

Summer Training Report

**By
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MBA (Health and Hospital Management)

2019-21



Acknowledgements

With immense pleasure, I express my heartfelt gratitude to **Dr. P R Sodani** (Pro President, Dean IIHMR University and Dean training) and **Dr. Ashok Kaushik** (Professor and academic advisor) for giving me this opportunity to undergo an online course during this crucial time period.

I express my warm gratitude to my mentor **Dr. Susmit Jain** (Associate Professor & Academic advisor), IIHMR University for always supporting and motivating me.

I also thank UNICEF [AGORA] and Cornell University for giving me an online platform for learning.

Last but not the least my parents and friends are also an important inspiration for me. So, with due regards, I express my gratitude to them.

Dr. Tripti Bhaskar

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[Part-1]

Research Study

COMPARATIVE STUDY OF COVID-19 CASES OF KERALA WITH RAJASTHAN

AN OBSERVATIONAL STUDY

Part – 1
(Research Study)

Comparative Study of COVID-19 cases of Kerala with Rajasthan

1. Introduction:

Coronavirus-2 (SARS-CoV-2) is an emerging virus that belong to the family ‘Coronaviridae’. Health authorities in **Wuhan, China** reported a cluster of viral pneumonia cases of unknown origin on 31 December 2019. According to an investigation most of the cases had links with the Huanan seafood market and so the virus was thought to be of Zoonotic origin. Since than 3,332,907 COVID-19 cases have been reported across the world with 1.02 million recovered cases and 234K deaths as on 1st May 2020, 14:10 GMT and are still on a rise.

Coronavirus also called COVID-19 (from 11th February 2020), is a new viral disease which was first reported in China’s Hubei province on 12.12.2019 which subsequently became its epicenter as it rapidly spreads all over the world, including India within a few months. While the whole world is working hard to cope with the pandemic, India reported its first COVID-19 confirmed case on 30 January 2020 in Thrissur, Kerala. COVID-19 was declared a Public Health Emergency of International concern on 30th January 2020.

As on May 2, 2020 there are 37,654 confirmed cases with 10,106 recovered cases and 1,230 deaths in India. An observational study was conducted for the state of Kerala by collecting data from various secondary sources such as articles, newspapers, journals, and websites to know the steps taken by the Kerala Government to combat the spread of COVID-19 in Kerala and how effective these measures were. The study also compares the Morbidity, mortality, and recovery indicators of cases in Kerala with Rajasthan because initially the cases were almost same and now Rajasthan is much ahead of Kerala in total no. of cases. As on May 2, 2020, there have been 500 confirmed cases with 400 recoveries and 4 deaths in the state of Kerala. Kerala's success in containing COVID-19 has been widely praised.

During the study it was also found that there are 1,280 hospitals in public sector and 2,062 hospitals in private sector giving a total of 3342 hospitals in Kerala as compared to 2,850

hospitals in public sector and 2,794 hospitals in private sector giving a total of 5,644 hospitals in Rajasthan. There are 99,227 total hospital beds and 4,961 ICU beds in Kerala and 93,176 total hospital beds and 4,659 ICU beds in Rajasthan. Total ventilators in Kerala are 2,481 and total ventilators in Rajasthan are 2,329. First case in **Kerala** was reported on **30th January,2020** and in **Rajasthan** on **2nd March,2020**.

The states were divided into red, orange and green zones to limit the spread of Covid-19. Areas with the maximum number of cases were Red zones, Areas with limited number of cases and no new cases recently were classified under orange zones and the areas with no cases at all or no cases in last 21 days were green zones.

2. Objective:

Comparative Study of Covid-19 cases of Kerala with Rajasthan.

3. Literature Review:

Journal and Date	Title	Authors and link	Main question	Key facts
MIT technology review April 13, 2020	What the world can learn from Kerala about how to fight covid-19	Sonia Falerio https://www.technologyreview.com/2020/04/13/999313/kerala-fight-covid-19-india-coronavirus/amp/	How Kerala is flattening the curve through epic levels of contact tracing and social assistance?	While the rest of India, along with countries such as the UK and the US, would not take stringent steps to limit movement for another two months, Shailaja had ordered Kerala's four international airports to start screening passengers in January. On March 11, Pinarayi Vijayan, the chief minister, ordered a lockdown, shutting schools, banning large gatherings, and advising against visiting places of worship. He held daily media briefings, got internet service providers to boost capacity to meet the demands of those now working from home, stepped up production of hand sanitizer and face masks, had food delivered to schoolchildren reliant on free meals, and set up a mental health help line.
The Lancet April 29,2020	Institutional, not home-based, isolation could contain the COVID-19 outbreak.	Borame L Dickens, Joel R Koo, Annelies Wilder-Smith, Alex R Cook https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31016-3/fulltext	Is institutional quarantine better than home-based quarantine?	Physical distancing, intensive contact tracing, and case isolation remain frontline measures in controlling the spread of COVID-19 in Wuhan, China. Critical to Wuhan's success, cases identified through liberal testing, regardless of symptom profile, were immediately isolated in purpose-built shelters, as delays in isolation from symptom onset increase transmission risk substantially. This approach reduced the contact rates by 75% in the household and by 90% in the community. European countries and the USA have followed home-based isolation and this approach is assumed to cause a 50% reduction in contact within the home and a 75% reduction in contact in the community.
CDDEP April 21,2020	COVID-19 in India-state wise estimate of current hospital beds, ICU beds and ventilators.	Geetanjali Kapoor, Aditi Sriram, Jyoti joshi, Arindam Nandi, Ramanan laxminarayan. https://cddep.org/publications/covid-19-in-india-state-wise-estimates-of-current-hospital-	India is home to over 1.3 billion people but are there enough ICU beds and ventilators to accommodate mass hospitalization at the peak of the Covid-19 pandemic?	The researchers estimated that India has approximately 1.9 million hospital beds, 95 thousand ICU beds, and 48 thousand ventilators. Most of the beds and ventilators in India are concentrated in seven states – Uttar Pradesh (14.8%), Karnataka (13.8%), Maharashtra (12.2%), Tamil Nadu (8.1%), West Bengal (5.9%), Telangana (5.2%) and Kerala (5.2%). Kerala has 1900 ICU beds in public sector and 3061 ICU beds in private sector totaling to 4961 ICU beds.

		beds-icu-beds-and-ventilators/		Kerala has 950 ventilators in public sector and 1531 ventilators in private sector totaling to 2481 ventilators.
The Lancet February 20,2020	Early epidemiological analysis of the coronavirus disease 2019 outbreak based on crowdsourced data: a population-level observational study	Kaiyuan Sun, Jenny Chen, Cécile Viboud https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30026-1/fulltext	How early crowdsourced data can be useful to monitor emerging outbreaks?	<i>507 patients reported from Jan 13, to Jan 31, 2020, including 364 (72%) from mainland China and 143 (28%) from outside of China were taken as sample.</i> Sex ratio was skewed towards males (55%). Median age group was 46 years for patients who were alive and 70 years for patients who died. 435 patients with known relation to Wuhan city, most reported a travel history to the city (135 [30%]) or were residents of the city (152 [30%]), while 80 (16%) had no direct relation to the city.
NEJM April 29,2020	Covid-19 in Immune-Mediated Inflammatory Diseases — Case Series from New York	Dr. Haberman, Dr. Axelrad, Mr. Chen, Drs. Hudesman and Scher. https://www.nejm.org/doi/full/10.1056/NEJMc2009567?query=featured_coronavirus		86 patients with immune-mediated inflammatory disease who had either confirmed (59 patients) or highly suspected (27 patients) symptomatic Covid-19 infection were identified. 62 of 86 (72%) were receiving biologics or Janus kinase (JAK) inhibitors, and the overall incidence of hospitalization was 16% (14 of 86 patients). The hospitalized patients were older than the ambulatory patients. As compared with the ambulatory patients, more of the patients for whom hospitalization was warranted had coexisting hypertension, diabetes, or chronic obstructive pulmonary disease.

EUROSURVEIL LANCE April 23,2020	Clinical characteristics of coronavirus disease (COVID-19) early findings from a teaching hospital in Pavia, North Italy, 21 to 28 February 2020	Marta Colaneri, Paolo Sacchi, Valentina Zuccaro, Simona Biscarini, Michele Sachs, Silvia Roda, Teresa Chiara Pieri, Pietro Valsecchi, Antonio Piralla, Elena Seminari, Angela Di Matteo, Stefano Novati, Laura Maiocchi, Layla Pagnucco, Marcello Tirani, Fausto Baldanti, Francesco Mojoli, Stefano Perlini, Raffaele Bruno, the COVID19 IRCCS San Matteo Pavia Task Force https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.16.2000460	What are the early clinical features of COVID-19?	Majority of the cases were males. Median age of patients was 67.5 years. Clinical features included fever, diarrhea, cough, dyspnea, confusion, chest pain, constipation, respiratory failure, muscle pain, chest pain and weakness. The most common underlying conditions were Diabetes, cancer, heart disease, chronic hepatitis, and lung disease.
EUROSURVEIL LANCE April 9, 2020	An alternative workflow of molecular detection for SARS-CoV-2-escape from the NA extraction kit-shortage, Copenhagen, Denmark, March 2020	Anna S. Fomsgaard, Maiken Worsøe Rosenstjerne. https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.14.2000398	What is the alternative for diagnosis for COVID-19 to overcome the shortage of viral nucleic acid extraction kits?	MagNA pure 96 system and SensiFAST SARS-CoV-2 RT-qPCR assay are usually used for the diagnosis of COVID-19. Due to the shortage of NA kits, an alternative was shown in this study by simple heating of the OP swab sample for 5 mins at 98°C that resulted in a specificity, sensitivity and accuracy of 97.4% using SensiFAST SARS-CoV-2 RT-qPCR assay. There is a very less chance of false negatives which can be assured by performing the assay in duplicates.
Bioscience trends January 20,2020	Drug treatment options for the 2019-new	Hongzhou Lu https://www.biosciencetrends.com/downloadpdf/1882	What can be the drug treatment options for the COVID-19 pandemic?	Use of anti-viral drugs like interferon I (IFN-alpha, beta, kappa, lamda, epsilon, etc.) and interferon II (interferon gamma). Screening of compounds in different cell lines. Drugs affecting neurotransmitter

