

 Health in Brazil 6

## Health conditions and health-policy innovations in Brazil: the way forward

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Brazil is a large complex country that is undergoing rapid economic, social, and environmental change. In this Series of six articles, we have reported important improvements in health status and life expectancy, which can be ascribed largely to progress in social determinants of health and to implementation of a comprehensive national health system with strong social participation. Many challenges remain, however. Socioeconomic and regional disparities are still unacceptably large, reflecting the fact that much progress is still needed to improve basic living conditions for a large proportion of the population. New health problems arise as a result of urbanisation and social and environmental change, and some old health issues remain unabated. Administration of a complex, decentralised public-health system, in which a large share of services is contracted out to the private sector, together with many private insurance providers, inevitably causes conflict and contradiction. The challenge is ultimately political, and we conclude with a call for action that requires continuous engagement by Brazilian society as a whole in securing the right to health for all Brazilian people.

### Introduction

“Brazil is not for beginners”, said Tom Jobim, one of the world’s greatest popular composers of the 20th century. Throughout this Series of articles,<sup>1–5</sup> we have shown that this statement indeed seems to be the case. We have reported remarkable progress in some aspects of health and health care, in sharp contrast with stagnation or even deterioration in other indicators. One of the ten largest economies globally, Brazil still has a long way to go before reaching current levels of health in the world’s most affluent nations.

Large countries tend to be complex and difficult to administer. With nearly 200 million inhabitants, striking regional differences exist in Brazil, from the rich southeast and south (where life expectancy approaches that of rich countries),<sup>1</sup> to the poorer north and northeast, and to the rapidly expanding frontier of the centre-west. In this Series of articles we have shown that, despite these deep divisions, the health of Brazilian people is improving.<sup>1–5</sup> Over the past four decades, life expectancy at birth increased by more than 6 months per calendar year.<sup>1</sup> Likewise, good progress is being made towards most of the Millennium Development Goals (MDGs; table 1). Indicators for MDG 1 (poverty and child undernutrition) and MDG 4 (child survival) will most probably be met.<sup>2</sup> Maternal mortality trends (MDG 5) have proven difficult to measure with precision because of enhanced reporting; modelled estimates show an annual rate of decline of around 4%,<sup>7,8</sup> which will be insufficient to reach the goal.<sup>2</sup> With respect to infectious diseases (MDG 6), Brazil excels in control of vaccine-preventable diseases and HIV/AIDS, but other diseases—particularly dengue fever—have been unaffected by control efforts.<sup>3</sup>

Neither chronic diseases nor violence and injuries are part of the MDGs, although some researchers argue they

should have been included.<sup>9,10</sup> Brazil is making some progress in these areas. Mortality rates of non-communicable diseases declined 20% between 1996 and 2007, mainly due to reductions in cardiovascular and chronic respiratory diseases, in parallel with falling smoking rates. By contrast, hypertension, obesity, and diabetes have risen, and neuropsychiatric disorders are currently the major contributor to disease burden.<sup>4</sup> Both homicide and traffic-related death rates started to fall slowly after reaching peak levels in the 1990s, but much still needs to be done to control these two epidemics;<sup>5</sup> for example, homicide rates in Brazil remain several fold higher than in neighbouring countries such as Argentina, Chile, or Uruguay.<sup>11</sup>

Social, ethnic, and regional inequalities have plagued Brazilian society for centuries, which is not surprising since Brazil is one of the world’s leaders in terms of income inequalities. Nevertheless, in this Series we have provided evidence that socioeconomic and regional gaps in several health indicators are being narrowed progressively.

To place Brazil in perspective, table 2 shows time trends in key socioeconomic and health indicators in the seven Latin American countries with a population greater than 15 million inhabitants. In 1960, Brazil was ranked first or second in terms of poverty, income concentration, rural population, illiteracy, and mortality. Income concentration in Brazil is especially high, with the Gini coefficient reaching a peak of 0·64 in the late 1980s, when Brazil was the world’s most unequal country. Unlike any other country in table 2, Brazil has a huge land area and a major tropical disease burden at baseline. All countries showed progress in all indicators. Absolute and relative gaps between Brazil and the average value of the other six countries were reduced for all indicators, and for some of these (fertility and urbanisation) reversals took place. Gaps

	Progress in terms of MDG indicators	Forecast
Eradicate extreme poverty and hunger (reduce extreme poverty and underweight by half; MDG 1)	Extreme poverty reduced from 8.8% (1990) to 4.2% (2005); underweight prevalence in children younger than 5 years reduced from 5.6% (1989) to 2.2% (2006–07)	Extreme poverty reduction goal reached; underweight reduction goal achieved
Achieve universal primary education (MDG 2)	95% of children and adolescents aged 7–17 years enrolled in school (2008)	On track
Promote gender equality and empower women (MDG 3)	More girls than boys are enrolled in primary, secondary, and higher education; discrimination against women in terms of employment, income, and political representation persists	Gender equality in education goal reached; other types of discrimination against women remain
Reduce under-5 mortality by two-thirds (MDG 4)	Under-5 mortality falling by 4.8% a year since 1990 (MDG requires annual rate of decline of 4.2%)	On track: goal likely to be met in 2011
Reduce maternal mortality by three-quarters (MDG 5)	Improved reporting of maternal deaths makes trends difficult to estimate but reduction unlikely to meet the goal; modelled estimates suggest annual reductions of 4%, lower than the rate of 5.4% required to meet the goal	Insufficient progress
Combat HIV, AIDS, malaria, tuberculosis, and other diseases (MDG 6)	Low prevalence (<0.5%) of HIV, which has been stable since 2000; almost complete eradication of some vaccine-preventable diseases (polio, measles, and diphtheria), diarrhoea, and Chagas' disease; partial success in control of malaria, hepatitis A and B, tuberculosis, and schistosomiasis; failure to control dengue and visceral leishmaniasis	Striking or partial progress against most infectious diseases

MDG=Millennium Development Goal. Data taken from United Nations Development Programme (UNDP) Brazil, the World Bank,<sup>6</sup> and previous articles in this Series.<sup>1-5</sup>

**Table 1: Progress in MDGs achieved by Brazil**

	Population (millions)		GDP per head (US\$)		Gini coefficient for income concentration		Urbanisation (%)		Adult literacy (%)		Total fertility rate (children/woman)		Life expectancy at birth (years)		Under-5 mortality rate (per 1000)	
	1960	2008	1960	2008	1984–87	2005–07	1960	2008	1980–82	2007	1960	2009	1960	2009	1960	2009
Brazil	71.7	191.9	1448	4448	0.58	0.55	45	86	75	90	6.2	1.8	54.5	72.7	178	21
Argentina	20.6	40.7	5237	9894	0.45	0.50	74	92	94	98	3.1	2.2	65.2	75.5	72	14
Chile	7.6	16.4	1842	6212	0.56	0.52	68	88	91	97	5.6	1.9	57.0	78.7	139	9
Colombia	16.0	44.9	1130	2986	..	0.58	45	75	..	93	6.8	2.4	56.7	73.2	144	19
Mexico	38.6	110.0	2554	6591	0.46	0.48	51	77	83	93	6.8	2.2	57.1	76.5	137	17
Peru	9.9	29.0	1647	2921	0.46	0.50	47	71	82	90	6.9	2.5	47.7	73.5	233	21
Venezuela	7.6	26.4	5425	5964	0.54	0.43	62	93	85	95	6.6	2.5	59.5	74.0	83	18
Mean*	..	..	2973	5761	0.493	0.503	57.6	82.8	86.9	94.1	6.0	2.3	57.2	75.2	134.5	16.2
Difference†	..	..	-1524	-1314	0.088	0.047	-12.7	2.8	-12.3	-4.1	0.2	-0.5	-2.7	-2.5	43.2	4.4
Ratio‡	..	..	0.49	0.77	1.18	1.09	0.78	1.03	0.86	0.96	1.04	0.80	0.95	0.97	1.32	1.27

GDP=gross domestic product. \*Mean value of the indicator in the six countries (Brazil not included). †Difference between Brazil and the mean value of the other six countries. ‡Ratio between Brazil and the mean value of the other six countries. Data taken from Gapminder.

