
Insights on the Impact of Covid-19 Papers Written by Affiliates of Romanian Universities with Medicine Specialization

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ABSTRACT

Due to its impact on all human activity, the new virus has therefore aroused increased interest in research. A large number of medical papers related to COVID-19 have been published as a result of the scientific community response to this emerging infectious disease. All measures that combat the spread of the disease came at a cost and the people had to add one more hardship which contributed to the rise in social inequality. Moreover, the costs for internet access, proper equipment to support online education, private healthcare, facemasks, and disinfectants have become a burden for a segment of Romanian society.

In this study, 18 Romanian universities a Medicine bachelor specialisation, both public and private, were analysed to determine the dataset query from Web of Science. Our research aimed to assess the impact of COVID-19 papers written by authors affiliated with Romanian universities with a medicine specialisation, which are

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the factors that influence the likelihood of a paper being cited and how the number of citations varies by university type.

The obtained results reveal that University of Medicine and Pharmacy “Carol Davila” from Bucharest records the highest number of published papers, while “APOL-LONIA” University of Iași has the highest number of citations in both WOS Core Collection and in all WOS Databases per research. Furthermore, there is a significant difference in the number of citations between papers with and without a PUB MED ID. Logistic models show that neither the type of university nor the property type of the university (public or private) are determinants of the likelihood of an article being cited in the WOS core collection or in all WOS databases. As a consequence, a research paper with PUB MED ID and a higher number of pages, has a higher chance to be cited.

Keywords: Romania, research assessment measures, bibliometric, COVID-19, research productivity

JEL Classification: I200, I230

1. INTRODUCTION

The COVID-19 pandemic and its consequences led to a broad impact in all human activity. The lack of information and the need to adopt recommendations to tackle the new disease led to an increased activity in the online environment, social media, traditional media and in publicity. Due to the initial adopted measures, as a result of the decrease in mobility and lockdowns (Andrei et al. 2021), people more time with their families at home, but the economy also started to be affected (Albu et al., 2020; Păunescu, and Matyus, 2020) and measures had to be imposed to protect the loss of jobs.

For a while, working from home where possible was favoured, education shifted to online learning and only basic services kept running business as usual. Such changes came suddenly with unforeseen consequences for the economy, challenging the democratic way of life (Raiu and Mina-Raiu, 2022), even questioning the notion of political freedom (Raiu and Juknevičienė, 2021). All measures that combat the spread of the new disease came at a cost (Onofrei et al., 2021) and the people had to add one more hardship which in some of the cases increased the social inequality. In this regard, the costs for facemasks, disinfectants, healthcare, internet access, proper equipment to support online education (Ionescu et al., 2020) became a burden for a population segment in Romania. Not leaving any citizen behind (United Nations, 2015) is the starting point in the analysis of measures that need to be taken so that people are not discriminated, and inequalities are reduced.

The degree of interconnection between people through online social networks such as Facebook, Twitter and many others is unprecedented in human history, and this facilitated the spread of conflicting information (Garrett, 2020) due to existing uncertainties. Limaye et al. (2020) pointed out

that the isolation and physical distancing in the context of reducing the spread of COVID-19 can deepen the use of social media networks as individuals try to maintain connectivity with each other.

This situation has accelerated interest in research and analysis in this field has increased the number of published unreviewed research. Legitimate concerns are also highlighted in the work of Horbach (2020), who studied the length of the publishing process in medical journals before and after the pandemic. The published results reveal that the process is accelerated for publishing coronavirus work, while for the rest, the process remained unchanged.

Although the accelerated publishing process has increased the dissemination of information, the peer review expediting in scientific and medical research adds yet a new pressure to the mechanisms for transmitting information in the current situation. As Bagdasarian et al. (2020) pointed out, many journals provide rapid peer review for COVID-19 manuscripts, encouraging pre-print publication and speeding up the publishing process.

