GMOA / ICTA COVID-19 EXIT STRATEGY SRI LANKA

Concept Proposal

Presented to
His Excellency Gotabaya Rajapaksa
President
Democratic Socialist Republic of Sri Lanka

04th April, 2020

ICTA
ideas actioned

Content Page:

Executive Summary:

COVID-19 pandemic which began in the Chinese city of Wuhan extended to Sri Lanka with our first foreign patient found on the 27th of January, 2020 and the first local patient found on the 11th of March, 2020.

Having recognized this issue both as a 'public health emergency' and as a 'global health challenge', Government Medical Officers' Association (GMOA) proposed studied interventions to the government. GMOA proposals were based on four pandemic phases declared by World Health Organisation (WHO). Strategies aimed to reinforce the three pillars of implementation- ie, Political will, health capacity and the social capital.

Reflecting the commitment of the political will, HE the President initiated action on 26th of January, well before the first local patient was detected. On 11th March when first local patient was identified, GMOA made a written communication to political leadership emphasizing aggressive interventions.

Airport and all other portals of entry were shut to ensure the prevention of further entry of virus. As measures to minimize the spread, schools were closed and curfew was imposed targeting maximum social distancing. Actions were taken to enhance the health capacity. Special emphasis was paid to safeguard the health sector human resource from Covid19. Many interventions were carried out to achieve expected outcome form social capital. We aimed at achieving more than 80% social distancing and other hygienic measures applicable to COVID-19.

Having achieved a reasonable success as interpreted by WHO and other international authorities, GMOA developed an exit strategy as the next step aiming to achieve maximum level of normal lifestyle of the country.

The exit strategy is simply based on the common structure which is applicable to a surgical theatre in hospitals, which is supposed to be sterile in the context of a contaminated environment.

Therefore, the country will be categorized under three main zones:

- Sterile zone
- Contaminated zone
- Buffer zone

This report will spell out the criteria to declare these three zones and the governance structure within every zone. In addition, the border control measures will also be included. In the process of improvement of the areas, the strategy to expand the sterile zone and shrink the contaminated zone will be discussed further.

This is with the expectation of bringing about food safety, reactivation of essential medical care and uplifting the micro and macro level economy of the country.

1. Background and rationale:

Having initiated preparation stage as phase I and the control of spread of the disease as phase II, GMOA, as a responsible professional body with an interest in the health of the country, is presenting an exit strategy as phase III.

Many Low and middle income countries with limited capacity to offset economic and social costs, are now reporting sporadic cases, clusters of cases, and community transmission. Compared to many other countries, Sri Lanka took early interventions to contain the virus and they are proving to be effective thus allowing us to stay at Level 3 or clusters of cases as described below.

According to the World Health Organization COVID19 Strategy, The trajectory of national outbreaks in these settings will depend not only on how effectively health system capacity can be increased and public health measures implemented, but also on the complex interplay of demographics, the prevalence of underlying conditions associated with poor COVID-19 outcomes (diabetes, hypertension and heart diseases), economic activities and the relative importance of social, religious, and cultural gatherings that have been shown to be important drivers of COVID-19 transmission in other contexts.

While most countries have implemented similar lockdown policies, there are no clear guidance or leading examples on how to develop exit strategies. For developed countries longer term lockdown could be a feasible option due to stronger supply chains and widespread use of cashless transactions. But for countries like Sri Lanka it is essential to be innovative and develop an exit strategy based on the local context. This document aims to present a suitable exit strategy for Sri Lanka.

But the risk of lifting restrictions too early and unleashing a devastating “second wave” applies to Sri Lanka, to countries all over the world, and the international community itself. We would be able to gradually ease certain restrictions, but only when we have built up our capacity to identify, test and isolate most confirmed Covid-19 contacts and their close contacts.

WHO said that a strategic "calibrated, step-wise approach" will be the safest and most effective way to ease these limitations.

As of today, public movements are restricted by imposing curfew, compromising normal lifestyle. Moreover, significant number is under institutional or home quarantine. However, when the virus spread was mapped, most of the geographical zones of Sri Lanka are free of spread. As such scientifically designed process is needed to govern the next phase of the outbreak. GMOA presents such a proposal titled ‘GMOA COVID19 exit strategy’. This proposal aims at identifying the strategy that must be followed in order to proceed from this stage of curfew styled lockdown whilst ensuring that community transmission does not take place and near normal activity is resumed.

WHO has declared 4 stages in spread of infectious disease:

I. No cases
II. Sporadic cases
III. Clusters
    a) Home clusters
    b) Small group clusters
IV. Community Transmission

At present Sri Lanka is in stage IIIa.

It should be emphasized that COVID19 eradication or elimination is only possible by vaccination, once developed. The strategies become more challenging, as majority of COVID19 patients either show no or mild symptoms. In addition, tests have sensitivity of 70% or less, making it further difficult to identify all corona infected patients.

1.1 Phase I: Preparation for COVID19

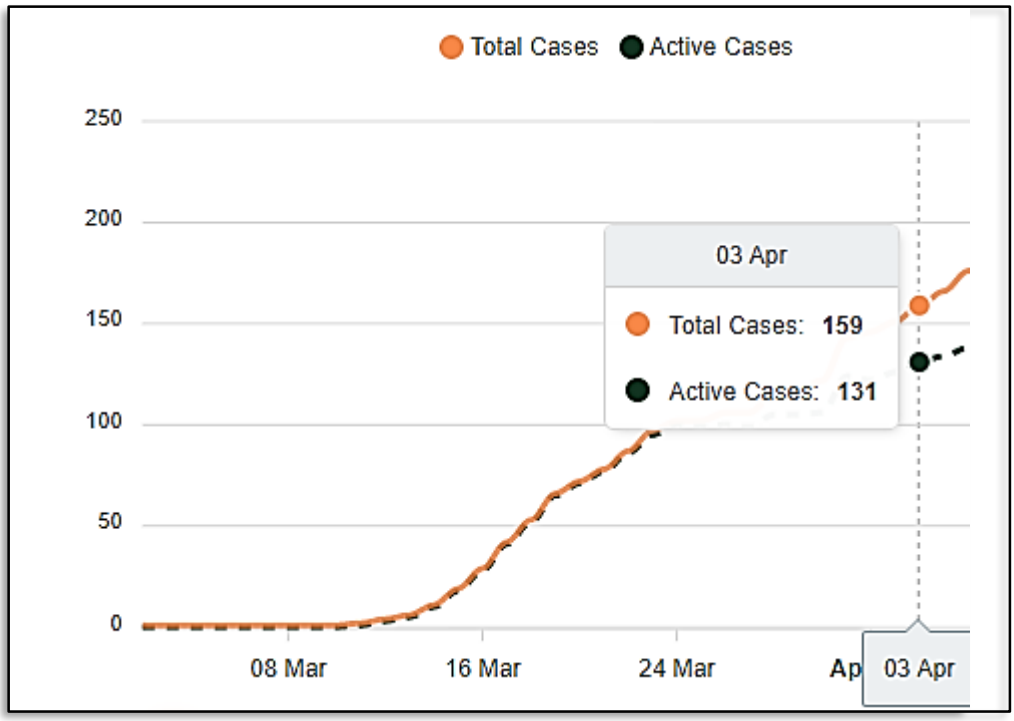
Prior to the detection of first confirmed local patient with COVID-19, a series of steps were taken to contain and manage the situation.

This included publishing a leaflet by the GMOA to educate about COVID19 pandemic and guidelines to prevent transmission.

In addition, preliminary meetings were carried out to plan the phase II.

1.2 Phase II: Control of spread of COVID19

A curfew style lockdown was enforced from the 19th of March with the expectation of restricting movements beyond 70%.



Source: Epidemiology Unit, Ministry of Health, Sri Lanka

Figure 1: Graph depicting Total cases and active cases in Sri Lanka

Following strategies were advocated by WHO to combat COVID19

1. Emergency response mechanisms
2. Risk communication & public engagement
3. Case finding, contact tracing and management
4. Surveillance
5. Public health measures (hand hygiene, respiratory etiquette and social distancing)
6. Laboratory testing
7. Case management
8. Infection prevention and control
9. Societal response (business continuity plans and a whole-of-society approach)

Following steps were adopted by Sri Lanka to prevent further spread of the disease. Social distancing and hygienic practices were emphasized.

- Closure of all schools
- Steps to detain those who travelled from abroad in quarantine centers for a period of 14 days
- closure of all ports of entry (airports and harbor)
- Initiating the concept of working from home followed by curfew

Basic hygienic care and prevention of transmission was also advocated:

- Hand washing/ hand sanitizing
- Maintenance of Personal hygiene especially following ventures outside the house

2. Exit strategy for COVID-19

2.1 Working definition of Exit strategy

The strategy proposed to gradually lift the restriction of human mobility where a paradigm shift will be essential to achieve sustainable development whilst safe guarding the strategic practices to contain the spread of COVID-19.

