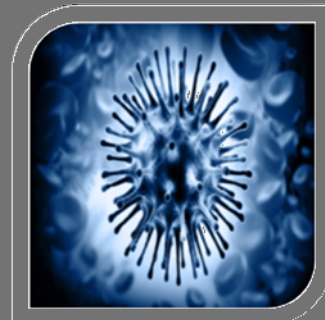


2017

# VIRUS RESEARCH AND DIAGNOSTIC LABORATORY NETWORK (VRDLN)

ANNUAL REPORT 2016-17



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## List of abbreviations

CMV –Cytomegalovirus  
 DHR –Department of Health Research  
 EBV –Epstein Barr Virus  
 HAV –Hepatitis A Virus  
 HBV –Hepatitis B Virus  
 HCV –Hepatitis C Virus  
 HEV –Hepatitis E Virus  
 HSV – Herpes Simplex Virus  
 IDSP – Integrated Disease Surveillance Programme  
 JE – Japanese Encephalitis Virus  
 NIE – National Institute of Epidemiology  
 NIV – National Institute of Virology  
 RSV – Respiratory Syncytial Virus  
 VRDLN – Virus Research and Diagnostic Laboratory Networks  
 VRDLs –Virus Research and Diagnostic Laboratories  
 VZV – Varicella Zoster Virus

## VRDLN Background

Outbreaks of viral agents are frequent in India. Timely diagnosis of these outbreaks is critical to mount appropriate public health response. The inadequacy of specialized virology laboratories in the country was noticed in the past. To address the shortage of specialized virus research and diagnostic laboratories (VRDL) in the country, the Department of Health Research has decided to establish a network of laboratories across the country.

### Objectives

- Creating infrastructures for timely identification of viruses and other agents

causing morbidity significant at public health level and specifically agents causing epidemics and/or potential agents for bioterrorism.

- Develop capacity for identification of novel and unknown viruses and other organisms and emerging - re emerging viral strains and develop diagnostic kits.
- Provide training to health professionals and
- Undertake research for identification of emerging and newer genetically active/ modified agents

## Role of VRDLN data resource and data mining centre

Monitoring online/offline data entry

Periodic training for data management and data entry

Develop periodic reports (weekly, monthly, half yearly and annually; Outbreak reports to DHR & ICMR).

Quality checks periodically (validation reports are generated monthly and annually)

## VRDLs

Nine VRDLs were newly approved during the year 2016-17. With the aforesaid addition, the

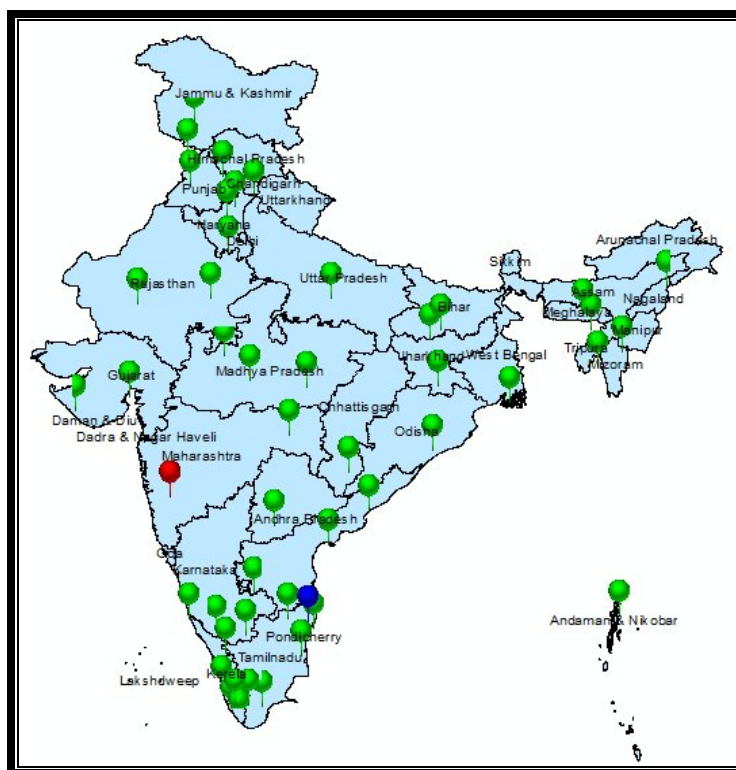
cumulative number has reached 47 virology laboratories. For details refer figure 2.

## Progress in data management software (Version 3.0)

The online/offline software version2 was updated with the additional variables / features in the modified Version 3.0 as per the following changes.

1. Included an additional field "State" & "Rural/Urban" in the Medical College & Outbreak interfaces. Included these fields in the excel file download with latest version information to prevent usage of older version.
2. Separate State reference table is created and these values will be shown while entering the state's name.
3. Auto assist is enabled for district entry and all the 707 district names are stored in the system with also a provision for newer districts
4. Some of the Labs download the excel file and edit the data which results in inconsistency in data. In order to prevent this error the downloaded excel file is protected with read only password so that labs can only read the downloaded excel contents and also it prevents any alteration of downloaded excel file.
5. Entry of new district names will be stored automatically into the system.
6. Bulk delete option is introduced in the menu to erase all the records at one stretch..

Figure 1: VRDLs as of December 2017



### Progress in outbreak and monthly reporting

All VRDLs must report the outbreak within 24 hrs of confirmation. Once the outbreak and its details are confirmed by NIE-VRDLN team over phone the same is intimated immediately to the state IDSPDHR and

ICMR. Every month, monthly report is generated in a standard template and the same is intimated to DHR (Note: Monthly reports are available on VRDLN webpage)

### Progress in data entry

During December 2016 to November 2017, 2,22,232 patients records were entered from

47 functional VRDLs. For details refer figure 2 & 3.

