

## Profile of research published in the annals of the Brazilian Pulmonology and Phthisiology Conferences held over the last twenty years\*

ALEXANDRE TODOROVIC FABRO<sup>1</sup>, HUGO HYUNG BOK YOO<sup>2</sup>, THAIS HELENA ABRAHÃO THOMAZ QUELUZ<sup>3</sup>

### ABSTRACT

**Objective:** To increase the knowledge base regarding pulmonology research in Brazil. **Methods:** A retrospective, observational study of the abstracts published in the Annals of the Brazilian Pulmonology and Phthisiology Conferences held from 1986 to 2004, quantifying the institutions of origin by geographic distribution and type, as well as categorizing the abstracts by study design and topic. **Results:** A total of 6467 abstracts were published. The institutions of origin were located, variously, in the Southeast (3870 abstracts), South (1309), Northeast (783), Central-West (267) and North (84). There were 94 abstracts originating from foreign institutions, especially from institutions in Portugal (56.3%) and the United States (13.8%). Most of the studies (5825) were conducted in public Brazilian institutions. There were 4234 clinical studies, 1994 case reports and 239 original research articles. A marked, progressive increase was observed in the number of clinical studies and case reports during the period evaluated. Overall, the most common themes were tuberculosis and other infections diseases (25.2%), following by oncology (11.6%), interstitial lung diseases (8.8%) and thoracic surgery (8.5%). Nevertheless, the number of abstracts on each topic varied widely from year to year. **Conclusion:** Public Brazilian institutions are the principal sources of pulmonology research in Brazil. Such research activity is concentrated in the southeastern part of the country. Case reports account for one-third of this activity. Although there was great variability in the subjects addressed, diseases that are highly prevalent in Brazil, such as tuberculosis and other infections diseases, were the most common topics.

**Keywords:** Biomedical research/statistics & numerical data; Respiratory tract diseases; Pulmonary disease (Speciality); Bibliometrics; Scientific and technical publications/statistics & numerical data; Brazil

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\* Study conducted at the "Julio de Mesquita Filho" Universidade Estadual Paulista (UNESP, Paulista State University) School of Medicine, Botucatu, São Paulo, Brazil.

1. Medical Student at the "Julio de Mesquita Filho" Universidade Estadual Paulista (UNESP, Paulista State University) School of Medicine, Botucatu, São Paulo, Brazil

2. Attending Physician at the "Julio de Mesquita Filho" Universidade Estadual Paulista (UNESP, Paulista State University) School of Medicine, Botucatu, São Paulo, Brazil

3. Full Professor at the "Julio de Mesquita Filho" Universidade Estadual Paulista (UNESP, Paulista State University) School of Medicine, Botucatu, São Paulo, Brazil

Correspondence to: Hugo H Bok Yoo. Faculdade de Medicina de Botucatu - UNESP, Departamento de Clínica Médica - CEP: 18618-000, Botucatu, SP, Brasil. E-mail: hugo@fmb.unesp.br

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## INTRODUCTION

The fact that research is important for the growth and development of countries is widely-recognized. In recent decades, scientific output in Brazil has increased significantly, quantitatively as well as qualitatively, as confirmed by the growing number of Brazilian articles published in journals indexed for the Institute for Science Information.<sup>(1)</sup>

In the period from 1997 to 2001, Brazilian medicine contributed 0.9% of the global output in the area.<sup>(1)</sup> However, little is known regarding the various aspects of pulmonology research in Brazil, such as which diseases and conditions are more widely studied, types of studies conducted, types of research groups, geographical distribution of research groups, sources of funding, etc. A study of some of these data was conducted in 1999,<sup>(2)</sup> consisting of a compilation of abstracts written by Brazilian authors and presented at the American Thoracic Society conference held in that year.

Even in the international literature, little is known about trends in research involving respiratory tract diseases. Some authors<sup>(3)</sup> have carried out a bibliometric assessment (evaluating production, circulation, absorbance, consumption and repercussion) of the research on respiratory tract diseases conducted in the European Union between 1987 and 1998. Others,<sup>(4)</sup> also using bibliometric criteria, have identified the twenty leading intensive care medicine researchers in the world. Still others<sup>(5)</sup> have compared the frequency of topics in the pulmonology scientific production from 1996 to 2001 in developed countries with the prevalence of diseases in those countries.