	coronavirus (2019-nCoV)			regulation, lipid metabolism, estrogen receptor, kinase signal transduction, sterol metabolism, protein processing and DNA repair can be used. Development of new drugs specific for COVID-19.
JAMA April 30,2020	Second- Trimester Miscarriage in a Pregnant Woman With SARS-CoV- 2 Infection	David Baud, Gilbert Greub, Guillaume Favre https://jamanetwork.com/journals/jama/fullarticle/2765616	Can COVID-19 spread from mother to fetus?	A 28-year-old woman at 19 weeks of gestation was tested positive for COVID-19 by NP swab examination. She was given oral acetaminophen and 2 days later she had extreme uterine contractions and fever with no improved symptoms. She got a miscarriage soon after. Vaginal swabs, amniotic fluid and fetal blood tested negative for COVID-19. Swabs and biopsies from placenta tested positive for COVID-19.

4. Methodology:

I) Research Question: What were the Proactive measures taken by Kerala to combat Covid-19?

II) Study Objective:

- To find out the total number of districts affected by COVID-19 in Kerala with that of Rajasthan.
- To find out the green, orange, and red zones in Kerala with that of Rajasthan.
- To study the spread of COVID-19 positive cases in Kerala as compared to that of Rajasthan.
- To compare the mortality, morbidity, and recovery indicators in Kerala with that of Rajasthan.
- To acknowledge the steps taken by the Government of Kerala to combat COVID-19.
- To check the total no. of ICU beds and ventilators in Kerala and Rajasthan.

III) Type of research methodology:

Descriptive cross-sectional method.

IV) Type of research design:

Observation is the method of data collection.

V) Data collection:

Data is collected through various resources like internet (various websites), Journals, newspapers.

Ethical considerations: The data was collected from various sources like journals, newspapers and various websites. The Confidentiality of individuals was maintained, and no individual was harmed during the research study.

Duration: The duration of the research study is from 7th April, 2020 - 6th May, 2020.

★ Sources from where data has been collected:

1) World health organization (WHO):

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

(as on 2 May 2020)

- **Worldwide:**

- Confirmed cases: 32,67,184
- Confirmed deaths: 229,971
- Affected countries: 215

2) Ministry of health and family welfare {Government of India}:

<https://www.mohfw.gov.in/>

(as on 30 April 2020)

- Active cases: 24162
- Cured cases: 8372
- Deaths: 1075
- Migrated: 1

3) India COVID-19 Tracker:

<https://www.covid19india.org/>

(as on May 2, 2020)

- **At India level:**

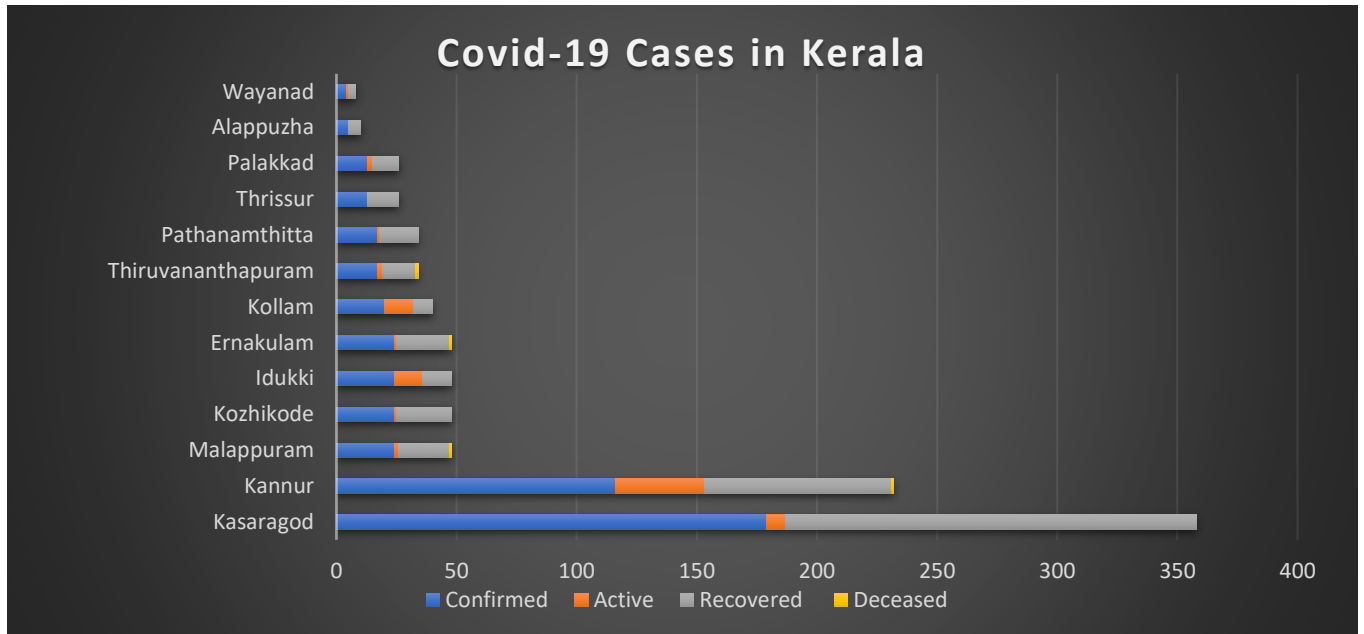
- Confirmed cases: 37,654
- Active cases: 26,314
- Cured cases: 10,106
- Deceased: 1,230

- **At Kerala level:**

- Confirmed cases: 500
- Active cases: 96
- Cured cases: 400
- Deaths: 4
- Tested: 27,150

At district level in Kerala:

Graph 3.1



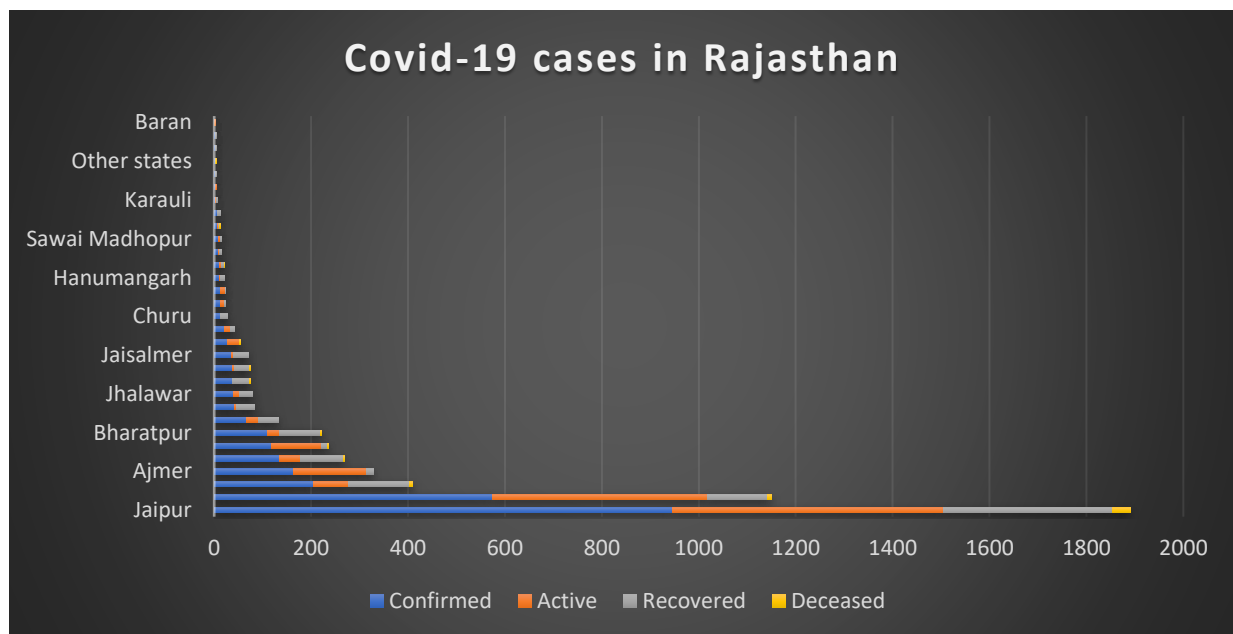
Interpretation: On the bases of above graph, it has been observed that maximum cases were in **Kasaragod, Kerala** [As on 2 May,2020].

- **At Rajasthan level:**

- Confirmed cases: 2,720
- Active cases: 1,534
- Recovered cases: 1,121
- Deceased: 64
- Tested: 1,08,543

- **At district level in Rajasthan:**

Graph 3.2



Interpretation: On the bases of above graph it was observed that maximum cases were observed in **Jaipur, Rajasthan** [As on 2 May,2020].

