Network for Canadian
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NCOHR WORKING PAPER SERIES

A comparative analysis of oral health care systems in the United States, United Kingdom, France, Canada, and Brazil

Daniela Garbin Neumann*[1] and Carlos Quiñonez[2]

Abstract

Brazil has developed a dynamic and complex health care system and in terms of oral health care, the Brazilian Constitution ensures for universal coverage. The 2004 Brazilian oral health policy "Smiling Brazil" also increased federal funds to provide comprehensive and universal access to oral health care. However, the magnitude of inequality in Brazil remains large compared to developed countries. In this context, a macro analysis of health care systems can help us understand how different countries organize and deliver health care and provides an opportunity to observe what can be done well, and what can cause challenges to achieving positive health and system outcomes. The purpose of this study was thus to conduct a comparative analysis of the oral health care system in Brazil with four countries, the United States, United Kingdom, France and Canada. A collection of published information sources was located to identify key indicators for a comparative framework to analyse the oral health care systems. Quantitative data were gathered from different databases and national statistics offices. Diverse patterns to organize, finance and deliver oral health care were found among the countries analyzed, but a common point was that oral health care is an exception in terms of general organization, financing and delivery, even in countries with universal coverage for general health care. Our findings suggest that Brazil should concentrate efforts to increase coverage by public sources for oral health care, and to allocate more public resources to finance oral health care. Finally, in order to maximize the reduction of social inequalities in oral health and oral health care, Brazil needs to keep building a system committed to providing oral health care free at the point of service.

MeSH Keywords: Health care systems, Health expenditures; Delivery of health care, Oral health; Inequalities; Brazil.

Introduction

Macro analyses of health care systems can help us understand how different countries organize and deliver health care to their populations. They provide an opportunity to observe what can be done well, and what can cause challenges to achieving positive health and system outcomes. In fact, the general health care system design and context, in conjunction with characteristics such as coverage, financing and the way the delivery system is organized can play an important role in improving health outcomes [1]. In the Brazilian context, since the promulgation of the 1988 Constitution, Brazil has developed a dynamic and complex health care system. Known as the Unified Health System (Sistema Único de Saúde – SUS), it is based on the principles of a citizen's right to health and the state's duty to secure it. The development of the SUS was driven by the Brazilian Health Reform movement, and has helped shape the SUS as a health system based on universality, integrality, decentralization, equity and social control [2,3].

The implementation of the SUS began in 1990 with the publication of a framework health care law (Law 8080/90), which specified the general attributions of the SUS to provide comprehensive, universal preventive and curative care through decentralized management [4]. As a result of the decentralization rationale, new rules and administrative reform at all levels of government were undertaken to establish funding mechanisms, including the "Primary Care Quota," a per-person amount that the federal Ministry of Health transfers to municipalities to

* Correspondence: danigneumann@hotmail.com
[1] CAPES Foundation, Ministry of Education of Brazil, Brasília, DF, Brazil.
[2] Discipline of Dental Public Health, Faculty of Dentistry, University of Toronto, Toronto, Canada

finance primary health care [3].

In 1994, a new approach to organizing primary health care was established, the Family Health Program (Programa Saúde da Família – PSF). It is a way of delivering health care to be performed by family health teams, including nurses, physicians, and community health workers. The PSF has been the main strategy for providing primary health care within the SUS [3,5,6].

Despite being called a "unified system", the SUS is actually made up of a complex network of complementary and competitive providers and purchasers, forming a public-private mix. In 2010, less than a half of health spending in Brazil was funded by public sources [7], and funding for the SUS has not been sufficient to ensure adequate resources for a universal and comprehensive health care system. Thus Brazil has a segmented health care system, with two sub-systems: the public one, in which services are financed and provided by federal, state, and municipal levels, and the private one, in which services are financed by employment-based or individually purchased private insurance, and household out-of-pocket payments. The public and private components are distinct but interconnected, as people can use both, depending on ease of access or their ability to pay [3].

Oral health care follows the same trend, but with even lower priority in public policies and public financing. The Brazilian Constitution ensures for universal coverage, but public funding has historically been targeted to specific groups, in particular children. Data from the health supplement of the 1998 Brazilian Household Survey showed that only about one-third of subjects had visited a dentist in the year preceding the survey, while 18.7% of them had never had a dental appointment. Participants also reported having paid for oral health care mainly through out-of-pocket payments, with 69% of them receiving care in privately owned dental offices [8].

Considering the low access to and low public funding for oral health care, the Brazilian government introduced Oral Health Teams within the PSF, aiming to reorganize public oral health care. Subsequently, the launch of the Brazilian oral health policy "Smiling Brazil" in 2004 increased federal funds to states and municipalities to provide comprehensive and universal access to oral health care. Adding fluoride to water systems and providing access to specialized treatment through Dental Specialty Centers (Centros de Especialidades Odontológicas – CEOs) are also part of Smiling Brazil [9,10,11,12].

Despite these efforts to ensure publicly funded oral health care for all people, the magnitude of inequality in Brazil remains large compared to developed countries. A study that analyzed data from the 2009 System for Surveillance of Risk and Protective Factors for Chronic Diseases by telephone survey found that more than 60% of all oral health care is still privately delivered and financed through out-of-pocket payments. Of the remainder, private dental insurance financed 22.4% and 13.2% was provided by the SUS. Individual characteristics (low levels of education) and regional differences (low levels of economic development) were associated with poorer access to oral health care services. While the supply of oral health care services by the SUS has increased, it appears to be still largely targeted to younger and school-age populations, reproducing the typical historical organization of public oral health care in Brazil [12,13].

This situation has similarities when compared to different health systems around the world. For example, while some countries have achieved near-universal coverage of health care costs for a core set of services, in some nations services such as pharmaceutical drugs and oral health care are partially covered or not covered at all and must be purchased separately [1]. On the other hand, there are nations where oral health care is universal and publicly funded, however providers can choose to provide mixed public-private care, often from the same office and sometimes to the same patient [14].

Given the effect of these various arrangements on equal access to oral health care, the purpose of this study is to conduct a comparative analysis of the oral health care system in Brazil with four countries, the United States, United Kingdom, France and Canada. In choosing these countries, the aim was to obtain a representation of nations with different health care system designs and, consequently, diverse types of oral health care systems. Concerning Canada and the United States, for example, there are major, even fundamental differences in how public health care is funded and organized, but substantial similarities in how oral health care is provided. The United Kingdom and France are nations that offer public oral health care to their populations, but with different ways of financing and delivering that can influence access to and utilization of oral health care services. Ultimately, the goal is to inform Brazilian and international policy debates on oral health care, especially with regards to making the best use of the resources allocated.

Methods

A collection of published information sources was used as reference material for this paper, including articles and official reports with detailed description of health care systems and oral health care systems from each country. These materials were located on research platforms (Web of Knowledge and Pub Med) using the terms "health care system" and "oral health care system" in addition to the nationality (e.g. "Brazilian health care system"). Articles in English, French and Portuguese were considered. Quantitative data were gathered from a number of different sources, including databases from the World Health Organization (WHO) and the Organization for Economic Co-operation and Development (OECD), as well as data from national statistical offices. A broad review of the documents was undertaken to identify key indicators that could be part of a comparative framework to analyse the oral health care systems. The indicators have been selected on the basis of their relevance, data availability and comparability and are described in Table 1.

Results

1. The American health care system

The United States (US) has a unique health care system unlike any other in the world. While most develop countries have health care systems that offer coverage as a right of citizenship, this is not yet the case in the US, where not all Americans are automatically covered by health insurance. Thus, one main feature in the US health care system is its fragmentation due to the fact that different people obtain health care through different means. The federal government provides a range of regulatory and funding mechanisms including Medicare and Medicaid. There is also a combined federal and state funded Children's Health Insurance Program (CHIP), which offers coverage to children in low-income families [17,18].

In 2011, 63.9% of Americans received health care coverage from private health insurance, with 55.1% receiving it through their employers and 9.8% acquiring coverage directly. Public programs covered 32.2% of residents and as types of health insurance are not mutually exclusive, people may be covered by more than one program. Almost 49 million residents (15.7% of the population) were uninsured [17,19].

