



Audiology in Brazil

Maria Cecilia Bevilacqua, Beatriz Caiuby Novaes & Thais C. Morata

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*Maria Cecilia Bevilacqua**
Beatriz Caiuby Novaes[§]
Thais C. Morata[‡]

*Universidade de São Paulo, Centro de Pesquisas Audiológicas, Brazil

[§]Pontifícia Universidade Católica de São Paulo (PUC-SP), Brazil

[‡]Universidade Tuiuti do Paraná, Brazil, and National Institute for Occupational Safety and Health, Cincinnati, USA

Key Words

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Abstract

The profession of audiology took root in Brazil nearly a half a century ago and has since blossomed into a flourishing, well-developed field. Currently, audiologists in Brazil work at private institutions, including private medical practices and dedicated speech and hearing clinics. They are also employed in a wide array of public institutions, including community clinics, elementary schools, colleges, and universities. In both the private sector and health clinics, audiologists perform diagnostic evaluations of auditory and vestibular disorders, select and fit hearing aids, and provide aural rehabilitation. At the public level, they assist with workers' health programs, dispense hearing aids, and aural rehabilitation. There is always room to grow, however, and the future of audiology in Brazil holds both challenges and opportunity. The following article will sketch the development of audiology training and practice in Brazil, provide a picture of how the field stands today, and summarize the unique challenges which the profession faces in this large and diverse nation.

Sumario

La profesión de La Audiología echó raíces en Brasil hace casi medio siglo y desde entonces se transformó en un campo floreciente y bien desarrollado. Actualmente, los audiólogos en Brasil trabajan en instituciones privadas que incluyen práctica médica privada y clínicas de audición y lenguaje de gran dedicación. También están empleados en un amplio rango de instituciones públicas, incluyendo clínicas comunitarias, escuelas primarias, colegios y universidades. Tanto en el sector privado como en las clínicas de salud, los audiólogos llevan a cabo evaluaciones diagnósticas de problemas auditivos y vestibulares, seleccionan y adaptan auxiliares auditivos y proveen rehabilitación auditiva. En el nivel público, apoyan programas de salud de trabajadores, distribuyen auxiliares auditivos y proporcionan rehabilitación auditiva. Sin embargo, siempre hay espacio para crecer y el futuro de la Audiología en Brasil tiene tanto desafíos como oportunidades. El siguiente artículo esboza el desarrollo de la capacitación y la práctica de la Audiología en Brasil, provee un panorama de cómo está actualmente el campo y resume los excepcionales desafíos que enfrenta la profesión en esta grande y diversa nación.

Some background information about Brazil is necessary in order to better understand the state of audiology in that country. Brazil is the largest and most populous country in South America, occupying nearly 50% of the continent and boasting a population of nearly 190 million people. It has numerous natural resources including agricultural products (coffee, soybeans, sugar, oranges, tobacco, and cocoa), livestock products (meat, poultry, and leather footwear), wood products (pulp, paper, veneer, and plywood), and mineral and metal products (iron, steel, and aluminum). It is the economic leader among South American countries. Table 1 summarizes some of Brazil's economic and demographic indicators for the year 2007.

Following the Second World War, Brazil's economic development was spurred on by a period of import-substituting industrialization, facilitated by a huge domestic market. For the next 35 years, the country's economy expanded rapidly and a large and diversified industrial sector developed. Strong external demand and an active export policy has contributed to increased trade and booming export earnings since 2003.

With a population approaching 190 million, Brazil is the seventh most populous country in the world (Central Intelligence Agency, 2007). Its inhabitants are concentrated primarily along the coastline and in the larger cities, while some areas of the interior are sparsely inhabited. One significant problem is the highly unequal distribution of income among the citizens of Brazil, with approximately 10% of the population earning 50% of the overall income. According to comparative figures published

by the World Bank (The World Bank Group, 2005), Brazil has a Gini coefficient of 0.59, indicating that, as a country, it has one of the most unequal distributions of wealth in the world. The Gini coefficient is a measure of income or wealth inequality ranging from 0 (perfect equality) to 1 (perfect inequality); as the Gini coefficient increases, inequality increases. Unfortunately, the tendency toward income inequality in Brazil is typical of many South and Central American countries and is clearly noticeable in many ways. All stages of development exist simultaneously in Brazil in many facets of life, including economic, social, educational, and medical aspects. This impacts the availability of, and access to, audiological services, as will be illustrated.

