

## Dental education in Colombia

Jorge A. Jaramillo<sup>1)</sup>, Jairo H. Ternera Pulido<sup>2)</sup>, Jaime A. Castro Núñez<sup>3)</sup>,  
William F. Bird<sup>4)</sup> and Takashi Komabayashi<sup>1)</sup>

<sup>1)</sup>Department of Endodontics, Texas A&M Baylor College of Dentistry, Dallas, TX, USA

<sup>2)</sup>Bogota Health Secretary Office, Colombia

<sup>3)</sup>Pacific Palisades, CA, USA

<sup>4)</sup>Department of Preventive and Restorative Dental Sciences, University of California, San Francisco, CA, USA

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**Abstract:** This article describes Colombia's development of formal dentistry, its dental school system, curriculum, and dental licensure, and current issues in oral health care. In 1969, there were only 4 dental schools in Colombia; at this writing there are 21. Five dental schools are public and the other 16 are private. Nearly all classes are conducted in Spanish. Undergraduate pre-dental coursework is not a prerequisite for dental school in Colombia. To obtain licensure, Colombian dental students must complete 5 years of study in dental school, earn a diploma, and work for the government for 1 year. There are approximately 41,400 dentists in Colombia, and the number is increasing quickly. However, the unemployment rate among dentists is very high, even though graduation from dental school is extremely difficult. Although the 1,100:1 ratio of citizens to dentists is considered satisfactory, access to dental care is limited due to the high rate of poverty. (J Oral Sci 52, 137-143, 2010)

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### Overview of the Republic of Colombia

The Republic of Colombia is located in northwestern

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Correspondence to Dr. Jorge A. Jaramillo, Department of Endodontics, Texas A&M Baylor College of Dentistry, 3302 Gaston Avenue, Dallas, TX 75246, USA

Tel: +1-817-300-3329

Fax: +1-214-874-4507

E-mail: jjaramillo@bcd.tamhsc.edu & jorgejaramillotero@hotmail.com

South America and has a population of approximately 45,000,000 (1). The capital Bogotá is the largest city, with a population of approximately 7,900,000, and is located in the center of the country. The area of Colombia covers a total of 2,074,408 km<sup>2</sup>, with 1,141,748 km<sup>2</sup> in the continental territory and 928,660 km<sup>2</sup> in the maritime expansion; the population density is 38/km<sup>2</sup>. Colombia is bordered by Venezuela in the northeast, Brazil in the southeast, Peru and Ecuador in the south, and Panama in the northwest; Colombia is the only nation in South America that has coasts on both the Pacific Ocean and the Caribbean Sea, in which it has islands such as San Andres and Providencia. Colombia was conquered by the Spaniard Alonso de Ojeda in 1499 and became part of the Spanish Viceroyalty of New Granada, which encompassed present-day Ecuador, Panama, Colombia, and Venezuela. Colombia achieved independence from Spain in 1813; its first president was Simon Bolivar. The official language is Spanish, and the legal currency is the Peso Colombiano. Colombia is recognized worldwide for its coffee, flowers, emeralds, coal, and petroleum (2).

### Evolution of formal dentistry and dental education in Colombia

The native tribes that previously lived in what is now the Republic of Colombia, most notably the Zenues, Chibchas, Taironas, Muiscas, and Calimas, never had preventive or restorative dentistry, and the most frequent dental problems were dental attrition and odontalgia. During the Spanish conquest and subsequent colonization, dentistry was performed by warlocks, shamans, and common people. In 1564, at San Juan de Dios hospital, Pedro Pablo de Villamor became the first dentist practitioner

allowed to practice in an institution. After him came others, including Rodrigo Enriquez de Andrade (1639), Fray Mateo Delgado (1758), Nicolas de Leiva Clavijo (1760), Juan Bautista Vargas, Domingo Rotta, and Miguel Meneses, who was the first native-born Colombian dentist (3).