2.2 Objectives of the Exit strategy

1) Stepwise lifting of the restriction of movement
2) Paradigm shift promoting sustainable development and day to day lifestyle
3) Maintaining strategic practices to contain spread of COVID-19

3. Issues taken into consideration

3.1 Disease characteristics

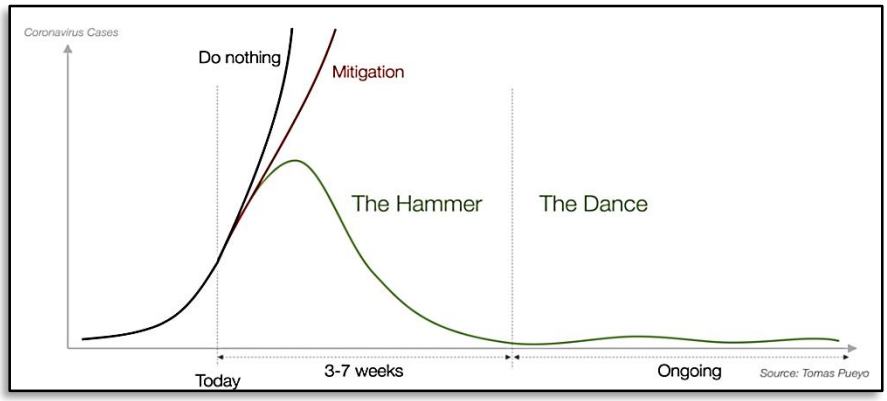
The behavior of this infection is difficult to predict. The majority of COVID-19 patients have mild symptoms, with approximately 20% show no symptoms of the disease. Thus, a fair proportion of those who may be infected are most likely to be 'hidden in the society'.

3.2 Testing profile

The sensitivity of the tests to detect COVID-19 is less than 70%. Therefore, tests should be repeated in series to enhance the pickup rates. The testing capacity for COVID-19 has its own limits in Sri Lanka.

3.3 COVID19 'Hammer and the Dance' theory

COVID19 elimination and eradication is not possible to-date. Figure 2 shows the "Hammer and the Dance" theory. First, COVID19 is to be aggressively controlled – 'Hammer'. Once this is achieved, strategies to be continued to ensure a good control- 'the dance'. In such a manner we can control the spread of disease even though the global status is one that is dynamic and volatile.



Source: Medium.com @Tomaspueyo

Figure 2: Graph depicting the "Hammer and dance" model

3.4 Paradigm shift

Though we expect to achieve COVID19 control in Sri Lanka, the global status, perhaps will not be the same in the near future. Therefore, it is imperative that, we maintain our daily living, whilst maintaining the precautionary strategies against COVID-19. In doing so it is important that, we not merely attempt to return to a near normalcy but instead achieve a paradigm shift which will enable and push Sri Lanka towards sustainable development.

4. Method of execution

4.1 Concept of sterility

The exit strategy is based on a concept similar to governance of a surgical operating theatre (figure 3). All surgeries are done in a sterile zone and the rest of the environment is considered as potentially contaminated. In sterility governance has a buffer zone and set of practices.

As such three distinctive zones are recognized:

1) Sterile zone
2) Buffer zone
3) Contaminated zone

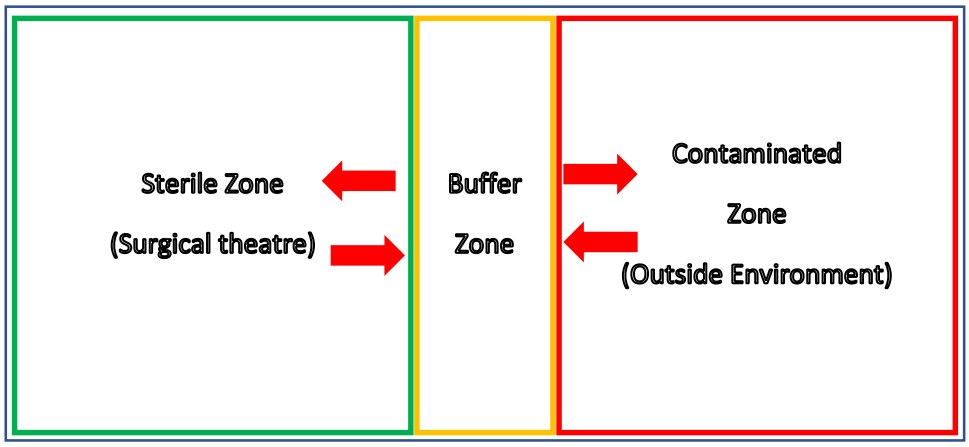


Figure 3: Concept based on surgical operating theatre settings

4.2 Size of the zone

We justify the Divisional Secretariat level as the smallest zone, since it is represented by 81 officials from the various ministries facilitating its ability to function independently in administrative, health and financial facets with the directives from the relevant National level authorities.

There are 25 districts and 331 Divisional secretariats in Sri Lanka. Each unit has;

1) Administrative capacity: with representatives from all ministries
2) Financial independence: having more than one banking facility in the area
3) Health care: presence of more than one hospital or medical facility in the locality

4.3 Areas to develop:

Based on above principles we need to develop:

1) Criteria for each zone (section 5)
2) Governance of each zone (section 6)

5. Proposed criteria for each zone:

A survey of each DS division may be carried out by the officials of the divisional secretariat with the area Medical officer Health under the guidance of the epidemiological experts (Regional Epidemiologists/ Consultant Community Physician) to categorize the areas.

The survey can be in the format of an application and must include the following:

1. Health status:

- COVID 19 confirmed/ suspect cases: Based on this the sterile and contaminated zones can be ascertained
- Other health conditions

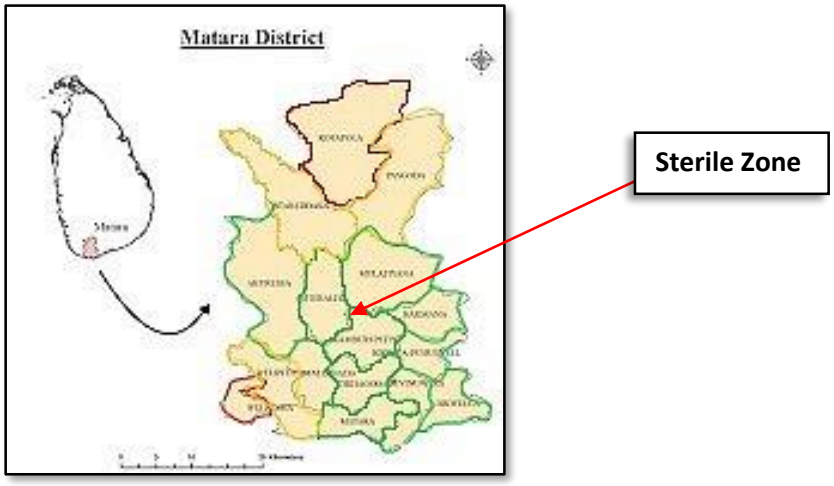
- Health resources

2. Work and occupation: Within the zone or outside the zone
3. Distribution of households
4. Economic potential of the zone: Banks / factories
5. Self-sufficiency of the zone: Agricultural opportunities/ Fisheries/ poultry/ Production of goods

In addition to the criteria given below a statistical method is annexed (Annexure 1) for identification of the zones.

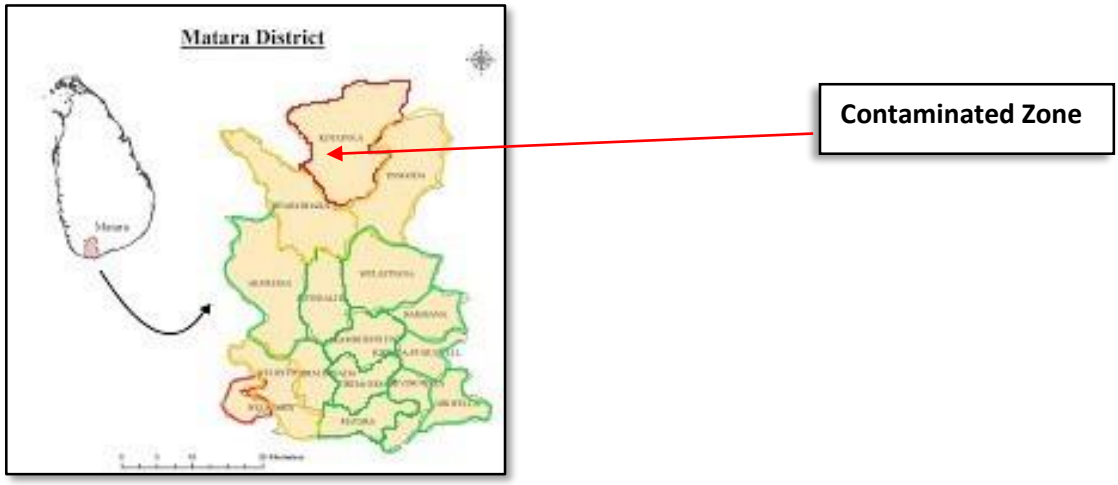
In each zone the main probable criteria have been mentioned and further criteria can be developed in a brain storming session with other stakeholders. These need to be reviewed over time.

