

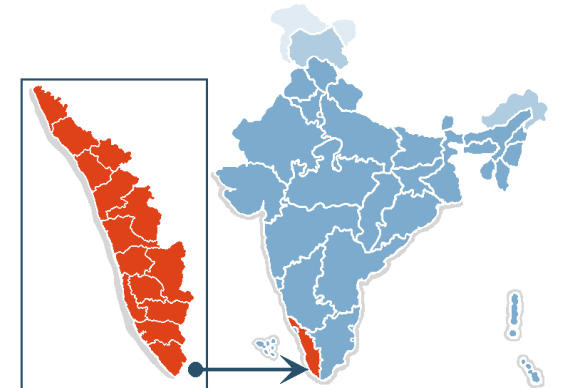


Surveillance of COVID-19, Kerala, India 2020-22

HEALTH & FAMILY WELFARE DEPT.

GOVT. OF KERALA

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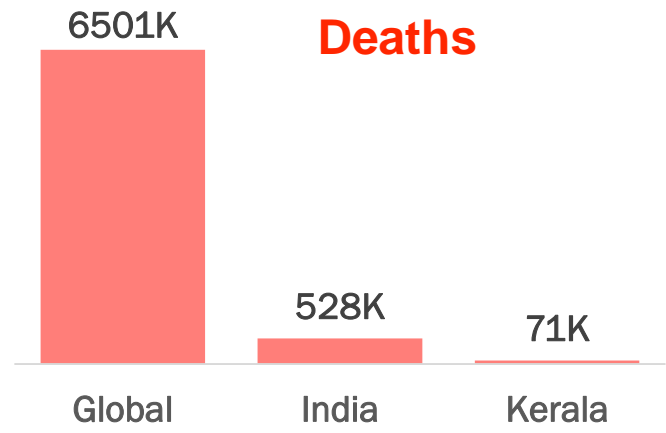
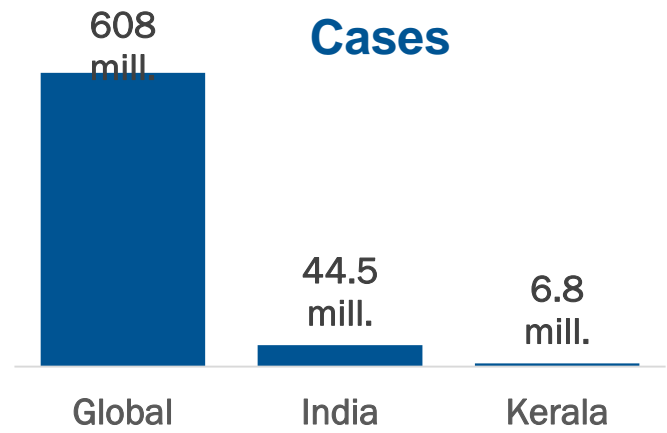
Introduction

- **COVID-19 Surveillance System**
 - **New**
 - **Intensive**
 - **Longest running**

Objective

- To describe the COVID-19 surveillance system in Kerala
- To critically evaluate the surveillance system in terms of its attributes and strength weakness opportunity and threat

COVID-19 burden – Global, India, Kerala



Describe the COVID 19 Surveillance system

List the objectives of the system.

Describe the health event(s) under surveillance. State the case definition for each health event.

Draw a flow chart of the system.

Describe the components and operation of the system.

- What is the population under surveillance?
- What is the period of time of the data collection?
- What information is collected?
- Who provides the surveillance information?
- How is the information transferred?
- How is the information stored?
- Who analyzes the data?
- How are the data analyzed and how often?
- How often are reports disseminated?
- To whom are reports distributed?

Objectives of the system

Suppress

- **Suppress transmission**

Restrict

- **Reduce Exposure**

Protect

- **Protect the Vulnerable**

Reduce

- **Reduce Mortality and morbidity from all causes**

Accelerate

- **Accelerate equitable access to Vaccination, Testing , Treatment , awareness practices**

Reinforce

- **Covid Appropriate Responsible Social Behavior**
- **Infection Control Practices**

Case definition of COVID-19

Probable Case

A person with severe acute respiratory illness (SARI), ILI, + no other etiology that fully explains the **clinical presentation AND any one of the following**

- A history of travel 14 days prior to symptom onset/
- Health care worker in a health care setting providing COVID care/
- Person with no travel history developing an unusual/
 - unexpected clinical course/
 - sudden deterioration/
- A person with ARI and history of exposure

Confirmed Case

A person with laboratory confirmation of COVID- 19 by Real time reverse transcriptase Polymerase Chain Reaction (rRT-PCR)/TrueNaT/Rapid Antigen testing, irrespective of clinical signs and symptoms in Kerala, 2020-22

Case definition of COVID-19

WHO COVID-19: Case Definitions

Updated in Public health surveillance for COVID-19, 22 July 2022



Case Definitions

Suspected case of SARS-CoV-2 infection (3 options)

- A** A person who meets the clinical **OR** epidemiological criteria:
- Clinical criteria:**
- acute onset of fever **AND** cough (ILI)
- OR**
- acute onset of **ANY THREE OR MORE** of the following signs or symptoms: fever, cough, general weakness/fatigue¹, headache, myalgia, sore throat, coryza, dyspnoea, nausea/diarrhoea/anorexia
- OR**
- Epidemiological criteria**²:
- contact of a probable or confirmed case, or linked to a COVID-19 cluster.³
- B** A patient with severe acute respiratory illness (SARI: acute respiratory infection with history of fever or measured fever of ≥ 38 °C; and cough; with onset within the last 10 days; and requires hospitalization)
- C** A person with no clinical signs or symptoms **OR** meeting epidemiologic criteria with a **positive professional-use or self-test SARS-CoV-2 Antigen-RDT**.⁴

¹ Signs separated with slash (/) are to be counted as one sign.

