Concept Paper

Advanced Covid-19 Syndromic Surveillance (ACSyS) System

Background:

The COVID-19 pandemic that originated in Wuhan City, China at the end of the year 2019 has affected almost all parts of the world by mid of the year 2020 with around 10 million cases and 500 thousand deaths across the world. It has posed great challenges to the economy, social, mental wellbeing, and health of people in all affected countries. India is no exception to that, in fact with the second-most populous country in the world, India took more than 100 days to cross first 100 thousand cases from the day when the first case of COVID-19 was detected in India and it took less than 50 days from there to cross 600 thousand cases of COVID-19 in India. And with increasing test positivity rate now, the exponential increase in the number of cases is expected to occur at a higher pace! While the challenges are mounting, it has also univocally agreed that timely testing and isolation of cases and contact tracing works as the key strategy to contain the virus in the ongoing COVID-19 pandemic. But here again, the fact we know that nearly 80% of cases are having mild to moderate disease sign symptoms and the fact we don't know that what percentage of cases are asymptomatic raises a big question on scale and effectiveness of surveillance to actively find cases in the communities. There are very high chances that we might be missing to catch some of these cases with mild to moderate sign symptoms and a large number of asymptomatic cases in the ongoing surveillance of COVID-19. This paper offers a concept of an Advanced Covid-19 Syndromic Surveillance (ACSyS) System which can be an epidemiological and technological solution to the problem with existing surveillance of COVID-19.

As Is Analysis:

Solutions are only sought when we have an existing problem and "As Is Analysis" is one of the best tools to capture those existing problems. We had discussions with health officials of Gandhinagar district on the current surveillance strategies of COVID-19 to find out the gaps.

There are mainly two technological platforms that are in use by the administration for real-time surveillance and management of COVID-19 situations in India.

1. **"COVID19 INDIA PORTAL"** developed by Centre for Health Informatics, Ministry of Health and Family Welfare (MoHFW), Government of India, and ICMR. The portal is accessible to District Collectors and other assigned users only through the following link: https://covid19.nhp.gov.in/

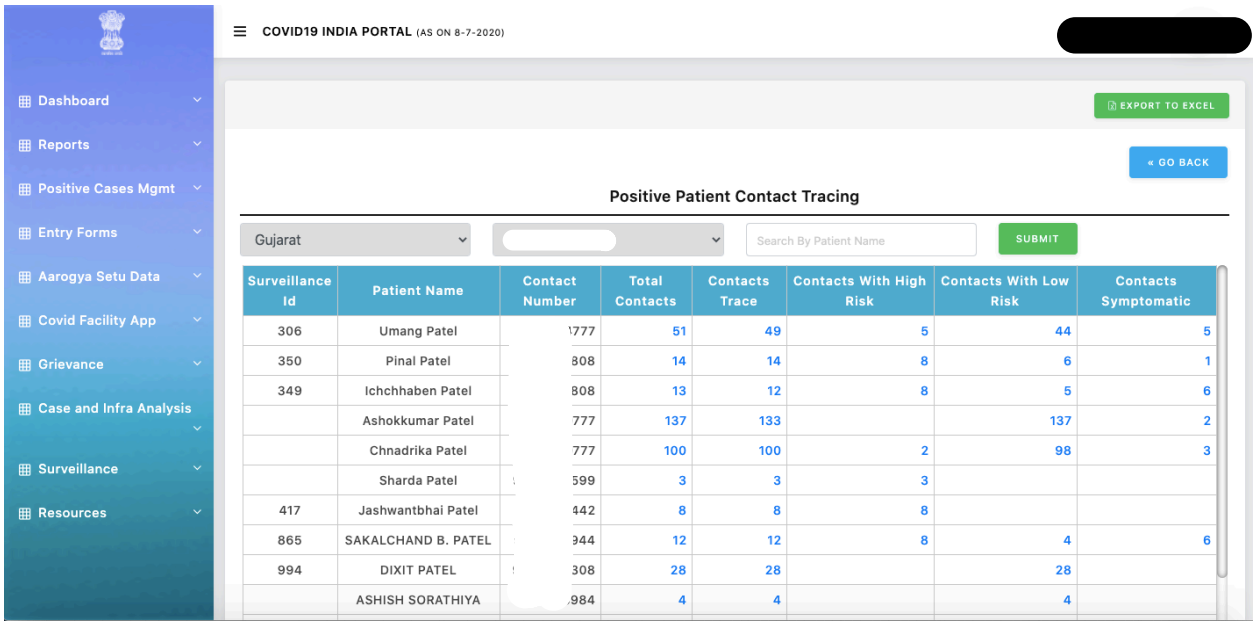

Figure 1: COVID19 INDIA PORTAL Screen

COVID Care Centre (CCC), Dedicated COVID Health Centre (DCHC), Dedicated COVID Hospital (DCH), or designated COVID-19 laboratory can only register a

confirmed COVID-19 case into **"COVID19 INDIA PORTAL"** once the suspected case is tested positive.

