



Research article

## Contribution in the scientific production of Peruvian universities against COVID-19

Avid Roman-Gonzalez<sup>1\*</sup>, Patricia Condori<sup>2</sup>, Natalia I Vargas-Cuentas<sup>3</sup><sup>1</sup> Aerospace Sciences & Health Research laboratory (INCAS - Lab) Universidad Nacional Tecnológica de Lima Sur, Lima, Peru<sup>2</sup> Business on Engineering and technology, S.A.C. (BE Tech), Lima, Peru<sup>3</sup> Universidad de Ciencias y Humanidades, Lima, Peru

### ABSTRACT

Humankind is living more than a year in a COVID-19 pandemic. Faced with this international health emergency situation, scientific research is a tool to combat it. Universities, which must contribute human knowledge, are called upon to do research to combat COVID-19 in different aspects. This work analyses which Peruvian universities have contributed the most to developing projects and publications related to COVID-19. The results show that it is mainly the universities in the capital, Lima, that have won funds from the government to develop projects.

**Keywords:** COVID-19, Coronavirus, SARS-Cov2, Scientific Research, Peru, Funding, Research projects.

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**Correspondence:** Avid Roman-Gonzalez\* ✉ avid.roman-gonzalez@ieee.org

Aerospace Sciences & Health Research Laboratory (INCAS-Lab), Universidad Nacional Tecnológica de Lima Sur, Lima, Peru

### INTRODUCTION

COVID-19 is a type of pneumonia, which began at the end of 2019, caused by a virus belonging to the coronavirus family [1]. According to the values reported by the World Health Organization (WHO) [2], for 23rd August 2021, worldwide, there are 211,288,358 confirmed cases and 4,422,666 deaths. Since 11th March 2020, COVID-19 is considered a pandemic by the WHO.

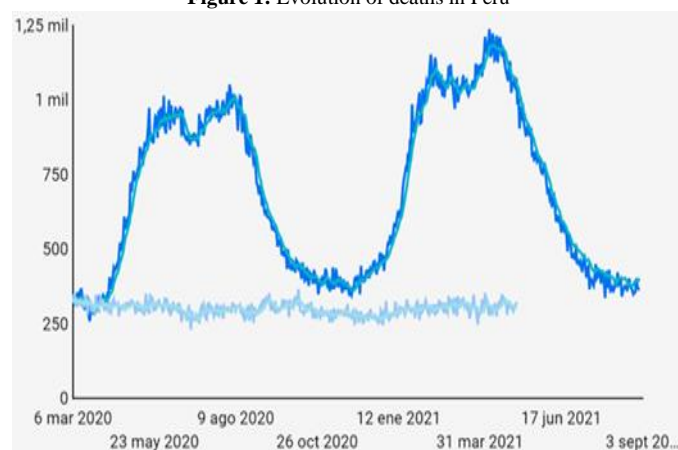
In Peru, the first case was announced on Friday, 6th March 2020 [3]. It has already gone through 2 waves of the disease and is waiting for the third wave (September 2021) despite the vaccination process. In Figure 1, one can see the evolution of deaths (reported by the National Information System of Deaths- SINADEF for its acronym in Spanish) in Peru since the first detected case. It is essential to mention that SINADEF reports all deaths, not only those related to COVID-19, but the difference in the number of deaths from previous years on the same dates is an indicator of the increase in deaths due to COVID-19. This data was processed by Open COVID Peru [4].

In Figure 1, 2 waves can be observed, the first between May and August 2020 with two crests and the second wave between February and June 2021 also with two higher crests than in the first wave.

Regarding the vaccination process in Peru, official data from the Ministry of Health confirm that daily infections and deaths from Covid-19 are increasing, leaving 2 153 092 confirmed cases and more than 198 420 deaths. The vaccination process in Peru against the

coronavirus is aimed at people over 18 years of age and foreigners registered by the Migration Directorate [5]. The procedure follows the recommendations established by the High-Level Technical Advisory Team, created under Ministerial Resolution, taking into account the following points; epidemiological criteria, ethical principles, and human rights. Vaccination is carried out sequentially in descending age groups; on the other hand, some factors prioritize the vaccination process for citizens, such as disability or various comorbidities, native communities with high vulnerability and territories with greater risk of contagion. To date, more than 19,160,649 vaccines have already been applied, with an index of 78.7% of vaccines completed by the inhabitants [6].