**Table 2: Evolution of selected demographic, socioeconomic, and health indicators in the seven largest countries in Latin America, 1960–2009**

in terms of life expectancy and under-5 mortality were small, except for a large reduction in the absolute gap in under-5 mortality, from 43.2 to 4.4 deaths per 1000 livebirths between 1960 and 2009.

Trends in the health status of the Brazilian population over the past 50 years must be interpreted in terms of social determinants of health. Military dictatorship from 1964 to the late 1980s was characterised by rapid economic growth and increased income concentration, inadequate social protection with a fragmented health system, and little social participation in all sectors, including health. This situation did not preclude growth of a strong social movement advocating for reform of the health sector in the 1970s and 1980s. The return to democracy allowed creation of the Unified Health System (SUS) in the new 1988 constitution, with strong popular participation at all levels.<sup>1</sup> Throughout this period, changes were seen in other determinants of health,

including urbanisation (more than four in every five Brazilian people now live in cities), fertility (which dropped from more than six to fewer than two children per woman in 40 years), and education (primary education now being nearly universal).

From the mid-1990s, other major changes started to happen. Hyperinflation was controlled and economic stability—followed by moderate economic growth—was established. The Family Health Strategy (formerly called the Family Health Programme) expanded primary health care and used geographic targeting to reach the poorest areas of the country, particularly the rural northeast and north, small cities, and periurban neighbourhoods in metropolitan areas. Conditional cash transfer programmes evolved into the current social protection system (the *Bolsa Familia*), which now benefits a quarter of the population. The minimum wage increased from US\$50 (about R\$83 at the 1990

For more on UNDP Brazil see <http://www.pnud.org.br/odm>

For the Gapminder data see <http://www.gapminder.org/data>

exchange rate) a month in the 1980s to \$300 at present (almost R\$500), and after a long period of income concentration, the Gini coefficient started to decline from around the year 2000.

In addition to positive changes in social determinants of health, Brazil has also profited from a strong and committed health-sector reform movement, including not only academics, policy makers, and managers but also health workers from all levels (eg, auxiliary staff, nurses, and doctors), trade unionists, and the general population. This social movement was at the forefront of resistance to the post-welfare neoliberal agenda that swept through the world in the 1980s and 1990s.<sup>1</sup> Even when national governments included coalitions led by centrist or right-centrist parties, progressive health policies continued to be pursued. A comprehensive tax-based universal health system was created at the same time that basic packages and user fees were implemented in the public sector in most low-income and middle-income countries.

Internationally, Brazil adopted an independent and outspoken stance in forums such as the World Trade Organization, at which unfair drug patent laws were challenged.<sup>12</sup> At WHO, Brazil expressed strong opposition to the year 2000 *World Health Report* on health systems performance. Some people might argue that Brazil's reaction was attributable to its poor ranking among the world's countries, but the critique to that report was scientifically based, published in a high-impact journal,<sup>13</sup> and later endorsed by the World Health Assembly.<sup>14</sup>

Nevertheless, progress has been uneven. Here, we address some of the main achievements and remaining challenges for the health of Brazilian people.

## What is special about health in Brazil?

### The Unified Health System

Since 1989, all Brazilian people have been entitled to free health care at primary, secondary, and tertiary level through a national health system that is unique in Latin America, being funded by taxes and social contributions, such as social security payments.<sup>1</sup> As described in the first report of this Series,<sup>1</sup> implementation of the SUS was accompanied by strong decentralisation and resulted in increased access to primary health care through the Family Health Strategy. This change has led to major increases in coverage,<sup>12</sup> with recorded effects on infant,<sup>15,16</sup> and possibly adult,<sup>17</sup> mortality, and reductions in unnecessary admissions.<sup>18</sup> Brazil has been investing in a sustainable system based on primary health care at a time when many countries opted for selective primary care and for less equitable forms of funding.<sup>19</sup> A 2008 survey showed that 93% of Brazilian people who sought health care were able to obtain it,<sup>1</sup> and several interventions for maternal and child health are now close to reaching universal coverage, being delivered through the primary health-care structure rather than as independent vertical programmes.<sup>2</sup>

### Social participation

Intense social participation has been a cornerstone of the SUS since the bottom-up movements that resulted in Brazilian health-sector reform in the 1970s and 1980s. Social participation in health was institutionalised by the 1988 constitution and regulated further in 1990 legislation, establishing national health councils and conferences at three levels of government: Brazil has one national, 27 state, and more than 5500 municipal health councils.<sup>1,20</sup> These are permanent bodies in charge of formulating health strategies, controlling implementation of policies, and analysing health plans and management reports submitted by their respective level of government. Strong interactions exist between councils, managers, and policy makers, forming a complex and innovative decision-making process.<sup>1</sup> All councils are made up of users (50% of members), health workers (25%), and health managers and service providers (25%). Health conferences are held every 4 years at the three levels, which entail many representatives with the same proportionate distribution as the councils. The mandate of these conferences is to assess the health situation and propose directives for health policies, thus contributing to inclusion of themes in the public agenda. Among other democratic mechanisms, the participatory budget adopted by several states and municipalities is quite innovative. A proportion of the health budget for a city (municipality) or state is defined on the basis of popular vote; the population of a given city can vote, for example, on whether a new intensive-care unit or more health posts should be built. Despite these advances, the participatory process needs to be improved continuously.<sup>21</sup> Social and educational differences between users, professionals, and managers sometimes preclude democratic dialogue on equal terms. Corporate interests (see Dangers of professional interests) frequently play a part, and technobureaucratic dominance could restrict the ability of councils to make substantial changes. As a response to these shortcomings, the National Policy for Strategic and Participatory Management (known as ParticipaSUS) was approved in 2007 with the clear objective to integrate actions related to social participation, ombudsmanship, auditing, monitoring, and evaluation. Despite some difficulties, institutionalisation of social participation at all levels is a unique characteristic of the SUS.<sup>22</sup>

### Human resources for health

Qualified individuals are needed to run this complex Brazilian health system. In 2007, 1.7 doctors, 0.9 nurses, and 1.2 dentists were available per 1000 population, and these people were mostly located in the southeast and south of the country.<sup>1</sup> Rapid growth has taken place in terms of university enrolments for these professions: in 2008, 90 000 medical, 220 000 nursing, and 50 000 dentistry students were in training.<sup>23</sup> In particular, training of nurses has been promoted to address the chronic imbalance between nurses and doctors. Even in

terms of numbers of doctors, Brazil is outperformed by Argentina (3·2 per 1000) and Mexico (2·9 per 1000).<sup>24</sup> The Brazilian ministries of health and education are investing heavily to increase the focus of undergraduate programmes on primary health care. The latest innovation is undergraduate courses devoted to training of public-health (rather than clinical) workers.<sup>25</sup> In parallel, large programmes were set up to train auxiliary health personnel, not only for the primary-care system but also for other levels of care. Although health workers already represent about 10% of the Brazilian workforce, several challenges remain: uneven regional distribution of qualified personnel, high turnover, scarcity of structured careers, and major differences in salaries between regions, states, and municipalities, factors which are discussed below (see Human resources challenges).<sup>1</sup>

