade, there has been a push to expand the monitoring and tracking of financial resources for health research, particularly in low- and middle-income countries. Although with some constraints,<sup>1,2</sup>

African Region. The data are based on a survey of health research institutions conducted by WHO in 42 sub-Saharan African countries. This survey collected financial data from ‘performers’ of health research who were then able to report on both the sources of funds for health research (revenue) and the uses of these funds (expenditure).

## Methods

The methods followed to assess national health information systems are described elsewhere<sup>5</sup> but are summarised briefly here.

The survey used Tool 6 from the Health Research System Analysis (HRSA) Initiative: Methods for Collecting Benchmarks and Systems Analysis.<sup>6</sup> Within the institutional survey, seven questionnaires (representing separate ‘modules’) were completed by the respondent institutions. This report draws on data from two of those questionnaires:

- Module 1000–Identification, introduction and background information
- Module 3000–Research financing

The categories or typology of health research performers used in the survey followed closely those in the research and development surveys of the Organisation for Economic Cooperation and Development (business, government, higher education and private non-profit institutions). They were modified by the Global Forum on Health Research (2001)<sup>7</sup> to suit health research and development and to include as specific categories hospitals, medical schools and pharmaceutical firms. The performer categories in the survey were as follows: (1) government agencies; (2) hospitals; (3) independent research institutions; (4) medical schools; (5) private non-profit institutions; (6) other higher education; (7) pharmaceutical firms; and (8) other business firms. The last three categories (6, 7 and 8) were combined under an ‘other’ category for purposes of subsequent analyses because of small numbers. We used *IBM® SPSS® Statistics* Version 19 statistical software to analyse the data.

## Results

The institution survey dataset included responses from up to 847 institutions in 42 countries in the Region (all except Algeria, Angola, Sierra Leone and South Africa). Half of the respondent institutions were under 30 years of age; 70.3% belonged to the public sector; 12.5% were independent research institutions and 64.3% functioned at the national level (Table 1).

**Table 1.** Characteristics of health research institutions in 42 sub-Saharan African countries, 2009.

Characteristics	Health research institutions	
	No.*	%
Age of institution (years) (n = 694)		
<30	426	61
30–59	200	29
≥60	68	10
Sector the institution belong to (n = 762)		
Public	536	70
Private not-for-profit	132	17
Para-state	37	5
Private for-profit	26	3
Other	31	4
Type of institution (n = 847)		
Government agencies	257	30
Hospitals	154	18
Medical schools	108	13
Independent research institutions	106	13
Other research institutions (non-governmental organisations, charities)	105	12
Other universities	95	11
Other	22	3
Level at which institution functions (n = 751)		
National	483	64
Local	140	19
Regional	60	8

(continued)

**Table 1.** Continued.

Characteristics	Health research institutions	
	No.*	%
International	55	7
Other	13	2
Primary functions of institution (n = 697)		
Conduct research on health topics	374	54
Academic	373	54
Provide health services	338	48
Conduct research on non-health topics	122	18
Product development or distribution	74	11
Other	128	18
National official or working language (n = 847)		
French	445	53
English	285	34
Other	117	14
Institution has mandate on		
Research of all types	571	79 (n = 723)
Health research	563	77 (n = 731)

\*Number of respondent health institutions, out of 847 surveyed.

Total health research expenditures for the African countries included in the survey were computed by taking the sum of itemised expenditures for the biennium 2005–2006. The estimates for total expenditure in the Region were considered ‘minimum’ levels because of the ‘partial’ coverage of the institution survey.

At the very least, an estimated total of US\$ 302 million was spent for health research by institutions that responded to the survey in the Region for the biennium 2005–2006 (Table 2). By extrapolation, the

estimated biennial expenditure for all health research institutions in the Region was US\$ 1.5 billion (US\$ 750 million per annum). This represents roughly one-sixth of the total annual expenditures reported by the Global Forum for low- and middle-income countries in 2003 of US\$ 4.1 billion.