Published papers on COVID-19 can be found in the fields of health, social sciences, economics, education, communication, and new technologies. Recent research of Paun et al. (2020) suggests that the Google Scholar Citations and the Mendeley Citations (reads) are potential predictors of WOS citations.

In this study, we build the database used in our analysis focusing on Romanian universities with bachelor specialisation in Medicine. Therefore, we investigated whether there is an impact of COVID-19 research papers written by authors affiliated with Romanian universities with a medicine specialisation. We examine the number of citations by type of university or indexing in other databases by analysing the factors that influence the likelihood that a paper in this specific database to be cited.

2. METHODOLOGY

For the purpose of this paper, the data was retried from Web of Science on April 30th 2022. The database was queried for author affiliation and topic. In the affiliation field, we entered every Romanian university that has a Medicine bachelor specialisation:

- University of Medicine and Pharmacy “Carol Davila” Bucharest
- “Grigore T. Popa” University of Medicine and Pharmacy
- “Iuliu Hașeganu” University of Medicine and Pharmacy
- Victor Babeș University of Medicine and Pharmacy Timișoara
- Transilvania University of Brașov

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- “Lucian Blaga” University of Sibiu
 - Oradea University
 - “Dunarea de Jos” University of Galați
 - University of Medicine and Pharmacy Craiova
 - George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș
 - Ovidius University of Constanța
 - Ștefan cel Mare University of Suceava
 - Titu Maiorescu University
 - University of Pitești
 - Western University “Vasile Goldiș” from Arad
 - “APOLLONIA” University of Iași
 - “Constantin Brâncuși” University of Târgu Jiu
 - Bioterra University

This list was taken from the open datasets’ portal data.gov.ro and contains information about the number of students by bachelor for each university as well as the type of university (public or private). When querying the WOS database, Bioterra didn’t return records.

To answer the first research question, a graphical analysis was performed to assess the number of the citations in the WOS core collection as well as in all WOS databases. The characteristics of the article (number of pages, year of publication, article type, whether or not the article has a PUBMED ID, Web of Science Index), as well as universities of the authors (property type, whether the university is multidisciplinary or has exclusively medical specialisations) were considered.

To answer the second research question, the ANOVA technique was applied to test the following set of null hypotheses:

- Null hypotheses 1: There is no significant difference in the number of WOS Core Collection citations between papers with a PUB MED ID and papers without such an ID
- Null hypotheses 2: There is no significant difference in the number of citations in all WOS databases between papers with a PUB MED ID and papers without such an ID
- Null hypotheses 3: There is no significant difference in the number of WOS Core Collection citations between papers belonging to a public university affiliate and a private university affiliate
- Null hypotheses 4: There is no significant difference in the number of citations in all WOS databases between papers belonging to a public university affiliate and a private university affiliate

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- Null hypotheses 5: There is no significant difference in the number of WOS Core Collection citations between papers belonging to an affiliate to a university with only medical degree programs and one to a multidisciplinary university
 - Null hypotheses 6: There is no significant difference in the number of citations in all WOS databases between papers belonging to an affiliate to a university with only medical degree programs and one to a multidisciplinary university.

The chosen threshold is 5%. In order to answer the third question, two logistic regression models were built:

$$\text{Model 1: } \log\left(\frac{P_i}{1 - P_i}\right) = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5$$

$$\text{Model 2: } \log\left(\frac{Q_i}{1 - Q_i}\right) = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5$$

P_i – the probability for a paper to be cited in WOS Core Collection;

Q_i – the probability for a paper to be cited in all WOS Databases;

