

## Cuban scientific production in SCOPUS on cardiology and cardiovascular surgery during 12 years

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### ABSTRACT

**Introduction:** cardiovascular diseases are the main cause of death in the world and, given this, scientific research is a mechanism to improve the health of populations. In this context, bibliometrics uses tools that offer information on the behavior of science in various branches of knowledge. **Objective:** to characterize the behavior of Cuban scientific production in cardiology and cardiovascular surgery in SCOPUS. **Method:** a bibliometric study with an observational and descriptive design was carried out using the data offered by Scimago Journal & Country Rank. A search was made of the data offered by this platform of the publications on cardiology and cardiovascular surgery carried out in Cuba from 2009 to 2020. **Results:** in the period studied, a total of 363 documents were published for an average of 30 publications per year. . The year 2020 stood out as the year with the largest number of published documents (88) and 2010 the year with the least number (13). A total of 1523 citations were made in this period for an average of 126.9 citations per year, being the The year 2012 in which the greatest number of citations were made (234) followed by the year 2009 (229) and 2020 the one with the least amount (36). **Conclusions:** Cuban scientific production on cardiology and cardiovascular surgery has a marked tendency to increase, however it is necessary to increase scientific training in these areas in order to improve quality and impact and thus increase the number of citations. Self-citations maintain lower values than those found in other thematic areas and a downward trend.

**Keywords:** Cardiology; Cardiovascular diseases; Bibliometrics.

Cardiovascular disease (CVD) is the leading cause of death and a major contributor to morbidity worldwide. Prevalent cases of CVD are estimated to have doubled between 1990 and 2019; they have exceeded 500 million globally<sup>1</sup>.

In Cuba, circulatory system diseases cause the greatest number of deaths, with a mortality rate ranging from 299,4 to 360 per 100 000 inhabitants. Heart diseases constituted the first cause of death in Cuba in the decade of 2009-2018, except in the years 2012, 2013 and

2014 when they were surpassed by malignant tumors. In the last 16 years, CVD mortality has had a tendency to increase. From 2009 to 2018 it increased to one year, the years of life potentially lost due to heart disease<sup>2</sup>.

Scientific research is a mechanism to study and improve the health of populations, and to curb the increasing burden of chronic non-communicable diseases through the principles of evidence-based medicine, public policy making and allocation of national and international funds<sup>3</sup>.

However, middle and low-income countries have the greatest challenges due to the scarcity of evidence-based information, quality and restrictions in the use of health databases and allocation of resources for research, which results in low scientific production on CVD<sup>3</sup>.

Bibliometrics constitute a means to evaluate scientific production; its predictive value for journal editorial teams, when assessing their status, tendencies and the identification of demanding changes justifies its boom in recent times<sup>4</sup>.

In this context, bibliometrics must make use of modern tools that offer reliable information on the behavior of science in various branches of knowledge. One of these tools is the Scimago Journal and Country Rank (SJCR). The coverage of indexed journals in

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**Received:** October 29<sup>th</sup>, 2021

**Accepted:** January 9<sup>th</sup>, 2022; **Published:** March 16<sup>th</sup>, 2022

### Cite as:

Salgado-Fuentes CE, Torrecilla-Venegas R, Hernández-Rodríguez E. Producción científica cubana en SCOPUS sobre cardiología y cirugía cardiovascular durante 12 años. 16 de Abril [Internet]. 2022 [citado: fecha de acceso]; 61(283):e1547. Disponible en: [http://www.rev16deabril.sld.cu/index.php/16\\_04/article/view/1547](http://www.rev16deabril.sld.cu/index.php/16_04/article/view/1547)

### Conflict of interest

The authors declare no conflict of interest.

the Ibero-American area in SJCR has increased as a result of the process of scaling up journals to higher impact indexes. Of note is the incidence of SCOPUS in Scimago, where more than 22 600 journals are indexed according to the Elsevier R & D Solutions website<sup>5</sup>.

Currently, there are a few records of bibliometric studies that evaluate Cuban scientific production on cardiology and cardiovascular surgery in SCOPUS. For this reason, the aim of this study is to characterize the behavior of Cuban scientific production on cardiology and cardiovascular surgery in SCOPUS during 12 years.

## METHOD

**Type of study:** a bibliometric study of observational and descriptive design was carried out to evaluate the Cuban scientific production in SCOPUS on cardiology and cardiovascular surgery during 12 years.