Once the confirmed case is registered on **"COVID19 INDIA PORTAL"** the contact tracing and house to house surveillance activity are carried out and details of all contact surveys are also registered on **"COVID19 INDIA PORTAL"**. Figure 2. below describes the flow of field surveillance.

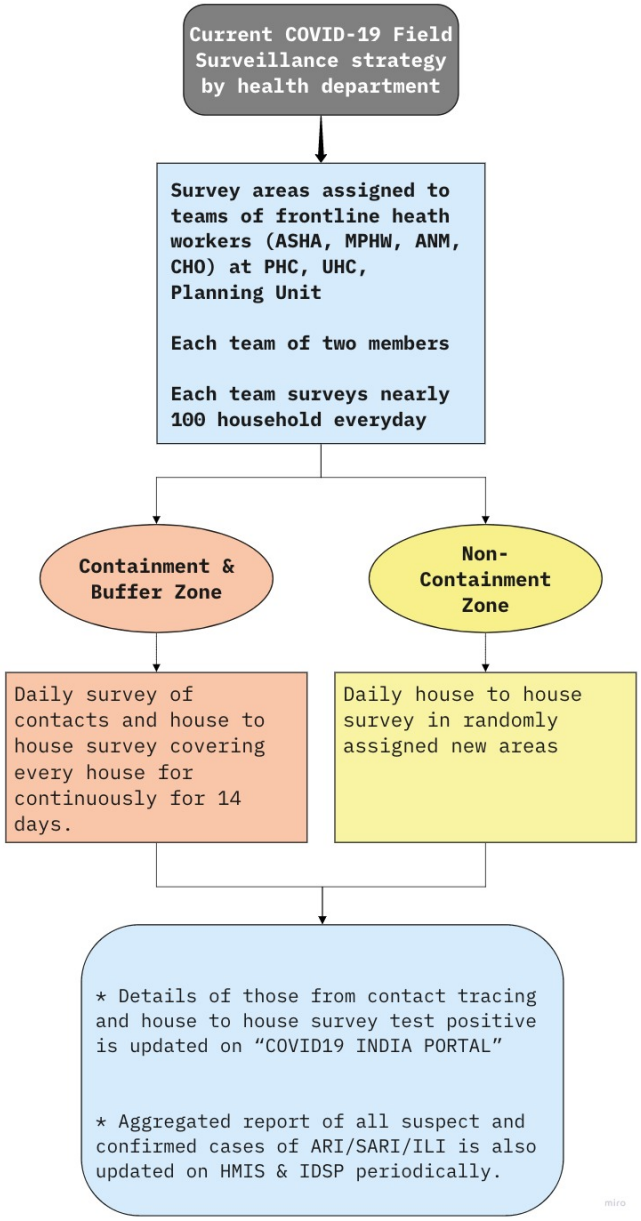

Figure 2: Flow of field surveillance

The criteria for mapping of containment and buffer zones as per "Micro Plan for Containing Local Transmission of Coronavirus Disease (COVID-19)" guidelines issued by MoHFW is, ***"The containment zone will be decided by the RRT based on the extent of cases/contacts listed and mapped by them. However, if contact listing/ mapping is taking time (>12-24 hours), then on arbitrary basis demarcate an area of 3Kms radius around the epicenter (the residence of the positive case). This area of 3 km radius will be the containment zone. If required, based on the mapping of contacts and cases, the containment zone will be refined. A buffer zone of an additional 5 Kms radius (7 Kms in rural areas)/administrative boundary of including neighboring districts/per-urban zone shall also be identified, as detailed in the cluster containment plan."*** Although in current situations where management of COVID-19 has moved from Containment Zones to Micro-Containment Zones level, the decision on spatial scale and mapping is done by local decision-makers more arbitrarily.

