
The effects of Covid-19 pandemic home confinement on higher education research facilities. A case study of laboratories, scholarly journals and scientific events in Algerian universities.

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Abstract

The present study deals with the effects of confinement on Algerian higher Education research facilities. Nearly, all sectors were affected because of Covid-19 confinement providing that results were catastrophically enormous, when so many workers left their jobs and stayed home. This has affected the economic situation of the country at all levels since though Algeria is an oil-exporting country, and oil prices fluctuation has made the situation worse. This study focuses primarily on investigating the overall effects of home confinement and lack of university funding sources whether governmental or private on research facilities including laboratories, journals and scientific events. A comparative analytical study was conducted before and during confinement to compare the research achievements of laboratories, journals and scientific events. Therefore, a comparison between the results of research productivity before (2019) and during (2020) confinement is made to evaluate its effects on the on-going process of research and publications. The analytical study is based primary on some governmental information obtained from ASJP and the ministry of Higher Education and scientific research. The statistical measures are based on Pearson correlation coefficient (R) which is used to calculate the correlation between the variables. The results show that due to confinement research activities has been reduced to about 20% for laboratories, and scientific events because activities were abandoned and private sponsors stopped some sorts of funding for research activities.

Keywords: confinement-Covid-19 pandemic-Algerian higher education- Research activities.

Introduction

When the World Health Organization declared Coronavirus as a global pandemic, the Algerian authorities together with the ministry of health called for strict confinement measures starting on March 24th, 2020 till the present day; in an attempt to reduce the amount of people infected with the virus, specifically when various cases were detected in many regions across the Algerian territory. Henceforth, most commercial, economic, educational and administrative institutions were abandoned and they are left only with a minimum service to insure the most important and urgent services only. The Algerian authorities banned all types of groupings in markets and social events (like weddings and funerals), and asked for various preventive and social distancing measures in shops, supermarkets and public

administrations. Meanwhile, the higher educational sector was completely paralyzed and all its institutions applied distance learning and determined to finish the academic year 2019/2020 online using different platforms like Google-meet and Zoom. Therefore, a substantial period of time in the second semester and the examinations were taken online in heterogeneous classes. In addition, the ministry of higher education ordered all colleges to quite scientific events specifically those who involve groupings of people like conferences and seminars and postpone them for later times. On the other hand, the economic and commercial sectors defined new boundaries and precautions to keep work running to avoid any catastrophic results. However, the confinement has made the business process very slow, and the economic and commercial sectors witnessed a massive loss in terms of services provided to clients, jobs and infrastructure utilization. This has resulted in lack of sufficient capital for the payment of workers and the lubrication of the process of business. Needless to say, most of the reciprocal funding (between governmental and private institutions) were either cut down or reduced to a minimum rate to guarantee essential services and business transactions and eliminate additional expenses. So, funding was a problematic issue in all private and governmental sectors.

1. Confinement precautions

The outbreak of Covid-19 pandemic has affected the entire globe including all types of social economic, commercial and educational groups. It has made a shift in peoples' life and changed it to take online forms in most cases. Confinement started exactly on march 24th, 2020 in an attempt to reduce the high index risk of the virus. After a period of two months, the Algerian authorities lift the confinement on June 13th, 2020 in 29 Algerian districts out of 48 districts. The lift of confinement included all economic, commercial and administrative institutions allowing the practice of much business, commercial and daily life activities with strict measures and precautions. It was very hard for business owners and merchants to start again without any kind of support or business loans. Therefore, the government assessed the situation and delivered, in correspondence with national banks, unconditional

business loans to companies, and small funding assets for shop-owners and supermarkets as restitutions for the damage of confinement (MSPRH 2020).

After the lift of confinement, there was a noticeable increase in people's life in the economic, commercial and administrative sectors. Most schools and universities continue to deliver courses online to avoid large gatherings and spread the idea of social distancing. The aim was to finish the year by all means possible, even if the process is taken at the expense of teaching and learning. However, the government insisted on the application of strict measures in public transportation, leisure canter, sporting events, weddings and funerals.