Figure 2: Number of patient enrolled by VRDLs during Dec 2016 to Nov 2017 in descending order

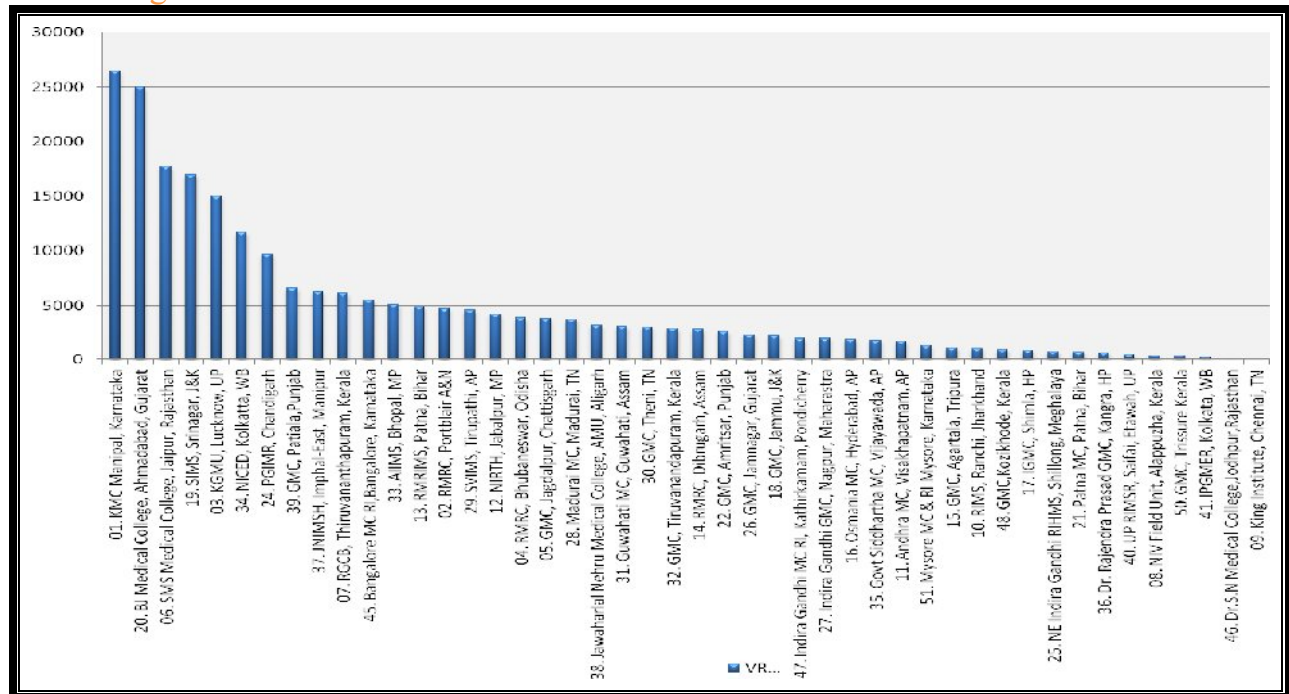
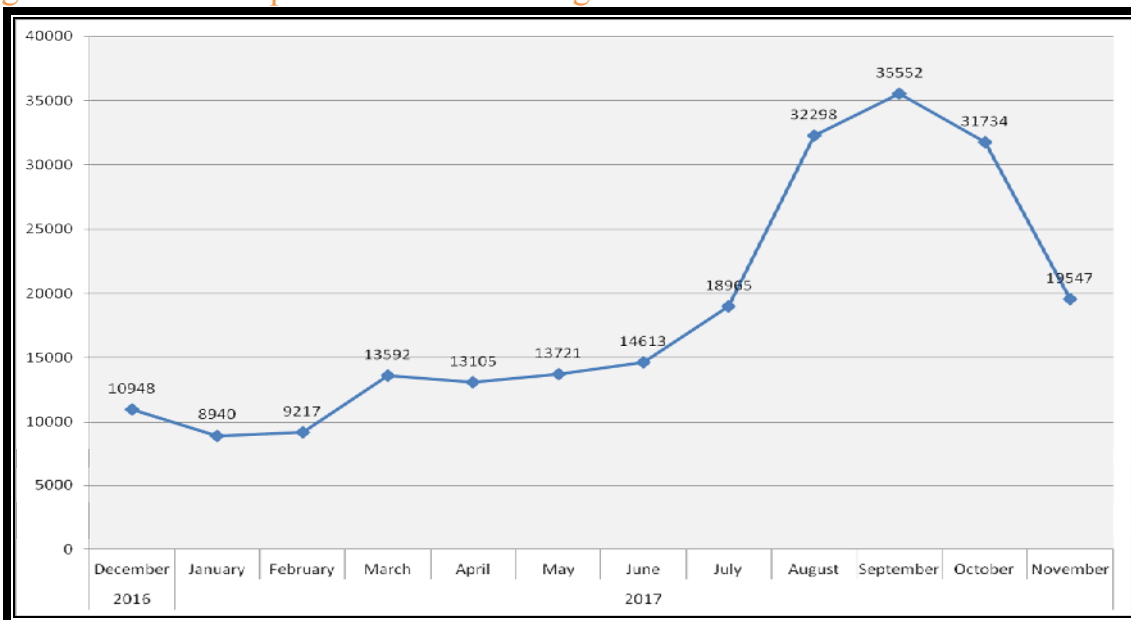


Figure 3: Number of patient enrolled during Dec 2016 to Nov 2017



### Outbreak details

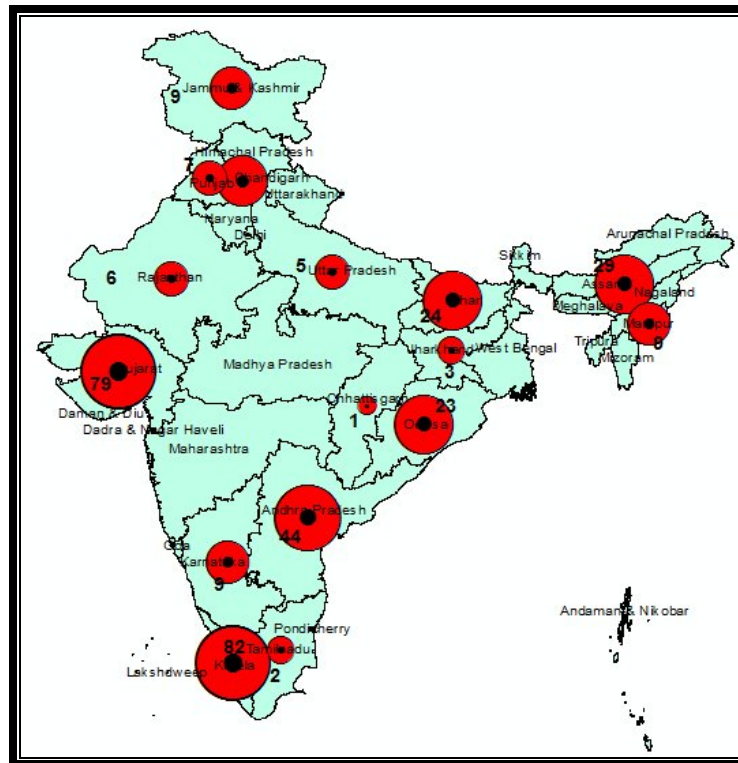
During December 2016 to November 2017 there were 329 suspected outbreaks reported from 5261 patient's records from 47 functional laboratories (figure 4). About 50%

of cases were confirmed for virus agents. For sample collection and total test done for outbreak cases refer table 1.

