

Flows of financial resources for health research and development in Brazil, 2000–2002

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Objective To map and measure the flows of financial resources for health research and development in Brazil for the years 2000–2002.

Methods After adapting the methodology developed for the Center for Economic Policy Research, data were collected on the sources and uses of resources for health research and development.

Results The annual average value of resources apportioned to health research and development was approximately US\$ 573 million. The public sector as a whole invested US\$ 417.3 million and the health department US\$ 51.1 million. Expressed in percentages, the public sector invested 4.15% of the health department's budget although the Ministry of Health assigned only 0.3% of its budget to health research in the country. The universities and the research institutes are the main users of the resources allocated to health research and development, receiving 91.6% of the total public spending, while the private sector receives a small share of around 0.69% of the total. The private sector invested US\$ 135.6 million per year, and the international organizations US\$ 20.1 million per year.

Conclusion Besides measuring the financial resources made available for health research and development, the results allowed the filling of gaps in national information; the identification of the flows of applied financial resources; and the testing and adaptation of the proposed methodology, generating information suitable for international comparisons.

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Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

Health research is essential for the preparation and implementation of national health policies, for planning health actions and for effective delivery of health services. Appropriate financing is critical for this entire process. Each year, more than US\$ 100 billion is spent on health research and development (R & D) by the public and private sectors, which makes health second only to military research in terms of global spending on research.¹

In 2001, an estimated US\$ 105.9 billion was invested in health worldwide. Of this amount, 44% came from public funds in the wealthy countries, in transitional economies and in the newly industrialized countries in Asia; 48% came from private resources (predominantly

the pharmaceutical industry) and 8% from the private resources of nonprofit entities. With regard to the public sector, US\$ 44.1 billion was invested by rich countries and US\$ 2.5 billion by developing countries, including Brazil.¹

Despite this investment, deficiencies in the process of establishing and supporting a set of priorities for health R & D have led to a situation in which less than 10% of the public and private financial resources destined for research are devoted to the health problems of 90% of the world's population, an imbalance known as the "10/90 gap". This gap has a high economic and social cost, aggravated by the fact that even the 10% that is available is not being used in areas where its impact on health would be greatest.²

In the specific case of Latin America, the actual expenditures on health R & D are relatively low when the populations and the gross national products of the countries are taken into account. Although there was a 57% increase in expenditure on health R & D in this region between 1990 and 1996, per capita expenditure in Latin American countries remains much lower than in more developed nations. The USA spends nearly 10 times more per capita and Canada approximately 12 times more. Latin American countries spend on average 0.5% of gross national product on health R & D. Countries with spending above this average are Costa Rica (1.13%), Brazil (0.76%) and Chile (0.64%). Moreover, total expenditures on health R & D are highly concentrated. In 1996,

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Table 1. Groups involved in health and total number of research groups registered in the 2002 census for the research group directory, by the principal area of knowledge in the group activities

Principal area of knowledge ^a	Groups involved with health activities ^b (H)	Total groups registered (T)	Percentage (H)/(T)
Health sciences	2507	2513	99.8
Biological sciences	1129	2126	53.1
Human sciences	430	2399	17.9
Exact sciences and earth sciences	319	2051	15.6
Agricultural sciences	216	1653	13.1
Engineering and computer sciences	199	2243	8.9
Applied social sciences	91	1429	6.4
Linguistics, literature and arts	23	744	3.1
Total	4914	15 158	32.4

Source: ref. 5.

^a Principal area of knowledge in the activities of the research groups.

^b Groups with at least one line of research related to the broad area of health sciences or in the human health activity sector.

spending in Brazil accounted for almost 60% of the total, followed by Argentina (12.5%) and Mexico (10%).³

As a general reference point, the Commission on Health Research for Development (COHRED) and the World Health Organization (WHO) recommend that governments of developing countries apportion at least 2% of national health expenditures to health R & D.

One issue that is important for a full appraisal of the imbalance between the financial resources allocated to health R & D and the resources aimed at overcoming priority health problems is the absence of systematic monitoring of global spending on this type of research. There is no continuous, reliable and accessible source of information on world spending on health R & D. Consequently, there are no verified quantitative estimates of the resources allocated for research on the principal diseases or risk factors. There is also no consolidated information on the results, products and impacts of these investments on health status.