2. **Aarogya Setu Web Portal** developed by NIC which is also accessible to District Collectors and other assigned users via OTP only through the following link: https://saccess.nic.in/

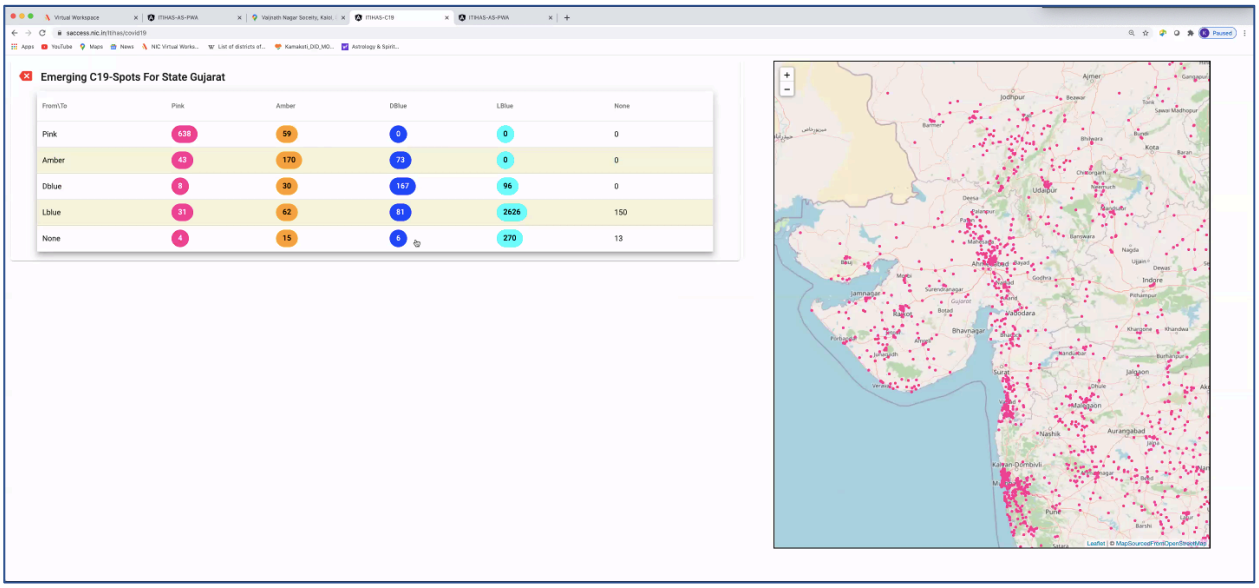

Figure 3: Aarogya Setu Web-Portal Screen

The Aarogya Setu web portal gives information on locations that are current hotspots and that can emerge as a hotspot in the coming few days. The Hotspot locations are at the scale of "Sub post office" Pincode area levels. They are categorized into 4 different color codes according to the risk of spread. The colors are Pink, Amber, Dark Blue and Light Blue where Hotspots areas with Pink color code are at the highest risk and requires priority surveillance and ones with Light Blue color code are relatively at lower risk and shall be monitored closely for future risk.

The risk categorization of any particular "Sub post office" Pincode area using the Bluetooth and location information captured from the Aarogya Setu App users is done based on,

- The number of positive cases in that area
- Movement of cases (from location information) in that area
- Movement of exposed people (from Bluetooth formation) in that area
- Number of people self-assessing themselves as unhealthy in that area.

Many local authorities across Gujarat are currently using this valuable information from the Aarogya Setu web portal for targeted Syndromic surveillance to fine COVID-19 cases in the fields.

To Be Analysis:

Is always useful to ask 5W and 1H during the ideation phase before jumping directly on to the induction phase of the idea. To understand the gaps in the existing surveillance system of COVID-19, we asked 5W and 1H questions to ourselves and tried to find the solution for strengthening the existing surveillance system in answers to those 5W and 1H questions.

Q.1 **WHO** all in the healthcare system are part of the current surveillance system?

Ans: Government Health Department is doing the surveillance whereas the Pvt. stakeholders of the healthcare system like Pvt. drug stores and health centers are not actively involved in the surveillance system. The evidence says that nearly 70% of India's

healthcare market is covered by the private sector and the practice of self-medication through Over the Counter (OTC) purchase of medicine is more than 50% in India. Looking at this, not making Pvt. sector an active part of the surveillance system can make entire efforts of chasing and containing the virus inadequate in the current COVID-19 pandemic.

Q.2 **WHAT** are the possible loopholes in the current surveillance system?

Ans: People might be missed or tend to hide information due to stigma during house to house surveillance. High Risk and Low-Risk area lead generated through Aarogya Setu Web Portal is highly dependent on the authenticity of the information entered by the user in self-assessment of their health status Also, in current surveillance system, missing people with signs & symptoms who were not present at home during house to house surveillance or did not disclose their true health status during the survey or on Aarogya Setu App may fail our efforts to contain the spread to a great extent.

Q.3 **WHEN** is the current surveillance system catching the case?