Table 1: Overall suspected outbreak cases reported during December 2016 to November 2017

Total no. of cases investigated	5261
Total no. of samples tested	6066
Total no. of tests done	9539
Total no. of tests positive	3173 (33%)
Total Case positive	2669 (51%)

Figure 4: VRDLs reporting suspected outbreak (n=329)



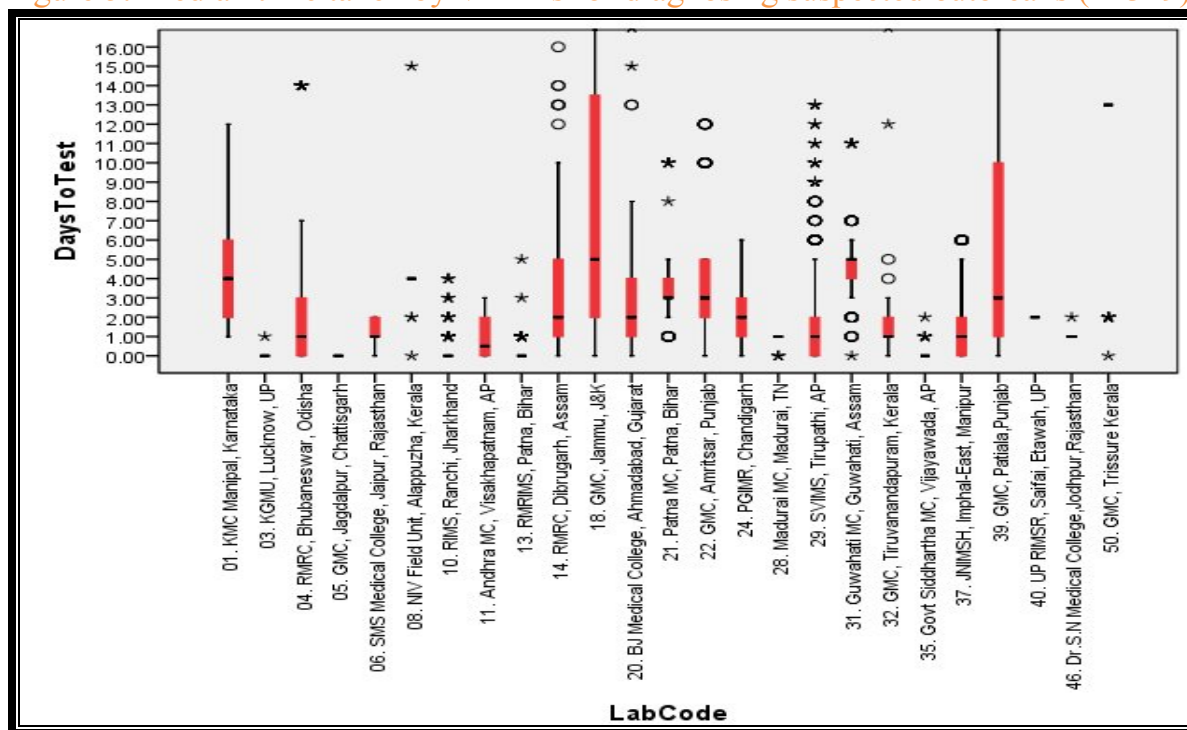
**Time taken by VRDLs for suspected outbreak confirmation**

For 344 outbreak confirmation the median time taken by VRDLs is 24 hours with range

of 0 to 60 days. For details of median time taken by various VRDLs refer figure 5.



Figure 5: Median time taken by VRDLs for diagnosing suspected outbreaks (n=329)



### Virological agent

Measles (n=109) virus outbreak was reported in higher number during December 2016 to November 2017, followed by Dengue (n=74),

Varicella zoster virus (n=34) and Influenza A (n=30) etc. For other virological agents detail refer table 2.

Table 2: Viruses diagnosed in outbreaks (n=329)

Etiological agents	Frequency
Measles virus	109
Dengue virus	74
Varicella Zoster virus	34
Influenza A H1N1 virus	30
Japanese Encephalitis virus	14
Hepatitis E virus	12
Chikungunya virus	10
Hepatitis A virus	9
Mumps virus	4

Herpes Simplex Virus	2
Rubella virus	2
Cytomegalovirus	1
Dengue/Chikungunya virus	1
Human Metapneumovirus	1
Influenza A H3N2 virus	1
Rota Virus	1
Unknown	24
<b>Total</b>	<b>329</b>

### Measles virus

A total of 2035 suspected samples for Measles virus were reported from 20 VRDLs, among them 760 (37%) samples were positive. Positivity rate of measles was higher in the age group 5-9 yrs for both the sexes.

Median age is 7 years (Inter-quartile range 4-11 years). Most number of cases was seen in winter (Dec-Mar). For details refer figure 6 & 7.





Table 3: Details of Measles virus suspected outbreak (n=109)

VRDLN	Total outbreaks	District	Frequency of outbreaks	Total cases	Positive cases	Percentage
04. RMRC, Bhubaneswar, Odisha	02	CUTTACK	1	11	7	64
		KANDHAMAL	1	9	9	100
14. RMRC, Dibrugarh, Assam	02	DIBRUGARH	1	21	6	29
		LONGDING	1	10	8	80
20. BJ Medical College, Ahmadabad, Gujarat	79	AHMEDABAD	2	10	4	40
		AMC	1	5	2	40
		ANAND	1	5	5	100
		BANASKANTHA	1	5	4	80
		BHAVNAGAR	4	20	18	90
		BHAVNAGAR CORPORATION	1	5	5	100
		BOTAD	1	5	2	40
		CHHOTA UDEPUR	2	10	10	100
		DANG	2	10	9	90
		DEVBHUMI DWARKA	1	5	4	80
		GANDHINAGAR	2	11	10	91
		GIR SOMNATH	12	60	52	87
		JAMNAGAR	7	37	27	73
		JUNAGADH	1	5	4	80
		KACHCHH	3	15	13	87
		KHEDA	1	5	5	100
		KUTCHH	8	40	31	77
		MEHSANA	7	38	34	89
		MORBI	5	25	16	64
		NARMAD	1	5	3	60
		PANCHMAHAL	2	10	10	100
		PATAN	1	5	5	100
		PORBANDAR	2	10	6	60
		RAJKOT	1	5	5	100
		SABARKANTHA	1	5	3	60
		SURAT	3	15	11	73
		SURAT MUNICIPAL CORPORATION	1	5	2	40
		VADODARA MUNICIPAL CORPORATION	1	5	5	100
		VALSAD	4	20	18	90
24. PGIMR, Chandigarh	10	AMBALA	1	6	5	83
		CHANDIGARH	2	11	9	82
		FARIDKOT	1	5	3	60