4) John Hopkins school of public health:

<https://coronavirus.jhu.edu/>

(as on May 2,2020)

- Global confirmed: 3,364,535
- Global deaths: 239,236

5. Findings and Discussion:

I) During the lockdown the districts were divided in red, orange and green zones to limit the spread of Covid-19 case. Activities allowed in the respective zones were as follows:

Activity	Red zone	Orange zone	Green zone
Travel by air, road, railway, or metro.	✗	✗	✗
Large public gatherings or public places like gyms, cinemas, etc.	✗	✗	✗
Running of schools, colleges or coaching's.	✗	✗	✗
Movement of people for non-essential activities (from 7am-7pm)	✗	✗	✗
Clinics and OPD's	✓	✓	✓
Running of cabs, auto-rickshaws with 1 passenger only.	✗	✓	✓
Running of salons, spas and barber shops.	✗	✓	✓

II) Green, orange and red zones in Kerala and Rajasthan: (applicable from May 4 ,2020)

Lockdown 3.0 divided the country in 3 zones. The lockdown was further extended till 17 May 2020.

- **In Kerala:**

There were 2 red zones, 10 orange zones and 2 green zones in Kerala.

Kannur
Kottayam
Kasaragod
Kozhikode
Idukki
Kollam
Palakkad
Pathanamthitta
Malappuram
Thiruvananthapuram
Alappuzha
Thrissur
Ernakulam
Wayanad

Interpretation: Maximum number of cases were reported in Kannur and Kottayam, so they were classified under red zones.

- **In Rajasthan:**

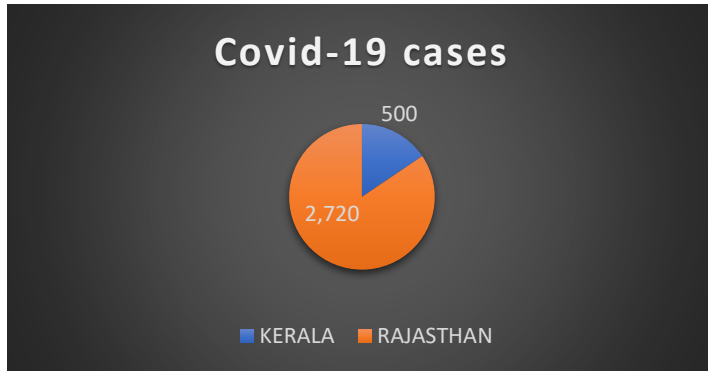
There were 8 red zones, 19 orange zones and 6 green zones in Rajasthan.

Jaipur
Jodhpur
Kota
Ajmer
Bharatpur
Nagaur
Banswara
Jhalawar
Tonk
Jaisalmer
Dausa
Jhunjhunu
Hanumangarh
Bhilwara
Sawaimadapur
Chittorgarh
Dungarpur
Udaipur
Dholpur
Sikar
Alwar
Bikaner
Churu
Pali
Barmer
Karauli
Rajsamand
Baran
Bundi
Ganganagar
Jalore
Sirohi
Pratapgarh

Interpretation: Jaipur, Jodhpur, Kota, Ajmer, Bharatpur, Nagaur, Banswara, and Jhalawar were the hotspots in Rajasthan and were classified under Red zones.

III) Total number of affected cases of COVID-19 in Kerala and Rajasthan:

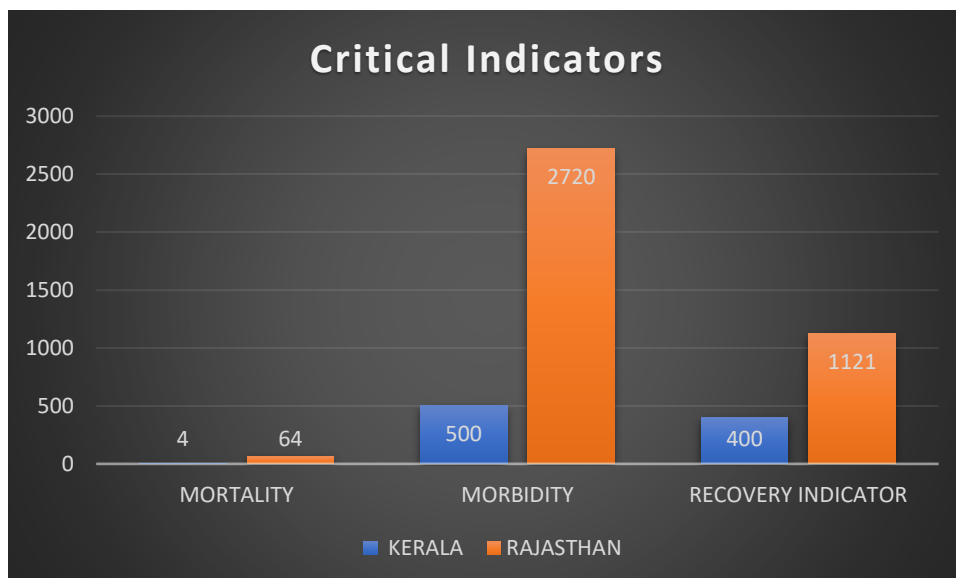
Graph 5.1



Interpretation: The number of cases in Rajasthan were almost 5 times more than that of Kerala.

IV) Mortality, morbidity, and recovery indicators in Kerala and Rajasthan:

Graph 5.2



V) Steps taken by the Government of Kerala to fight COVID-19:

- a. 100% testing at all the international airports: As soon as the first case was reported in Kerala, strict surveillance was started at all the international airports in the state. The travelers were also given a health card in which they have to pen down the places they travelled and any illness if they are experiencing. The traveler must get a clearance seal on the card before immigration. In case the traveler is from any COVID-19 affected country like China, (s)he is immediately sent for temperature screening.

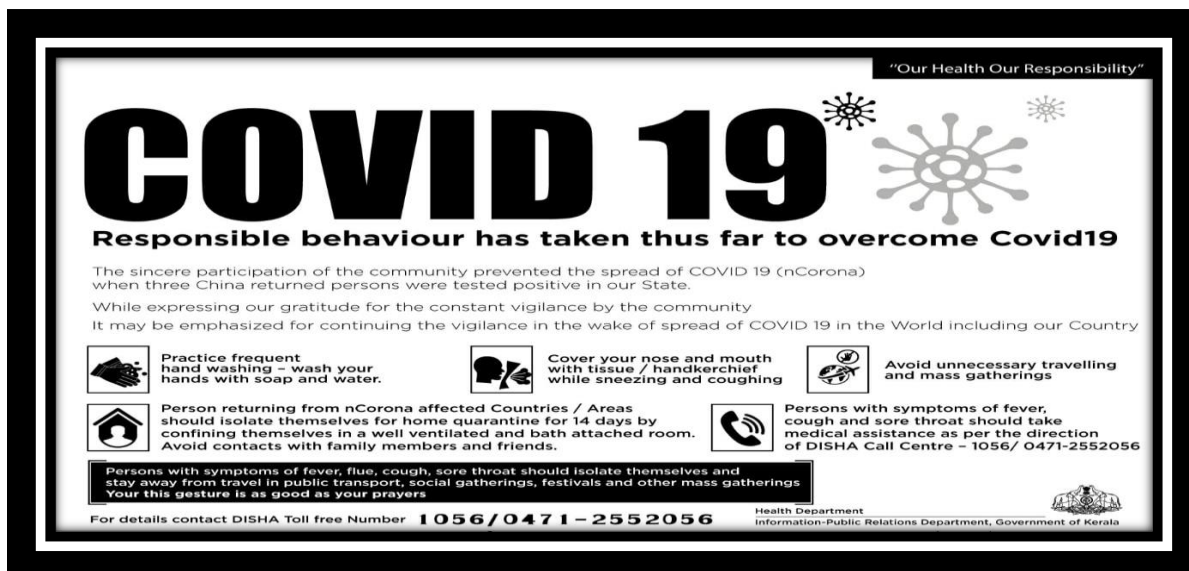
Kerala is the only state where a **28 days of home quarantine** is mandatory for all those coming from abroad, while in other states the period is of 14 days.

- b. An expert committee was set up which included doctors, scientists, virologist, disaster management experts and members of IMA to advice the Government in taking appropriate actions.
- c. Around 5000 COVID-19 care homes were set up near all the international airports and many abandoned buildings and hospitals were converted into COVID-19 care centers.
- d. A **24*7 Disha call center** was setup to guide the home quarantined people regarding responsible behavior.
- e. Prisoners were also trained to make masks, PPE and sanitizers.
- f. A mobile app called **GO Direct** was launched to give updates regarding COVID-19 and to ensure that no fake news is been circulated regarding the outbreak. This app was praised by the people of Kerala.
- g. **'Break the Chain'** initiative was started by the GOK and sanitizers and water taps were installed at public places to maintain hygiene.
- h. Two days before the lockdown the State also announced India's biggest regional stimulus of 20,000 crores that would be distributed by various welfare schemes.
- i. Food was distributed at 25/- to poor people.

