



LETTER TO THE EDITOR

Science funding crisis in Brazil and COVID-19: deleterious impact on scientific output

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Abstract: The Brazilian scientific community and health care workers are working hard to provide support for the political health measures to deal with this unprecedented crisis of the COVID-19 pandemic. Paradoxically, while the society is looking forward for an immediate response of the scientific community, Brazilian scientists are facing a dramatic reduction in financial support for research and graduate programs.

Key words: Brazil, Science, funding, crisis, COVID-19.

In the last years, Brazilian scientists are facing a dramatic reduction in financial support for research and graduate programs. For instance, in 2017, the Ministry of Science, Technology, Innovations and Communications (MCTIC) had its lowest budget in at least 12 years. As a matter of fact, the MCTIC budget is now roughly one-third of its amount in 2010, and further cuts are expected for the next years (Tollefson 2019). This dire state of public funding of research in Brazil has been threatening even our graduate system, as we recently reported (Martelli-Junior et al. 2019). To make an already troublesome scenario worse, the current polarized political atmosphere, in which prevails an ideology hostile to academic freedom, scientific research, public funding universities and environmental protection, casts a somber perspective across the academic world, as wisely pointed out by a recent editorial in *Nature* (2018).

In this distressful scenario, there are some clues that the scientific output of the country is already declining (Bolaños-Villegas et al. 2020). In order to ascertain this issue further, we did a preliminary analysis associating the Brazilian scientific performance with the governmental financial support in the last 18 years. Figure 1 displays the devastating toll of the reduction of financial support on the scholarly output, mainly after 2011. From 2000 to 2009, there was a steady increase in the budget of MCTIC. Over this period, publications by Brazilian researchers in peer-reviewed journals had leapt from 14,237 to 50,415. The median annual growth rate of research papers was about 13%. This performance has led Brazil to jump from the 21th to the 13th position in the world ranking of scientific publications (Petherick 2010). On the other hand, from 2010 to 2017, in parallel with a systematic decrease in MCTIC budget, the median annual growth rate of research papers has plunged to only about 6%. Actually, since 2013, this figure is even worse, with a growth pace of only 4%. Consequently, Brazil's position in the world ranking of scientific publications has already dropped to the 14th.

At present, we are facing the first pandemic of the 21st century. SAR-CoV-2 virus continues to spread throughout the world, producing COVID-19, which, in turn, has been critically affecting health-care systems and world population (Fauci et al. 2020, Kickbusch et al. 2020). Amid this crisis, there