Probable case of SARS-CoV-2 infection (2 options)

- A** A patient who meets clinical criteria **AND** is a contact of a probable or confirmed case, or linked to a COVID-19 cluster³
- B** Death, not otherwise explained, in an adult with respiratory distress preceding death **AND** who was a contact of a probable or confirmed case or linked to a COVID-19 cluster³

Confirmed case of SARS-CoV-2 infection (2 options)

- A** A person with a positive Nucleic Acid Amplification Test (NAAT), regardless of clinical criteria **OR** epidemiological criteria
- B** A person meeting clinical criteria **AND/OR** epidemiological criteria (suspect case A) with a **positive professional-use or self-test SARS-CoV-2 Antigen-RDT**.⁴

Definition of COVID-19 death

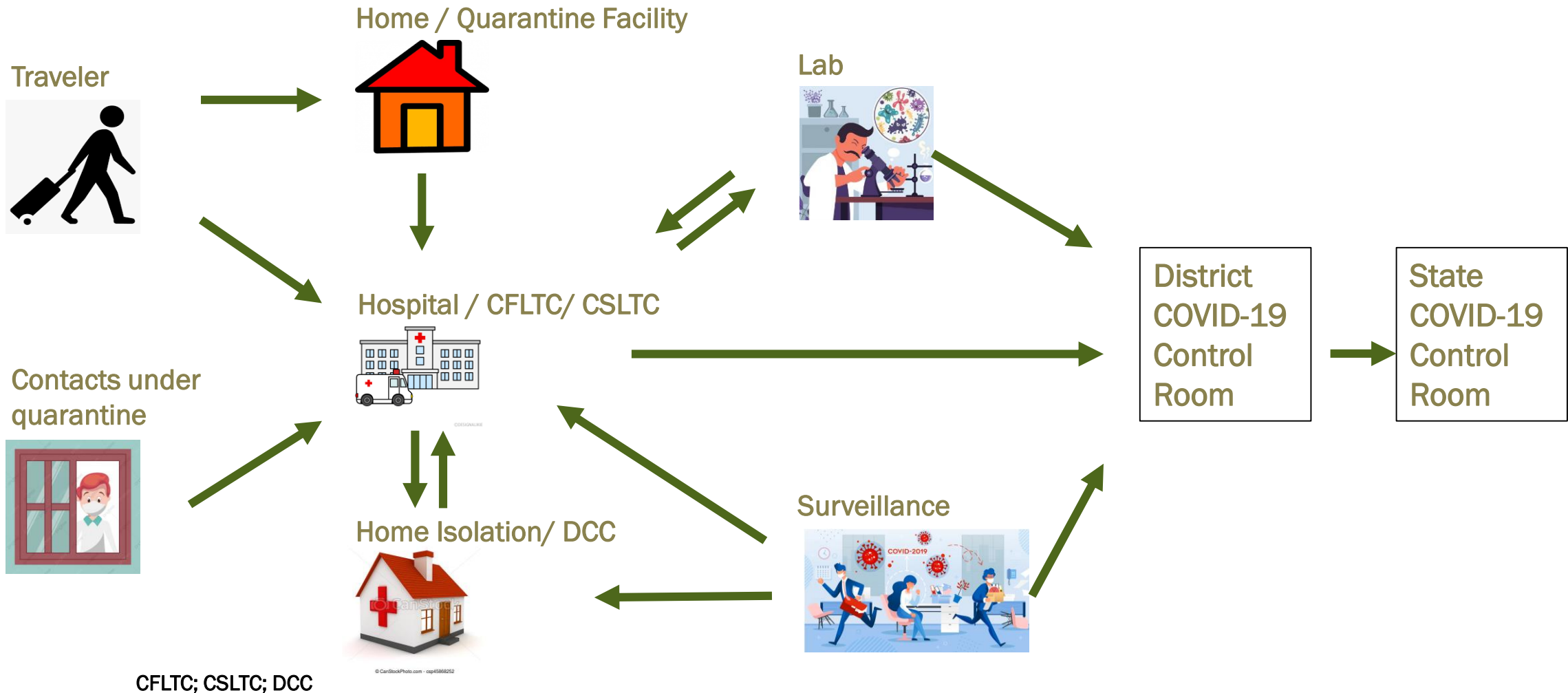
- A death due to COVID-19 is defined for surveillance purposes as a death resulting from a clinically compatible illness, in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID disease (e.g., trauma).
- There should be no period of complete recovery from COVID-19 between illness and death.