### The public-private mix

Brazil has substantial experience to share with respect to public-private partnerships, particularly in terms of provision of health services. The interface between the two sectors has evolved over time, yet it remains a constant source of conflict and contradictions.<sup>1</sup> Many private services (non-profit and for-profit hospitals, diagnostic laboratories, private outpatient clinics, etc) provide services for both the SUS and patients with private insurance. These facilities sometimes offer a dual standard of care according to how much they are being reimbursed per patient. A short visit to most private hospitals will show striking differences between crowded wards occupied by SUS patients and comfortable accommodation for those with private insurance. The public-private mix also leads to distortions in use of procedures, according to how much the government will reimburse private providers for a specific intervention. For example, the sharp rise in number of caesarean sections can be traced to higher payments for operative than for normal deliveries by social security schemes (which predated the SUS) to private providers in the 1970s.<sup>26</sup> Currently, private providers systematically complain that the values they receive from the SUS are insufficient to provide an adequate standard of care, but on the other hand they would not be able to survive economically without SUS contributions, which account for more than two-thirds of their clientele. Advocates for the SUS, in turn, argue that increased coverage and funding from the government, coupled with strong regulation and auditing, are essential to confer equal status to SUS and private patients and for effective insertion of the private sector into rationalised regionalised health-care networks. Public-private interactions are complicated further because many patients are entitled to use both systems, and doctors, nurses, and other health workers tend to have more than one job, typically being employed by both sectors. In short, the complex dimensions of the public-private mix in the Brazilian health sector are yet to be addressed.

### Private health insurance

Important changes are also happening in the private insurance sector. Although Brazil has more than 1000 health plan providers,<sup>27</sup> most of these are small and operate at local level; among the largest companies with national operations, fusions and acquisitions have taken place that are rapidly leading to concentration in this sector.<sup>28</sup> The number of Brazilians with private insurance rose by more than 6 million from 2002 to 2008, although the proportion of the population covered has remained at around 20–25%.<sup>1</sup> As many formerly poor families join the middle class, the clientele for new mega-companies is likely to grow.<sup>1</sup> There is concern, however, that the overall price of insurance is increasing well above inflation rates, and that new plans exclude disorders for which treatment is likely to be costly. Because of the universal nature of the SUS, private patients with complex conditions that are not covered by their insurance plans still rely on the public sector, even though their private insurance contributions are largely tax-deductible—a highly regressive policy that undermines funding for the SUS.<sup>29</sup> Although progress has been made in regulation of private insurance, a redefinition of the roles of this sector vis-à-vis the SUS is essential, and stronger regulation is vital to define how to minimise competition between public and private sectors and how to reimburse the SUS when patients with private insurance use public services.

### Capacity building for health research

Scientific research is growing rapidly in Brazil.<sup>30</sup> The National Science and Technology System was launched five decades ago with incentives for scientific training at undergraduate and postgraduate levels. Currently, there are 2718 postgraduate courses in the area of health, including 55 that offer masters and doctoral degrees in public health and related fields.<sup>31</sup> Special incentives are provided for consolidated programmes, most of which are in the southeast and south of the country, to foster development of emerging groups in the rest of the country. Publications by Brazilian researchers in peer-reviewed science journals have leapt from 14237 in 2003 to 30415 in 2008.<sup>30</sup> 2·7% of global scientific publications in all areas of research are from Brazil, and this proportion is advancing faster than comparable countries in public health sciences (figure). This growth is attributable largely to a striking increase in government investment in research, including grants and performance-based funding of individual researchers and academic departments, and to investments that ensure open access to major Brazilian journals and improve their quality. In particular, the ministry of health established, in 2000, its department of science and technology, which uses 1·5% of the large SUS budget to finance health research according to a set of priorities<sup>32</sup> delineated after a broad consultative process. From 2003 to 2009, the department financed 3700 projects with a total budget of

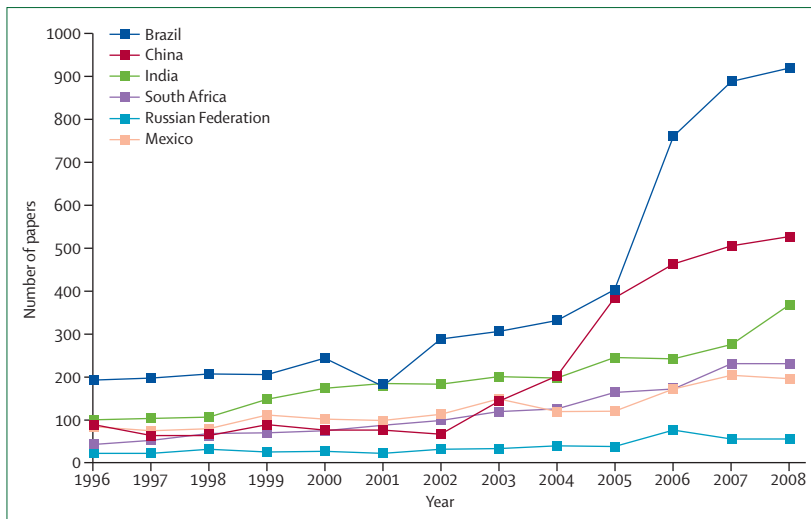


Figure: Number of scientific articles published per year in the area of public health, in selected countries  
Data taken from ABRASCO.

US\$400 million (more than R\$907 million at 2009 exchange rates).<sup>33</sup> Funding of postgraduate programmes on topics such as surveillance, environmental health, hospital management, and technological assessment, among many others, is also supported. Academic institutions receive funding from the ministry of health to offer these courses regularly to health managers employed by the SUS. A major player in this area since 1979 has been the Brazilian Association of Post-Graduate Programmes in Collective Health (ABRASCO), which had a major role in creation of the SUS and which now represents the academic public health community in several national and international forums.<sup>34</sup>

For ABRASCO see <http://www.abrasco.org.br>

### Mass media and health promotion

Another positive aspect of Brazilian public health is heavy involvement of the mass media. Televised soap operas are an integral part of Brazilian culture and are a major export item to other countries. Since the 1980s, serials and other television programmes have been used intensively by government and international organisations and by civil society to promote healthy behaviours, including oral rehydration for diarrhoea, breastfeeding, condom use for HIV prevention, and family planning. In parallel to the explicit dissemination of health messages, the lifestyle portrayed in soap operas—eg, small families<sup>35</sup> and leisure-time physical activity—has contributed to shaping behavioural norms. Television and soap operas are only one of many media channels used to promote healthy behaviours. Local radio stations, usually operated by community volunteers, have long had a role in health promotion; a good example is the dissemination of materials prepared by the Brazilian ministry of health and UNICEF during vertical campaigns in the 1980s for child-survival interventions. On the negative side, mass media has been used heavily to advertise unhealthy foods

For the International Baby Food Action Network see <http://www.ibfan.org.br>

and drinks, aggressively market private insurance, and promote high-technology solutions (such as transplants, complex diagnostic procedures, caesarean section, plastic surgery) as equivalent to the best health care.