- j. A **three-tier system** was launched under which doctors were divided in groups, 2 active groups and 1 standby group. No frontline worker works for more than a week and after that comes back to work after 2 weeks.
- k. COVID-19 first line treatment centers were setup so that the patients with mild to moderate symptoms visit there and this will also help in avoiding crowds at COVID-19 designated hospitals.
- l. 4503 relief camps and 500 community kitchens were also setup by the GoK for the migrant workers.
- m. At the village level, ASHA and Kudumbashree workers were asked to trace if any person in their zone returned from abroad.
- n. **Route maps** were set up to trace all the locations a COVID-19 positive patient visited before admitting to the hospital along with date and time. These maps were also released on various social media platforms. This helped people to maintain social-distancing and to report to hospital in case they have visited the place recently.
- o. The GoK closed all the public and private schools in the state on March 10, 2020. Government also ensured that mid-day meals will be provided at home to all those studying at anganwadi centers.
- p. Use of **Transmedia** proved to be a game changer in Kerala and it also has an advantage of wider audience. Print media have limited readers due to illiteracy.
- q. Call center's which had at least 5 languages were set-up in the state for migrant workers.
- r. A complete **statewide lockdown** was announced by the GoK on March 23, 2020 whereas a nation-wide lockdown was announced on March 24, 2020.
- s. **Kerala police** played a major role in the fight against this outbreak. A video of Kerala police also went viral on social media in which the policeman are dancing at a Malayalam blockbuster- Ayyapanum Koshium and are demonstrating proper hand-washing technique.
- t. Another video also went viral on all the social media platforms in which Kerala police used VFX to depict coronavirus running behind a man wearing lungi and T-shirt. This video was made in regard with the government initiative 'break

the chain'. A poem was also drafted by the police of Kerala that tells them dire need of everyone to work together in this fight.

- u. These efforts have made the Facebook page of Kerala police as one of the most followed. police department pages with over 1.4 million followers.
- v. **Round the clock call centers** were set up for people who are asked for home-quarantine. In case of any emergency these people were supposed to call on 0471 2309250, 2309251 and 2309252.
- w. An app was also developed by the doctors at Government medical college, Manjeri. This app compiles the information of all those who have returned from the virus hit countries and those who were in close contact with them.
- x. A **robot** developed by Asimov Robotics, distributes masks, sanitizers and napkins at Kochi.
- y. Health Department asked all the Hotels and homestays in Kochi to set-up isolation rooms for suspected cases.
- z. Catchy **audio jingles** were created by BCC wing of NHM to spread awareness about COVID-19.
- aa. Kozhikode government medical college started preparing its own hand sanitizers in 100 mL, 200 mL and 500 mL bottles.
- bb. Social justice Department also decided to distribute **free kits** containing 5Kg rice, sugar, tea, pulses, atta and oil to 1,000 members of transgender community.
- cc. Awareness posters used by the Kerala government:



Awareness posters used by the Kerala government

★ Rajasthan and Kerala were in the list of top 5 states in India with COVID-19 cases:

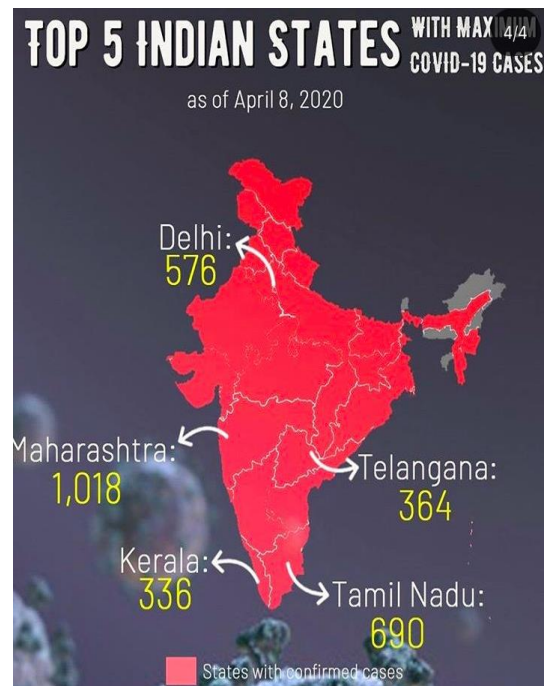
→ As on March 27, 2020 the cases in Rajasthan were 45 as compared to 137 cases in Kerala.

Figure 1



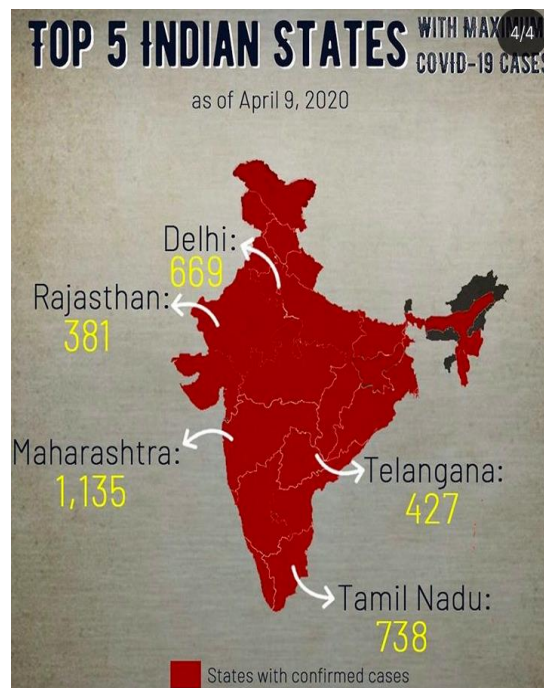
→ On April 8, 2020, Kerala reported 336 cases and stood 5th in no. Of cases in India.

Figure 2



→ On April 9, 2020, Rajasthan reported 381 cases and replaced Kerala at became the 5th state with highest covid-19 cases in India.

Figure 3



- On May 5, 2020, the total number of cases in Rajasthan went up by 53:

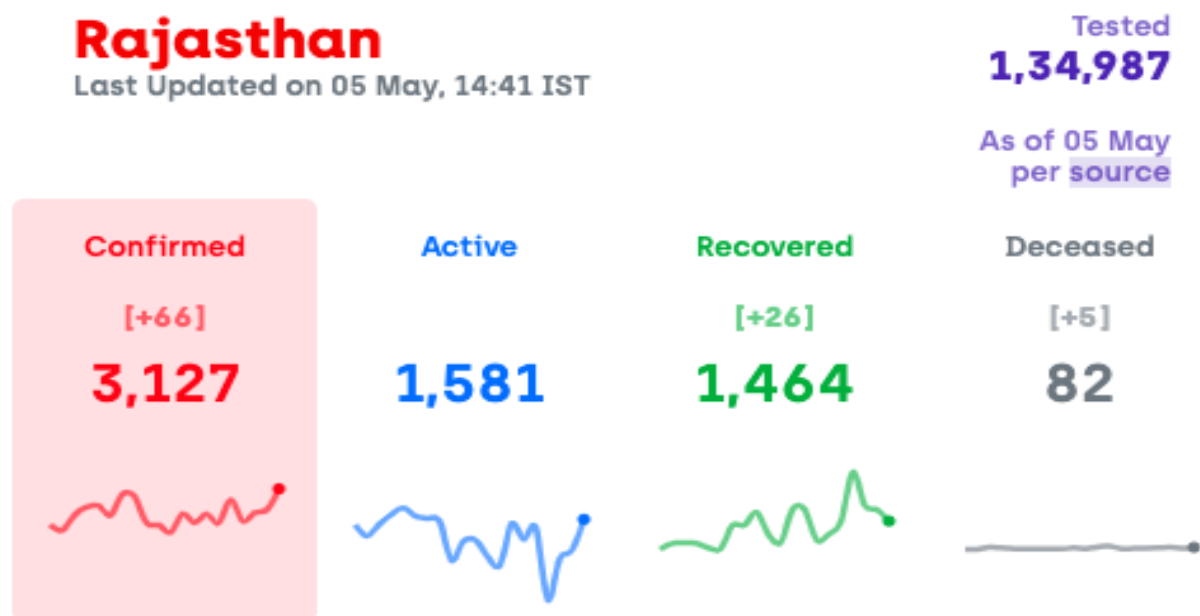
Jaipur 1024 (increase by 19)

