

Status of South Africa's National Health Research System: a 2018 update

Authors:

Flavia Senkubugeⁱ

Moses Bockarieⁱⁱⁱ

Michael Kahn^v

Tshilidzi Muthivhiⁱⁱ

Thomas Nyirendaⁱⁱⁱ

Glaudina Loots^{vi}

Michael Makangaⁱⁱⁱ

Joses Muthuri Kirigia^{iv}

Joyce Shirindeⁱ

South Africa's pursuit of universal health coverage requires contextualised scientific knowledge to guide the development of health system-strengthening strategies. Urgent concerted action is needed to strengthen the national health research system (NHRS), with a view to generating high-quality knowledge and promoting its utilisation in population health.

This chapter reports on a study that evaluated some aspects of South Africa's NHRS which includes the computation of a NHRS barometer score.

The overall NHRS barometer score was 83.7% with indications that South Africa needs to address deficits in NHRS human and physical resources, and financing. However, the overall score for South Africa exceeds those of many other African countries, thus providing important lessons and opportunities for learning.

South Africa needs to address deficits in human and physical resources, and financing of the national health research system.

i School of Health Systems and Public Health, University of Pretoria

ii South African National Department of Health

iii European & Developing Countries Clinical Trials Partnership (EDCTP), The Hague, The Netherlands

iv European & Developing Countries Clinical Trials Partnership National Health Research System Consultant, Nairobi, Kenya

v School of Government, University of the Western Cape

vi South African National Department of Science and Technology

Introduction

South Africa's pursuit of universal health coverage (UHC) requires contextualised scientific knowledge to guide development of health system-strengthening strategies, and to spur inter-sectoral action tackling the social determinants of health. Urgent concerted action is needed to strengthen the national health research system (NHRS), with a view to generating high-quality knowledge and promoting its utilisation in population health.

In 2015, South Africa invested around 8% of its gross domestic product (GDP) and about 14% of general government expenditure on health.¹ The country fell short of the Organisation of African Unity's (OAU) Abuja Declaration target by one percentage point.² Current health expenditure is 54% domestic general government health expenditure, 44% domestic private health expenditure, and 2% external health expenditure.¹

The United Nations Sustainable Development Goal 3 focuses on ensuring healthy lives and promoting well-being for all, at all ages. Target 3.8 aims to achieve UHC.³ Currently, South Africa's total health expenditure per person per year is less than the projected minimum of US\$ 533 (57% of which should be from government) needed to attain UHC.⁴ This partially accounts for the suboptimal essential health services coverage index of 67% in 2015.⁵

The first NHRS status report published by Senkubuge and Mayosi in 2012 highlighted the weaknesses inherent in the system.⁶ A survey conducted by the World Health Organization (WHO) in 2014 estimated South Africa's NHRS barometer score at 79%, higher than the average of 37% for high- and upper-middle-income African Region countries.⁷ In 2015, the sixty-ninth WHO Regional Committee for Africa adopted a regional strategy on research for health⁸ calling upon Member States to strengthen their NHRS.

The purpose of the 2018 survey (reported on here) was to gauge South Africa's progress in NHRS strengthening, three years after adoption of the regional strategy.

The specific objectives of this study were to: assess some aspects of the South Africa's NHRS; estimate NHRS barometer scores for South Africa; identify facilitating and constraining factors; and make recommendations to enhance South Africa's NHRS.

A number of studies have attempted to assess the status of NHRS in WHO African Region countries by applying the Pang et al.⁹ conceptual framework, which consists of two goals and four functions. Since the purpose of the article by Pang et al.⁵ was to propose a theoretical framework, it did not delve into how to operationalise the framework, and none of the African Region studies reviewed for this study attempted to develop an index or barometer for tracking NHRS performance.¹⁰⁻¹⁵

To date, only two published studies in the African Region have attempted to develop a NHRS index to monitor performance over time. In 2015, Kirigia et al.¹⁶ developed the Malawi national NHRS index, and in 2016, Kirigia et al.¹⁶ used regional data collected in 2014¹⁴ to develop a NHRS barometer for use in the African Region. The barometer has four functions (governance of research for health (R4H); developing and sustaining resources for R4H; producing and using research; and financing of R4H), and 17 sub-functions. The authors categorised individual countries as below average if their NHRS barometer score was less than 50%, average if the score was

50%, and above average if over 50%. The overall African Region score was 42%, while South Africa's score was 79%, signifying above-average NHRS performance.