### Regulation and drugs

A complex system such as the SUS requires a strong regulatory body. The National Agency for Health Surveillance (ANVISA; the Brazilian equivalent of the US Food and Drug Administration) was set up in 1999 as an autonomous body to regulate on a broad range of matters: medicines and health technologies, environment, food, health services, and frontiers.<sup>36</sup> Efficient action in many different areas is proving to be a major challenge, as exemplified by control of drugs. High treatment coverage for key infections such as HIV/AIDS, tuberculosis, and leprosy has been achieved, with exclusive distribution of free drugs through the SUS on the basis of protocols derived through expert consensus. Although emergence of strains resistant to antimicrobials remains a great concern, levels of primary and secondary resistance have been low and stable, suggesting that regulation has contributed to rational drug use.<sup>3</sup> The situation for other antimicrobials is rather different. Despite strong regulatory rulings, most antibiotics have historically been available to anyone who requested them from unlicensed salespersons in private pharmacies;<sup>37</sup> such practices undoubtedly contributed to high levels of antimicrobial resistance in patients with community-acquired urinary infections<sup>38</sup> and gonorrhoea.<sup>39</sup> At the end of 2010, new legislation was passed to prohibit sales of antibiotics without a medical prescription, but whether it will be enforced effectively throughout the country remains to be seen.

### Commercial advertising

Infant foods, tobacco, alcoholic beverages, and sugared soft drinks are examples of products with potential harmful effects on health that can be controlled through legislation. Brazil has a mixed track record in this area. Experience with breastmilk substitutes is highly positive;<sup>2</sup> infant formula and bottles cannot be advertised to the general public, and labels of all commercial milk products must mention that they are unsuitable to replace breastmilk. Marketing techniques—such as discounts and gifts—are forbidden in the case of infant formula and bottles. Funding of scientific meetings by infant formula companies is strictly regulated, and grants to health personnel are not allowed. The International Code of Marketing of Breastmilk Substitutes was adopted in 1988 and is enforced strongly by the Brazilian ministry of health, in collaboration with the International Baby Food Action Network. Marketing regulations on tobacco are also comprehensive and strict; since 2000, advertising was prohibited, and photographs alerting about risks are mandatory on cigarette packets.<sup>4</sup> By contrast, limits on the marketing

of alcoholic beverages are weak and are restricted to drinks with more than 13% alcohol. This constraint allows large marketing campaigns for beer targeted at young consumers, including sponsorship of major sports and cultural events.<sup>4</sup> Regulatory attempts by ANVISA have been defeated repeatedly by industry and the media. The situation is even more important for energy-dense, nutrient-poor processed foods, which are not subject to any type of regulation, not even advertisements directed at children and adolescents. The timid pledges voluntarily assumed in Europe and North America by transnational food and beverages companies are not honoured in Brazil, and repeated attempts by ANVISA to regulate such marketing have been blocked by industrial lobbyists.<sup>40</sup> Unlike the observation for breastmilk substitutes and tobacco, civil society movements have yet to tackle the aggressive commercial promotion of alcoholic beverages and unhealthy processed foods, possibly because the health hazards of moderate alcohol intake and of processed foods are less well documented and publicised than are those of tobacco or infant formula, both nationally and globally. Therefore, unsurprisingly, breastfeeding is on the increase<sup>2</sup> and smoking is becoming less frequent;<sup>4</sup> by contrast however, no detectable improvements have been seen in drinking of alcohol or being overweight.<sup>4</sup>

### Major challenges remain

In a large and complex country such as Brazil, to lay out a comprehensive list of challenges to population health—and in particular, to provision of health care—would be overambitious. Nevertheless, some of the most important issues that need to be tackled in the near future are discussed below. These challenges are by no means the only ones. A major need exists to improve coordination between the public and private sectors, between different government sectors, and between diverse levels of government—municipal, state, and federal. Furthermore, impact assessment is crucial. Many programmes, projects, policies, and other initiatives have been launched in the past 20 years, the effect of which are unknown because of sparse attention to rigorous evaluation.

### Reaching the hardest to reach

Despite high overall coverage and narrowing of regional and social disparities, important health inequities remain. Child mortality rates are still twice as high in the north and northeast of Brazil than in the south or southeast of the country.<sup>2</sup> Indigenous populations, mostly in the Amazon region, account for less than 1% of the population but still lag well behind the rest of the country in health indicators.<sup>41</sup> Inequalities in ethnic groups persist for many indicators, whether in maternal and child health, chronic diseases, or violence.<sup>2,4,5,42</sup> Quilombolas—or communities established in the 19th century by runaway slaves—present unacceptable levels of maternal and child health, as do settlements for

landless families (located throughout Brazil).<sup>43</sup> Having ensured high levels of access to health services for most of the population,<sup>1</sup> reduction of social exclusion of specific subgroups remains a challenge to the SUS. Further expansion and consolidation of primary care through the Family Health Strategy can help to address this challenge, together with the need to increase access to secondary and tertiary care.

### Financing of the SUS

The SUS has been less successful than originally expected with respect to expansion of the share of the public sector relative to total health expenditure, which at 41% in 2007 compares unfavourably to countries with (UK, 82%) or without (Mexico, 47%) a national health service.<sup>1</sup> Expenditure in private insurance and out-of-pocket payments rose steadily over time, but the SUS has been underfunded since its creation, despite specific funding recommendations embedded in the 1988 constitution. The share of the health sector in the federal budget has remained stable, and total health expenditure represents 8.4% of the gross domestic product.<sup>44</sup> Important constraints exist in infrastructure, supply of specialised services, and human resources within the SUS, which have exacerbated the dependence of the SUS on purchasing services from the private sector, particularly for secondary and tertiary care. For example, only a third of all hospital beds used by SUS patients are in public hospitals. Private providers, on the other hand, are constantly arguing that current levels of reimbursement by the SUS barely allow them to meet costs. The current financing crisis is a major threat to the future of the SUS and a key priority for the future.

### Improving quality of care

In this Series, we have not only reported striking improvements in access to services and in coverage levels for most health interventions but also highlighted that the quality of services provided through the SUS is sometimes below par—eg, in antenatal care.<sup>2</sup> Poor quality of care is related to institutional issues, such as high turnover of health workers in the Family Health Strategy, and difficulties in attracting skilled doctors to remote areas despite high salaries. Such posts are mostly attractive to young doctors who come out of medical school and choose to postpone their further education, at least for a few years. Greater investment in short training courses in specific areas, such as Integrated Management of Childhood Illnesses (IMCI)<sup>45</sup> or syndromic management of sexually transmitted diseases,<sup>46</sup> could contribute to improvement of quality of care, particularly in settings in which laboratory services are limited. Other important threats to quality of care include: health-care-associated acquired infections (a major problem, with hospital infection-control programmes being understaffed and without a focus on surveillance); the undue effect of medical technology on clinical decision making (Brazil has one of the highest rates of caesarean section in the

Frequency and trends	
<b>Health of mothers and children<sup>2</sup></b>	
Illegal abortions	Highly prevalent*
Maternal mortality	Slow decline*
Preterm delivery	Increasing
Over-medicalisation of childbirth (caesarean sections, etc)	Increasing
<b>Infectious diseases<sup>3</sup></b>	
Dengue fever	Repeated epidemics, out of control
Visceral leishmaniasis	Increasing
<b>Non-communicable diseases<sup>4</sup></b>	
Overweight/obesity	Rapid increase
Diabetes	Increasing
Hypertension	High prevalence, still increasing
Psychiatric diseases	High prevalence*
Asthma	High prevalence*
Cancers of the breast, lung, prostate, and colon	Increasing
Tobacco use	Declining but still at unacceptable levels
Excessive use of alcohol	High prevalence*
<b>External causes<sup>5</sup></b>	
Homicides	Slight decline but still at epidemic levels
Traffic-related injuries and deaths	Slight decline but still at epidemic levels
Domestic violence	High prevalence*

\*Reliable and representative data for time trends are not available.