Ans: In the current surveillance system, a case is identified when either a suspect case comes to health center seeking diagnosis and treatment or when our field workers are catching them in contact tracing or house to house surveys. But what about those who are neither coming to a health facility or not got traced during surveys? Important to notice here is that nearly 80% of COVID-19 cases have signs & symptoms of the mild disease and do not aggressive treatment or hospitalization. What are such cases are missed in the current surveillance system and taking self-medication or from Pvt. health facility? They do not require aggressive treatment or hospitalization but they are still spreading the disease! So, it's important to catch them from where they are taking treatment, either through drug stores or Pvt. health facilities.

Q.4 **WHERE** is the opportunity to improve in the current surveillance system?

Ans: Catching those cases which are missed in field surveys and through Aarogya Setu is the area where the current surveillance system can improve. A technological solution that can work as an added "widget" in the existing technology in use for surveillance i.e.

Aarogya Setu & COVID19 INDIA PORTAL and help in catching those missed cases can strengthen the current surveillance system.

Q.5 **WHY** it is necessary to strengthen the current surveillance system?

Ans: As we are heading from Lockdown to Unlock, the risk of spread of the virus to newer places which were green zones earlier will increase! In such situations, it becomes very important to not miss a single suspect case from surveillance and therefore strengthening the current surveillance system is the need of the hour.

Q.6 **HOW** can we strengthen the current surveillance system?

Ans: Syndromic surveillance provides a useful "real-time" evidence to understand disease patterns by identifying deviation in health data for informed decision making. Syndromic surveillance is getting very popular with increasing the feasibility of electronic preliminary diagnostic data for surveillance purposes. Syndromic surveillance at Drug Stores, Govt. & Pvt. Health Centers and by Field Health Workers may play a pivotal role in identifying active infections and containing possible community transmission of Covid-19 by generating alerts for high-risk areas. We propose an **A**dvanced **C**ovid-19 **Sy**ndromic **S**urveillance (**ACSyS**) System which is a technology (Mobile App for data entry by end-users and Web-portal for Decision Support System) based innovative syndromic surveillance system targeted to identify hotspot areas with increased cases of Fever, Cough, Difficulty in Breathing, Cold, and Throat Pain (five cardinal signs & symptoms of COVID-19) and take timely evidence-based actions to contain the further spread of disease in the community.

The ACSyS System will ultimately supplement and strengthen the current real-time technological tools which are "COVID19 INDIA PORTAL" and "Aarogya Setu Web Portal" for surveillance and management of COVID-19 situations in India

Workflow of ACSyS System

The end-users of the ACSyS mobile app which are drug stores, govt. & Pvt. health centers and field health workers will download the app, allow access to their location, and enter data in the app in real-time. The data and workflow of ACSyS end-users mobile app & administrator decision support system web-portal are described in Figure 4 below.