Methods

South Africa's NHRS barometer was developed using the following six steps proposed by Kirigia.¹⁷

Step 1: Delineate the goals and functions of NHRS

The Pang et al.⁹ NHRS conceptual framework was applied, consisting of two goals (advancement of scientific knowledge, and utilisation of knowledge for health development) and four functions, namely NHRS leadership and governance; developing and sustaining resources for NHRS; producing and using R4H; and financing of NHRS.

Step 2: Delineate the sub-functions under each NHRS function

The sub-functions, listed in Table 1, were used to calculate the South African NHRS Barometer.

Table 1: Sub-functions used to calculate South Africa's NHRS barometer, 2018

A. Leadership and governance	
1.	Existence of a national policy on R4H
2.	Existence of laws/legislation relating to R4H
3.	Existence of a R4H strategic plan
4.	Existence of a national research ethics review committee
5.	Existence of a national R4H priority list/agenda
6.	Existence of a national health research focal point/unit
B. Developing and sustaining resources	
7.	Existence of a health research programme/directorate/department in the Ministry of Health (MoH) (Health Research and Policy (HRP))
8.	Number of technical and support staff in HRP per 100 000 population
9.	Whether HRP has internet connectivity
10.	Presence of a Medical Research Council
11.	Number of universities conducting R4H per million population
12.	Existence of non-governmental organisation(s) (NGOs) undertaking R4H
C. Producing and utilising research	
13.	Existence of a health research management forum
14.	Existence of knowledge-translation platform(s)
15.	Total number of R4H publications per 100 000 population in 2017
D. Financing R4H	
16.	Presence of R4H budget within government budget
17.	Government allocation to R4H as a percentage of NDoH budget in the 2017/18 financial year

Source: Kirigia, 2018.¹⁷

Step 3: Collect data on each NHRS sub-function

The study used the EDCTP African Participating States: National Health Research System Assessment Questionnaire,¹⁷ which has 10 sections. The questionnaire was administered to both the National Department of Health (NDoH) and the Department of Science and Technology (DoST) and relevant local documents were reviewed. The data were analysed using Excel Software.

Step 4: Scoring of NHRS sub-functions

Thirteen of the 17 sub-functions were binary variables (the existence or non-existence of a NHRS attribute). Each sub-function scored 1 if it was reported to exist, and 0 if it did not. Four sub-functions were continuous variables. Further information on how the actual scores were calculated is provided elsewhere.^{7,16}

Step 5: Calculate NHRS barometer sub-function indices for South Africa

The formula used to calculate indices for the 17 sub-functions was similar to that used by the United Nations Development Programme to calculate the Human Development Index,¹⁸ the Health Development Governance Index,¹⁹ Malawi NHRS Index,¹⁶ African NHRS Barometer,⁷ and EDCTP African Participating States NHRS Barometer.¹⁷

Step 6: Calculate the overall NHRS barometer score for South Africa

South Africa's overall NHRS barometer score was calculated as an arithmetic mean of sub-function indices 1 to 17.

Results and discussion

Leadership and governance

Article 27(1) of South Africa's Constitution states that "Everyone has the right to have access to: (a) health services, including reproductive health care; (b) sufficient food and water; and (c) social security..."²⁰

Chapter five of the 1997 White Paper for the Transformation of the Health System discussed essential national health research, and stipulated that the Directorate of Health Information, Evaluation and Research be responsible for developing a national health research and funding strategy, coordinating an essential health research programme, and ensuring utilisation of health systems research in policy, planning, service delivery, health services management, and evaluation.²¹ It called for participatory development of an action-oriented R4H agenda to address major population health problems.

In 2001, South Africa developed a health research policy.²² Goals included development of a NHRS; promotion of innovation in health and service delivery; advancement of knowledge; development of a coordinated and adequately funded research agenda; development of capacities to conduct and utilise R4H; and encouraging uptake of research in health system development.²²

In 2014, the country developed the National Development Plan 2030.²³ The chapter 'Promoting health' set out nine priorities, with the last priority being to improve quality by using evidence. This priority underscores the need to base health policy, planning,

resource allocation, public health and clinical practice on empirical evidence, which in turn requires an efficiently functioning NHRS.