### *Payment for health research in 2005–2006*

A total of 27 categories of funders for health research were used in the survey; however, for the purposes of this report, this number was reduced to just nine categories:

1. Ministries of health
2. Non-ministry of health government ministries (e.g. ministry of education, ministry of science and technology)
3. Local government units (e.g. state or provincial government, municipal government)
4. Other government entities (e.g. social security funds, public corporations)
5. Private non-profit institutions
6. Private corporations or firms (other than health insurance)
7. Other private entities (e.g. household out-of-pocket and private health insurance)
8. Rest-of-the-world (e.g. bilateral and multilateral funds)
9. Internal institutional revenues or own funds (e.g. fees collected by hospitals and universities)

Table 3 shows how, for each type of institution, health research expenditures in 2005–2006 were paid for, expressed in percentage terms by type of funder.

Looking across all performer types, the most notable funders for health research activities were external funding, ministry of health, non-ministry of health government ministries, own funds and non-profit institutions. The different types of performers varied in terms of the major funder for their research activities. The patterns for each category of performer reflected the nature of their functions and financial base. Medical schools, which are service providers and receive fees, covered some of their research expenditures from their own internally generated revenues. Reliance on ministry of health funds was reported by government agencies and hospitals. Other types of research performers, including universities, relied heaviest on non-ministry of health government ministry funds. Independent research institutions, hospitals, medical schools and non-governmental organisations

**Table 2.** Total biennial expenditures on health research (US\$ thousands) spent by research institutions in sub-Saharan Africa, 2005–2006.

Type of expenditure	No. of responses (%)	Mean expenditure	Estimated expenditure (all 847 institutions)
Capital investment	83 (910)	1725.0	1,460,776
In-house researchers	102 (12)	1102.0	933,234
Managers and administrators	79 (9)	174.2	147,507
Ancillary services	78 (9)	153.9	130,316
Consumed goods	74 (9)	142.3	120,529
Research managers and administrators	80 (9)	1394.7	104,168
Individual contracts	75 (9)	107.4	90,980
External collaborations	64 (8)	35.5	30,044
Total			3,017,557
Total excluding capital investments			1,556,781

**Table 3.** Health research expenditures expressed in percentage terms by type of funder, sub-Saharan Africa, 2005–2006.

Type of funder	Type of institution						Total (%)
	Government agencies (%)	Hospitals (%)	Independent research institutions (%)	Medical schools (%)	Other (non-governmental organisation, charity) (%)	Other (universities, business firms) (%)	
Foreign (rest-of-the-world)	47	29	54	31	64	63	48
Ministry of health	45	28	21	34	29	44	36
Non-ministry of health	48	28	67	49	41	37	44
Internal institutional revenue/income	16	17	62	25	38	37	26
Non-profit institutions	16	–	55	16	61	41	23
Private business firms	10	–	57	2	63	41	19
Other government units	11	4	38	16	13	2	11
Local government units	6	4	38	–	8	26	9
Other private entities	8	–	–	19	31	–	8

obtained significant funding from rest-of-the-world funds.

### Use of funds for health research in 2005–2006

Use of health research funds was reported in the performer survey in terms of expense items and research

topics. For the purposes of this report, the categories for expense item have been regrouped to:

- In-house research (including salaries of in-house researchers and expenditures for ancillary services supporting health research and supplies)

- Contracts to individual researchers
- Contracts to other research institutions' management of research activities (including research managers and general administration dealing with finance and personnel matters)
- Capital investment
- Consumer goods
- Ancillary services
- External collaborations

Table 4 shows how, for each type of institution, health research expenditures in 2005–2006 were used by expense item, with the distribution expressed in percentage terms.

Most types of health research performers spent significant portions of their resources for research done in-house, medical schools spending 82% and government agencies 62%. Hospitals spent 38% of their resources on management, and other institutions (universities, firms, etc.) spent 87% of their resources on capital investment.

Expenditures on the 13 categories of health research topics used in the survey are shown for 2005–2006 (Table 5), with the distribution expressed in percentage terms. Over 80% of expenditures were for research on four topics: human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), tuberculosis (TB) and malaria (30%); other communicable diseases and maternal, perinatal and nutritional conditions (23%); innovations (14%); and health impact (14%). Basic research accounted for 8% of expenditures.