Private and public coverage typically includes inpatient and outpatient hospital care and physician services. Many also include preventive services, mental health care, physiotherapy and prescription drugs. Since 2010, private health insurance is required to cover certain preventive services (with no cost-sharing if services are provided in-network), and in 2011, Medicare eliminated cost sharing for a number of preventive services, although deductibles are required for hospital stays and ambulatory care as well as co-payments for physician visits. Private coverage for dental care and optometry are also available – sometimes through separate policies – as is long-term care insurance [17].

1.1 Financing

The public share of health care expenditure in the US was 48.2% in 2010 (Table 2). Medicare is financed through a combination of payroll taxes, premiums, and federal general revenues. Medicaid

Table 1: Comparative framework to analyze the oral health care systems.

INDICATOR	DEFINITION	INDICATOR DEFINITION MEASURES
Coverage for oral health care	The share of the population receiving a defined set of oral health care services under public and private sources. Public coverage refers both to government programs and social health insurance. Private coverage refers to employment-based or individually purchased private dental insurance.	1. Percentage of total population covered by public sources 2. Percentage of total population covered by private sources (private health insurance) 3. Type of oral health care services covered by public and private sources
Financing	The oral health care expenditure and sources of financing. Public financing includes general government revenues and social security funds allocated to oral health care. Private financing covers private dental insurance (individual and employment-based) and household out-of-pocket payments.	1. Total oral health care expenditure (TOHCE) 2. TOHCE as a share of GDP 3. Per capita TOHCE 4. TOHCE as % of total health care expenditure 5. Expenditure on oral health care by source of financing: percentage of public, private dental insurance and out-of-pocket expenditures.
Oral health care organization, management and delivery	The characteristics of the recognized oral health care providers (the dental workforce), regulation schemes and the way oral health care services are delivered to the population. Certain forms of delivery may prove to be more compatible with certain approaches to financing; the questions are linked, but separate.	1. Number of practising dentists 2. Dentist/1000 population ratio 3. Number of recognized oral health care providers 4. Regulation schemes for oral health care providers (level of regulation)
Oral health outcomes	The oral health status, focusing on the most prevalent oral disease (caries) through data from population-based oral health surveys conducted in each country. The oral health care services utilization and the unmet oral health care needs will be also considered to assess social inequalities in oral health and oral health care in each country.	1. Average number of decayed, missing and filled teeth (DMFT) at age 12 2. Percentage of individuals who visited a dentist within the previous 12 months 3. Percentage of individuals who felt they needed oral health care services but did not receive them in the previous 12 months

Source: adapted from OECD [1], Chen [15] and Deber [16].

is a tax-funded, joint federal-state health insurance program administered by the states, within broad federal guidelines [17,20].

Private health insurance is responsible for 34.7% of the total health care expenditure. It can be purchased by individuals, but is usually funded by tax-free premium contributions shared by employers and employees. Some individuals are covered by both public and private health insurance – for example, many Medicare beneficiaries purchase private complementary policies to cover additional services and cost sharing. Out-of-pocket payments accounted for 12.3% of total health expenditures in 2010 [17,21].

1.2 Delivery

Primary care doctors account for roughly one-third of all US doctors and operate in private practices. Patients are not required to register with a primary care practice, except within some managed care plans. Specialist doctors can work in both private practice and hospitals. Physicians are paid through a combination of methods: negotiated fees paid by most private insurers, capitation rate contracts and administratively set fees paid by the major public programs [17].

After-hours care is provided mainly by emergency rooms. Some insurance companies make after-hour telephone advice lines available. The provision of mental health care is made up through a mix of for-profit and non-profit providers, with a variety of payment methods; although since 2010, most employment-based insurance has to provide the same degree of coverage for it. Tertiary care is delivered in public (15% of beds), non-profit (70% of beds) or for-profit (15% of beds) hospitals. Some hospital-based physicians are salaried hospital employees, but most are paid on a fee-for-service basis [17].

1.3 The American oral health care system

1.3.1 Coverage

Overall, dental insurance coverage is less prevalent than medical insurance in the US. In 2007, nearly 60% of adults age 21-64 (approximately 105 million persons) had private dental coverage, 5% had public dental coverage and more than 35% had no dental coverage (Table 3). Among elderly Americans, traditional Medicare is not a source of dental insurance, therefore almost 70% of Americans aged 65 and older do not have dental coverage [22,23].

Among adults with low incomes, Medicaid is the primary vehicle for oral health care, but while Medicaid programs cover comprehensive dental services for children, states have flexibility to determine what dental benefits are provided to adults. Consequently, there is a wide variation among states in the types of dental services and degree of coverage offered, with only sixteen states offering coverage in all dental service categories for all adult enrolees [22].

1.3.2 Financing

In the US, oral health care services are predominantly funded by the private sector (Table 4). The largest source of financing is through private health insurance (48.6% of total oral health care expenditure), followed by out-of-pocket payments (41.6%). Public funding accounted for only 9.3% of all expenditures on oral health care in 2011, with 6.7% paid by Medicaid, 0.3% paid by Medicare and 2.3% paid through other health insurance programs, including the CHIP, the Department of Defense and the Department of Veterans' Affairs [24].

The proportion of total health care expenditure allocated to oral health care is roughly 4.0%. This share has been declining steadily since 2001 but especially since the start of the recent economic downturn. However, total oral health expenditure reached more than 108 billion dollars in 2011, or a per capita amount of US$348.00 [24,25].

1.3.3 Organization, management and delivery

Traditionally, independent private practitioners have delivered

Table 2: Health care expenditure and sources of financing, Brazil and selected countries, 2010.

	BRAZIL	CANADA	FRANCE	UNITED KINGDOM	UNITED STATES
Total health care expenditure (THCE) Billion US$, PPP	63.5	151.6	257.8	213.6	2,544.3
Total health care expenditure (THCE) as % of GDP	9.0	11.4	11.7	9.6	16.6
Per capita THCE at average exchange rate (US$)	990	5,257	4,618	3,495	8,233
THCE as % of total government expenditure	10.7	18.3	15.9	15.9	19.9
Public health care expenditure as % of THCE	47.0	71.1	76.9	83.2	48.2
Private health insurance as % of THCE	21.4	13.2	14.2	3.2	34.7
OOP payments as % of THCE	30.6	15.0	7.6	8.9	12.3

Sources: WHO [21] and OECD [27].

oral health care in the US. As of 2009, there were 186,084 professionally active dentists (Table 5) and 91.7% of them were private practitioners. The dentist/population ratio in the US is 0.6/1000 population [26,27].

The final authority on dentists' licensure requirements is the individual state. Though requirements vary from state to state, all applicants for dental licensure must meet an education requirement, a written examination requirement and a clinical examination requirement. The US also recognizes dental hygienists, dental assistants, denturists, and dental laboratory technicians. Dental hygienists can work in a host of settings to deliver clinical care and under varying levels of supervision, depending on the state practice act. Currently, 35 states have policies that allow dental hygienists to work in community-based settings to provide preventive oral health services without the direct supervision of a dentist. At the same time, 15 states recognize and reimburse hygienists as Medicaid providers [26,28,29].

1.3.4 Oral health outcomes

For most Americans, oral health status has constantly improved. Dental caries continues to decrease in the permanent dentition for youth, adolescents, and most adults, and edentulism among seniors has also declined. A report published in 2007 compared national estimates and trends for a variety of oral health status measures between 1988-1994 and 1999-2004. The results showed that the mean number of Decayed, Missing, and Filled Teeth (DMFT) at age 12 in the last survey was 1.3 (Table 6) and the prevalence of dental caries among adolescents 12-19 years of age decreased from 67.8% to 59.1% during this period. For adults aged 20-64 years, the mean DMFT decreased from 12.54 to 10.33. The prevalence of edentulism among people aged 65 years also fell from 33.9% to 27.2% in this period of time [27,30].

The utilization of dental services in the US has declined significantly since 2007, eroding several years of gains. After peaking at 43.6% in 2007, the percentage of the US population who visited a dentist declined to 42.2% in 2009 (Table 6). Overall, 16% of dentate adults aged 18-64 had an unmet dental need due to cost in the past 12 months. Among adults with one or more mouth or teeth problems, more than one-half of those who were uninsured had an unmet dental need due to cost, compared to one-tenth of those with private health insurance with dental coverage, highlighting inequalities due to lack of coverage [31,32].

Table 3: Coverage for oral health care, Brazil and selected countries, latest data available.

