



# RIS Diary

— Research shaping the development agenda

## From Director General, RIS

The debates are back on the table on the role of science and technology with regard to fighting COVID-19 which has thrown the entire world into an unprecedented health and safety crisis that is worsening day by day. All economic and social activities have come to a halt at global level. It is in these contexts, that RIS has come out with the Third Special Edition of RIS Diary on COVID -19. The issue contains articles on: *“Harnessing Science, Technology and Innovation in India for Tackling COVID-19”* by Arabinda Mitra; *“Science, Technology and Innovation - Fighting the COVID-19 Outbreak”* by Bhaskar Balakrishnan; *“Science Diplomacy : Covid and Beyond”* by Balakrishna Pisupati; *“Global Governance of Technology, Institutional Architecture and Indian Response to COVID-19”* by Sachin Chaturvedi; *“Science, Technology, and Innovation in Indian Systems of Medicine: An Exploration in the Context of COVID-19 Pandemic”* by T. C. James and Apurva Bhatnagar; *“Science, Technology and Innovation and the Challenge of Epidemic”* by Krishna Ravi Srinivas; *“Impact of COVID-19 on the World Economy”* by Biswajit Banerjee; *“Global Institutions and COVID-19”* by Atul Kaushik.

We hope that articles contained here and in the two previous special issues of RIS Diary would serve as useful references in the on-going discussions at different levels on issues related to the war against COVID-19. While hoping sincerely that humankind will come out of this dark tunnel soon to rejoin the normal course of various socio-economic activities, we would highly appreciate to hear from you about the contents of the Special Issues of RIS Diary.

**Sachin Chaturvedi**

## Harnessing Science, Technology and Innovation in India for Tackling COVID-19

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### Introduction

The COVID-19 epidemic has resulted in greater collaboration among scientists and innovation throughout the world.<sup>1</sup> Many Academies of Science, including the Royal Society are actively engaged in providing policy advice, providing a voice



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to the scientific community and educating and informing the public on the scientific aspects in the fight against the epidemic and cautioning against undue fear and false claims and narratives.<sup>2</sup> In India the fight has resulted in many new initiatives, repurposing/refocussing the old ones, greater thrust on finding solutions to immediate problems and focussed approach in finding scientific solutions and promoting innovations.<sup>3</sup>

With lockdown in effect, better use of Information and Communication Technologies and greater co-ordination using digital tools has become inevitable. Given the spread of the virus across States, the involvement of research and academic institutions in different parts of the country to contribute in various initiatives taken by the Central and State Governments requires coordinated efforts. Optimal solution can be provided through mobilization of scientific resources and rapid deployment of technology led innovative solutions and at the same time it can lend evidence based policy guidelines to the government.

In India, this crucial role is being played by the Office of the Principal Scientific Adviser to the Government of India (O/o PSA) which co-ordinates among, government ministries/ departments, scientific institutions, academia and enterprises in ensuring that critical scientific and technological data and findings are shared and speedy decisions on Research and Development related issues to tackle COVID-19 epidemic are taken to support the government and the citizenry.

The O/o PSA constituted the Science & Technology Empowered Committee for COVID-19 on 19 March 2020. The committee is co-chaired by Prof. Vinod Paul, Member- Health, NITI Aayog and by Prof. K. VijayRaghavan, Principal Scientific Adviser. In addition, a Task Force on Vaccine Development and related S&T has also been constituted by the Prime Minister's Office with Prof. Paul and VijayRaghavan as Co-chairs. Given the multiple challenges involved in finding solutions and supporting outcome driven R&D, a coordinating mechanism has been developed which is helping to address various topical issues like:

- Development of Vaccine and Repurposing of Drug based on scientific evidence and existing strengths, technology readiness levels, status of IP, manufacturability in India etc. In depth information on various vaccine and drug candidates will help to allow informed decision making towards timely development and delivery. The regulatory/legal processes are also being addressed. This is crucial because all over the world collaborative R&D is being pursued on Vaccine development and also Repurposing of Drugs.<sup>4</sup> With its multifaceted scientific strength and infrastructure, India cannot afford to lag behind in this critical effort. Another reason is that India has the potential to emerge as a major manufacturer and supplier of both vaccines and drugs.
- Application of mathematical models to track the disease spread and use of models to



predict the medical equipment and auxiliary requirements of the COVID-19. This approach will combine telemedicine and digital health data with serological testing in specific areas and high-risk patients/health workers. One aim is that stratification of hot spots into red, green and orange can be made based on sero-epidemiology evidence.

