

ORIGINAL RESEARCH

DOI: <http://dx.doi.org/10.15446/revfacmed.v66n4.65208>

Scientific and academic production and visibility of the Faculty of Health Sciences of Universidad del Cauca

Producción y visibilidad científico-académica de la Facultad de Ciencias de la Salud de la Universidad del Cauca

Received: 23/05/2017. Accepted: 18/09/2017.

Catalina Quilindo¹ • José Andrés Calvache^{2,3} • Mario Delgado-Noguera⁴

¹ Universidad del Cauca - Faculty of Health Sciences - Medical Program - Popayán - Colombia

² Universidad del Cauca - Faculty of Health Sciences - Anesthesiology Research Group GRIAN - Popayán - Colombia

³ Erasmus University Medical Center Rotterdam - Department of Anesthesiology - Rotterdam - The Netherlands.

⁴ Universidad del Cauca - Faculty of Health Sciences - Department of Pediatrics - Breastfeeding and Complementary Feeding Research Group - Popayán - Colombia.

Corresponding author: José Andrés Calvache. Anesthesiology Research Group GRIAN, Faculty of Health Sciences, Universidad del Cauca. Carrera 6 No. 13N-50, La Estancia, floor 2, office 01. Telephone number: +57 2 8209900, ext.: 2717. Popayán. Colombia. Email: jacalvache@unicauca.edu.co.

| Abstract |

Introduction: Bibliometric indexes are important indicators of the quality of the country's medical programs. There are few studies of this kind at the Universidad del Cauca.

Objective: To evaluate the scientific-academic activity of the Faculty of Health Sciences (FHS) of the Universidad del Cauca based on bibliometric production indicators of the authors, visibility and impact during the period 2010-2016.

Materials and methods: Descriptive, cross-sectional, bibliometric research. Different categories of the academic production of the FHS were identified (citation by authors, language of publication, areas of health sciences), and the main journals where the authors published. In addition, the metric indicators of the journals and citation indexes of the authors were determined, as well as their enrollment in research groups and the most cited publications according to SCOPUS.

Results: 183 articles were found. The main language of publication was Spanish and mainly in the clinical-surgical area. 60% of the articles of the main authors have some international collaboration. The Revista de la Facultad de Ciencias de la Salud of Universidad del Cauca had the largest number of articles published by authors of the same faculty during the period under study.

Conclusion: The scientific and academic production and visibility of the FHS of the Universidad del Cauca is low. The findings reveal the need for greater institutional support for research, and the creation and support of research groups and incubators. Therefore, this work seeks to encourage greater visibility of the FHS in the national and international scientific field.

Keywords: Bibliometrics; Medicine; Research; Colombia (MeSH).

| Resumen |

Introducción. Los índices bibliométricos son indicadores importantes de la calidad de los programas de medicina del país. En la Universidad del Cauca se cuenta con pocos estudios de este tipo.

Objetivo. Evaluar la actividad científico-académica de la Facultad Ciencias de la Salud (FCS) de la Universidad del Cauca a partir de indicadores bibliométricos de producción de los autores, visibilidad e impacto durante el período 2010-2016.

Materiales y métodos. Investigación bibliométrica descriptiva de corte transversal. Se identificaron diferentes categorías de la producción académica de la FCS (citación por autores, idioma de publicación, áreas de las ciencias de la salud) y las principales revistas donde publicaron los autores. Se determinaron los indicadores métricos de las revistas, los índices citacionales, la vinculación a grupos de investigación y las publicaciones más citadas de acuerdo a Scopus.

Resultados. Se encontraron 183 artículos. El principal idioma fue español y la mayoría de publicaciones eran del área clínico-quirúrgica. El 60% de los artículos de los principales autores tienen alguna colaboración internacional. La Revista de la Facultad de Ciencias de la Salud de la Universidad del Cauca presenta el mayor número de artículos publicados por autores de la misma facultad durante el período en estudio.

Conclusión. La producción y visibilidad científico-académica de la FCS de la Universidad del Cauca es baja. Los hallazgos encontrados revelan la necesidad de un mayor apoyo institucional para la investigación, la creación y el apoyo a grupos y semilleros de investigación. Con esto se pretende tener un grado mayor de visibilidad en el campo científico, tanto nacional como internacional.

Palabras clave: Bibliometría; Medicina; Investigación; Colombia (DeCS).

Quilindo C, Calvache JA, Delgado-Noguera M. Scientific and academic production and visibility of the Faculty of Health Sciences of Universidad del Cauca. Rev. Fac. Med. 2018;66(4):557-63. English. doi: <http://dx.doi.org/10.15446/revfacmed.v66n4.65208>.

