



**Office of the Principal Scientific Advisor  
to the Government of India**

**An Agenda for**

# *Reprioritizing Health R&D*

**in the context  
of COVID 19**





## 1. The Objective of this note is to:

- Examine the role and relevance of R&D in the context of COVID-19
- Discuss the share of Health R&D in the context of global health spend
- Discuss the share of Health R&D in the context of India's public expenditure on R&D and overall R&D expenditure
- Estimate Health GERD as a percentage of GDP in India and abroad
- Prepare a roadmap for boosting Health R&D for meeting COVID-19 challenge

### Key Facts

1. Global Health Expenditure was US\$ 7.8 trillion in 2017
2. Share of Public Expenditure in Aggregate Global Spend on Health sector about 60%
3. India's spending on Health is 4% of GDP
4. India's public spending on Health is 1.6% of GDP in 2019-20 (BE)
5. GERD on Health as a percentage of GDP is 0.01% in India

Source: WHO and Economic Survey

## Context

### Pre – COVID – 19

2. Economic Advisory Council to the Prime Minister had prepared a report on R&D Expenditure Ecosystem in consultation with the Office of Principal Scientific Adviser to the Government of India. This report was released by Member Secretary, Economic Advisory Council to the Prime Minister and Principal Scientific Adviser to the Government of India on 24<sup>th</sup> July 2019. This report contains 14 recommendations. It inter-alia recommended for boosting R&D investment in India to 2% of GDP by 2022.

### COVID – 19

3. COVID 19 pandemic is unprecedented in human history. It has resulted in colossal loss of life and has brought to the forefront the need of a robust healthcare system across all countries in the world. It has also highlighted the need to devote adequate resources to medical research for not only prevention of such unprecedented outbreaks but also its treatment.

4. On 1<sup>st</sup> July 2020, Government of United Kingdom has come out with an R&D Roadmap to inter-alia meet the challenge of COVID19 and spur economic revival. Some significant observations from this document are reproduced below:



*“In light of the COVID-19 crisis, the importance of being able to find ingenious, practical and timely solutions to the most challenging problems are even clearer. Research and Development will be critical to economic and social recovery from the impacts of COVID-19, enabling us to build a greener, healthier and more resilient UK. Science and innovation have helped drive major progress in global development over the past two decades and are vital to achievement of the UN’s Sustainable Development Goals. Our goal is to further strengthen science, research and innovation across the UK, making them central to tackling the major challenges we face, and taking advantage of opportunities. Our commitment to increasing UK investment in R&D to 2.4% of GDP by 2027 and to increase public funding for R&D to £22 billion per year by 2024/25 will allow us to make major strides towards this goal. We will use this investment to raise domestic and international business investment into UK R&D, increasing economic productivity and prosperity through new products, services and jobs and helping to transform our public services. Across the UK government and the devolved administrations, working with businesses, academia, charities and wider society across the UK, we will tackle some of our biggest societal challenges, advancing our understanding of the world and translating that delivering benefits to people, communities and places around the UK and globally.”*

## **Health R&D and its Share in Global Health Spend**

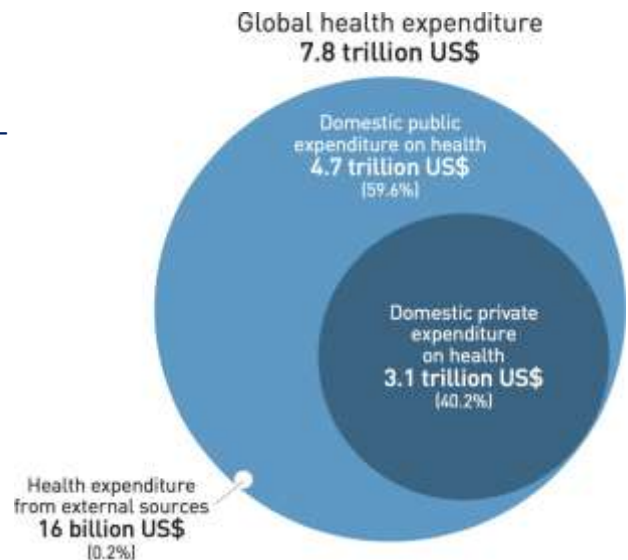
5. Research is indispensable for resolving public health challenges – whether it be tackling diseases of poverty, responding to rise of chronic diseases, or ensuring that mothers have access to safe delivery practices.
6. In the past, shared vulnerability to global threats, such as severe acute respiratory syndrome, Ebola virus disease, Zika virus and avian influenza has mobilized global research efforts in support of enhancing capacity for preparedness and response. Research is strengthening surveillance, rapid diagnostics and development of vaccines and medicines.
7. Public-private partnerships and other innovative mechanisms for research are concentrating on neglected diseases in order to stimulate the development of vaccines, drugs and diagnostics where market forces alone are insufficient.