This is the context for the present research, which has the general purpose of mapping and measuring the flows of financial resources for health R & D in Brazil for the years 2000–2002. We aimed to construct a framework to apply the methodology developed by the Center for Economic Policy Research, Philippines,⁴ to monitor those resources in a systematic way, as well as to foster the development of initiatives which optimize their use and outcomes. The specific objectives were:

- to estimate the amount of national spending on health R & D in Brazil for the years 2000–2002;

- to trace the financial flows of health R & D by the principal agents involved in the system; and
- to categorize and evaluate the distribution of national investment in health R & D by sector (public, private and nongovernmental organizations, and external financing agencies).

Methods

A preliminary step in this study was, therefore, to delimit precisely what activities were regarded as health research, that is, to define the meaning of “health” in health R & D. Even among specialists and experts in the field, the definition of health research is frequently limited to biomedical research. This lack of conceptual precision leads to a methodological complication and an empirical accommodation. The complication arises from regarding “health” as an area of knowledge, whereas it is in fact a sector for implementation or action.⁵ The consequent accommodation in practice consists in measuring the health research effort in terms of the total health research undertaken in the broad areas of the health and biological sciences, leaving out from health R & D all the research activities devoted to health in other areas, such as the humanities, the natural sciences and agricultural sciences.

The central criterion for the definition of health R & D to be included in this study was that of sector of activity or application in the health area rather than the area of knowledge within health. Health R & D thus included all R & D within the domains of the medical and natural sciences, as well as studies in

health economy and sociological studies (such as surveys on knowledge, attitudes, and practices of individuals related to health programmes and interventions). But it also included work that, although it did not originate from areas of knowledge conventionally linked to health, aimed at developing new applications for improving the health of groups and individuals. One example is the research programmes devoted to establishing the role of the Justice Department in the obligatory supply by the Brazilian Government of antiretroviral medication for treating acquired immunodeficiency syndrome (AIDS) — these are clearly “humanities programmes”. Another example is the development of simplified technology for sanitation, traditionally treated as “engineering”. However, because they are linked to human health, the above examples are included in health R & D.

To identify the relevant programmes, it was necessary to use appropriate filters for examining the National Council for the Development of Science and Technology (CNPq) Research Groups Directory. These filters were tailored to achieve the desired expansion, thus identifying research groups and activities not restricted to the area of knowledge within health (Table 1). The Directory is a national database that enumerates the research groups acting in Brazil, and includes information about human resources, areas of research in progress, sector of application, scientific and technological achievements, and publications.

The sources of health R & D resources considered in our research were

the primary financing agents for health research, both public and private, regardless of the existence of intermediary agents between the source agency and the end-user of the resources. Users of resources were considered to include those institutions that receive financial resources from third parties to carry out activities in the field of health R & D (Fig. 1).

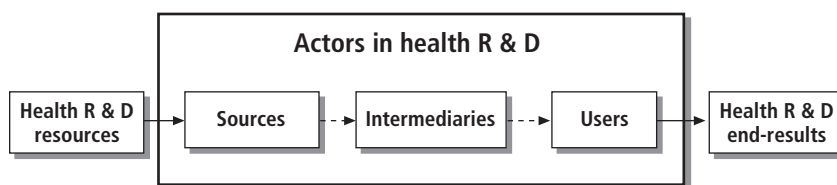
When possible, spending on health R & D was grouped by the type of beneficiary or user of the financial resources, using the following institutional categories:

- entities of the Ministry of Health of Brazil and related foundations;
- related foundations of other ministries;
- state government foundations for research support;
- other state government and municipal government organizations;
- nongovernmental organizations;
- professional councils and specialist associations;
- universities, research institutes, and related foundations;
- other private sector institutions;
- international organizations.

Research strategies and instruments

To expand the coverage of information about health R & D activities, and improve its quality so that it can be used in the formulation and evaluation of policies for this area, it was necessary to use a two-stage process. The first stage was the collection, processing, systematization, and production of consolidated tables

Fig. 1. Graphic representation of actors and financial flows involved with health research and development (R & D)



from information already available, frequently at a high level of aggregation, and the second stage was the effort to produce primary data, to make it possible to fill gaps in knowledge and/or to expand and validate already existing information.

Data-gathering in each of the Ministry of Health institutions and agencies was planned in such a way as to collect primary and secondary data, both from institutes involved in direct administration (Health National Fund and National Cancer Institute), and in indirect administration (National Health Foundation, Oswaldo Cruz Foundation, National Agency for Supplementary Health and National Agency for Sanitary Surveillance).