**Table 3: Diseases and health problems that need special attention**

world);<sup>2</sup> the reduced proportion of services that have undergone accreditation (despite introduction of this process in the 1990s); and scant continuity of care.<sup>47</sup>

### Human resources challenges

Legislation that regulates hiring of civil servants in Brazil is rigid. Workers can only be selected through an open competitive process that takes several months, salary overheads are substantial, and to dismiss under-performers is very difficult. For these reasons, doctors, nurses, and community health workers are employed by the Family Health Strategy through special contracts, which makes them much easier to hire and to dismiss and allows payment in some categories (such as doctors or nurses) of competitive salaries that are well above those received by other similarly qualified health workers. This plan also allows remote municipalities to offer high salaries to attract professionals who would not otherwise be willing to live in such areas. The downside is that family health workers have neither a career structure nor job security or fringe benefits that other civil servants are entitled to. As a result, job satisfaction is typically below par and staff turnover is high,<sup>48,49</sup> leading to discontinuities in patients' care.

### Dangers of professional interests

Corporatism is a challenge to public health in Brazil. Medical societies have lobbied strongly against allowing other health workers—even university-trained nurses, physiotherapists, or audiologists—to prescribe any type

of drug, and this action resulted in the *Law of Medical Acts* being passed by congress in 2009. Training of nurses or community health workers in the IMCI programme, which entails prescription of simple antibiotics to children with suspected pneumonia, was interrupted in 2002 because of pressure from medical societies, even though no doctors are working in 455 of Brazil's 5562 municipalities<sup>50</sup> and despite strong evidence that community case-management can reduce under-5 mortality<sup>51</sup> and that IMCI-trained Brazilian nurses treat common illnesses to the same standard as doctors.<sup>52</sup> This type of corporatism is especially paradoxical in a country where, until new legislation was passed in late 2010, antibiotics could be purchased easily over the counter. Other examples include pressures exerted by doctors against allowing nurse-midwives to deliver babies and by registered nurses against community health workers precluding them from administering injections.

### The judiciary and health

Interference of the judicial system in prescription of drugs is a unique occurrence in Brazil. The 1988 constitution states that "health is the duty of the state"; patients who have been prescribed expensive, sometimes experimental, drugs that are not part of the essential drug lists ask judges to issue court orders obliging municipal health managers to purchase these drugs or to provide elective medical procedures immediately. Managers who do not comply are threatened with imprisonment. In 2008, the State of Rio Grande do Sul spent 22% of its drug budget to comply with 19 000 court orders.<sup>53</sup> Analysis of injunctions in São Paulo city shows that most cases were filed through private attorneys, that 47% of prescriptions were by private doctors, and three-quarters of such patients lived in high-income neighbourhoods.<sup>54</sup> Interference by the judiciary violates the key equity principle of the SUS, by privileging individuals with higher purchasing power and more access to information, boycotting rational prescribing practices, and taking resources away from priority areas. As a reaction to this stalemate, members of parliament are proposing the elaboration of clinical guidelines—similar to those issued by the UK's National Institute for Health and Clinical Excellence—to increase the powers of health managers in ruling which treatments and procedures are cost effective.

### Reducing dependency on imported health technologies

Augmented demand for public services, combined with the rapid process of innovation and adoption of such advances in the health system, led to a striking increase in the proportion of the national health budget dedicated to medical equipment and commodities (drugs, diagnostics, vaccines, etc)—from 5·8% in 2003 to 12·3% in 2009. These items are mostly imported and represent a growing share of the country's trade balance. The ministries of health and of science and technology are making renewed

investments towards reduction of such dependency, but greater efforts are needed. Brazil's major investment in scientific training provides a strong basis for public-private partnerships with national entrepreneurs. Mechanisms such as tax exemptions, low-interest loans, and market guarantees for products produced locally are being trialled, and further investments in this area are needed.<sup>55,56</sup>

### Lessening the outcomes of environment and climate change

The effect of global climate change on disease patterns is unquestionable.<sup>57</sup> Vast areas of Brazil's north (Amazon rainforest) and centre-west (the Pantanal wetlands and savannah) are at especially high risk owing to a combination of overexploitation, deforestation, previous

#### Panel: Call for action

For a large and complex country undergoing rapid change, a call for action towards improvement of health conditions and provision of health services must be necessarily long. We have divided our recommendations into categories directed at the Brazilian Government and at other actors in the health arena. The state has a central role in the health sector, but other actors must also be involved to achieve the best population health.

#### The Brazilian Government

We urge the Brazilian Government to reaffirm its commitment to improve the health of all Brazilian people, in particular to the 1988 constitution and SUS, by taking action in the following areas.

#### Health conditions

- Expand activities aimed at achieving optimum health for all Brazilian people, including health conditions covered by the MDGs (health of children and mothers, undernutrition, selected infectious diseases including HIV, tuberculosis, and malaria) and other major health problems (non-communicable diseases and their risk factors, remaining infectious diseases, violence, traumas and injuries, etc).
- Renew efforts to further reduce diseases and conditions that are still highly prevalent, including traffic-related injuries and deaths, homicides, depression and other psychiatric diseases, and use of tobacco, alcohol, and illicit drugs.
- Prioritise diseases and conditions that are increasing in frequency, including overweight and obesity, diabetes, dengue fever, and prematurity, among others.
- Continue to invest in improvement of public health surveillance, birth and death information systems (particularly for maternal mortality), interpersonal violence, and other currently under-reported conditions.
- Enhance actions to further reduce regional, ethnic group, and socioeconomic inequalities in health, and particularly to reach populations that still have insufficient coverage of health care, including Indigenous groups, landless peasants, and quilombolas (Afro-Brazilian settlements).
- Improve use of health information technology and health information systems.
- Ensure that monitoring and evaluation systems take equity into account, by producing disaggregated results according to socioeconomic status and ethnic origin.

#### Financing of health care

- Reverse the trend of diminishing participation of public funds in total health expenditure by substantially increasing the public budget for health and reducing public subsidies for the private sector.
- Reduce the dependence of SUS on services purchased from the private sector, particularly in-hospital care and diagnostic services, by expanding public investment in infrastructure.

#### Primary health care

- Promote and integrate the Family Health Strategy to all levels of care as the means for reaching universal coverage with health interventions.
- Continue to support programmes in which Brazil currently excels, including immunisations, HIV/AIDS, and control of endemic diseases such as Chagas disease.