Research on HIV/AIDS, TB and malaria took a significant share of the health research funds of government agencies and independent research institutions. Research on other communicable diseases and maternal, perinatal and nutritional conditions was an important component of medical schools. The study of health impacts of health policies and programmes was an important component of research in hospitals, while research on innovative practices and product development was also important to hospitals and other agencies (universities, business firms, etc.). Basic research also took a significant share of the expenditures of these other types of performers.

The study of health services delivery received the most attention by non-governmental organisations. Prevention and treatment of HIV/AIDS, TB and malaria, and other communicable diseases and maternal, perinatal and nutritional conditions were being funded across all types of institutions. Studies on the health system were generally carried out by government agencies.

**Table 4.** Biennial expenditures expressed on health research by types of institutions (\$US thousands), sub-Saharan Africa, 2005–2006.

Biennial expenditures (exact)	Other (universities, business firms)		Other (non-governmental organisations, charity)		Medical schools		Independent research institutions		Government agencies		Hospitals		Total	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Capital investment	130,235 (87)	5894 (8)	1601 (4)	4076 (12)	912 (25)	428 (9)	143,146 (46)							
In-house researchers	12,038 (8)	43,936 (59)	37,369 (82)	16,447 (48)	2262 (62)	333 (7)	112,385 (36)							
Managers and administrators	6542 (4)	4263 (6)	335 (1)	725 (2)	115 (3)	1778 (38)	13,758 (4)							
Ancillary services	55 (0.0)	4230 (6)	2650 (6)	4055 (12)	161 (4)	849 (18)	12,001 (4)							
Consumer goods	68 (0.0)	2881 (4)	1207 (3)	5889 (17)	127 (3)	358 (8)	10,530 (3)							
Research managers and administrators	217 (0.01)	8435 (11)	–	680 (2)	83 (2)	423 (9)	9839 (3)							
Individual contracts	–	3539 (5)	2198 (5)	2105 (6)	–	214 (5)	8056 (3)							
External collaborations	–	1608 (2)	–	368 (1)	–	294 (6)	2270 (1)							
Total	149,156 (100)	74,785 (100)	45,360 (100)	34,345 (100)	3660 (100)	4678 (100)	311,985 (100)							

**Table 5.** Percentage biennial expenditures on specific subject areas of health research institutions in sub-Saharan African countries, 2005–2006.

Area of health research	Government agencies (%)	Hospitals (%)	Independent research institutions (%)	Medical schools (%)	Other (non-governmental organisation, charity) (%)	Other (universities, business firms) (%)	Total (%)
HIV/AIDS, TB, malaria	69	12	50	5	13	5	30
Other communicable diseases and maternal, perinatal, nutritional conditions	5	0	9	63	16	2	23
Health impact (health consequences of policies or programmes)	2	48	2	9	15	14	14
Innovative practices/products development	6	39	17	1	0	34	14
Basic, fundamental (health) research	1	1	12	11	12	41	8
Health services delivery	1	0	1	4	35	2	3
Health policy and systems	10	0	1	1	0	0	3
Risk factors outside the health system/social determinants	4	0	4	2	7	0	2
Non-communicable diseases	1	1	3	1	0	1	1
Non-health consequences of illness/injury	0	1	0	3	0	0	1
Risk factors within the health system	2	0	1	1	0	0	1
All injuries, unintentional or intentional	0	0	0	1	0	0	0
Disease/health monitoring and surveillance	0	0	0	0	0	1	0
Total	100	100	100	100	100	100	100

## Discussion

At least US\$ 302 million was spent on health research in the Africa Region in the biennium 2005–2006.

The different types of health research performers or institutions varied in terms of the major funders for their research activities, reflecting their functions and operational structure. For example, medical schools are service providers receiving fees for services rendered, and part of their research is paid out of their internally generated funds. Government agencies expectedly rely on government budgets. Hospitals, medical schools, independent research institutions and non-governmental organisations

rely heavily on the rest of the world for donor funds for their health research activities.