Similar information, in addition to improving the knowledge regarding the profile of research in pulmonology in Brazil, could help determine how appropriate this research is within the context of life in the country, thus assisting funding agencies and governmental organizations in planning their investments in the fields of pulmonology, adjusting any distortions, as well as encouraging the development of vocational sectors and of sectors that are characteristic of Brazil. It is also important that these data, which are based on scientific criteria and on the research conducted by members of the specialist community, be disseminated to those in that community, thereby allowing them to plan and implement incentives, instruction,

continuing education, etc.

With the objective of increasing the knowledge regarding pulmonology research in Brazil, we have conducted an observational study of the abstracts submitted to Brazilian Pulmonology and Phthysiology Conferences (1986 to 2004), as well as a quantitative analysis of the type/geographic distribution of the institutions of origin, study designs and themes addressed.

## METHODS

A retrospective study carried out by observing, tabulating and analyzing abstracts published in the Annals of the Brazilian Pulmonology and Phthysiology Conferences and in the journal then known as the *Jornal de Pneumologia* (Journal of Pulmonology) from 1986 to 2004.<sup>(6-15)</sup> The Conferences, as well as the publication of their respective annals, occur every two years. The present study therefore comprises ten consecutive conferences. Each published abstract was evaluated critically and manually by two independent observers in terms of the following variables: year of publication; geographic region (south, southeast, central-west, north or northeast) of the institute at which the work was carried out (each abstract was counted only once - in cases of multiple institutions, the institution of the first author was the one considered - when the data contained in the abstract did not enable the identification of the institution of origin, it was classified as undetermined); type of institute at which the work was carried out, classified as Brazilian or foreign, as well as (if Brazilian) public, private or undetermined; type of study (clinical, experimental or case report); theme, according to the summary of the annals of the latest conference,<sup>(15)</sup> totaling 21 types of diseases and conditions (allergies, asthma, pulmonary circulation, thoracic surgery, chronic obstructive pulmonary disease, interstitial lung diseases, neuromotor diseases, occupational diseases, pleural diseases, gastroesophageal reflux disease, continuing education, endoscopy, cystic fibrosis, pulmonary function, oncology, sleep apnea syndrome, rehabilitation, smoking, intensive care, pulmonary tuberculosis and other infections).

The results are available in tables and graphs for analysis and interpretation.

## RESULTS

During the study period (1986 to 2004), ten Brazilian Pulmonology and Phthysiology Conferences were held in alternate years and in the following cities/states: Recife/Pernambuco; Curitiba/Paraná; Salvador/Bahia; Brasília/Distrito Federal; Natal/Rio Grande do Norte; Belo Horizonte/ Minas Gerais; Rio de Janeiro/Rio de Janeiro; Gramado/Rio Grande do Sul; São Paulo/São Paulo; and (again) Salvador/Bahia. For those ten conferences, a total of 6467 abstracts were published. Of those, 6373 (98.5%) were related to studies performed at Brazilian institutions, of which 5825 (90%) were public, 495 (7.8%) were private, and 53 (0.8%) were of an undetermined nature. There were 94 abstracts (1.5% of the total) that summarized studies conducted at institutions located in foreign countries: Portugal (53); the USA (13); Spain (10); Mexico (4); Angola (3); Canada (3); Italy (3); Argentina (1); Ecuador (1); France (1); and Switzerland (1).

The geographic distribution of the institutions of origin for the abstracts published in the annals of each conference studied is shown in Table 1. It can be observed that, although the number of abstracts produced is, in general, increasing in all regions of Brazil, the order of frequency of the amount of abstracts has remained unchanged in several regions (listed here in decreasing order): southeast, south, northeast, central-west and north. At each conference, the number of abstracts presented by researchers in the region in which the conference was held has tended to increase, the exception being the southeast region. For 0.9%

of the published abstracts, it was not possible to determine the geographic region in the institution of origin was located.

We found that 4234 of the abstracts summarized clinical studies (65.5%), 1994 summarized case reports (30.8%), and 239 summarized experimental studies (3.7%). Table 1 shows the numbers of the different types of studies in each conference, as well as the stability of the order of frequency, although with a marked increase of the number of clinical studies and case reports and a small variation in the number of experimental studies.