5.1 Proposed criteria for Sterile zone



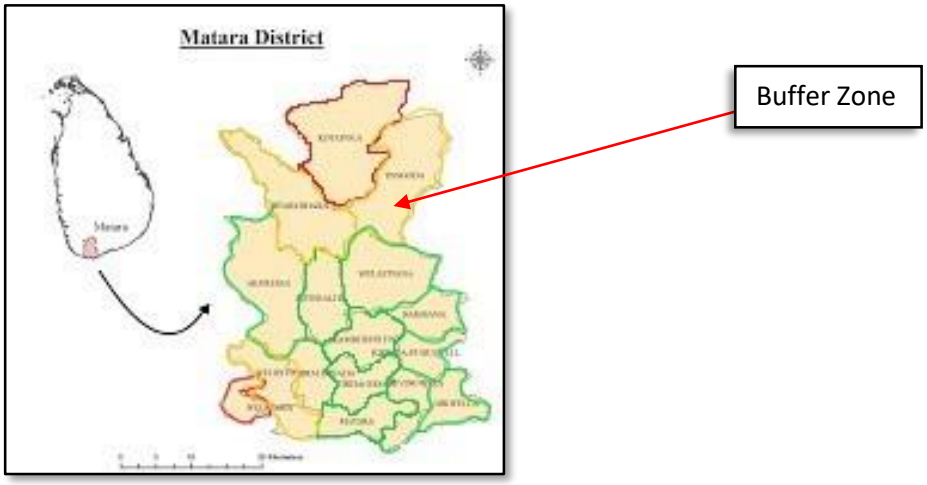
- Having no confirmed cases of COVID-19 for a period of 28 days prior to declaration
- No suspects or contacts of COVID-19 patients within the zone for a period of 28 days
- Following the initial defining of the zones, the presence of at least one case or suspect will change the nomenclature of the zone to a contaminated zone

5.2 Proposed criteria for Contaminated zone



- Having at least one confirmed case of COVID-19 within the last 28 days prior to declaration
- Presence of suspects or contacts of COVID-19 patients who will be tested immediately
- Following this if at any point the number of cases or suspects become zero for a period of 28 days the area nomenclature will be converted from contaminated zone to sterile zone.

5.3 Proposed criteria for Buffer zone



- Area which is sterile; having no confirmed cases, no suspects or contacts for a period of 28 days but situated between a sterile zone and a contaminated zone
- The buffer zone may even be situated between two districts as we must also consider the divisional secretariats that are bordering the two districts

6. Governance strategy for zones

Each area must be governed based on the following:

- Under the coordination of administrative officers, by the multisectoral team which include health, and other sectors
- By clearly mapping and defining the Human resources and their responsibilities
- Standard protocols of operations
- Tailor made protocols eg: - if the area was known for a particular product how to manage the supply chain of that product

Further principles of governance can be developed by a consultative and consensus process with the stake holders.

In each area special attention must be given to mobility, hygienic practices, economic aspects and health aspects.

6.1 Governance strategy for Sterile zone

Non-Corona related governance:

- The sterile areas may function within the confines of that area in a near normal manner.
- Normal activities must be carried out but with precautionary measures in place.
- Work places and places of business may function as previous whilst ensuring the basic concepts of social distancing and infection control

- The supply chain for each of the essential goods i.e. foods, drugs and other essentials must be set in place in a pre-determined manner.
  Eg: - goods being transported may take place from sterile zone to sterile zone via a delivery system
- Banking activities can take place and must be within the zone
- Medical activities can take place within the sterile zone
- Supplies can be distributed within the zone
- If any needs or functions must be carried out at ministry level it should be facilitated for individuals and groups through the divisional secretariat
- If any activities need to be carried out beyond the border this must be done via online co-ordination

Corona related governance:

- If any individual is identified as being a suspect case or contact, immediate testing must take place to maintain sterile status of the zone
- Handwashing and use of hand sanitizer must be advocated
- Mass gatherings and group activities must be prohibited
- Movement in and out of the zone is strictly prohibited
  Those allowed mobility outside of the borders are mentioned below and that is under strict regulations
- To prevent the contamination of the area sealing of the borders of the sterile zone must take place by a **buffer zone**. Thus, preventing contamination and preventing crossing in of individuals.

6.2 Governance strategy for Contaminated zone

Non-Corona related governance:

- Essential foods, medicines and goods must be received via a systematic delivery method to doorsteps organized by the government
- Essential services as much as possible should be online or via delivery services
- Extensive systems to deliver foods and medicines to all with a special focus on vulnerable groups
- With large part of the country being opened up, resources should be diverted to provide extra support for families and individuals living in these areas
- Only those involved in essential services must be allowed to travel for work and within the contaminated zone only. Crossing the border is strictly prohibited.

Corona related governance:

- Curfew must be maintained within the zone: home and institutional quarantine is essential and 100% movement within the zone is prohibited.
- Masks must be used as recommended by the experts
- Home quarantine of contacts and monitoring of home quarantine by the staff of local MOH office.

- Vigilant surveillance to trace contacts of the first, second and third ring must take place.
- Extensive testing including community level testing which increase case detection must be carried out.

That is "community screening" must be carried out extensively using test methods. In doing so the borders of sterile zone can be further extended and contaminated zone further reduced or vice versa based on the outcome of community screening.

- If detected patients are to be transported necessary precautions must be taken at all times; ensuring health care workers have PPE, ambulance is correctly handled and distance is maintained.

6.3 Governance strategy for Buffer zone

Non -Corona related governance:

- This must take place similar to that of a contaminated zone

Corona related governance:

- Curfew must be maintained within the zone in a similar manner to the contaminated zone
- Masks must be recommended to all
- No mass gatherings
- Vigilant surveillance of potential positive cases and contact
- Strict governance of borders ensuring that no crossing in or out other than for essential services must be maintained
- Should apply necessary precautions to stop the transmission of virus through vehicles and personnel travelling between zones. This may include changing people and vehicles carrying essential goods between contaminated and sterile zones.

7. Border crossing principles:

Strict Border crossing criteria is essential to prevent virus transmission to sterile zones, which has less restricted movements. Successful implementation of strict border control is of paramount importance in a successful exit strategy.

Identification of border crossing needs.

1) Food suppliers
2) Fuel Suppliers
3) Electricity and water supply
4) Health Staff
5) Military staff

Movement of even these personnel need to be highly regulated in order to keep the sterile zones safe and to convert the contaminated zones to sterile zones.

It must be attempted to try to contain essential service staff in the same zone. If travel is necessary an Standard Operating Procedure must be developed with stakeholder consultation.

Eg: A doctor residing in a contaminated area travelling to sterile zone for work, need to go through a sterile chamber and get cleared to enter the zone.

Supply chain mechanisms also need to be developed.

Eg. A vegetable supply lorry coming from a sterile zone to a contaminated zone
i) can change at border or ii) can come to one center only for unloading.

The border crossing staff need to be notified and, testing for COVID 19 has to be at a very low threshold.