Some dentists came from France and the United States, such as Joseph Watson ver Valen in 1847; Ernesto Bingley (1852), who graduated from the Dental Surgery School of Baltimore; Augusto Pisot (1864); and the Colombians

Luis Capella Rodriguez (1871) and Juan Porrati (1872), who trained in New York. In 1880, Guillermo Vargas Paredes, who is recognized as the father of Colombian dentistry, came from the Dental College of New York. On 27 March 1887, Paredes and his colleagues founded the Colombian Dental Society; by June 1 of the same year he had organized the first Colombian dental journal. On 2 January 1888, along with Dr. Nicolas Rocha Caicedo and Alejandro Salcedo, Paredes founded the Dental College

Table 1 Dental Schools in Colombia

Number	Institution	City	Department (State)	Accreditation
<b>Private dental schools</b>				
1	Corporacion Universitaria Rafael Nunez	Cartagena	Bolivar	Active
2	Fundacion Universitaria Autonoma de las Americas	Medellin	Antioquia	Active
3	Fundacion Universitaria Juan N. Corpas	SantaFe de Bogota	Bogota D. C.	Inactive
4	4A Fundacion Universitaria San Martin	SantaFe de Bogota	Bogota D. C.	Active
	4B Fundacion Universitaria San Martin	Puerto Colombia	Atlantico	Active
5	Fundacion Universitaria Sanitas	SantaFe de Bogota	Bogota D. C.	Active
6	6A Institucion Universitaria Colegios de Colombia	Cali	Valle del Cauca	Active
	6B Institucion Universitaria Colegios de Colombia	SantaFe de Bogota	Bogota D. C.	Active
7	Pontificia Universidad Javeriana	SantaFe de Bogota	Bogota D. C.	Active
8	8A Universidad Antonio Narino	Armenia	Quindio	Inactive
	8B Universidad Antonio Narino	Bucaramanga	Santander	Active
	8C Universidad Antonio Narino	Cucuta	Norte de Santander	Active
	8D Universidad Antonio Narino	Circasia	Quindio	Active
	8E Universidad Antonio Narino	Ibague	Tolima	Active
	8F Universidad Antonio Narino	Neiva	Huila	Active
	8G Universidad Antonio Narino	Villavicencio	Meta	Active
	8H Universidad Antonio Narino	SantaFe de Bogota	Bogota D. C.	Active
	8I Universidad Antonio Narino	Palmira	Valle del Cauca	Active
	8J Universidad Antonio Narino	Popayan	Cauca	Active
9	Universidad Autonoma de Manizales	Manizales	Caldas	Active
10	Universidad Ces de Medellin	Medellin	Antioquia	Active
11	11A Universidad Corporativa de Colombia	Villavicencio	Meta	Active
	11B Universidad Corporativa de Colombia	Pasto	Narino	Inactive
	11C Universidad Corporativa de Colombia	SantaFe de Bogota	Bogota D. C.	Active
	11D Universidad Corporativa de Colombia	Medellin	Antioquia	Inactive
	11E Universidad Corporativa de Colombia	Envigado	Antioquia	Active
	11F Universidad Corporativa de Colombia	Pasto	Narino	Active
	11G Universidad Corporativa de Colombia	Bucaramanga	Santander	Inactive
	11H Universidad Corporativa de Colombia	Medellin	Antioquia	Active
	11I Universidad Corporativa de Colombia	Villavicencio	Meta	Inactive
12	12A Universidad del Sinu Elias Bechara Zainum	Monteria	Cordoba	Active
	12B Universidad del Sinu Elias Bechara Zainum	Cartagena	Bolivar	Active
13	Universidad el Bosque	SantaFe de Bogota	Bogota D. C.	Active
14	Universidad Metropolitana	Barranquilla	Atlantico	Active
15	Universidad Santiago de Cali	Cali	Valle del Cauca	Active
16	Universidad Santo Tomas	Bucaramanga	Santander	Active
<b>Public dental schools</b>				
17	Universidad de Antioquia	Medellin	Antioquia	Active
18	Universidad de Cartagena	Cartagena	Bolivar	Active
19	Universidad de Magdalena	Santa Marta	Magdalena	Active
20	Universidad del Valle	Cali	Valle del Cauca	Active
21	Universidad Nacional de Colombia	SantaFe de Bogota	Bogota D. C.	Active

Source: Sistema Nacional de Informacion de Educacion Superior, Colombia.

of Bogota, which has become the premier institution of its kind in South America. The Dental College of Bogota was the precursor to many dental schools across the country, including the Dental School of Cartagena founded in 1891, the Dental National School of Medellin (1912), the Polytechnic Martinez Olier Institute (1914), the Dental School of Medellin (1919), the Dental Faculty of Cartagena (1920), the Colombian Dental Institute (1923), and the Dental College of Medellin (1932) (4,5).