Definition of COVID-19 death

G.O.(Rt)No.2110/2021/H&FWD Dated,Thiruvananthapuram, 29/09/2021

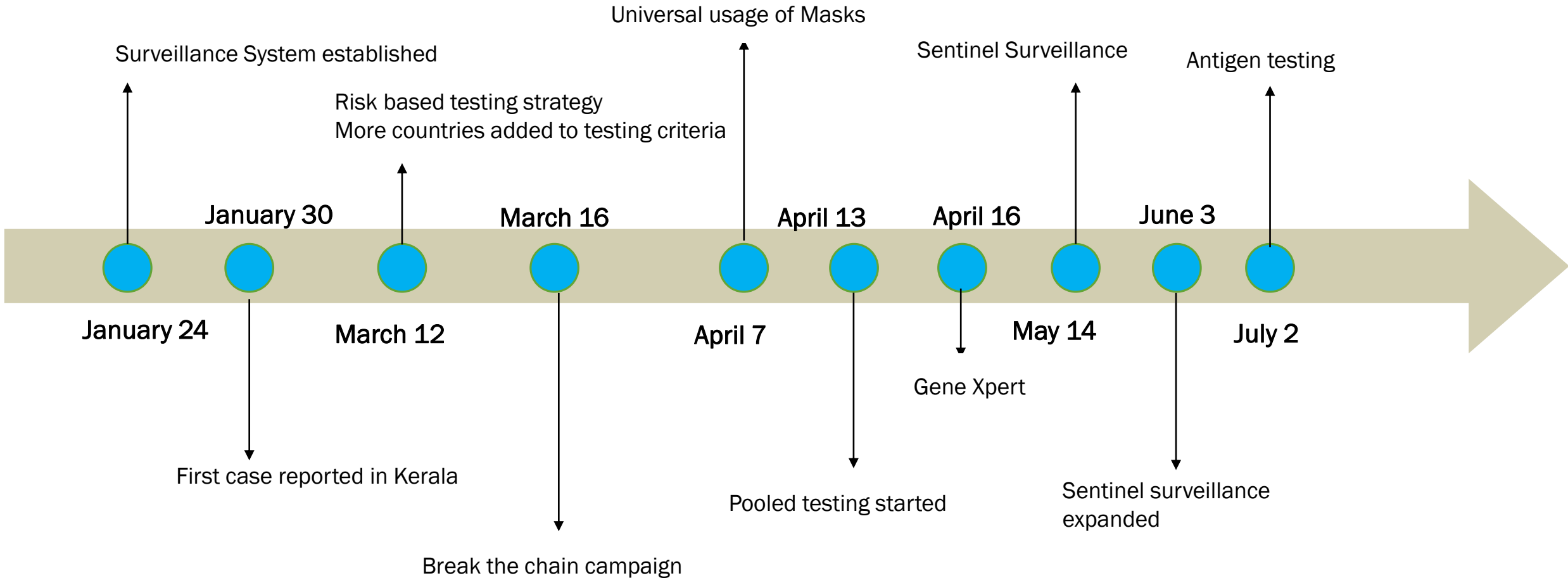
- Covid 19 cases were defined as those diagnosed through a positive RTPCR/molecular tests/RAT or clinically determined through investigations in a hospital /in patient facility by a treating physician while admitted in the hospital/in patient facility.
- Deaths occurring due to poisoning, suicide, homicide, deaths due to accident etc will not be considered as covid 19 deaths.
- Deaths occurring within 30 days from date of testing or from date of clinically determined as covid 19 will be treated as death due to covid 19 even if the death takes place outside hospital/in patient facility.
- A covid 19 case while admitted in the hospital/in patient facility and who continued as the same admission beyond 30 days and died subsequently shall also be treated as a covid 19 death.

COVID 19 Surveillance System, Kerala



Changes in COVID-19 surveillance system

Kerala, 2020-22



Description of surveillance system continued

What information is collected?

- COVID 19 positive patients details daily through LDMS
- Other information's as directed from state from time to time through e mail

Who provides the surveillance information?

- District surveillance unit collecting data from each PHC/CHC/major hospitals

How is the information transferred?

- Through email

How is the information stored?

- In secured google drive

Who analyzes the data?

- District and state covid control room teams

How are the data analyzed and how often?

- Data is analyzed daily and prepares presentation and bulletin(stopped now)

To whom & How often are reports disseminated?

- Reported to higher authorities on a daily basis

Various streams of surveillance

- **Field surveillance**
 - Community surveillance with the help of RRT members
 - Contact tracing
 - Infection prevention and control, and protection of the health workforce
- **Travel surveillance in Airports and community**
- **Hospital surveillance**
- **Genomic surveillance**
- **Others**

Travel Surveillance



Post Unlock Phase



Mandating Registration at Points of entry,

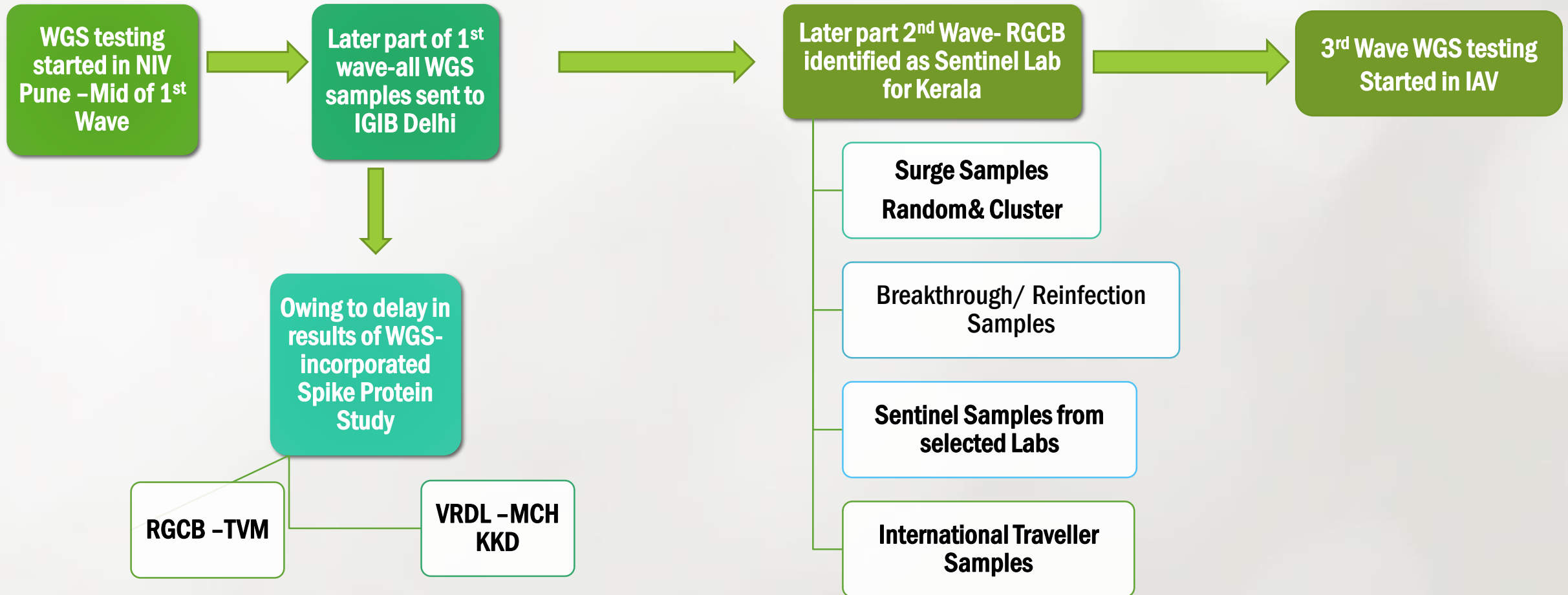


WGS among travelers/Contacts.