8. Improvement of the identified zones:

8.1 Extension of sterile zones

Sterile zones can be extended by:

- Contact tracing
- Testing
- Isolation on confirmation
- Quarantine if required
- Aggressive social distancing / hand hygiene / face mask

By doing so can rapidly identify the status of adjoining administrative areas and extend the surface area identified as “sterile”

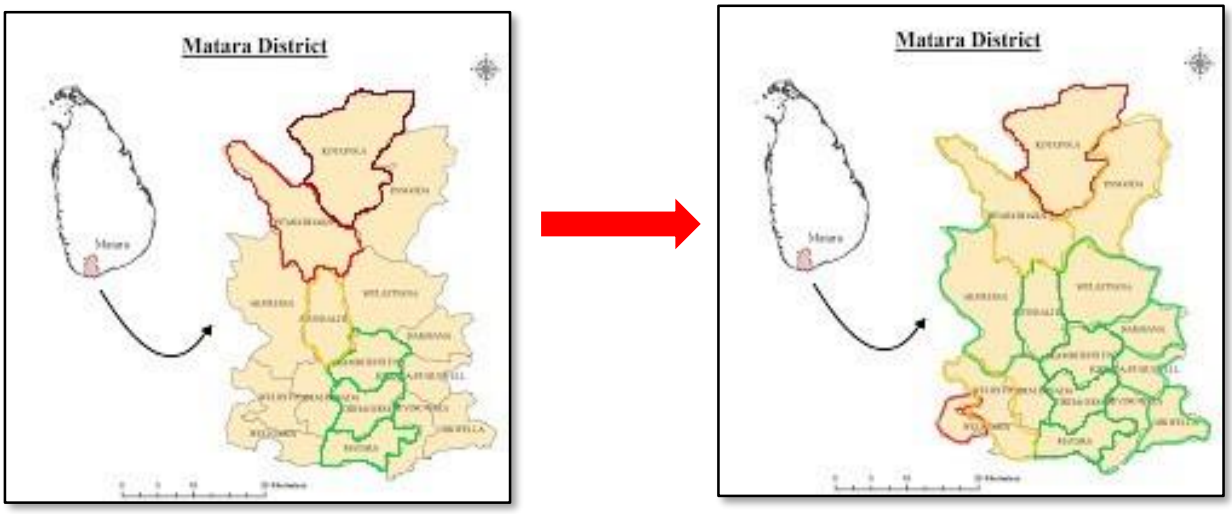


Figure 5: Extension of sterile zones explained using the Matara district map

8.2 Shrinking of contaminated zones:

Contaminated zones may be as large as a whole district such as Colombo district or smaller administrative areas. Thus, by extensive surveillance:

- Contact tracing
- testing
- Isolation on confirmation
- Quarantine
- Aggressive social distancing / hand hygiene / face mask; we can shrink the contaminated areas gradually.

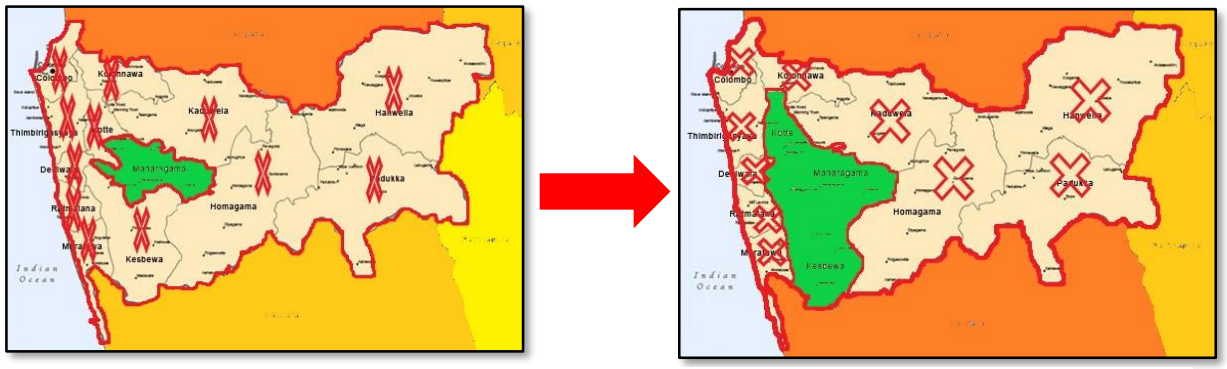


Figure 6: Shrinking of contaminated areas explained using the map of Colombo district

Carrying out this exit strategy will be beneficial as:

Only the needed areas will be locked out and other areas will function normally whilst ensuring those areas remain uncontaminated. This will reduce the burden on the government, it will bring about political stability and it will ensure the seamless management of the nation. It will allow police and Army officers to concentrate in much needed areas and enforce the curfew better. Optimum implementation of this strategy will ensure that we are an example to the world as having controlled the COVID-19 pandemic successfully.

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Conclusion:

This document provides outline for an exit strategy from the current lockdown style curfew in Sri Lanka.

The key feature of this strategy is the dynamic process of evolving and responding to the changing circumstances. It is impossible to develop a static or a rigid strategy at this stage. The virus will appear and disappear in different places in the country. We will have to establish a mechanism which can cope with those changes. While many countries in the world are struggling to develop their exist strategies, we believe our thoughtful proposal will have the capacity to go from strength to strength with our experience. We will also be able to share it with other low and middle income countries who are looking for good examples.

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Annexure I

Sri Lanka's COVID-19 Lockdown Exit Strategy through an Intelligent Software Platform

Concept Paper by GMOA to the Lockdown Exit Strategy Committee of the Presidential Task Force- 4th April, 2020

Abstract

Technically, a lockdown exit strategy should be made up of parameters which are derived from different segments of experts in the society i.e. healthcare specialists, military officers, government officials and third party experts etc;

Lifting the lockdown with no exit strategy would lead to a second wave largely overwhelming the healthcare system[1]. Our challenge is to harness the knowledge components from these different areas together, which will increase the accuracy of the lockdown exit process.

Here we propose a responsible solution for a progressive exit strategy through an intelligent Software platform (ISP) to encapsulate and lift the lockdown in sterile zones surrounded by the buffer zones.

Methodology

Identification of Three Zones Based on Weightage Coefficient Calculation Using Intelligence Software Platform

The Sterile, Buffer and Contaminated zones will be identified based on a formulated score points. This score points are derived based on weightage coefficients calculation using artificial intelligence software solution.

The following explanation has been given by using the Colombo district as an example.

Only the data regarding population is accurate. In order to clearly explain the methodology, all the other data as mentioned below are dummy data,

- area of each divisional secretariat (DS)
- the Muslim population
- all other data included

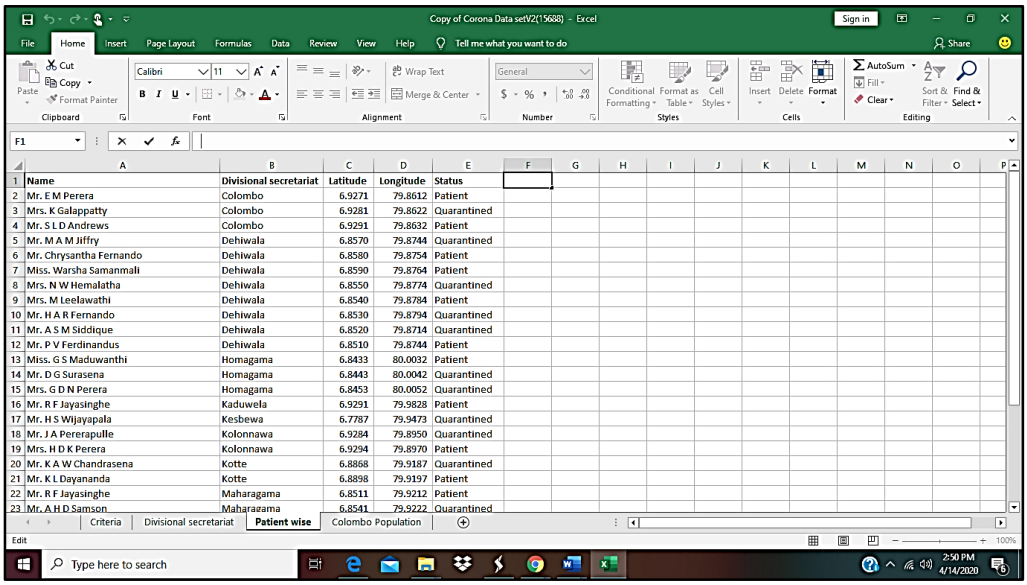
1. Data Sets:

   In order to carry this out, 2 data sets were considered,

   1.1 Data set 1

Case and quarantine information:

- In each Divisional Secretariat area of a district, the number of patients with the first line contacts are considered.
- This could be extended to 2nd and 3rd line contacts based on expert opinion. This provision can be developed in the software solution on request.
- Both patients and quarantined individuals including their locations based on latitude and longitude are considered.