		JALANDHAR, PUNJAB	1	5	2	40
		KURUKSHETRA	1	5	1	20
		MANSA	1	5	3	60
		PUNJAB	1	6	2	33
		YAMUNANAGAR	2	10	8	80
<b>31. Guwahati MC, Guwahati, Assam</b>	15	ANJAW	1	5	5	100
		DHUBRI	1	5	5	100
		DIMA HASAO	2	10	9	90
		JAINZIA HILLS	2	11	8	73
		KARBI ANGLONG	1	5	5	100
		KOKRAJHAR	1	5	5	100
		LOHIT, ARUNACHAL PRADESH	1	5	5	100
		LONGDING	1	5	5	100
		MON, NAGALAND	2	15	13	87
		TIRAP, ARUNACHAL PRADESH	1	5	4	80
		ZUNHEBOTO	2	12	6	50
<b>39. GMC, Patiala, Punjab</b>		MANSA	1	5	3	60

### Dengue virus

A total of 1,16,020 samples were tested for Dengue virus among them 29,293 (25%) samples were positive. Median age is 25 years. Positivity rate of dengue was higher in the age group 10-19 yrs for both the sexes. (Inter-quartile range 16 - 37 years). Positivity

rate of dengue was higher in the age group 10-19 yrs for both the sexes. Most number of cases was reported during monsoon (Jul-Sept) and post monsoon month (Oct-Dec). For details refer figure 8 & 9

Figure 8: Age/sex distribution and monthly trend of Dengue cases

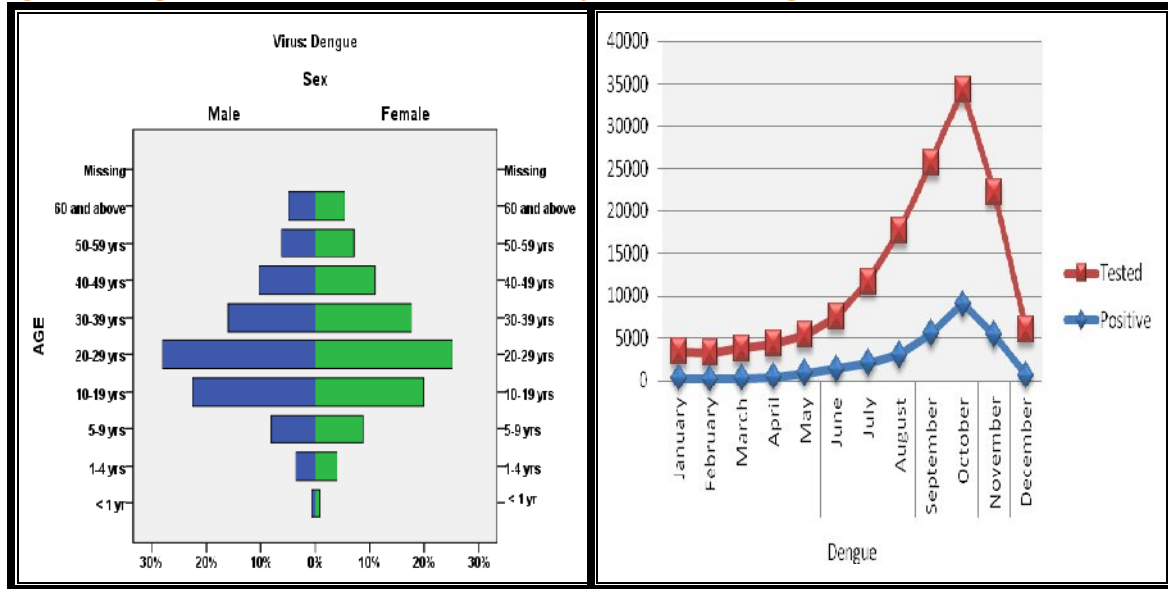


Figure 9: Map showing distribution of Dengue virus suspected outbreak (n=74)

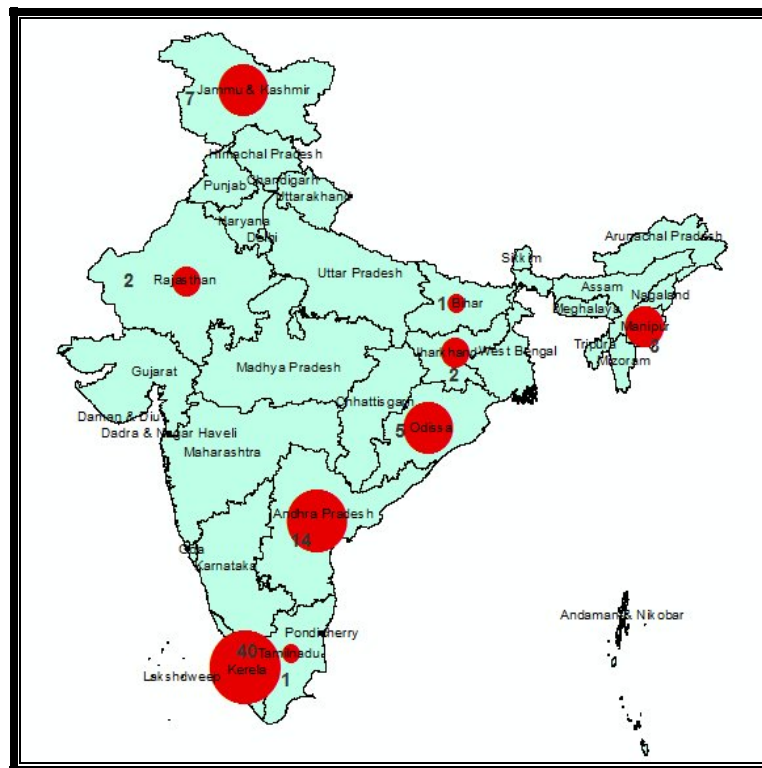


Table 4: Details of Dengue virus suspected outbreak (n=74)

