

Influence of local and regional publications in the production of public health research papers in Latin America

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Abstract The study seeks to identify the influence of local and regional publications in the production of public health research papers in the Latin American region. A citation analysis of the papers published in the following three leading journals in the field of public health was conducted: *Revista Médica de Chile* (Chile) (RMCh); *Archivos Latinoamericanos de Nutrición* (Venezuela) (ALAN); and *Salud Pública de México* (México) (SPM). Papers were analyzed for the period 2003–2007. SciELO (Scientific Electronic Library Online) and the printed version of the journals were used in the analysis. Overall, 1,273 papers from 122 journal issues were analyzed. References accounted for a total of 38,459. Over 90% of the production was published through the collaboration of two or more authors. Author affiliation corresponded in most cases to the country of origin of the journal. References to Portuguese papers accounted for nearly 5% in ALAN and less than 1% each in SPM and RMCh. Citations among the three journals were not significant. Only ALAN cited RMCh and SPM over 3% each, of total citations. SPM and RMCh cited each other less than 1% of total citations. With the exception of ALAN, most public health papers published in RMCh and SPM derived from the national collaboration of researchers in the field. A small amount of public health knowledge communication was being transferred from Brazil to the region through RMCh and SPM. A vertical and individual (per journal/country) model of knowledge communication in public health was identified.

Keywords Public health research · Knowledge management · Bibliometric analysis · Health journals · Citation analysis · Latin America

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Introduction

The Latin American and Caribbean (LAC) countries vary greatly in terms of their level of development and epidemiological profiles, yet they face a series of common public health challenges in the twenty first century. The persistence of diseases such as dengue, tuberculosis, and malaria and the emergence of new diseases such as HIV/AIDS as well as the changing epidemiological profile of the population pose challenging developments to public health systems among these countries (PAHO 2007a). Other factors such as migration, education, nutrition, traffic accidents, homicides and poverty aggravate this situation. Public health in the region of the Americas is indeed at the crossroads (PAHO 2007b). Throughout the 1990s, LAC countries implemented a series of Health Sector Reforms in which the goal was to increase equity, effectiveness, quality, efficiency, sustainability and social participation. Over 500 LAC documents were recorded in the field during this period (Macías-Chapula 2002). While these reforms have had some positive outcomes in reducing inequities in access and improving resource allocation (Almeida 2002; Almeida Filho et al. 2003), overall, health sector reforms have not been successful in achieving the proposed goals. One of the reasons for this failure may be attributed to the fact that public health was largely absent from the reform agenda (PAHO 2007b).

In order to take steps to improve health outcomes, LAC countries must identify and address the gaps in their public health capacity. One major obstacle for better assessing public health capacity in the region is the lack of information about the elements that comprise it (PAHO 2007b). The information gap is only now starting to be filled with recent attempts to quantify and qualify public health workforce and to identify and monitor public health expenditures (PAHO 2007b; Magaña-Valladares et al. 2009). A stronger commitment to strengthening public health research is needed. Essential Public Health Function 10, which refers to research in public health, was one of the worst performers in the LAC region, as reported by a PAHO (Pan American Health Organization) study (PAHO 2007b). This was in spite of the fact that LAC countries have had a strong tradition of Schools of Public Health and academic centers working on the subject (Magaña-Valladares et al. 2009).

Scientific production in the field of public health in the LAC region has long been reported as less than 5% of total health/biomedical research in the region (Pellegrini et al. 1997; IDRC 2009), as compared with clinical (over 50%) and biomedical research (over 40%). Apart from being small, the overall output of public health research is limited to a few LAC countries. A recent bibliometric analysis in Latin America and the Caribbean as conducted in LILACS (Latin American and Caribbean Health Literature Database), indicated that the following eighth countries accounted for 85% of the regional production on public health research during the period 1980–2002: Brazil, Chile, Mexico, Argentina, Venezuela, Colombia, Peru and Cuba (Macías-Chapula 2005). Brazil alone contributed with 42.63% of the total production. Most of the regional production corresponded to papers in scientific journals (67.73%). The five leading journals in the field in descending order were the following: *Revista de Saúde Pública* (Brazil), *Cadernos de Saúde Pública* (Brazil), *Revista Médica de Chile* (Chile), *Archivos Latinoamericanos de Nutrición* (Venezuela), and *Salud Pública de México* (México). The main languages of publication of the regional production corresponded to Spanish (49.26%) and Portuguese (46.19%). English language publications accounted for only 4.03% of total production in LILACS.

Given these findings, the following questions emerged: How much influence in the field of public health research is there between Brazil and the rest of the Latin American and Caribbean countries? Is there a pattern of collaboration or communication among

researchers in this field? Which is the role of the language in the process of scientific communication/collaboration? How much of the local public health research results is being used and taken into action regionally or globally?