Brazil is composed of 26 states and one federal district. The State of São Paulo is the cradle of audiology in Brazil, and the state where many of the training programs and audiology practitioners are still located. Therefore, a brief summary of São Paulo's socioeconomic and demographic data is also useful.

Although São Paulo ranks only twelfth among the Brazilian states in terms of area, it ranks highest in terms of population, having 40 million inhabitants and accounting for over 20% of the Brazilian population. São Paulo is also the richest state in Brazil, contributing over one-third of the nation's GDP. However, the state reflects the same unequal income distribution problem that plagues Brazil as a whole. Although many enjoy a high standard of living, there are areas of intense poverty as well. Table 2 summarizes some economic and demographic indicators for the state of São Paulo for the year 2000.

Table 1. 2007. Chief demographic and economic indicators for Brazil.

<i>Brazilian demographic and economic indicators</i>	
Area	8 511 965 square kilometres
Population	190 010 647 (0–14 years: 25.3%; 15–64 years: 68.4%; >65 years: 6.3%)
Population growth rate	1.008% /year
Birth rate	16.3 births/1000 people
Infant mortality rate	27.6 deaths/1000 live births
Life expectancy at birth	72.2 years (male: 68.3 years; female: 76.4 years)
Literacy (age 15+ who can read and write)	88.6% (2004)
GDP- Brazilian real (R\$) growth rate	3.7% /year
GDP-(R\$) per capita: purchasing power parity	\$8800
Unemployment rate	9.6%
Population below poverty line	31% (2005)

Source: Central Intelligence Agency (2007).

Development of the profession of audiology in Brazil

In Brazil, as in many other countries, audiology began as an outgrowth of the ear, nose, and throat (ENT) medical specialty. Initially, technicians called audiometrists performed pure-tone audiometry in ENT clinics. Because of the limited testing procedures, hearing evaluations were far from thorough, and accurate diagnoses could not be made. ENT physicians, therefore, went abroad to study audiology, and on their return, they fostered the development of the field in Brazil.

One early pioneer, Dr. Orozimbo Alves Costa Filho, spent five years at Washington University in St. Louis, Missouri, USA, studying under such internationally-recognized experts as Drs. Hallowell Davis, S. Richard Silverman and Ira Hirsh. Dr. Costa returned to Brazil in 1968, bringing with him extensive knowledge of new audiological procedures, including electrophysiology. Dr. Costa thus greatly expanded options for testing and treating persons with hearing impairment in Brazil. He also opened up many horizons for audiological research in the country.

Another early influence on the field of audiology in Brazil was the practice of phoniatrics in the neighboring country of Argentina. Professionals trained primarily in language pathology and known as phoniatricians came to Brazil in the late 1960s and proposed the creation of a course of study in phoniatrics, but it did not attract more than half a dozen students. However, some ENTs and other professionals in Brazil obtained training in speech-language pathology and introduced speech therapy into the emerging field of audiology. Thus, in Brazil, speech pathology and audiology were intertwined from the very beginning, and the professions continued to develop as a unified field.

In 1981, the profession of speech-language pathology and audiology—or *fonoaudiologia*, as it is called in Brazil—was formally recognized by the federal government through Legis-

Table 2. Demographic and economic indicators for the state of São Paulo, Brazil. Data are for the year 2000 (latest information available), unless noted.

<i>Current demographic and economic indicators for the State of São Paulo</i>	
Population	9 million (22% of the Brazilian population)
Infant mortality rate	21.2 deaths/1000 live births
Literacy	83.8% (age 15+ who can read and write)
GDP contribution	36.9%.
São Paulo State budget (2004)	
Total	R\$ 69.7 billion (~ USD 32 billion);
Health	R\$ 7.2 billion (~ USD 3.3 billion);

Source: Ministério do Desenvolvimento, Indústria e Comércio Exterior, 2004; Instituto Brasileiro de Geografia e Estatística, 2000.

lative Acts 6965/81 and 87218/82 (Brasil, 1981). Also in 1981, the Brazilian Speech-Language Pathology and Audiology Council was created, first at the national level and later at a regional level with seven regional offices, each representing three or four states. This association represents professionals working in the field and is the only agency that can provide a common licensure to speech-language pathologists, audiologists, and speech, language, and hearing scientists. It also maintains a code of ethics which sets forth the fundamental principles and rules guiding ethical conduct and professionalism for speech pathologists and audiologists in Brazil.