**Figure 1:** Evolution of deaths in Peru



This research work continues as follows, Section II shows the followed methodology to data collection and data processing. Section III gives the obtained results of the analysis, and finally, Section IV presents the discussion and conclusions of the work.

## METHODOLOGY

As already mentioned, universities play an essential role in the generation of knowledge through research. In addition, universities are looking to increase their scientific production to improve their position in the research rankings. What is why the analysis of the scientific production of the universities is made, with greater reason under the current situation of COVID-19 as presented. To measure the contribution of Peruvian universities against COVID-19, one will analyse two essential aspects; on the one hand, one will collect data on which universities received funding for the development of research projects, and on the other hand, one will analyse the number of scientific articles published and indexed in SCOPUS database related to COVID-19.

### Calls for Funding Research Projects

In Peru, the governing body of science, technology and innovation is the National Council of Science, Technology and Technological Innovation (CONCYTEC for its acronym in Spanish). CONCYTEC has an executing branch initially called the National Fund for Scientific, Technological and Technological Innovation Development (FONDECYT for its acronym in Spanish), now called PROCIENCIA. PROCIENCIA is in charge of capturing, managing and channelling resources to finance activities related to the training of human resources, the development of scientific research, and the technological application of knowledge.

Since the beginning of the pandemic, until now, FONDECYT (today PROCIENCIA) has launched five calls to finance research proposals that contribute to the fight against COVID-19.

The first call was entitled 'Proyectos Especiales: Respuesta al COVID-19' (Special Projects: Response to COVID-19). In this call, 600 proposals were presented, of which only 23 projects were financed.

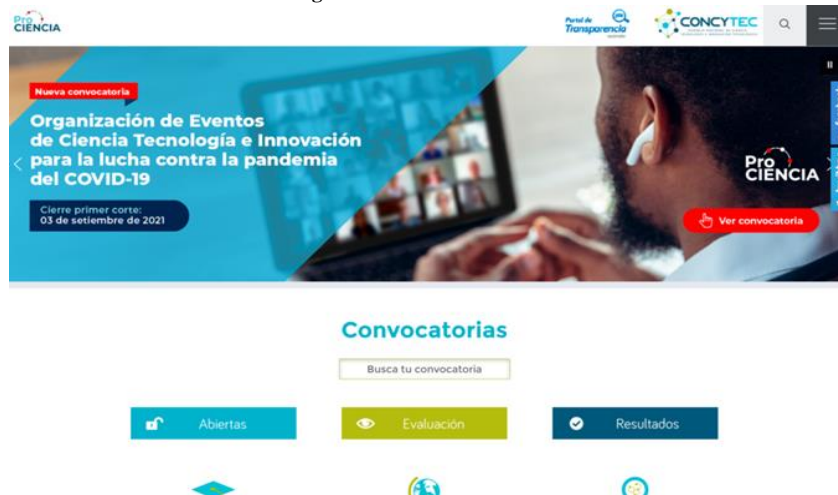
The second call was entitled "Proyectos Especiales: Modalidad – Necesidades Emergentes al COVID-19 2020-02" (Special Projects: Modality - Emerging Needs to COVID-19 2020-02). In this call, 496 proposals were presented, of which only 21 projects were financed.

The third call was entitled "Proyectos Especiales: Modalidad – Programas de Capacitación en Respuesta al COVID-19" (Special Projects: Modality - Training Programs in Response to COVID-19). In this call, a total of 20 proposals were submitted, of which only four proposals were funded.

The fourth call was entitled "Proyectos Especiales: Modalidad – Escalamiento de Proyectos COVID-19" (Special Projects: Modality - Escalation of COVID-19 Projects). In this call, a total of 31 proposals were presented, of which only five projects were financed. Finally, the fifth call was entitled "Proyectos Especiales: Modalidad - Escalamiento de kits de diagnóstico, dispositivos y tecnologías médicas para el COVID-19" (Special Projects: Modality - Scaling of diagnostic kits, devices and medical technologies for COVID-19). In this call, a total of 30 proposals were presented, of which only five projects were financed.

To extract this information, one accessed the FONDECYT website (<http://www.fondecyt.gob.pe>), shown in Figure 2.

Figure 2: FONDECYT website



On the FONDECYT website, one can find the different open calls, under evaluation calls, and past calls' results.

### Scientific Articles Published and Indexed in SCOPUS

The SCOPUS database will be used to evaluate the scientific production related to COVID-19 of the universities, an internationally

recognized database that indexes scientific journals that meet specific criteria of scientific rigour.