2. Confinement and social life

Many researches were conducted to evaluate the psychological effects of confinement on people and different practices of their social life. In a recent psychological study, Boutabel, Medani, and Bryant (2021) surveyed social and mobility impact on Algerian cities. The study questioned the impact of people social during confinement in different aspect including modes of transportation, family visits, and practicing sport. Most citizens in Algeria (87%) of Algerians respected travel restrictions and they use different means of transportations mainly, on foot (55.9%) and 20% using bicycles. the study also linked confinement to prohibition of visiting families, practicing sport at home, and following a diet to stay healthy. The social practices and mobility restrictions are all aspects included in the safety measures for staying at home.

Literature about the effects of confinement witnessed a growing interest among researchers and it transcends different aspects of social life practices. An international study conducted by a number of scientists Ammar, Trabelsi, & Brach, *et al* (2021) to evaluate the psychosocial effects of confinement on mental and emotional wellbeing using questionnaires 'before' and 'during' confinement. The study indicated that individuals in different countries are suffering from negative effects of confinement in terms of mood and feelings, life satisfactions, social participation, employment, physical activities, diet behaviours and sleep behaviours. The study recorded threatening levels of anxiety among individuals because of

disruptions in regular lifestyle behaviours. Disruption in the regular life cycle prompted 40% of individuals in North Africa with these psychosocial negative effects.

3. Social confinement and education

The academic world has experienced a turnover during confinement from face to face to distance learning. Educators agreed long ago about the inclusion of distance learning platforms to revolutionize the process of teaching. The effects of confinement on teaching and learning are enormous. Teachers' expectations and students' achievements are evaluated on the basis of mastering ICT and owning high tech devices and high speed internet (Caldag, Gokalp, & Alkiz, (2021). Assessment and evaluation is also intriguing since it takes time and deserves a lot of practice, and online teaching and learning requires assessment and evaluations before the actual application (Guermeide & Maouche 2020). Distance learning is a double-edged sword because students needn't any fancy classrooms, travelling, and it is not even costly (Rosenberg 2001). E-learning is customized depending on the needs; it is available all the time to help build new kinds of communities. However, some studies (Arkufol & Abaidoo, 2014 ; Gonzalez, *et al*, 2020) referred to the negative effects of confinement and distance learning and teaching. Generally speaking, distance learning creates remoteness and this may cause contemplation over the process of learning. It erodes both the students' role and teachers' role in the classroom as a result of lack of communication skills specifically when it is mixed with autonomous learning. It may also affect the well being and state of learners mind. In a recent study, Duckworth, kautz, Defnet, setlof-bedrick, *et al* (2020) investigated the effects confinement on high school students in the United States. Confinement exerted a lot of pressure, anxiety and lack of self-esteem which as the worst case scenario specifically when finals arrive. The study concluded that students who study remotely suffer from different social, emotional and academic wellbeing complex issues.

4. Economic impact on social life

Since the beginning of Covid-19 pandemic, the economic situation in Algeria became critical and the income of families and individuals decreased gradually. During confinement all shops, private and public companies are shut down; therefore, about 60% of the population experienced a delay and even no income like wages, and salaries. The Algerian authorities supported families and individuals specifically with private businesses and shops with bonuses for their families. However, the government itself was suffering from fiscal deficit because of oil prices fluctuations as the price of Sahara blend fell from 50 dollars per barrel in February 2020 to only 17 dollars a barrel in March 2020 (Economic Monitor 2020). This has created a severe economic deficiency specifically when we know that Algeria is oil exporting country and about 98% of its foreign trade is based on exporting oil.

5. Economic impact on research

One of the most important aims of higher education is to keep research going and enhance the quality of life through research. However, research needs time available and sources available. The fundamental issue of scientific events and university labs has always been a thorny issue specifically when it comes to funding research. Research centres and universities are always struggling to obtain the bare minimum to find sources of funding both from the government and private companies. Leslie and Slaughter (1997) tackled the notion of ‘market capitalism’ an idea which is directed towards companies with capital. The university should cooperate with capital companies to enrich funding sources for teaching and research.