#### Regulation, accountability, and quality of care

- Promote initiatives to improve quality of care and patients' safety in health care.
- Monitor quality of care at all levels, including systematic and regular auditing of deaths and near-misses associated with preventable conditions.
- Enforce regulatory measures to avoid distortions and over-medicalisation associated with the need to purchase a large proportion of services from the private sector and with scant performance monitoring of public services.
- Reinforce social participation in the health sector and take proactive actions to ensure that existing health councils remain representative and able to effectively influence policy at all levels.
- Ensure increased accountability of policy makers, managers, and health personnel at all levels by strengthening performance measurement and participatory structures, and by establishing a strong organisational culture orientated around quality and safety.
- Strengthen regulatory bodies to implement effective certification processes for health workers.
- Expand existing regulations on the advertising of infant foods and tobacco, to also cover other potentially unhealthy products such as sugared soft drinks and alcoholic beverages.
- Strengthen regulatory bodies to produce measures that are more effective for protection of the environment and workplaces, and for reduction of potential harmful effects of food and medicines.

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#### *Human resources for health*

- Review civil-service regulations to improve the benefits and working conditions for doctors, nurses, and community health workers employed by the Family Health Strategy, to avoid turnover and maintain morale.
- Renew efforts to address health-worker shortages in hard-to-reach areas, by expanding on-the-job training and promoting task-shifting of procedures from doctors to nurses and community health workers.
- Create mechanisms for minimisation of discontinuities in the management of SUS at municipal, state, and federal levels as a result of political party interests.

#### *Health research*

- Continue to expand the funding available for health research, with special emphasis on achievement of technological independence and on thorough evaluation of existing technologies, programmes, and services.
- Consider creating a series of research institutes similar to the National Institutes of Health in the USA, or the UK's Medical Research Council.

#### *Intersectoral actions*

- Continue to promote conditional cash transfers and real increases in the minimum wage, which have contributed to income redistribution and near-elimination of extreme poverty.
- Enhance social policies and programmes focused on education, housing and social security as a means to reduce inequities.

#### **Health workers**

We urge health workers to:

- Fully engage in the continued process of construction and improvement of SUS.
- Participate as key actors in the process of delivering high-coverage quality and comprehensive care to the whole population.
- Avoid allowing narrow corporate interests to prevent essential health interventions from reaching those who need them most.
- Collaborate in augmenting access to high quality of care to those living in remote areas of the country where doctors and nurses are still not accessible.

#### **Private sector**

We urge the private sector to:

- Recognise its social role in providing services in coordination with SUS when requested, and to fully engage in the pursuit of high-quality health care for all Brazilian people.
- Harmonise its own financial requirements with the greater goal of achieving the best possible outcome for all, by ensuring equal treatment standards to private and SUS patients.
- Treat all patients with an equal standard of care, irrespective of how services are being reimbursed.

#### **Universities, training institutions, health councils, and researchers**

We urge universities, training institutions, health councils, and researchers to:

- Restate their commitment to SUS, specifically, to primary health care as gatekeeper of the system and as a means of achieving comprehensiveness in care and equity.
- Restate their commitment to train professionals to provide high quality of care.
- Review training programmes to ensure a high supply of family doctors and specialists directed at the public sector, by contrast with the current focus towards production of specialists aimed at the private sector.
- Invest further in training of public-health professionals at the undergraduate level.
- Ensure that every graduating doctor and nurse has the basic skills required to provide high quality of care in the Family Health Strategy, independently of whether or not they will become specialists in the future.
- Accelerate production of nurses and mid-level health workers.
- Increase investment in short in-service courses directed at doctors, nurses, and other health workers employed by SUS and the Family Health Strategy.
- Continue to undertake research aimed at improvement of equity in health, including monitoring and evaluation of access and effectiveness of health care, patients' satisfaction, cost-effectiveness of technologies and interventions, development of clinical guidelines, and health information technology.
- Expand research efforts towards achievement of technological self-sufficiency in health products (drugs, vaccines, diagnostics, and equipment) and health-technology assessments.
- Expand research efforts to improve knowledge and political and public awareness about social determinants of health.

#### **Civil society**

We urge civil society to:

- Restate its engagement in, and support for, the sanitary reform movement and, in particular, SUS and the Family Health Strategy.
- Continue to participate in health conferences and councils on equal terms with health workers and government representatives.
- Help the public sector to improve availability and quality of services by denouncing ill-treatment, scant access, and under-the-table payment requests.
- Understand that the best health care is not necessarily associated with the most advanced technologies.
- Continue to have a key critical and constructive role in building a unified, effective, and equitable national health system.

SUS=Unified Health System. MDG=Millennium Development Goal.

environmental degradation (eg, mercury poisoning in the major Amazon basins because of rustic open-air mining activities),<sup>58</sup> a local economy that is heavily dependent on non-renewable sources of energy (eg, forest chopping and burning), and the complex interplay of local and global climate changes.<sup>59</sup> Progressive environmental degradation at the border of pristine forests, new settlements, and large urban areas undergoing fast and chaotic development has been associated with the urbanisation of malaria.<sup>60,61</sup> In Brazil's south, repeated severe flooding and tornadoes—unheard of until recent times—caused major material damage and some loss of life together with outbreaks of diarrhoea and leptospirosis, which were rapidly controlled by the health sector. Although attribution of recent increases in dengue fever and leishmaniasis to global warming is tempting, more complex determinants exist, including disordered urbanisation, inadequate sanitation and garbage disposal, and deficiencies in surveillance and control actions.<sup>3</sup> The social environment is also affected by change: widespread urbanisation and urban violence<sup>5</sup> limit opportunities for physical activity in public spaces; increased availability of processed foods contributes to being overweight;<sup>40</sup> and rapid changes in fertility and family structures might lead to positive and negative changes in physical and mental disease patterns.<sup>62</sup> Particular attention should be paid to integrated initiatives with several benefits—eg, reduction in deforestation for production of charcoal with a concomitant fall in periurban malaria, or promotion of active commuting, which will increase physical activity and reduce emissions.<sup>63</sup>

### Tackling problems in health that are on the increase

In this Series, we have highlighted several health disorders that are either increasing in prevalence or are stable at unacceptably high levels (table 3).<sup>1-5</sup> A cross-cutting issue is the sharp growth in the elderly population,<sup>1</sup> who are at high risk of many of these conditions, particularly non-communicable diseases. Health issues related to ageing were discussed by Schmidt and colleagues.<sup>4</sup> Improving the training of doctors and nurses employed by the Family Health Strategy in chronic conditions is a key challenge.

### Concluding remarks

On the basis of present analyses and the preceding articles in this Series,<sup>1-5</sup> we conclude with a call for action (panel), in which we specify challenges directed to the government, private sector, academics, health workers, and civil society as a whole. We stress, however, that the actions recommended and the respective actors involved are deeply interconnected, and coordinated action is required by all.

Here, we have recorded important improvements in health status. The core message from this Series is that health improvements can be ascribed to favourable changes in social determinants of health, together with a

strong reform movement dating from the 1970s that led Brazil to take the unique approach—as far as Latin America is concerned—of creating a national health service specifically aimed at reduction of inequalities in health. Health-sector reform and the resultant creation of the SUS were part of a broad movement aimed at lowering social exclusion through initiatives in health, education, cash transfers, and other sectorial actions.<sup>64</sup>

Yet, many challenges remain. Despite overall progress, socioeconomic and regional disparities remain unacceptably large, reflecting the fact that much effort is still needed to improve basic living conditions for much of the population. New health issues arise as a result of urbanisation and social and environmental change, and some old health problems remain unabated. Administration of a complex, decentralised public health system—in which a large share of services are contracted to the private sector—inevitably causes conflict and contradiction, as does the presence of a strong private health insurance sector. The challenge is ultimately political,<sup>1</sup> requiring continuous engagement by Brazilian society as a whole to secure the right to health for all Brazilian people.