VRDLN	Total outbreaks	District	Frequency of outbreaks	Total cases	Positive cases	Percentage
04. RMRC, Bhubaneswar, Odisha	05	BHADRAK	1	31	30	97
		KENDRAPADA	1	9	4	44
		KEONJHAR	1	13	12	92
		KHURDA	1	7	1	14
		MAYURBHANJ	1	21	3	14
06. SMS Medical College, Jaipur, Rajasthan	02	CHURU	1	20	11	55
		KARAULI	1	15	2	13
10. RIMS, Ranchi, Jharkhand	02	EAST SINGHBHUM	1	117	48	41
		PAKUR	1	10	3	30
13. RMRIMS, Patna, Bihar	01	PAKUR	1	12	8	67
18. GMC, Jammu, J&K	08	JAMMU	5	33	11	33
		KATHUA	1	8	1	12
		UDHAMPUR	1	16	1	6
28. Madurai MC, Madurai, TN	01	MADURAI	1	5	5	100
29. SVIMS, Tirupathi, AP	12	CHITTOOR	9	392	86	22
		KADAPA	3	43	9	21
32. GMC, Tiruvanandapuram, Kerala	40	KOLLAM	3	16	6	37
		THIRUVANANTHAPURAM	37	718	392	55
35. Govt Siddhartha MC, Vijayawada, AP	01	KRISHNA	1	8	8	100
37. JNIMSH, Imphal-East, Manipur	02	IMPHAL WEST	1	7	1	14
		CHURACHANDPUR	2	79	8	10

### Varicella Zoster Virus

A total of 5600 suspected samples for Varicella Zoster virus were reported from 17 VRDLs, among them 525 (9%) samples were

positive. Median age was 14 years (Inter-quartile range 8- 25 years).

For details refer figure 10 and 11.

Figure 10: Age/sex distribution and monthly trend of Varicella Zoster virus cases

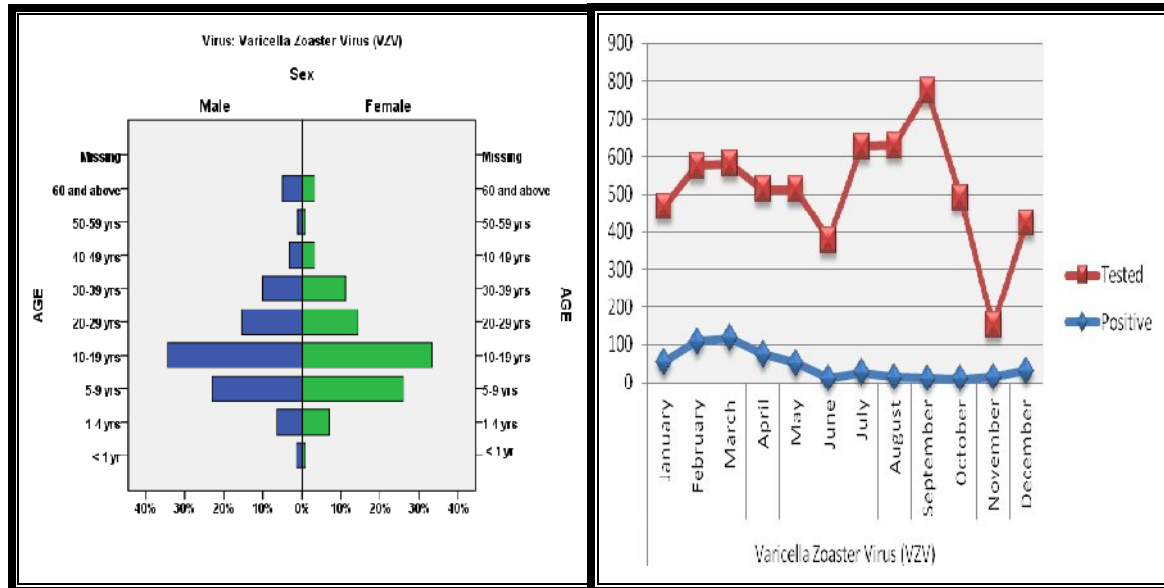


Figure 11: Map showing distribution of Varicella zoster virus suspected outbreak



Table 5: Details of Varicella zoster virus suspected outbreak (n=34)

VRDLs	Total outbreaks	Districts	Frequency of outbreaks	Total cases	Positive cases	Percentage
01. KMC Manipal, Karnataka	07	DAVANAGERE	3	23	21	91
		TUMKUR	4	44	41	93
03. KGMU, Lucknow, UP	03	LUCKNOW	1	5	5	100
		RAEBARELI	2	26	23	88
04. RMRC, Bhubaneswar, Odisha	06	BHADRAK	2	13	11	85
		BOLANGIR	1	10	6	60
		CUTTACK	1	14	6	43
		JAGATSINGHPUR	1	15	5	33
		JAJPUR	1	5	2	40
05. GMC, Jagdalpur, Chattisgarh	01	BASTAR	1	9	3	33
06. SMS Medical College, Jaipur, Rajasthan	01	ALWAR	1	7	2	29
10. RIMS, Ranchi, Jharkhand	01	RANCHI	1	6	6	100
13. RMRIMS, Patna, Bihar	01	PATNA	1	8	2	25
14. RMRC, Dibrugarh, Assam	04	DHUBRI	1	8	6	75
		DIBRUGARH	1	6	3	50
		LAKHIMPUR	1	8	7	87
		MANGALDOI	1	5	2	40
21. Patna MC, Patna, Bihar	10	JAMUI	1	8	8	100
		MADHUBANI	1	5	1	20
		NALANDA	4	27	25	93
		PATNA	1	9	8	89
		SAMASTIPUR	2	10	7	70
		VAISHALI	1	5	3	60



### Influenza A H1N1

Thirty three VRDLs reported 56000 suspected samples of Influenza A H1N1 virus infection, among them 14108 (25%) samples were positive. Median age was 35 years

(Inter-quartile range 18- 52 years). Most number of cases were seen in monsoon (Jul-Sept). For details refer figure 12 and 13.