Table 2 shows the distribution of abstracts by type of study and by each geographic region of Brazil, together with foreign abstracts and abstracts of undetermined origin. The ratio between clinical studies and case reports is similar (approximately 2:1) in the southeast, south and northeast regions. In the central-west region, this ratio was 3:1, compared with

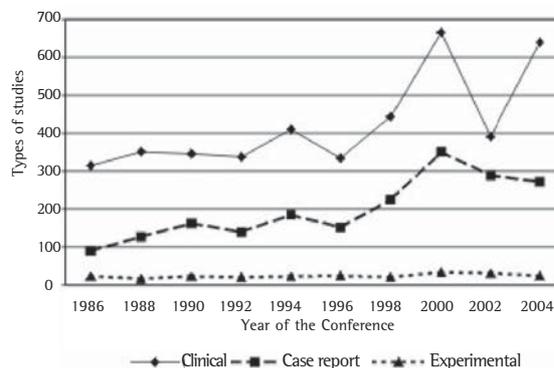


Figure 1 - Types of studies published as abstracts in the Annals of the Brazilian Pulmonology and Phthysiology Conferences (1986-2004)

TABLE 1

Geographic distribution of the institutions of origin of abstracts published in the Annals of the Brazilian Pulmonology and Phthysiology Conferences (1984-2004) and geographic regions where the conferences were held each year

Year	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004
Region	NE	S	NE	CW	NE	SE	SE	S	SE	NE
Southeast	302	331	381	331	419	326	445	468	431	436
South	61	107	96	68	72	99	125	354	130	197
Northeast	51	41	45	63	99	45	66	132	89	152
North	2	0	0	0	2	4	4	18	21	33
Central-West	8	13	8	26	21	28	13	61	21	68
Foreign	4	2	1	9	2	7	5	16	3	45
Undetermined	0	1	1	0	3	1	32	1	16	5
Total	428	495	532	497	618	510	690	1050	711	936

NE, northeast; S, south; SE, southeast, CW, central-west

TABLE 2

Geographic distribution of the types of studies published as abstracts in the Annals of the Brazilian Pulmonology and Phthysiology Conferences (1986-2004)

Type of study	Region						
	SE	S	NE	CW	N	Foreign	Undetermined
Clinical n (%)	2512 (64.9)	858 (65.5)	527 (67.3)	194 (72.6)	53 (63.1)	70 (74.5)	20 (33.3)
Case report n (%)	1171 (30.3)	419 (32.0)	252 (32.2)	64 (24.0)	31 (36.9)	17 (18.1)	40 (66.7)
Experimental n (%)	187 (4.8)	32 (2.5)	4 (0.5)	9 (3.4)	0	7 (7.4)	0
Total	3870	1309	783	267	84	94	60

CW, central-west; N, north; NE, northeast; S, south; SE, southeast

7:1 in the north. The majority of the foreign abstracts were clinical studies, whereas the majority of the abstracts of undetermined origin were case reports. Most abstracts related to experimental studies were written by researchers working at institutions in the southeast region.

Table 3 shows the number of published abstracts by topic and by conference. In the overall count, tuberculosis and other infectious diseases were the most common topics, followed by oncology, interstitial lung diseases and thoracic surgery. However, there were

significant variations in the number of abstracts on each topic presented at each conference, which can be observed in detail in the table.

Table 4 shows the numbers of abstracts on each topic by region. We found that, for each of the topics evaluated, there were more abstracts written by researchers working at institutions in the southeast region than by those working in any other region. In addition, regardless of the region or country of origin, tuberculosis and other infections were the most prevalent themes.

TABLE 3

Number of abstracts about several topics and the total number of abstracts published in the Annals of the Brazilian Pulmonology and Phthysiology conferences (1986-2004)