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CGV wrote the paper with contributions from all other authors. All authors have seen and approved the final version.

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#### Conflicts of interest

We declare that we have no conflicts of interest.

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#### References

- 1 Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet* 2011; published online May 9. DOI:10.1016/S0140-6736(11)60054-8.
- 2 Victora CG, Aquino EML, Leal MdC, et al. Maternal and child health in Brazil: progress and challenges. *Lancet* 2011; published online May 9. DOI:10.1016/S0140-6736(11)60138-4.

- 3 Barreto ML, Teixeira MG, Bastos FI, et al. Successes and failures in the control of infectious diseases in Brazil: social and environmental context, policies, interventions, and research needs. *Lancet* 2011; published online May 9. DOI:10.1016/S0140-6736(11)60202-X.
- 4 Schmidt MI, Duncan BB, e Silva GA, et al. Chronic non-communicable diseases in Brazil: burden and current challenges. *Lancet* 2011; published online May 9. DOI:10.1016/S0140-6736(11)60135-9.
- 5 Reichenheim ME, de Souza ER, Moraes CL, et al. Violence and injuries in Brazil: the effect, progress made, and challenges ahead. *Lancet* 2011; published online May 9. DOI:10.1016/S0140-6736(11)60053-6.
- 6 The World Bank Group. Millennium Development Goals: country—Brazil. [http://ddp-ext.worldbank.org/ext/ddpreports/ViewSharedReport?&CF=&REPORT\\_ID=1336&REQUEST\\_TYPE=VIEWADVANCED](http://ddp-ext.worldbank.org/ext/ddpreports/ViewSharedReport?&CF=&REPORT_ID=1336&REQUEST_TYPE=VIEWADVANCED) (accessed Dec 16, 2010).
- 7 Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet* 2010; **375**: 1609–23.
- 8 WHO. Trends in maternal mortality: 1990 to 2008—estimates developed by WHO, UNICEF, UNFPA and The World Bank. 2010. <http://www.who.int/reproductivehealth/publications/monitoring/9789241500265/en/index.html> (accessed Feb 2, 2011).
- 9 Fuster V, Voûte J. MDGs: chronic diseases are not on the agenda. *Lancet* 2005; **366**: 1512–14.
- 10 Hyder AA, Ghaffar A. The millennium development goals and road traffic injuries: exploring the linkages in South Asia. *J Coll Physicians Surg Pak* 2004; **14**: 742–45.
- 11 United Nations Office on Drugs and Crime. The eleventh United Nations survey of crime trends and operation of criminal justice systems (eleventh UN-CTS, 2007–2008). [http://www.unodc.org/unodc/en/data-and-analysis/crime\\_survey\\_eleventh.html](http://www.unodc.org/unodc/en/data-and-analysis/crime_survey_eleventh.html) (accessed Dec 15, 2010).
- 12 Galvão J. Access to antiretroviral drugs in Brazil. *Lancet* 2002; **360**: 1862–65.
- 13 Almeida C, Braveman P, Gold MR, et al. Methodological concerns and recommendations on policy consequences of the World Health Report 2000. *Lancet* 2001; **357**: 1692–97.
- 14 WHO. World Health Assembly: executive board resolution—health systems performance assessment. Geneva: World Health Organization, 2001.
- 15 Macinko J, Guanais FC, de Fátima Marinho de Souza M. Evaluation of the impact of the Family Health Program on infant mortality in Brazil, 1990–2002. *J Epidemiol Community Health* 2006; **60**: 13–19.
- 16 Aquino R, de Oliveira NF, Barreto ML. Impact of the family health program on infant mortality in Brazilian municipalities. *Am J Public Health* 2009; **99**: 87–93.
- 17 Rocha R, Soares RR. Evaluating the impact of community-based health interventions: evidence from Brazil's Family Health Program. *Health Econ* 2010; **19** (suppl): 126–58.
- 18 Macinko J, Dourado I, Aquino R, et al. Major expansion of primary care in Brazil linked to decline in unnecessary hospitalization. *Health Aff (Millwood)* 2010; **29**: 2149–60.
- 19 Rohde J, Cousens S, Chopra M, et al. 30 years after Alma-Ata: has primary health care worked in countries? *Lancet* 2008; **372**: 950–61.
- 20 Conselho Nacional de Secretários de Saúde. Brasil: legislação do SUS. Brasília: Ministério da Saúde/Conselho Nacional de Secretários de Saúde, 2003.
- 21 Cortes SMV. Conselhos e conferências de saúde: papel institucional e mudança nas relações entre Estado e sociedade. In: Fleury S, Lobato LVC, eds. Participação, democracia e saúde. Rio de Janeiro: CEBES, 2009: pp 102–28.
- 22 Ministério da Saúde. Participação e controle social. [http://portal.saude.gov.br/portal/saude/cidadao/area.cfm?id\\_area=1036](http://portal.saude.gov.br/portal/saude/cidadao/area.cfm?id_area=1036) (accessed Dec 16, 2010).
- 23 Haddad AE, Morita MC, Pierantoni CR, Brenelli SL, Passarella T, Campos FE. Undergraduate programs for health professionals in Brazil: an analysis from 1991 to 2008. *Rev Saude Publica* 2010; **44**: 383–91.
- 24 WHO. Global health atlas. <http://apps.who.int/globalatlas/DataQuery/default.asp> (accessed Dec 16, 2010).
- 25 Bosi ML, Paim JS. Undergraduate on Public Health: limits and possibilities as a professional education strategy. *Cien Saude Colet* 2010; **15**: 2029–38 [in Portuguese].
- 26 Barros FC, Vaughan JP, Victora CG. Why so many caesarean sections? The need for a further policy change in Brazil. *Health Policy Plan* 1986; **1**: 19–29.
- 27 Agência Nacional de Saúde Suplementar. Caderno de Informação da Saúde Suplementar. Rio de Janeiro: Agência Nacional de Saúde Suplementar, 2010.
- 28 Ocké-Reis CO. The consolidation of private health plans in Brazil: challenges for the regulator. *Cien Saude Colet* 2007; **12**: 1041–50 [in Portuguese].
- 29 Bahia L. The Brazilian health system between norms and facts: mitigated universalization and subsidized stratification. *Cien Saude Colet* 2009; **14**: 753–62.
- 30 Diniz SG, Chacham AS. “The cut above” and “the cut below”: the abuse of caesareans and episiotomy in São Paulo, Brazil. *Reprod Health Matters* 2004; **12**: 100–10.
- 31 Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. Relação de cursos recomendados e reconhecidos: saúde coletiva. <http://conteudoweb.capes.gov.br/conteudoweb/ProjetoRelacaoCursosServlet?acao=pesquisarLes&codigoArea=40600009&descricaoArea=CI%CANCANCIAS+DA+SA%DADE+&descricaoAreaConhecimento=SA%DADE+COLETIVA&descricaoAreaAvaliacao=SA%DADE+COLETIVA> (accessed Dec 16, 2010).
- 32 Guimarães R, Santos LM, Angulo-Tuesta A, Serruya SJ. Defining and implementing a national policy for science, technology, and innovation in health: lessons from the Brazilian experience. *Cad Saude Publica* 2006; **22**: 1775–85.
- 33 Santos LM, Souza LE, Serruya SJ, Guimarães RF. The role of research in the consolidation of the Unified National Health System (SUS). *Cad Saude Publica* 2010; **26**: 1666–67.
- 34 Aquino EM. Gender and health: profile and trends of the scientific production in Brazil. *Rev Saude Publica* 2006; **40**: 121–32.
- 35 La Ferrara E, Chong A, Duryea S. Soap operas and fertility: evidence from Brazil. Washington, DC: Inter-American Development Bank, 2008.
- 36 Piovesan MF, Labra ME. Institutional change and political decision-making in the creation of the Brazilian National Health Surveillance Agency. *Cad Saude Publica* 2007; **23**: 1373–82.
- 37 Ramos MC, da Silva RD, Gobatto RO, et al. Pharmacy clerks' prescribing practices for STD patients in Porto Alegre, Brazil: missed opportunities for improving STD control. *Int J STD AIDS* 2004; **15**: 333–36.
- 38 Andrade SS, Sader HS, Jones RN, Pereira AS, Pignatari ACC, Gales AC. Increased resistance to first-line agents among bacterial pathogens isolated from urinary tract infections in Latin America: time for local guidelines? *Mem Inst Oswaldo Cruz* 2006; **101**: 741–48.
- 39 Dillon JA, Rubabaza JP, Benzaken AS, et al. Reduced susceptibility to azithromycin and high percentages of penicillin and tetracycline resistance in *Neisseria gonorrhoeae* isolates from Manaus, Brazil, 1998. *Sex Transm Dis* 2001; **28**: 521–26.
- 40 Monteiro CA, Gomes FS, Cannon G. The snack attack. *Am J Public Health* 2010; **100**: 975–81.
- 41 Coimbra CEA, Santos RV. Emerging health needs and epidemiological research in indigenous peoples in Brazil. In: Salzano FM, Hurtado AM, eds. Lost paradises and the ethics of research and publication. Oxford: Oxford University Press, 2004: 89–109.
- 42 UNIFEM/UNICEF. Desigualdades Raciais e de Gênero entre Crianças, Adolescentes e Mulheres no Brasil, no contexto dos Objetivos de Desenvolvimento do Milênio. Brasília: UNIFEM/UNICEF, 2010.
- 43 Santos LMP, Paes-Sousa R, da Silva Junior JB, Victora CG. National Immunization Day: a strategy to monitor health and nutrition indicators. *Bull World Health Organ* 2008; **86**: 474–79.
- 44 Instituto Brasileiro de Geografia e Estatística. Conta-Satélite de Saúde Brasil 2005–2007. Rio de Janeiro: IBGE, 2010.
- 45 Amaral J, Gouws E, Bryce J, Leite A, Cunha A, Victora C. Efeito da AIDPI sobre o desempenho de profissionais de saúde [The effect of IMCI on the performance of health workers]. In: Cunha A, Benguigui Y, Silva M, eds. Atenção Integradas às Doenças Prevalentes na Infância: implantação e avaliação no Brasil [Integrated Management of Childhood Illness: implementation and evaluation in Brazil]. Rio de Janeiro: Editora Fiocruz, 2006: 55–75.