Most of the top five leading journals in the field of public health have undergone different bibliometric analysis (Carvalho et al. 2007; Barradas Barata 2007; Krauskopf and Krauskopf 2008; Díaz Mujica 2007). Such studies however have been limited to either journal overall assessment or isolated analysis regarding their structure, subject content, productivity and visibility. Outside the LAC region, the Spanish Journal of Public Health (*Revista Española de Salud Pública*) has also been analyzed with this purpose (Pérez Andrés et al. 2002; Estrada Lorenzo et al. 2003; Villar Álvarez et al. 2007).

A bigger effort however is needed so as to articulate public health research output with the different communicating links that emerge among varying actors and elements. Thus a model of knowledge/science communication that integrates public health problems, public health research, research output, bibliometric analysis, dissemination of results and translation/empowerment needs to be constructed in the region.

Purpose

The purpose of this work is to present the advancing results of a research in progress on the development of a knowledge/science communication model in the field of public health in the LAC region. In a previous paper (Macías-Chapula 2005) a preliminary model of scientific communication in the field was described as characterized mainly by (a) the concentration of the regional production in eighth countries, with Brazil leading the list; (b) most of the documents produced corresponded to journal articles; (c) scientific journals corresponded to 29 different specialties, particularly from general medicine and pediatrics; (d) most of the papers were published through the collaboration of two or more authors; and (e) the language of publication was predominated by Spanish and Portuguese in similar proportions.

In this study the purpose was to identify the influence of local and regional publications in the production of public health research papers in the Latin American and Caribbean region, as derived from the use of Spanish language and Portuguese-Brazilian publications in Spanish speaking countries of the region.

Methodology

Due to their high production in the field of public health (Macías-Chapula 2005), a citation analysis of the papers published in the following three leading journals from Spanish speaking LAC countries was conducted: *Revista Médica de Chile* (Chile) (RMCh); *Archivos Latinoamericanos de Nutrición* (Venezuela) (ALAN); and *Salud Pública de México* (México) (SPM). The rationale behind the citation analysis was to identify the local and regional communication links that exist via citing and cited sources among the above mentioned journals. Papers published in each journal issue were analysed for the period 2003–2007. Both the SciELO (Scientific Electronic Library Online) platform and the printed version of the journals were used in the analysis. Overall, mainly original research papers were selected from each issue. Editorials, letters, news, etc., were excluded from the study.

Revista Médica de Chile is a general and internal medicine journal. With the exception of the clinical papers section, all the research papers in this journal were included in the

analysis. This approach reduced the amount of papers selected, however did not guarantee that only public health papers were retrieved. This was a limitation of the study since at this stage of the analysis it was not possible to corroborate the subject content of the papers published. In the case of *Salud Pública de México*, a public health journal, the analysis considered all the articles including those published in the supplements to all the volumes in the period of study. *Archivos Latinoamericanos de Nutrición* (Venezuela) is a regional specialized journal in the field of nutrition. All the papers published in this journal were included in the analysis.

For each paper the following data was manually collected and tabulated: language of publication of the paper; No. of authors; country affiliation of authors; No. of references to each paper; language of references; and type of documents cited only in case of Spanish language citations. English language citations from English language papers published in Latin American and Caribbean journals were also identified. Here, PAHO publications, namely *Revista Panamericana de Salud Pública* (Panamerican Journal of Public Health) and *Boletín de la Oficina Sanitaria Panamericana* (Bulletin of the Panamerican Health Organization) while published in the USA, were also included in the analysis. Spanish publications on the other hand, were excluded since the interest of the study was limited to the LAC regional communication flows. A data file of all the papers analyzed for each journal was constructed and summarized.

Results

Overall, 1,273 papers from 122 journal issues were analyzed. References to all papers accounted for a total of 38,459. Table 1 provides a detailed distribution of data collected from each journal.

Authorship

Over 90% of the production was published through the collaboration of two or more authors. This pattern was more visible in ALAN and RMCh, less in SPM. Table 2, provides a distribution of papers published by number of authors in four categories, accordingly.

Country affiliation

Author affiliation corresponded in most cases to the country of origin of the journal; however, some differences were found. ALAN for example had an average affiliation of

Table 1 Journal issues, papers analyzed and references to papers published in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN), during the period 2003–2007

Elements analyzed	RMCh	SPM	ALAN	Total
Number of journal issues	60	42	20	122
Number of papers	616	399	258	1273
Number of references to all papers	17137	12284	9038	38459
Number of references per paper	27.81	30.78	35.03	31.20

Table 2 Authorship in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN), during the period 2003–2007

Journals	Number of authors			
	1	2–5	6–10	+10
RMCh	19 (3.08%)	315 (51.14%)	242 (39.29%)	40 (6.49%)
SPM	32 (8.02%)	258 (64.66%)	105 (26.32%)	4 (1%)
ALAN	7 (2.71%)	201 (77.91%)	50 (19.38%)	

24% for Venezuela (its country of origin) and an even distribution for Mexico and Chile (11.24% each). In this journal Brazil had a significant affiliation of 19.38%. Other relevant affiliations in ALAN corresponded to Costa Rica (7.36%), Spain (6.20%) and Argentina (6.20%). On the other hand, the affiliation of Mexico in RMCh was only of 1.14% and that of Chile in SPM of only .5%. In both journals the collaboration with USA corresponded to 2.60% for Chile—USA in RMCh; and 10.28% for Mexico—USA in SPM. USA alone affiliated with 4.51% of the papers in SPM. Table 3, provides the average country affiliation of papers published in each journal.