	Name	Divisional secretariat	Latitude	Longitude	Status
2	Mr. E M Perera	Colombo	6.9271	79.8612	Patient
3	Mrs. K Galappatty	Colombo	6.9281	79.8622	Quarantined
4	Mr. S L D Andrews	Colombo	6.9291	79.8632	Patient
5	Mr. M A M Jiffry	Dehiwala	6.8570	79.8744	Quarantined
6	Mr. Chrysantha Fernando	Dehiwala	6.8580	79.8754	Patient
7	Miss. Warsha Samanmali	Dehiwala	6.8590	79.8764	Patient
8	Mrs. N W Hemalatha	Dehiwala	6.8550	79.8774	Quarantined
9	Mrs. M Leelawathi	Dehiwala	6.8540	79.8784	Patient
10	Mr. H A R Fernando	Dehiwala	6.8530	79.8794	Quarantined
11	Mr. A S M Siddique	Dehiwala	6.8520	79.8714	Quarantined
12	Mr. P V Ferdinandus	Dehiwala	6.8510	79.8744	Patient
13	Miss. G S Maduwanthi	Homagama	6.8433	80.0032	Patient
14	Mr. D G Surasena	Homagama	6.8443	80.0042	Quarantined
15	Mrs. G D N Perera	Homagama	6.8453	80.0052	Quarantined
16	Mr. R F Jayasinghe	Kaduwela	6.9291	79.9828	Patient
17	Mr. H S Wijayapala	Kesbewa	6.7787	79.9473	Quarantined
18	Mr. J A Pererapulle	Kolonnawa	6.9284	79.8950	Quarantined
19	Mrs. H D K Perera	Kolonnawa	6.9294	79.8970	Patient
20	Mr. K A W Chandrasena	Kotte	6.8868	79.9187	Quarantined
21	Mr. K L Dayananda	Kotte	6.8898	79.9197	Patient
22	Mr. R F Jayasinghe	Maharagama	6.8511	79.9212	Patient
23	Mr. A H D Samson	Maharagama	6.8541	79.9222	Quarantined

1.2 Data set 2:

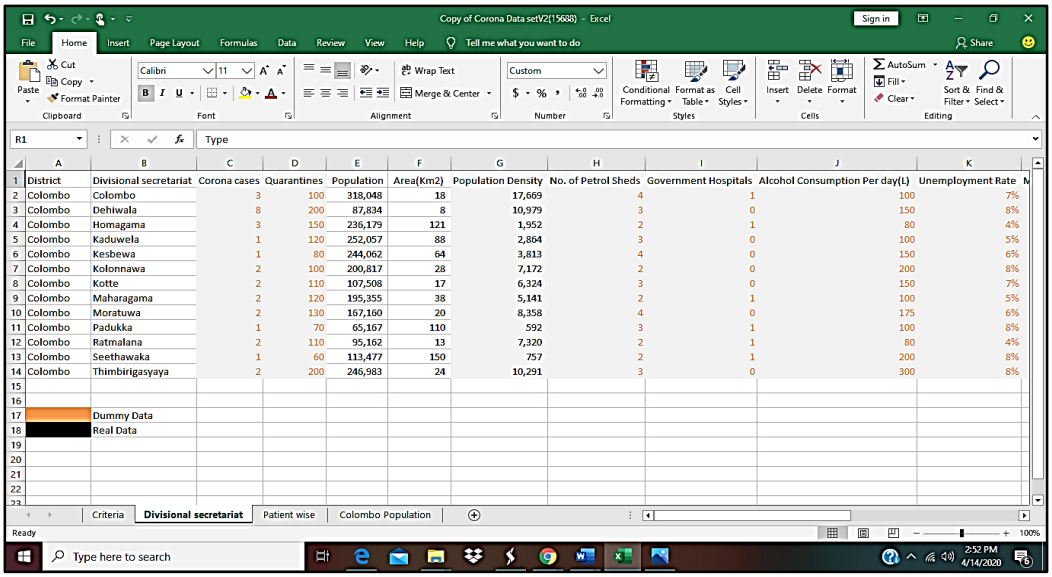
The second data set comprises 12 variables regarding each divisional secretariat. The vital variables would be,

- Number of Corona cases
- Number quarantined
- Population density
- Muslim population

In addition, the number of petrol sheds, number of government hospitals, alcohol consumption per day, unemployment rate, average temperature, annual rainfall and number of hotspots.

The software solution has provision to include any number of variables and these can be added based on expert opinion.

Following table shows the 2nd set of data.



District	Divisional secretariat	Corona cases	Quarantines	Population	Area(Km2)	Population Density	No. of Petrol Sheds	Government Hospitals	Alcohol Consumption Per day(L)	Unemployment Rate
Colombo	Colombo	3	100	318,048	18	17,669	4	1	100	7%
Colombo	Dehiwala	8	200	87,834	8	10,979	3	0	150	8%
Colombo	Homagama	3	150	236,179	121	1,952	2	1	80	4%
Colombo	Kaduwela	1	120	252,057	88	2,864	3	0	100	5%
Colombo	Kesbewa	1	80	244,062	64	3,813	4	0	150	6%
Colombo	Kolonnawa	2	100	200,817	28	7,172	2	0	200	8%
Colombo	Kotte	2	110	107,508	17	6,324	3	0	150	7%
Colombo	Maharagama	2	120	195,355	38	5,141	2	1	100	5%
Colombo	Moratuwa	2	130	167,160	20	8,358	4	0	175	6%
Colombo	Padukka	1	70	65,167	110	592	3	1	100	8%
Colombo	Ratmalana	2	110	95,162	13	7,320	2	1	80	4%
Colombo	Seethawaka	1	60	113,477	150	757	2	1	200	8%
Colombo	Thimbirigasyaya	2	200	246,983	24	10,291	3	0	300	8%
	Dummy Data									
	Real Data									

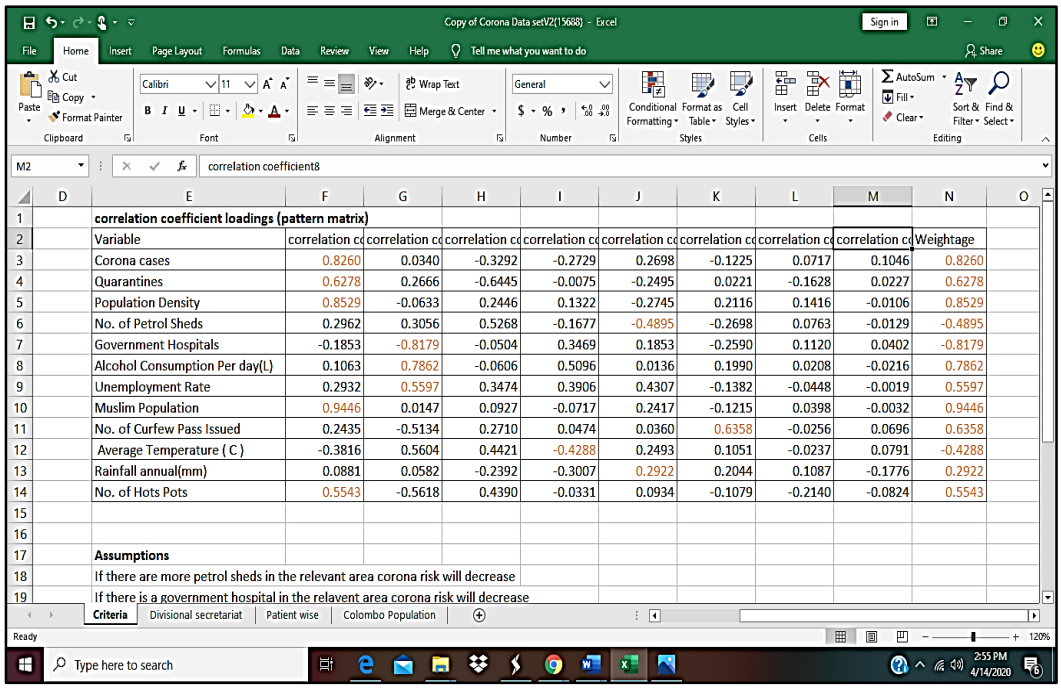
The data sets must then be uploaded to the software solution.

2. Weightage coefficient set generation modality

2.1 To achieve higher confidence during the decision-making process, several weightage coefficient sets are expected to be employed.

2.2 According to the provided data and considering the nature of the data, 8 sets of weightage coefficients (the number of sets of weightage coefficients can be increased if required, based on expert opinion) will be auto generated through this intelligent Software platform which uses Statistical computing algorithms for data classification (under the certain assumptions made by the system).