Prior to 1980, audiology practice was largely limited to private practice in hospitals, physicians' offices, and private clinics. Few had access to very sophisticated care. The majority of the population was underserved. Some limited speech therapy services were available through public institutions. However, during the 1980s, several occurrences helped facilitate the expansion of audiology into other venues.

The end of more than 30 years of military rule in 1985 was an event that contributed, in many ways, to the expansion of the field of audiology in Brazil. A new constitution was ratified in 1988, which devoted specific attention to the protection of workers' health and created mandates for worker health promotion.

The Interunion Department of Studies and Research on Work Health and Environment (Departamento Intersindical de Estudos e Pesquisas de Saúde e dos Ambientes de Trabalho, DIESAT) was created to support workers and strengthen unions in issues related to occupational safety and health. DIESAT created Workers' Health Programs in the Public Health System (today called Reference Centers in Workers' Health), first in several cities in the state of São Paulo and eventually through most of Brazil. These centers encouraged the participation of union representatives in health and safety programs, improved the quality of workplace inspections, and highlighted the magnitude and seriousness of hearing loss among workers due to exposure to noise and other causes (Santos & Morata, 1994). The changes brought about by the new Brazilian political system not only strengthened the occupational health arena but also

accelerated the placement of audiologists into other public health areas.

In 1986, the São Paulo State Health Department and the undergraduate speech pathology and audiology course at the Pontifícia Universidade Católica de São Paulo developed a joint program in which audiologists worked with industry to collect data on noise exposure and hearing levels across different occupational sectors. Prior to this effort, the audiologist's role in the area of occupational health had been quite limited, characterized exclusively by the audiometric monitoring of workers (Morata & Carnicelli, 1988). The collaboration between the health department and the university was a great success. The data obtained in the first year of the partnership identified high rates of noise-induced high-frequency hearing loss, providing the impetus for the university to request that the State Health Department purchase audiological equipment and hire audiologists that would be exclusively dedicated to workers' health programs. In the following years, various workers' health programs were funded by other state and municipal health departments and made similar progress in identifying cases of hazardous noise exposure, and protecting workers' hearing.

An example of the further expansion of audiology into public sector programs was the addition of audiology services to public health clinics. This was initiated in 1990 by the University of São Paulo at Bauru. The University had past experience in working with the Federal Health Ministry on craniofacial pathologies. In 1990, it started to offer a speech pathology course, and the existing experience of the professionals in the craniofacial pathologies group was transferred to audiology. This partnership resulted in a 1993 resolution of the Health Ministry, by which cochlear implants were guaranteed in the public health system, free of charge. In 2000, the resolution was expanded to include the concession of hearing aids by public health clinics. In 2004, this resolution was incorporated into Brazilian law (Ministério da Saúde, 2004).

Another effort to expand audiological services encompasses neonatal hearing screening. In the past 15 years, a few maternity hospitals in several regions of Brazil have started screening newborns for hearing loss. Most use otoacoustic emissions, though some use a high risk registry to refer for an evaluation. Several research groups and professional organizations are investigating alternatives to provide hearing screenings for newborn babies across the whole of Brazil (Lewis, 1996).

It is likely that the adoption of neonatal screening will be gradual and varied in different areas of the country. Feasibility surveys conducted in recent years (unpublished) suggest that it might not be possible in the short term to use a uniform protocol across states or regions. Some regions might adopt a universal screening policy while others may need to begin by screening only those babies identified as high risk through a registry approach. Some facilities may use otoacoustic emissions to screen hearing while others might use auditory brainstem evoked responses. Much depends on the availability of equipment and competent personnel, as well as the capacity to provide services to infants identified as hearing-impaired. Increased public interest in this service might, of course, facilitate the expansion of newborn hearing screening programs throughout the country.