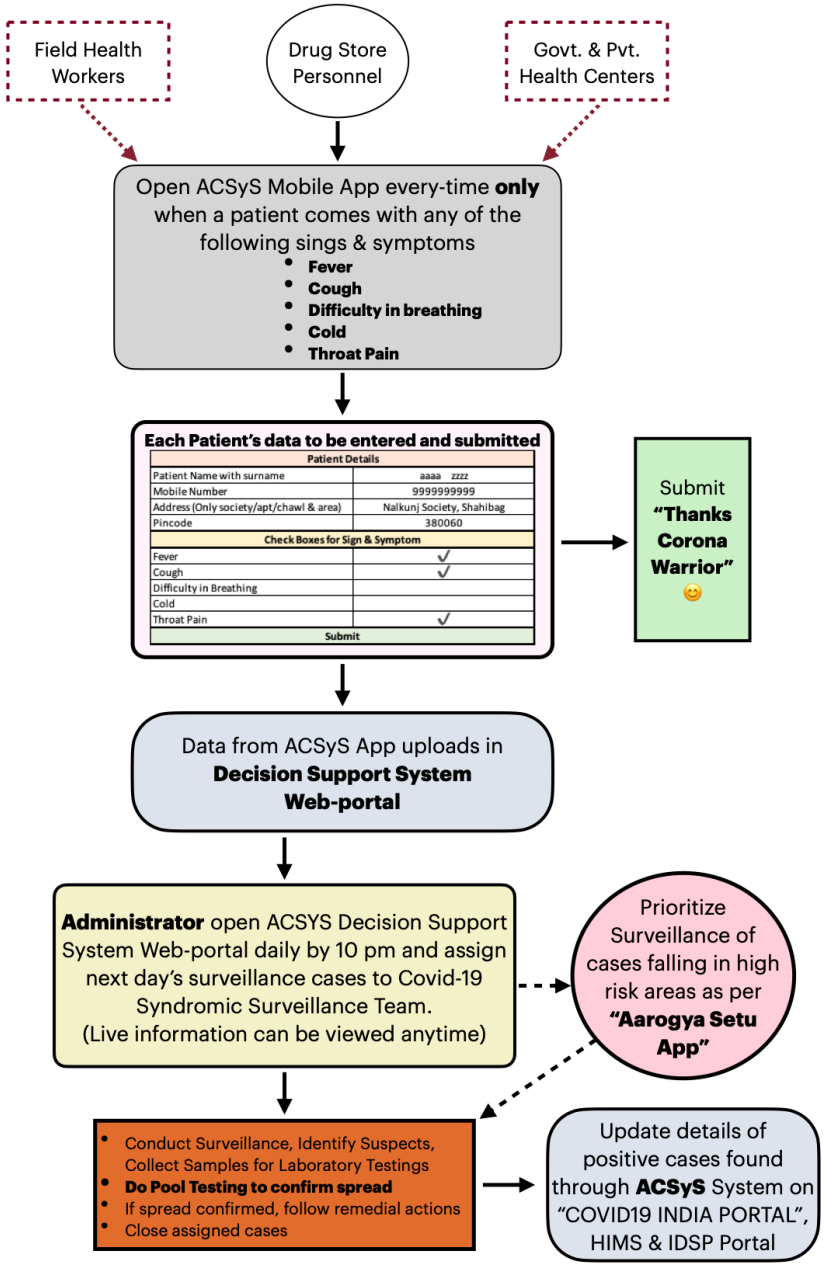

Figure 4: Data & Workflow of ACSyS System

SWOT Analysis of ACSyS System:

First Phase implementation of ACSyS System:

The first phase implementation of the ACSyS System is been carried out in Gandhinagar district since 14th July 2020. Only drug stores are involved in entering syndrome based suspect cases of COVID-19 in ACSyS Mobile App during this first phase implementation of ACSyS System. The first phase implementation has helped us in identifying the bottlenecks in the system and has given us the opportunity to improve the system. The initial results from the first phase implementation of the ACSyS System are very encouraging and promising. The two most important findings from the first phase implementation are that,

- The test positivity rate is high among suspects with COVID-19 Syndromes traced through ACSyS System. This means the system helps catch the right suspects and thus make utilization of resources in surveillance more rational.
- The ACSyS System is helping in tracing the COVID-19 cases in an advanced stage of the disease and well advance in time. This means the system helpful in catching the right suspects in well advance stage of the disease and thus helping in containing the spread and increasing the chances of recovery.

Scalability & Adaptability with IDSP of ACSyS System:

The first phase implementation of the ACSyS System has given us the opportunity to learn from field experiences and develop a technological disease surveillance system that is flexible and scalable to all levels from village or city to taluka, district, and state. It also gives the flexibility of choosing users (data providers). For example, currently, the ACSyS System developed for COVID-19 syndromic surveillance is designed for Drug Stores, Private Doctors, Government Doctors, and Government Field Health Workers to use it as data providers but it can be easily modified to include other users also like pathology centers, radiology centers and other possible sources from where the disease information can be gathered to provide information. This flexibility of the ACSyS System makes it an easily scalable model. Similarly, while currently the system is designed only for COVID-19 surveillance and therefore the cardinal sign symptoms of only COVID-19 are included in the data provider user's Mobile App, it can easily be modified for any other disease requiring surveillance by including the cardinal sign symptoms of that particular disease in the ACSyS System. Currently, there are 22 diseases covered under the **Integrated Disease Surveillance Program (IDSP)** including **"Acute Respiratory Infection (ARI) / Influenza Like Illness (ILI)"** for which the current ACSyS System is already helpful in real-time surveillance. But in a possible scenario of any emerging outbreak in any confined area of any of those 22 diseases listed under the IDSP program, the ACSyS System can easily be adapted for real-time surveillance of that emerging outbreak by changing the users and cardinal sign symptoms to be entered by the users. The data in IDSP is collected on weekly basis on three different formats by three different users. The field workers provide the information on suspected cases via "S" form, the clinicians provide the information on presumptive cases via "P" form and the laboratory staff provides the information on laboratory confirmed cases via "L" form. This data is summarized in papers at health center levels and then aggregated information is sent electronically on weekly basis. The weekly data is useful to some extent in giving information on trends and seasonality of diseases under surveillance but some important signals of emerging outbreaks can be missed because of the lag of one week in reporting. This lag in reporting can sometimes pose a serious risk to public health as in case of COVID-19 and therefore it's important to have a real-time surveillance system like ACSyS for effective and real-time surveillance to better control the emerging outbreaks of disease