Prompt identification of such cases and contact tracing and containment

Phases of Whole Genome Sequencing



Strategy for WGS

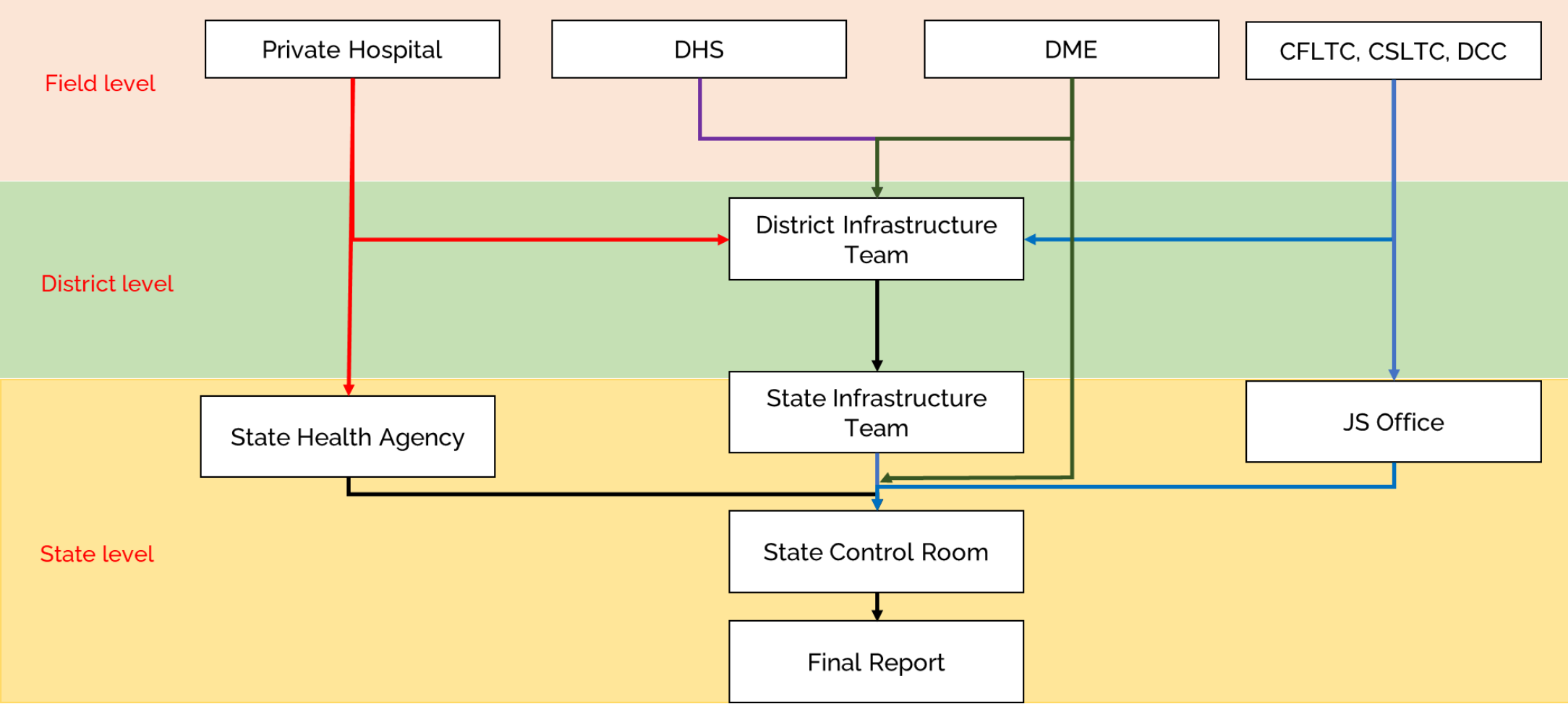
Testing

- Random Samples with Ct Value < 25 from the following categories selected and sent to INSACOG recognized designated labs for the state
- Sentinel samples – from 11 sentinel labs
- Samples from Clusters
- Samples of severely ill
- International Traveler Samples
- Re-infection and breakthrough infection

Follow up Action

- Trace back the VOCs
- Closely follow up the VOC cases
- to look out for break through infections in nearby areas among completely vaccinated INDIVIDUALS
- Look out for any Outbreaks in recent weeks in adjoining areas and/or abnormal clinical presentations or Outcomes.
- Send samples of contacts for WGS

Hospital surveillance



- **Dedicated infrastructure teams collect data from the following hospitals**
 - Hospitals under the Directorate of Health Services
 - Medical colleges
 - Private hospitals
 - Field hospitals like CFLTCs, CSLTCs and DCCs.
- **District Programme Management Support Units (DPMSU)**
 - Monitoring the occupancy status in all hospitals in their concerned districts.
 - Real-time and based on the occupancy decides upon activating additional field hospitals or identifying additional ICU beds and ventilators.
 - Call centres to respond to queries regarding patient care and hospitalisation as well as an ambulance network to ensure hassle-free transport of COVID patients.
- **Total beds, Oxygen beds, ICU beds and Ventilator data**
 - Validated and reported to the Infrastructure Team at the state level who cross check the data before sending it to the State Control room.
 - State Control room compiles the data and any discrepancies or mismatches if identified are rectified