Introducción

The dissemination of research results in health sciences is generally done by publishing scientific articles, essays, documents or books that facilitate the exchange of ideas and the use of scientific evidence among the different local, regional and world academic communities. (1)

The application of statistical methods, among others, to written communication products of research is known as bibliometrics. (2) This activity responds to the need to quantify scientific production in order to compare, measure and objectify it (3), and “also stands out for its maturity both in its praxis and in its conceptual theoretical development.” (4, p11)

Bibliometrics is based on indicators and is defined as

“[...] a set of methodological knowledge applied to measure the number of documents published and their citations, according to their origin and authors, which ultimately contributes to the evaluation of the outputs of science” (1, p44).

Indicators enable the characterization of scientific activity, academic productivity and the impact of research. By tradition, the fundamental criterion used to assess the success of a researcher is the number of published works; researchers with a large number of publications are considered highly productive, experienced and successful.

However, at present, one of the most used indicators is h-index, which indicates scientific performance by analyzing the number of times that an author, publication or journal has been cited. (5) H-index is considered an easily accessible indicator because it can be looked for in Google Scholar; it measures the global impact and represents the influence of the author in a specific field of research, that is, the degree to which his/her work has been useful for other researchers. (6) Even so, it has some disadvantages because it can be manipulated in highly cited articles and analyzes all kinds of products (original articles, systematic reviews), giving the same value to all of them, and is influenced by the number of years the researcher has been working on a specific area. (7)

Regarding journals, the SCOPUS database has the largest amount of abstracts and citations of peer-reviewed literature and has bibliometric tools to track, analyze and visualize research. (8) This instrument measures, on the other hand, the scientific prestige of the sources and classifies them by means of quartiles, being 1 (Q1) the highest impact score. SCOPUS has other scientific indicators that are used to evaluate and analyze publications, such as the SCImago Journal Rank (SJR), an indicator that provides a relative quality index of the journals included in the SCOPUS databases from 1996 onwards. (9) The SJR makes an estimation of the time an article of a journal has been cited over a period of 3 years and is useful to compare journals, since it classifies them according to their prestige. The Source Normalized Impact per Paper (SNIP) is another indicator that measures the impact of a journal citation based on the total number of citations in a given field of research. (10)

The bibliometrics of scientific production is also a benchmark for placing the faculties of medicine and health sciences in the national and international context. (5) The Universidad del Cauca is ranked ninth among Colombian universities in terms of scientific production (11); nevertheless, neither the university nor the Faculty of Health

Quilindo C, Calvache JA, Delgado-Noguera M. [Producción y visibilidad científico-académica de la Facultad de Ciencias de la Salud de la Universidad del Cauca]. Rev. Fac. Med. 2018;66(4):557-63. English. doi: <http://dx.doi.org/10.15446/revfacmed.v66n4.65208>.

Sciences (FHS) have a system of permanent tracking of the production of their academic community nor of bibliometric indicators evaluating the volume and citations of their scientific production, which limits the information processes needed for accreditation and feedback of their research groups and their departments.

A preliminary work conducted at the Universidad del Cauca (12), also in the Faculty of Health Sciences (FHS), evaluated scientific-academic production by departments in the period 2010-2016. This study characterized the main author by sex, profession, employment and academic attainment while establishing the type of journal or means of dissemination of the scientific and academic production, as well as the collaboration percentage with entities external to the FHS. (12) Still, not only the faculty but the entire university lack internal bibliometric studies. Given the current situation of the institution, it is important to continue carrying out works in this area and, in consequence, the objective of this study was to evaluate the scientific-academic activity of the FHS of Universidad del Cauca based on bibliometric production indicators of authors, visibility and impact. In this way, this line of research is strengthened and may be an incentive for other faculties, libraries and the university itself to begin the process of measuring their contributions.

Materials and methods

This was a descriptive, cross-sectional bibliometric research that considered as population all the academic scientific production of the FHS of the Universidad del Cauca, represented in the publication of articles in journals and periodicals. Certified production in the period between January 2010 and April 2016 was selected as sample; 183 products met the inclusion criteria. Certified academic scientific production—with ISSN (International Standard Serial Number)—was included and classified into different typologies (original research, review or other).

The search and localization of the information was structured in two phases. During phase 1, a thorough search was performed in the PubMed, MEDLINE, ScienceDirect, Cochrane Library, SCOPUS, LILACS, Google Scholar databases, in the databases of the Vice-Rector's Office for Research of the Universidad del Cauca, and in CVLaC curriculums to identify the academic production of the faculty in the period under study. The common strategy for searching title, abstracts, affiliation and authors was: Filiation: Universidad del Cauca/University of Cauca Date: Jan 2010 to Apr 2016 (Annex 1). The total result of the searches was debugged manually using the EndNote software (Windows OS). In phase 2, after obtaining the results of the initial search, a statement was sent to the heads of each department of the faculty for socialization. The statement requested the review of the search results and adding the production that was not included.