$X_1 = 1$ if a paper has a PUB MED ID; 0 otherwise

$X_2 =$ Number of pages

$X_3 =$ Year of publication

$X_4 = 1$ if the university queried is multidisciplinary; 0 otherwise

$X_5 = 1$ if the university queried is public; 0 otherwise

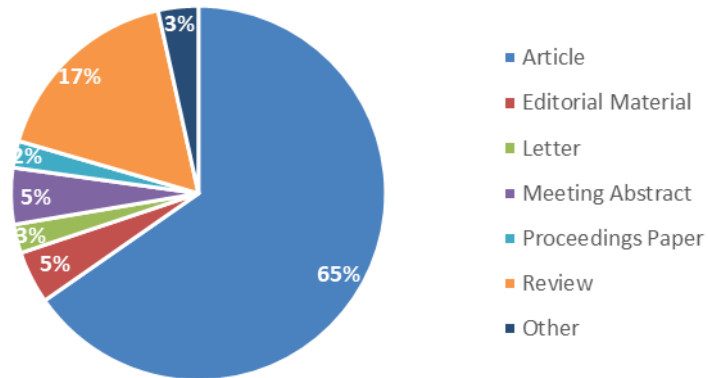
Factors are removed from the model if the z-test probability is higher than 5%.

3. RESULTS

Firstly, the results of the exploratory analysis of the characteristics of the papers taken from the query are presented. 65% of the retrieved papers are research articles followed by reviews (Figure 1). Moreover, over half of the papers are between 1 and 10 pages long, while 36% of them are between 11 to 20 pages long (Figure 2). Most of the papers were written in 2021 (Figure 3) and have a PUB MED ID (Figure 4) meaning that they are present in the PUB MED database. Additionally, approximately half of all the analysed materials were published in journals indexed Science Citation Index Expanded (Table 1).

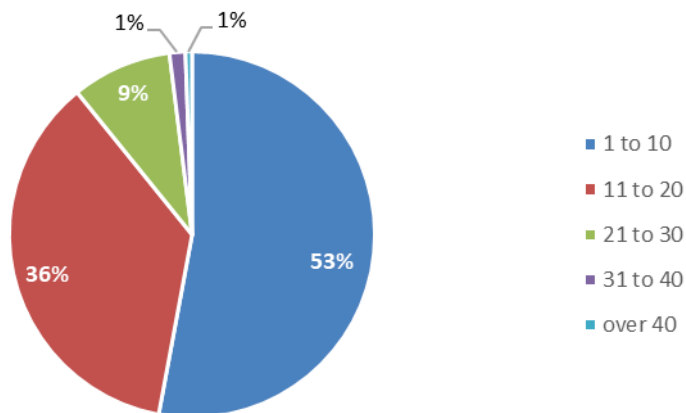
Share of papers by type of document; source: designed by the authors based on WOS data

Figure 1



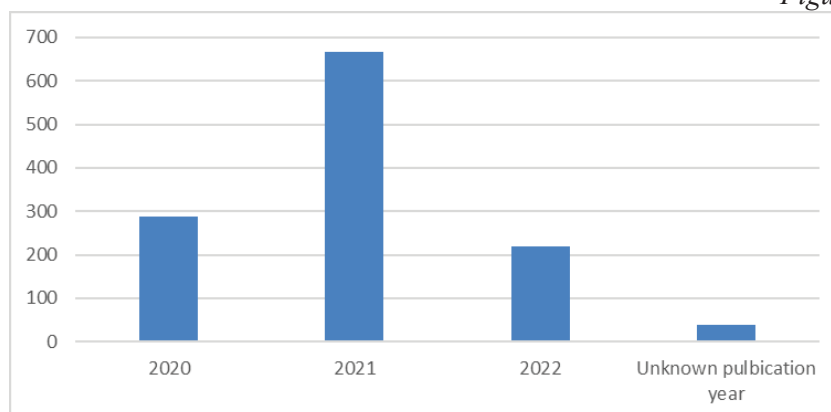
Share of papers by number of pages; source: designed by the authors based on WOS data

Figure 2



Number of papers by year of publication; source: designed by the authors based on WOS data

Figure 3



Number of papers by Web of Science Index; source: designed by the authors based on WOS data