8. As per WHO report on Global Spending on Health, global health spending continues to rise rapidly – to US\$7.8 trillion in 2017, or about 10% of GDP and \$1,080 per capita – up from US\$7.6 trillion in 2016. About 60% of this spending was public and 40% private, with donor funding representing less than 0.2% of the total.

9. The broad components of this public Spending are not readily available but going by OECD data, the various components of public spending on health are as follows:

- Medical products and appliances
- Outpatient Services
- Hospital Services
- Public health Services and
- Health R&D



10. It is noteworthy that the contribution of Health R&D to overall public spending on Health is the lowest. The EU country wise breakup for 2018 is placed at Annexure 1.

## WHO Strategy on Research for Health

11. It is noteworthy that WHO had prepared a Strategy on Research for Health in May 2010. This strategy is based on the premise that policies and practices in support of health worldwide should be grounded in the best scientific knowledge.

12. The strategy's mission is that all partners should work together to harness science, technology and broader knowledge in order to produce research-based evidence and tools for improving global health.

## Health R&D and its Share in India's Public Expenditure on Health

13. Policy makers across the world, including India monitor public spending on health. It is an important policy instrument. In India, the data on Public Expenditure on Health is reflected in the tables below:



### Trends in Public Expenditure on Health (Combined Centre and States)

*As percentage to GDP*

Item	2016-17	2017-18	2018-19 RE	2019-20 BE
Health	1.4	1.4	1.5	1.6

*As percentage to Total Expenditure*

Item	2016-17	2017-18	2018-19 RE	2019-20 BE
Health	5.0	5.4	5.3	5.3

*Source: Economic Survey 2020*

14. The above-mentioned data does not indicate the share of Health Research as a component of Public Expenditure on Health. This is so because; Expenditure on Medical research data is not separately shown in the health accounts of Government of India or State Governments. It is covered under Medical Education, Research and Training.

15. It will be useful to have separate accounts on Medical Research in order to indicate the share of medical research in total public spending

### Health R&D and its Share in Total R&D Expenditure

16. In the following sections, we have attempted to indicate the share of medical research in total R&D spending of the country.

17. The Gross expenditure on R&D (GERD) in the country has been consistently increasing over the years and has nearly tripled from Rs. 39,437.77 crore in 2007-08 to Rs. 1,13,825.03 crore in 2017-18. It is estimated to be Rs. 1,23,847.70 crore in 2018-19.

18. Gross Expenditure on R&D (GERD) is mainly driven by the Government sector comprising of Central Government 45.4%, State Governments 6.4%, Higher Education 6.8% and Public Sector Industry 4.6% with Private Sector Industry contributing 36.8% during 2017-18.