**Universe and sample:** the universe consisted of 363 Cuban articles published on cardiology and cardiovascular surgery during 12 years in SCOPUS indexed journals. The entire universe was studied.

**Variables and data collection:** the following variables were analyzed: published documents; year of publication; citable documents (number of citable documents published during the year: articles, reviews and conferences); citations (number of citations of the published documents during the year); self-citations (number of self-citations of all dates received by the documents published during the year) and citations per document (citations per document published during the year).

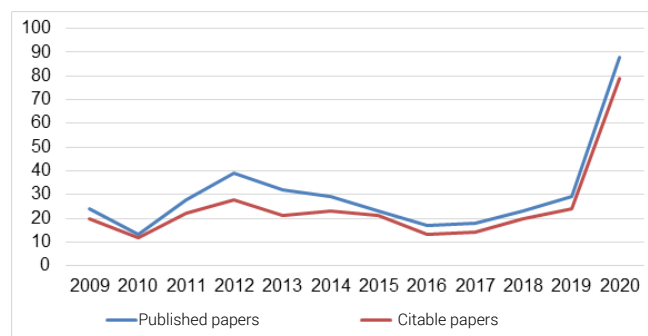
Data provided by Scimago Journal & Country Rank (SJCR) were used (<https://www.scimagojr.com/>). SJCR is an open access platform that contains metrics obtained from the metadata generated by journals indexed in Scopus. SJCR allows searches using various filters, including subject area, country, region, institution, open access, presence in SciELO and in the Web of Science. In addition, it allows to analyze the quartile in which it is located (position that the journal occupies depending on its SJR within the subject area), H index and other metric indicators<sup>6</sup>. In the study, a search of the data offered by this platform on publications in the area of "Medicine", "Latin America" region and "Cardiology and Cardiovascular Surgery" category, performed in Cuba from 2009 to 2020 was carried out.

**Statistical processing:** descriptive statistics were used and the data were stored in a database prepared for this purpose using IBM SPSS version 23 statistical software.

**Ethical standards:** the present study did not require approval by an ethics committee because the used data are publicly available, anonymous, and cannot be traced back to identifiable individuals.

## RESULTS

A total of 363 articles were published during the studied period, with an average of 30 publications per year. The year 2020 stood out as the year with the highest number of published papers (88) and 2010 the year with the lowest number (13). Of the published articles, 297 were citable documents (Figure 1).



Source: created database

Figure 1: Distribution of published papers and citable papers by year. SCOPUS. Year 2009-2020

A total of 1523 appointments were generated in this period for an average of 126.9 appointments per year; the highest number were made in 2012 (234) followed by 2009 (229) and 2020 had the lowest number with only 36 appointments (Figure 2).

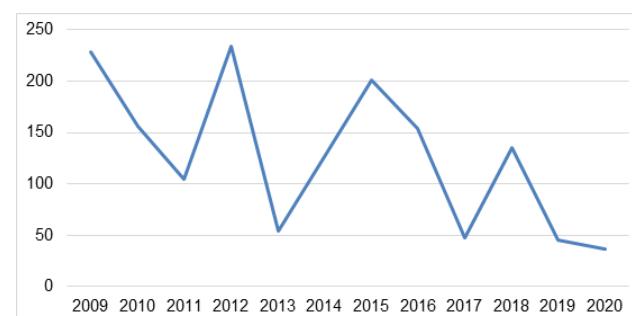


Figure 2. Distribution of citations per year

A total of 154 self-citations were made, 2012 was the year with the highest numbers (42) and 2010 with the lowest (2) with an average of 12,83 self-citations per year. Citations per document reached their highest values in 2010 (12) and their lowest values in 2020 (0,41) (Figure 3).

## DISCUSSION

Bibliometric studies are becoming increasingly relevant for the scientific community because of their valuable contributions to the knowledge of the state of an area or topic of research. It is recognized that they allow the determination of phenomena, tendencies and

regularities that occur in the field of science, which is of considerable value in the analysis of the results that are produced and published worldwide<sup>4</sup>.