Language

Regarding the language of publication of papers, RMCh published all papers (100%) in Spanish language; SPM published 77.19% in Spanish and 22.81 in English. ALAN on the other hand, published 73.26% in Spanish, 12.40% in English, and 14.34% in Portuguese. References to Portuguese papers accounted for nearly 5% in ALAN and less than 1% each in SPM and RMCh. On the other hand, Spanish language references accounted for over 26% in SPM, 18% in ALAN, and 17% in RMCh. References to English language papers accounted for more than 72% in all journals analyzed. Table 4 provides a comparison of language of publication and language of references found for each journal.

Table 3 Average country affiliation of papers published in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN) during the period 2003–2007

Country affiliation	RMCh (Chile)	SPM (Mexico)	ALAN (Venezuela)
Chile	89.29	.5	11.24
México	1.14	67.17	11.24
Venezuela	.97	.25	24.03
Chile—USA	2.60		
Colombia	1.30	1	1.94
Brazil	.32	1	19.38
México—USA		10.28	
USA		4.51	
Spain	.81	1.75	6.20
México—UK		1.25	
Costa Rica			7.36
Argentina			6.20
Total (%)	96.43	87.71	87.59

Table 4 Language of publication and language of references to papers published in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN) during the period 2003–2007

Language	RMCh (%)	SPM (%)	ALAN (%)
English papers		22.81	12.40
English references	82.32	72.23	75.93
Spanish papers	100	77.19	73.26
Spanish references	17.24	26.73	18.86
Portuguese papers			14.34
Portuguese references	.14	.48	4.85
French references	.15	.46	.19
Other language references	.15	.10	.17

Table 5 Frequency distribution of Latin American and Caribbean journals that published English language papers which were cited in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN) during the period 2003–2007

Number of references	Country of publication	Cited journal	RMCh	SPM	ALAN
106	México	Salud Pública Méx		106	
34	Venezuela	Arch Latinoam Nutr		1	33
26	Brazil	Mem Inst Oswaldo Cruz	16	10	
24	USA	Rev Panam Salud Pública	5	13	6
17	Brazil	Cad Saúde Pública	2	8	7
15	Mexico	Rev Invest Clínica	2	13	
10	Brazil	Rev Inst Med Trop Sao Paulo	8	2	
10	Chile	Rev Méd Chile	5	2	3
9	USA	Bol Oficina Sanit Panam	4	3	2
9	Brazil	Braz J Med Biol Res	3	2	4
9	Brazil	Rev Soc Bras Med Trop	4	1	4
8	Brazil	Rev Saúde Pública	4	3	1
6	Mexico	Rev Gastroenterol Mex		6	
5	Brazil	Braz J Infect Dis	3	2	
5	Mexico	Gac Méd Méx		5	
5	México	Rev Latinoam Microbiol	2	3	
47		Other 37 journals with four or less references each	14	15	18
345		Total ^a	72 (.51%)	195 (2.20%)	78 (1.14%)

Spanish journals were excluded from the analysis

^a Percentage as related to total English language references found

Regarding English language references to papers that were published by Latin American and Caribbean journals, it was found that SPM was head in the list with 106 references, followed by ALAN (34), *Memorias do Instituto Oswaldo Cruz* (Brazil) with 26, and *Revista Panamericana de Salud Pública* (USA) with 24. Table 5 provides a frequency

distribution of references to these journals. This type of references represented less than 5% of total English language references found. Most of the references derived from journals published in Brazil, Mexico and by PAHO.

Document types

The type of Spanish language documents cited by each journal indicated that journal article references were particularly significant in RMCh (nearly 70%). Books and book chapters were significant in SPM (over 38%). In ALAN, apart from the relevance of references to books and book chapters (28% both) a relevant amount of references to gray literature documents such as technical reports, surveys, thesis and official norms was also found. Table 6 describes the type of Spanish language references found for each journal.

Citations

Citations among the three journals were not significant. Only ALAN cited RMCh and SPM over 3% each of total citations. SPM and RMCh cited each other less than 1% of total citations. Similarly, ALAN was cited less than 1% by RMCh and SPM. Journal self-citation corresponded to over 46% in RMCh, 37% in SPM, and nearly 27% in ALAN. Over 20% of references in RMCh and SPM corresponded to national scientific journals published in Chile and Mexico respectively. While not significant (less than 5%), PAHO publications were cited and visible with ten or more citations in all three journals. Tables 7, 8 and 9, provide a rank distribution of journals cited in RMCh, SPM and ALAN.