- Prioritizing manufacturing of test kits, ventilators, PPE in India.

The Government of India on 29 March 2020 constituted 11 Empowered Groups of Officers, under Disaster Management (DM) Act 2005, to develop a well-planned and coordinated emergency response to ensure health and economic security of millions of Indians from COVID-19 outbreak. These Groups are empowered to identify problem effective solutions thereof; delineate policy; formulate plans; and take necessary steps for effective and time bound implementation for these. The Principal Scientific Adviser is a member of the Group responsible for coordinating with private sector, NGO, International bodies for response related activities. PSA is involved in, inter alia, in /with the following activities/ programs/ initiatives.

## Mobilizing S&T Capabilities and Utilizing Infrastructure

The Empowered Committee on R&D has worked towards enhancing the testing facilities to meet COVID-19 related challenges by leveraging the existing resources (instruments and manpower) in Government of India laboratories. It has enabled ICMR to issue the required notification allowing institutions under Department of S&T, Department of Biotechnology, Council for Scientific and Industrial Research, Defense Research and Development Organization, Department of Atomic Energy, and Indian Institute of Science (IISc) to self-assess and prepare their Bio-Safety Laboratories (BSL) labs for research and testing of corona virus. For this O/o PSA has developed a "Handbook for COVID-19 testing in Research Institutions" which allows more such labs to self-assess its preparedness, in terms of equipment, staff and expertise required for COVID-19 testing.

This ensures that the institutions are well prepared for testing and upgrade their facilities.

A detailed checklist has been outlined, which can be used by research lab to self-assess and indicate their preparedness for declaring the lab as a research and testing facility for COVID-19 after ICMR approval.

A "Science & Technology core team" has been set up in the office of the Principal Scientific Advisor to crowd source ideas and solutions from experts, companies, academia and citizens to tackle the spread of the COVID-19 virus in the country.

## Innovation Promotion

The Office of the PSA has brought together, efforts across various government departments and programme to identify innovations that can tackle COVID-19 challenges. This has resulted in synergy and better solutions and has also reduced the communication gaps and facilitated better understanding among the stakeholders. DST, AIM, BIRAC, Start Up India and Accelerating Growth of New India's Innovations (AGNIi) have been brought together, to evolve common criteria for evaluation and short listing of best solutions



Office of PSA is sensitizing R&D and academic institutions and City Clusters to submit solutions for COVID-19 challenges. It is enabling, new potential technologies for testing at government labs/academic institutions. It is connecting with industry partners through CII for ensuring rapid manufacturing, In addition to these it is, channelling financial resources and other enabling

mechanisms for their implementation. As a result so far 22 Start-ups have been shortlisted for support by AGNI team from more than 400 applications.

The O/o PSA worked with the Ministry of Corporate Affairs for issuing an enabling OM for the use of CSR funds for research and innovation projects for providing solutions to meet the COVID-19 challenges. This has ensured the speedy engagement of industries to support the COVID crisis with resources through available CSR in support of the O/o PSA is coordinating with R&D labs for accessing these funds as Healthcare and preventive healthcare are covered under Schedule VII of Companies Act as Specified CSR activity. The Office of the Principal Scientific Advisor has provided specific support to help understand and formulate regulatory requirements in the Indian context for ventilators and other medical equipment.