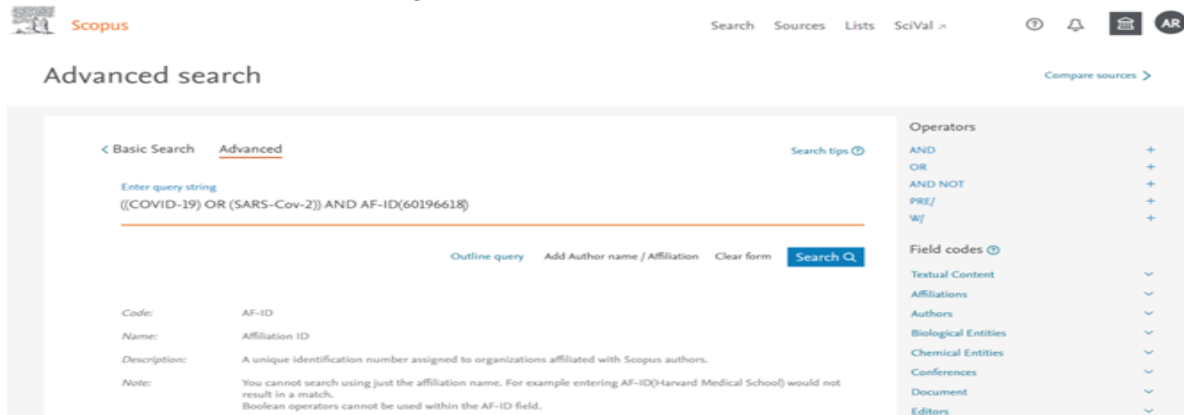
For identifying the scientific production of each Peruvian university, an advanced search was made with the keywords "COVID-

19" or "SARS-Cov-2", since both are the terms most related to the subject under study; Likewise, it was combined with the SCOPUS ID of each university, as shown in Figure 3. The equation used in the search is the following:

((COVID-19) OR (SARS-Cov-2)) AND AF-ID (USID)

Where USID is the SCOPUS ID of the university

Figure 3: Advanced search in SCOPUS website



## RESULTS

According to the collected data from the FONDECYT or PROCIENCIA website, the universities that have obtained financing for the development and execution of their proposals, in the different calls, are shown in the following tables from Table 1 to Table 5.

Table 1: Proposals presented and selected in call 1

Call 1: Proyectos Especiales: Respuesta al COVID-19			
University	# Proposals	# Selected Proposals	% Selected of Proposals
Universidad peruana cayetano heredia	35	5	14,29
Pontificia universidad catolica del peru	27	3	11,11
Universidad del pacifico	2	1	50,00
Universidad peruana de ciencias aplicadas	7	1	14,29
Universidad nacional de san agustín	15	1	6,67
Universidad nacional mayor de san marcos	41	1	2,44
Universidad nacional de ingeniería	25	1	4,00
Universidad de ciencias y humanidades	5	1	20,00
Universidad ricardo palma	8	1	12,50
Universidad catolica de santa maria	13	1	7,69
Universidad nacional agraria la molina	3	1	33,33

Table 2: Proposals presented and selected in call 2

Call 2: Proyectos Especiales: Modalidad – Necesidades Emergentes al COVID-19 2020-02			
University	# Proposals	# Selected Proposals	% Selected of Proposals
Pontificia universidad catolica del peru	35	4	11,43
Universidad peruana cayetano heredia	40	3	7,50
Universidad nacional mayor de san marcos	30	2	6,67
Universidad del pacifico	5	1	20,00
Universidad peruana de ciencias aplicadas	5	1	20,00
Universidad andina del cusco	1	1	100,00

Table 3: Proposals presented and selected in call 3

Call 3: Proyectos Especiales: Modalidad – Programas de Capacitación en Respuesta al COVID-19			
University	# Proposals	# Selected Proposals	% Selected of Proposals
Universidad peruana cayetano heredia	4	2	50
Universidad continental	1	1	100
Universidad de ingeniería y tecnología	1	1	100

Table 4: Proposals presented and selected in call 4

Call 4: Proyectos Especiales: Modalidad – Escalamiento de Proyectos COVID-19			
University	# Proposals	# Selected Proposals	% Selected of Proposals
Pontificia universidad catolica del peru	8	2	25
Universidad peruana cayetano heredia	2	1	50
Universidad nacional de ingeniería	4	1	25

Table 5: Proposals presented and selected in call 5

Call 5: Proyectos Especiales: Modalidad - Escalamiento de kits de diagnóstico, dispositivos y tecnologías médicas para el COVID-19			
University	# Proposals	# Selected Proposals	% Selected of Proposals
Pontificia universidad catolica del peru	5	2	40,00
Universidad peruana cayetano heredia	3	1	33,33
Universidad nacional mayor de san marcos	2	1	50,00

It should be mentioned that the calls were not only open to universities, but research institutes and private companies could also participate. However, the scope of the present work only covers the analysis of the contribution of the universities and therefore only collects data from the funded universities.

