

Expenditure on health research in South Africa, 1991/1992

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Objective. To determine expenditure on health research in South Africa in 1991/1992.

Design. Data from the financial statements of large statutory councils conducting research in South Africa, as well as other relevant reports, particularly the Department of National Education's (NATED) survey of research institutions, were analysed.

Results. A total of R198,7 million was spent on health research in 1991/1992, 56,1% by the tertiary education sector and 20,7% by the Medical Research Council. Only 1,1% of expenditure on health was spent on research. Less than 9% of health research expenditure by tertiary educational institutions is classified within the category of 'comprehensive medicine' (which includes community health, epidemiology and nutrition), whereas 82% of expenditure by autonomous government institutions is so classified.

Conclusions. Given that expenditure on health research in South Africa is relatively low by international standards, an increase in expenditure by both the public and private sectors should be considered. Given the scarcity of research resources, there should be adequate planning, co-ordination, and particularly prioritisation of resource allocations, so that research can be directed towards addressing the country's health needs.

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Although much has been said about the role of research in health¹⁻³ and about the relative priorities of various research areas in South Africa,^{4,5} surprisingly little is known or has been debated about expenditure on health research. Clearly, budgetary allocations to health research in total, as well as to specific programmes, will greatly affect the amount and nature of research conducted.

Institutions conducting or financing research in South Africa fall under one of four sectors.⁶

1. The government sector, which may be further subdivided into two parts: (i) government departments, provincial and local authorities; and (ii) research councils, i.e. the statutory councils such as the Medical Research Council (MRC), the Human Sciences Research Council (HSRC), the Council for Scientific and Industrial Research (CSIR) and the Foundation for Research Development (FRD). These councils each function under their own act (e.g. the South African Medical Research Council Act 58 of 1991) and according to a system known as 'framework autonomy'.

2. The tertiary education sector, which consists of the universities and technicons. Universities receive funds through several mechanisms,⁶ including: (i) funds generated by a subsidy formula as part of the general subsidy for tertiary educational institutions. This formula includes a component based on the amount of research output; (ii) funds for self-initiated research that are allocated by the research councils as agencies for the State; (iii) funds for contract research; and (iv) funds from donations and grants.

3. The business sector.

4. The non-profit sector.

The study aimed to determine: (i) expenditure on health research in South Africa, and to compare this to research expenditure in other sectors and in other countries; (ii) the sources of finance for expenditure on health research by institutions such as statutory councils and universities; and (iii) expenditure on various categories of health research.

Methodology

A number of documents and financial statements was reviewed.⁶⁻²⁰ Of these, the most useful source of information consulted was a national survey of research in South Africa conducted every 2 years by the Department of National Education (NATED).⁷ In conducting their surveys, they claim to observe the guidelines of the internationally adopted Frascati manual.²¹

The Frascati manual defines basic research, applied research and experimental development as follows: (i) 'basic research . . . is carried out with the primary objective of obtaining new knowledge of the underlying bases of phenomena . . .'; (ii) 'applied research . . . is directed primarily towards a specific practical aim or objective'; and (iii) 'experimental development . . . is directed to producing new materials, products and devices . . . and to improving substantially those already produced or installed'.

The NATED report is the only source which details expenditure for universities, as well as for statutory research institutions and private companies. As such, it is the most comprehensive data source, and much of the data presented are drawn from it. The annual reports of certain

organisations, particularly the statutory councils, were also consulted to supplement and validate the NATED information.

Several methodological problems emerged:

1. It is unclear whether the same definition of 'health' is being used by the different bodies. Most reports appear to use a narrow definition of health such as 'medical science'. Using a narrow definition such as this, or an illness-based definition, is simpler than using a broad primary health care definition. Particular difficulty lies in the classification of research in interdisciplinary areas, which are essential in public health research. Unfortunately the main data source, NATED,^{6,7} appears to adopt a relatively arbitrary system of classifying these interdisciplinary subject areas.

2. Most institutions do not give a separate breakdown for expenditure on health research in their annual reports. This is particularly true of institutions like the CSIR and HSRC.

3. Personnel expenditure is probably underestimated as some research is conducted by clinicians whose own income is derived from service authorities; the proportion spent on research is therefore unlikely to have been fully costed or accounted for separately.