	% of population covered by public sources	% of population covered by private sources (private dental insurance)
BRAZIL	37.0	9.5
CANADA	5.5	62.6
FRANCE	100.0	95.0
UNITED KINGDOM	100.0	11.8
UNITED STATES	5.0	59.5

Sources: McGinn-Shapiro [22]; Kravitz & Treasure [35]; Health Canada [53]; Brazil [62]; ANS [63].

2. The United Kingdom's (UK) health care system

Based on developments that took place during the Second World War, and in particular the Beveridge Report, which called for comprehensive health care as part of a postwar government plan, the Labour Government established the UK's National Health System (NHS) in 1946. The NHS provides preventive medicine, primary care and hospital services largely free at the point of use to all those "ordinarily resident". However, some health care is funded privately, through private insurance, by user charges for NHS services and by out-of-pocket payments for items such as over-the-counter drugs and medical appliances [14].

Approximately 12.3% of the UK population has private insurance and the dominant form is supplementary, providing coverage for enhanced services such as faster access and increased consumer choice. Individual insurance represents 25% of the market and the remaining is employment-based insurance, as part of benefit packages for employees. No public subsidy is available to encourage people to buy private insurance [14].

Insurers are free to determine what benefits they offer, but most plans cover surgeries, hospital accommodation, nursing care, and inpatient tests. Outpatient consultations and physiotherapy are less likely to be covered and typically expensive items such as organ transplant are normally excluded as well. There is also a general exclusion of pre-existing conditions. Thus, private insurance coverage is narrower in scope than the comprehensive coverage offered by the NHS [14].

2.1 Financing

Health care in the UK is mainly financed by the government. In 2010, the country spent about 9.6% of its GDP on health care and public expenditure accounted for about 83% of this (Table 2). Public sources of finance are allocated by central government to the Department of Health, which is then responsible for the subsequent disbursement of monies [14,21,27,33].

Although most NHS health care is free at the point of use, some services are either not covered and patients must pay themselves or are covered but subject to cost sharing. These private expenditures are funded both by private health insurance, which accounts for 3.2% of total health care expenditure in the UK, and out-of-pocket payments, which are responsible for 8.9% of the same [14,27].

2.2 Delivery

The first point of contact for general medical needs in the NHS is usually a general practitioner (GP). People are required to register with a local GP, but the government plans to introduce a "right" to choice of GP in the near future. Community health services, NHS Direct (a telephone and web-based helpline), dentists, opticians and pharmacists are part of NHS primary care services. The primary care system also plays a gatekeeping role in determining access to more specialized health care services [14,33].

Specialists provide NHS-funded secondary care. To access NHS specialist care, patients require a referral for a consultation from a GP. Patients can also pay out-of-pocket for a private consultation or be referred through a private insurance scheme if they are members of such a scheme. After-hours care is available through a range of providers, including GP cooperatives and private companies. A mix of primary care and community-based services supported by specialist inpatient care provides mental health care. There is a form of co-payment for prescription drugs, which is set at a flat fee that is not related to the amount prescribed. However, widespread exemptions from prescription charges are in place, and about 50% of the population is exempt from charges. Tertiary care is delivered by public hospitals. Specialist doctors are employed by the NHS on a salaried basis, but may supplement their salary by treating private patients within private hospitals and over 50% of NHS specialists also work in the private sector [14,33].

2.3 The UK's oral health care system

2.3.1 Coverage

Dentistry was included in the NHS at its inception, to assure that the whole population would be entitled to oral health care. However, because of the huge amount of unmet need, it became rapidly apparent that the dental service was a threat to the affordability of the NHS and patient charges were introduced in 1951, although hospital and community oral health services remain free at point of use [14,34].

Primary care trusts are responsible for the provision of NHS oral health services in their geographically defined local areas. Individuals in the UK are entitled to immediate access to urgent oral health care when required and also have the right – subject to a set of co-payments – to all clinically necessary treatments, such as preventive treatment, white fillings, dentures, root canal treatment, crowns and bridges, and, for people under 18 years, orthodontic care. Nevertheless, they may choose to receive a mix of private and NHS treatment within the same episode of dental care [14].

Private oral health care is paid out-of-pocket or through a private insurance plan. Approximately 11.8% of the population is covered by dental plans (Table 3) and 88% of it is individually purchased with the remaining (12%) sponsored by employers. Dental insurance in the UK takes two basic forms: dental capitation (only available to the individual plans) whereby individuals pay a fixed amount per year for a package that cover a range of treatments; and dental insurance whereby individuals pay a fixed amount per year and their costs of treatment by any NHS or private dentist are covered up to an agreed level [14,35,36].

2.3.2 Financing

Per capita spending on oral health care in the UK has grown over the last twenty years, reaching US$141.23 in 2010 (Table 4). The effect of an increased expenditure by patients in the private sector and the high proportion paid by them as dental charges when obtaining treatment in the NHS, means that patients in the UK are funding 54% of all spending on oral health care, with 46% being publicly funded. About 75% of private oral health care expenditure is made up by out-of-pocket payments and 25% by private dental insurance [36,37].

Specific groups may receive NHS oral health care without any patient charge, for example children under 18 years old, pregnant or nursing mothers and individuals on welfare benefits. The remainder of the population receives subsidized care where prices are regulated within a national framework of patient charges with three charging bands: band 1 – includes examination, diagnosis, preventive care and urgent care; band 2 – includes all treatment covered under band 1 plus additional treatment such as fillings, root canal or extractions; and band 3 – includes all necessary treatment covered under band 2 plus more complex procedures such as crowns, dentures or bridges [14,35].

2.3.3 Organization, management and delivery

Oral health care in the UK is delivered in three ways: secondary and tertiary dental services are delivered in acute hospitals (and some single-specialty hospitals); community dental services, such as screening of schoolchildren, oral health promotion and dental services for patients with special needs are provided in community settings, the patient's own home and nursing homes; and ambulatory services to meet most oral health needs are delivered in small independent practices [14].

All dentists who wish to practice in the UK have to be registered with the General Dental Council (GDC). In 2009 there were 37,049 registered dentists (0.50/1000 population) and 27,000 of them were carrying out NHS activity in primary care settings (Table 5). Dental auxiliaries or Dental Care Professionals (DCPs) also have to be registered with the GDC. There are seven types of recognized dental auxiliaries: dental nurses (dental assistants), dental hygienists, dental therapists, orthodontic therapists, dental technicians, clinical dental technicians (denturists) and oral health educators. In the UK, dental hygienists may only work under the direction of a dentist, who must prepare a treatment plan, but need not be on the premises during treatment [14,35,36].

2.3.4 Oral health outcomes

The last oral health survey of 12-year-old children was conduct-

ed during the school year 2008/9. The results showed that 33.4% of children were found to have experienced caries. Across the whole of the population examined the average number of DMFT per child was 0.74 (Table 6) but it is important to consider that the mean DMFT among those children who were found to have disease (i.e. DMFT > 0) was 2.21. In regards to adult oral health, the 2009 Adult Dental Health Survey showed that only 6% of the adult population (16 years and older) were edentate in the UK. At the same time, 31% of dentate adults had tooth decay and 85% had at least one filled tooth [38,39].

In terms of access to and utilization of oral health services, the majority of the UK population (64%) had visited a dentist less than one year ago. The 2009 Adult Dental Health Survey showed that of those adults who had tried to make an NHS appointment in the previous three years before the survey, the vast majority (92%) successfully received and attended an appointment. It is clear that the NHS remains the dominant provider of oral health services, with 71% of those in the survey having used the NHS for their last course of treatment. The use of private services accounted for 27% and very few respondents reported receiving mixed NHS and private care. Finally, the OECD reported that only 3% of people who felt they needed oral health services in the last 12 months in the UK were unable to receive them, with minimal differences between high (2%) and low income groups (3.2%), one of the lowest rates among European countries [39,40,41].

3. The French health care system

The health care system in France is a mix of public and private providers and insurers. Public insurance, financed by both employees and employer contributions and earmarked taxes, is compulsory and covers almost the whole population, while private insurance is complementary and voluntary. The social security system consists of compulsory protection, with four branches covering health, work-related illness and injuries, family allowances and retirement. SHI is the branch of social security covering health [42].