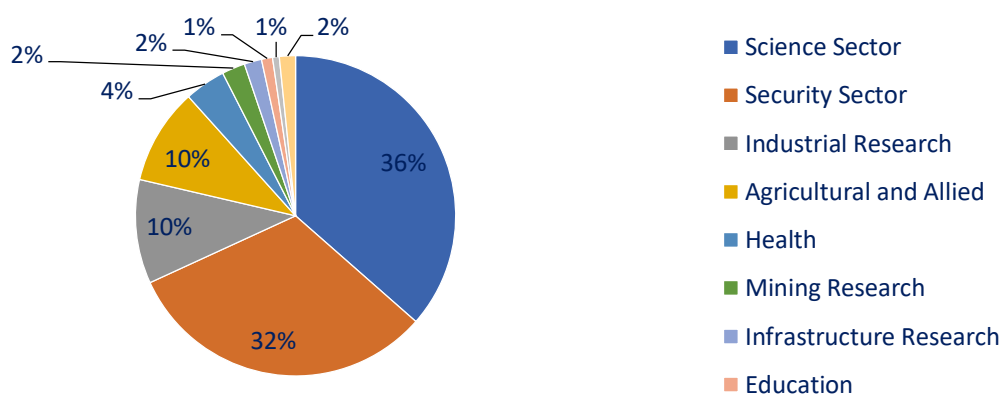


19. During the year 2017-18, 93% of the R&D expenditure incurred by Central Government sources came from 12 major scientific agencies. Amongst the 12 Central Government major scientific agencies, DRDO accounted for the maximum share of 31.6% of R&D expenditure followed by DOS (19.0%), ICAR (11.1%), DAE (10.8%), CSIR (9.5%) and DST (7.3%), DBT (3.7%) and ICMR (3.1%), MoES (2.3%), MEITY (0.8%), MoEFCC (0.5%), MNRE (0.1%) during 2017-18. The rest 7% expenditure is shared by 43 ministries. This aggregate picture does not indicate sector wise breakup of R&D expenditure as distinct from line Ministry wise R&D expenditure.

## Sectoral Profile

20. An attempt has been made in the following section to classify broadly Central Government expenditure into various major sectors.

### Sectoral Breakup of R&D Expenditure(2017-18)



Expenditure on R&D (Value in Rs. Crore)	
Sectors	2017-18
Science Sector	20760.45
Security Sector	18029.82
Industrial Research	5974.94
Agricultural and Allied	5523.06
Health	2355.12
Mining Research	1330.96
Infrastructure Research	1000.75
Education	633.03
Sustainability Sector	387.09
Others	924.81
<b>Grand Total</b>	<b>56920.03</b>



## Analysis of Data

21. It is pertinent to mention that the data for this sectoral estimation is derived from R&D expenditure data ministry wise as published by Department of Science and Technology in its S&T Indicators Tables Research and Development Statistics 2019-20. This analysis does not reflect the precise and accurate expenditure pattern of R&D across sectors including health because many Ministries incur health R&D expenditure, which are not reflected in the existing health accounts of Government of India.

22. Notwithstanding these limitations, the sectoral breakup indicated clearly that R&D expenditure on Health accounts for only 4% of the total R&D expenditure of the Central Government. The bulk of the resources for R&D research are accounted by Science & Security sector ie about 67% combined. The relevant data is Annexure 2.

## GERD and Health

23. GERD on health is an important indicator monitored by WHO. They have a Global GERD Health Observatory, however it does not contain India data. As per our analysis, India's GERD as a percentage of GDP amounts to 0.01% in 2017-18 as compared to other countries like Denmark (0.9%), Netherlands (0.33%) and UK (0.13%) as indicated by WHO. This is abysmally low.

## State Profile

24. Health is a State subject. Consequently, States incur bulk of the expenditure on Health. The expenditure on medical research is indistinguishable from the overall data. The expenditure profile of States and Center on health including research is given at Annexure 3 and Annexure 4.

## Issues

25. The above analysis reveals that the Health R&D share in overall R&D Spend in India is only 4% in 2017-18. This aspect needs to be examined in the context of COVID- 19, which has ravaged the health care system across the world and has led to a mad rush for discovery of vaccine by all medical researchers. This requires higher level of R&D spending not only on basic research but also on building R&D infrastructure. Other key findings of this document are listed below:

- Data on health GERD is not readily available
- Sectoral breakup of R&D Expenditure is also not available



## Way Forward

### Short Term

- A plan for reprioritizing R&D Expenditure in the current year across sectors for increase in Health-Related R&D Expenditure.
- Data on Health Research and other sectors may be compiled by Ministry of Finance.