Since the spread of Covid-19 pandemic has created a severe economic downturn, the amalgam of research sponsorship has recorded its lowest levels for years. Likewise, Clarck (2003) emphasized the importance of funding dependence. The threshold of research funding is always dependable on one source whether it is governmental or private as the main source of funding. In times of crises like Covid-19 independent funding is required. Neave (1998) gave the university full freedom in terms of its action plans to find legal funding sources. Funding can be obtained in this case for tuition fees, and benefits and legal activities. Hence, Dill (2001)

distinguished between ‘procedural deregulation’ and ‘substantive deregulation’ these two terms stand for collecting fees, benefits, and facilities construction, with accepting the programmes and good-governance as well. Dill tried to make balance between different sources to vary the funding. Still, the old method of financing the university is always self regulated and it is based on teaching expenses to fund research (Massy & Zemsky 1994).

6. Methods

A comparative analytical study was conducted before and during confinement to compare the research achievements of laboratories, journals and scientific events. Government statistics obtained from ASJP (Algerian Scientific Journals Platform) and publishes all the research works achieved from laboratories, journals, and scientific events (mainly conferences, workshops, seminars, and study days) throughout the Algerian territory (ASJP). The data are collected from 48 Algerian universities which contain 1400 laboratories, and 511 journals. The publication range of journal articles is 35000 each year. However, the laboratories publish around 2000 to 3000 articles annually.

In this study, a comparison is made between the results of research achievements during confinement and the usual results before confinement of organizing scientific events and publications. In addition, different companies’ sponsorship for research events, laboratories and publications is evaluated on the basis of cooperation between them and the university. The comparison is based on calculating the Pearson correlation coefficient (R) to calculate the relationship between the variables confinement and funding with laboratories, journals, and scientific events publications.

7. Results

Table 1. Pre-confinement research proportions in Algerian universities 2019

Research Items	Proportion
Scientific Events	240
Laboratories	1400
Journals	511
Total Published Articles	36480

As a general observation about the research publications indicated in table 1, there is variance of the research publications indicated in the ASJP. In the year 2019, a total of 240 scientific events were organized throughout the year and in different scientific domains. Most of the scientific events are conferences (160), and the other scientific events are study days (30), seminars (30), and 20 workshops. Teachers and researchers organize generally conferences; although they are costly and require plenty of preparation, they are scientifically accredited at the international level and for job promotion purposes as well. In all Algerian universities, there are 1400 laboratories distributed in between 40 universities and 8 university canter and they produce around 2000 publication each year. In addition, they participate in a significant number of organizing scientific events (20%) in all the universities. Concerning the journals, there are 511 active journals and they publish a significant number of articles of around 30000 a year. The total proportion of published articles reached 36800 articles in the year 2019. This number is moderate considering the overall academic conditions of the year 2019.

Statistically speaking, the infrastructure of the university is very compulsory and it determines the extent to which researchers adopt research in different domains. In comparison to big universities with good infrastructure, small universities have limited budgets and infrastructure; therefore, it is difficult for researchers to conduct

research in such conditions let alone the impact of Covid-19 socio-economic impact. Table 2 demonstrates the research results during confinement.

Table 2. During confinement research proportions in Algerian universities 2019

Research Items	Proportion
Scientific Events	150
Laboratories	1250
Journals	627
Total Published Articles	31700

Most of the scientific events organized during Covid-19 pandemic are online due to confinement. The obtained data show that 90% of the scientific events organized online, despite being criticized about its credibility and purpose in most of the cases. This time, the proportion of seminars and workshops is excluded from the statistics as the ASJP provides no data about them. The government closed 150 laboratories during confinement during the last laboratories reform introduced during covid-19. The government evaluated the usefulness and productivity of the laboratories and claimed the efficiency of these laboratories. The proportion of journals increased from 511 to 627 as the government accepted the launch of 116 new accredited journals in ASJP. Unexpectedly, the number of publications decreased in the year 2020 with a dispersion of 5100 articles from pre-confinement. The data show that 15% of editors and reviewers ceased working from March 2020 till June 2020.