French SHI has almost reached universal coverage, covering 99.9% of the population in 2008. People are covered on an employment basis and any dependants of the insured person are also covered. The general insurance scheme covers employees in commerce and industry (87% of the population). The agricultural scheme covers farmers and agricultural employees and there is also a scheme for self-employed people and craftsmen. Since the 1999 Universal Health Coverage Act (CMU Act), people with different sources of revenue, those with low income and the unemployed are entitled to free public coverage and also have the right to free complementary health insurance coverage. Thus, the criteria for coverage have progressively moved from employment status to resident status [42,43].

SHI covers hospital care; rehabilitation or physiotherapy, ambulatory care provided by general practitioners, specialists, dentists, and midwives; diagnostic services; prescription drugs; medical appliances; some prescribed prostheses; and prescribed transportation. It also partially covers long-term and mental health care and provides some coverage of outpatient vision and dental care. Although it is generally accepted that the French health care system is very generous in terms of goods and services covered, coverage is generally not 100%; a share of the tariff is left to the patient whatever the scheme, and varies from 20% to 50%, according to the type of care. In addition to co-insurance, which can be fully reimbursed by private health insurance, some non-reimbursable co-payments apply to doctor visits, prescription drugs, ambulance transport, and to hospital treat-

Table 4: Oral health care expenditure and sources of financing, Brazil and selected countries, 2010.

	BRAZIL	CANADA	FRANCE	UNITED KINGDOM[1]	UNITED STATES
Total oral health care expenditure (TOHCE) Billion US$	3.96	10.55	11.39	8.73	108.44
Total oral health care expenditure (TOHCE) as % of GDP	0.17	0.80	0.50	0.60[2]	0.70
Per capita TOHCE at average exchange rate (US$)	20.75	309.40	175.70	141.23	349.00
TOHCE as % of total health care expenditure	1.8	7.4	4.6	4.1	4.0
Public oral health care expenditure as % of TOHCE	10.4	5.3	35.6	46.0	9.3
Private dental insurance as % of TOHCE	25.7	52.1	38.5	13.4	48.6
OOP payments as % of TOHCE	63.9	42.6	25.5	40.6	41.6

Sources: CMS [24]; OECD [27]; Kravitz & Treasure [35]; Blackburn [36]; Office of Fair Trading [37]; Brazil [62]; ANS [63]; and IBGE [66].

[1]Conversions between British Pounds and US Dollars were made at http://www.unitconversion.org/

[2] 2006.

ment. Finally, doctors and dentists can extra-bill – that is, charge higher prices than the SHI will pay [42,43].

Private health insurance (or complementary health insurance – CHI) covers 95% of the population to provide reimbursement for co-payments and better coverage for medical goods and services that are poorly covered and/or for which charging over the statutory fees is the rule. Private insurance is provided mainly by three categories of operators in the CHI market: mutual insurance companies; commercial insurance companies; and provident institutions, specialized in providing group contracts for companies that have a policy of mandatory enrolment in the CHI. To enhance access to the CHI, a special fund created in 2000 provides vouchers for private insurance for low-income individuals and their dependents [42,43].

Among the French population benefitting from the CHI in 2009, a higher percentage benefitted from the private CHI (56%) than the employer-sponsored CHI (44%). The provision of employer-sponsored CHI is unevenly distributed with a higher percentage of offers in large firms, notably in the industrial sector, and companies employing a high percentage of executives. Employees can deduce the cost of premiums from their taxable income [42,43,44].

3.1 Financing

Public expenditure accounted for almost 77% of total health care expenditure in 2010 (Table 2). The Ministry of Health controls a large part of the regulation of health care expenditures on the basis of a national budget established by the parliament; funds are pooled at the national level, and allocation of funds to providers is divided between the different sectors. Within each budget, a regional allocation is made and distributed by the Regional Health Agency [1,42,43].

The CHI is responsible for 14.2% of total expenditure on health, leaving 7.6% to be paid by households. The trend of increased user charges and thus increased CHI participation in financing the health system decreases equity of finance, because while the SHI premium is priced proportionately to revenue, the CHI premiums are not. As a result, richer people pay less as a proportion of their income to the financing of health care than poorer groups. Moreover, the SHI premium is not related to age and risks, while the CHI premiums are set at a variable level [1,43].

3.2 Delivery

Primary and secondary health care that do not require hospitalization are delivered by self-employed doctors, dentists and medical auxiliaries working in their private practices, and, to a lesser extent, by salaried staff in hospitals and health centres. Although registration with a primary care doctor is not a legal obligation, there are strong financial incentives for patients to have a gatekeeping physician, including higher co-payments for visits and prescriptions without a referral from the gatekeeper [42,43].

Emergency care is delivered by the emergency departments of public and private hospitals, self-employed physicians and, more recently, by public facilities open after hours, financed by SHI funds and staffed by health professionals on a voluntary basis. The SHI package also covers mental health care hospitalization, but does not cover psychologist visits and psychoanalysis. A third-party payment system has become more common for drug purchases, involving direct payment to the pharmacist by the SHI or CHI, so that the patient does not incur any direct cost [42,43].

Tertiary care is delivered by public and private hospitals. Two-thirds of hospital beds are in government-owned or not-for-profit hospitals and are funded by the SHI (90%), CHI (7%), or out-of-pocket payment (3%). In addition, all university hospitals are public, and the remaining hospitals are private for-profit clinics. Hospital physicians in public or not-for-profit facilities are salaried, but have been permitted to see private patients in public hospitals [42,43].

3.3 The French oral health care system

3.3.1 Coverage

All those legally resident in France are entitled to oral health care under the SHI (Table 3). However, there is co-insurance for most dental treatments. Usually, the patients pay the dentist the total amount of the treatment directly, and then they can claim reimbursement of a part of the cost to the SHI. For conservative and surgical treatments, the practitioner must charge fees defined at the national level in agreements called "conventions", signed between the SHI and representatives of the profession. The patient can reclaim up to 70% of these statutory tariffs. For other treatments, such as orthodontics, implants, periodontics and prosthodontics, dentists can set their own fees, having informed the patient of the estimated cost. The SHI, subject to prior approval, usually covers a part of these fees [35,42].

In 2006, a new programme of oral health examination was established especially for children and teenagers, who can benefit from a prevention examination, covered 100% by the SHI at age 6, 9, 12, 15 and 18. This examination is mandatory at 6 and 12 and all subsequent necessary care is fully covered by the SHI; additionally, one-hour long oral health prevention sessions must be scheduled for all children in primary school. To provide this care the dentists are directly paid by the SHI [35,42].

Approximately 95% of people use complementary insurance schemes to cover part of their dental treatment. There are many such schemes. With regard to conservative and surgical care, these complementary insurance schemes frequently cover all of the fees not covered by the SHI. For prosthetic and orthodontics, they cover at least 30% of the fees not covered by the SHI thus it is important to note that some of these schemes may cover more than the costs covered by the social security system [35].

3.3.2 Financing

Total oral health expenditure reached 11.39 billion dollars in 2010, with a per capita expenditure of US$175.70 (Table 4). The

Table 5: Dentists and other oral health care providers in Brazil and selected countries, latest data available.

	BRAZIL	CANADA	FRANCE	UNITED KINGDOM	UNITED STATES
Dentists (n)	256,889	20,789	43,146	37,049	186,084
Dentist/1000 population ratio	1.14	0.59	0.67	0.50	0.60
Dental hygienists (n)	16,033	26,854	NR	5,545	181,800
Dental assistants (n)	96,143	27,585	17,000	42,700	297,200
Dental technicians (n)	20,405	NA	20,000	7,100	40,900
Dental technician assistants (n)	4,818	NA	NR	NR	NR
Dental therapists (n)	NR	304	NR	1,393	NR
Denturists (n)	NR	2,200	NR	120	NR

Sources: OECD [27]; Kravitz &Treasure [35]; Blackburn [36]; Health Canada [53]; CIHI [58]; and CFO [73].
* NR= not recognized
NA= not available.

average rate paid by the SHI was 35.6%, with significant discrepancies depending on the type of care: almost 70% of expenditure for conservative dental treatments is covered, but only 33% of prosthetic care and 10% of orthodontic care. Therefore the major portion of payments comes from private sources, as the remaining expenditure is paid through complementary health insurance (38.5%) and out-of-pocket payments (25.5%) [27,42].