- 46 Moherdau F, Vuylsteke B, Siqueira LF, et al. Validation of national algorithms for the diagnosis of sexually transmitted diseases in Brazil: results from a multicentre study. *Sex Transm Infect* 1998; **74** (suppl 1): S38–43.
- 47 Almeida PF, Giovanella L, Mendonça MH, Escorel S. Challenges for healthcare coordination: strategies for integrating levels of care in large cities. *Cad Saude Publica* 2010; **26**: 286–98 (in Portuguese).
- 48 Amaral JJ, Gouws E, Bryce J, Leite AJ, Cunha AL, Victora CG. Effect of Integrated Management of Childhood Illness (IMCI) on health worker performance in Northeast-Brazil. *Cad Saude Publ* 2004; **20** (suppl 2): S209–19.
- 49 Medeiros CR, Junqueira AG, Schwingel G, Carreno I, Jungles LA, Saldanha OM. Nurses and doctors turnover: an impasse in the implementation of the Family Health Strategy. *Cien Saude Colet* 2010; **15** (suppl 1): 1521–31 (in Portuguese).
- 50 Global Health Workforce Alliance. GHWA asks: Dr Francisco De Campos. 2009. [http://www.who.int/workforcealliance/Newsletter\\_issue%201\\_2009.2.pdf](http://www.who.int/workforcealliance/Newsletter_issue%201_2009.2.pdf) (accessed Feb 3, 2011).
- 51 Sazawal S, Black RE, for the Pneumonia Case Management Trials Group. Effect of pneumonia case management on mortality in neonates, infants, and preschool children: a meta-analysis of community-based trials. *Lancet Infect Dis* 2003; **3**: 547–56.
- 52 Huicho L, Scherpbier RW, Nkowane AM, Victora CG, the Multi-Country Evaluation of IMCI Study Group. How much does quality of child care vary between health workers with differing durations of training? An observational multicountry study. *Lancet* 2008; **372**: 910–16.
- 53 Biehl J, Petryna A, Gertner A, Amon JJ, Picon PD. Judicialisation of the right to health in Brazil. *Lancet* 2009; **373**: 2182–84.
- 54 Chieffi AL, Barata RB. 'Judicialization' of public health policy for distribution of medicines. *Cad Saude Publica* 2009; **25**: 1839–49 (in Portuguese).
- 55 Gadelha CAG. O complexo industrial da saúde e a necessidade de um enfoque dinâmico na economia da saúde [The health industrial complex and the need of a dynamic approach on health economics]. <http://www.scielo.br/pdf/csc/v8n2/a15v08n2.pdf> (accessed Feb 3, 2011).
- 56 Gadelha CAG, Barbosa PR, Maldonado J, Vargas M, Costa L. The health economic-industrial complex: concepts and general characteristics. Rio de Janeiro: Fundação Oswaldo Cruz, 2010: 2–16.
- 57 Costello A, Abbas M, Allen A, et al. Managing the health effects of climate change. *Lancet* 2009; **373**: 1693–733.
- 58 Grotto D, Valentini J, Fillion M, et al. Mercury exposure and oxidative stress in communities of the Brazilian Amazon. *Sci Total Environ* 2010; **408**: 806–11.
- 59 Cox PM, Harris PP, Huntingford C, et al. Increasing risk of Amazonian drought due to decreasing aerosol pollution. *Nature* 2008; **453**: 212–15.
- 60 Ferreira Goncalves MJ, Alecrim WD. Non-planned urbanization as a contributing factor for malaria incidence in Manaus-Amazonas, Brazil. *Rev Salud Publica (Bogota)* 2004; **6**: 156–66.
- 61 Rodrigues Ade F, Escobar AL, Souza-Santos R. Spatial analysis and determination of malaria control areas in the State of Rondônia. *Rev Soc Bras Med Trop* 2008; **41**: 55–64 (in Portuguese).
- 62 de Almeida-Filho N, Burnett CK. Family size and child mental disorders in Bahia, Brazil. *Popul Environ* 1983; **6**: 3–16.
- 63 Haines A, McMichael AJ, Smith KR, et al. Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. *Lancet* 2009; **374**: 2104–14.
- 64 Guanais FC. Health equity in Brazil. *BMJ* 2010; **341**: c6542.