Table 1

Web of Science Index	Number of papers
Conference Proceedings Citation Index - Science (CPCI-S)	22
Conference Proceedings Citation Index - Science (CPCI-S); Conference Proceedings Citation Index - Social Science & Humanities (CPCI-SSH)	3
Conference Proceedings Citation Index - Social Science & Humanities (CPCI-SSH)	3
Emerging Sources Citation Index (ESCI)	231
Science Citation Index Expanded (SCI-EXPANDED)	676
Science Citation Index Expanded (SCI-EXPANDED); Conference Proceedings Citation Index - Science (CPCI-S)	14
Science Citation Index Expanded (SCI-EXPANDED); Social Science Citation Index (SSCI)	215
Social Science Citation Index (SSCI)	46
Social Science Citation Index (SSCI); Arts & Humanities Citation Index (A&H/C)	1

Share of papers by PUB MED status; source: designed by the authors based on WOS data

Figure 4

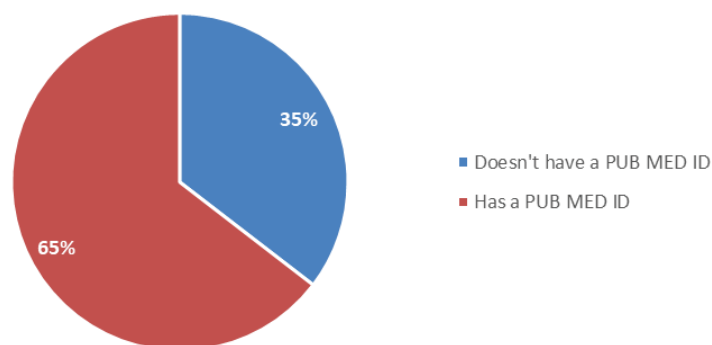


Table 2 shows the number of papers by the number of citations in Web of Science Core Collection as well as in all Web of Science databases. Most of the papers were not cited at all or received at most 9 citations. One paper was cited 935 times in the WOS Core Collection database and 956 times in all WOS databases.

Number of papers by number of citations; source: designed by the authors based on WOS data

Table 2

Times cite in WOS Core Collection	Number of papers	Times cite in all WOS databases	Number of papers
0	536	0	534
1 to 9	517	1 to 9	516
10 to 20	82	10 to 20	84
21 to 161	75	21 to 166	76
935	1	956	1

Table 3 presents the number of papers by university while Figure 5 displays the number of citations number of citations in WOS Core Collection per paper and the number of citations in all databases per paper by university. The highest number of papers is registered for the University of Medicine and Pharmacy “Carol Davila” Bucharest, yet the highest number of citations in WOS Core Collection as well as in all WOS Databases per paper is registered for the “APOLLONIA” University of Iași.

Number of papers by University; source: designed by the authors based on WOS data

Table 3

University	Number of papers
University of Medicine and Pharmacy “Carol Davila” Bucharest	298
“Grigore T. Popa” University of Medicine and Pharmacy	127
“Iuliu Hașeganu” University of Medicine and Pharmacy	126
Victor Babeș University of Medicine and Pharmacy Timișoara	117
Transilvania University of Brașov	98
“Lucian Blaga” University of Sibiu	67
Oradea University	65
“Dunărea de Jos” University of Galați	63
University of Medicine and Pharmacy Craiova	59
George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș	52
Ovidius University of Constanța	45
Ștefan cel Mare University of Suceava	37
Titu Maiorescu University	24
University of Pitești	11
Western University “Vasile Goldiș” from Arad	10
“APOLLONIA” University of Iași	7
“Constantin Brâncuși” University of Târgu Jiu	5

Number of citations in WOS Core Collection per paper and Number of citations in all databases per paper by university; source: designed by the authors based on WOS data