Table 6 Distribution by type of documents found as Spanish language citations to papers published in *Revista Médica de Chile* (RMCh), *Salud Pública de México* (SPM), and *Archivos Latinoamericanos de Nutrición* (ALAN) during the period 2003–2007

Type of documents	RMCh	SPM	ALAN
Journal article	2065 (69.88%)	1311 (39.93%)	697 (40.88%)
Book	357 (12.08%)	937 (28.54%)	381 (22.35%)
Technical report	121 (4.09%)	142 (4.33%)	163 (9.56%)
Book chapter	93 (3.15%)	334 (10.17%)	102 (5.98%)
Website	41 (1.39%)	32 (.98%)	62 (3.64%)
Survey	38 (1.29%)	121 (3.69%)	61 (3.58%)
Statistics	23 (.78%)	67 (2.04%)	
Clinical guide	22 (.74%)		
Thesis	20 (.68%)	46 (1.40%)	57 (3.34%)
Plan/programme		52 (1.58%)	
Official norm			52 (3.05%)
Congress/seminar			22 (1.29%)
Other, more than 15 categories each	175 (5.92%)	241 (7.34%)	108 (6.33%)
Total	2955 (100%)	3283 (100%)	1705 (100%)

The list is limited to the top ten categories of references for each journal, accordingly

Table 7 Frequency distribution of Spanish language references to scientific journals in *Revista Médica de Chile* during the period 2003–2007

Journals cited	Country of publication	Number of references	%
Rev Méd Chile	Chile	965	46.73
Rev Chil Pediatr	Chile	88	4.26
Rev Chil Cir	Chile	76	3.68
Rev Chil Nutr	Chile	56	2.71
Rev Chilena Infectol	Chile	54	2.62
Rev Chil Enfer Resp	Chile	47	2.28
Rev Chil Obstet Ginecol	Chile	43	2.08
Rev Chil Cardiol	Chile	41	1.99
Bol Chil Parasitol	Chile	35	1.70
Rev Chil Neuropsiquiatr	Chile	30	1.45
Rev Esp Cardiol	Spain	22	1.07
Bol Oficina Sanit Panam	USA	20	.97
Gastr Latinoamer	Chile	19	.92
Med Clín (Barc)	Spain	19	.92
Bol Epidemiol	México	18	.87
Salud Pública Méx	México	16	.77
Kasmera	Venezuela	14	.68
Rev Psiquiatr	Chile	13	.63
Cuad Med Soc	Chile	12	.58
Enf Infecc Microb Clin	Spain	12	.58
Parasitol al Día	Chile	12	.58
Rev Invest Clin	México	12	.58
Rev Panam Salud Pública	USA	12	.58
Rev Chil Salud Pública	Chile	10	.48
Other 206 journals with less than 10 references each		419	20.29
Total		2065	100

Discussion

Collaboration was a significant finding regarding authorship of papers published (over 90%) in all journals. It was found that this collaboration was national, mainly in RMCh (89.29%), followed in descending order by SPM (67.17%), and ALAN (24.03%). A similar pattern of collaboration was reported regarding the Spanish Journal of Public Health (*Revista Española de Salud Pública*) (Pérez Andrés et al. 2002; Estrada Lorenzo et al. 2003). These results coincide with previous reports which indicate that overall health research collaboration in Latin America and the Caribbean was mainly national (Sancho et al. 2006) and intra-institutional in Mexico (Macías-Chapula et al. 2007).

The small international collaboration of RMCh and SPM was mainly conducted with USA. In the case of SPM, USA alone contributed with 4.51% of the total papers. Colombia and Brazil contributed with only 1% each and countries like Chile and Venezuela did not reach 1%. Thus, apart from publishing Mexican papers, SPM tends to publish more papers

Table 8 Frequency distribution of Spanish language references to scientific journals in *Salud Pública de México* during the period 2003–2007

Journals cited	Country of publication	Number of references	%
Salud Pública Méx	México	495	37.76
Salud Mental	México	72	5.49
Rev Invest Clín	México	49	3.74
Gac Méd Méx	México	46	3.51
Bol Oficina Sanit Panam	USA	34	2.59
Ginecol Obstet Méx	México	27	2.06
Bol Méd Hosp Infant Méx	México	25	1.91
Rev Panam Salud Pública	USA	25	1.91
Enferm Infecc Microbiol Clín	Spain	11	.84
Gac Sanit	Spain	11	.84
Arch Invest Médica	México	10	.76
Perinatol Reprod Hum	México	10	.76
Rev Saude Pública	Brazil	10	.76
Other 244 journals with less than 10 references each		486	37.07
Total		1311	100

Table 9 Frequency distribution of Spanish language references to scientific journals in *Archivos Latino-americanos de Nutrición* (Venezuela) during the period 2003–2007