4. There are considerable discrepancies in the research expenditure reported by NATED⁷ and that reported by statutory councils such as the CSIR^{10,11} and the HSRC.^{12,13}

5. There are likely to be some inaccuracies in the estimates of expenditure on research by the tertiary education institutions. This is partly because data on the proportion of the general subsidy spent on research are partly based on the South African post-secondary education personpower surveys, the completion of which relies on subjective assessments of the amount of time taken up by research.

Results

All figures given are for the 1991/1992 financial year unless otherwise stated.

Total expenditure on research

South Africa spent R2 786 077 000 (R2,8 billion) on research in 1991/1992, which represents 1,04% of GDP.⁷ NATED reported that this was 57% more than the R1 774 billion spent in 1989/1990. This apparent increase is mainly attributable to the larger number of businesses surveyed in 1991/1992. According to NATED, 0,86% of GDP was spent on research in 1989 and 0,96% in 1985.^{6,7}

Approximately 0,87% of government sector expenditure in 1991/1992 (excluding tertiary institutions) was on research (R0,74 billion⁷ out of R85 billion).²² In 1985, 1,6% of government expenditure was spent on research.⁶ Although figures presented by the MRC are slightly lower than those above, they confirm that the proportion of government expenditure on research declined between 1987 and 1992.⁸

Expenditure on research by the tertiary education sector was R690,4 million in 1991/1992. Total expenditure by some of the statutory science councils included R421,4 million by the CSIR,¹¹ R115,8 million by the FRD,¹⁴ R95,7 million by the HSRC¹³ and R52,5 million by the MRC.⁸

Total expenditure on health research

NATED provides the best available estimate of expenditure on 'medical sciences' — R192 981 000. If one adjusts the NATED report for MRC expenditure, as given in its annual report⁵ (see under 'Medical Research Council' below), expenditure in 1991/1992 was R198 659 000 (R199 million).

This means that 6,9% of South Africa's research expenditure was devoted to health, which was considerably less than expenditure on research in the fields of engineering (33,7%), agriculture/biology/forestry (14,1%), chemistry (7,9%) or technology (7,6%).

Of all research done by the government sector (government departments, statutory science councils and autonomous government institutions), 7,1% was health-related. In 1989 the figure was 5,4%⁷ and in 1985/1986 it was 7,4%.⁶ In contrast, tertiary institutions devoted 16,1% of their research expenditure to health and the business and non-profit sectors 2,1%.

Only 1,1% of total health expenditure in South Africa was spent on research. (Total expenditure on health was approximately R16,2 billion in 1990/1991 — R8,063 billion in the public sector, and R8,2 billion in the private sector.²³ By 1992/1993, this had increased to a total of R21,6 billion (R10,907 billion public and R10,725 billion private).²⁴)

In the classification system used by NATED, philosophical, social and human sciences are categorised separately from health, which is classified under natural sciences.

Expenditure in 1991/1992 on this group totalled R215 096 000 and included R36,7 million on psychology and R50,7 million on education. The nature of this research is very diverse and a large proportion cannot easily be classified as 'health', particularly if a narrow definition of health is used.

Expenditure according to institution

Table I shows expenditure on health research according to sector and institution performing the research. It does not indicate source of funding for research. For example, funding by the pharmaceutical industry was higher than R11,3 million, but this was partly given to other institutions that perform research.

Table I. Expenditure of institutions performing health research (1991/1992)⁷

| Institution | Thousand rand | % |
|--|---------------|--------|
| Government sector total | 59 486,00 | 29,94 |
| Department of National Health and Population Development | 5 917,00 | 2,98 |
| Other 'government departments and industries' | 7 591,00 | 3,82 |
| Medical Research Council ⁸ | 41 200,00 | 20,74 |
| Other 'autonomous government institutions' | 4 778,00 | 2,41 |
| Tertiary education | 111 425,00 | 56,09 |
| Business sector total | 23 256,00 | 11,71 |
| Private pharmaceutical | 11 281,00 | 5,68 |
| Business other | 11 975,00 | 6,03 |
| Non-profit | 4 492,00 | 2,26 |
| Grand total | 198 659,00 | 100,00 |

Expenditure according to geographical region

The distribution of total health research expenditure by tertiary education institutions (universities and technicons) between the various provinces is shown in Table II. No figures are available for health research in the former homelands where expenditure was presumably much less.