Regarding scientific production (scientific articles published in journals indexed in SCOPUS), of the 94 institutions licensed in Peru, only 80 have publications between 2020 - 2021 (data collected on August 23, 2021). Table 6 shows the top 30 universities with the

highest scientific production related to COVID-19. It is appropriate to mention that the scientific production related to COVID-19 is not only framed in the health issue but also engineering issues (for example, the development of medical devices), the social sciences (for example, the issue of social isolation or the effects of COVID-19 on tourism, on the economy, etc.), among other issues of the different research topics that universities have.

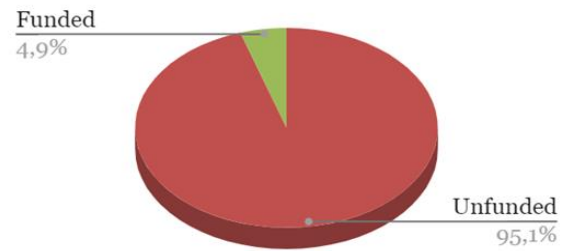
**Table 6:** Scientific production of Peruvian licensed universities related to COVID-19 (indexed in SCOPUS)

S. No.	University	Publications
1	Universidad Peruana Cayetano Heredia	180
2	Universidad Científica del Sur	124
3	Universidad Nacional Mayor de San Marcos	119
4	Universidad San Ignacio de Loyola	81
5	Universidad Peruana de Ciencias Aplicadas	66
6	Universidad Privada del Norte	62
7	Pontificia Universidad Católica del Perú	61
8	Universidad César Vallejo	57
9	Universidad Continental	47
10	Universidad Nacional de San Agustín	47
11	Universidad de Lima	40
12	Universidad Nacional Federico Villarreal	37
13	Universidad Nacional Hermilio Valdizán	36
14	Universidad Privada San Juan Bautista	36
15	Universidad de San Martín de Porres	33
16	Universidad Ricardo Palma	29
17	Universidad Peruana Unión	27
18	Universidad de Ciencias y Humanidades	26
19	Universidad Señor de Sipán	24
20	Universidad Nacional de Trujillo	23
21	Universidad Católica de Santa María	23
22	Universidad Privada Norbert Wiener	17
23	Universidad del Pacífico	17
24	Universidad Privada Antenor Orrego	16
25	Universidad Nacional de Ingeniería	16
26	Universidad Nacional Tecnológica De Lima Sur	14
27	Universidad Peruana Los Andes	11
28	Universidad Nacional de San Antonio Abad del Cusco	11
29	Universidad Nacional del Centro del Perú	11
30	Universidad Tecnológica del Perú	11