The 183 articles found were classified by language of publication and related health sciences area (basic, clinical-surgical, public health and others), taking into account abstract and full text reading.

Regarding the production of authors of the FHS, the type of the product, the year of publication and the number of citations were established by means of SCOPUS. In case the article of any author was duplicated, it was excluded.

With respect to the visibility of authors, the h-index was identified using Google Scholar, and the category of the main author as a

researcher was established based on the system of the Administrative Department of Science, Technology and Innovation (Colciencias) through call 737 of 2015 (13), and classified as Junior, Senior, Associate, New, Not recognized or Other. The association of the main author with some research group of the Universidad del Cauca was established.

The 10 main journals included in the SCOPUS database, where the authors of the FHS made their publications, were identified. The quartile, SJR and SNIP indicators from these journals were obtained.

Qualitative variables were summarized with absolute frequencies and proportions, and quantitative variables by means of descriptive statistics and graphs. The statistical package R was used for the analysis and the graphs were designed using the free statistical package RStudio. (14)

Results

Phase 1 of the information search yielded 1 362 studies that met the inclusion criteria: 1 092 records were found in external databases and 270 in Latin American databases. 170 articles were excluded based on the evaluation of titles, 119 records based on the evaluation of the abstracts, and 865 records based on authors and affiliation, for a total of 1 154 articles excluded. Thus, 183 publications were included in the study after excluding 25 that were repeated or duplicated (Figure 1).

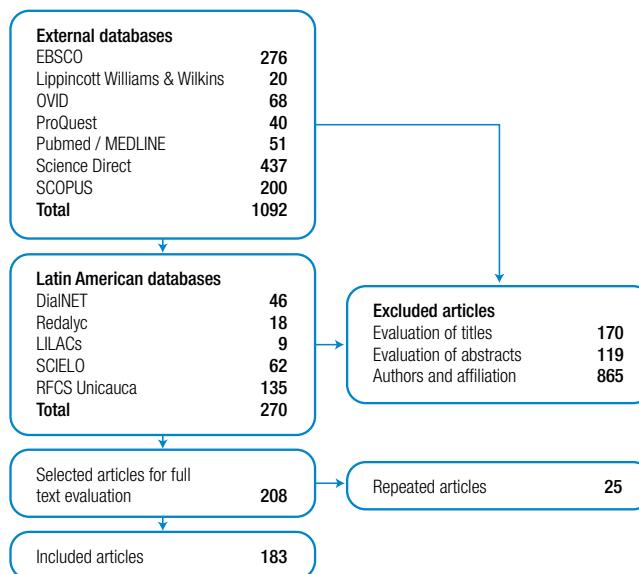


Figure 1. Search and selection flowchart of studies conducted in the Faculty of Health Sciences of the Universidad del Cauca. 2010-2016. Source: Own elaboration.

According to SCOPUS, the health area represents 11% of all the academic-scientific production of Universidad del Cauca, which places it in third, surpassed by computer sciences and engineering. (15)

Publication language

Of the total production found, 157 articles (85.7%) were originally published in Spanish and 26 (14.2%) in English.

Distribution of production by area of knowledge

Of 183 articles produced by the professors of the FHS, 104 (63.7%) were from the clinical-surgical area. The basic areas and those related to public health contributed with 26 (14.2%) and 20 (10.9%) products, respectively.

The main authors, according to the number of citations, are presented in Table 1. Half of the scientific-academic production of these authors corresponds to original articles; there are also systematic and narrative reviews and a case report. 60% of the articles of the main authors of the faculty have some international collaboration.

Table 1. Main authors of the Faculty of Health Sciences of Universidad del Cauca and number of citations, year of publication and type of product according to SCOPUS.