The NDoH Strategic Plan 2015/16–2019/20 details how right to health services will be realised.²⁴ One of the strategic objectives is to ensure that research contributes to the improvement of health outcomes. The NDoH intends to accomplish this by developing and implementing a national health research strategy by 2019/20. The strategy will build on the priority R4H agenda and seven recommendations of the 2011 National Health Research Summit.²⁵ The recommendations include allocation of 2% of the national health budget to health research and development (R&D); doubling the number of health researchers in five years; developing health research infrastructure in academic health complexes; creation of a National Priority Health Research Fund; improving the efficiency of the Medicines Control Council (MCC); development of a National Planning, Coordination and Translation System for Health Research; and developing a NHRS monitoring and evaluation mechanism.²⁵

The vehicle for progressive realisation of the right to health services is the National Health Insurance Fund (NHIF), established by the National Health Insurance Bill.²⁶ The goal of the NHIF is to realise sustainable and affordable UHC for all South African citizens and permanent residents. The Act requires the NHIF to contribute to the development and maintenance of a National Health Information Repository and Data System to facilitate research, monitoring and evaluation, and access to information. Optimal operation of the NHIF system will demand various forms of evidence from R4H.

Chapter nine of the South African National Health Act of 2003 (National Health Research and Information),²⁷ mandates the Minister of Health to establish a 15-person National Health Research Committee (NHRC) to develop a national R4H priority agenda; ensure that R4H agendas and resources focus on national priority health problems; develop an integrated national strategy for health research; and coordinate the research activities of public health authorities. It also establishes a National Health Research Ethics Council (NHREC), which is mandated to develop guidelines for institutional research ethics committees (IRECs), register and audit IRECs, and advise national and provincial departments of health on all research ethics matters. The Act also requires every institution at which R4H is conducted to establish an IREC and register it with NHREC.

The Medicines and Related Substances Act 101 of 1965, as amended by Act 72 of 2008, together with Act 14 of 2015, provided for establishment of the South African Health Products Regulatory Authority (SAHPRA).^{28–30} In February 2018, SAHPRA replaced the MCC. It operates as an autonomous juristic entity mandated to monitor, evaluate, regulate, investigate, inspect, register and control medicines, scheduled substances, clinical trials, medical devices and related matters in the public interest.

On 20 July 2018, the Minister of Health published the 'Material Transfer Agreement of Human Biological Materials' for use by all providers and recipients of the biological material used in research or clinical trials under the HRECs.³¹ South Africa does not have national guidelines on development of collaboration agreements for health research involving institutions and agencies outside the country. However, each university or science council has its own set of guidelines, and the country subscribes to the Research Fairness Initiative (RFI), which has specific guidelines.

Table 2: South African NHRS 'leadership & governance' barometer score, 2018

Sub-functions	Actual score (A)	Maximum score (B)	Minimum score (C)	Sub-function NHRS index (D)=[(A-C)/(B-C)]
National Health Research Policy 2001	1	1	0	1
Health Research Legislation/Law: Chapter 7 of the National Health Act (61 of 2003)	1	1	0	1
Health Research Strategic Plan: National Health Research Summit Report 2011	1	1	0	1
Functional National Ethics Review Committee/NHREC/HREC	1	1	0	1
National Health Research Focal Point/Unit	1	1	0	1
National Health Research Agenda 2011	1	1	0	1
Average 'leadership & governance' barometer score				1

A memorandum of understanding (MoU) between the NDoH and national research institutions (e.g. the South African Medical Research Council (SAMRC), university health science faculties, medical schools and schools of public health) could be an important instrument in governing, growing and nurturing the working relationships. In the context of NHRS, a MoU³² might cover development (training and mentoring) of human resources for NDoH and Provincial Departments of Health (PDoHs), consultancy services, technical advice, research, and knowledge translation. A MoU in the form of annual performance plans exists between the NDoH and the SAMRC. Despite the fact that medical schools work closely with the NDoH, there are no MoUs governing the relationship.

Leadership and governance of the NHRS in South Africa is primarily performed by the NHRC, and the NHREC.

Table 2 shows the NHRS 'leadership and governance' function barometer score. Since each of the six sub-functions had an index of 1, the average leadership and governance function score was 1 (or 100%), implying optimal performance (flourishing).

Despite the 100% score, there is room for improvement. For example, the national health research policy, the health research strategic plan, and the national health priority research agenda are over six years old and need to be updated.