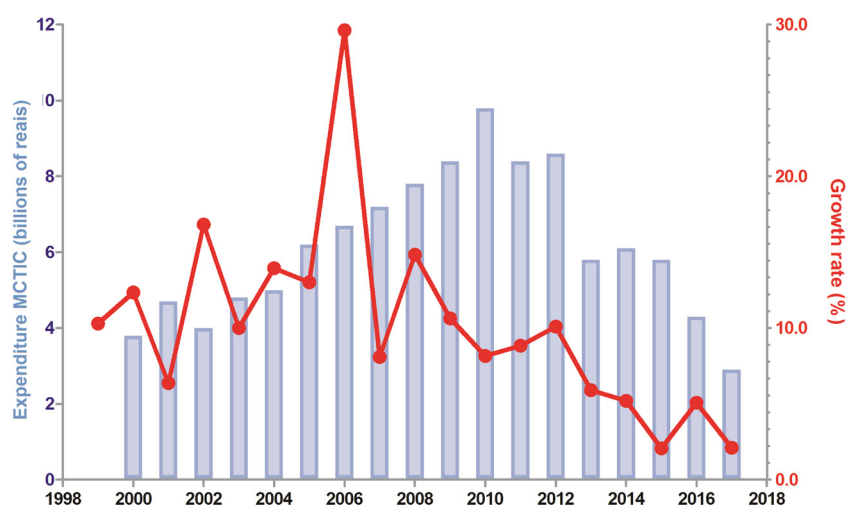


Figure 1. Annual growth rate of scientific papers output as compared with annual expenditure by Brazilian Ministry of Science, Technology, Innovations and Communications (MCTIC) (in billions of reais) from 2000 to 2017. Data sources: 1Data source for scientific papers growth rate: Scopus database, accessed 25 April 2020, <https://www.scimagojr.com/countryrank.php>. 2Data source for Brazilian MCTIC budget: Ministry of Science, Technology, Innovations and Communications, accessed 01 May 2020, https://www.mctic.gov.br/mctic/opencms/indicadores/detalhe/recursos_aplicados/governo_federal/2_2_4.html.

have been widespread worries that the disease could threaten the nations' supply systems and a severe economic recession is expected for the next years (Gates 2020). Paradoxically, when the entire world eagerly waits for an immediate response of the scientific community, the scientific enterprise seems threatened by the dire consequences of the pandemic (Zagury-Orly & Schwartzstein 2020). However, this somber scenario may be an opportunity for the Brazilian political leaders and the citizens to concretely comprehend how crucial is the advance of science for our development. (Lancet 2020, Martelli-Junior et al. 2020). The Brazilian scientific community and health care workers are working hard to provide support for the political health measures to deal with COVID-19. For instance, among 5228 articles on COVID 19 already published and reported in PubMed, 294 (5.6%) are from Brazil (<https://www.ncbi.nlm.nih.gov/pubmed/>). We believe that these data highlight the need of a sustainable public investment program for the scientific development support in emerging countries like Brazil. In this dramatic setting, we do believe that to fight to preserve the academic system is a civic responsibility for Brazilian scientists.

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REFERENCES

- BOLAÑOS-VILLEGAS P ET AL. 2020. Latin America: Reduced S&T Investment Puts Sustainable Development at Risk. *ScienceOpen*: DOI 10.14293/S2199-1006.1.SOR-PPBKUJ.v3.
- FAUCI AS, LANE H & REDFIELD RR. 2020. Covid-19 - Navigating the Uncharted. *N Engl J Med* 382: 1268-1269.

- GATES B. 2020. Responding to Covid-19 - A Once-in-a-Century Pandemic? *N Engl J Med* 382: 1677-1679.
- KICKBUSCH IG, LEUNG M, BHUTTA ZA, MATSOSO MP, IHEKWEAZU C & ABBASI K. 2020. Covid-19: how a virus is turning the world upside down. *BMJ* 369: m1336.
- LANCET. 2020. Editorial. COVID-19 in Brazil: "So what?". *Lancet* 395: 1461.
- MARTELLI-JUNIOR H, MARTELLI DR, SIMÕES E SILVA AC, OLIVEIRA MCL & OLIVEIRA EA. 2019. Brazil's endangered postgraduate system. *Science* 363: 240.
- MARTELLI-JUNIOR H, MARTELLI DR & MACHADO RA. 2020. The world haunted by Covid-19. *An Acad Bras Cienc* 92: e20200560.
- NATURE. 2018. Editorial. Brazil's new president adds to global threat to science. *Nature* 563: 5-6.
- PETHERICK A. 2010. High hopes for Brazilian science. *Nature* 465: 674-675.
- TOLLEFSON J. 2019. Tropical Trump' sparks unprecedented crisis for Brazilian science. *Nature* 572: 161-162.
- ZAGURY-ORLY I & SCHWARTZSTEIN RM. 2020. Covid-19 - A Reminder to Reason. *N Engl J Med*: DOI 10.1056/NEJMp2009405.

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E. A. Oliveira contributed to conception, design, data acquisition and interpretation, drafted and the manuscript. H. Martelli-Junior, .R.B. Martelli, A. C. Simões e Silva, and Maria Christina L. Oliveira contributed to conception, interpretation and critically revised the manuscript. All authors gave their final approval and agree to be accountable for all aspects of the work.