Study	Authors *	Number of citations	Type of product	International cooperation
Alonso-Coello <i>et al.</i> (16). 2010	Pablo Alonso Coello, Affan Irfan, Ivan Solà, Ignasi Gich, Mario Delgado Noguera , David Rigau, Sera Tort, Xavier Bonfill, Jako Burgers, Holger Schunemann.	123	Original article	Yes
Delgado-Noguera <i>et al.</i> (17). 2015	Mario F Delgado Noguera , José Andrés Calvache, Xavier Bonfill Cosp, Eleni P Kotanidou, Assiina Galli-Tsinopoulou.	45	Systematic review	Yes
Concha <i>et al.</i> (18). 2010	Juan M Concha, Alejandro Sandoval, Philipp N Streubel.	27	Original article	Yes
Barajas-Nava <i>et al.</i> (19). 2010	Leticia Barajas Nava, Ivan Solà, Mario Delgado Noguera , Ignasi Gich, Carola Orrego Villagran, Xavier Bonfill, Pablo Alonso-Coello.	12	Systematic review	Yes
Calvache <i>et al.</i> (20). 2011	José Andrés Calvache, Manuel Felipe Muñoz, Francisco Javier Baron.	6	Original article	Yes
Correra-Correa <i>et al.</i> (21). 2010	Zamanda Correa Correa, Isabel Muñoz Zambrano, Andres Felipe Chaparro	5	Original article	No
Rendón-Becerra & Ortiz-Martínez (22). 2016	César Augusto Rendón Becerra, Robert Alirio Ortiz Martínez.	4	Original article	No
Romero-Rojas <i>et al.</i> (23). 2013	Alfredo Romero Rojas, María Rosa Bella Cuetos, Ivone A Meza Cabrera, Angeles Cabezuelo Hernández, Darío García Rojo, Hernando Vargas Uricoechea, José CameselleTeijeiro.	4	Case report	Yes
Sierra-Zúñiga <i>et al.</i> (24). 2013	Marco Fidel Sierra Zúñiga, Oscar Eduardo Castro Delgado, Juan Carlos Caicedo, Angela María Merchán Galvis, Mario Delgado Noguera.	3	Original article	No

* The names in bold correspond to the authors of the Faculty of Health Sciences of Universidad del Cauca.
Source: Own elaboration.

Production and visibility of the main authors

Table 2 presents the top 10 authors by order of production according to the h-index found for the period 2010-2016. In addition, it also presents their category according to call 737 of 2 017 of Colciencias, the research group of Universidad del Cauca to which they belong, and the classification of the group.

Table 2. Characteristics of the main authors in terms of production of the Faculty of Health Sciences of Universidad del Cauca. 2010-2016.

Author	h-index *	Colciencias Category †	Research group ‡	Registration of the group in Colciencias VRI †
Mario Delgado -Noguera	11	Senior	Lactancia materna y alimentación complementaria (Breastfeeding and complementary feeding)	--
José Andrés Calvache	8	Senior	Investigación en anestesiología GRIAN (Research in anaesthesiology GRIAN)	C
Hernando Vargas-Uricoechea	3	NR	Endocrinología y metabolismo (Endocrinology and metabolism)	--
Tomás Omar Zamora	2	NR	SG	--
Nelson López	0	NR	SG	--
Guillermo Rivera	2	NR	SG	--
Pilar Mirely Chois	1	Junior	Comunicación humana y sus desordenes (Human communication and its disorders)	C
Juan Pablo Martínez	0	NR	SG	--
Jenny Arroyave	0	NR	SG	--
Edwin Muñoz	0	NR	SG	--

VRI: Vice-Rector's Office for Research; NR: non-registered researcher; SG: author not associated to a research group; --: research group not registered in Colciencias or not endorsed by the Universidad del Cauca.

* Data retrieved from Google Scholar.

† Data taken from call 737 of 2017 of Colciencias.

‡ Data according to the Vice-Rector's Office for Research, Universidad del Cauca. Source: Own elaboration.

Citation indexes of the top 10 journals where authors published

Evaluation of citation indicators

Of the total of the journals or means of disclosure where the authors of the FHS of Universidad del Cauca published, 9 of them were found in SCOPUS (Table 3). The Cochrane Library and Burns belong to Q1 and have 4 and 2 products, respectively. The Revista de la Facultad de Ciencias de la Salud of Universidad del Cauca, which is not registered in the SCOPUS platform, has the largest number of articles published by the authors of the same faculty during the study period.

Table 3. Main journals or means of dissemination of scientific production of the Faculty of Health Sciences of Universidad del Cauca according to the SCOPUS quartile. 2010-2016.

Journal	Quartile according to SCOPUS	SJR	SNIP	Frequency
The Cochrane Library	Q1	2.3	18.6	4
Burns	Q1	0.895	1.174	2
Biomédica Revista del Instituto Nacional de Salud	Q2	0.280	0.447	2
Revista Colombiana de Anestesiología	Q3	0.151	0.410	9
Clinica e Investigación en Arteriosclerosis	Q3	0.195	0.165	2
Revista de Salud Pública	Q4	0.138	0.146	4
Revista Colombiana de Cardiología	Q4	0.114	0.096	2
Aquichán	Q4	0.136	0.183	2
Arete	Q4	0.101	0.00	2
Revista de la Facultad de Ciencias de la Salud de la Universidad del Cauca	--	--	--	103

SJR: Scimago Journal Rank; SNIP: Source normalized impact per paper. Source: Own elaboration.