2.3 We will continue to work with domain experts to select the most relevant weitages according to the risk level pertaining to the variable.



correlation coefficient loadings (pattern matrix)									
Variable	correlation co	correlation co	correlation co	correlation co	correlation co	correlation co	correlation co	correlation co	Weightage
Corona cases	0.8260	0.0340	-0.3292	-0.2729	0.2698	-0.1225	0.0717	0.1046	0.8260
Quarantines	0.6278	0.2666	-0.6445	-0.0075	-0.2495	0.0221	-0.1628	0.0227	0.6278
Population Density	0.8529	-0.0633	0.2446	0.1322	-0.2745	0.2116	0.1416	-0.0106	0.8529
No. of Petrol Sheds	0.2962	0.3056	0.5268	-0.1677	-0.4895	-0.2698	0.0763	-0.0129	-0.4895
Government Hospitals	-0.1853	-0.8179	-0.0504	0.3469	0.1853	-0.2590	0.1120	0.0402	-0.8179
Alcohol Consumption Per day(L)	0.1063	0.7862	-0.0606	0.5096	0.0136	0.1990	0.0208	-0.0216	0.7862
Unemployment Rate	0.2932	0.5597	0.3474	0.3906	0.4307	-0.1382	-0.0448	-0.0019	0.5597
Muslim Population	0.9446	0.0147	0.0927	-0.0717	0.2417	-0.1215	0.0398	-0.0032	0.9446
No. of Curfew Pass Issued	0.2435	-0.5134	0.2710	0.0474	0.0360	0.6358	-0.0256	0.0696	0.6358
Average Temperature (C)	-0.3816	0.5604	0.4421	-0.4288	0.2493	0.1051	-0.0237	0.0791	-0.4288
Rainfall annual(mm)	0.0881	0.0582	-0.2392	-0.3007	0.2922	0.2044	0.1087	-0.1776	0.2922
No. of Hots Pots	0.5543	-0.5618	0.4390	-0.0331	0.0934	-0.1079	-0.2140	-0.0824	0.5543
Assumptions									
If there are more petrol sheds in the relevant area corona risk will decrease									
If there is a government hospital in the relavent area corona risk will decrease									

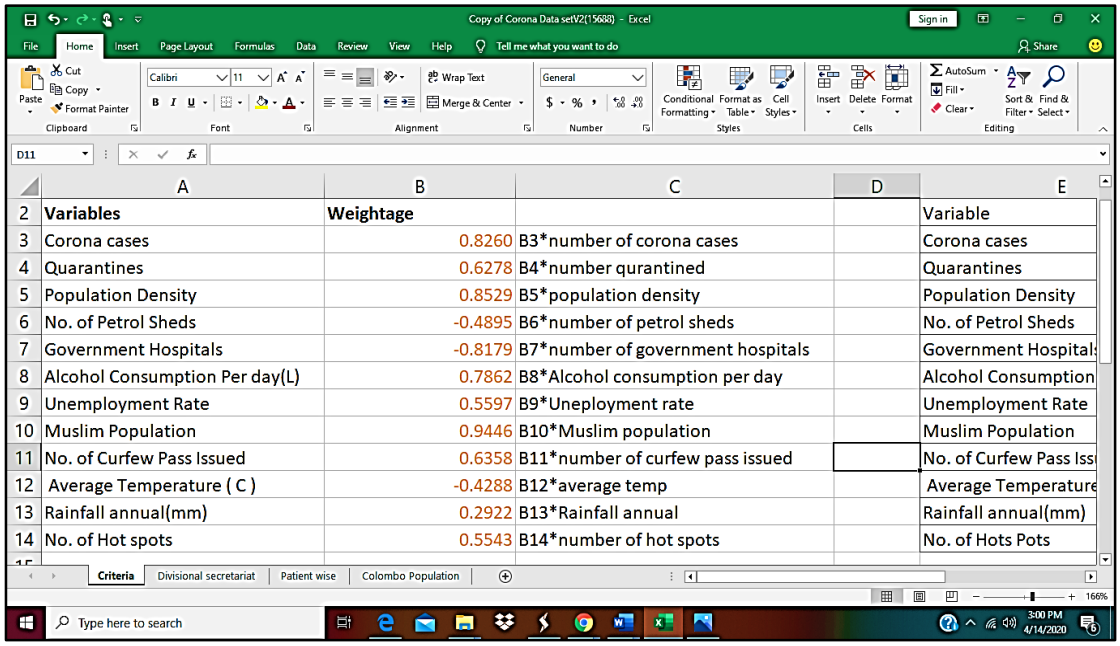
3. The development of the total score can be done by looking at the weightages on the auto generated table. For the selection of weightages following sample assumptions can be taken. Also assumptions can be varied based on expert opinion to select the weightages for final score.

   The following assumptions were taken as an example:

   - If there are more petrol sheds in the relevant area, corona risk will decrease
   - If there is a government hospital in the relevant area, corona risk will decrease
   - If the average temperature increases in the relevant area, corona risk will decrease
   - When considering other variables increase, corona risk will increase

   Based on the above assumptions following weightages were selected.

4. The individual score related to a particular variable is calculated by multiplying the relevant weightage by the actual value of the variable of the particular DS division. The total score is calculated adding up individual scores obtained for a particular DS division.



	A	B	C	D	E
2	**Variables**	**Weightage**			Variable
3	Corona cases	0.8260	B3*number of corona cases		Corona cases
4	Quarantines	0.6278	B4*number qurantined		Quarantines
5	Population Density	0.8529	B5*population density		Population Density
6	No. of Petrol Sheds	-0.4895	B6*number of petrol sheds		No. of Petrol Sheds
7	Government Hospitals	-0.8179	B7*number of government hospitals		Government Hospitals
8	Alcohol Consumption Per day(L)	0.7862	B8*Alcohol consumption per day		Alcohol Consumption
9	Unemployment Rate	0.5597	B9*Uneployment rate		Unemployment Rate
10	Muslim Population	0.9446	B10*Muslim population		Muslim Population
11	No. of Curfew Pass Issued	0.6358	B11*number of curfew pass issued		No. of Curfew Pass Iss
12	Average Temperature (C)	-0.4288	B12*average temp		Average Temperature
13	Rainfall annual(mm)	0.2922	B13*Rainfall annual		Rainfall annual(mm)
14	No. of Hot spots	0.5543	B14*number of hot spots		No. of Hots Pots

Above table shows the final score for each DS division.

The ranges can be defined according to the expert opinion:

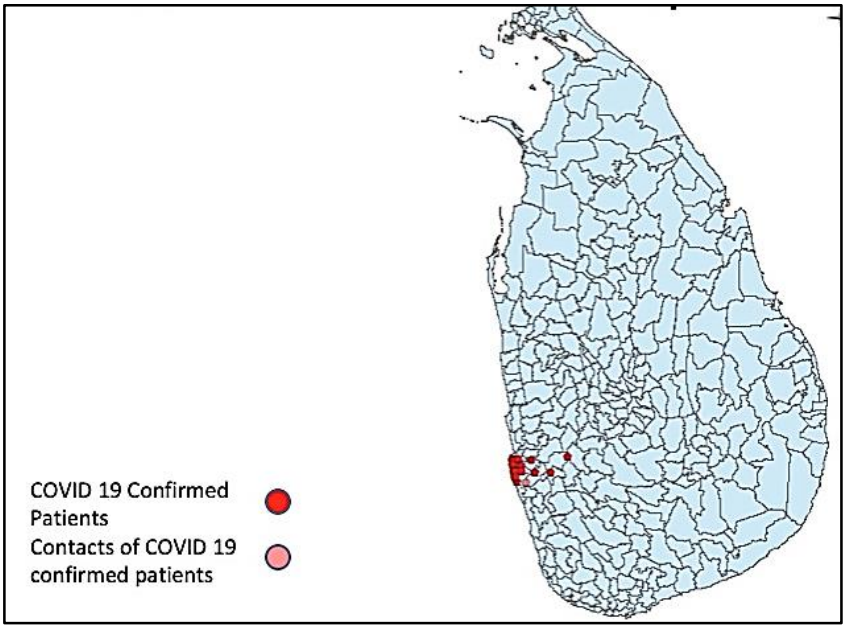
- Sterile – below 50
- Buffer – 50 –=/< 100

- Contaminated - =/> 100

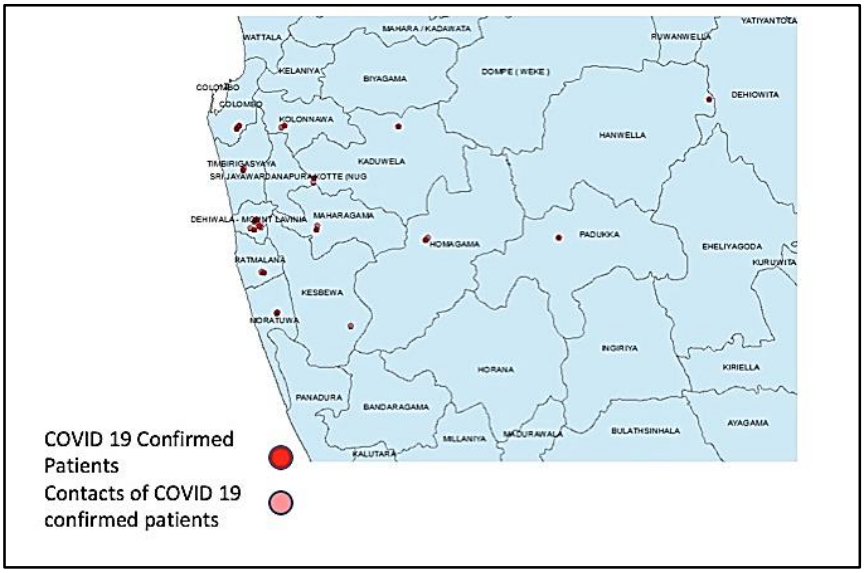
5. According to the ranges given to the system, the following maps are generated.