Journals cited	Country of publication	Number of references	%
Arch Latinoam Nutr	Venezuela	188	26.97
Rev Chil Nutr	Chile	40	5.74
An Venez Nutr	Venezuela	32	4.59
Rev Méd Chile	Chile	24	3.44
Salud Pública Méx	México	23	3.30
Nutr Hosp	Spain	16	2.30
Bol Oficina Sanit Panam	USA	15	2.15
Rev Chil Pediatr	Chile	14	2.01
Alimentos	Colombia	12	1.72
Medicina (B. Aires)	Argentina	11	1.58
Alimentaria	Colombia	10	1.44
Other 256 journals with less than 10 references each		312	44.76
Total		697	100

from outside the Latin American and Caribbean region, particularly from USA and Europe. This finding coincides with the leadership of SPM in publishing articles in English language. While all English language citations from Latin American and Caribbean journals in SPM are self-citations, this journal also leads English language citations as provided by regional journals.

ALAN on the contrary, was the only journal that had more papers published from the Latin American and Caribbean region since—apart from Venezuela, countries like Brazil, Chile, Mexico, Costa Rica, and Argentina had a relevant representation of papers, notably Brazil with over 19% of total papers. A similar pattern was found in a more retrospective bibliometric analysis (1990–2003) as conducted in this journal by Díaz Mujica (2007). These findings corroborate the regional scope and coverage of this specialized journal. Outside the region, the only country that was visible in ALAN was Spain with 6.20% of the papers published.

Spanish was the main language of publication of all journals; however an important effort was made by SPM to publish 22.18% of the articles in English Language. ALAN was the only journal that published original papers in Portuguese (14.34%), even more than those published in English (12.40%). References in these papers corresponded mostly to English language papers in all journals, followed by Spanish. References in Portuguese language were particularly visible in ALAN (4.85%). This result coincides with the fact that this was the only journal that published original papers in Portuguese; however, the correlation of papers published, country affiliation and language of references remains to be explored.

The scatter amount of Portuguese papers cited in RMCh and SPM (less than 1%) reflects the small use of the significant regional production published in this language (nearly half the total). On the other hand, the visibility of Brazilian journals that publish papers in English language and provide citations to RMCh and SPM indicate that the amount of English language citations from Brazilian journals is similar to that of Portuguese language citations (less than 1%), at least in RMCh and SPM. Thus the visibility of the Brazilian references either in English or Portuguese language in RMCh and SPM leads to approximately 1%. This was an interesting finding since one would expect a major communication flow via citation of papers from Brazilian journals given the similarity of regional public health problems (PAHO 2007a, b; Macías-Chapula 2002; Almeida 2002; Almeida Filho et al. 2003; IDRC 2009) and major developments in the access to local publications via SciELO and the Virtual Health Library (Alleyne 2001; Valdés 2002).

A recent cross-sectional study conducted by Ospina et al. (2005) on the use of bibliographic databases by LAC health researchers indicated that BIREME information sources were used only by 6% of the researchers in the sample. BIREME-LILACS database was searched way behind the use of MEDLINE (34.1%), general search engines (15.9%) and online journals (9.8%). Clearly, a major promotion and development of skills by public health researchers on the use of these information sources is needed. Similarly, further research needs to be conducted on the amount and characteristics of Spanish language references in Brazilian journals in the field of public health in order to obtain a better picture of this regional communication flow.

The type of Spanish language documents found in the references of the papers published in the journals analyzed in this study indicated the relevance of journal articles, particularly in RMCh (69.88%), a pattern found in most medical journals worldwide. In SPM and ALAN on the other hand while journal articles were relevant, the amount of citations to books, technical reports and book chapters was also important. These findings coincide with those of Carvalho et al. (2007), Barros (2006) and Porta et al. (2006) when they reviewed the Portuguese literature in the field of public health. In ALAN gray literature and technical information also had an important role. This was the case for example, of official norms, thesis and websites. Further research needs to be conducted on the citation analysis of these types of documents since they represent over 50% of documents cited in SPM and ALAN. A high rate of citations to books, book chapters and grey literature has

also been reported by other authors when analyzing public health journals (Carvalho et al. 2007; Villar Álvarez et al. 2007). Porta et al. (2006) for example have found the academic importance of citations to books in the sub-field of epidemiology.

The small amount of journal citations found (less than 1%) among RMCh, SPM and ALAN was another unexpected finding since the selection of these journals derived from their high production in the field of public health. Furthermore, the visibility of these journals at the national, regional and international levels is validated since they are indexed—among other secondary sources in LILACS, SciELO, MEDLINE and the Web of Science. The 2007 *h*-Index for RMCh (16), ALAN (13) and SPM (18) was above the average of other Latin American and Caribbean journals within the category of Health Sciences/Medicine in SCImago/SCOPUS. The trend line (total citations received in a year divided by total articles published in a year) of these journals in SCOPUS increased throughout the years, on average from 2 to 9, from 1996 to 2009.