From the Ministry of Science and Technology, the two main institutions studied were the CNPq and the Agency for Studies and Projects Financing (FINEP). The former produced specially designed tables, requested for the study, that included data on investments fostering research programmes, and on fellowships for PhD programmes and postdoctoral studies. Information about the relevant projects in FINEP, was obtained through consultation of

the list of documents entitled “approved financing requests” (key documents on financing of projects), and from reports specially prepared for this study by the agency staff, providing briefings on the relevant projects.

There are two modes by which health R & D is financed by the Ministry of Education: the first is through the salaries of teachers and researchers belonging to federal universities and research centres, and the second is through support of key programmes by the Coordination Agency for Personnel Improvement (CAPES); the relevant programmes for our purposes are the Social Demand Programme and the Post-graduation Fostering Programme. Values were computed using the CNPq list of researchers linked to human health. For CAPES, information was obtained through “activities reports” on fellowships related to health and biological sciences.

In addition to State expenditure on the salaries of teachers and researchers working in state universities, are funds from the state foundations sources, mainly the State Foundations for Research Support (FAPs). For computing salaries we used the same method as

Table 2. Total expenditure for development of health R & D in Brazil, by type of source, 2000–2002, in US dollars

Sources of resources	2000	2001	2002	2000–2002	Annual average
Federal government	262 604 143	227 788 605	190 056 764	680 449 513	226 816 504
Ministry of Health	32 487 903	32 093 522	33 326 362	97 907 787	32 635 929
Ministry of Science And Technology	54 021 258	56 997 266	42 147 385	153 165 909	51 055 303
Ministry of Education	176 094 982	138 697 817	114 583 018	429 375 817	143 125 272
State governments	235 195 516	189 058 567	147 225 037	571 479 120	190 493 040
State education secretariats	171 465 895	133 524 506	107 459 790	412 450 191	137 483 397
State foundations for research support	63 729 621	55 534 061	39 765 247	159 028 929	53 009 643
Subtotal public sector	497 799 659	416 847 172	337 281 802	1 251 928 633	417 309 544
Private sector	169 049 849	131 648 181	106 230 214	406 928 244	135 642 748
International organizations	10 845 066	20 510 366	29 113 292	60 468 724	20 156 241
Total	677 694 574	569 005 719	472 625 308	1 719 325 601	573 108 534

Note: In the conversion of Brazilian real to dollars the average rate for the year was used, according to the rates given by the Central Bank of Brazil.⁶ The conversion rates were: 2000 (1.83), 2001 (2.35) and 2002 (2.92).

Table 3. Total expenditure on health R & D in Brazil, by user type, 2000–2002, in US dollars

Users	2000	2001	2002	2000–2002	Annual average
Federal Government	29 763 774	28 736 668	28 554 267	87 054 709	28 736 668
Ministry of Health	29 057 975	27 639 645	27 383 344	84 080 964	28 026 988
Other ministries	705 799	1 097 023	1 170 923	2 973 744	991 248
State governments	3 399 737	3 188 825	3 008 789	9 597 351	3 199 117
Universities, research institutes, and related foundations	483 198 412	401 619 371	320 446 112	1 205 263 895	401 754 632
Private sector	159 851 546	133 768 949	118 055 432	411 675 927	137 225 309
Pharmaceutical industry	110 581 002	86 108 173	69 295 998	265 985 173	88 661 724
Medical equipment industry	40 127 037	31 246 468	25 145 758	96 519 263	32 173 088
NGOs	959 681	1 513 768	2 095 615	4 569 064	1 523 021
Professional councils and associations	663 345	1 003 395	1 429 355	3 096 095	1 032 032
Other private institutions	7 520 482	13 897 144	20 088 707	41 506 333	13 835 444
Not identified	1 481 104	1 691 906	2 560 708	5 733 718	1 911 239
Total	677 694 574	569 005 719	472 625 308	1 719 325 601	573 108 534

NGOs, nongovernmental organizations.

Note: In the conversion of Brazilian real to dollars the average rate for the year was used, according to the rates given by the Central Bank of Brazil.⁶ The conversion rates were: 2000 (1.83), 2001 (2.35) and 2002 (2.92).

described above, and estimation of values for FAPs was based on activities reports and on information obtained directly from research institutions and from the Ministry of Health in those cases in which FAPs acted as intermediaries.