Figure 5

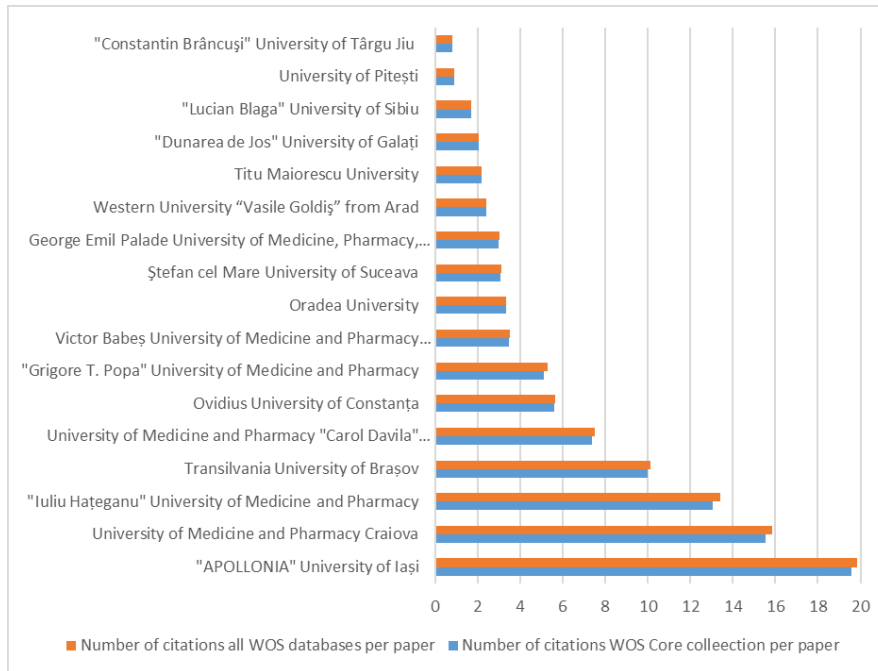


Table 4 shows the number of citations in WOS Core Collection and all WOS databases, the number of papers and number of citations per paper by university's property type. The same indicators by type of university (multidisciplinary or with medical study program only) are displayed in Table 5. Public universities have a higher number of citations per paper as well as a higher number of papers compared to private ones. Universities with only medical study program have approximately the same number of papers as multidisciplinary ones, yet a considerably higher number of citations per paper.

Number of citations in WOS Core Collection and all WOS databases, number of papers, number of citations per paper by university's property type; source: designed by the authors based on WOS data

Table 4

	Number of citations in WOS Core collection	Number of citations in all databases	Number of papers	Number of citations in WOS Core collection per paper	Number of citations in all WOS databases per paper
Private universities	213	215	41	5.20	5.24
Public universities	7782	7935	1170	6.65	6.78
Total	7995	8150	1211	6.60	6.73

Number of citations in WOS Core Collection and all databases, number of papers, number of citations per paper by type of university; source: designed by the authors based on WOS data

Table 5

	Number of citations in WOS Core collection	Number of citations in all databases	Number of papers	Number of citations in WOS Core collection per paper	Number of citations in all WOS databases per paper
Universities with only medical specialisations	5161	5265	600	8.60	8.78
Multidisciplinary university	2834	2885	611	4.64	4.72
Total	7995	8150	1211	6.60	6.73

Secondly, the results of the ANOVA procedure are presented (Table 6). There is a significant difference in the number of citations between papers with a PUB MED ID and papers without one. Similar results are obtained when the type of university is considered. However, there is no significant difference between papers published by affiliates in private universities or public ones. Yet, this might occur because there were only 41 of 1211 papers written by authors from private universities.

Results for the ANOVA procedure – Number of citations in WOS Core Collection and WOS all databases by several binary variables; source: designed by the authors based on WOS data

Table 6

	F-Statistic
Number of WOS Core Collection citations by whether or not the paper has a PUB MED ID	15.78*
Number of citations in all WOS databases by whether or not the paper has a PUB MED ID	15.78*
Number of WOS Core Collection citations by type of property of the university	0.06
Number of citations in all WOS databases by type of property of the university	0.09
Number of WOS Core Collection citations by type university (multidisciplinary or not)	4.94*
Number of citations in all WOS databases by type university (multidisciplinary or not)	4.93*