Table 1 shows a list of all the dental schools in Colombia. Currently, there are 21 accredited dental schools in Colombia, and some of these schools have branches in different cities. For example, the Universidad Antonio Nariño has 10 sites, and the Universidad Cooperativa has 9. Because of this, there are considered to be 41 different dental school facilities in Colombia. Of the 21 schools, 16 are private and 5 are public; all require full-time attendance. The majority of these dental schools are active, meaning that they fulfill all the requirements of the Ministry of Health, which oversees the accreditation process, and thus these schools are able to continue operating. However, some dental schools may be considered inactive if they have not met the current requirements of the Ministry of Health. These schools are required to close until they meet all requirements. According to information collected by the present authors, dental schools that do not fulfill all requirements must cease academic activities.

### Requirements for dental school admission

All applicants to dental school must have graduated from high school; no undergraduate pre-dental coursework is required before admission. Dental school admission in Colombia requires successful completion of the Instituto Colombiano para el Fomento de la Educacion Superior (ICFES) test, as well as a test administered by the dental school (6). The ICFES test assesses knowledge of subjects taught in high school; some dental schools award scholarships to the applicants with the highest scores on the ICFES test (7). If the submitted scores and high school course work are satisfactory, the applicant will be contacted for an interview.

Currently, approximately 10,000 first-year dental students are admitted to the various accredited dental schools in Colombia each year. The distribution of applications by sex shows that females submitted 65% of applications in the 1980s (8). Although precise data are not available, in recent years it is estimated that more than 70% of applicants nationwide are female.

Tuition for public dental schools is less expensive than that of private dental schools. For instance, the public

Universidad Nacional de Colombia, a public school, charges according to the student's parents' income; thus, if the family income is low, the student will pay less than a student at a private dental school. Consequently, a student at the Universidad Nacional de Colombia might pay US\$2,000 per year, while a student at the Institution Universitaria Colegios de Colombia (UNICOC) (a private dental school) might pay US\$5,000 per year.

### Dental school curriculum

The Ministry of Health and the Colombian Dental Association have been working together to promote science-based education and a standardized curriculum; however, most schools do not use the same curriculum. All schools conduct classes mainly in Spanish.

The 5-year dental school program culminates in a Doctor of Dental Surgery (D.D.S.) degree. For example, at UNICOC, there are two 18-week semesters: the first semester starts in mid-January and ends in mid-June, with a summer break between June and July (9). The second semester starts in mid-July and finishes by mid-December. There is a Christmas vacation between the 2 semesters. Each week, students spend approximately 30 hours in classes from Monday to Friday, and sometimes on Saturday, as well.

A typical 5-year dental school curriculum in Colombia (that of UNICOC, for example; Table 2a) comprises 2 years, or 4 semesters, of mainly preclinical didactic and laboratory courses, and 3 years, or 6 semesters, of mainly clinical training that is supervised by faculty members. The third year of the course, i.e., the fifth and sixth semesters, includes lectures, seminars, and introductions to clinical dentistry, as well as initial work on student projects. In the fourth year (the seventh and eighth semesters), students continue with clinical activities, projects, and lectures. In the fifth year (the ninth and tenth semesters), students take rotations in some hospitals and health institutions, including some outside Colombia. In the Universidad CES de Medellin dental program, for example, students can take rotations in foreign dental schools in countries such as Germany, Brazil, and the United States (10).

Due to socioeconomic issues in Colombia, UNICOC has created a new 4-year, 8-semester, curriculum (Table 2b) (9). With this short program, dental students are able to go back to their hometown sooner, thereby hastening the development of the dental health care system and public health infrastructure in small towns.

There are several postgraduate programs available; these are oriented to clinical dentistry and are of varying duration. After successful completion of a postgraduate program, a candidate is eligible for a 2-year master's degree program.

Table 2a Dentist Curriculum; five-year (ten semesters) (UNICOC)