The same procedures were followed for international organizations known to be active in financing research in health, such as the Inter-American Development Bank (IDB), the International Bank for Reconstruction and Development (IBRD), the Ford Foundation and the WK Kellogg Foundation as well as those suggested by the users of resources for health R & D already investigated.

Two categories of private investment in health R & D were considered in the study: the first was investment by private colleges and universities which was computed using the above-mentioned method, and the second was investment originating from the industrial sector for which information was obtained from a research report published by the Brazilian Institute for Geography and Statistics (IBGE) entitled *Industrial research on technological innovation*.

Data obtained from these different sources were entered into a databank built in Excel[®]. Research projects and information about the coordinator, financial backer and financed amount were classified by character and by research field. This databank enabled comparison of information from different sources, assessment of compatibility and validation of data.

Results

The total spending on health R & D in Brazil for the years 2000–2002 was US\$ 1719 billion, with an annual average of US\$ 573 million. The public sector invested approximately US\$ 1.2 billion, with an annual average of about US\$ 417 million, corresponding to 72.8% of total spending (Table 2). The Federal Government was responsible for 54.3% and the states for 45.6% of the total spending by the public sector.

Table 3 shows the distribution of resources received for health R & D by users in the study. In the period 2000–2002, universities, research institutes and related foundations were allocated US\$ 1.2 billion, an annual average of US\$ 401.7 million, corresponding to 70.1% of the overall total expenditures. The private sector accounted

for approximately 23.9% of the total, equivalent to US\$ 411 million for the period 2000–2002, with an annual average of US\$ 137 million.

From information in the tables it was possible to construct a diagram of financial flows between financing agents and users of health R & D resources in the country (Fig. 2).

A third way to see the flow of health R & D resources is by means of a source–user matrix. This relates the origin and the destination of the resources used and allows a quick visualization of how and with what weight each group of institutions contributes to the health research effort. Table 4 (available at <http://www.who.int/bulletin>) presents the profile of health research by type of institution, using the average spending on health R & D for the period 2000–2002.

The percentage share of health R &

Table 5. Percentage of expenditure for health R & D, compared to the principal national aggregates — annual averages for the period 2000–2002

National aggregates	Total MH health R & D (%)	Total public sector health R & D (%)	Total health R & D (%)
Gross domestic product (GDP) ⁸	0.0064	0.0789	0.1085
General expenses of the union ⁹	0.0123	0.1521	0.2093
Budget for social security ⁹	0.0498	0.6171	0.8493
Total expenses on health ^a	0.0843	1.0789	1.4815
Public expenses on health	0.1875	2.3968	3.2923
Ministry of Health ⁹	0.3355	4.1549	5.7183

MH, Ministry of Health.

^a Estimated at 7.5% of gross domestic product.

D spending, in comparison with principal aggregate economic indicators, can be seen in Table 5. Total spending on health R & D represented only 0.1085% of gross domestic product, and 5.7% of actual spending in the budget of the Ministry of Health. Compared to total public sector spending, investments in health R & D were equivalent to nearly 0.61% of expenses for social security and 4.15% of the expenses of the Ministry of Health. Finally, it is worth emphasizing that the Ministry of Health, as a rule, dedicated only 0.33% of its budget to research in health. With respect to national expenditures on health, estimated at 7.5% of GDP for 2002, the proportion of total spending on health R & D was 1.48%.

Conclusions

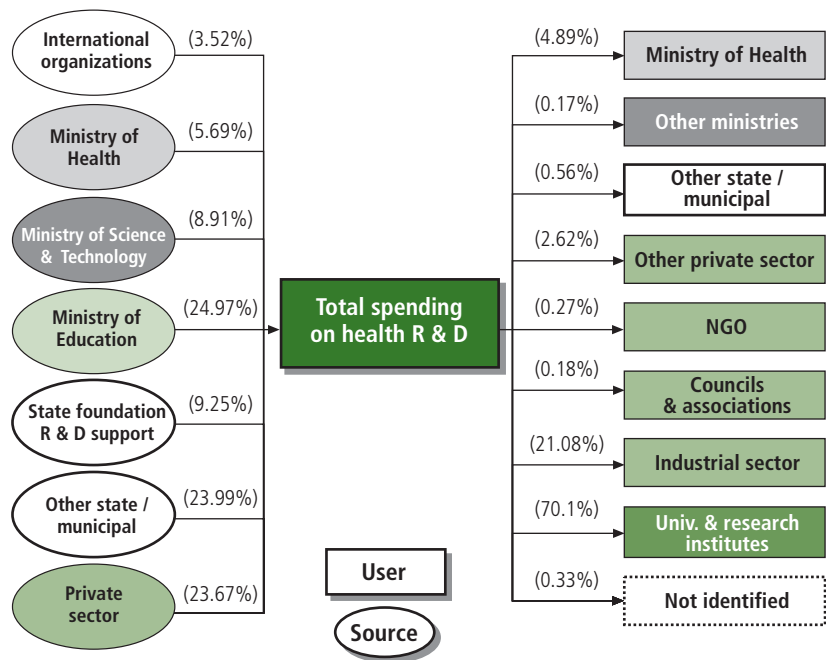
The general objective of this study was to map and measure the flows of financial resources for health R & D in Brazil for the years 2000–2002. The goal was to give the Brazilian health industry a means for improving the coordination of actions directed to monitoring the use of these resources while respecting an agenda which reflects national priorities.