ALAN was the only journal that cited the other two over 3% each, but was cited less than 1% by RMCh and SPM. On the other hand, journal self-citation was followed by the citation of journals published in the country of origin of the citing journal. That is, RMCh with a self-citing rate of 46.73% was followed by 22.77% of citations to nine Chilean journals. A similar pattern was identified in SPM. These results suggest a vertical model of communication of results in the field of public health for each journal (RMCh and SPM) and each country (Chile and Mexico). Due to its Latin-American coverage ALAN did not follow this pattern since had a low self-citing rate (26.87%) as compared to RMCh and SPM and allowed for more citations from journals published in regional countries. PAHO publications were clearly visible as an important source of knowledge access and use in the field of public health in the region. Apart from the citations to national journals, PAHO publications were the next cited source. This was particularly visible in SPM where both PAHO publications accounted for 4.5% of total citations. These findings corroborate the Pan-American influence (Cruz 1995) and coverage of PAHO publications in the field of public health in the region.

Why is information mainly used on a national level? Are topics discussed mainly of national interest? Is language of publication a problem (reading and citing Portuguese and English language papers)? Clearly, further research needs to be conducted so as to answer these questions. Previous papers have reported the measurement of own-language preference (Bookstein and Yitzhaki 1999) and own-group preference (Egghe and Rousseau (2004)). The methods used and measures obtained by these authors need to be analysed so as to explore its relevance in approaching the above mentioned questions. On the other hand, the search for example of the subject content of the production in RMCh, SPM and ALAN can help identify the emergence of research subjects and groups of interest regarding public health topics. Research results can be compared with national and regional public health programs and priorities. The bibliometric analysis of books, book chapters and gray literature that is cited particularly in SPM and ALAN can help complement important communication flows. Other social and cultural issues regarding science policy at the national and regional levels need to be also taken into consideration in order to fully understand the knowledge/science communication model in this field (Krauskopf and Krauskopf 2008; Kellner and Ponciano 2008; Ortiz 2004). Finally the citation analysis of the highly productive Brazilian journals in the field of public health, namely *Revista de Saude Pública* and *Cadernos de Saude Pública*, needs to be conducted so as to complement previous studies (Barradas Barata 2007; Carvalho et al. 2007) and to identify the amount of citations to LAC publications, particularly those published in Spanish language. Results will be helpful to compare in context the knowledge communication flows in the field.

In spite of the small amount of public health production in the region (less than 5%), as compared with clinical and basic research, little is known about the knowledge management processes undertaken that target pertinent public health problems in the LAC region. A switch from excellence to relevant research in public health has been discussed in the last decades (Frenk 1987; De los Ríos 1999). Similarly the role of information and knowledge as a social determinant of health has been put forward (Alleyne 2001; Valdés 2002; Lolas 2002; Pellegrini Filho 2002; The Rockefeller Foundation 2008). South to south collaboration, lessons learned and transferred, capacity building and social empowerment are but few of the implications involved in the public health knowledge management process (Frenk 2007). A major effort is needed so as to transfer this knowledge throughout the region and to translate this knowledge into public health and social actions. The existing vertical model of communication needs to start moving horizontally so as to integrate the knowledge that is published in other LAC journals into the local/regional public health journals. This demands a tremendous effort by the different actors that participate in the information/knowledge lifecycle, from researchers to editors, database producers, and end-users among other.

Strengthening of public health research in the LAC region has been urgently needed in the last decade (IDRC 2009). Multiple efforts have resulted in different strategies (De los Ríos 1999; Dias et al. 2002) and approaches (Pelaez 2003). Recent regional proposals, such as that of the Instituto Carso de la Salud (Alleyne et al. 2008), the Mesoamerican project in public health (Sistema Mesoamericano de Salud Pública 2009) and the different emerging networks of research for health (COHRED 2006; Jsselmuiden 2007; Alger 2009) are important opportunities where to orchestrate knowledge management issues and to develop communication models through bibliometric/quantitative and qualitative methods. Here, a LAC collaborative model of information and knowledge production, organization, access, use, and translation can be enhanced and developed.

Conclusions

With the exception of ALAN, most public health papers published in RMCh and SPM derive from the national collaboration of researchers in the field. It remains to be explored whether this collaboration is intra or inter-institutional.

A minimum amount (approximately 1%) of Brazilian papers (either in English or Portuguese language) was published in and cited by RMCh and SPM. These findings reflect the small amount of public health knowledge communication being transferred from Brazil to the region through RMCh and SPM.

Public health knowledge transfer as derived from journal citations among RMCh, SPM and ALAN was minimal (3% or less each). Results indicate that information and knowledge is being used mostly at the local, national level. This is corroborated by the high self-citing pattern of the journals, followed by the high citation of national journals, particularly in the case of RMCh and SPM.