3.3.3 Organization, management and delivery

Oral health care in France is mainly provided by self-employed practitioners, representing 91% of the roughly 43,000 active practitioners in 2010 (Table 5). These professionals work on their own or in association with other dentists and are paid directly on a fee-for-service basis [35,42]. While there is no real public dental service in France, a small number of practices are owned by the SHI schemes, municipalities, or mutual insurance companies. About 5% of dentists work in these practices, are salaried, and can treat any kind of patient. The provision of oral health care in hospitals is very small and the majority of hospital dentists are part-time employees and also work as practitioners within their own private practice [35,45].

The practitioner's license is granted by the National Dentists Association (Ordre national des dentistes), which administer the registration of dentists, as well as control processes of de-registration and check the conditions of registration of foreign dentists. In terms of other oral health care professions, no auxiliaries are allowed to work in the mouth in France. The only recognized auxiliary personnel are dental assistants and dental technicians and there are respectively 17,000 and 20,000 registered professionals [35,42].

3.3.4 Oral health outcomes

The oral health of children in France has improved during the last decades. A survey conducted in 2006 by the French Union for Oral Health showed that the average DMFT of 12-year-old children had decreased from 4.2 in 1987 to 1.9 in 1998 and 1.2 in 2006 (Table 6). The proportion of children under 12 years completely free of decay, which was 12% in 1987 and 40% in 1998, reached 56% in 2006. Yet substantial socioeconomic disparities remain, with the DMFT at age 12 reaching 1.55 in children of workers and 1.59 in rural areas, compared to 0.90 in children of executives. This pattern can be related to inequalities in access and the lack of comprehensive prevention programmes [42,46].

In regards to the oral health status of adults, there appears to be no recent data available. The last national survey was conducted in 1994 and the mean DMFT index at 35-44 years was 14.6. The average number of decayed teeth was 1.2, the missing component was 3.0 and the filled component was 10.4. For people aged 65-74 years, the DMFT was 23.3 and the percentage of edentulism was 16.3 [47,48].

Once a considerable part of the expenditure for oral health care is financed by out-of-pocket payments, inequalities in access to and utilization of oral health services develop. The proportion of the French population who had visited a dentist less than one year ago in 2010 was 52% and the probability of having received dental care increased with education level, income and complementary health insurance coverage. OECD data regarding unmet care needs has shown that on average, 8.4% of individuals who felt they needed oral health care services did not receive them, but this number goes to 4.3% among high-income people and reaches 15.5% among low-income individuals. These

results are consistent with a French survey, which highlighted that, in 2008, 10% of the French population aged 18 and over declared having foregone dental care for financial reasons over the last twelve months [40,41,42].

4. The Canadian health care system

The Canadian health care system is predominantly publicly financed and highly decentralized in terms of governance, organization and service delivery. Provinces are responsible for administering their own tax-funded and universal Medicare plan. Medically necessary hospital, diagnostic and physician services are free at the point of service for all provincial residents [49].

The federal government's role includes funding, facilitating data gathering and research, and some regulatory aspects of prescription drugs and public health, in addition to providing public health insurance to certain groups of people, such as specific aboriginal groups, and members of the Canadian Forces, veterans, inmates in federal penitentiaries and eligible refugee claimants. Canada's ten provinces are responsible for providing Canadians with coverage for medically necessary hospital and physician services, through private for-profit, private non-profit and public organizations as well as by physicians who receive remuneration from provincial ministries of health [49,50].

Health services not covered by Medicare are largely privately financed. Prescription drugs, ambulance services, vision care and dental care are not covered and individuals and families who do not qualify for publicly funded coverage may pay these costs directly, be covered under an employment-based group insurance plan or buy private insurance [49,50].

Private insurance in Canada is complementary, that is, it covers services excluded from or only partially covered by public insurance. Supplementary insurance to provide faster access to publicly funded physician and hospital services is either prohibited or discouraged by provincial laws. Both the federal and provincial governments are involved in regulating the private health insurance market, but Canadian regulation of the design of insurance products, their pricing and their sale, are relatively weak by international standards [49,50,51].

4.1 Financing

More than 70% of health care in Canada is publicly financed through general tax revenues (Table 2). The provinces are most directly responsible for raising the majority of financing for publicly funded health care, but the federal government contributes with an annual cash transfer on a per capita basis [21,27,49,50].

Out-of-pocket payments make up more than 50% of expenditures on privately financed health care services. At the same time, private health insurance is responsible for roughly 13% of total health expenditures. The majority comes in the form of employment-based group plans, sponsored by employers, unions, professional associations and similar organizations and deductible from income for tax purposes. However, such benefits are generally restricted to higher-wage permanent jobs, whereas the working poor are often in low-paid, temporary or seasonal jobs, precisely the type of employment that does not come with private insurance benefits [21,27,49].

4.2 Delivery

The traditional model of primary care in Canada has been based on individual family physicians providing primary medical services in private practices. Most physicians act as gatekeepers for further care and are remunerated on a fee-for-service basis. Patients are free to choose and change their family physicians, and provincial ministries of health have renewed efforts to reform primary care in the last decade, focusing on moving from the traditional physician-only practice to interprofessional primary care teams that provide a broader range of primary health care services on a 24-hour, 7-day-a week basis [49,50].

Almost all of secondary, tertiary and emergency care is performed in hospitals. In terms of secondary care, there is a movement toward providing specialist services in private nonhospital facilities, but this has not yet become the dominant mode of delivery. Patients can access specialists directly, but it is common for family physicians to refer patients to specialty care because many provinces pay lower fees for non-referred consultations [49,50].

Emergency care is generally provided in an emergency room of a hospital and also by the emergency medical services (EMS) that provide medical transportation. The Canadian system includes universal coverage for physician-provided mental health care, but the services of psychologists or social workers are not covered. Every provincial government has a prescription drug plan that covers outpatient prescription drugs for designated populations, with the federal government providing drug coverage for eligible aboriginal groups [49]. Ultimately, there is a clear trend in Canada for the consolidation of tertiary care in fewer and more specialized hospitals, as well as the spinning off of some types of elective surgery and advanced diagnostics to specialized clinics [50].

4.3 The Canadian oral health care system

4.3.1 Coverage

Oral health care occupies a relatively separate position in the Canadian health system, as it is not part of Medicare and almost all of it is privately financed and delivered. The oral health module of the Canadian Health Measures Survey 2007-2009 (CHMS) reported that 5.5% of the population is covered by public dental insurance (Table 3), although to varying degrees. The federal government covers a portion or all of oral health care costs to veterans, refugees and eligible aboriginal individuals and every province recognizes some dental care as medically necessary and targets oral health care resources to marginalized groups, using different ways and varied health and social services provisions [52,53,54].

Publicly financed oral health care is provided, for example, to

social assistance recipients and adults with disabilities and their dependents are normally entitled to receive a broad range of preventive and curative services. Surgical-dental services delivered in hospital for those with congenital abnormalities are covered under the Medicare statutes nationwide. Seniors and persons in long-term care receive little attention in most jurisdictions, with children receiving the greatest public subsidies for oral health care under provincial legislation [52,54].

Private dental insurance covers 62.6% of the population, mostly by way of employment-based benefit plans. By the end of 2011, 87,500 group insured contracts provided 13.1 million workers and dependants with dental care benefits. Finally, 31.9% of Canadians self-reported having neither public nor private dental insurance [53,55].

Dental plans coverage helps to pay for preventive and maintenance services and root canals, periodontal cleaning and scaling. It may also extend to major restorative procedures, such as crowns, bridges, dentures, braces and orthodontic services. Many plans typically reimburse most of the charges for primary dental care, plus 50% for major procedures to a maximum amount in any year and orthodontic services to a lifetime maximum. The benefits may also be subject to a deductible amount for which the insured is responsible [55].

4.3.2 Financing

The major portion of payments for oral health care in Canada comes from private sources, either out-of-pocket or through private dental insurance. The latest data available showed that total per capita expenditure on oral health care was US$309.40 (Table 4). Public expenditure accounted for 5.3% of total oral health expenditure and the private sector made up the largest component of spending. The share of out-of-pocket payments on oral health care expenditures in 2010 was 42.6%, and the remaining (52.1%) was spent by private insurers [27,52,56].

4.3.3 Organization, management and delivery

In Canada, independent practitioners operating their own practices deliver nearly all oral health care. A number of allied dental professionals support dentists in their work, including dental hygienists, dental assistants and dental technologists. In select jurisdictions, dental therapists and denturists have legislated practice, and offer services independent of dentists [49,56].