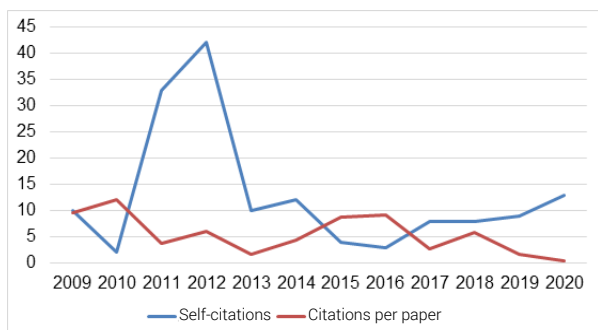


Figure 3. Distribution of self-citations and citations per paper

In the studied period, a total of 363 scientific publications were made, a result that coincides with that found by Hussein *et al.*<sup>7</sup> in their study of scientific activity on cardiovascular diseases in Arab countries. The similarities of the results found by this author in countries such as Oman and the United Arab Emirates stand out.

However, regarding tendencies in this study, a decrease in the number of articles published on these topics was identified, findings that contrast with the results of the present investigation. One of the causes of these differences is the promotion of scientific production by the Cuban Ministry of Public Health and the priority of local articles to be published in the Cuban Journal of Cardiology and Cardiovascular Surgery over foreign articles.

From 1996 to 2018 Atencio-Paulino *et al.*<sup>8</sup> found a total of 337 articles published in Peru on neurology and 260 on psychiatry and mental health, both results are quantitatively lower than those of the present study. The differences found become more marked if the longer period of studied time in that article is taken into account. This article explains the importance of collaboration and intersectoriality as factors that stimulate scientific production.

The average number of articles per year found in the present study considerably exceeds that reported by Vargas-Fernández *et al.*<sup>3</sup> who found an average of 3,61 articles per year in their study on Peruvian scientific production in cardiology and cardiovascular surgery between 1976 and 2020. This author refers that global cardiovascular research production increased steadily in the last decade, with an increase of more than 40 % in the number of publications in 2017 compared to 2008, and a significant increase from 2013. In the case of Cuba, considerable growth was identified in 2012 and from 2019 onwards.

Corona Martínez *et al.*<sup>9</sup> explain that improving the production of publications, in quantity and quality, requires

the training and development of professional competence in the area of scientific research. It is not possible to publish if there has not been adequate research. Publication is the last step of scientific research, so it is not unrelated to it. In other words, research is published. If it is not rigorously researched, it can hardly be published. Therefore, for a given individual, the chances of acceptance of a scientific article by any journal are directly proportional to the degree of development of his or her skills in the field of scientific research.

Besides of the aforementioned, there is a need to increase the number of places for training in master's and PhD programs in areas of knowledge that contribute to cardiology and cardiovascular surgery. This increase would create the potential to gradually increase the quantity and quality of scientific publications in these areas.

Citable documents showed a predominance, a result that coincides with that obtained by Gonzalez-Argote<sup>10</sup> in his study on Latin American scientific production on digital medical records. He states that this data represents a strength because it assumes that they are publications related to the results of relevant scientific research that generally contribute to new knowledge and have a greater impact.

In terms of citations, similar values to those found by Díaz-Chieng *et al.*<sup>11</sup> were observed, taking into account that in their study they found an average of 124,33 citations per year in the Scientific Information Magazine. The great similarity in the results may be related to the high impact indexes of the articles published in that journal, which brings it statistically close to the results found in SCOPUS.

Fornaris-Cedeño *et al.*<sup>12</sup> observed that 2009 was the year with the highest number of citations in the Cuban scientific production on neurosciences and neurology. The aforementioned results partially coincide with those of the present study, taking into account that the years in which the greatest number of citations were reported were 2009 and 2012.

Scientific production in cardiology and cardiovascular surgery showed much higher results than those obtained by the specialty of intensive care and emergency medicine. This statement is confirmed when comparing the results of the present study with those presented by Vitón Castillo<sup>13</sup> which shows that in 23 years a total of 277 citations were produced in intensive care and emergency medicine. This author states that in order to improve scientific production it is necessary to increase the number of articles by number and volume and to prioritize original articles, which should be processed in short periods of time.

Crisci *et al.*<sup>14</sup> refers that citations signify conceptual value (relationship of the work and its concepts with other articles) and there lies impact, influence, usefulness and relevance. It also expresses its repercussion on the reputation, recognition, visibility and productivity

of authors, journals and countries. He comments that in terms of citations, the so-called San Mateo effect is observed, according to which eminent scientific researchers reap much greater recognition than other lesser-known researchers for equivalent contributions. As mentioned above, a tendency towards an increase in the number of citations of published articles in cardiology and cardiovascular surgery would cause a feedback that would eventually increase the prestige and impact of Cuba in this area.