Figure 12: Age/sex distribution and monthly trend of Influenza A H1N1 cases

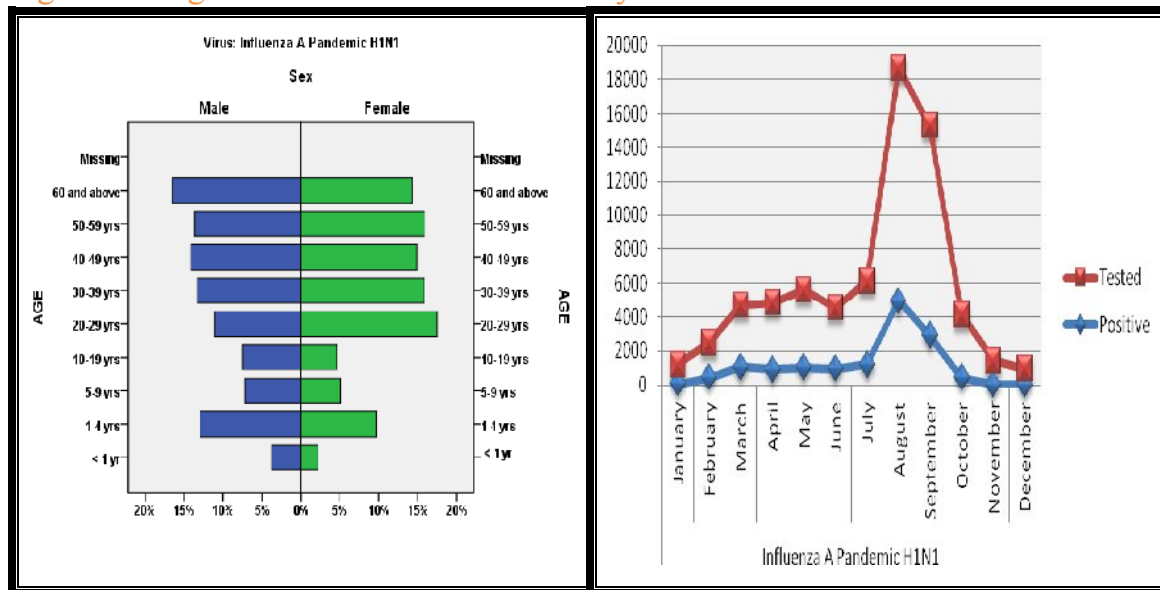


Figure 13: Map showing distribution of Influenza A H1N1 virus suspected outbreak



Table 6: Details of Influenza A H1N1 virus (n=30) suspected outbreak

VRDLs	Total outbreaks	District	Frequency of outbreaks	Total cases	Positive cases	Percentage
14. RMRC, Dibrugarh, Assam	04	DIBRUGARH	2	42	15	36%
		EAST SIANG	1	11	4	36%
		IMPHAL WEST	1	11	5	45%
18. GMC, Jammu, J&K	01	JAMMU	1	5	2	40%
29. SVIMS, Tirupathi, AP	22	ANANTAPUR	1	15	8	53%
		CHITTOOR	7	496	238	48%
		EAST GODAVARI	1	27	16	59%
		GUNTUR	2	20	12	60%
		KADAPA	3	93	30	32%
		KRISHNA	4	75	34	45%
		NELLORE	1	48	24	50%
		PRAKASAM	1	43	22	51%
39. GMC, Patiala, Punjab	02	LUDHIANA	2	11	4	36%
		FIROZABAD	1	7	2	29%
40. UP RIMSR, Saifai, Etawah, UP	01	FIROZABAD	1	7	2	29%

### Japanese Encephalitis

Twenty five VRDLs reported 10566 suspected samples of Japanese Encephalitis virus infection, among them 660 (6%) samples were positive. median age was 18

years (Inter-quartile range 8- 38 years). Most number of cases were seen in monsoon (Jul-Sept). For details refer figure 14 and 15.

Figure 14: Age/Sex distribution and monthly trend of Japanese Encephalitis (JE) virus cases

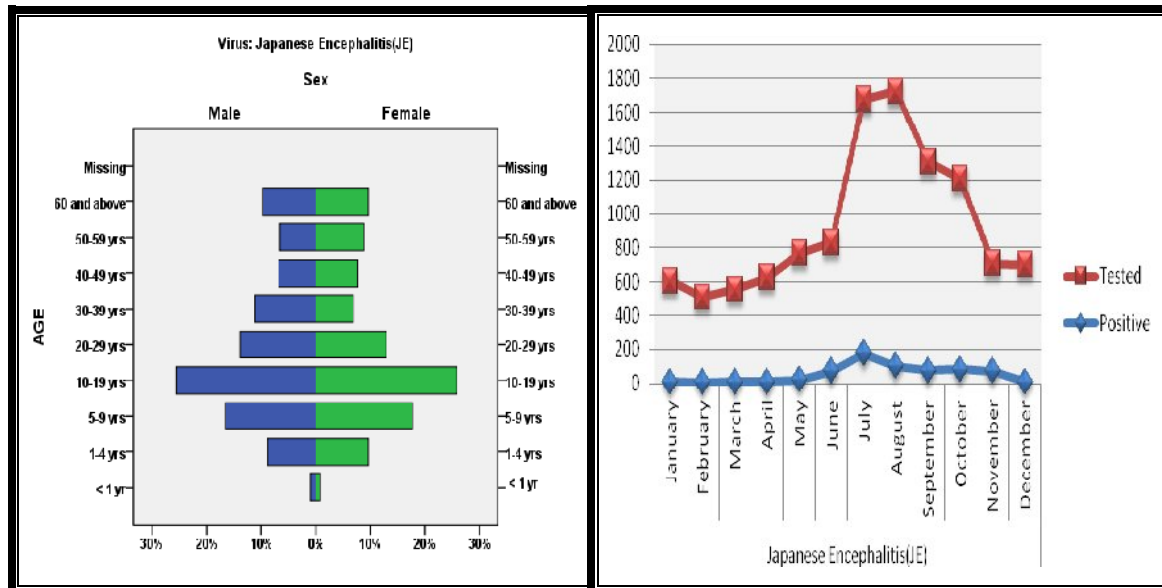


Figure 15: Map showing distribution of Japanese Encephalitis (JE) virus suspected outbreak