Maintaining routine surveillances and other Special surveillances

- Mucor mycosis and MIS-C
- Post COVID-19 syndrome surveillance
- Other Communicable disease surveillance
- SARI /ILI surveillance
- Cluster surveillance
- Mass gathering surveillance
- Institutional Clusters prevention and containment

Sero surveillance

Round of survey	Antibodies	Time period	Population	Remarks
First	IgG and IgM antibodies using ELISA	May-June 2020	specific risk groups	
Second	IgG Nucleocapsid antibody (CLIA method)	February 2021	General community aged ≥ 18 yrs, front line workers and on the residual samples from blood banks and taluk level laboratories.	Overall seroprevalence 10.76%
ICMR 4th serosurvey		May 2021		44.4%
Third			Community ≥ 18 yrs, Antenatal women, Children aged 5-17 yrs, Tribal population ≥ 18 yrs, coastal population ≥ 18 yrs and the urban slum population aged ≥ 18 yrs	Around 80% in all except Antenatal-65% Children-40%

Timeline of Events



Phase 1

January 20 – March 5, 2020

State COVID Control Room Set up on 24th January 2020

18 multidisciplinary teams constituted

District Control Rooms and call centers established

Screening of Passengers from all International airports and seaports

Intersectoral Co-ordination meetings convened and follow up actions initiated

Guidelines for testing, quarantine, admission and discharge published

3 cases detected, all cured, none of their contacts acquired the disease

COVID 19 declared as State Specific Disaster

COVID 19 Testing facilities established within the State

Phase 2

March 6 to May 4, 2020

**Surveillance activities at
entry points
strengthened**

**Route maps of cases
Published to enhance
Surveillance and
Contact tracing**

**Nation wide lock down
enforced**

**499 COVID Care
Centers identified
through out the state**

**COVID First Line
Treatment Centers
(CFLTCs) established**

**29 Covid Hospitals
across the state for
Category C patients**

**Human Resource scaled
up**

**Testing Facilities
scaled up**

**Sentinel Surveillance
started**

**Kerala Epidemic Diseases Ordinance
Published on March 27th**

**Community Health Volunteer groups
at LSG Level ensured adherence to
quarantine measures**

**Psychosocial Support Calls given to
persons in Quarantine and Covid
patients**

**Targeted psychosocial Support calls
made to Mentally ill patients on
treatment, Children with special
Needs, Guest Labourers, Elderly
people living alone and Health Care
Workers during lockdown**

Phase 3

May 5, 2020 to December 31, 2020

Surge in the number of repatriates

CSLTCs for treatment of Category B patients

Domiciliary Care Centres (DCC) for treatment of asymptomatic persons

Home Isolation of COVID patients started

Testing target increased to 80,000 tests per day

District specific target-based testing initiated

State level Core group for overall monitoring of COVID control activities

Sectoral Magistrates to enforce social distancing and COVID Protocol

Strict legal actions taken against persons spreading fake news through social media and those violating quarantine

**eSanjeevani Telemedicine Platform
launched**

COVID-19 Step KIOSKS established

**All persons entering the state
through trains and roads were
screened using squads at all points
of entry.**

**New strain of SARS CoV2 from UK,
screening and contact tracing of
passengers from UK was
augmented.**

**Oxygen audit was also done daily to
monitor the Oxygen generation
capacity and Oxygen consumption
in the COVID hospitals.**

**Rapid Antigen testing at PHCs and
CHCs for symptomatic patients and
persons from containment zones.**

Phase 4

January 1, 2021 to December 31, 2021

Back to Basics campaign

Delta wave genomic surveillance

Coordination mechanism for COVID-19 vaccine introduction established

Occupancy status in all health facilities monitored by the infrastructure committee.

COVID 19 testing through Government laboratories and outsource model RTPCR mobile laboratories

Weekend lockdowns and subsequent complete lock down

Expected third wave, preparedness guidelines for ensuring Covid 19 surge in children June 2021

TPR based containment-at All the Local self-governments followed by Weekly infection population ratio