Developing and sustaining resources

At national level, the Health Research Unit (HRU) in the NDoH's Programme on Health Information, Health Research, and Monitoring and Evaluation, and the Health Innovation Unit (HIU) in the Department of Science and Technology, are mandated to coordinate, monitor and evaluate implementation of the national priority R4H agenda.

In South Africa, R4H is mainly conducted by three categories of institutions. In addition, the National Health Laboratory Services (NHLS) also conducts important research for the country. Of the

three main institutions, the SAMRC follows a decentralised model, with most research carried out by university MRC units.³² It is a public entity, established in 1969, with a mandate to improve the health of the country's population through research, development and technology transfer. Key facilitating factors include SAMRCs multi-disciplinary staff; close links with the NDoH; acknowledged scientific excellence; and international linkages. Key constraints are insufficient research funding; and retention of young scientists.

Second, Health Systems Trust (HST) was established in 1992 as an NGO. The organisation conducts health systems research, provides technical support, and disseminates information aimed at developing comprehensive national, provincial, district and community health systems in southern Africa.³³

The third category of R4H institution is universities. Approximately 11 universities have health sciences faculties that produce human resources for health and conduct health research. Further, 13 universities are involved in production of biomedical sciences human resources and conduct biomedical research.³⁴

Although the universities do not have MoUs with the NDoH, the medical schools work closely with the NDoH and PDoHs to provide training for the health workforce and human resources for health research; to undertake R4H for the NDoH when commissioned; and to serve as experts on advisory panels to the NDoH. All the universities are autonomous, but receive funding from government.

Key facilitating factors for most universities conducting R4H are competent teaching/academic staff, and growing scientific output. Eight local universities are ranked among the top 1 000 universities in the world.³⁵ Key constraining factors are insufficient research funding, and inadequate research equipment in some universities.

Table 3 shows the NHRS 'developing and sustaining resources' barometer score, with some sub-function indices of 100% and others below average.

Table 3: South African NHRS 'developing and sustaining resources' barometer score, 2018

Sub-functions	Actual score (A)	Maximum score (B)	Minimum score (C)	Sub-function NHRS index (D)=(A-C)/(B-C)
Health Research Programme/Unit (HRP)	1	1	0	1
Number of technical & support staff in HRP per 100 000 population	0.01769	100	0	0.00018
Whether HRP has internet connectivity	1	1	0	1
Presence of SAMRC	1	1	0	1
Number of universities conducting R4H per one million population	0.42	1	0	0.42
Presence of NGOs undertaking health research	1	1	0	1
Average 'developing and sustaining resources' barometer score				0.737

The average barometer score for developing and sustaining resources was 0.737 (73.7%). In order to maximise this function, both the number of universities undertaking R4H and human resources for health research per population need to increase.

Producing and utilising research

As mentioned, the NHRC is mandated to develop and update national strategy on R4H, and to prioritise the R4H agenda and ensure adherence. The NHRC convened the first National Health Research Summit of health stakeholders in July 2011, with the second Summit held in the last quarter of 2018.

Each university and science council has a scientific research committee that reviews research proposals/protocols for scientific quality and correct study design before they are sent to the HREC for ethical review.

The country has a number of platforms for collating, translating, synthesising and communicating research to inform health policy and practice. The SAMRC houses Cochrane South Africa, an independent non-profit network³⁶ that undertakes systematic reviews of published literature on what does and does not work in health care. Cochrane South Africa also manages the Pan African Clinical Trials Registry, and the South African Guideline Excellence Project (SAGE), which uses globally generated evidence and local knowledge and skills to support the development, adaptation and implementation of health-related guidelines for South Africa.³⁷ Cochrane South Africa also contributes to the Collaboration for the Evidence-Based Healthcare and Public Health in Africa network³⁸ and the Effective Health Care Research Consortium³⁹ to bridge primary research, evidence synthesis and implementation into policy-and-practice.