In terms of self-citations, lower values were identified than those reported by Fornaris-Cedeño *et al.*<sup>12</sup>; in this study, a total of 373 self-citations were identified. On this subject, Salvador-Oliván *et al.*<sup>15</sup> comment that there are occasions when self-citation is justified, but other times an excessively high rate of self-citations is detected or they are unjustified because they are not related to previous works. Self-citations by authors provide valuable information on the process of scientific communication, but if we wish to evaluate the impact of a work and/or author, external citations are more relevant, since they reflect the repercussion in the scientific community.

Citations per paper reached their highest numbers in the years 2010, 2015 and 2016; these were figures much higher than those observed by Vitón-Castillo<sup>13</sup>. He states that researchers should work to publish their articles in specialized journals indexed in SCOPUS and registered in these thematic areas, which improves the visibility of the specialty. However, to achieve this, a high methodological and research level must be achieved in specialists. The work of the provincial chapters of the society is necessary to achieve the necessary training.

Similar results were found by Corrales-Reyes *et al.*<sup>16</sup> in a study on Cuban scientific production on Stomatol-

ogy in the period 2007-2016. In both studies, temporary tendencies towards an increase in citations per document were observed, irregularly though. In the last three years there was a slight decrease that may be related to the marked increase in the number of publications.

The limitations of the study include the absence of bibliometric indicators and indexes such as impact factors. It should be noted that neither the SCImago Journal Rank nor the H index were studied as part of the analysis.

## CONCLUSIONS

Cuban scientific production on cardiology and cardiovascular surgery has a marked tendency to increase, however, it is necessary to increase scientific training in these areas in order to improve the quality and impact and thus increase the number of citations. Self-citations maintain lower values than those found in other thematic areas and a tendency to decrease.

## AUTHORSHIP

Carlos Enrique Salgado-Fuentes: conceptualization; data curation; formal analysis; research; methodology; project management; original draft.

Rolando Torrecilla-Venegas: supervision; resources; formal analysis; conceptualization.

Eglis Hernández-Rodríguez: supervision; resources; formal analysis; conceptualization; data curation.

## FUNDING

The authors did not receive funding for this article.

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## Producción científica cubana en SCOPUS sobre cardiología y cirugía cardiovascular durante 12 años

### RESUMEN

**Introducción:** las enfermedades cardiovasculares son la principal causa de muerte en el mundo y ante esto la investigación científica es un mecanismo para mejorar la salud de las poblaciones. En este contexto la bibliometría emplea herramientas que ofrecen información sobre el comportamiento de la ciencia en diversas ramas del conocimiento. **Objetivo:** caracterizar el comportamiento de la producción científica cubana en cardiología y cirugía cardiovascular en SCOPUS. **Métodos:** se realizó un estudio bibliométrico de diseño observacional y descriptivo en el que se utilizaron los datos ofrecidos por Scimago Journal & Country Rank. Se realizó una búsqueda de los datos ofrecidos por esta plataforma de las publicaciones sobre cardiología y cirugía cardiovascular realizadas en Cuba desde el año 2009 hasta 2020. **Resultados:** en el período estudiado fueron publicados un total de 363 documentos para un promedio de 30 publicaciones por año. Se destacó el año 2020 como el año con mayor cantidad de documentos publicados (88) y 2010 el año con menor cantidad (13). Fueron hechas en este periodo un total de 1523 citas para un promedio de 126,9 citas por año siendo el año 2012 en el que mayor cantidad de citas se hicieron (234) seguido del año 2009 (229) y el 2020 el de menor cantidad (36). **Conclusiones:** la producción científica cubana sobre cardiología y cirugía cardiovascular tiene una marcada inclinación al aumento, sin embargo se hace necesario incrementar la formación científica en esas áreas con el propósito de mejo-

rar la calidad e impacto y de esta forma aumentar el número de citas. Las autocitas mantienen valores inferiores a los encontrados en otras áreas temáticas y una tendencia a la disminución.

**Palabras clave:** Cardiología; Enfermedades Cardiovasculares; Bibliometría.

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