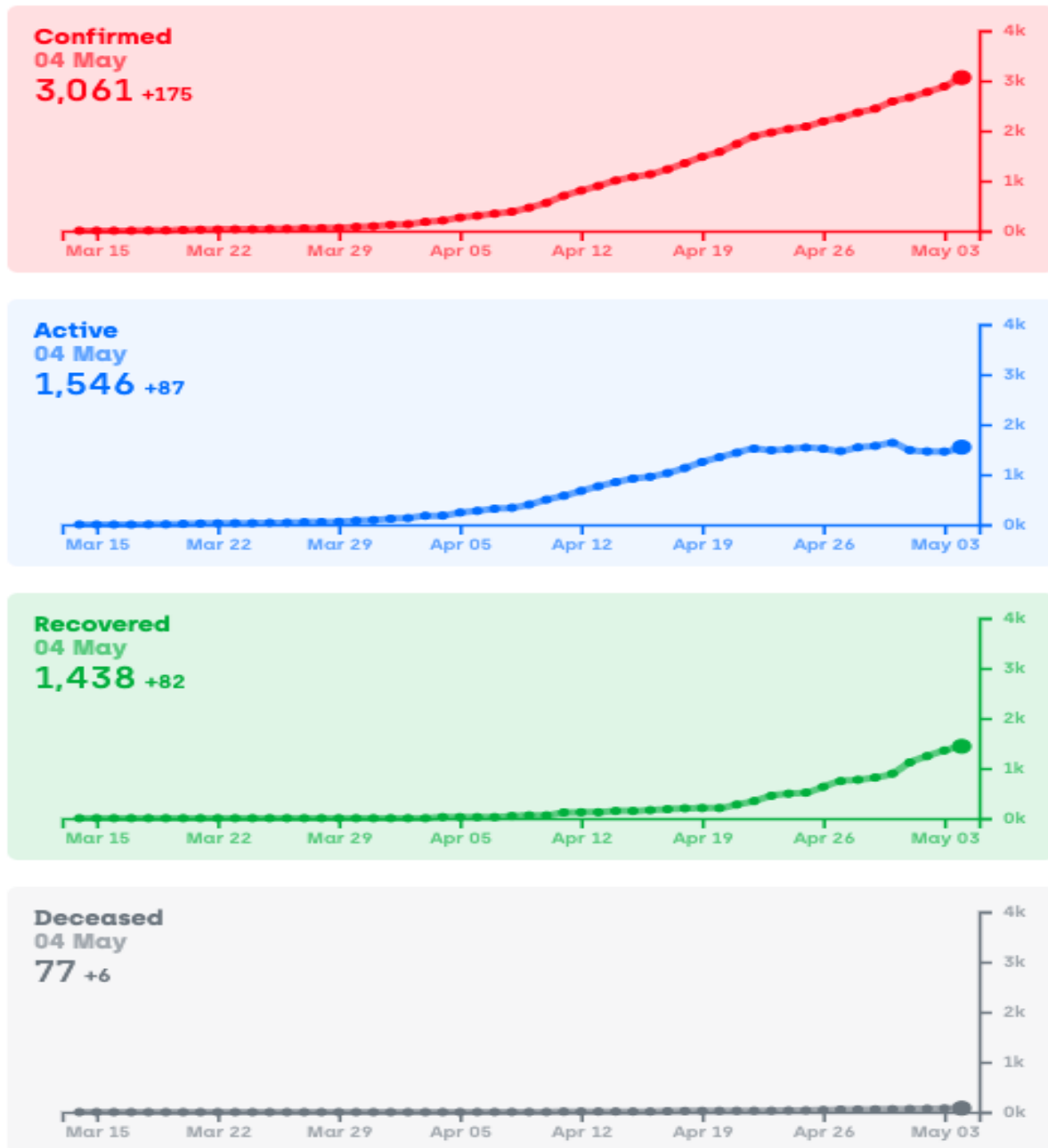
Jodhpur 744 (increase by 23)

Kota 221 (increase by 9)

Ajmer 173 (increase by 1)

Tonk 136 (increase by 2)





(Figure 4)

A spike in cases was seen in India as well as Rajasthan on **May 5, 2020**. Whereas, it was a great day for Kerala as for the 2nd consecutive day there were no new cases of coronavirus in the state, 61 patients recovered (which is highest in a single day till now) and the count of coronavirus active cases went down to 34.

- **Total number of cases went down by 61 in Kerala:**

Kasaragod 179 (decrease by 2)

Kannur 116 (decrease by 19)

Ernakulam 24

Kozhikode 24 (decrease by 4)

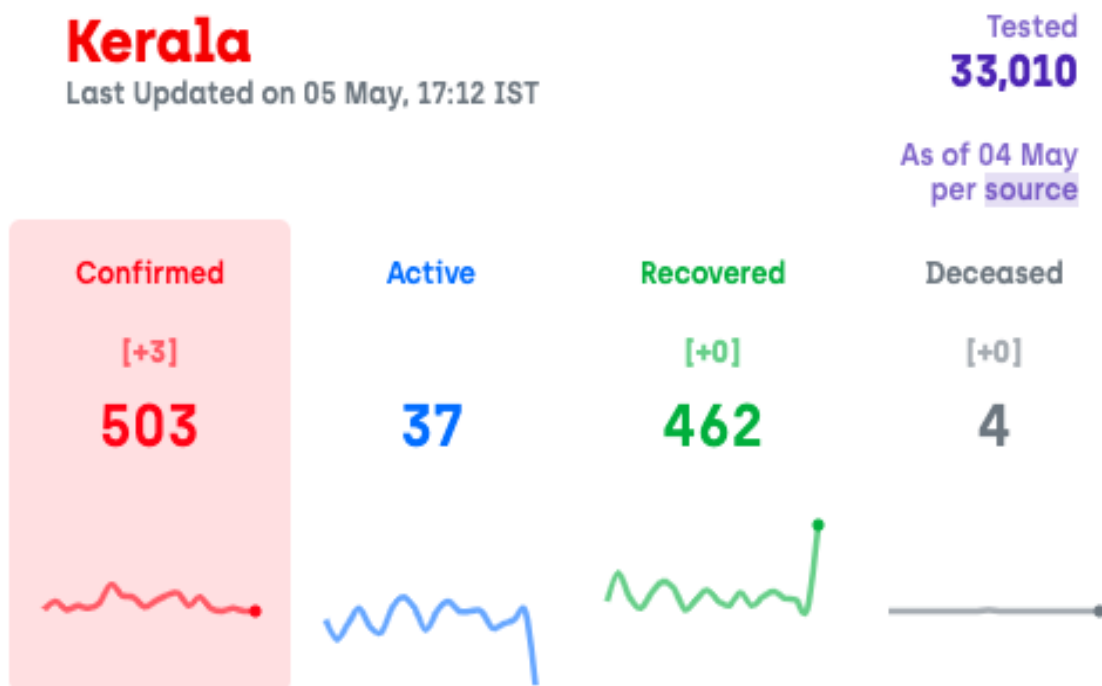
Malappuram 24 (decrease by 2)

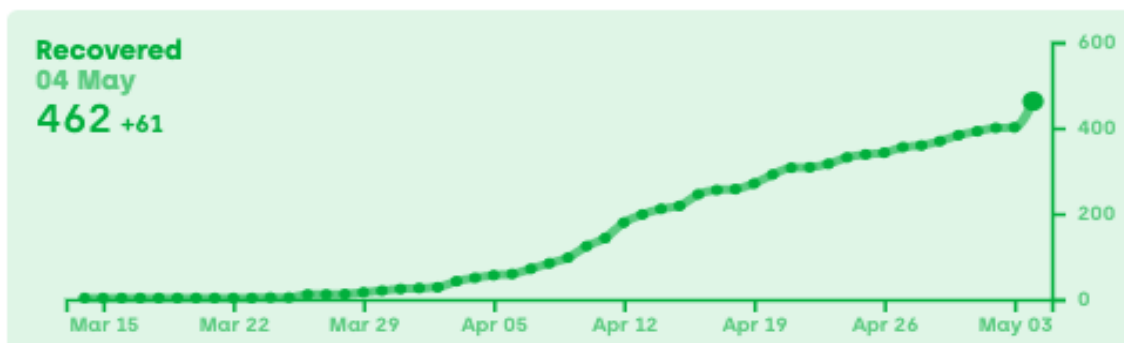
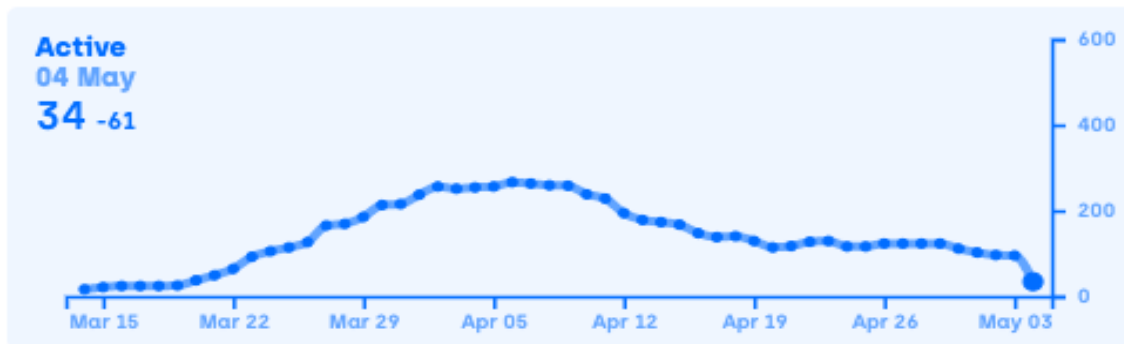
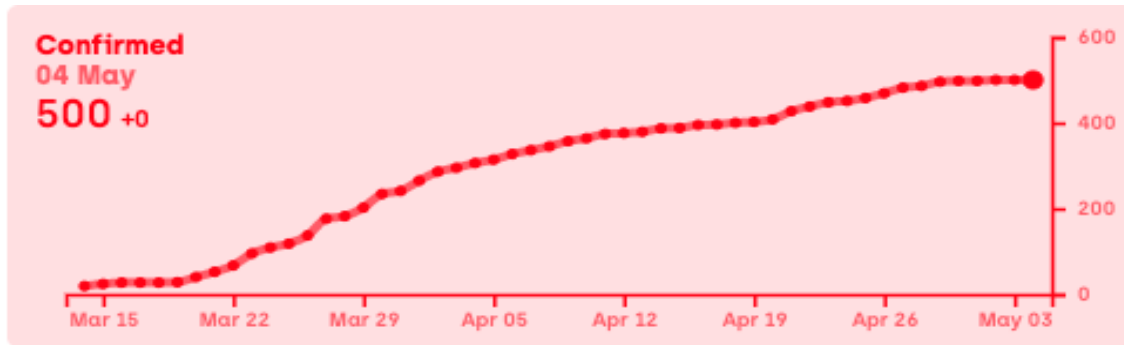
Thiruvananthapuram (decrease by 2)

Idukki (decrease by 11)

Kollam (decrease by 9)

Figure 5





The success of Kerala in the fight against COVID-19 can also be because of previous experiences of outbreaks like Ebola and Nipah in 2018. It was the first state to report covid-19 case in India but now its success in flattening the curve and slowing down the momentum of cases is well praised. The painstaking steps taken by the Kerala government

as well as the support from people can be attributed to its success. The inter-department coordination in Kerala is what every state should learn.