The study had the complementary objective of developing a system for applying the methodology for these processes proposed by the Global Forum for Health Research, to allow international comparisons and the development of the elements necessary for setting up a system to monitor these flows through the country.

The total annual average value of resources invested in health R & D was approximately US\$ 573 million. The public sector as a whole invested US\$ 417 million (72.8%) and the Ministry of Health US\$ 32 million (5.6%).

In percentage terms, the public sector invested approximately 4.15% of the health budget in health R & D, thus exceeding the 2% proposed by WHO. However, the Ministry of Health invested only 0.33% of its budget in health research in the country. It should also be noted that the resources of the Ministry of Health were allocated almost entirely to its own institutions. Therefore, although the answer is beyond the scope of this work, we could question the real impact that this figure, in percentage terms, would have on reshaping the

Fig. 2. Total expenditures on health R & D — financial flows by type of institution using the resources — annual average for the period 2000–2002



R & D, research & development; NGO, nongovernmental organization; Association, professional associations; Univ., university.

health R & D system, or even on the national health system.

Universities and research institutes received 92.5% of the public resources for health R & D in Brazil, amounting to approximately US\$ 382 million per year. Of these resources, the largest amount was used to pay the salaries of professors and researchers. It is worth noting that the private sector receives a small fraction of the public resources, about 0.69% of the total expenditures and that this small proportion was all allocated to nongovernmental organizations and professional associations in the health field. During this period, no public financial resources were identified as being allocated to companies producing inputs for health.

These figures unveil a remarkable autonomy of Brazilian researchers in the definition of their goals. In order for the Government to succeed in instigating a research programme with significant impact on the 10/90 gap mentioned above, it would be necessary to make an unambiguous move towards the introduction of a priorities agenda for health research. Preliminary data coming from studies currently in progress using information on the period 2003–2005 suggest an increase in the investments

of the Ministry of Health and the other ministries in health R & D. That, if confirmed, could be taken as an indication of such a move.

The process of development of this work made it possible to establish a basis for designing a monitoring system for information related to the financing of health R & D. Key institutions, which are important because they finance health R & D, organize and make available information on research projects, and have a coordinating role in research development, are identified.

This study supports the notion that carrying out these activities may enable the existing information gaps to be filled, thus making it possible for the Ministry of Health to gain a more reliable picture of the financial situation and the flows of resources among the various agents concerned with health R & D in Brazil. ■

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Competing interests: none declared.

Résumé

Flux financiers en faveur de la recherche et du développement en santé au Brésil sur la période 2000–2002

Objectif Cartographier et mesurer les flux financiers pour la recherche et le développement en santé au Brésil sur la période 2000–2002.

Méthodes Après adaptation de la méthodologie développée par le Center for Economic Policy Research, des données ont été recueillies sur les sources de financement et les utilisations de ces ressources en faveur de la recherche et du développement en santé.

Résultats Le montant annuel moyen des ressources affectées à la recherche et au développement en santé était de US\$ 573 millions environ. Le secteur public dans son ensemble avait investi US\$ 417,3 millions et le Département de la santé US\$ 51,1 millions. En pourcentage, l'investissement du secteur public représentait 4,15 % du budget du Département de la santé, bien que le Ministère de la santé ait affecté 0,3 % seulement de

son budget à la recherche en santé dans le pays. Les universités et les instituts de recherche ont été les principaux utilisateurs des ressources allouées à la recherche et au développement en santé, recevant 91,6 % des dépenses publiques totales, tandis que le secteur privé ne bénéficiait que d'une part réduite, soit environ 0,69 % de ce total. Le secteur privé a investi US\$ 135,6 millions par an et les organisations internationales US\$ 20,1 millions par an.