### Medium term

- Consider preparing a Strategy on Health Research
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# Annexures



## Annexure 1 - Total General Government Expenditure on Health (EU), 2018, % of GDP

Country/Zone	Health	Medical products, appliances and equipment	Outpatient services	Hospital services	Public health services	R&D Health	Health n.e.c.
European Union – 27	7.0	1.1	2.5	2.8	0.2	0.1	0.3
European Union – 28	7.1	1.0	2.3	3.2	0.2	0.1	0.3
Euro area O 19	7.1	1.2	2.6	2.8	0.1	0.1	0.3
Belgium	7.6	0.8	2.9	3.6	0.1	0.0	0.2
Bulgaria	5.0	0.7	0.5	3.5	0.1	:	0.2
Czechia	7.6	0.9	1.6	3.5	1.3	0.1	0.2
Denmark	8.3	0.5	1.2	5.9	0.1	0.2	0.4
Germany	7.2	1.6	2.2	2.8	0.1	0.1	0.5
Estonia	5.1	0.7	0.5	3.7	0.0	0.1	0.1
Ireland	5.0	0.7	1.8	1.9	0.1	0.0	0.4
Greece	5.0	1.3	0.5	3.1	0.0	0.0	0.0
Spain	6.0	1.0	4.6	0.0	0.1	0.2	0.0
France	8.1	1.3	3.0	3.4	0.1	0.1	0.1
Croatia	6.6	1.5	1.0	3.4	0.2	0.0	0.4
Italy	6.8	1.0	2.5	2.8	0.3	0.1	0.1
Cyprus	2.7	0.6	0.1	1.9	0.0	0.0	0.0
Latvia	4.0	0.6	1.0	2.2	0.1	0.0	0.2
Lithuania	5.9	0.7	1.5	2.2	0.1	0.0	1.4
Luxembourg	4.7	3.3	1.0	0.1	0.0	0.2	0.1
Hungary	4.7	0.8	1.4	2.1	0.1	0.0	0.2
Malta	5.3	0.6	1.0	3.4	0.0	0.0	0.3
Netherlands	7.6	0.7	2.5	3.4	0.2	0.3	0.2
Austria	8.2	1.1	1.5	4.6	0.2	0.5	0.3
Poland	4.8	0.1	1.4	3.0	0.1	0.1	0.1
Portugal	6.3	0.5	2.0	3.4	0.0	0.2	0.2
Romania	4.7	0.9	0.1	2.7	0.1	0.0	0.8
Slovenia	6.6	0.9	1.9	3.0	0.3	0.1	0.3
Slovakia	7.3	1.5	2.1	3.3	0.0	0.0	0.4
Finland	7.0	0.6	3.1	3.1	0.0	0.1	0.0
Sweden	7.0	0.7	3.1	2.5	0.2	0.2	0.2
United Kingdom	7.5	0.5	1.0	5.5	0.2	0.1	0.2
Iceland	7.8	0.5	1.8	5.3	0.0	0.0	0.2
Norway	8.2	0.5	1.9	4.8	0.3	0.4	0.3
Switzerland	2.2	0.0	0.2	1.7	0.1	0.1	0.1

Source: EUROSTAT: gov\_10aexp



## Annexure 2 - Central Government Expenditure on R&D

Sectors	Ministry/Department	2016-17	2017-18
Science Sector	Atomic Energy	4750.39	5208.01
	Biotech	1446.71	1771.65
	Earth Science	951.24	1123.58
	DST	3161.54	3526.64
	Space	8040	9130.57
	Total	18349.88	20760.45
Security Sector	DRDO	13382.05	15195.87
	Defense Production	2277.07	2814.25
	Home Affairs	13.83	19.7
	Total	15672.95	18029.82
Industrial Research	CSIR	4013.06	4582.12
	Heavy Industry	997.03	869.4
	DPIIT	50.04	59.84
	MSME	28.84	31.57
	DPE	0.33	0.36
	Steel	198.13	184.83
	Textiles	235.22	246.82
	Total	5522.65	5974.94
Agricultural and Allied	ICAR	4592.95	5355.57
	Agriculture and Corp	3.26	3.79
	Animal Husbandry	27.79	23.73
	Food Processing	45.93	67.31
	Food and PDS	10.3	8.86
	Rural Development	56.03	63.8
	Total	4736.26	5523.06
Health	ICMR	1073.83	1468.7
	Health and Family Welfare	323	346.58
	Health Research	0.51	0.66
	AYUSH	350.31	510.59
	Pharmaceutical	28	28.59
	Total	1775.65	2355.12
Mining Research	Mines	126.14	110.12
	Coal	65.67	159.45
	Petroleum and Natural Gas	1072.23	1061.39
	Total	1264.04	1330.96