Except for independent research institutions and hospitals, most performers carry out research activities in-house and through contracts to individual persons. Hospitals spend 38% of their resources on management, and other institutions such as universities and firms spend 87% on capital investment.

Four topics account for 81% of expenditures: HIV/AIDS, TB and malaria; other communicable diseases and maternal, perinatal and nutritional conditions; innovations; and health impact. Research on HIV/TB and malaria accounts for 30% of the funds, followed by research on other

communicable diseases and maternal, perinatal, nutritional conditions (23%). Innovation and health impact each account for 14%, while basic research accounts for 8%.

The performer survey used in this report is the result of a start-up effort to establish a system for collecting information related to health research in the Region. The data collection instruments developed by the HRSA Initiative for the health research performer surveys were implemented for the first time in the 42 participating African countries included in this report. The pilot activity was expectedly not perfect, but it served very important purposes. First, it contributed new information about health research in Africa, some of which have been presented above. Second, it provided valuable lessons on what needs to be addressed to improve the outcome of similar activities that will be conducted in the future. The findings discussed in this section relate to some operational aspects of the conduct of the performer survey and the outcomes particularly of the financial module of the survey.

The estimated number of institutions that were identified by country teams to be performing health research activities across the 42 countries was 1496. For lack of any other information, this total number is used as a preliminary estimate,  $N$ , of the 'universe' or population of health research performers in the 42 countries. The number of respondents to the survey, referred to as survey participants or sample respondents ( $n$ ), came to 684 institutions. However, of the 684 institutional survey participants, only 166 institutions reported 2005–2006 health research financial data, representing only about 24% of the sample ( $166/n = 166/684$ ) and 11% of the population ( $166/N = 166/1496$ ). The selection of the sample institutions,  $n$ , for the survey from among the population of institutions,  $N$ , was supposed to follow a systematic, predetermined sampling scheme. However, this requires further documentation.

Therefore, for this preliminary analysis, the relationship between the distribution of sample institutions,  $n$  (i.e. distribution according to specified institution characteristics such as type of institution and expected level of research on health topics), and the distribution of the population of institutions,  $N$ , is not known. This particular module of the survey was expected to be the most difficult for institutions to document responses and was expected to have the lowest response rates. The importance of building up transparent approaches to document the flow of research funds within institutions, and for which topics, led to the decision to maintain this module despite the expected challenges.

Building on these expectations, to improve the outcome of the financial module if and when the performer surveys are repeated in the future, a number of questions need to be answered and acted upon accordingly. These include:

- Is the problem of poor response rate to the financial module a result of issues on the respondent side or issues about the questionnaire design, or both?
- Are institutions keeping track of what they do in financial terms?
- Are institutions willing to share financial data?
- How can sharing of financial data be promoted?
- How can the design of the financial module questionnaire be improved to encourage and facilitate its accomplishment?
- Is there a better or simpler way to track health research performer expenditures by research topic?

Resolving these issues would increase transparency and provide better data in the future. Survey results from the financial module can be used for a wider range of analyses, including country-level analysis, if the selection of survey respondents is done systematically based on pre-set, statistically determined, country sampling schemes. Efforts should also be made for follow-ups or call-backs to maintain the original sample selected and to reduce incomplete questionnaires.

The survey results used in the report come from a start-up effort to collect Region-wide data on health research in Africa. Other findings reported on pertain to the general usefulness of the survey and lessons learned. Being a first-time effort, it contributed new information about health research in Africa, such as those presented in this paper.

## Conclusions

The survey shows that research on major health problems of the Region, such as communicable diseases, accounts for most of the research expenditures. However, the total expenditure is very low compared with other WHO regions. Future studies could improve the quality of financial data and expand the usefulness of the data for analysis purposes.

### Declarations

**Competing interests:** None declared

**Funding:** WHO Regional Office for Africa.

**Ethical approval:** Not required because the survey did not touch on ethical issues requiring individual consent.

**Guarantor:** DK

**Contributorship:** DK wrote the paper and carried out statistical analyses; CZ, PEM, IS and WK reviewed the paper and assisted with fieldwork; PSLD reviewed the design of the study and provided support and overall leadership.

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