<b>Year 1</b>	
<b>1st Semester</b>	<b>2nd Semester</b>
Anatomy and General Histology	Physiology
Cellular, Molecular and Genetic Biology	Microbiology and Immunology
Biochemistry	Embryology and Histology Orofacial
Dental Anatomy and Occlusion	Dental Biomaterials
Scientific Communication	Biostatistics
Technical English	Elective I*
Prerequisites**	Technical English
*Art I, Music I, History I, Ecology and Environment I, Sports I	
** Basic English, Languages, Biology, and Chemistry	
<b>Year 2</b>	
<b>3rd Semester</b>	<b>4th Semester</b>
General and Oral Pathology	<b><i>Promotion and Prevention Clinic</i></b>
Cariology	Anesthesiology and Oral Surgery
Imagenology and Oral Diagnosis	Endodontics and Dentalveolor Orthopedic Surgery
Periodontics and Oral Biology	Oral Implantology
Temporomandibular Function and Dysfunction	Aesthetic and Restorative Dentistry
Epidemiology	Pharmacology and Therapeutic Management
Elective II*	Bioethics
Administrative Sciences and Public Health**	Dental Sciences ***
*Art II, Music II, History II, Ecology and Environment II, Sports II	
** Management and Community Development, Management in Health and Social Security	
*** Biological and Surgical Dentistry, Aesthetic and Restorative Dentistry	
<b>Year 3</b>	
<b>5th Semester</b>	<b>6th Semester</b>
Oral Medicine and Clinical Diagnosis	<b><i>Integrated Clinic of the Adult I</i></b>
Pediatric Dentistry, Growth and Development	Orthodontics and Maxillary Orthopedics
Introduction to the Clinic	Internal Medicine Foundations
Prostodontics	Endo-Perio Relations and Oral Surgery
Administration and Legislation in Health	Management and Marketing in Health Services
Psychology	Clinical Psychology
	Seminar and Research Project I
<b>Year 4</b>	
<b>7th Semester</b>	<b>8th Semester</b>
<b><i>Paediatric Clinic I</i></b>	<b><i>Paediatric Clinic II</i></b>
<b><i>Integrated Clinic of the Adult II</i></b>	<b><i>Integrated Clinic of the Adult III</i></b>
Pain and Anxiety Control	Medical Managing of the Patient in Odontology
Biomaterials for Surgery	Clinical Case Study
Community Practice I*	Community Practice II*
Elective III**	Elective IV**
Seminar and Research Project II	Seminar and Research Project III
* Fluoridation practice in kindergarten/ elementary school	
** Any available courses	
<b>Year 5</b>	
<b>9th Semester</b>	<b>10th Semester</b>
<b><i>Paediatric Odontology and Maxillary Orthopedics</i></b>	<b><i>Paediatric Clinic and Orthodontic Diagnosis</i></b>
<b><i>Integrated Clinic of the Adult IV</i></b>	<b><i>Integrated Clinic of the Adult V</i></b>
Oral Manifestations of the Systemic Diseases	Impatient Dentistry
Clinical Odontology I	Clinical Odontology II
Administration and Public Health I	Administration and Public Health II
Legal Medicine and Forensic Odontology	Foundations of Constitution
Seminar and Research Project IV	

Note; ***Bold Italic*** indicates clinical courses.

Table 2b Dentist Curriculum; four-year (eight semesters) (UNICOC)

<b>Year 1</b>	
<b>1st Semester</b>	<b>2nd Semester</b>
Anatomy and general histology	Physiology
Cellular, Molecular and Genetic Biology	Microbiology and Immunology
Biochemistry	Orofacial Embryology and Histology
Dental Anatomy and Occlusion	Functions of Temporomandibular Joint
Dental Biomaterials	Imagenology
Research Methodology and Biostatistics	Epidemiology
Colombian Constitutional Law	Ethics and Bioethics
English I	English II
<b>Year 2</b>	
<b>3rd Semester</b>	<b>4th Semester</b>
General and Oral Pathology	<b>Promotion and Prevention Clinic</b>
Endodontics and Dentoalveolar Orthopedic Surgery	Pediatric Dentistry, Growth and Development
Periodontia and Oral Biology	Anesthesiology and Oral Surgery
Cariology and Restorative Dentistry	Prosthodontics and Oral Implantology
Introduction to the Clinic	Pharmacology and Therapeutic Management
Oral Epidemiology, Promotion and Prevention	Public Health in Colombia
Dynamic Psychology	Clinical Psychology
English III	English IV
<b>Year 3</b>	
<b>5th Semester</b>	<b>6th Semester</b>
<b>Pediatric Clinic I</b>	<b>Pediatric Clinic II</b>
<b>Integrated Clinical and Scientific Evidence I</b>	<b>Integrated Clinical and Scientific Evidence II</b>
Internal Medicine Foundations	Pain and Anxiety Control
Orthodontics and Maxillary Orthopaedics	Strategic Management
Administration and Organization Development	Elective I*
Forensic Legal Medicine and Dentistry	
<b>Year 4</b>	
<b>7th Semester</b>	<b>8th Semester</b>
<b>Pediatric Clinic III</b>	<b>Pediatric and Orthodontic Dentistry</b>
<b>Integrated Clinical and Scientific Evidence III</b>	<b>Biological and Surgical Dentistry</b>
Oral Medicine	<b>Esthetic and Restorative Dentistry</b>
Community Dentistry	Inpatient Dentistry
Elective II*	Clinical Professional Emphasis
	Social Professional Emphasis**