The role played by universities was pivotal to the introduction and diversification of audiological services in the Brazilian public health system. Through collaborations such as these involving

universities and the public health sector, the presence of audiologists in public services and the labor market dramatically increased. As a consequence, other opportunities for hearing professionals became available in unions, industry, and other health services.

During the 1990s, several individuals obtained doctoral degrees in audiology, achieving greater autonomy from other professions and boosting research development. These very dedicated individuals played an important role in consolidating the scope of practice and shaping the scientific and scholarly basis for the profession of audiology in Brazil. Since the early 1990s, audiology has become clearly recognized as an independent area of knowledge in Brazil, as evidenced by the increasing number of presentations at national and international conferences, the proliferation of scientific publications, and the growing presence of audiologists in both private and public practice.

Development of audiology training in Brazil

The first training program in communication disorders was established in 1960 at the University of São Paulo with the primary objective of training speech therapists. The program soon expanded into a two-year, and shortly after that into a three-year course that offered a diploma in logopedics, or speech therapy. By 1970, the University of São Paulo realized that the breadth of the field required more extensive training, and changed the curriculum to a four-year undergraduate professional degree course in *fonoaudiologia* (speech pathology and audiology), which is still the entry level degree of the profession. In 1981, when the legislative acts establishing *fonoaudiologia* as a legal profession were passed, there were 10 undergraduate programs in speech-language pathology and audiology in Brazil.

Prior to the 1970s, the coursework consisted primarily of speech and language pathology classes, due to the influence of the phoniatrists from Argentina. However, the ENT physicians who went abroad to study audiology returned to Brazil and facilitated the development of courses in various areas of diagnostic hearing testing and rehabilitation of hearing loss. In 1970, a group of professionals who desired to see audiology established as an independent field of study launched the first graduate course in audiology. The course was housed at the Pontifícia Universidade Católica de São Paulo (PUC.SP), in collaboration with the Department of Otorhinolaryngology in the medical school of the Santa Casa de Misericórdia de São Paulo. Two years later, a masters degree course in communication disorders was also created at PUC.SP, specializing in speech-language pathology. In 1996, the Speech-Language Pathology and Audiology Council passed Resolution 157-96, defining four areas of graduate study in the field: audiology, language, oral motor disorders, and voice (Conselho Federal de Fonoaudiologia, 1996). The availability of graduate training not only raised the standard of professional care, but also expanded professional opportunities and the scope of practice for audiologists.

At this time, the entry level for the profession remains the baccalaureate degree. The undergraduate course in *fonoaudiologia* involves a double major with coursework in both speech-language pathology and audiology. Classes include the basic sciences, anatomy and physiology, human development,

linguistics, phonetics, psychology, the nature and process of audition and balance, normal and abnormal communication development, and supervised clinical practicum. A double license is granted to graduates of this four-year course, and they are free to work in any area of the field. Graduates must also comply with federal regulatory (licensure) standards in order to practice. According to the Brazilian Federal Speech-Language Pathology and Audiology Council (Conselho Federal de Fonoaudiologia, 1996), there are currently 117 undergraduate courses in speech-language pathology and audiology in Brazil, and an average of 2000 students graduate each year. Table 3 displays the number of undergraduate courses of study by region within Brazil.

It is at graduate level that different courses are offered in the four areas of specialization defined by the Speech-Language Pathology and Audiology Council (audiology, language, oral motor disorders, and voice). There are several options for degrees and coursework. Some courses offer a 500-hour course of study which provides advanced clinical training focused in one of the four areas of specialization, and graduates receive the title 'Specialist'. In addition, a few universities offer masters and doctoral degree courses designed to provide the necessary training for those aiming at a career in research and education. Currently, there are 32 specialization courses and eight graduate courses in communication disorders throughout Brazil; the geographic dispersion of these programs is also given in Table 3.

Audiology in Brazil today

At the time of writing, 30911 individuals have completed an undergraduate course of study in speech-language pathology and audiology, and obtained licensure to practice in Brazil. Audiologists work in a wide array of private and public settings. The majority of these professionals are in the southeast region of the country, which encompasses São Paulo and Rio de Janeiro. See Table 3 for a complete distribution of professionals by region (Conselho Federal de Fonoaudiologia, 2007).