Discussion

Medical research is a fundamental pillar of knowledge and demands vocation and basic training in methodological and ethical aspects that undergraduate and postgraduate medical training does not always include in its programs. (25,26) In Latin America, about two thirds of the professionals do not carry out research, having as main barriers lack of time, lack of knowledge in research methodology and lack of institutional culture that incorporates research as an usual task. (25) Some subjects, such as Health Research (27), and scientific production itself are not paid enough attention by medical schools, particularly at Universidad del Cauca.

The production of the FHS during the period 2010-2016 was 183 studies. 157 articles (85.7%) were published in Spanish and were mainly related to the clinical area. Today, this result is a normal trend in Latin America, where many researchers do not write in English yet. The articles of the top 10 authors were mostly written in collaboration with international authors and in English. This collaboration is likely to be important when publishing in English-language journals, as they have greater visibility. (28)

According to the analysis carried out, the clinical-surgical area was the main area of publication (42.8%). In the study by Sisa *et al.* (29) in Ecuador, the main thematic area was the clinical-surgical area with 60%. This result demonstrates the low level of research and publication in the core areas in the FHC. (12)

The h-index is one of the most popular instruments for evaluating the impact and quality of a researcher's articles. Depending on the number of citations and the amount of scientific production, this index detects outstanding researchers within the area and measure their productivity; however, it should be considered that this index depends on the number of publications of the author, does not discriminate between the types of products, is strongly influenced by the age of the researcher, and does not allow comparing different areas of knowledge. (7,30,31)

Romero-Torres *et al.* (32) noted that the h-index was directly related to the years the author has devoted to research, but in Colombia this fact does not seem to be met given the relative science and technology backlog. The highest h-index found in this work was 11 and corresponds to Colciencias Senior Researchers, who usually have a PhD, have worked in international networks and have published in other languages.

Regarding the main authors of the FHS, only 30% of them were registered as researchers in Colciencias and were part of a research group registered in the Vice-Rector's Office for Research (VRI). These results show that most of the main authors of the FHS (70%) do not have any link to a group endorsed by Colciencias and their publications do not seem to come from a formal project registered in the VRI or have participated in any call. Today, the Universidad del Cauca has only two journals indexed in the Publindex registry of Colciencias, which makes evident the need for more publications of this type where both research groups and professors can publish.

Indirect measurement of academic quality can be done through intellectual and scientific production and bibliometric indicators that measure the quality and quantity of publications and allow evaluating individual researchers, journals and universities. (33) In 2010, Frenk *et al.* (34) published a study on barriers to research among orthopedists; it is important to note that this Spanish study has a short version. (35) This study found little literature on the subject, but at the same time pointed out the concern for a necessary change in medical education that favors research, writing and publication. For researchers, it is also essential to go beyond the departmentalization of the knowledge plan proposed by Flexner in 1910 and avoid the so-called "tribalism" of the professions, in this case the departments, that is, their tendency to act in isolation or even compete among them. (34)

Nowadays, 17 Colombian journals in the health area are registered in SCOPUS, but none of them belong to the Q1. (25) The Revista de la Facultad de Ciencias de la Salud of Universidad del Cauca, the local journal, has the largest number of articles published by the authors of the same faculty during the study period, which shows that the authors of the FHS prefer publishing locally, perhaps because of a close relationship with the Editorial Committee and because of the easy access to the language in which its contents are published. (12) However, it is possible for this trend to change due to the new classification policies of the journals registered in Colciencias, which leave local or regional journals without an important support although they seek to avoid inbreeding in the publication.

According to the study by Rodríguez-Morales (26) at Universidad Tecnológica de Pereira, of the total of publications, 45.5% were published in quartile I journals (Q1), while the present study only found 3.2% articles published in Q1 journals. In that same study, of the total authors (n = 55) only one was classified in the Senior category, 10 in the Junior category and the others were not registered (26); these findings were similar to those of this investigation where only two authors were classified in said categories. These data clearly show that there are few researchers recognized by Colciencias in the FHS and that this seems to be a common reality in the faculties of health and medicine throughout the country. (36)

Sánchez-Bello *et al.* (37), in a study carried out between 2001 and 2015 in Colombia, highlight that the scientific production of a medical school can be considered essential, since new possibilities can be extended to improve the care provided to patients through innovation. In addition, the volume of scientific production of medical schools in Colombia is concentrated in a few universities, and may even appear to be null in other institutions. (38)

In a consensus article of orthopedists on the barriers to research in Latin America (35), the authors found research designs difficult to carry out, as well as little ability to read journals in English, lack of incentives or academic recognition, poor funding for research projects and weak publication in high-impact journals. The authors

considered that a solution to these barriers is using medical teaching models based on evidence-based medicine (EBM), give residents feasible and manageable research questions, seek support through incentives or grants, partner with universities with access to journals, and use databases to directly access information. (33)