Topic	Ano										Total (N (%))
	1986	1988	1990	1992	1994	1996	1998	2000	2002	2004	
Tuberculosis	65	70	43	50	71	92	125	148	89	122	875 (13.5)
Other Infections	62	68	73	62	68	81	67	117	77	78	753 (11.7)
Oncology	63	76	76	85	97	26	87	120	70	52	752 (11.6)
Interstitial Diseases	40	45	52	32	44	42	56	99	79	79	568 (8.8)
Thoracic Surgery	36	37	35	40	49	27	74	99	48	103	548 (8.5)
Pulmonary Function	44	70	76	30	33	51	17	48	46	53	468 (7.2)
Asthma	31	18	30	34	52	35	51	62	50	92	455 (7.0)
Pulmonary Circulation	13	12	37	27	26	28	26	48	42	43	302 (4.7)
Pleural Diseases	7	18	19	31	43	13	42	43	31	21	268 (4.1)
Endoscopy	10	6	13	36	33	20	41	49	28	23	259 (4.0)
COPD	19	15	13	22	26	17	14	41	18	64	249 (3.9)
Intensive care	13	15	17	11	18	13	12	43	36	43	221 (3.4)
Occupational Diseases	11	24	18	13	18	28	27	33	24	12	208 (3.2)
Smoking	3	9	10	3	20	13	16	40	12	59	185 (2.9)
Sleep	0	1	6	6	7	5	9	16	13	30	93 (1.4)
Rehabilitation	1	0	0	0	3	2	3	14	15	24	62 (1.0)
Continuing Education	2	2	0	4	3	5	8	12	7	11	54 (0.8)
Cystic Fibrosis	0	1	3	0	2	7	9	10	11	11	54 (0.8)
Allergies	6	6	8	10	2	2	5	1	6	8	54 (0.8)
Gastroesophageal reflux	0	1	1	1	2	2	1	6	6	1	21 (0.4)
Neuromuscular Disorders	2	1	2	0	1	1	0	1	3	7	18 (0.3)
Total n	428	495	532	497	618	510	690	1050	711	936	6467
(%)	6.6	7.6	8.2	7.7	9.6	7.9	10.7	16.2	11.0	14.5	100.0

TABLE 4

Geographical distribution of the several topics of the Annals of the Brazilian Pulmonology and Phthisiology conferences (1986-2004)

	SU	S	NE	CW	N	Foreign	Undetermined	Total
Tuberculosis	530	127	148	37	16	11	6	875
Other Infections	368	224	86	39	8	17	11	753
Oncology	491	140	74	15	3	11	18	752
Interstitial Diseases	359	120	54	13	14	5	3	568
Thoracic Surgery	335	128	50	13	13	5	4	548
Pulmonary Function	321	94	23	18	9	2	1	468
Asthma	245	111	69	18	4	6	2	455
Pulmonary Circulation	177	71	31	13	3	4	3	302
Pleural Diseases	173	38	44	1	2	9	1	268
Endoscopy	162	35	47	5	5	2	3	259
COPD	167	40	19	15	0	7	1	249
Intensive Care	159	23	29	3	1	4	2	221
Occupational Diseases	153	12	27	12	1	2	1	208
Smoking	61	48	40	33	2	1	0	185
Sleep	35	24	8	20	1	4	1	93
Rehabilitation	34	17	5	4	0	0	2	62
Continuing Education	24	20	6	4	0	0	0	54
Cystic Fibrosis	31	13	9	1	0	0	0	54
Allergies	20	15	11	1	2	4	1	54
Gastroesophageal reflux	9	9	1	2	0	0	0	21
Neuromuscular Disorders	16	0	2	0	0	0	0	18
Total	3870	1309	783	267	84	94	60	6467

CO, Centro-Oeste; N, Norte; NE, Nordeste; S, Sul; SE, Sudeste.

## DISCUSSION

This study was carried out in order to attend the need to know more about the production of pulmonology research in Brazil and to initiate critical reflection on such production. Such reflection could form the basis for the planning and implementation of measures to promote research, funding, the formation of human resources, and aid to emerging groups, which would be taken by the professional society for those in the specialty, by the academic community or by the State.

The results show that, in the space of twenty years, 6467 abstracts were published in the Annals of the Brazilian Pulmonology and Phthisiology Conferences and that, over that period, the number of abstracts published for each conference has, in general, been increasing, growing from 428 in 1986 to 936 in 2004. In the Annals of the American Thoracic Society Conferences, which has approximately 15,000 participants, approximately 5000 abstracts are published each year.<sup>(4)</sup> Of those, only a few are related to studies conducted in Brazil. For instance, of the

5354 abstracts published in the Annals of the 1999 American Thoracic Society Conference, 91 were written by researchers working at Brazilian institutions.<sup>(2)</sup>

In general, with the exception of those from institutions located in the southeast region, the number of abstracts from the region in which the conference is held tends to increase (Table 2), perhaps due to the encouragement of local leadership and to the reduction of travel and accommodation expenses for participants living in the region. More recently, the number of studies of Portuguese origin has grown, perhaps due to the fact that, since the year 2000, Brazilian conferences on the specialty have all been Luso-Brazilian. However, conferences have an eminently national character, and the virtual absence of Latin-American participation is noteworthy.