Table II. Tertiary education sector health research expenditure by region (1991/1992)

| | % population ²⁵ | % research expenditure ⁷ |
|------------------------------|----------------------------|-------------------------------------|
| Natal | 7,8 | 9,2 |
| Transvaal | 30,6 | 45,8 |
| Cape | 19,7 | 24,4 |
| OFS | 7,1 | 20,6 |
| 'Self-governing territories' | 34,8 | N/A |

Expenditure on research personnel

Expenditure on labour was R95 592 000 in 1991/1992; this is 49,5% of total health research expenditure. Three thousand eight hundred and eleven people are reported to have devoted 1 652 person-years to research on 'medical sciences' in this year.

Expenditure according to field of study

Expenditure according to research field and institution performing the research is shown in Table III.

Of research expenditure, 23% is categorised as 'comprehensive medicine and oncology'. NATED includes community health, epidemiology, geriatrics, nutrition and radiotherapy in this category. Eighty-two per cent of research done by autonomous government institutions (mainly the MRC), but only 8,3% of health research conducted by the tertiary institutions, is so classified. Under the NATED classification system, 'medical interdisciplinary subject fields' include medical microbiology, immunology, virology, mycology, medical ethics, forensic medicine, biomechanics and radiology.

Of health research, 29% was classified as 'basic research', 58,8% as 'applied research' and 12,2% as 'experimental development' (see definitions above).⁷

Medical Research Council

While the MRC's total expenditure in 1991/1992 totalled R52,5 million,⁸ R11,3 million (21,5%) was channelled to universities in the form of grants (G. Groenewald, MRC — personal communication). Thus the MRC's expenditure on its own research programmes was R41,2 million, and 20,7% of total expenditure on health research was attributable to the MRC (Table I). Funding received by the MRC increased in real terms from 1970/1971 to a peak in 1988 but has decreased annually since then. This is shown in Fig. 1 which was compiled from MRC annual reports.^{8,9} Of all the expenditure on statutory councils and other autonomous government institutions, the MRC received approximately 5,2%⁷ of government sector funds.

Table III. Expenditure on health research according to research field and performers.⁷

| Research fields | Performers | | | | Total R (x 1000) |
|--|------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|---------------------|
| | Government sector R (x 1000) | Tertiary education R (x 1000) | Business enterprise R (x 1000) | Non-profit sector R (x 1000) | |
| Medical sciences | | | | | |
| Dental science | 158 | 3 237 | 150 | 0 | 3 544 |
| Internal human medicine | 0 | 8 203 | 2 237 | 242 | 10 681 |
| Obstetrics and gynaecology | 0 | 5 105 | 0 | 0 | 5 105 |
| Surgery and anaesthetics | 0 | 10 953 | 231 | 0 | 11 184 |
| Comprehensive medicine and oncotherapy | 33 722 | 9 222 | 812 | 587 | 44 392 |
| Paediatrics | 0 | 4 815 | 231 | 0 | 5 046 |
| Psychiatry | 0 | 994 | 0 | 0 | 994 |
| Anatomy and histology | 266 | 3 668 | 281 | 0 | 4 216 |
| Physiology | 650 | 7 521 | 147 | 176 | 8 495 |
| Medical biochemistry | 892 | 5 744 | 0 | 71 | 6 707 |
| Pathology | 983 | 3 794 | 1 877 | 468 | 7 122 |
| Pharmacy | 68 | 9 271 | 11 281 | 20 | 20 640 |
| Medical interdisciplinary subject fields | 8 114 | 23 678 | 58 | 2 878 | 34 727 |
| Supplementary health sciences | 58 | 4 172 | 2 508 | 51 | 6 788 |
| Nursing science | 5 | 3 908 | 0 | 0 | 3 913 |
| Veterinary science | 8 842 | 7 142 | 3 443 | 0 | 19 426 |
| Total | 53 808 | 111 425 | 23 256 | 4 492 | 192 426 |