De-centralizing the system of declaration of deaths

Phase 5

January 1, 2022 to till date

Omicron surveillance-
Control room and DPMSU
activities were rejuvenated

International travelers tested
positive in home isolation
until tested negative

Home isolation for Covid 19
positive asymptomatic
international travelers

Quarantine not needed for
other primary contacts
except for primary care giver

Cluster management
guidelines

Isolation period to
7 days

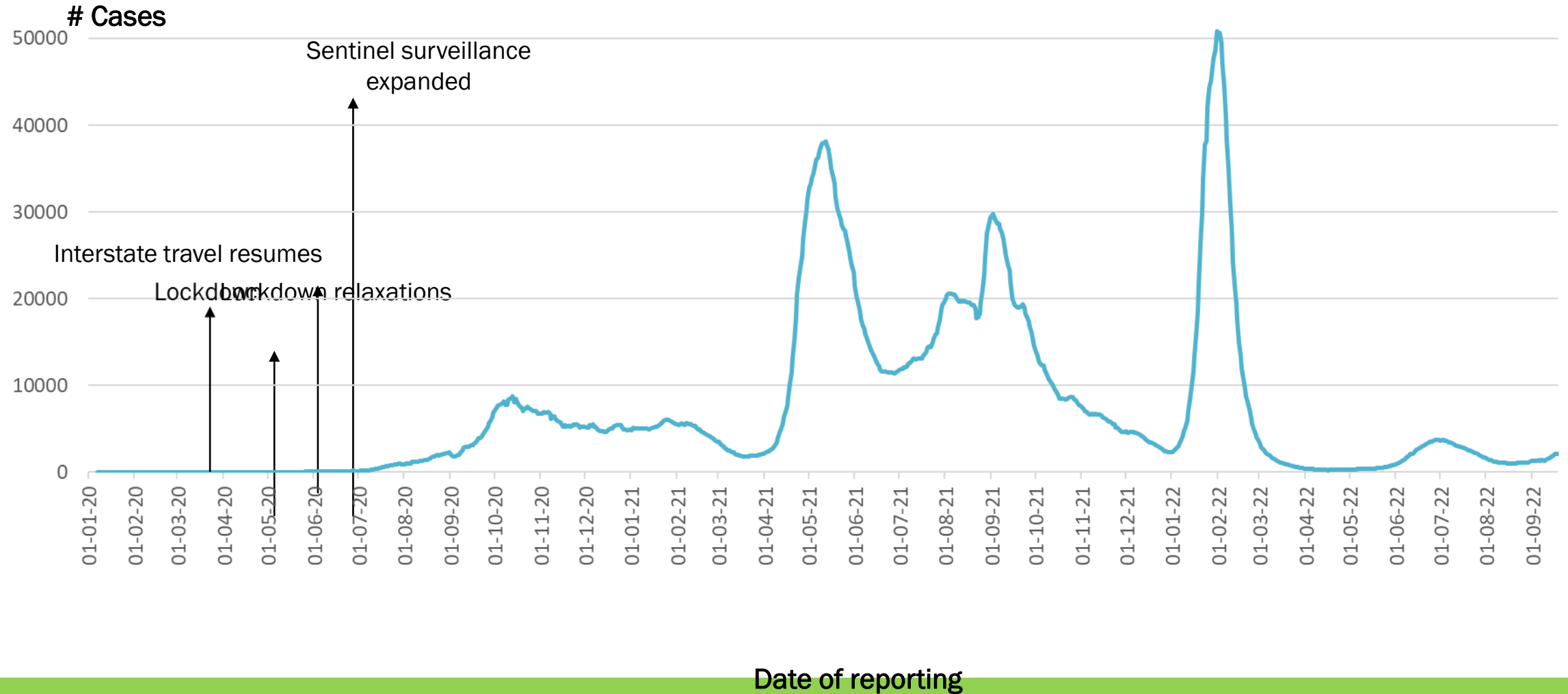
Purposive testing

Threshold action matrix-
hospital infrastructure,
testing, surveillance,
materials and supplies, field
hospitals and health human
resource

Additional human resource
recruited till March 31st

Distribution of COVID-19 cases by date of reporting

Kerala, January 2020- September 2022



Demographic characteristics of COVID-19 patients in Kerala, total deaths, and case fatalities in Kerala, 2020-2022

Category	Variable	Total Cases	Total Deaths	Case fatality %
	Total cases	6793786	71057	1.05
Gender	Female	3477089	28195	0.81
	Male	3200651	42861	1.34
		116046	1	0
Age group	0-10	490574	120	0.02
	11-20	779909	130	0.02
	21-30	1236430	422	0.03
	31-40	1228874	1520	0.12
	41-50	1093854	4439	0.41
	51-60	918734	10222	1.11
	61-70	625465	18072	2.89
	71-80	298617	19657	6.58
	> 80	121329	16475	13.58

District wise distribution of COVID-19 cases, deaths and CFR in Kerala, 2020-2022

District	Total Cases in the district	Total deaths in the district	Case Fatality Rate due to COVID 19 (B/A*100)
Alappuzha	403033	5277	1.31
Palakkad	457516	5864	1.28
Kannur	353131	4485	1.27
Kollam	529943	6660	1.26
Thiruvananthapuram	759862	8615	1.13
Thrissur	687214	7524	1.09
Malappuram	651756	6499	1.00
Kottayam	478686	4669	0.98
Kozhikode	685615	6448	0.94
Pathanamthitta	283297	2617	0.92
Ernakulam	947960	8456	0.89
Kasaragod	168483	1398	0.83
Idukki	216969	1562	0.72
Wayanad	170321	983	0.58
TOTAL	6793786	71057	1.05

ATTRIBUTES OF SURVEILLANCE SYSTEM

Attribute	Definition	Remarks
Simplicity	<ul style="list-style-type: none">• COVID-19 case definitions were easy to follow in field• Ease of compilation and analysis – district• Ease of compilation and analysis – state	
Flexibility	<ul style="list-style-type: none">• Change in the guidelines• Change in data fields	
Data Quality	<ul style="list-style-type: none">• Completeness of the variables in the line list	
Representativeness	<ul style="list-style-type: none">• Districts reporting to state• Health Facilities reporting to district	
Timeliness	<ul style="list-style-type: none">• Consolidated surveillance data send by health facility daily• Districts sending consolidated surveillance data to state daily	

*Updated CDC guidelines MMWR 2001



SWOC ANALYSIS

Strength

- Online platform for covid test reporting – Lab Diagnosis Management System
- Creation of platforms for streamlined and transparent sharing of information between health systems (public and private) and the general public
- Online surveillance system - covid Jagratha portal
- Well established health infrastructure at field level
- Upgradation of infrastructure at Healthcare institutions
- Decentralized surveillance system with supportive supervision from the state and district surveillance units. Community participation in surveillance activities by RRT formation at all levels
- Improvement of infrastructure and standards at Diagnostic centres

Strength

- Intersectoral coordination with other departments
- Daily review from the state level to ensure that the surveillance is in right track
- Constitution of different teams - contact tracing, cluster management, testing, isolation, travel surveillance and treatment
- Easy access to Testing- Focus should be on decentralized / Mobile testing- sentinel and random testing
- Political will
- Data driven Policy
- Pace of vaccination

Weakness

- **FATIGUE!!!!** same group of health care personnel involved
- Urban health system lacking enough manpower for effective surveillance
- Dearth of research on preventive and intervention side
- Delay in Whole Genomic Sequencing hamper contact tracing and containment strategies
- Multiple surveillance systems eg labsys-testing, COVID jagratha-contact tracing, IDSP
- Couldn't effectively decentralize contact tracing to LSGD level
- No Free flow of data, e.g., patient details, etc, to the periphery(initial days)
- TPR driven policy changes/instead of TPR a denominator involved indicator like attack rate or incidence would have been better