The CM of Kerala also build a trust and faith in people by addressing the citizens of Kerala every evening on TV for an hour. The unwanted movement of migrant workers was also controlled by providing them shelter and free food/ration.

Besides all these measures, an initiative called **Corona safe Network** has been setup to create awareness and educate people about coronavirus and to convert the educational institutions into coronavirus hospitals if required.

6. Expected Outcome:

The cases are on a rise day by day. But, data from some sources has also revealed that according to an internal assessment done by the GOI, a sharp rise in cases will be seen during the first week of May. Studies also suggested that the states which took timely measures and earlier lockdown are better in controlling the number of new cases as compared to other states. An accelerated rise in cases is expected in the coming days. According to sources India may face up to 1 Lakh-13 Lakh cases by mid of May. These projections may change if the strict measures and rapid testing continues.

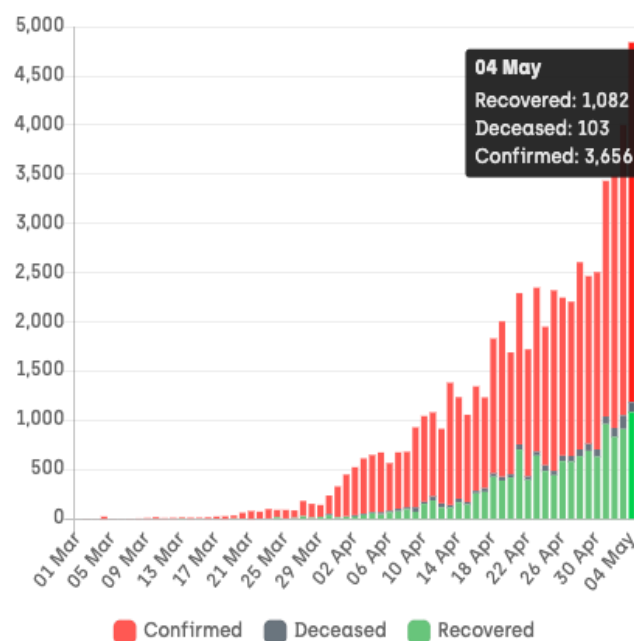
7. Conclusion:

The whole world is fighting hard to beat the novel coronavirus. India is much ahead in controlling the spread of coronavirus as compared to other covid-19 affected countries like Italy, Spain, USA, China through its strict measures and nationwide lockdown. With respect to mortality rates, India is far better than these developed nations. Data from Ministry of health also showed that in US the mark increased from 500 to 1000 in 3 days and from 1000 to 2000 in 2 days whereas in India it took 5 days to go from 500 to 1000 mark and then 4 days from 1000 to 2000. At present the doubling rate for coronavirus in India stands at 10.2 days and cured cases rises to 23.3 %. As on May 5, 2020 India saw highest spike in new coronavirus cases by 3,875 and 194 deaths in last 24 hours making the total cases standing at 46,711. More number of males are affected by COVID-19 as compared to females.

Every state should take such steps as taken by Kerala to trace COVID-19 patients and hence control the spread of the disease.

The cases are still on the rise but at a slower rate as compared to countries like Italy, Spain, USA, Germany and China.

Figure 6



8. References:

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[PART-2]

1.Name of the course:

‘Programming for infant and young child feeding’.

2.Course Description:

This training course aims to enhance the competencies and build the capacity of UNICEF staff and counterparts who are involved in infant and young child feeding (IYCF) programs in developing countries. This includes programme development, programme implementation, programme evaluation, and other related activities for improving nutrition and health outcomes of infants, young children, and women.

This training course was jointly developed by the Infant and Young Child Feeding Unit, Nutrition Section, UNICEF Headquarters and Cornell Nutrition Works, Division of Nutritional Sciences at Cornell University.

3.Objectives of the course:

- Awareness of up-to-date knowledge about IYCF and nutrition for women.
- Knowledge about malnutrition and importance of IYCF.
- Importance of Breastfeeding.
- Initiation of complementary feeding.

4.Course contents:

- a. Essentials of malnutrition.
- b. Role of IYCF in child survival, growth and development.
- c. Essentials of breastfeeding.
- d. Essentials of complementary feeding.
- e. Essentials of nutrition for women.
- f. Birth spacing, and fewer pregnancies affect maternal and child nutrition outcomes.
- g. Key direct nutrition interventions to prioritize to improve maternal nutrition.
- h. Common challenges in implementation of nutrition interventions for women.
- I. Comprehensive IYCF Programming.

j. Selected Interventions for Improving Breastfeeding.

k. Improving maternity BF practices.

5. Learning methodology used in the course:

- Videos
- Tests
- Case studies

6. Key Learnings from the Course:

a. Essentials of malnutrition:

What is malnutrition?

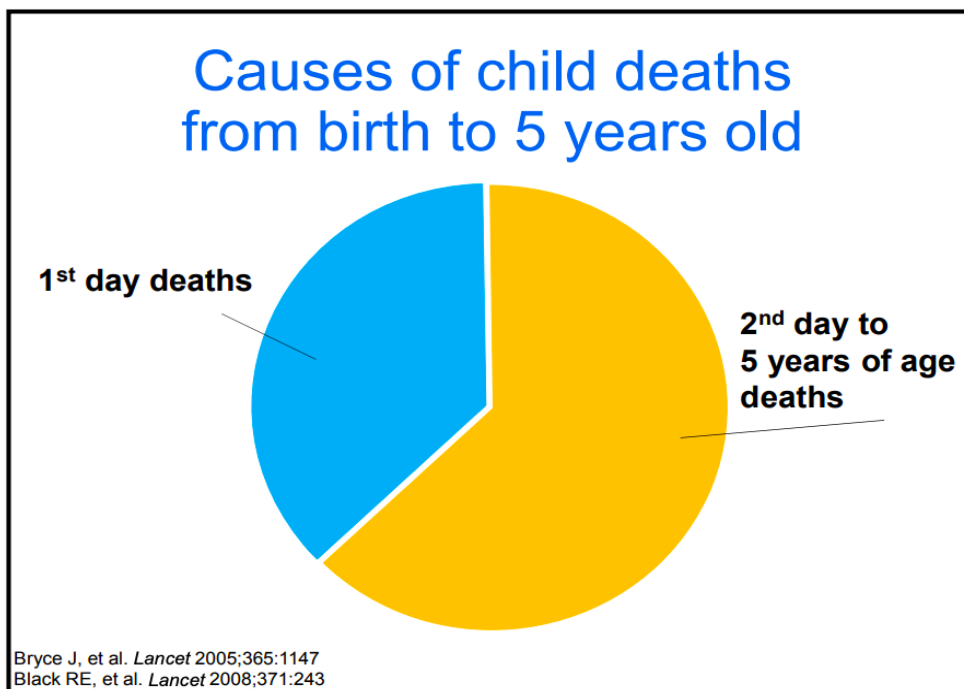
Undernutrition:

- Failure to eat enough food and absorb the essential nutrients to
 - Perform well
 - Be healthy
 - Survive
- Types – Acute (SAM, MAM) and Chronic (stunting).
- Undernutrition is the major single cause of child death in the world whether or not deaths in the first day are counted.
- More child deaths can be prevented by preventing undernutrition than by preventing any other cause of death.

Overnutrition:

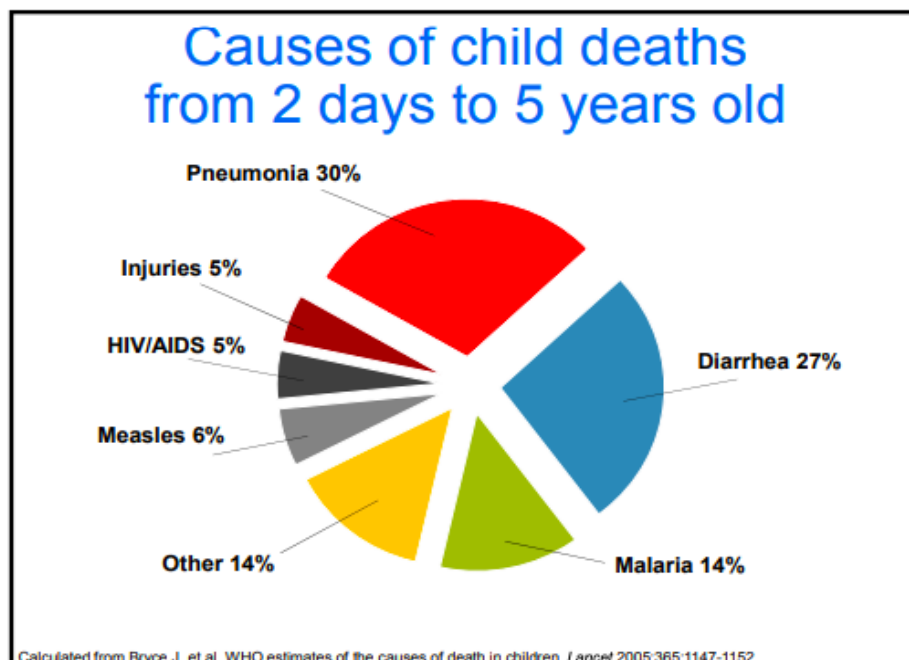
- Types – Overweight and Obese.