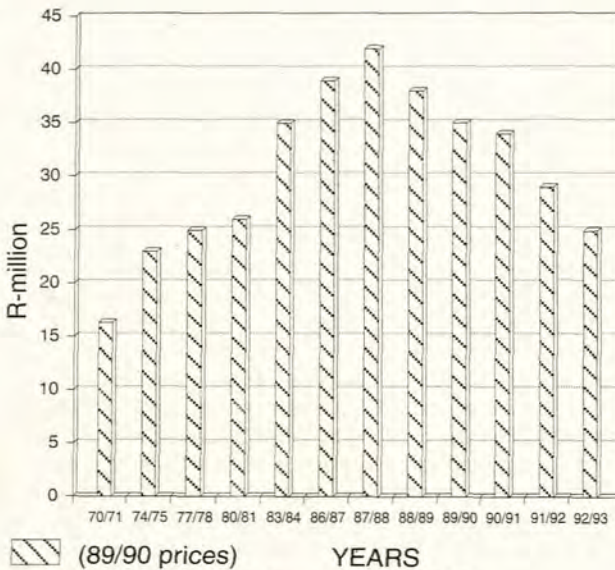


Fig. 1. Central Government allocations to the MRC.

Allocations to MRC research programmes and MRC university units are shown in Table IV.²⁰ As data for 1991/1992 were not available, the data presented are for 1994.

Other statutory councils

Figures derived from NATED suggest that only R4,78 million was spent by autonomous government institutions (mainly statutory research institutions other than the MRC) on health research. This includes all spending on health by the HSRC, CSIR, etc.

HSRC annual reports do not specify expenditure on health research. The HSRC income and expenditure statement for 1991/1992 shows a total expenditure of R95,7 million.¹² How much of this is health-related is uncertain. The difficulties of

Table IV. Allocations to MRC research programmes and MRC university research units (1994)

| Research group | R x 1000 |
|---|---------------|
| Community Health Research Group total | 15 693 |
| National AIDS Research Programme | 994 |
| National TB Research Programme | 2 157 |
| National Malaria Research Programme | 1 263 |
| National Urbanisation and Health Programme | 2 111 |
| National Programme for Nutritional Intervention | 3 227 |
| National Trauma Research Programme | 917 |
| Centre for Epidemiological Research (CERSA) | 5 024 |
| Health Technology Research Group total | 204 |
| Laboratory and Clinical Research Group total | 6 216 |
| Experimental Biology Programme | 2 435 |
| Amoebiasis Research Programme | 528 |
| Programme on Mycotoxins and Experimental Carcinogenesis | 2 304 |
| Medical Biophysics Research Programme | 949 |
| MRC Research Units at Universities total | 5 560 |
| AIDS Virus Research Unit | 175 |
| Bioenergetics of Exercise Research Unit | 237 |
| Biomembrane Research Unit | 254 |
| Centre for Molecular and Cellular Biology | 1 078 |
| Dental Research Unit | 298 |
| Ischaemic Heart Disease Research Unit | 464 |
| Liver Research Centre | 943 |
| Mineral Metabolism Research Unit | 234 |
| Molecular Hepatology Research Unit | 322 |
| Perinatal Mortality Research Unit | 149 |
| Pregnancy Hypertension Research Unit | 165 |
| Regulatory Peptides Research Unit | 318 |
| Research Unit for Cell Biology of Atherosclerosis | 481 |
| Research Unit for Inflammation and Immunity | 140 |
| Research Unit for Medical Genetics | 302 |
| Total | 27 673 |

These allocations exclude MRC staff function groups and so underestimate true costs.

classification were discussed earlier. However, we feel intuitively that the NATED survey result (R4,8 million on health research by all autonomous government institutions besides the MRC) is too low.

The CSIR income statement for 1991/1992 shows expenditure of R421,4 million (R210 million from a parliamentary grant and R194,7 million from contract research). A small part of its research could be classified as health-related, e.g. clinic design, development of South African hospital norms and health and safety issues. Again, the NATED estimate appears somewhat low.

Discussion

For total expenditure on research to represent 1,06% of GDP is not particularly high when compared with many other countries. International comparisons include Korea and the UK where 1,83% (1990) and 2,2% of GDP respectively were devoted to research. It has been reported that the Third World Academy of Sciences proposed a target of 2% of GDP for developing countries.¹ Adequate levels of research expenditure are essential to enable countries to develop their scientific and technological capabilities.