Map No.	Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown,
6.1.	in all Divisional Secretariats
6.2.	in surrounded Divisional Secretariats
6.3.	with 1st level contacts
6.4.	with 2nd, 3rd and 4th level contacts
6.5.	lockdown exit availability
6.6.	Google aerial view

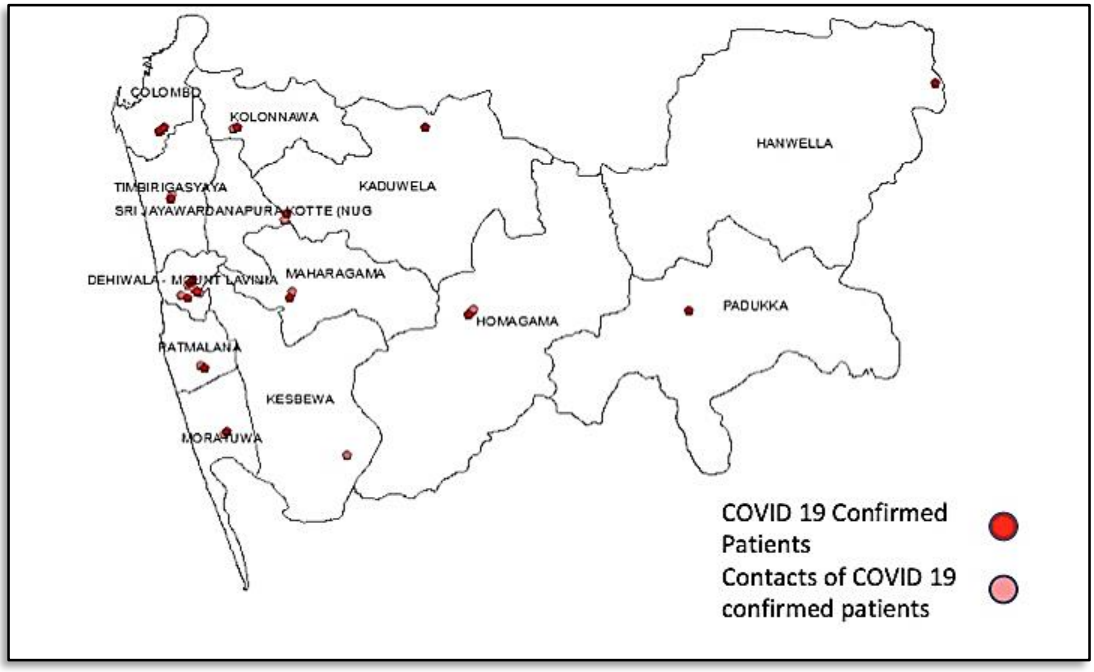
Map No. 6.1. Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown in all Divisional Secretariats



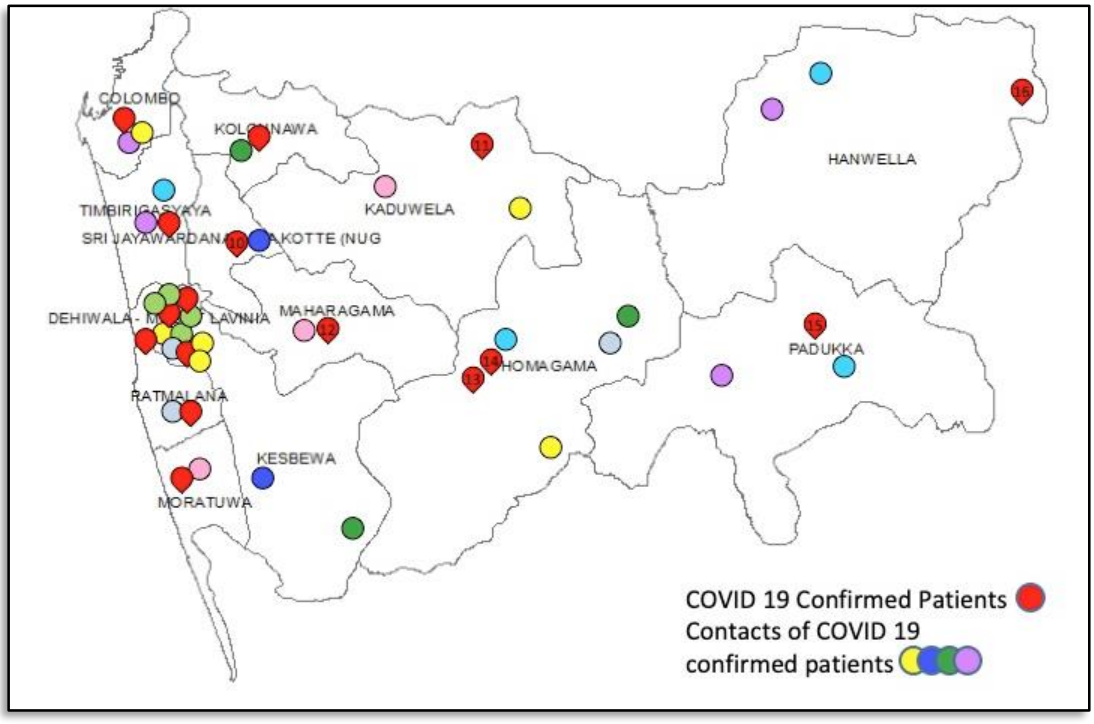
Map No. 6.2. Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown in surrounded Divisional Secretariats



Map No. 6.3. Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown with 1st level contacts

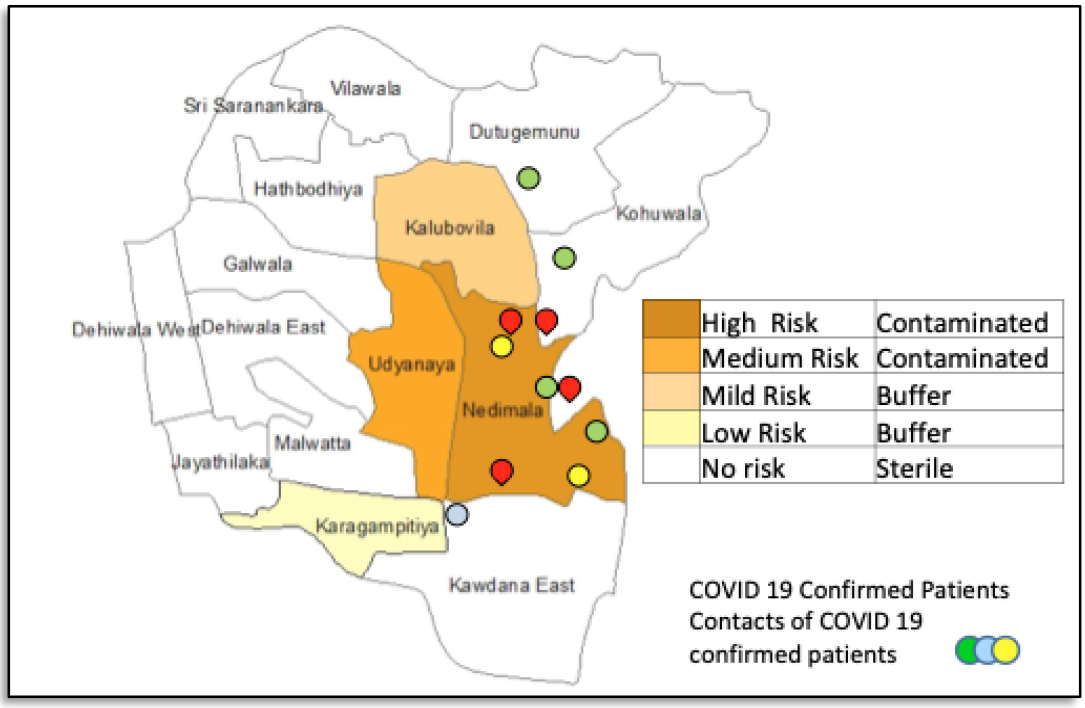


Map No. 6.4. Distribution of COVID 19 confirmed patients and their contacts in Colombo