Figure 1. Research Results of scientific events **Figure 2** Laboratories research publications organized before and during confinement before and during confinement

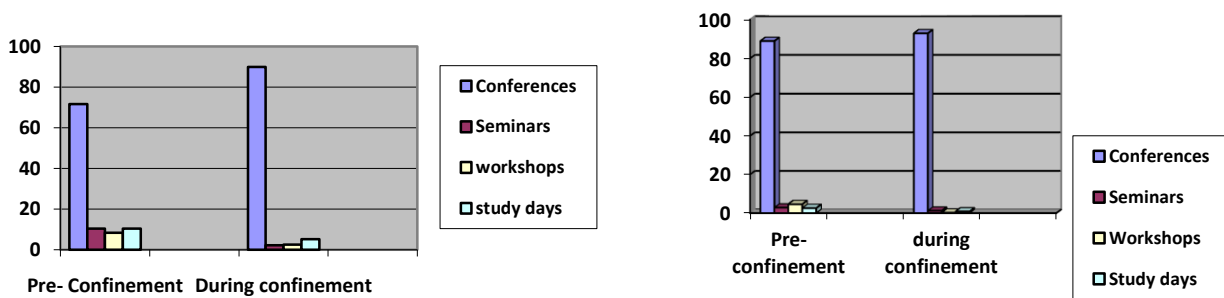
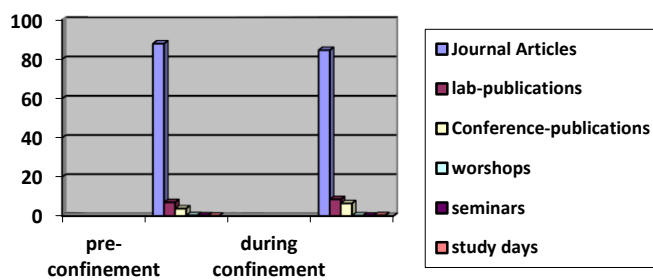


Figure 3. Proportions of publications of journal articles, lab-publications, conference publications, workshops, and seminars.



The descriptive results of the total publications of scientific events, journals and laboratories indicate that most of the publications of laboratories (89% and 93%) and scientific events (71% and 90%) are conferences both before and during confinement. Accordingly, during scientific events and laboratories engage less in other activities like workshops (2.6% and 0.2), seminars (2.2% and 1.2%) and study days (5.2% and 0.8%). The fact is that, when most of the scientific event' and whether or not they are integrated with laboratories, most editors ask only for abstracts PowerPoint presentations as condition to participate, and article submission is not a requirement. The proportions of seminars, and workshops and study days are slightly high (10.5%, 8.33% and 10.5% respectively) as universities and laboratories call for variations in terms of the research productivity. The totalities

of the results of publications in the ASJP are journal articles (88% and 87.7%), and conferences specifically online during confinement (6.3%).

8. Analysis

The statistical measures dealt with in the results section are close to each other; however, it indicates the impeccable impact of confinement on research productivity. The statistics taken from the ASJP show that 150 laboratories were closed during confinement due to the decrease of research productivity as the ministry higher education and scientific research claimed. The medium (M=) of the publication of articles is 2654, while the medium before confinement (M=) equals 3040 with a divergence of 386 articles a month. The divergence is relatively low, and it carries a significant importance if we take into consideration the fast dropping of publications and research productivity. This is clearly shown at the beginning of the confinement in between the months March, April, and May. The publication medium of these months is 1800 to 2000 articles with a divergence of about 1000 articles per month. The following table demonstrates the medium of the total research productivity in the years 2019/2020 from January to December:

Table. 3 Medium for research productivity of the year 2020.