\* Any available courses

\*\*Administration, Social Projection, Research and Innovation, and General Medical Liability

Note; **Bold Italic** indicates clinical courses.

## Graduation from dental school

Graduation from dental school in Colombia is very difficult. In 2004 there were 10,354 newly admitted dental students, but only 1,183 graduated; in 2005 there were 9,930 first-year dental students, but only 868 graduated. These figures indicate that most students do not finish their studies on time. Information collected by the present authors suggests that this delay in graduation is sometimes due to failure to successfully complete all coursework. In

addition, some students cannot continue their studies for financial reasons, others realize that their interests lie elsewhere and thus give up, and some interrupt their education to seek temporary employment.

A recent study found that of 4,064 dentists who graduated between 2001 and 2004, 70.6% were women and 29.4% were men, which confirms that women are more numerous in Colombian dentistry (11).

## Mandatory government licensing and services

Colombia does not have national or state dental licensure examinations like the US National and State Board Dental Examinations. In addition, continuing education courses are currently not compulsory; however, there are plans to introduce mandatory continuing dental education requirements. To qualify as a practicing dentist, Colombia requires a D.D.S degree and 1 year of paid compulsory government service, during which graduates are assigned to locations by the Ministry of Health, although individual preferences are also taken into account. More than 90% of new graduates are assigned to work in public hospitals and in rural areas.

## Current problems in Colombia oral health care

While there are many problems in Colombia's oral health care system, we will focus on 2 significant issues: limited access to dental care and the oversupply of dentists.

In 1993, the Colombian government passed a social security law, named Ley 100, by which Colombian people have the right to health care services, including dental care. However, these dental care services include only a few procedures, most of which are preventive. For example, Colombian children at 2 years of age are entitled to a free first dental appointment. Further, children younger than 5 years are entitled to receive health education and fluoridation at no charge (12). Of course, promotion of frequent use of fluoridated dentifrices and adequate tooth brushing practices by oral health professionals and the parents of children is of great importance (13). However, because most procedures are not covered by Ley 100 and the freedom of setting treatment fees is left to individual dentists, many people cannot afford dental services, as more than 46% of the population is at or below the poverty level (14).

The second problem is that although there are many dentists in Colombia, most are concentrated in metropolitan areas, and too few practice in rural areas and small towns. Until 1969, there were only 4 dental schools in Colombia. At that time, the ratio of citizens-to-dentists was 7,749: 1. It decreased to 3,500:1 in 1987, and to 2,500:1 in 1989. In 2004, the number of dental schools peaked at 30 (9 of which subsequently closed) and the ratio of citizens-to-dentists was 1,000: 1. Hence, Colombia is currently experiencing a problem opposite to that which it had in 1969 (15). This oversupply of dentists has resulted in a high unemployment rate among dentists in Colombia – 26% in 2009 (16). The number of dentists in 2005 was 35,592, and according to projections, the number of dentists in 2020 will be

approximately 57,000. Demographic changes in the Colombian population, e.g., a lower-than-expected growth rate and a healthier population, will require new strategies for dental education and human resource management. If these strategies fail to materialize, the unemployment rate among dentists could reach 45% in 2020 (17).

With all these problems at home, many Colombian dentists are attempting to obtain licensure overseas. Between 2002 and 2005, US studies investigating the numbers of foreign-trained dentists attempting to obtain US dental licenses found that Colombian dentists were the third-largest such group (18).

## Closing remarks

The number of dentists in Colombia is increasing, and the current and growing oversupply of dentists is a serious problem. In addition, there is a need for more community oral health care programs in Colombia; consequently, oral health prevention and promotion have been prioritized in the dental school curriculum. This review provides information that can facilitate assessment of the competency level of Colombian-trained dentists who are applying for international dental/graduate programs; it also raises issues that should be considered in creating new public health policies. We hope that the information included in this review contributes to a better understanding of international dental education.

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