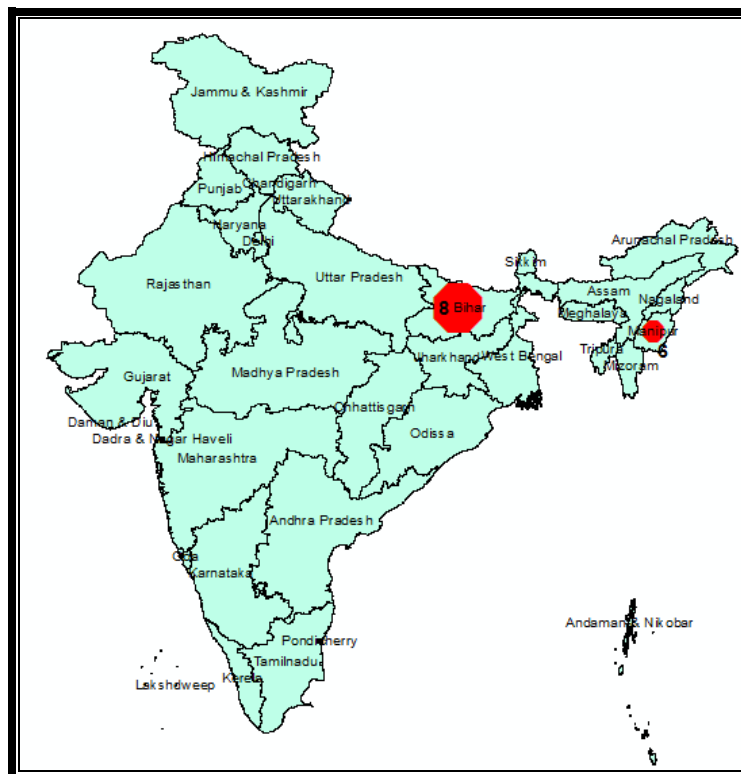


Table 7: Details of Japanese Encephalitis (JE) virus suspected outbreak (n=14)

VRDLs	Total outbreaks	District	Frequency of outbreaks	Total cases	Positive cases	Percentage
13. RMRIMS, Patna, Bihar	08	GAYA	5	36	14	39
		GAYA	1	6	3	50
		MUZAFFARPUR	2	13	3	23
		SITAMARHI	1	7	3	43
37. JNIMSH, Imphal-East, Manipur	06	CHURACHANDPUR	2	78	12	15
		IMPHAL WEST	2	34	8	24
		SENAPATI	2	31	5	16

### Virological diagnosis

About 45 to 50 viruses were suspected and evaluated in 46 VRDLs. Among them i) 20 to 25% positivity was reported for Dengue, Influenza A and other influenza, Chikungunya, Rubella, Parvovirus, and Rotavirus.

ii) 10 to 15% positivity was reported for Hepatitis A,B,C and E, Cytomegalovirus RSV.

ii) For other viruses reported positivity for < 10% refer Table 8.

**Table 8: Details of different virological agents evaluated by VRDLs**

Virus	Total cases	Positive cases	Percentage
Dengue	116020	29293	25
Influenza A Pandemic H1N1	56000	14108	25
Hepatitis C virus (HCV)	34294	3496	10
Hepatitis B virus (HBV)	33582	4251	13
Influenza B	25083	310	1
Chikungunya	24174	4748	20
Influenza A H3N2	22824	1361	6
Hepatitis E virus (HEV)	11108	1534	14
Hepatitis A virus (HAV)	10984	1620	15
Japanese Encephalitis(JE)	10566	660	6
Herpes simplex virus (HSV)	9775	489	5
Cytomegalovirus (CMV)	7303	840	11
Other Influenza	6524	1569	24
Varicella Zoaster Virus (VZV)	5601	525	9
Enterovirus	5261	73	1
Herpes Simplex Virus (HSV-2)	4965	119	2
Rubella Virus	3878	753	19
Epstein-Barr-Virus (EBV)	3327	250	7
Not in the list	2517	154	6
Scrub Typhus	2199	95	4
Measles	2035	760	37

### Data validation

NIE will be checking the data entered (every month on regular basis) by all VRDLs for its completeness and logical errors. The online software system automatically captures the missing key variables. The data validation was done for 15 key variables among them 8 key variables had missing data, district was highest (9%), followed by duration of illness (6%), Syndrome/symptoms of presentation (4%) etc. For details of other missing variables refer figure 16.

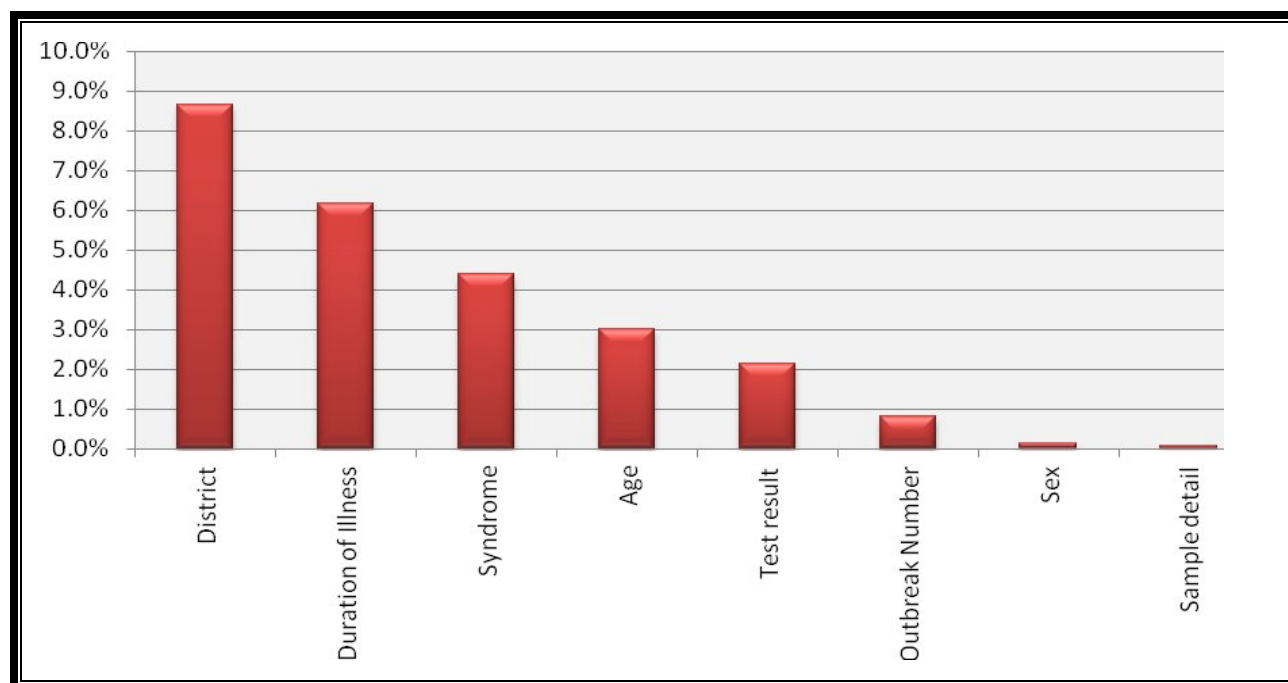
West Nile	1751	7	0.4
Respiratory Syncytial Virus (RSV)	1558	155	10
Parvovirus	1473	279	19
Zika virus	1351	0	0.0
Adeno Virus	1343	116	9
Rota Virus	1121	213	19
Mumps virus	847	89	10
Norovirus	664	7	1
Human metapneumovirus (HMPV)	623	46	7
Rhinoviruses	368	34	9
Parainfluenza 1,2	338	18	5
Astrovirus	226	1	0.4
No data	195	18	9
Sapovirus	136	0	0.0
Human Boca virus	81	3	4
Parainfluenza A/B/C	52	0	0.0
Influenza A-H2N2	51	12	23
Human papilloma virus	50	4	8
Para Influenza 1,2,3,4,	33	0	0.0
Coronavirus	24	0	0.0
Coxsackievirus	22	11	50
Hantavirus	9	0	0.0
HIV -1	8	0	0.0
Kyasanur Forest Disease Virus	6	1	17