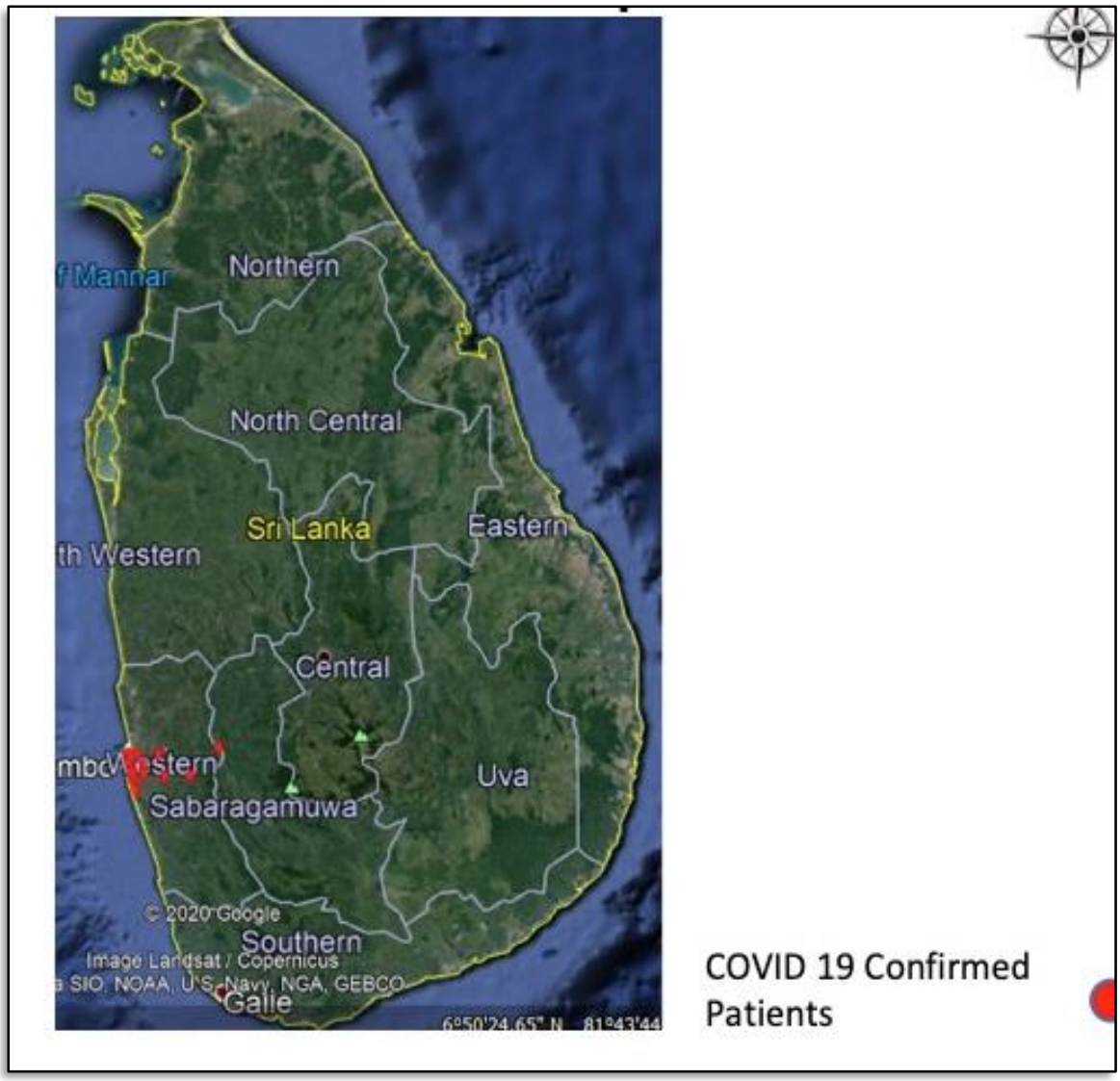


District shown with 2nd, 3rd and 4th level contacts

Map No. 6.5. Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown with lockdown exit availability



Map No. 6.6. Distribution of COVID 19 confirmed patients and their contacts in Colombo District shown with Google aerial view


Northern
North Central
Sri Lanka
Eastern
Central
Uva
Sabaragamuwa
Southern
Galle
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COVID 19 Confirmed Patients


Colombo
Western
Moratuwa
Sabaragamuwa
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Peliyagoda
Avissawella
Colombo
Malabe
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Nugegoda
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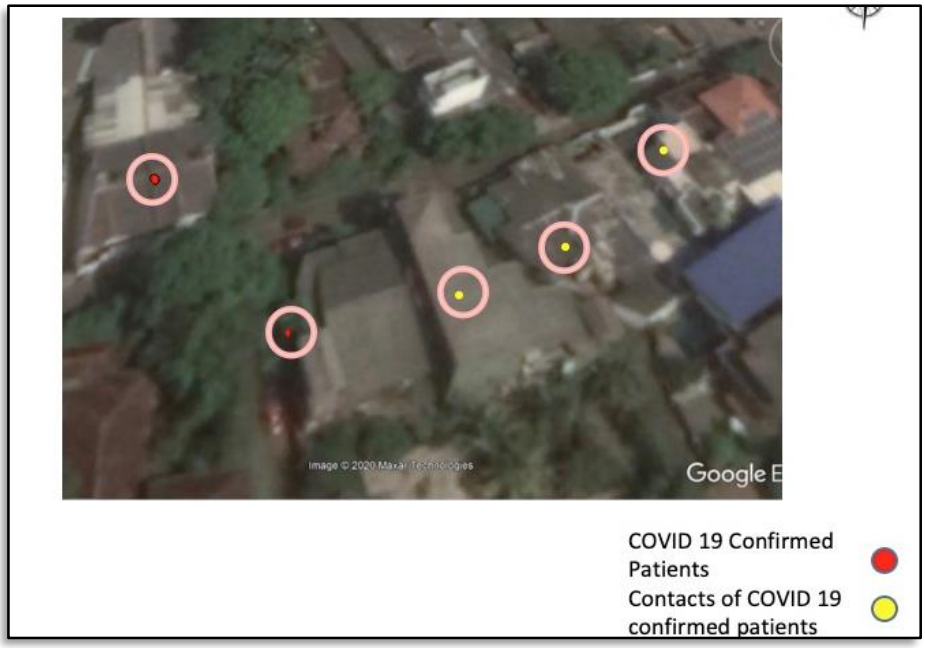
Image © 2020 Maxar Technologies
COVID 19 Confirmed Patients
Contacts of COVID 19 confirmed patients

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Annexure 2:

Lessons learnt from China:

Following the spread of the Corona infection in China, the main action taken was total lock-down like strategy of the Hubei province which was the epicenter of the disease.

In other areas of China (depicted in the map) where cases were identified restriction of movement was carried out.

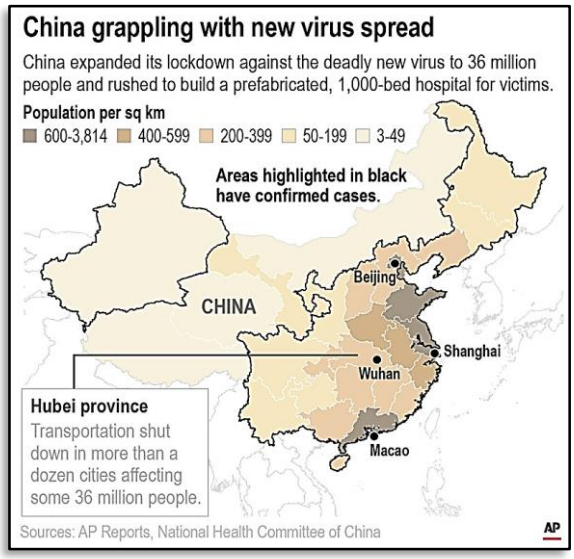

Figure 1: Distribution of cases in China

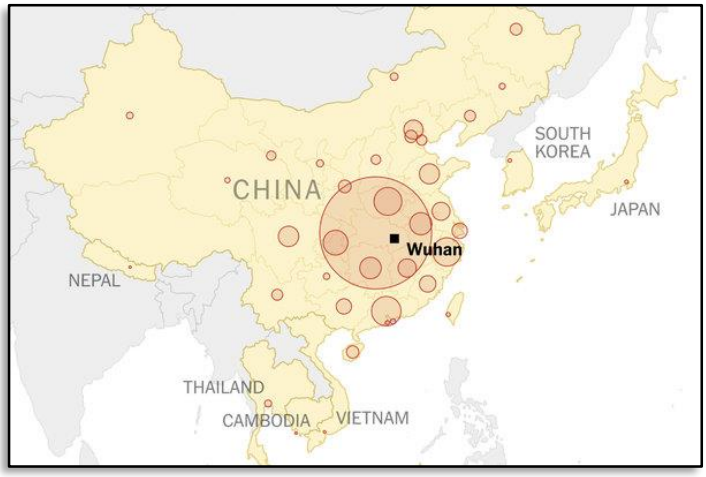

Figure 2: Map depicting the Hubei province and where lockdown was instituted and additional land areas which had positive cases

The lesson that can be extracted from China is that complete lockdown of a country is not essential to contain the disease.

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