Opportunity

- Gained the experience
- Hospital Infrastructure improvement
- Lab network improvement
- Improved human resource
- To use the same system to achieve SDG, One Health
- Online meetings and training were useful
- Public and administration are now more aware of preventive and promotive strategies, more chance of funding at periphery in these activities
- Media took initiative to discuss public health-it's a policy window to push preventive and promotive strategies

Challenges

- Surveillance and Decentralized testing in hard-to-reach settings and vulnerable populations
- Responsive behavior change among public
- Strategies to reduce household transmission
- No Media policy in handling
- Training for program officers in media management
- Lack of consistent co-ordination with other department staff involved in surveillance
- Effective Contact tracing was difficult later on
- High influx of foreign nationals and NRIs - chance of exposure to variant strains

Recommendations

- Proper monitoring and validation of data to be done at district and state level
- **Seroprevalence studies - post- introduction of vaccines**
- Need for a subdistrict/block level public health unit for more coordinated surveillance
- Redouble contact tracing and Case investigation, critical to understanding transmission patterns in the post-introduction monitoring of COVID-19 vaccines.
- Sustained quarantine efforts more important in the context of emergence of Variants of concern-responsive behavior change by SMS/Back to basic campaign
- Protect high risk Groups- Enhanced testing and vaccination prioritization for patients and care givers,

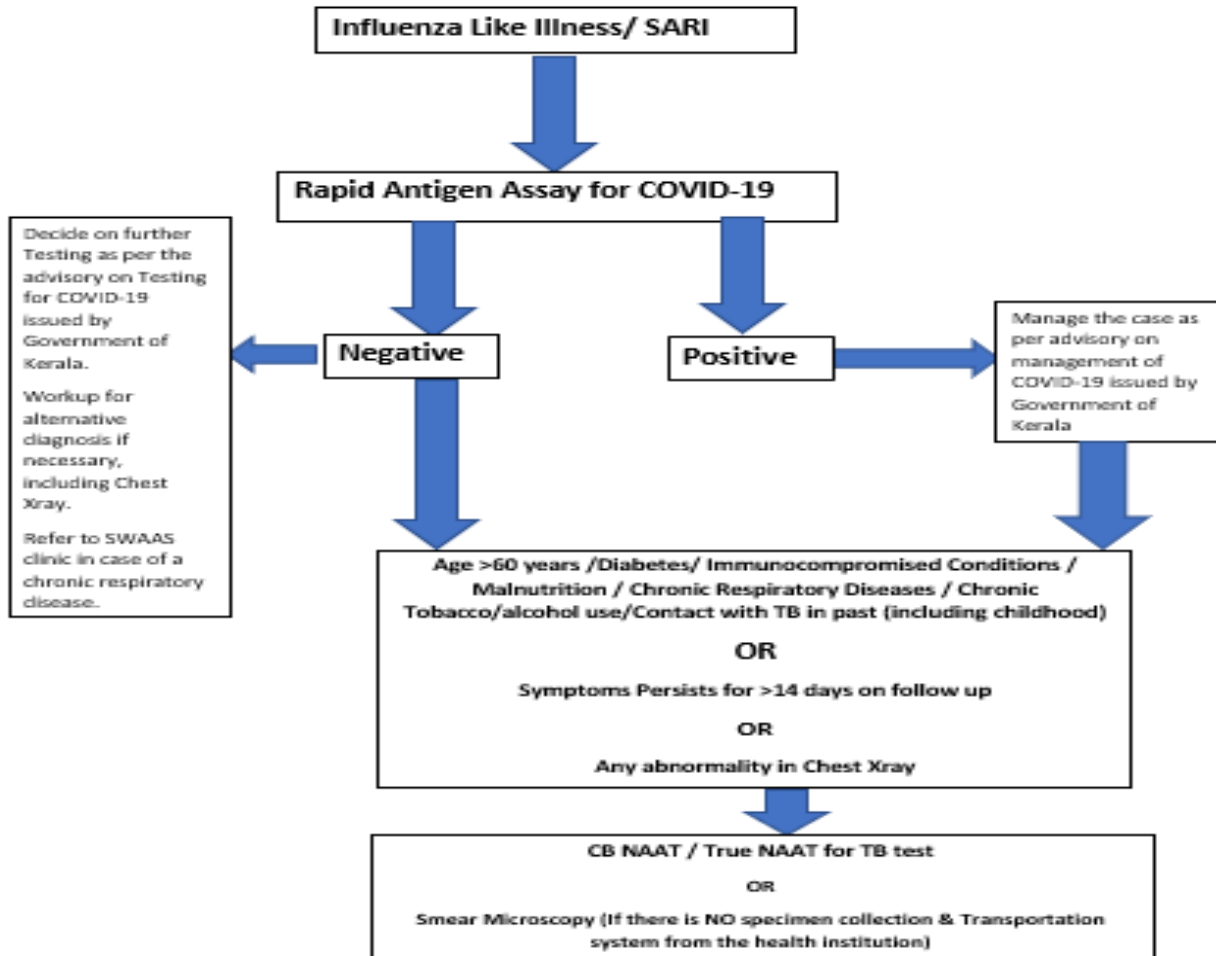
Acknowledgements

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- Dr Mahesh N, Aardram SLEC member
- Dr Manu M S, State covid control room
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- Dr Anoop, Dy DMO Palakkad

Innovations

TB and COVID Bidirectional Screening

Integrated Algorithm for testing TB among ILI/SARI cases in the context of COVID-19



Individuals with TB & COVID together **174**

Deaths among TB – COVID **26**

TB detected through ILI/SARI through combined screening with COVID **207**

#If not COVID
#Maybe TB

Kerala TB Elimination Mission

Sectoral Magistrates

- Officers of the DDMA's reporting directly to the concerned Chairman, DDMA.
- Act as the 'eyes and ears' of the DDMA for better containment of the pandemic.
- Liaise and work alongside the present deployment of personnel from other regular departments
- Monitor and enforce all Covid Containment measures – existing and those introduced from time to time.
- Focus on Break the chain campaign (SMS – social distancing, masks, sanitizing), quarantine and isolation, compliance of Covid protocol in gatherings (in marriages/ funerals/ auditoria / others), micro containment measures, reverse quarantine, compliance of Covid protocol in shops, markets and commercial establishments, IEC campaigns and such other matters as advised by the District Collector /DDMA.