## Converging Supply and Demand sides

COVID-19 critical medical supplies advisory cell is being enabled by a digital platform to facilitate administration with managing supply and demand of critical medical equipment, and enable efficient decision making with regards to timely procurement. The platform has been developed by Invest India in partnership with the O/o PSA. The portal will help:

- To know national Demand aggregation of critical medical equipment
- In providing access to Supplier information at one place - GeM, Invest India, Industry Association (FICCI, PHD Chamber of Commerce, CII etc)
- By enabling states to estimate numbers of critical medical equipment based on number of patients and health care workers
- Through a centralized query mechanism and online facilitation for States seeking advice on managing medical equipment demand/supply/usage
- As a single source of information for people, and infrastructure resources prepared by NSDS

- In geo tagging of crises management infrastructure (health care centers, isolation centers, etc.) along with district-wise patient load.

## Guidance to Citizens, Public Outreach and Communication

The O/o PSA has been instrumental in the launch and outreach of the Aarogya Setu App through NIC. The app built through public private partnership with knowledge input from academic institutions will help people assess themselves the risk for their catching the Corona Virus infection by tracking infected cases in the vicinity. This is a data protected App using cutting edge Bluetooth technology, algorithms and artificial intelligence tools. It has gained public acceptance with more than 50 million users within two weeks of its launch.

The App will help the administration to take necessary timely steps for assessing risk of spread of COVID-19 infection, and ensuring isolation where required. The PSA also serves on a committee constituted by the Cabinet Secretariat to evaluate and ensure development and launch of Citizen App technology platform to help citizens and government in combating this pandemic. The App is a pioneering initiative and is used for the first time in India in such conditions. The lessons learnt from this will be very useful in many ways, including, understanding role of digital health in controlling epidemics.



Wearing masks has been made mandatory in most places in India for anyone who wants to visit public places and interact with others. But availability of masks has been an issue and the lockdown has resulted in delays in masks getting distributed to users. But making masks is possible even at homes and it does not need much training or skills to make them. Sensing the need for guiding the public in making and use of masks, The O/o PSA has issued a detailed manual on making homemade masks for curbing the spread of Coronavirus.

The guide provides a simple outline of best practices to make, use and reuse masks to enable NGOs and individuals to self-create such masks and accelerate widespread adoption of masks across India. This has now become a part of the national advisory for citizenry issued by the Ministry of Health and Family Welfare (MoH&FW). The manual has been released in several regional languages. As it is available for free download, it has resulted in better understanding among the public and greater use of ordinary materials to meet the unmet needs for masks.

The O/o PSA issued illustrative guidelines with precautions and measures for controlling the spread of COVID-19 in densely populated areas on April 13, 2020. The frugal and simple measures which can be easily adopted in lockdown can greatly help in controlling the spread of the disease in resource constraint areas where toilets, washing or bathing facilities are shared.

The guidelines propose swift installation of do-it-yourself hand-washing stations that have been used world-wide to contain epidemics. Foot-operated stations not only reduce the chance of transmission by eliminating direct contact with potentially high infection areas, but also reduce the amount of water used by people during hand-washing. The designs proposed allow self-assembly by community volunteers

and authorities, using affordable and locally available materials, even during lockdown and supply-chain challenges. An outline of good toilet practices to maintain sanitation and hygiene in communities have also been clearly outlined.

The guidelines have been recommended by the MoHFW on April 14<sup>th</sup> 2020 for adoption across the country.

The Office has been closely working with science communication agencies such as Vigyan Prasar. Covid Gyan (<https://covid-gyan.in>), a website dedicated to scientifically accurate COVID-19 content and resources, has been launched as a joint initiative of multiple research institutions.

## Conclusion

PSA and his office have been working seamlessly in ensuring that nation is able to leverage the maximum from the concerted application of Science, Technology and Innovation (STI), to tackle this challenge. The O/o PSA is promoting evidence based policy making and scientific decision making required as critical guidance tool to various stakeholders in the country engaged in the fight against COVID-19.

## Endnotes

- <sup>1</sup> <https://blogs.scientificamerican.com/observations/how-covid-19-is-changing-science/>
- <sup>2</sup> <https://royalsociety.org/news/2020/03/coronavirus-covid-19/>
- <sup>3</sup> <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.56>
- <sup>4</sup> <https://www.reuters.com/article/us-health-coronavirus-lifeline/reasons-for-hope-the-drugs-tests-and-tactics-that-may-conquer-coronavirus-idUSKBN21Z2HP>