In addition, approximately 1000 people have completed a 500-hour specialization course in audiology; an estimated 500 people have obtained a masters degree in either speech-language pathology or audiology; and about 300 individuals have obtained a doctoral degree in one of these areas (Conselho Federal de Fonoaudiologia, 2007).

In view of the country's population and size, there is an obvious shortage of qualified audiologists. The World Health Organization estimates the prevalence of incapacitating hearing loss to be 6% in developing countries. A study conducted in the

south region of Brazil resulted in a very similar estimate, projecting the prevalence of hearing loss to be 6.2% (WHO, 2003). Extrapolating from this estimate, there are approximately 17 million individuals with hearing loss in Brazil who need hearing aids, and 200 000 people who need cochlear implants. Comparing the number of licensed professionals with the estimated number of individuals with some degree of hearing loss, it is evident that a large percentage of the population is underserved regarding audiological care.

As stated above, audiology is practiced in a number of public and private practices in Brazil. A recent study conducted in the southern states of Brazil asked speech-language pathologists and audiologists to categorize their worksite as private, non-profit, or governmental. Of the 986 speech-language pathologists and audiologists who provided specific information about their work setting, 590 (60%) reported working in private practice clinics (Silva et al., 2000). This trend toward private employment is evident in other regions of Brazil as well, and raises concerns regarding the availability of services to lower-income persons.

Speech-language pathology and audiology services are less available in community clinics; hospitals; rehabilitation centers; centers for persons with developmental disabilities; public schools; and federal, state, and local health departments or other government agencies. This implies that mostly those who can afford private health care—a small fraction of the Brazilian population, as the Gini coefficient indicated—will have access to audiological care. Indeed, poorer Brazilians are still unaware of the existence of the profession and the scope of services provided by speech-language pathologists and audiologists.

Despite the fact that fewer audiologists work in the public sector than in the private sector, the availability of hearing services available through governmental organizations is increasing. Brazil has a national health care system that is universal, but only in the last decades have comprehensive audiological services become available. These services are coordinated through the Unified Health System (Sistema Único de Saúde, or SUS). The SUS pledges to offer health assistance to all Brazilians through the diagnosis and treatment of disease and injury, integral ambulatory and hospital care, and domiciliary assistance. The SUS has five principles:

- Universality, that is, the whole Brazilian population has unrestricted access to all health services;
- Equity, that is, health services are distributed in an equitable manner, avoiding inequalities in the offer of assistance;
- Democratization, that is, supervisors, providers, and beneficiaries of services all participate in the establishment of guidelines for the SUS;

Table 3. Number of audiology training courses by level and region in Brazil, and number of graduates by region.

<i>Number of audiology training courses by level and geographic region</i>						
<i>Course level</i>	<i>North</i>	<i>Northeast</i>	<i>Southeast</i>	<i>South</i>	<i>Central west</i>	<i>Total</i>
Undergraduate	5	22	61	20	9	117
Specialization	–	6	21	4	1	32
Number of graduates by geographic region						
<i>Course Level</i>	<i>North</i>	<i>Northeast</i>	<i>Southeast</i>	<i>South</i>	<i>Central west</i>	<i>Total</i>
Undergraduate	860	4592	19 096	4204	2159	30911

Source: Conselho Federal de Fonoaudiologia (2007).

- Decentralization, that is, management in the three spheres of government, with clearly-defined roles for the union, states, and municipalities; and
- Integrality, that is, holistic assistance to each individual, with access to all available technologies.

The SUS is organized into three levels of care, and audiological services are available at each level. Each successive level involves services of increasing complexity. All levels work together in an organized network of assistance, referral, and counter-referral. Priorities are defined in health conferences, and supervising councils makes decisions.

Basic attention (primary health care)

This level includes health services of low cost and technology. It involves an interdisciplinary team working in conjunction with the patient and the family. In the area of hearing loss, SUS services at the basic level include provision of information and community guidance to assist in the early identification of hearing problems, public health programs to prevent the main causes of avoidable hearing impairment, and identification of community resources for the person with hearing impairment. Currently, the basic attention system is examining a proposal to have providers ask the basic question, ‘Does your child hear well?’ in every interaction with parents. Orienting families to the hearing health of their children emphasizes the importance of early detection of hearing loss and encourages parents to monitor speech, language, and hearing milestones and report any concerns.