There are currently more than 20,700 dentists in Canada and the dentist/1000 population ratio is 0.59 (Table 5), but with the addition of dental hygienists, the licensed provider/population ratio becomes to roughly 0.77. A minority of these professionals practice in public health settings, with information collected from provincial, municipal, and federal health jurisdictions showing that 47 public health specialists, 66 clinical dentists, 152 therapists and 453 dental hygienists were part of the public health workforce in 2007/2008 [53,57,58].

To practice in Canada, dentists must have a Doctor of Dental Medicine (DDM) or a Doctor of Dental Surgery (DDS) degree from one of the ten accredited programmes, pass the National Dental Examining Board of Canada Written Examination and Objective Structured Clinical Examination and also be registered with the pertinent regulatory body. Provincial dental organizations are responsible for licensing and regulating professionals, although the Royal College of Dentists of Canada plays the role of setting standards for postgraduate specialty practice [49].

4.3.4 Oral health outcomes

The oral health component of the CHMS provided national estimates of the oral health status of Canadians. The results showed that the mean DMFT at age 12 was 1.02 (Table 6), and 38.7% of 12-year-old children had 1 or more permanent teeth affected by caries. Overall, dentate adults have an average of 0.58 teeth with untreated decay, 2.14 teeth extracted and 7.95 teeth filled. The level of edentulism among Canadians has fallen from 23.6% in 1970–72 to 6.4% in 2007-09. Approximately 58.6% of Canadians have no clinical needs as identified by dentist-examiners in the CHMS [53].

The CHMS also showed that the percentage of Canadians making a visit for oral health care for any reason within the last 12 months was 74.5%. The rate of annual visiting to obtain oral health care is greatly influenced by income and insurance; 83.8% of people from the most affluent and 82.3% of privately insured families visited a dentist compared to 60.0% of people from the lower income category and 59.3% of non-insured families. At the same time, avoiding visit a dentist because of costs is an issue for more than 17% of Canadians, and this percentage can be higher among young adults with no insurance (49.9%) and lower incomes (46.7%), as well as among adults aged 40–59 years with no insurance (42.3%) [53].

5. The Brazilian health care system

The Brazilian Constitution asserts that "health is a right of all and a duty of the state [and that] health actions and services are of public importance, and it is incumbent upon the Government to provide for their regulation, supervision and control" [59: 137]. However, Article 199 states that "health assistance is open to private enterprise" [59: 138], evidencing the existence of two health sub-systems within Brazil. The SUS is the public face of the system and is characterized by public financing and public/private delivery. It is the sole provider of health care for at least 75% of the population, and it also serves a portion of those covered by private health insurance. In addition, the SUS delivers services such as epidemiological surveillance, immunization, and endemic disease control to the entire population. The SUS aims to provide universal and free at the point of delivery health care services, through two main lines of action: the Family Health Program (PSF), where family health teams provide primary care and act as gatekeepers to determine access to more specialized and hospital-based services; and a network of public

and SUS-contracted private clinics and hospitals which delivers secondary and tertiary care nationwide [3,60,61].

A family health team includes a family physician, a nurse, a nurse assistant and five to seven community health workers; when expanded, it includes the oral health care team, with a dentist, a dental hygienist and a dental assistant. These professionals work in public settings (PSF clinics), which are in charge of geographically defined local areas and populations. In 2012, there were roughly 33,400 family health teams, covering about 104 million people in 5,280 municipalities [3,62].

On the other hand, the private health sector offers duplicate coverage for most health care services. The demand for private health insurance is income-related and comes mostly from employees of public and private companies, which have frequently offered health insurance as a non-wage and/or cost-shared benefit. Data from the National Regulatory Agency for Private Health Insurance and Plans (ANS) shows that 25.1% of the Brazilian population is covered by medical care plans and 9.5% by dental care plans. These numbers are limited in accurately defining coverage relative to all the population, as the same person can be covered by both, so there may be some double counting. In short, employment-based insurance is the most common type of health insurance and represents 76.9% of medical plans and 83.1% of dental plans [3,63].

Private health insurers can offer plans with different degrees of coverage, including outpatient and hospital-based care and/or only dental care. Some progress has been made concerning the regulation of private health insurance, especially after the introduction of Law 9656/98, which made it illegal for insurance companies to deny coverage to patients with pre-existing disorders or to set limits on the use of specific health care services or procedures. Nonetheless, some insurance companies tend to not cover disorders for which treatment is likely to be costly. Thus, people with private insurance report having better access to preventive and curative services, but often receive vaccines, high-cost services, and complex procedures such as transplants through the SUS [3,64].

5.1 Financing

The public sector in Brazil has generally been responsible for approximately half (47%) of total health care expenditures (Table 2). Almost all revenues for public health spending come from taxes and social security contributions of federal, state, and municipal budgets. The decentralization of the health system has played a fundamental role in public financing since legislation transferred part of the responsibility for the management and financing of health care to states and municipalities. The states are required to allocate a minimum of 12% of their total budget to health while the municipal governments must spend 15% [21,65].

The remaining 53% of health care financing comes from private sources and the last data available showed that one third of all private health expenditures were made by companies providing health insurance to their employees. The other two thirds were out-of-pocket payments made by individuals and families, especially for drug purchases, payment of private health insurance and medical and dental appointments, depending on the income strata. The share of the health sector in the federal budget remains stable, and total health care expenditure represents 9% of the GDP [7,21,61,64,66].

5.2 Delivery

Although to varying degrees of coverage among states and geographic regions, the PSF provides primary care for 54.8% of the population. Family health teams act as a first point of contact

Table 6: Oral health outcomes, Brazil and selected countries, latest data available.

	BRAZIL	CANADA	FRANCE	UNITED KINGDOM	UNITED STATES
Mean DMFT at age 12	2.1	1.0	1.2	0.7	1.3
% of individuals who visited a dentist within the previous 12 months	40.2	74.5	52.0	64.0	42.2
% of individuals who felt they needed oral health care services but did not receive them in the previous 12 months	15.2	17.3	8.4	3.0	16.1

Sources: Peres KG et al [12]; Peres MA et al [13]; OECD [27]; Bloom et al [31]; Manski & Brown [32]; Rooney et al [38]; European Commission [40]; Health Canada [53]; and Brazil [75].

with the health system and also as gatekeepers, deciding whether the patient should obtain diagnostic tests or be referred to medical specialists. As the SUS does not ensure access to primary care for all people, many patients only come into the health system at the last minute, sometimes via emergency departments, resulting in overcrowded hospitals, long waiting times and lines. Therefore many Brazilians, especially those from high and middle-income strata, opt for the private sector to avoid these kinds of delays and frustrations [3,65].

Provision of secondary care has also been problematic. The SUS is highly dependent on contracts with the private sector to provide such care and specialized clinics are generally more restricted and often give preferential treatment to individuals with private health insurance. However, there have been improvements through specific financing policies, which have led to an increase in the provision of specialist outpatient care through direct delivery (public settings) in the past 10 years [3].

Emergency care can be performed in hospitals or at 24-hour public clinics in coordination with an emergency service that assists people on the street, at home or at work and provides transportation and pre-hospital care. As for mental health care, it is provided in community-based psychosocial care centres. Although universal access to drugs has not been achieved, the SUS has a National Listing of Essential Drugs and a generic drugs policy to provide free and/or subsidized prescription drugs [3].

In regards to tertiary care, Brazil has 6,753 hospitals, but 70% of them are private. Private hospitals make available 38.7% of their beds to the SUS and this number results in a low inpatient bed density (almost 1.9/1000 population). It also results in inequalities in access to hospitals, as people living in poorer municipalities are less likely to be admitted to a hospital when they need such care [3].

5.3 The Brazilian oral health care system

5.3.1 Coverage

As in general health care, coverage for oral health care in Brazil is duplicated, since people who have private insurance are not excluded from public coverage. Having said this, publicly financed oral health care has been strengthened by the 2004 Brazilian oral health policy – "Smiling Brazil" – which aimed to provide primary oral health care within the PSF, and specialized dental procedures through the creation of the CEOs. Moreover, there is financial support to increase the number of municipalities with a fluoridated water supply [2,10,67].