Jan. (M=)	Feb. (M=)	Mar . (M=)	Apri l (M=)	May (M=)	Jun e (M=)	July (M=)	Aug . (M=)	Sep. (M=)	Oct. (M=)	Nov . (M=)	Dec. (M=)
310 0	315 0	309 0	3140	305 0	297 0	290 0	283 0	295 0	308 0	313 0	309 0
305 0	312 0	185 0	1900	200 0	238 0	267 0	250 0	290 0	310 0	318 0	320 0

The data of research articles recorded in the years 2019/2020 identifies clearly the medium of research productivity of each month. At the beginning of confinement, research productivity recorded its lowest rates, as if researchers went

on hibernation specifically in the two first months March, and April. Even when researchers are on holidays, research productivity does not record very low rates (July and August 2019) in comparison to confinement and the effects of Covid-19 pandemic. Laboratories and scientific events research productivity are the main deteriorated and the most affected activities, which are embodied in conferences, workshops, seminars and study days (see figure 1, 2 and 3), among all research facilities.

In order to prove or disprove the validity of the correlation between the research variables, and to calculate precisely the rates and proportions of confinement research productivity, Pearson correlation coefficient (R) is used to give exact proportions of the correlation. In the Pearson correlation coefficient (R), a simple calculation of the correlation is based on the following equation:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

The correlation here, can be as high as (+1) when the relationship is positive, and this implies that if the value of one variable increases, so does the other one and vice versa. When the relationship is negative (r) can have a value as high as (-1), and this means that when one variable increases the other decreases and vice versa. To sum up, the nearer is (r) to (1) or (-1) the stronger is the relationship. Hence, the following table summarizes the correlation between the variables in the following table:

Table 4. Pearson correlation Coefficient with research productivity

Research Items	Coefficient Correlation (R)
Scientific events	0.532
Journals	0.121
Laboratories	0.439
Total Published articles	0.253

As table 4 demonstrates, the research items namely scientific events, journals, and laboratories have all correlation with confinement during covid-19 pandemic. The results indicate mostly that the scientific events including workshops (0.2%), seminars (1.2%) and study days (0.8%) have a fairly strong correlation with confinement. Conferences does not have a strong correlation (see figure 1. 2 and 3) as the continuity of organizing online conferences recorded high percentages even during confinement. In addition, laboratories also display a strong correlation with productivity even in conferences. The closing and opening of laboratories is linked to confinement. Meanwhile, journals and the total research publications have a weak correlation with confinement.

Statistically speaking, in order to the validity or invalidity of the research items (scientific events, scholarly journals, laboratories and total published articles, is based on calculating the degree of freedom ‘df’ on the basis of the dispersion of the medium of total published articles which is in this case 386.

Hence, to get the Alpha level ‘A’, 2 is subtracted out of the dispersion 386, then df equals $386-2=384$. In addition, the Alpha level ‘A’ is calculated by dividing the degree of freedom on the percentage 100% so:

$$A = \frac{386}{100} = 3.86$$

The percentage is divided on 4 which represent the research items:

$$A = \frac{3.86}{4} = 0.96$$

Since the alpha level is 0.96 and the results of the Pearson correlation (R) is 0.53, 0.12, 0.43 and 0.25 respectively, the rates are not $\leq$ than the level alpha 0.96 the correlation between the variables confinement and research productivity is weak. Therefore, the means of scientific events 0.53 and laboratories are the highest as 47% and 57% of the factors occurred haphazardly. However, the means of journals 0.12 and total published articles 0.25% are the lowest correlations with 0.88% and 0.75% of unwanted variables occurrences.