Major Responsibilities of Sectoral Magistrates

Containment Zone Management

- Containment Zone Marking
- Contact tracing
- Surveillance of Quarantine norms
- Enforcing regulations in shops/establishments

COVID Protocol Management

- Regulating public gatherings
- Ensuring adherence to COVID protocols in shops/establishments
- Ensure maintenance and monitoring of visitors registers



Action Against Violations

- Report Offences in Covid Jagratha portal
- Issue Warning
- Order for imposition of fine by Police
- Closing down of shops/establishments
- Recommend for registration of cases

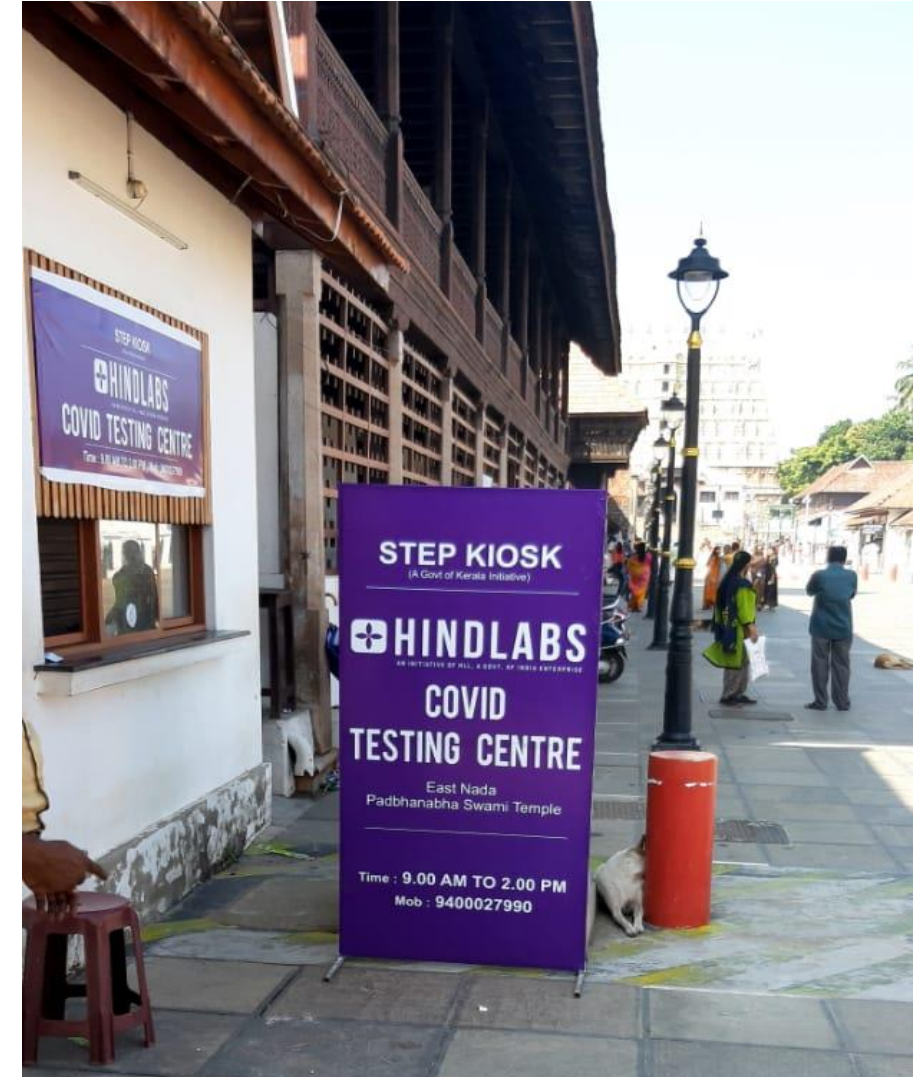
Break the Chain Campaign

- Break the chain awareness campaigns
- Reverse quarantining awareness promotion

STEP Kiosks

Services Offered

- Educate the people on prevention of COVID-19 by providing correct information regarding precautions to be taken including correctly wearing face masks. Correct methods of sanitizing hands and following physical distancing norms
- Offer screening for COVID-19 symptoms such as fever using flash thermometer and anosmia using smell test and explain about other symptoms like diarrhoea, sore throat, headache, rhinitis and fatiguability
- Offer Rapid Antigen Assay testing for COVID-19 at cost fixed by Government
- Offer good quality facemasks & hand sanitisers at costs for the needy



[Vehicle Permit Report](#)[Operation Permit Report](#)[Self Declaration Report](#)[Emergency Travel Pass](#)[Volunteer Pass Issued Report](#)[Volunteer Registered Report](#)

COVID-19 Jagratha

Covid-19 Jagratha

A comprehensive solution for real time surveillance, care and support for people affected/quarantined by Covid 19. This portal is a one stop platform for the public to avail emergency services and information related to Covid 19 and ensures transparency and quality in public services and welfare measures.

[Login](#)[Read More](#)[Dashboards](#)[Sabarimala Medical Certificate Format](#)



Mobile Sample Collection Units

WISK

Walk In Sample Kiosk

'WISK' is a specially designed , State of the Art kiosk for facilitating sample collection and rapid testing in a hospital/community level setting.