The Brazilian population covered by oral health care teams rose from 15.2% to 37% between 2002 and 2012 (Table 3) and there are roughly 22,000 teams in 4,900 municipalities. As for the CEOs, there are more than 900 centers all over the country. To access them, people must first be assessed by an oral health care team, which will provide primary oral health care and if necessary, will refer the patient to the nearest center [2,62,68].

Services covered by public sources include all procedures considered as primary oral health care (examination, diagnosis, preventive care, sealants, scale and polish, fillings, extractions and urgent care) and also some specialized procedures delivered at the CEOs, such as periodontal surgery, endodontic treatment, minor oral surgeries, diagnosis and treatment of oral lesions, dentures and treatment to disabled patients. Crowns and bridges are not covered [69].

Private dental insurance covers 9.5% of the population and insurance companies must cover a set of dental benefits mandated by the regulatory agency ANS, including primary and specialized procedures. They can also offer optional benefits, which they have no obligation to cover. Many companies have cost-control mechanisms for some procedures, such as preauthorization of benefits and cost sharing [63].

5.3.2 Financing

The Brazilian oral health care system is mainly privately financed, even after the implementation of "Smiling Brazil". As Brazil still does not have a unified monitoring system for health care expenditures, no accurate data are available on total oral health care expenditures based on internationally comparable criteria. To estimate public oral health care expenditures, transfers from the National Health Fund to municipalities to finance oral health policies have been considered. Private sources of financing have been assessed through the revenues of dental insurance companies and family spending on dental care. Estimates from these data suggest that private dental insurance has financed 25.7% of total oral health care expenditures, out-of-pocket payments accounted for 63.9% and the SUS has financed only 10.4% of total oral health care expenditures (Table 4). It appears that total oral health care expenditure reached 3.96 billion dollars and represents 1.8% of total health care expenditure [62,63,66].

5.3.3 Organization, management and delivery

In Brazil, there are five recognized oral health care professions: dentist, dental hygienist, dental assistant, dental technician and dental technician assistant. The last two professionals are permitted to produce technical work under the prescription of a dentist, but cannot work in the mouth [70]. The Federal Council of Dentistry is the Brazilian authority responsible for the registration and regulation of all oral health care providers. It has a federal head office and one regional office in each state and the professionals must register at the regional office in the state where they wish to work. There is an initial cost of registration and an annual charge in order to remain on the register [71].

There are 256,889 registered/licensed dentists – a dentist/population ratio of 1.14/1000 (Table 5). As roughly 10,000 students graduate each year, the number of dentists becomes comparable to 12% of all dental professionals in the world. However, there is a poor geographical distribution of professionals, related to differences between the more and the less developed regions

of the nation. For example, in the Northern region there are 0.27 dentists per 1000 population and in the Southeastern region this number increases to 1.25 dentists per 1000 population [72,73].

Dental assistants and dental hygienists had their profession regulated just five years ago. Therefore the number of licensed professionals is much lower, accounting for approximately 96,000 dental assistants and 16,000 dental hygienists. It is important to stress that these professionals cannot practice independently and must exercise their activities under the supervision of a dentist [70,74].

Public oral health care is usually provided in local community settings and all oral health care providers working in the public sector are part-time or full-time salaried employees of the municipality where they are working. On the other hand, private oral health care is delivered in independent private dental offices, where dentists can work on their own or in a group practice. These practitioners can earn their living entirely through fees paid directly by their patients and/or by dental plans. They can also work as part-time employees in the public sector [64].

5.3.4 Oral health outcomes

The last National Oral Health Survey in Brazil was undertaken in 2010. The most significant results include an important reduction in dental caries compared to the 2003 survey. At 12 years, the mean DMFT was 2.1 (Table 6) compared to 2.8 in 2003. For the component of untreated (decayed) teeth, the decrease was 29% (from 1.7 to 1.2) and the proportion of "caries-free" children (DMFT = 0) increased from 31% to 44% in 2010. In adults aged 35-44 years, the mean DMFT in 2003 was 20.1, decreasing to 16.3. However, the survey identified persistent issues including large regional differences in the prevalence of dental diseases; 80% of decayed deciduous teeth are still untreated; and despite the decreasing need for dental prostheses in adolescents and adults, there are still significant needs in the elderly, as only 7.3% of them do not need prostheses [75,76].

In terms of access to and utilization of oral health care services, a 2008 survey showed a decrease in the proportion of subjects that had never visited a dentist, from 18.7% (1998) to 11.9% of the population. Nearly 40% of Brazilians made a dental visit in the previous 12 months (Table 6), but the number increases significantly among the higher income group (67.2%) comparing

Table 7: The comparative framework of the oral health care systems, Brazil and selected countries, latest data available.

INDICATOR	BRAZIL	CANADA	FRANCE	UNITED KINGDOM	UNITED STATES
Coverage for oral health care					
% of population covered by public sources	37.0	5.5	100.0	100.0	5.0
% of population covered by private dental insurance	9.5	62.6	95.0	11.8	59.5
Financing					
TOHCE (billion US$)	3.96	10.55	11.39	8.73	108.44
TOHCE as % of GDP	0.17	0.80	0.50	0.60	0.70
Per capita TOHCE at average exchange rate (US$)	20.75	309.40	175.70	141.23	349.00
Public oral health care expenditure as % of TOHCE	10.4	5.3	35.6	46.0	9.3
Private dental insurance as % of TOHCE	25.7	52.1	38.5	13.4	48.6
Out-of-pocket payments as % of TOHCE	63.9	42.6	25.5	40.6	41.6
Organization, management and delivery					
Number of practising dentists	256,889	20,789	43,146	37,049	186,084
Dentist/1000 population ratio	1.14	0.59	0.67	0.50	0.60
Regulation level for oral health care providers	Federal	Provincial	Federal	Federal	State
Oral health outcomes					
Average number of DMFT at age 12	2.1	1.0	1.2	0.7	1.3
% of individuals who visited a dentist within the previous 12 months	40.2	74.5	52.0	64.0	42.2
% of individuals who felt they needed oral health care services but did not receive them in the previous 12 months.	15.2	17.3	8.4	3.0	16.1

to the lower income group (28.5%). The main reason for not obtaining dental care was the waiting times to get an appointment within the SUS due to a shortage of dentists, which can reflect cost barriers to access private dental services. Data also showed that the SUS was responsible for delivering 29.3% of all oral health care services at that time [12].

Self-reported access to and utilization of oral health care services was also explored in 2009. Data were collected from a sample of the Brazilian adult population in Brazil's state capitals and showed that 15.4% of Brazilians who felt they needed oral health care services in the 12 months before the survey did not receive them. Lack of access to oral health care was more frequent among women, young adults, less educated individuals, and blacks [13].

Discussion

Diverse patterns to organize, finance and deliver oral health care were found among the countries analyzed. A broad range of factors, including the historical, political, social, and economic context in which policy decisions have been made, and the public-private mix in the provision of oral health care that resulted, appear to underpin these arrangements. In terms of specific metrics, the proportion of the population with no coverage by public sources is similar in Canada and the US (Table 7). In these countries, public sources are targeted mainly to low-income children and social assistance recipients. Consequently, private dental insurance plays a key role in providing for oral health care services, despite fundamental differences in the organization of their general health care systems [17,18,49,54]. On the other hand, coverage by public sources for oral health care reaches all those legally resident in France and the UK. There is also a significant complementary dental insurance market in France, providing reimbursement for co-payments, and a smaller and supplementary one in the UK, commonly used to cover enhanced access and increased consumer choice [14,35,42].

Brazil can be compared to these two last countries, since it has the legal aspiration of universal coverage for oral health care, as part of the SUS [59]. However, this goal is still far from being achieved. There is a gap between what is officially covered and what is actually available in practice, since public coverage reaches less than 40% of the population, and there is a substantial proportion of the population covered neither by public sources nor by private dental insurance [62]. Therefore Brazil has ideologically ensured a universal oral health care system but, unlike France and the UK, still lacks application of what is lawfully defined.

With regards to financing, Canada and the US present the greatest per capita expenditure on oral health care among the countries analyzed (Table 7). At the same time, the share of public oral health care spending is scarce compared to total oral health care expenditures in both countries. Importantly, increased reliance on private sources to finance oral health care may exacerbate health care expenditure growth, perhaps due to the weak purchasing power of individuals [17]. France and the UK have lower expenditures on oral health care and are similar in terms of public spending, although there is a set of co-payments mainly carried out by complementary oral health insurance in France and also some charges paid out-of-pocket in the UK. As a result of a chronic lack of funding for the SUS, Brazil presents the same pattern of financing found in Canada and the US, but with lower per capita and consequently lower total oral health care expenditures and a significant proportion of household out-of-pocket spending. Even after the implementation of "Smiling Brazil", public investment in oral health care remains low, and has not been sufficient to address social inequalities in access to oral health care [12,13,62,66].