For all of the conferences, there was a marked predominance of abstracts from institutions located in southeastern Brazil, corresponding to 59.9% of all the abstracts published. Most of the private and public pulmonology facilities that offer undergraduate, specialization and graduate courses in Brazil are located

in this region. This is also the region of the country in which the greatest number of researchers operate.<sup>(1,16)</sup> This phenomenon of research being concentrated in certain geographic regions or institutions is not exclusive to Brazil, also occurring in other countries, especially in those of continental dimensions such as ours, since the successful execution of research is directly related to adequate human resources, both in terms of quantity and quality, as well as to funding.<sup>(16-17)</sup>

It should be stressed that 90% of the abstracts published were related to studies carried out in public institutions in Brazil. Brazil invests little in research, and, except for the state of São Paulo, where the Fundação de Amparo à Pesquisa do Estado de São Paulo (Foundation for the Support of Research in the State of São Paulo) provides a reasonable amount of research funding, financial support for public institutions is quite irregular, whether for actual research or for human resources.<sup>(16-19)</sup> These data reinforce the idea that there is a direct relationship between research and financial support, although, above all, they highlight the commitment of professionals to performing research, despite adverse conditions, at public institutions in Brazil.

There was a wide variation of topics studied for the period evaluated. However, overall, 25.2% of the abstracts dealt with pulmonary infections, including tuberculosis, which present high prevalences in Brazil. Although these topics have maintained a prominent position in the number of abstracts published for all conferences, others, such as pulmonary circulation and smoking, rose significantly in the rankings during the period studied, and yet others, such as pulmonary function, fell. This finding seems to reflect the global trend toward waxing and waning interest in some areas of the specialty in different periods.

Due to the diversity of forms in which the abstracts were published, the lack of graphic standards and, especially, the unstructured formatting of the abstracts, a qualitative analysis of the studied material was not possible. It is known that a structured abstract improves the quantity and quality of the information furnished<sup>(20)</sup> and has therefore been recommended by most journals, including the Brazilian Journal of Pulmonology.<sup>(21)</sup> It is of note that it was not possible to identify the institution of origin or geographic region, data that is fundamental for author identification in any

scientific research, for 0.9% of the studied abstracts.

Another noteworthy finding is that 30% of the published abstracts were case reports, which, although constituting an important and legitimate form of scientific communication, do not characterize a methodologically structured type of research, which results from testing a hypothesis. Although the number of case reports, which rose sharply throughout the period studied, began to drop gradually in 2002, such studies still accounted for nearly one-third (29%) of the abstracts published for the 2004 conference. Interestingly, the ratio between clinical studies and case reports was similar in the southeast, south and northeast, although the total number of abstracts significantly different among those regions. As previously discussed, the southeast region, in comparison with the rest of the country, is privileged in terms of human and financial resources for research. Therefore, there is no justification for the fact that case reports were the prominent form of research produced in that region. One hypothesis to explain this phenomenon is that the presentation of case reports in conferences is a cultural phenomenon in Brazilian pulmonology. The fact that, of the foreign studies presented, only 17 were case reports (18.1%), lends support to this hypothesis. However, foreign participation has only recently become consistent and merits further study.

The data collected in the present study do not allow a full assessment of pulmonology research in Brazil, since not all of the Brazilian abstracts on the subject were studied, some having been presented at other national or international conferences on pulmonology or other specialties. Above all, the pulmonology studies published in Brazilian or other journals were not studied quantitatively or qualitatively. This last proposal would have allowed us to identify and assess the published Brazilian pulmonology research (the studies published, the impact of the journals in which they were published and the number of citations received), as has been done for other specialties or countries.<sup>(3-5,20-25)</sup> Abstracts in annals and publications in journals that are not indexed or have small circulations are part of the so-called "invisible science",<sup>(16)</sup> which is science that is not widely disseminated and that perhaps represents a significant portion of the pulmonology research in Brazil.

In summary, the evaluation of the profile of research published in the Annals of the Brazilian Pulmonology and Phthysiology Conferences over the last twenty years revealed that public Brazilian institutions are responsible for the majority of this activity. In addition, pulmonology research was found to be concentrated in the southeast region. Furthermore, case reports accounted for one-third of all such research. Moreover, although a wide variety of topics were addressed, we found that diseases that are highly prevalent in Brazil, such as tuberculosis and other infectious diseases, were the most common themes. For a complete assessment of pulmonology research in Brazil, further bibliometric studies are needed.

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