According to Sánchez-Bello *et al.* (37), of the few professionals who investigate, 61% do not go beyond presenting an abstract in oral format or poster in congresses, and in fact about 40% of them never become an article and, of course, are never published in indexed journals. Therefore, according to the current policies of Colciencias on visibility and productivity it is difficult to generate any impact in the field of research. (38)

However, many of the shortcomings exposed here can be solved by designing educational policies aimed at addressing the aforementioned barriers, promoting scientific culture, generating research groups or incubators and adopting the scientific method as the basis for medical research (26,39), but these policies also demand investment and interest. One of the implemented strategies has been the promoting the implementation of the scientific method in clinical practice, which, for nearly three decades, has fostered the EBM movement by promoting clinical actions based not only on experience but also on the critical reading of scientific publications. (40,41)

Research groups or incubators are another strategic way to favor health research at the undergraduate level, because they help to appropriate the academic and institutional culture of educational and scientific processes. They are also the place where methodological tools can be strengthened, research processes can be experimented, products can be socialized and academic learning spaces can be strengthened. (42)

Conclusion

These findings point out the need for greater institutional support for health research, the creation and support of research groups and incubators, and the promotion of academic programs for better proficiency in the English language to facilitate the production of new knowledge and, particularly, to ensure that the FHS and the Universidad del Cauca itself have a greater degree of visibility in both national and international scientific fields.

Conflicts of interest

None stated by the authors.

Funding

This article is the product of the research project entitled "Producción académica por departamentos de la Facultad Ciencias de la Salud, Universidad del Cauca 2010-2016 (Academic production by departments of the Faculty of Health Sciences, Universidad del Cauca 2010-2016)", developed by the "Epi-Salud" incubator, which is financed by the Sistema General de Regalías - Fondo CTI (InnovAcción Cauca - Semilleros de investigación).

Acknowledgements

None stated by the authors.

References

1. Cortés-Vargas D. Medir la producción científica de los investigadores universitarios: la bibliometría y sus límites. *Rev. educación superior*. 2007; 36(142):43-65.