Causes of child deaths: Undernutrition is a sneaky killer Children who die of undernutrition look as If they are dying from an infectious disease.It kills about 50%, Infectious diseases kill about 80%. (The 80% includes double counting of children who die because they have both undernutrition and infectious illness.) Undernutrition causes about half of all deaths among children 2 days to 5 years old. It kills directly those who have an infectious illness. It also kills indirectly by causing disease, but this is a relatively small contribution to deaths.

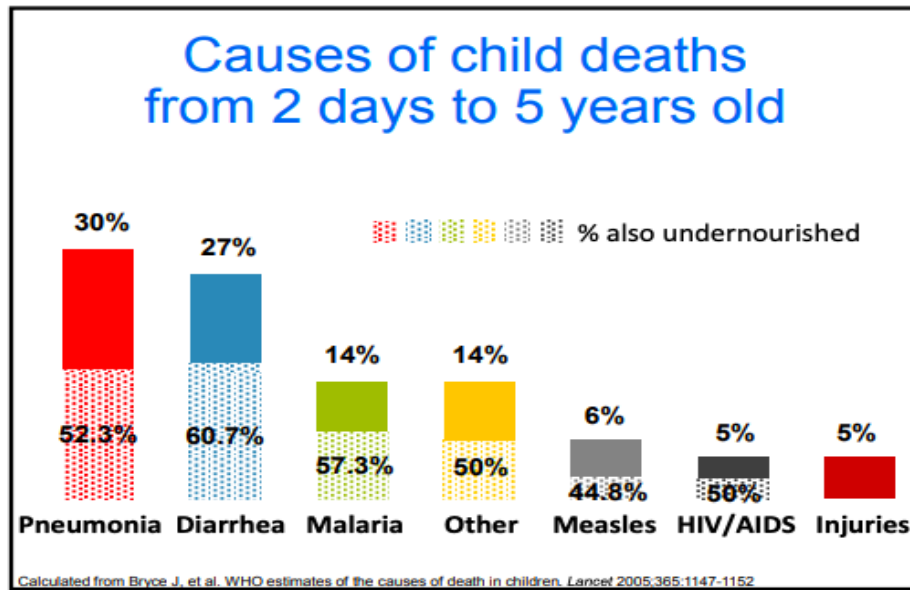


(Figure 1)

Interpretation: 1/3rd of children dies on the 1st day of birth and 2/3rd die after 2nd day to 5 years of age.



(Figure 2)



(Figure 3)

Interpretation: Of the deaths in children of 2 days to 5 years old, Children who have any disease are also undernourished.



(Figure 5)

The total number of children who die from less severe undernutrition is far greater than the total number of children who die from severe acute malnutrition (SAM).

Undernutrition kills at every level of undernutrition. For an individual child, severe acute undernutrition (SAM) is more deadly than less severe undernutrition. Less severe undernutrition, however, is much more common. Therefore, globally, more deaths occur among the less severely undernourished who appear healthy.

Long-term impact of micronutrient undernutrition:

Consequences of poor school performance (iron and iodine deficiencies)

Goiter and mental retardation (iodine deficiency)

Blindness (vitamin A deficiency)

Undernutrition evidenced by stunting has a lifelong negative impact on physical and mental development and leads to:

- reduced school performance
- reduced productivity and income earning capacity in adult life
- obesity and chronic diseases in adulthood
- low birth weight in offspring

When does illness lead to undernutrition in children?

- Good nutrition prevents cumulative pernicious effects of illness. Common infectious illnesses do not cause undernutrition in well fed children.
- Common illnesses worsen undernutrition in undernourished children, so they become more undernourished.

Window of Opportunity:

When are interventions most efficacious?

Interventions are most effective if taken in early age (0-24 months of age).

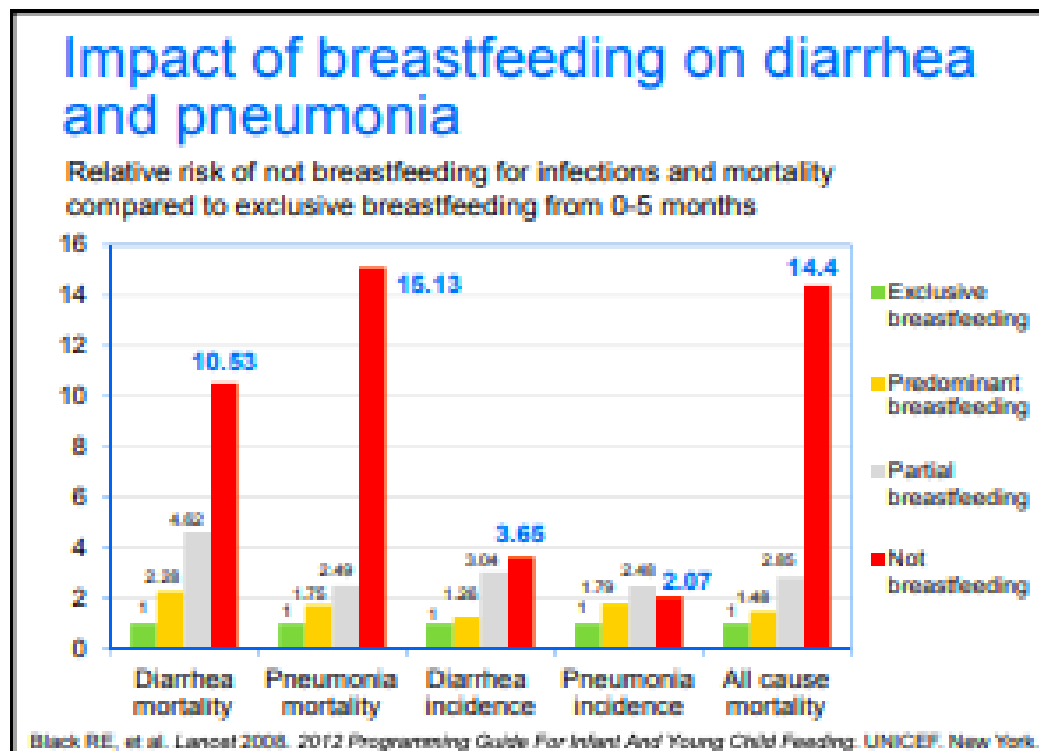
To improve nutrition:

- Increase food to child
- Increase food availability in markets for household.
- Increase food accessibility
- Increase income
- Decrease price
- Increase feeding of appropriate mix of nutrients (food, supplements) to child

Consequences of child undernutrition:

- Intra-uterine growth retardation, stunting and severe wasting together are responsible for 2.2 million young child deaths and 91 million DALYs (21% of the total for children under 5)
- Undernutrition – including fetal growth restriction, stunting, wasting, and deficiencies of vitamin A and zinc along with suboptimum breastfeeding is a cause of 3.1 million child deaths annually or 45% of all child deaths in 2011.
- Optimum breastfeeding practices have the potential to prevent 1.4 million deaths every year among children less than 5 years old (of 10 million estimated deaths).
- Suboptimum breastfeeding results in more than 800,000 child deaths annually. The number of child deaths attributed to suboptimum breastfeeding in 2011 was 804,000, or 11.6% of all deaths.

b. Role of IYCF in child survival, growth and development:



(Figure 6)

Early initiation of breastfeeding:

In a study conducted in Ghana it was found that 22 % of neonatal deaths could be prevented with initiation of breastfeeding within the first hour and 16 % of neonatal deaths could be prevented with early initiation of breastfeeding within the first day.

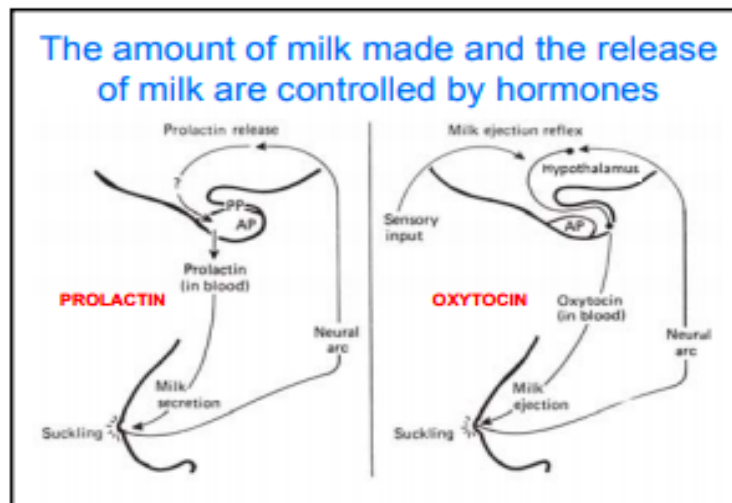
In a similar study in Nepal it was found that approximately 19.1% of all neonatal deaths may be avoided with universal initiation of breastfeeding within the first hour and approximately 7.7 % of all neonatal deaths may be avoided with universal initiation of breastfeeding within the first day. Exclusive breastfeeding protects against growth faltering.