Conclusion Outre la mesure des ressources financières mises à la disposition de la recherche et du développement en santé, les résultats de cette étude ont permis de combler des lacunes en matière de données nationales, d'identifier les flux de ressources financières utilisées, ainsi que de tester et d'adapter la méthodologie proposée, ce qui a permis d'obtenir des informations se prêtant à des comparaisons internationales.

Resumen

Corrientes de recursos financieros para la investigación y el desarrollo sanitarios en el Brasil, 2000–2002

Objetivo Mapear y medir las corrientes de recursos financieros para la investigación y el desarrollo en salud en el Brasil durante los años 2000–2002.

Métodos Tras adaptar la metodología desarrollada para el Centro de Investigación de Políticas Económicas, se reunieron datos sobre las fuentes y los usos de los recursos destinados a la investigación y el desarrollo sanitarios.

Resultados El valor medio anual de los recursos asignados a la investigación y el desarrollo sanitarios fue de aproximadamente US\$ 573 millones. El sector público invirtió en conjunto US\$ 417,3 millones, y el departamento de salud US\$ 51,1 millones. Expresando las cantidades en porcentajes, el sector público invirtió un 4,15% del presupuesto del departamento de salud, pero el Ministerio de Salud asignó sólo un 0,3% de su presupuesto a la investigación sanitaria

en el país. Las universidades y los institutos de investigación son los usuarios principales de los recursos asignados a la investigación y el desarrollo sanitarios, recibiendo un 91,6% del gasto público total, mientras que el sector privado recibe un pequeño porcentaje, de alrededor del 0,69% del total. El sector privado invirtió US\$ 135,6 millones al año, y las organizaciones internacionales, US\$ 20,1 millones anuales.

Conclusión Además de medir los recursos financieros aportados para la investigación y el desarrollo sanitarios, los resultados permitieron colmar diversas lagunas en la información nacional; identificar las corrientes de los recursos financieros empleados; y ensayar y adaptar la metodología propuesta, obteniéndose información idónea para realizar comparaciones internacionales.

ملخص

تدفقات الموارد المالية اللازمة للبحوث والتطوير الصحي في البرازيل، 2000 – 2002

وزارة الصحة خصصت 0.3% فقط من ميزانيتها للبحوث الصحية في البرازيل. وبيّنت الدراسة أيضاً أن الجامعات ومعاهد البحوث هي المستفيد الرئيسي من الموارد المخصصة للبحوث والتطوير الصحي، حيث تلقت 91.6% من إجمالي الإنفاق العام، في حين أن القطاع الخاص يتلقى نسبة قليلة مقدارها 0.69% تقريباً من الإجمالي. وقد استثمر القطاع الخاص 135.6 مليون دولار في العام، واستثمرت المنظمات الدولية 20.1 مليون دولار في العام.

الاستنتاج: بالإضافة إلى قياس الموارد المالية التي خصصت للبحوث والتطوير في مجال الصحة، سُدَّت النتائج الثغرات في المعلومات الوطنية، وأسهمت في تحديد تدفقات الموارد المالية المخصصة، وفي اختبار وتكييف المنهجية المقترحة، مما أسفر عن معلومات مناسبة للمقارنة على الصعيد الدولي.

الهدف: وضع خرائط وقياس تدفقات الموارد المالية اللازمة للبحوث والتطوير الصحي في البرازيل، للسنوات 2000–2002.

الطريقة: بعد تكييف المنهجية المعدّة لمركز بحوث السياسات الاقتصادية، جُمِعَت المعطيات حول مصادر واستخدامات الموارد اللازمة للبحوث والتطوير الصحي، وحُلَّت هذه المعلومات من أجل التوصل إلى مؤشرات لتحسين تنسيق رصد الموارد.

الموجودات: بلغت القيمة المتوسطة السنوية للموارد المخصصة للبحوث والتطوير الصحي نحو 573 مليون دولار. استثمر القطاع العام بمجمعه 417.3 مليون دولار منها، ووزارة الصحة 51.1 مليون دولار. ومن حيث النسب المئوية، استثمر القطاع العام 4.15% من ميزانية وزارة الصحة، برغم أن

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