*Significant 5%

Tables 7 and 8 show the results of the logistic models 1 and 2. The Hosmer-Lemeshow test shows a probability above 5%, indicating a good fit of the model (Analytica Datalab, 2019). Yet, the coefficients of X_4 and X_5 variables are significant. This shows that neither the type of university (multidisciplinary or exclusively medical) neither the property type of the university (public or private) are determinants of the likelihood that an article will be cited in WOS core collection or in all WOS databases. Tables 9 and 10 show the results of these models after eliminating non-significant variables. The results are very similar for models 1 and 2 because there are only 2 papers cited in other WOS databases but Core Collection. If the paper has a PUB MED ID and a higher number of pages, it has a higher chance to be cited. Also, recent papers have a lower probability to be cited.

Logistic regression results - model 1; source: designed by the authors based on WOS data

Table 7

Variable	Coefficient	z-statistic
X_1	1.87*	11.25
X_2	0.08*	7.41
X_3	-1.88*	-14.05
X_4	-0.20	-1.44
X_5	-0.32	-0.83
Prob (LR Statistic) = 0.00		
McFadden R-square = 0.24		
Hosmer Lemeshow Prob Chi-Square (8) = 0.47		

* Significant 5%

Logistic regression results - model 2; source: designed by the authors based on WOS data

Table 9

Variable	Coefficient	z-statistic
X_1	1.87*	11.25
X_2	0.08*	7.41
X_3	-1.88*	-14.05
X_4	-0.21	-1.44
X_5	-0.32	-0.83
Prob (LR Statistic) = 0.00		
McFadden R-square = 0.24		
Hosmer Lemeshow Prob Chi-Square (8) = 0.47		

* Significant 5%

Logistic regression results after removing non-significant variables – model 1; source: designed by the authors based on WOS data

Table 8

Variable	Coefficient	z-statistic
X_1	1.91*	11.25
X_2	0.08*	7.36
X_3	-1.89*	-14.08
Prob (LR Statistic) = 0.00		
McFadden R-square = 0.24		
Hosmer Lemeshow Prob Chi-Square (8) = 0.17		

* Significant 5%

Logistic regression results after removing non-significant variables – model 2; source: designed by the authors based on WOS data

Table 10

Variable	Coefficient	z-statistic
X_1	1.92	
X_2	0.08	
X_3	-1.88	
Prob (LR Statistic) = 0.00		
McFadden R-square = 0.24		
Hosmer Lemeshow Prob Chi-Square (8) = 0.21		

* Significant 5%

4. CONCLUSIONS

The rapid publication of related literature for the new disease is an essential and valuable resource for the support of the medical and scientific research community. Although, accelerating the speed of dissemination in response to the worldwide phenomenon identified as COVID-19 pandemic highlight significant changes in characteristics of scientific research published in medical journals, it must not compromise quality and ethical standards.

Our research aimed to assess what is the impact of COVID-19 papers written by authors affiliated to Romanian universities with a medicine specialisation, which are the factors that influence the probability of a paper being cited and how does the number of citations vary by university type.

The study analysed data from a total of 18 Universities from Romania, both public and private. We identified that half of the papers have between 1 and 10 pages long while 36% of them are 11 to 20 pages long, with approximately half of all being published in journals indexed Science Citation Index Expanded. The results also reveal that the highest number of published papers is registered for the University of Medicine and Pharmacy “Carol Davila” Bucharest, although “APOLLONIA” University of Iași has the highest number of citations in WOS Core Collection as well as in all WOS Databases per research.

The ANOVA procedure outputs reveal significant difference in the number of citations between papers with a PUB MED ID and papers without one. Moreover, the results of our logistic models shows that neither the type of university (multidisciplinary or exclusively medical), neither being of public or private type are determinants of the probability for an article to be cited in WOS core collection or in all WOS databases. Consequently, a paper with PUB MED ID and a higher number of pages, has a higher chance to be cited.

In future work, we plan to extend our research to track the existence of gaps within and between groups in terms of article publishing in Romania.

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