9. Discussion of the results

The results of the analysis section indicate that there is a weak correlation between confinement and research productivity. In this descriptive study, the percentages obtained of the research items represent research continuity in relation to confinement and other factors including the economic crisis and lack of funding. It is noticed that confinement affected directly research productivity of laboratories (see figure 1, 2 and 3), as the publication is basically the result of online conferences 89%. Despite the invalidity of the correlation calculated by Pearson correlation coefficient (R), the preliminary results in table 1 and 2 demonstrate low percentages of some scientific events including workshops, seminars and laboratories. The fact is that, these events maintain a clear-cut relation with the university and its environment. Before Covid -19 pandemic, the publication range of articles was steady in all the months of the year 2019; however, a sudden collapse of publication range took place on March 2020 (the beginning of confinement), and in the Months april and July as well (the end of confinement. When we compare the low range of publication during confinement, it found that this low range is not even recorded during summer holidays (July and August 2019) when teachers and researchers are exempted from all their teaching and research duties. Despite the fact that the number of journals in Algerian universities increased in confinement, the number of scientific events decreased with a percentage of up to 20 percent. This is definitely due to confinement, nevertheless Confinement is not the only variable responsible for the decrease of research productivity, the lack of sponsorship and funding from private and companies has significantly influenced the process of research.

Generally speaking the companies which abandoned the funding of scientific events are commercial in nature. They provide funding in response to advertisements they get during the scientific events. The table below demonstrates the type of sponsorship of companies:

Table 5. Companies and its funding proportions

Commercial	Economic	Industrial	administrative
23%	13%	8%	15%

Collaboration with other companies specifically economic and industrial is at stake. Covid-19 pandemic has revealed that one-way collaboration with commercial companies cannot provide enough coverage of research funding, and this collaboration is reciprocal as companies receives advertisement in the scientific events and the university and its facilities receive funding. The results of the research activities conducted and articles published maintain a strong correlation with commercial funding companies. This is an indication that research and funding are mutually intelligible because research needs funding to promote and upgrade research activities. The opposite is also true when we say that managers of companies are aware of the importance of the results of scientific research for their companies. Lack of funding during covid-19 has a kind of a chain reaction as Covid-19 confinement affected the economy, funding, and research as well. This was clearly the case of conferences, laboratories and published articles as there is a considerable decrease in the percentages of these variables.

The funding of these companies can also be designated to overcome hard times, and induce scientific laboratories to produce more research in the fields of medicine, treatment and prevention at the expense of other laboratories. The ministry of higher education has instead cut from the budgets of other scientific events and laboratories, to help fund scientific laboratories find a cure, or at least lessen the spread of the virus.

Conclusion

Even though the university has closed down its doors to contain the disease, and ensure the safety and security of all university members, researchers cannot make excuses for research abandonment. It is actually high time for the government and the minster of higher education and scientific research to unleash opportunities for

researchers to cooperate with societies and private companies to promulgate research and develop a solid funding for universities. Accordingly, cooperation with other societies is needed to enhance the quality of research and provide the necessary means for it. Researchers should keep in mind that they cannot refrain from research productivity in confinement since the university is closed. Research is not limited by time, place, or confinement, but it is limited to the resources available in the hands of the researchers, or in the lab as they are used to produce significant results and solid research in different domains.

The well-being and state of mind of researchers is important for the production of research ; as a result, as indicated in previous psychological studies (Ammar, Trabelsi & Brach, et al 2021 ; Boutabel, Madani, & Bryant 2021) have all concluded that eating well and practicing sport are compulsory routines during confinement. So, researchers should engage themselves in various daily life activities to break the routine inside the house. The solution is moderation for research continuity and productivity neither ever-overdoing it nor neglecting it, but engaging in it with the possible means available.

The universities in Algeria must make collaboration with lucrative small and medium-sized companies which can be used as a field work for research application and development. Also, foreign universities and companies can also be targeted to introduce the Algerian researchers to new and competent research means, and open up the lines of communication with foreign capital providers from all sectors.

At the end it is said that funding lubricates the wheel of research. The Algerian universities are obliged to make more corporations with companies to provide funding and vary funding sources. This will enhance the quality of research and keep research going specifically in difficult times like Covid-19 pandemic.

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