2. Carpenter CR, Cono DC, Sarli CC. Using publication metrics to highlight academic productivity and research impact. *Acad Emerg Med.* 2014;21(10):1160-72. <http://doi.org/f6mwjz>.
3. Gómez YJ. Política científica colombiana y bibliometría: usos. *Nómadas.* 2005; 22:241-54.
4. Gorbea-Portal S. Una nueva perspectiva teórica de la bibliometría basada en su dimensión histórica y sus referentes temporales. *Investig. bibl.* 2016; 30(70):11-6. <http://doi.org/cq8v>.
5. Yang K, Meho LI. Citation Analysis: A Comparison of Google Scholar, Scopus, and Web of Science. *Proc Am Soc Sci Technol Inf.* 2006;43(1):1-15. <http://doi.org/bpb3mt>.
6. Google Scholar Metrics. Google Académico; 2017 [cited 2017 Dec 11]. Available from: <https://goo.gl/5KR9eG>.
7. Díaz GJ. El índice h: una forma objetiva de evaluar la producción científica de un investigador. *Rev. Med. Vet. Zoot.* 2014; 61(2):13-114. <http://doi.org/cq8w>.
8. Gil-Rivera MC. La base de datos. Importancia y aplicación en educación. *Perfiles Educativos.* 1994 [cited 2017 Mar 21];(65). Available from: <https://goo.gl/HzVCvt>.
9. SCImago. *Form. Univ.* 2012; 5(5):1-1. <http://doi.org/cq8x>.
10. Sobrido M. Cómo calcular el cuartil de una revista científica en ISI Web of Knowledge. Santiago de Compostela: BiblioSaúde; 2011 [cited 2017 Mar 3]. Available from: <https://goo.gl/Vaffg9>.
11. González-Correa CA, González-Correa CH. Investigación en la Facultad de Ciencias para la Salud, Universidad de Caldas (Colombia), en el contexto iberoamericano. *Hacia promoc. salud.* 2014; 19(1):13-24.
12. Arroyo AE, Quilindo C, Diago JL, Vera-Montoya M, Delgado-Noguera M, Calvache JA. Producción académica por departamentos de la Facultad Ciencias de la Salud, Universidad del Cauca, 2010-2016. *Revista Facultad Ciencias de la Salud. Universidad del Cauca.* 2016; 18(1):10-7.
13. Colombia. Departamento Administrativo de Ciencia, Tecnología e Innovación. Reconocimiento de investigadores del sistema nacional de ciencia, tecnología e innovación. Publicación de resultados finales de la convocatoria 737 de 2015. Bogotá D.C.: Colciencias; 2016 [cited 2017 Apr 12]. Available from: <https://goo.gl/469dWH>.
14. r-project.org. The R Project for Statistical Computing. [cited 2017 Feb 12]. Available from: <https://goo.gl/7EXCBK>.
15. Cañedo AR, Rodríguez LR, Montejo CM. Scopus: la mayor base de datos de literatura científica arbitrada al alcance de los países subdesarrollados. *Acimed.* 2010 [cited 2017 Dec 14];21(3):270-82. Available from: <https://goo.gl/sUyKaZ>.
16. Alonso-Coello P, Irfan A, Solà I, Gich I, Delgado-Noguera M, Rigau D, et al. The quality of clinical practice guidelines over the last two decades: a systematic review of guideline appraisal studies. *Qual Saf Health Care.* 2010; 19(6):58. <http://doi.org/ex6p94>.
17. Delgado-Noguera MF, Calvache JA, Bonfill Cosp X, Kotanidou EP, Galli-Tsinopoulou A. Supplementation with long chain polyunsaturated fatty acids (LCPUFA) to breastfeeding mothers for improving child growth and development. *Cochrane Database Syst Rev.* 2015;(7):CD007901. <http://doi.org/dspvg3>.
18. Concha JM, Sandoval A, Streubel PN. Minimally invasive plate osteosynthesis for humeral shaft fractures: are results reproducible? *Int Orthop.* 2010;34(8):1297-305. <http://doi.org/c8xfgc>.
19. Barajas-Nava L, Solà I, Delgado-Noguera M, Gich I, Villagran CO, Bonfill X, Alonso-Coello P. Quality assessment of clinical practice guidelines in perioperative care: a systematic appraisal. *Qual Saf Health Care.* 2010;19(6):e50. <http://doi.org/dpbqgx>.
20. Calvache JA, Muñoz MF, Baron FJ. Hemodynamic effects of a right lumbar-pelvic wedge during spinal anesthesia for cesarean section. *Int J Obstet Anesth.* 2011;20(4):307-11. <http://doi.org/ckk5rx>.
21. Correa-Correa Z, Muñoz-Zambrano I, Chaparro AF. Síndrome de Burnout en docentes de dos universidades de Popayán, Colombia. *Rev. salud pública.* 2010;12(4):589-98.
22. Rendón-Becerra CA, Ortiz-Martínez RA. Comparación de dos protocolos de manejo en preeclampsia severa lejos del término, y resultados maternos y neonatales: una cohorte histórica, Hospital Universitario San José, Popayán (Colombia). *Rev Colomb Obstet Ginecol.* 2016;67(1):26-35. <http://doi.org/cq6m>.
23. Romero-Rojas A, Bella-Cueto MR, Meza-Cabrera IA, Cabezas-Lo-Hernández A, García-Rojo D, Vargas-Uricoechea H, et al. Ectopic thyroid tissue in the adrenal gland: a report of two cases with pathogenetic implications. *Thyroid.* 2013;23(12):1644-50. <http://doi.org/f5kn8m>.
24. Sierra-Zúñiga MF, Castro-Delgado OE, Caicedo-Caicedo JC, Merchán-Galvis ÁM, Delgado-Noguera M. Epidemiological profile of minor and moderate burn victims at the University Hospital San José, Popayán, Colombia, 2000-2010. *Burns.* 2013;39(5):1012-7. <http://doi.org/cq6n>.
25. Chomsky-Higgins K, Mielau TA, Mackechni MC, Aguilar D, Avila JR, Dos-Reis FB, et al. Barriers to Clinical Research in Latin America. *Front Public Health.* 2017;5:57. <http://doi.org/gc3jhz>.
26. Rodríguez-Morales AJ, Ochoa-Orozco SA, Mayta-Tristán P. Impacto de las revistas de salud colombianas: comparación de Publindex versus Google Scholar Metrics, SciELO y SCOPUS. *Rev. Cuba. Inf. Cienc. Salud.* 2014;25(1):24-35.
27. Delgado-Noguera M. David Sackett y la Medicina Basada en la Evidencia. *Revista Facultad Ciencias de la Salud. Universidad del Cauca.* 2017;17(3):8-9.
28. Villalba-Cuellar JC, González-Serrano AG. La importancia de los semilleros de investigación. *Prolegómenos.* 2017;20(39):9-10. <http://doi.org/cq82>.
29. Sisa I, Espinel M, Fornasini M, Mantilla G. La producción científica en ciencias de la salud en Ecuador. *Rev Panam Salud Pública.* 2011;30(4):388-92.
30. Agarwal A, Durairajanayagam D, Tatagari S, Esteves SC, Harley A, Henkel R, et al. Bibliometrics: tracking research impact by selecting the appropriate metrics. *Asian J Androl.* 2016;18(2):296-309. <http://doi.org/f877jx>.
31. Kellner AW, Ponciano LC. H-index in the Brazilian Academy of Sciences: comments and concerns. *An Acad Bras Cienc.* 2008;80(4):771-81. <http://doi.org/bnr325>.
32. Romero-Torres M, Acosta-Moreno LA, Tejada-Gómez MA. Ranking de revistas científicas en Latinoamérica mediante el índice h: estudio de caso Colombia. *Revista española de Documentación Científica.* 2013;36(3):e003. <http://doi.org/cq84>.
33. Sanz-Valero J, Tomás-Casterá V, Wanden-Berghe C. Estudio bibliométrico de la producción científica publicada por la Revista Panamericana de Salud Pública/Pan American Journal of Public Health en el periodo de 1997 a 2012. *Rev Panam Salud Pública.* 2014;35(2):81-8.
34. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet.* 2010;376(9756):1923-58. <http://doi.org/b9jgxq>.
35. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Profesionales de la salud para el nuevo siglo: transformando la educación para fortalecer los sistemas de salud en un mundo interdependiente. *Revista Peruana de Medicina Experimental y Salud Pública.* 2011;28(2):337-41. <http://doi.org/fjbd2>.
36. Gómez-Marín JE, Rodríguez-Morales AJ. Clasificación de investigadores colombianos (Webometrics versión beta): los que faltaron. *Infect.* 2015;19(2):49-51. <http://doi.org/f27kft>.
37. Sánchez-Bello NF, Galván-Villamarín JF, Eslava-Schmalbach J. Producción científica en las facultades de Medicina en Colombia en el periodo 2001-2015. *Rev. Fac. Med.* 2016;64(4):645-50. <http://doi.org/cp56>.
38. Mastandueno R, Prats M, Enríquez D, Flichtentrei D. Perfil de la investigación médica en Latinoamérica. *IntraMed Journal.* 2016;4(1):1-6.
39. Rodríguez-Morales AJ, Culquichicón-Sánchez C, Gil-Restrepo AF. Baja producción científica de decanos en facultades de medicina y salud de Colombia: ¿una realidad común en Latinoamérica? *Salud pública Méx.* 2016;58(4):402-3. <http://doi.org/cq86>.
40. Calvache JA, Chaparro LE, Chaves A, Delgado MB, Fonseca N, Montes FR, et al. Estrategias y obstáculos para el desarrollo de la investigación en programas de anestesiología: documento de consenso en Colombia. *Rev Colomb Anestesiol.* 2012;40(4):256-61. <http://doi.org/f2ftqm>.
41. Delgado-Noguera M. Pregunta estructurada y búsqueda de la literatura: el primer paso en la práctica de la Medicina Basada en la Evidencia. *Revista Facultad Ciencias de la Salud. Universidad del Cauca.* 2010;12(4):45-9.
42. Torres FA. El trabajo médico en el nuevo orden mundial. TM editores; 1997.