## DISCUSSION AND CONCLUSIONS

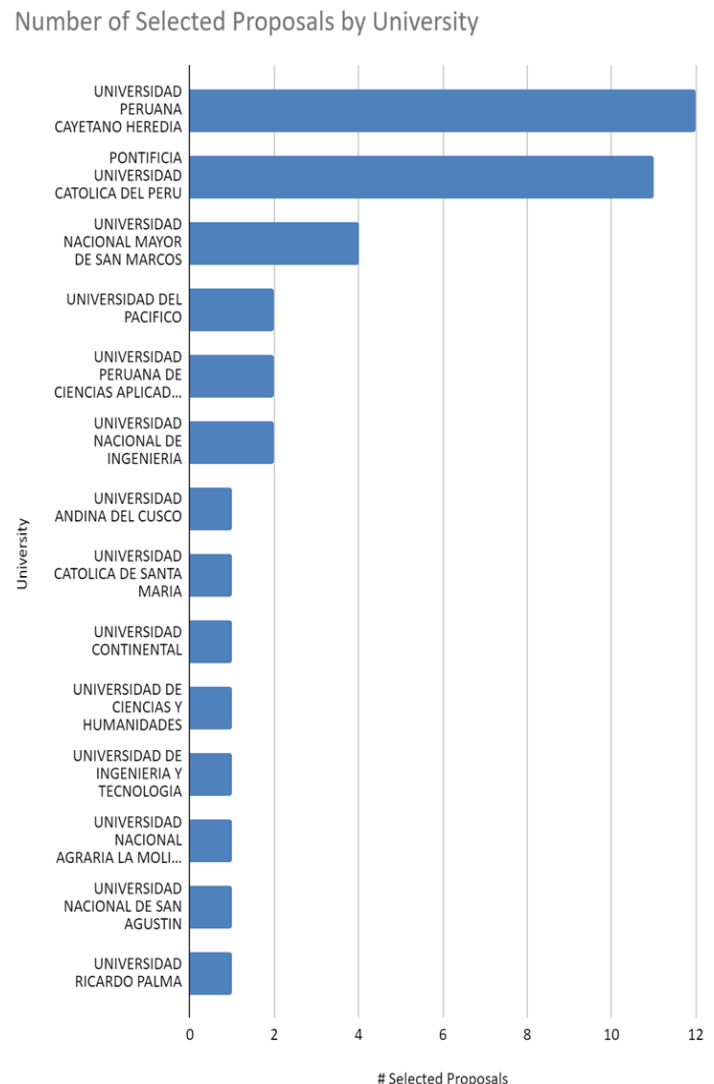
According to the obtained data, in Peru, significant economic resources have been allocated to finance research projects related to COVID-19 and help generate knowledge that allows us to face this pandemic. Likewise, there has been significant interest in proposing research ideas; unfortunately, not all proposals can be financed since resources are limited. In the call for proposal 1, only 3.83% of the proposals were selected to receive funding. In the case of the second call, 4.23% of proposals were selected. For the third call, 20% received financing. In the call for proposal 4, 16.13% of proposals were selected to receive funding. Finally, in the case of the fifth call, 16.67% of proposals were selected. In total, counting the five calls, 1177 proposals were submitted, representing a large number of initiatives by researchers to contribute to the fight against COVID-19; however, only 58 proposals were selected to receive funding, which means that approximately 1 in 20 proposals receives funding. Figure 4 shows the proportion of funded and unfunded proposals.

**Figure 4:** Percentages of funded and unfunded projects within the 5 FONDECYT calls for proposals



Analysing individually the number of proposals selected by each university, one can mention that the Universidad Peruana Cayetano Heredia is the university that has won the most competitive funds with a total of 12 proposals selected from the five calls under study. In second place is the Pontificia Universidad Católica del Perú with 11 proposals that received funding, and completing the Top 3 is the Universidad Nacional Mayor de San Marcos with four selected proposals. In Figure 5, one can see the ranking of the universities with the most proposals selected to receive financing for the execution of their projects related to COVID-19.

**Figure 5:** Total number of selected proposals for each university



If one analyses as a whole, the number of scientific articles published and indexed in SCOPUS added to the number of projects that obtained funding from FONDECYT; one can conclude that the Universidad Peruana Cayetano Heredia is the university that researches the most and contributes the most with knowledge related to the COVID-19 pandemic.

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NA

#### **DECLARATIONS**

##### **Funding**

NA

##### **Conflict of interest**

NA

##### **Ethical approval**

NA

#### **REFERENCES**

1. Xu Z, Shi L, Wang Y, et al, 2020. Pathological findings of COVID-19 associated with acute respiratory distress syndrome, *The Lancet Resp. Med*, 8(4), 420-422.
2. Chen H, Guo J, Wang C, et al, 2020. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women, a retrospective review of medical records, *the Lancet*, 395(10226), 809-815.
3. Ministerio de Salud, 2021. Minsa Casos confirmados por coronavirus COVID-19 ascienden a, 2, 153-092 en el Perú (Comunicado N°669).
4. Ministerio de Salud, 2021. Resolución Ministerial, 326, MINSA.
5. Gregorio-Chaviano O, Limaymanta CH, López-Mesa EK, 2020. Bibliometric evaluation of latin American contributions on COVID-19. *Análisis bibliométrico de la producción científica latinoamericana sobre COVID-19*, *Biomd. Rev. del. Inst. Nac. De. Salud*, 40(2), p-104-115.
6. Roman-Gonzalez A, Vargas-Cuentas NI, 2018. Scientific production in the 50 first universities licensed by SUNEDU. *Proc. IEEE Sci. and Hum Int. Resch. Conf., SHIRCON*, 12.

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