Government expenditure on research as a proportion of total government expenditure, appears to have decreased from 1,6% in the mid-1980s to about 0,87% in 1991/1992. Given that this is relatively low by international standards (the USA, UK and the Republic of China spend between 2,5% and 5,8%), the MRC has suggested that South Africa needs to triple its expenditure on science and technology research.¹⁹

Only 1,1% of total health expenditure in South Africa was spent on research. This appears low by international standards. Comparative figures include the Netherlands (2,1%), Norway (1,9%), USA (1,8% in 1986), and Zimbabwe (0,67% in 1989).¹⁹

Similarly, the 6,9% of total research expenditure on health also appears low. The Commission on Health Research for Development recommended that at least 10% of research expenditure be spent on health.¹ For reasons mentioned in the methodology section, these data probably underestimate actual expenditure on research in South Africa.

NATED's figure for the proportion of total health expenditure spent on labour is likely to be an underestimate. This is partly because research assistance is sometimes not classified as labour.

NATED indicates that R11,3 million was spent on research performed by the private pharmaceutical industry. However, in addition to this amount, some of the research financed by the pharmaceutical industry was contracted to and performed by other institutions, especially universities. According to a representative of the pharmaceutical industry (C. de Wet — personal communication), seven German and Swiss companies alone spent R47 million on health research in South Africa in 1993. He estimates that R100 million was spent by the pharmaceutical industry in South Africa in 1993 (approximately R85 million in 1991/1992). It is unclear why the NATED survey does not show flows of this magnitude. The high prices of pharmaceuticals in South Africa are frequently justified on the basis of high research costs. Yet the turnover of just five companies, listed on the

pharmaceutical and medical sector of the Johannesburg Stock Exchange, exceeded R3 billion in 1991.²⁰ These data, if correct, suggest that less than 3% of turnover is spent on South African-based research. It has been estimated that the world's ten largest pharmaceutical companies invest about 16% of revenue from drug sales in research¹ and that 43% (US\$13 billion out of \$30 billion) of global expenditure on health research in 1986 was by pharmaceutical companies.

The Orange Free State appears to have received the highest health research funding relative to its population size and the former homelands the lowest funding. While resources for research need not necessarily be distributed on an equal per capita basis between geographical regions, this analysis serves to highlight the vast differences in institutional capacity for health research between regions.

The categorisation of research used by NATED and shown in Table III is in some cases too highly aggregated to be of much use.

Expenditure on comprehensive medicine (which includes community health, epidemiology and nutrition) by the universities appears to be disproportionately low. It is important for health research in South Africa to be targeted at our country's health needs and priorities. It has been estimated that 95% of global expenditure on health research is devoted to problems of developed countries despite the fact that 93% of preventable mortality occurs in developing countries.¹

Recommendations

There were significant problems in obtaining accurate data on research expenditure. Different data sources had discrepancies with little methodological explanation. The following are therefore recommended.

1. Several issues relating to NATED's survey methodology need to be clarified with them. For example, NATED's estimates of expenditure by the statutory councils are significantly lower than figures given in the financial statements of these organisations.

2. Persons appointed by the health sector should work with staff from the Department of National Education to establish the methodology for future NATED studies. A clear indication of sources of financing and points of expenditure on health research is required. A more useful system of categorisation of content areas of health research needs to be developed.

3. Areas where additional research needs to be undertaken to obtain a more comprehensive picture include: (i) international norms and standards for spending on health research in total and on various fields of study (e.g. public health); (ii) expenditure on interdisciplinary areas, particularly those related to public health; (iii) research expenditure by pharmaceutical companies; and (iv) the extent to which labour costs are undercounted.

4. Given that research expenditure in South Africa is relatively low by international standards, it is recommended that consideration be given to increasing (possibly doubling) expenditure on health research. The possibility of increasing government sector expenditure on health research should receive attention.

5. The private sector should be encouraged to play a more active role in health research within South Africa and this research should be relevant to the country's needs.

6. In the light of extremely scarce research resources, it is critical that there be adequate planning, co-ordination, and particularly prioritisation, of resource allocation between the various fields of research. Research must aim to address the health needs of the country. This requires extensive consultation to reach agreement on national health research priorities.

7. Consideration should be given to separating research funding to universities from the general subsidy. This would permit allocation of research expenditure to be better targeted and would facilitate the process of evaluation of research output by institutions.

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