Annex 1. Information search strategies

Common strategy	Filiation: Universidad del Cauca / University of Cauca Date: Jan 2010 to Apr 2016
SCOPUS	AF-ID("Universidad del Cauca" 60051434) AND (LIMIT-TO(PUBYEAR,2016) OR (LIMIT-TO(PUBYEAR,2015) OR (LIMIT-TO(PUBYEAR,2014) OR LIMIT-TO(PUBYEAR,2013) OR LIMIT-TO(PUBYEAR,2012) OR LIMIT-TO(PUBYEAR,2011) OR LIMIT-TO(PUBYEAR,2010))
ScienceDirect	pub-date >2009 and pub-date <2016 and AFFILIATION (Universidad del Cauca) or (University of Cauca).
ProQuest	all(Universidad del Cauca) OR all(University of Cauca) Limites adicionales: Desde 01 January 2010 hasta 31 Abril 2016
EBSCO	TX Universidad del Cauca OR TX University of Cauca Limiters - Published Date: 20100101-20141231; Scholarly (Peer Reviewed) Journals; Hidden NetLibrary Holdings
PubMed	University of Cauca[Affiliation] OR Universidad del Cauca[Affiliation] AND ("2010/01/01" [PDAT] : "2016/04/31" [PDAT])
Ovid	Universidad del Cauca.in. or Universidad del Cauca.ab. or Universidad del Cauca *.au. or University of Cauca.in.
Wolters Kluwer	Universidad del Cauca in Author Affiliation OR University of Cauca in Author Affiliation between years 2010 and 2016
Google Scholar	(Universidad del Cauca OR "University of Cauca") AND ("health sciences" OR "facultadcienciassalud")