Sectors	Ministry/Department	2016-17	2017-18
Infrastructure Research	Power	453.69	456.15
	Railways	167.09	174.08
	Road Transport	6.34	7.3
	Shipping	1.05	1.53
	Telecommunications	427.5	361.69
	Total	1055.67	1000.75
Education	HRD	552.41	632.94
	Skill Development	0.4	0.09
	Total	552.81	633.03
Sustainability Sector	Ministry of Environment	220.21	260.87
	MNRE	32.35	34.5
	Water	86.16	91.72
	Total	338.72	387.09
Others	Other Departments	950.81	924.81
	Total	950.81	924.81
	<b>Grand Total</b>	<b>50219.44</b>	<b>56920.03</b>

Source: NSTMIS



### Annexure 3 - Total States Expenditure on Medical and Public Health (Rs. Lakh)

	2015-16	2016-17	2017-18
Andhra Pradesh	520731	643773	638852
Arunachal Pradesh	51512	70722	93523
Assam	286211	319678	444170
Bihar	457132	549290	618154
Chhattisgarh	270924	329227	400789
Goa	57419	67056	0
Gujarat	712510	769953	851554
Haryana	252490	304443	337647
Himachal Pradesh	141739	178685	200584
Jammu & Kashmir	261003	281034	0
Jharkhand	217325	247924	0
Karnataka	582946	688288	811694
Kerala	477124	598757	648180
Madhya Pradesh	545408	594027	744875
Maharashtra	1000803	1072381	1217457
Manipur	48566	47920	58025
Meghalaya	60486	68707	70248
Mizoram	37842	39900	55391
Nagaland	46496	49560	60816
Orissa	368055	472925	492711
Punjab	260628	289023	274785
Rajasthan	775780	825213	999957
Sikkim	26064	28194	46170
Tamil Nadu	834500	864086	1043625
Tripura	61033	68193	78465
Uttarakhand	146462	150615	1690444
Uttar Pradesh	1345122	1578383	161933
West Bengal	785878	826233	0
Telangana	375881	493966	503077
All states*	11008070	12518153	12543125
Centre	1422641	1832750	2261092
Rev exp	1320177	1694324	1938747
Cpa Exp	102464	138426	322345

All states exclude Union Territories, Delhi and Pondichery

Central transfers to states under grants in aid is included in States expenditure and not in central

Data of states for the year 2017 O18 exclude the states of Goa, Jammu and Kashmir, Jharkhand and West Bengal

Source: Data is compiled from CAG Audit reports "Finance Accounts" of the respective years.



## Annexure 4 - Total States Expenditure on Medical Education, Research and Training (Rs. Lakh)

	2015-16	2016-17	2017-18
Andhra Pradesh	60491	70721	60852
Arunachal Pradesh	507	6512	6780
Assam	41328	84147	85584
Bihar	75262	114835	124951
Chhattisgarh	33135	41533	48267
Goa	10223	9993	0
Gujarat	111194	108335	83214
Haryana	56101	89404	90455
Himachal Pradesh	30514	51617	59521
Jammu & Kashmir	55459	57219	0
Jharkhand	21655	39767	0
Karnataka	157631	170036	201007
Kerala	108642	137673	143642
Madhya Pradesh	35665	69641	129844
Maharashtra	113315	129052	126793
Manipur	7775	6629	9524
Meghalaya	380	527	583
Mizoram	811	1353	9408
Nagaland	458	348	6745
Orissa	68836	115744	104516
Punjab	26268	27286	31132
Rajasthan	116778	118041	152494
Sikkim	173	245	351
Tamil Nadu	88291	97849	117759
Tripura	3438	3551	3607
Uttarakhand	22229	24019	404902
Uttar Pradesh	304368	435491	21591
West Bengal	90040	118929	0
Telangana	29270	29093	30279
All states*	1670237	2159589	2053802
Centre	790483	996583	1316639
Rev exp	742338.45	903418.45	1076361
Cpa Exp	48144.49	93164.06	240278

All states exclude Union Territories, Delhi and Pondichery

Central transfers to states under grants in aid is included in States expenditure and not in central Data of states for the year 2017 O18 exclude the states of Goa, Jammu and Kashmir, Jharkhand and West Bengal

Source: Data is compiled from CAG Audit reports "Finance Accounts" of the respective years.