Dental workforce supply, measured as dentist/population ratio, is lower in Canada, France, the UK and the US when compared to Brazil (Table 7). While having an adequate supply of dentists must take into account numerous factors such as the amount of unmet needs and the role of dental auxiliaries, in countries such as Canada, the UK and the US, concern is being expressed about the possibility of a shortage of professionals, especially in remote and already underserved areas [35,42,58]. On the other hand, the Brazilian oversupply of dentists is associated with an excess of dental schools and graduates and, importantly, has not resulted in better access to oral health care, given a similar unequal geographic distribution of professionals [72].

Privately owned practice is the most common setting for delivering oral health care services in Canada and the US, given the predominantly private nature of their oral health care systems, but this is also the case in France and the UK, countries with larger coverage by public sources. As a consequence, it is argued that treatment decisions are often more influenced by business considerations than by patients needs [14,25,34,49]. On the other hand, almost all of Brazil's publicly financed oral health care is delivered in community settings by salaried staff, and all private dental care is delivered in independent practices [2,64]. The establishment of a direct-delivery model for public oral health care follows the primary health care approach and arguably represents a strong advantage for Brazil, as it can promote comprehensive access to oral health care according to need and facilitate coordination between public institutions. These goals are more difficult to reach with third-party delivery models, and Brazil can learn from the UK and France in terms of avoiding the challenges stemming from third-party delivery, thus continuing to develop a "real" public dental service.

To analyse the oral health status of the population in each country, this paper considered the DMFT index at age 12 (Table 7). As national surveys showed, overall, oral health has improved in all of the countries analyzed [30,38,39,46,53,75]. In this regard, Brazil has experienced a great decrease in the mean DMFT at age 12 between 2003 and 2010, possibly an effect of the implementation of "Smiling Brazil", in addition to the re-

ported increase in average income and employment rates during this period [12]. Nevertheless, Brazil still suffers from the highest index among the selected countries and maintains significant regional disparities in the prevalence of oral diseases [75,76].

Social inequalities in oral health care were assessed by the utilization of oral health care services and by unmet oral health care needs. The proportion of individuals who visited a dentist within the previous 12 months was higher in Canada, followed by the UK, France, the US and Brazil (Table 7). This number is influenced to a great extent by insurance and income. Recent findings, for example, showed a pro-rich distribution in both the probability and the frequency of dentist visits in all OECD countries, with a higher degree in countries where oral health care is not provided publicly and has to be paid for either out-of-pocket or through private dental insurance [77,78].

Canada and the US, alongside Brazil, presented the highest proportion of people with unmet oral health care needs (Table 7). All countries presented some degree of inequality between low- and high-income groups, with the lowest degree found in the UK. It appears that unmet oral health care needs increase when there is lower coverage by public sources for oral health care, showing that reliance on private sources to finance oral health care is a factor in limiting access. Another financial barrier is related to payments at the point of service delivery. Paying up-front costs that are reimbursed later creates barriers for low-income households, which seems to explain the great discrepancy in the proportion of unmet oral health care needs between low- and high-income groups in France [41,78]. Given the magnitude of income inequalities in Brazil, with a great proportion of the population in the poorest strata, any form of payment required for public services, no matter if reimbursed later, would imply even worse access to oral health care.

An important issue when analyzing oral health care systems is to consider to what extent the development of the general health system can lead to a certain type of oral health system design. As could be seen in our cross-country comparisons, systems for the provision of oral health care have their roots in different historical, political, social and economic traditions, but a common point among the countries analyzed is that oral health care is an exception in terms of general organization, financing and delivery, even in countries with universal coverage for general health care [2,14,22,32,34,35,42,53,54,68]. A range of possible reasons behind this trend includes the "special" nature of dental diseases as being highly localized, extremely common and treated by well-established procedures, with a lesser degree of uncertainty and relatively minimal external effects by the presence of the disease and the consumption of dental care. With the exception of oral cancer and extreme cases of disease, dental diseases are not life threatening and generally do not lead to serious permanent disabilities. In this sense, the oral health care system is likely to operate outside the health care system and, historically, has much less a tradition of third-party involvement in funding, whether by private insurance or government. In turn, the role of the private sector is more significant and out-of-pocket payments more common even in systems where most other types of health care are free at point of delivery [79,80].

Oral health care system arrangements also appear to resemble, in certain aspects, the model of the welfare state that prevails in each country. Among the various typologies developed in the social policy literature, Esping-Andersen's typology has been the most widely used and proposes three regime types. The liberal regime is characterized by minimal state provision of welfare, modest benefits and strict entitlement criteria; further, welfare recipients are usually means-tested and stigmatized, and there is a division between those who rely on state aid and those who are able to afford private provision. In conservative welfare states, welfare programs and benefits are often related to income levels and administered through employers; thus, such regimes are oriented towards maintaining existing social patterns. The social-democratic welfare regime is characterized not only by its universal, egalitarian and comparatively generous benefits, but also by a strongly interventionist state used to promote equality through a redistributive social security system [81].

According to Esping-Andersen's work, the liberal welfare state model is represented by Canada, the UK and the US [81,82]. The great reliance on private sources to finance and deliver oral health care found in the Canadian and the American oral health care systems, associated with a targeted approach to meeting public needs and with a wide variation in the degree of coverage, corroborate this classification [22,23,52,53,54]. Yet the UK's oral health care system does not follow the liberal welfare model, especially in terms of entitlement criteria, as it largely considers oral health care a public good, provided on the basis of citizenship. So while universalism is an element most typically associated with the social-democratic welfare state, it is also associated with those welfare states based on the Beveridgian model, such as the NHS within the UK [14,34,82].

France is considered an example of the conservative welfare state model, which is in line with some features of the French oral health care system described in this paper, such as the provision of oral health care under the SHI (largely financed by employer and employee payroll taxes), the remuneration scheme for professionals, regulation by agreements at the national level, and the absence of a public dental service [35,42,81,82].

Although it is not possible to classify Brazil in terms of a single welfare state regime, the Brazilian oral health care system appears to mirror, in certain aspects, the social-democratic approach, especially in its ideological standpoint of universal coverage, strengthened by the Health Reform movement and consolidated within the 1988 Constitution. Nevertheless, oral health care in Brazil is mainly privately financed and delivered, despite being considered a right of citizenship. There is also duplicate and segmented coverage for oral health care, comparable to some fundamentals within the liberal welfare state regime [3,64,83].

Some of the limitations of this study must now be stressed. Firstly, comparisons between Brazil and the countries analyzed must be made prudently, since all of these countries have their own historical, political, social and economic trajectories, each affecting their oral health care systems in varying degrees. Secondly, due to the lack of a uniform data source, the quantitative data presented were based on a number of different sources, thus data collection methods and definitions may vary among countries. Ultimately though, this comparative analysis can play an important role in providing relevant information to policymakers and other researchers about different approaches to organize, finance and deliver oral health care services and also highlight what can be learned from these international experiences.

In conclusion, our findings suggest some lessons for Brazil. Firstly, following from the French and British models, it should concentrate efforts to increase coverage by public sources for oral health care. Universal coverage is a great strength of the Brazilian model, but Brazil needs to go beyond the ideology and put in practice what was set out in the 1988 Constitution. The second lesson derives from the first, meaning that to march towards universal coverage, Brazil should allocate more public resources to finance oral health care, especially if it wants to move away from the Canadian and the American models, which appear to exacerbate social inequalities. Thirdly, and finally, Brazil needs to keep building a system committed to providing oral health care free at the point of service, aligned to the primary health care approach and the principles of the SUS, in order to maximize the reduction of social inequalities in oral health and oral health care. Ultimately, Brazil has the "youngest" oral health care system among the countries analyzed and these lessons correspond to challenges that must be continually addressed in the political and economic arena, but this also means that Brazil can take advantage of its stage of development to make the best choices in order to secure oral health and oral health care as rights of citizenship.

Acknowledgements: to CAPES Foundation for their financial support.

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