Secondary level

This level involves the operation of public clinics where professionals offer diagnostic and rehabilitative services, provide technical support to basic attention level teams, and identify and refer cases that require higher level services. With regard to hearing health, secondary level programs include ENT and audiological evaluations; hearing screening in newborns, preschoolers, and school-aged children; audiometric monitoring of noise-exposed individuals; aural rehabilitation; speech-language pathology evaluations and therapy; and hearing-aid selection and fitting. Related services include psychological assessment and therapy, social work assistance, family and school orientations, and home and/or institutional visits. Secondary level service providers advise basic attention teams as to the main causes of hearing loss, methods for prevention, and methods of early identification of hearing problems.

High complexity (tertiary level)

This service level provides advanced diagnostics and treatment, as well as basic care to difficult-to-treat populations. Additionally, this level is responsible for the qualification of basic attention level personnel and oversight of services provided at the secondary level. In the realm of hearing health, Tertiary level teams provide sophisticated testing services including otoacoustic emissions evaluation (distortion-product and transient-evoked) and auditory evoked potential testing (including auditory brainstem responses, middle, and long latency potentials). They also provide testing and hearing-aid services to children under age three, and patients with multiple disorders

Table 4. Number and value (in US dollars) of hearing aids distributed through the Unified Health System (Sistema Único de Saúde, or SUS) for the past five years.

<i>Year</i>	<i>Number of hearing aids given</i>	<i>Value in US Dollars</i>
2002	34 025	19 645 351.00
2003	64 884	42 986 101.00
2004	81 361	51 463 493.00
2005	113 983	105 374 078.00
2006 (through August)	68 849	45 511 314.55

Source: Brazilian Ministério da Saúde (2006), presented at the 4th Joint WHO/CBM Workshop on hearing aids and services for developing countries (Nascimento, 2006).

who are difficult to test. Advanced neurological, psychological, speech pathology, and social services are available as well.

Hearing aids and cochlear implants are guaranteed to the Brazilian population through the SUS, which coordinates their distribution. Although hearing aids are also available through the private sector to those who can afford to obtain them, more than 60% of the hearing aids fitted in Brazil are dispensed by the SUS, and this percentage is increasing (Ministério da Ciência e Tecnologia, 2006). Table 4 shows the distribution of hearing aids by the government in recent years.

Although the quantity of hearing aids dispensed has increased annually, the numbers indicate that only a small fraction of the estimated 17 million Brazilian people who would benefit from amplification are being served.

Future challenges and opportunities

Audiology in Brazil has a promising future. Government services are expanding, providing professionals with new markets and a broadening scope of practice. Neonatal screening programs are being adopted across Brazil, resulting in earlier identification of debilitating hearing loss and expanding hearing aid services to the pediatric population. Professional organizations are increasing, creating opportunities for collaboration and fostering the talents of practitioners through interaction. In 2002, the Brazilian Academy of Audiology was founded; this very active organization is likely to boost audiology at national level and create a new dynamic among professionals both nationally and internationally.

The profession also faces some challenges in the years ahead. Additional support is needed for research and surveillance programs. Quality indicators should be established for monitoring the audiological services provided at each level, including prevention efforts, screening and identification of hearing loss, diagnostic testing, hearing-aid fitting, and provision of cochlear implants.

Audiological services need to be better integrated throughout the public health system network. Audiological practice is still characterized by the diagnosis and treatment of communication disorders, rather than their prevention. More activity is necessary in the area of primary prevention. In addition, decision-making processes regarding the use of secondary and tertiary level services need to be streamlined and improved. It is important that audiologists network through professional

organizations and outreach activities to form partnerships throughout the country. Teamwork will facilitate the ability to monitor hearing health status, identify and investigate health problems, conduct research to enhance prevention, develop and advocate solid public health policies, implement prevention strategies, promote healthy behaviors, foster safe and healthful environments, and provide leadership and training.

Decentralization of audiology services and a greater geographic distribution of professionals are necessary in order to meet the needs of all Brazilians. At present, most professionals are concentrated in the south and southeastern regions of the country, and there is an extreme need for more audiologists in the midwest, north, and northeastern regions. Recently, measures have been adopted by the Ministry of Health to establish a national network of hearing health services to give support to centers in Brazil's poorest regions (Ministério da Saúde, 2004).