Preliminary results indicate that a vertical and individual (per journal/country) model of knowledge communication in public health can be identified as characterized mainly by the collaboration of two or more researchers at the national level in the publication of papers in journals of their own country, providing citations mainly in English and Spanish language. The Spanish citations correspond mainly to journal articles published in journals of their own country and to books and book chapters. Apart from the collaboration found in the

subfield of nutrition (as identified in ALAN) regional collaboration in the field of public health is practically non-existent in RMCh and SPM.

References

- Alger, J. (2009). National Health Research Systems in Latin America: Outcomes of the First Latin American Conference on Research and Innovation for Health and a review of 14 countries. Viewpoint. In *UNESCO Forum for Higher Education, Research and Knowledge. Workshop on research in diverse social contexts: Tensions, dynamics and challenges. Theme 3: Organizing research in challenging geographical contexts*. Paris: UNESCO.
- Alleyne, G. (2001). Information—a bridge over the divide. *Revista Panamericana de Salud Pública*, 10(1), 1–5.
- Alleyne, G., Aninat, E., de Ferranti, D., de Quadros, C., Chen, L., Freire, M., et al. (2008). Instituto Carso de la Salud: A boost for health philanthropy. *Lancet*, 371(9607), 100–101.
- Almeida, C. (2002). Health systems reform and equity in Latin America and the Caribbean [editorial]. *Cadernos de Saúde Pública*, 18(4), 903.
- Almeida Filho, N., Kawachi, I., Pellegrini Filho, A., & Dachs, N. W. (2003). Research on health inequalities in Latin America and the Caribbean: Bibliometric analysis (1971–2000) and descriptive content analysis (1971–1995). *American Journal of Public Health*, 93(12), 2037–2043.
- Barradas Barata, R. (2007). SciELO Saúde Pública: O desempenho dos *Cadernos de Saúde Pública* e da *Revista de Saúde Pública*. *Cadernos de Saúde Pública*, 23(12), 3031–3040.
- Barros, A. J. D. (2006). Producao científica em saúde coletiva: Perfil dos periódicos e avaliacao pela Capes. *Revista de Saúde Pública*, 40(N Esp), 43–49.
- Bookstein, A., & Yitzhaki, M. (1999). Own-language preference: A new measure of 'relative language self-citation'. In C. A. Macías-Chapula (Ed.), *Proceedings of the Seventh Conference of the International Society for Scientometrics and Informetrics* (pp. 65–74). Colima, Mexico: Universidad de Colima/ISSI.
- Carvalho, L., Coimbra, C. E. A., Jr, Souza-Santos, R., & Ventura Santos, R. (2007). Producao e citacao em Saúde Coletiva: Um loar a partir dos periódicos *Cadernos de Saúde Pública* e *Revista de Saúde Pública*. *Cadernos de Saúde Pública*, 23(12), 3023–3030.
- COHRED (2006). Council on Health Research for Development. *Supporting health research systems development in Latin America*. Record Paper 6. Geneva: COHRED.
- Cruz, A. (1995). Influencia de las publicaciones de la OPS en la producción científica en salud en América Latina y el Caribe. *Boletín de la Oficina Sanitaria Panamericana*, 119(6), 515–528.
- De los Ríos, R. (1999). La promoción de la investigación en salud pública: Búsqueda del equilibrio entre pertinencia y excelencia. *Revista Panamericana de Salud Pública*, 5(4/5), 309–315.
- Dias, J. C., Silveira, A. C., & Schofield, C. J. (2002). The impact of Chagas disease control in Latin America: A review. *Memorias do Instituto Oswaldo Cruz*, 97(5), 603–612.
- Díaz Mujica, D. (2007). Análisis bibliométrico de la revista *Archivos Latinoamericanos de Nutrición*. *Anales Venezolanos de Nutrición*, 20(1), 22–29.
- Egghé, L., & Rousseau, R. (2004). How to measure own-group preference? A novel approach to a socio-metric problem. *Scientometrics*, 59(2), 233–252.
- Estrada Lorenzo, J. M., Villar Álvarez, F., Pérez Andrés, C., & Rebollo Rodríguez, M. J. (2003). Estudio bibliométrico de los artículos originales de la *Revista Española de Salud Pública* (1991–2000). Parte Segunda: Productividad de los autores y procedencia institucional y geográfica. *Revista Española de Salud Pública*, 77, 333–346.
- Frenk, J. (1987). De la pertinencia a la excelencia: Dilemas de la investigación en el sector público. *Ciencia*, 38, 169–178.
- Frenk, J. (2007). Tender puentes: Lecciones globales desde México sobre políticas de salud basadas en evidencias. *Salud Pública de México*, 49(1), 14–22.
- IDRC (2009). International Development Research Center, Council on Health Research for Development. Priorities in collective health research in Latin America. http://www.idrc.ca/en/ev-22961-201-1-DO_TOPIC.html. Retrieved from 30 June 2009.
- Jsselmuiden, C. I. (2007). COHRED's perspective on strengthening health research systems internationally. *Salud Pública de México*, 49(1), 328–332.
- Kellner, A. W. A., & Ponciano, L. C. M. O. (2008). H-index in the Brazilian Academy of Sciences—comments and concerns. *Anales de la Academia Brasileira de Ciencias*, 80(4), 771–781.