Common challenges in improving IYCF practices along the continuum of care:

- Lack of focus by national nutrition program on IYCF
- Low coverage of activities.
- A non-comprehensive approach.
- Lack of institutionalization of certain activities.
- Design of programmes not based on evidence and the country context.

- Inadequate training, esp. a lack of focus on problem solving, communication and counseling skills.
- Weak health system capacities and links with CHW.
- Overburdened community workers.
- No performance monitoring, supportive supervision.
- Communication strategies not evidence-based and focused on addressing specific barriers to optimal behaviors.

c. Essentials of breastfeeding:



(Figure 7)



(Figure 8)

Importance of Breastfeeding for child:

Breast milk protects against infection.

Breast milk helps to develop and sustain the infant's gut microbiome.

Breast milk is an important source of nutrients.

Breast milk provides energy.

Breast milk provides fat.

Importance of breastfeeding for the mother:

- Delays the return of fertility.
- More rapid return to pre-pregnancy weight; lower postpartum weight retention.
- Lowers risk of postpartum depression.
- Lowers risk of pre-menopausal breast cancer and ovarian cancer.
- May reduce the risk of hip fracture.

Benefits of breastfeeding for the family and community:

- Decreases absence in the workplace because of decreased family illness.
- Lowers expenditures for food and health care.
- Provides a safe food in emergency and disaster situations.
- Supports the environment, reducing use of fuels, pharmaceuticals, plastic, and waste from the dairy industry.

How does early initiation save lives?

- Colostrum (first milk) is rich in immune and non-immune components that fight infection and accelerate intestinal maturation.
- Promotion of warmth and protection may reduce risk of death from hypothermia.
- The alternative, prelacteal feeding, may disrupt normal physiologic gut priming.
- Earlier onset of ample milk production.
- Longer duration of breastfeeding.
- Improved mother/infant bonding.
- Decreased infant distress.
- Stronger uterine contractions that reduce uterine bleeding.

Recommended breastfeeding practices:

- Immediate skin-to-skin contact and early initiation of breastfeeding (within first hour after delivery).
- Breastfeed exclusively for 6 months.
- Continue breastfeeding to 24 months and beyond.

d. Essentials of Complementary Feeding:**Guiding Principles for Complementary Feeding of the Breastfed Child:**

1. Exclusive breastfeeding (EBF) for 6 months and introduction of complementary foods at 6 months.
2. Maintenance of BF for up to two years and beyond.
3. Responsive feeding.
4. Safe preparation and storage of complementary foods.
5. Adequate amount of complementary foods needed.
6. Appropriate food consistency.
7. Adequate meal frequency and energy density.
8. Adequate nutrient content.
9. Use of vitamin-mineral supplements or fortified products for infants and mother.
10. Increase feeding during illness and after illness (e.g. diarrhea).

e. Essentials of Nutrition for Women:

- Undernutrition – BMI < 18.5 kg/m² – Short stature (<145 cm).
- Overnutrition –
 - Overweight (BMI ≥ 25 kg/m²).
 - Obesity (BMI ≥ 30 kg/m²).
- Micronutrient deficiencies – Can co-exist with undernutrition and overnutrition.

Malnutrition in women and magnitude of the problem:

- Undernutrition:

– In most low-income countries, 10-19% adult women with BMI < 18.5 kg/m² (as high as 30-40% in some countries)

– Short stature (<145 cm): more than 10% of women in South Asia.

• **Overnutrition:**

– % of overweight women (BMI≥25) from ~ 30% to 38% in 2013 and a third of whom (297 million) are obese women (BMI≥30).

– Overweight and obesity has reached up to 70% in some countries in the Americas, Middle East and Pacific Islands and more than 40% in parts of Africa.

– Considerable increase in adolescent girls (22% overweight or obese in 2013).

Micronutrient deficiencies in women: (Widely prevalent in women during pre-pregnancy period and often exacerbated in pregnancy)

• Anaemia prevalence – About half of anaemia is due to iron deficiency – 29% in non-pregnant women (496 million) and 38% in pregnant women (32 million).

• Iodine deficiency disorders (IDD) – 28.5% (population wide based on urinary iodine concentration <100ug/L) – Pregnant women are also quite at risk of IDD but there is limited data on IDD in pregnant women.

• Vitamin A deficiency – 15.3% -19.1 million pregnant women (based on SR<0.70 umol/L)

• Zinc deficiency – 17.3% (population wide)

Causes of micronutrient deficiencies:

• Inadequate intake.

• Recurrent infections.

• Reproductive cycles – Menstruation – Repeated pregnancies.

Consequences of anaemia and iron deficiency:

• Maternal deaths – Anaemia during pregnancy is a risk factor for more than a quarter of maternal deaths.

• Low birth weight.

• Prematurity.

• Reduced transfer of iron to fetus.

• Neonatal mortality.

Vitamin A deficiency:

Causes Increased risk of:

- Night blindness in mothers.
- Low birth weight • Miscarriage.
- Stillbirth.
- Reduced transfer of Vitamin A to fetus.
- Low vitamin A concentration in breastmilk

Iodine deficiency disorders (IDD).

- Impairs thyroid function in women resulting in lower metabolic rate.
- Hampers brain development in children (Spectrum of intellectual impairment ranges from: (• Mild mental impairment • Severe mental impairment • Cretinism – Affects: • Concentration, cognitive function, and learning performance • School readiness • Underutilization of school facilities • Causes growth retardation & increased perinatal mortality.)

Consequences of other nutrient deficiencies:

- Folic acid deficiency – Low birth weight – Maternal anaemia – Neural tube defects (birth defects, brain defects).
- Calcium deficiency – Increases risk of pre-eclampsia.

Consequences of women's overnutrition:

Obese pregnant women (BMI >30): • 4x more likely to develop gestational diabetes • 2x more likely to have pre-eclampsia • Increased risk of maternal and infant death • More likely to delay or fail to lactate • Greater post-partum weight retention after birth • Obese mothers have more risks to have obese children. {Overweight and obesity are increasing in all regions}.

f. Birth spacing, and fewer pregnancies affect maternal and child nutrition outcomes:

- Short birth spacing (conception <6 month after previous birth) – 30% increased risk for small-for-gestational-age baby – 80-100% increased risk for preterm birth and LBW – Increased risk of maternal nutrient depletion and higher probability of maternal anaemia (32%).
- Multiple pregnancies and birth order – 50.5 % of children with birth order of 6+ were stunted
- Appropriate intervals between pregnancies – WHO (2005) recommends that after a live birth, the recommended interval before attempting the next pregnancy is at least 24 months in order to reduce the risk of adverse maternal, perinatal and infant outcomes.

Maternal nutrition interventions and birth outcomes:

- Folic acid supplementation – reduces risks of neural tube defect and improves mean birth weight
- Iron supplementation – 19% reduction of low birth weight; improves birth weight; 67% reduction in iron deficiency anemia at term
- Multiple micronutrient supplementation – reduced risks (9-12%) of low birth weight, stillbirth compared to iron-folic acid supplementation.
- Balanced protein energy supplements (particularly for malnourished women) – reduced incidence of small-for-gestational age by 32%-34% and increased birthweight. Calcium supplementation – effect is mostly on reduction of gestational hypertension (incidence reduced by 35%) and pre-eclampsia (52%).
- Salt iodization – effect on brain development.

g. Key direct nutrition interventions to prioritize to improve maternal nutrition:

1. Assessment and counselling on optimal diet during pregnancy & lactation.
2. Regular weighing to monitor weight gain; using BMI (or mid-upper arm circumference (MUAC)) for undernutrition and overnutrition screening.
3. Therapeutic and supplementary feeding for undernourished pregnant & lactating women.
4. Energy supplements targeted to specific population groups if required (e.g. high prevalence of low BMI).

5. Supplementation with iron-folic acid or MMS as early as possible during pregnancy.
6. Use of iodized salt.
7. Supplementation with calcium where required.

h. Common challenges in implementation of nutrition interventions for women:

- Overall, low awareness about the importance of nutrition for women.
- Most of the recommendations are based on well-designed studies in controlled settings.
- Health service coverage is low, and this is where many of the nutrition interventions need to be delivered.
- Women come late during pregnancy and even more difficult to reach before pregnancy.
- Lack of capacity to support.
- Lack of supplies for all women in need.

I. Comprehensive IYCF Programming:

National strategic planning process for IYCF:

1. ADVOCACY & COORDINATION/ PARTNERSHIP.
2. SITUATION ANALYSIS.
3. POLICY.
4. IYCF STRATEGY.
5. OPPORTUNITIES FOR INTEGRATION.
6. PLANNING.
7. IMPLEMENTATION & MONITORING; REVIEW & EVALUATION.

j. Selected Interventions for Improving Breastfeeding:

Breastfeeding indicators:

- Children ever breastfed: children born in the last 24 months who were ever breastfed.
- Children breastfeeding at 2 years: proportion of children 20-23m of age who received breastmilk the previous day.
- Age-appropriate breastfeeding: proportion of children 0-23m who are appropriately breastfed (combination of EBF and continued BF with CF).
- Predominant breastfeeding: proportion of infants 0-5m of age who received breastmilk as the predominant source of nourishment the previous day (they may also receive other fluids such as water, juice, but not other milk or foods).

- Duration of breastfeeding: median duration of breastfeeding among children less than 36m of age.

k. Improving maternity BF practices:

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staffs in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants
6. Give newborn infants no food or drink other than breastmilk unless medically indicated.
7. Practice rooming in - allow mothers and infants to remain together - 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