Professional education and training also needs to be evaluated and modified to meet the changing needs of the profession in Brazil. Public health programs in Brazil rely on professionals who are general practitioners. Professionals in speech language pathology and audiology have been required to work on a wide array of communication disorders. The need for professionals with more specific training in the area of audiology has recently been addressed by the Hearing Health Resolution in 2004 of the Ministry of Health (Ministério da Saúde, 2004), which established more stringent requirements for the training of professionals. Undergraduate educational policies are being reviewed throughout Brazil; however, the focus is still mainly on improving professional training at the undergraduate level. Recent trends in the public educational system are directed at increasing professional training after completing a basic cycle common for all students. Coursework more compatible with recent developments in technology and public health is also essential, both at graduate and undergraduate levels. This would consolidate the production of knowledge at the international level.

The challenges that lie ahead, however, only increase the exciting opportunities that the future holds for audiologists in Brazil. The progress achieved in recent decades places Brazil in a leadership position in Latin America and other Portuguese-speaking countries with regard to the prevention, diagnosis, treatment, and rehabilitation of hearing loss. No doubt audiologists in Brazil will forge ahead into their future, determined to fulfill their own professional mission.

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References

- Brasil. 1981. Presidencia da República. Lei nº 6.965, de 9 de dezembro de 1981. *Dispõe sobre a regulamentação da Profissão de Fonoaudiólogo, e determina outras providências*. Available at: http://www.fonoaudiologia.org.br/doc/lei_decreto/lei6965.htm.
- Central Intelligence Agency. 2007. *The World Factbook*. United States of America. Available at: <https://www.cia.gov/cia/publications/factbook/index.html>.
- Conselho Federal de Fonoaudiologia. 1996. Resolução CFFa. 157 de 13 de abril de 1996. *Concessão de Titulos de Especialista*. Brasília.
- Conselho Federal de Fonoaudiologia. 2007. Personal communication, from joelma.financeiro@fonoaudiologia.org.br.
- Instituto Brasileiro de Geografia e Estatística. 2000. Banco de Dados: *Estados*. Available at: <http://www.ibge.gov.br/home>.
- Lewis D.R. 1996. As habilidades auditivas do recém nascido e a triagem auditiva neonatal. In: Andrade C.R.F. (ed.) *Fonoaudiologia em berçário normal e de risco*. São Paulo: Lovise; p. 149-99.
- Ministério da Ciência e Tecnologia. 2006. *Ciência e Tecnologia*. Available at: <http://www.mct.gov.br>.
- Ministério da Saúde. 2004. *Secretaria de Assistência à Saúde (SAS): portarias*. Available at: <http://bvsm.sau.gov.br/html/pt/legislacao/portarias.html>.
- Ministério da Saúde. 2006. *DATASUS: Bases de Dados do Sistema Único de Saúde*. Available at: <http://www.datasus.gov.br>.
- Ministério do Desenvolvimento, Indústria e Comércio Exterior. 2004. Available at: <http://www.desenvolvimento.gov.br/sitio/sti/proAcao/proTecnologica/apresentacao.php>.
- Morata, T.C. & Carnicelli, M.V. 1988. *Audiologia e Saúde do Trabalhador*. EDUC: São Paulo.
- Nascimento C.A. 2006. Report on Brazil. Presentation at the *4th Joint WHO/CBM Workshop on hearing aids and services for developing countries*. World Health Organization, WHO, Geneva.
- Santos, U.P. & Morata, T.C. 1994. Efeitos do ruído na audição. In U.P. Santos (ed.), *Ruído: Riscos e Prevenção*. São Paulo: Hucitec, pp. 43-53.
- Silva A.P.B.V., Ribas A. & Massi G.A. 2000. *O Perfil do Fonoaudiólogo na Região Sul do Brasil*. Conselho Federal de Fonoaudiologia (CRFa): São Paulo. v.1.
- The World Bank Group. 2005. *World Development Indicators*. Available at: <http://devdata.worldbank.org/wdi2005/Section2.htm>.
- World Health Organization. 2003. *Reports on the Informal Consultation on Epidemiology of Deafness and Hearing Impairment in Developing Countries and Update of the WHO Protocol*. WHO, Geneva, March 2003.