As mentioned, the HST undertakes health systems research and works with the NDoH to translate knowledge from research into policy and practice.⁴⁰ In 2013, HST spearheaded the development of the National Health Research Database (NHRD) that enables the NDoH and PDoHs to monitor research activities and utilise information in decision-making. Since 2005, HST has produced the annual District Health Barometer, monitoring trends in inequities in health outcomes and health-resource allocation and delivery, and tracking the efficiency of health processes across provinces and districts. Since 1995, HST has also published the annual *South African Health Review*, with peer-reviewed chapters on health policy development, implementation of health system reforms and interventions, and performance of national and local health systems.⁴⁰

South Africa also has disease-specific knowledge-translation platforms, such as the TB and HIV Think Tanks, which bring together experts to assist in guiding the country's TB and HIV response. According to White et al.,⁴¹ the TB Think Tank contributed to the strategy accelerating progress towards the WHO TB control targets, development of the HIV and TB investment case, and the decision to create a dedicated grant for TB.⁴¹ The HIV Think Tank worked on the monitoring and evaluation framework and strategy for Ward Based Primary Healthcare Outreach Teams, the good practices compendium of community health workers, research on non-communicable diseases and HIV comorbidities, and a harmonisation guideline for provinces.^{42,43}

The SAMRC, HST and universities primarily disseminate their R4H through scientific publications in peer-reviewed journals, books and chapters, research briefs (including policy briefs), annual reports, conferences, and information on websites. Some of the research is also converted into patented innovations.

Information available through the Web of Science search engine indicates that in 2017, South Africa's total publication count in all research areas was 23 094.⁴⁴ Of that, 7 073 publications (31%) were in the health sciences, i.e. 12.5 publications per 100 000 population, double the number of health science publications per 100 000 population in 2014.⁴⁵ Foreign country organisations accounted for 66% of the health science publications.

Table 4 shows the barometer score for producing and utilising R4H. Two sub-functions had indices of 1 (or 100%), implying optimal performance.

In 2017, the total number of R4H publications in South Africa was 12.5 per 100 000 population, compared with 15.46 in Brazil,^a yielding a publication index of 0.81 (or 81%). The barometer score for this function was 0.937 (93.7%). The deficit in performance can be bridged by increasing the number of peer-reviewed R4H publications.

Table 4: South African NHRS 'producing and utilising R4H' barometer score, 2018

Sub-function	Actual score (A)	Maximum score (B)	Minimum score (C)	Sub-function NHRS index (D)=(A-C)/(B-C)
Existence of NHRC that convenes National Health Research Summit	1	1	0	1
Existence of knowledge-translation platforms	1	1	0	1
Total number of R4H publications in 2017 per 100 000 population	12.5	15.46 (Brazil)	0	0.81
Average 'producing and utilising R4H' barometer score				0.937

a Calculated using data from PubMed.com.

Financing research for health

In South Africa, R4H is funded mainly by government tax revenue, big pharma clinical trials and private healthcare expenditures, and multilateral and bilateral donor funding. International NGOs, private sector companies, and local NGOs fund some R4H in the country.

In the 2017/18 financial year, the overall government budget was R1 409 215.4 billion, of which R42 625.7 billion (3.02%) was allocated to the NDoH.

The government's budgetary allocation to all research was approximately R10.1 billion, of which 74.4% went to the Department of Science and Technology (DST) and 8% went to the NDoH. The NDoH research allocation amounted to R812.8 million, of which 80.9% went to the SAMRC, 13.6% to R4H within the NDoH, and 5.5% to research-related activities within the NHLS.

Of the DST research budget of R7.5 billion, about R776.2 million (10.3%) was spent on aspects of NHRS. Of the latter, 10.5% was spent on health innovation, HIV treatment and prevention, and the International Centre for Genetic Engineering and Biotechnology; 14.1% on health-related research infrastructure, South African Research Chairs, and support of international grants; and 75.4% on science councils committed to health research, e.g. the HSRC, the Technology Innovation Agency, the CSIR, and the National Research Foundation. Therefore, the entire government NHRS-related spending was approximately R1.5 billion, which was 0.0037% of the overall NDoH budget. This is greatly short of the Algiers Declaration,⁴⁶ the Bamako Call to Action on R4H,⁴⁷ and the Mexico Summit Statement on health research⁴⁸ recommendation to countries to invest at least 2% of national health expenditure on research and NHRS capacity strengthening.

Table 5 shows the barometer score for financing R4H, as determined by the two sub-function indices.

The average 'financing R4H' score was 0.50 (or 50%). A lot needs to be done to attain the recommended investment of at least 2% of national health budget on NHRS capacity strengthening.

South Africa's overall NHRS barometer

Table 6 shows the South African NHRS barometer scores for 2018. None of the 17 sub-functions had a zero index (which would have meant non-existent); two scored less than 1%; one scored 42% (below average); one scored 81% (above-average); and the remaining 13 sub-functions scored 100% (flourishing).