### VRDLN data management activity



NIE conducted a data management training workshop on 3<sup>rd</sup> Feb 2017 and 17 laboratory participants attended the training workshop

Figure 16: percentages of missing data of eight key variables



### Summary

The Indian Council of Medical Research and the Department of Health Research, Govt. of India has established a network of virology laboratories for providing early diagnosis to disease outbreaks and other agents causing morbidity significant at public health level and specifically agents causing epidemics and/or potential agents for bioterrorism. This network is also generating case-based data on important viral illness in India.

As of Dec 2017, there are 47 active VRDLs across 23 States of the country. During December 2016 to November 2017, VRDLs diagnosed 329 suspected outbreaks. A total of 5261 patients affected during these outbreaks were investigated for 16 different viruses among them 2669 (51%) were positive. The common viral outbreaks diagnosed by these laboratories include Measles virus (n=109), Dengue virus (n=74), VZV (n=34), Influenza A H1N1 (n=30) and JE (n=14). Beside the diagnosis to 329 suspected outbreaks VRDLs investigated 216971 patients attending the medical colleges that housed VRDLs, of which 57476 (26%) were positive.

NIE, VRDLN team is regularly sending weekly reports on first working day of the week to all VRDLs. Regular monthly reports on standardized format are reported to DHR and same is uploaded on VRDLN website. Every month data validation report is mailed to all VRDLs for updating missing variables, if any. Suspected outbreak is confirmed over phone call and intimated to state IDSP and DHR within 24 hours of receiving outbreak alert. Timely online/offline data entry workshop will be conducted to train newly added VRDL staffs.

## Functional VRDLs

Lab Code	VRDLs
001	Manipal Centre for Virus Research, KMC Manipal, Karnataka
002	Regional Medical Research Centre, Port Blair, Andaman and Nicobar
003	King George's Medical University, Lucknow, Uttar Pradesh
004	Regional Medical Research Centre, Chandrasekharpur, Bhubaneswar, Orissa
005	Late Sri Baliram Kashayap Memorial Govt. Medical College, Jagdalpur, Chattisgarh
006	SMS, Medical College, Jaipur, Rajasthan
007	Rajiv Gandhi Centre for Biotechnology, Poojapura, Thiruvananthapuram, Kerala
008	National Institute of Virology Field Unit, Alappuzha, Kerala
009	King Institute of Preventive Medicine and Research, Guindy, Chennai, Tamil Nadu
010	Rajendra Institute of Medical Sciences, Ranchi, Jharkhand
011	Andhra Medical College, Visakhapatnam, Andhra Pradesh
012	National Institute for Research in Tribal Health, Jabalpur, Madhya Pradesh
013	Rajendra Memorial Research Institute of Medical Sciences, Patna, Bihar
014	Regional Medical Research Centre for NE Region, Dibrugarh, Assam
015	Government Medical College, Agartala, Tripura
016	Osmania Medical College, Hyderabad, Andhra Pradesh
017	Indira Gandhi Medical College, Shimla, Himachal Pradesh
018	Govt. Medical College, Jammu, Jammu and Kashmir
019	Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir
020	BJ Medical College, Ahmadabad, Gujarat
021	Govt. Medical College, Patna, Bihar
022	Govt. Medical College, Amritsar, Punjab
023	Pt. B.D. Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana
024	Postgraduate Institute of Medical Education & Research, Chandigarh
025	North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, Meghalaya
026	Government Medical College, Jamnagar, Gujarat
027	Indira Gandhi Government Medical College, Nagpur, Maharashtra
028	Madurai Medical College, Madurai
029	S.V. Institute of Medical Sciences, Tirupati
030	Govt. Medical College, Theni
031	Guwahati Medical College, Guwahati, Narakasur Hill Top Bhangagarh, Guwahati, Assam
032	Govt. Medical College, Thriuvananthapuram, Kerala
033	AIIMS, Saket Nagar, Bhopal, MP
034	National Institute of Cholera & Enteric Disease (NICED), Kolkata 700 010.
035	Govt Siddhartha MC, Vijayawada, AP
036	Dr. Rajendra Prasad GMC, Kangra, HP



037	JNIMSH, Imphal-East, Manipur
038	Jawaharlal Nehru Medical College, AMU, Aligarh
039	GMC, Patiala, Punjab
040	UP RIMSR, Saifai, Etawah, UP
041	IPGMER, Kolkata, WB
045	Bangalore MC RI, Bangalore, Karnataka
046	Dr.S.N Medical College, Jodhpur, Rajasthan
047	Indira Gandhi MC RI, Kathirkamam, Pondicherry
048	GMC, Kozikhode, Kerala
050	GMC, Trissure Kerala
051	Mysore MC & RI Mysore, Karnataka