- Krauskopf, M., & Krauskopf, E. (2008). Una mirada epistemométrica de la *Revista Médica de Chile* y su aporte al conocimiento en Medicina. *Revista Médica de Chile*, 136, 1065–1072.
- Lolas, F. (2002). Información, comunicación y equidad: Dilemas en el ámbito sanitario. *Revista Panamericana de Salud Pública*, 11(5/6), 430–434.
- Macías-Chapula, C. A. (2002). Bibliometric and webometric analysis of health system reforms in Latin America and the Caribbean. *Scientometrics*, 53(3), 407–427.
- Macías-Chapula, C. A. (2005). Hacia un modelo de comunicación en salud pública en América Latina y el Caribe. *Revista Panamericana de Salud Pública*, 18(6), 427–438.
- Macías-Chapula, C. A., Mendoza-Guerrero, J. A., Rodea-Castro, I. P., & Gutiérrez-Carrasco, A. (2007). Institutional health research collaboration in México. A bibliometric study. In D. Torres-Salinas & H. Moed (Eds.), *Proceedings of the 11th International Conference of the International Society for Scientometrics and Informetrics* (pp. 894–895). Madrid: ISSI.
- Magaña-Valladares, L., Nigenda-López, G., Sosa-Delgado, N., & Ruiz-Larios, J. A. (2009). Public health workforce in Latin America and the Caribbean: Assessment of education and labor in 17 countries. *Salud Pública de México*, 51(1), 62–75.
- Ortiz, S. (2004). Investigar y publicar en salud pública en la Argentina. *Medicina (B Aires)*, 64(1), 1–4.
- Ospina, E. G., Revez Herault, L., & Cardona, A. F. (2005). Uso de bases de datos bibliográficas por investigadores biomédicos latinoamericanos hispanoparlantes: Estudio transversal. *Revista Panamericana de Salud Pública*, 17(4), 226–232.
- PAHO (2007a). Pan American Health Organization. *Volume I: Health in the Americas*, 2007 edition. Washington, DC: PAHO.
- PAHO (2007b). Pan American Health Organization. *Public health capacity in Latin America and the Caribbean: Assessment and strengthening*, 2007 edition. Washington, DC: PAHO.
- Pelaez, M. (2003). More need for the “old” in new public health research in the Americas [editorial]. *Revista Panamericana de Salud Pública*, 13(6), 352–354.
- Pellegrini Filho, A. (2002). Inequidades de acceso a la información e inequidades en salud. *Revista Panamericana de Salud Pública*, 11(5/6), 409–412.
- Pellegrini, F. A., Goldbaum, M., & Silvi, J. (1997). Production of scientific articles about health in six Latin American countries, 1973–1992. *Revista Panamericana de Salud Pública*, 1(1), 23–24.
- Pérez Andrés, C., Estrada Lorenzo, J. M., Villar Álvarez, F., & Rebollo Rodríguez, M. J. (2002). Estudio bibliométrico de los artículos originales de la Revista Española de Salud Pública (1991–2000). Parte primera: Indicadores generales. *Revista Española de Salud Pública*, 76(6), 659–672.
- Porta, M., Fernández, E., & Puigdomenech, E. (2006). Book citations influence of epidemiologic thought in the academic community. *Revista de Saúde Pública*, 40((N Esp)), 50–56.
- Sancho, R., Morillo, F., Fillippo, D., Gómez, I., & Fernández, M. T. (2006). Indicadores de colaboración científica Inter-Centros en los países de América Latina. *Interciencia*, 31, 284–292.
- Sistema Mesoamericano de Salud Pública (2009). Instituto Mesoamericano de Salud Pública. http://portal2.ser.gob.mx/mesoamerica/index.php?option=com_content&task=view&id=57&Itemid=45. Retrieved 28 Jul 2009.
- The Rockefeller Foundation. (2008). *Making the eHealth connection. Global partnerships, local solutions*. Bellagio: The Rockefeller Foundation.
- Valdés, A. (2002). La biblioteca virtual en equidad, salud y desarrollo humano. *Revista Panamericana de Salud Pública*, 11(5/6), 462–465.
- Villar Álvarez, F., Estrada Lorenzo, J. M., Pérez Andrés, C., & Rebollo Rodríguez, M. J. (2007). Estudio bibliométrico de los artículos originales de la Revista Española de Salud Pública (1991–2000). Parte tercera: análisis de las referencias bibliográficas. *Revista Española de Salud Pública*, 81(3), 247–259.