The average barometer function scores were 100%, 73.7%, 93.7%, and 50.11%. Thus the overall NHRS barometer score for South Africa in 2018 was 83.7% (above average, but short of optimal performance by 16.3 percentage points), compared with 79% in 2014.⁷

Table 6: South African NHRS barometer scores, 2018

Functions and sub-functions	NHRS index (D)=(A-C)/(B-C)
A. Leadership and governance	1
1. National Health Research Policy 2001	1 (or 100%)
2. Health Research Legislation/Law – Chapter 7 of the National Health Act, Act 61 of 2003	1 (or 100%)
3. Health research strategic plan: National Health Research Summit Report 2011	1 (or 100%)
4. Functional National Ethics Review Committee	1 (or 100%)
5. National Health Research Focal Point/Unit	1 (or 100%)
6. National health research agenda 2011	1 (or 100%)
B. Developing and sustaining resources	0.737
7. Health Research Programme/Unit	1 (or 100%)
8. Number of technical & support staff in HRP per 100 000 population	0.00018 (0.018%)
9. Whether HRP has internet connectivity	1 (or 100%)
10. Presence of SAMRC	1 (or 100%)
11. Number of universities conducting R4H per a million population	0.42 (or 42%)
12. Presence of NGOs undertaking health research	1 (or 100%)
C. Producing and utilising research	0.937
13. Existence of NHRC that convenes Summit	1 (or 100%)
14. Existence of knowledge-translation platform(s)	1 (or 100%)
15. Total number of R4H publications in 2017 per 100 000 population	0.81 (or 81%)
D. Financing R4H	0.50
16. Presence of health research budget within government budget	1 (or 100%)
17. Government allocation to health research in the 2017/18 financial year	0.00041 (or 0.041%)
Overall NHRS barometer score ((sum of sub-function indices divided by 17) x 100%)	0.837 x 100 = 83.7%

Table 5: South African NHRS 'financing R4H' barometer score, 2018

Sub-functions	Actual score (A)	Maximum score (B)	Minimum score (C)	Sub-function NHRS index (D)=(A-C)/(B-C)
Presence of health research budget within government budget	1	1	0	1
Government allocation to R4H as proportion of NDoH budget in the 2017/18 financial year	0.003728	9.162241866 (Cameroon)	0	0.00041
Average 'financing R4H' barometer score				0.50

Recommendations

Leadership and governance

- Update the national R4H policy, national strategic plan on R4H, and national priority R4H agenda (with a clear implementation framework).
- Strengthen research management capabilities at provincial level.
- Develop/adapt national guidelines for the management of intellectual property and knowledge-transfer activities management in international research collaboration agreements between South African institutions and external partners. According to the European Union, such guidelines should include: a system that enables the protection of intellectual property rights, a technology transfer framework, and a fair law-enforcement system.⁴⁹ This would complement the existing national Material Transfer Agreement and standardise existing individual university guidelines.
- Spearhead development of MoUs between the NDoH and national universities with health sciences faculties and those involved in biomedical research. The MoU may cover health workforce development, technical advice, R4H, and other matters of interest to the NDoH.
- Continue promoting south-south and north-south R4H collaborations and networking for excellence.
- Continue discussions on genomic research and its potential benefit to African countries.

Developing and sustaining resources

- Upgrade health research infrastructure in the 10 lowest-ranked universities.
- The newly established SAHPRA should fast track clinical research approvals.
- Upgrade more clinical research facilities to the standards of the WHO Good Clinical Laboratory Practice,⁵⁰ the FDA,⁵¹ and the European Medicines Agency.⁵²
- Continue investing in doctoral degree training to create a critical mass of multidisciplinary human resources for health research, and postgraduate trainers and mentors.

Producing and utilising research

- Sustain/increase investment in the existing knowledge-translation platforms (SAMRC, HST, Think Tanks, etc.).
- Sustain incentives for universities and the SAMRC to optimise production of peer-reviewed publications, patents, and other knowledge products.
- Support the ongoing development of South Africa's National Health Research Observatory.⁵³ The observatory should have modules on NHRS goals and functions, among others. It should also have an inventory of all R4H human and physical resources in the country.

Financing research for health

- Institutionalise a system of national R4H accounts to track health-related R&D spending.⁵⁴
- Commission a study to inform development of sustainable innovative health-related R&D financing mechanisms to meet the Algiers Declaration target, namely at least 2% of MoH budget allocated to NHRS strengthening.^{46–48}

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