Summer Training Report

By

Dr. Nanda Kumar KN

MBA Hospital and Health Management

2019-2021

ACKNOWLEDGEMENT

An effort over a period can be successful only with the advice and support of well-wishers. I take this opportunity to express my gratitude and appreciation to all those who encouraged me to complete this project.

I would like to extend my deep gratitude to my mentor **Dr. Susmit Jain**, Associate Professor, IIHMR University, Jaipur. I am greatly thankful to him for providing his valuable advice and guidance at all stages of the study. His positive, supportive attitude and continuous encouragement, without which it would not have been possible to complete this project report.

I express my sage sense of gratitude and indebtedness to **Dr. P.R Sodani**, Pro President and Dean IIHMR University, Jaipur.

I would like to present Sincere thanks to my friends, NGO workers and Kerala government health professionals sparing their valuable time during the pandemic by providing relevant information.

I hope that I can build upon the knowledge and information that I have gained and make a valuable contribution in building up our nation and providing important knowledge to the people of Kerala.

Dr. Nanda Kumar K N
MBA /HM -24

Table of Contents

List of Figures

List of Tables

Abbreviations

ASHA – Accredited Social Health Activist

AYUSH – Ayurveda, Yoga and naturopathy, Unani, Siddha and Homeopathy

CI – Confidence Interval

COVID-19 – Corona Virus Disease 2019

DHS – Directorate of Health Services

GoK – Government of Kerala

KITE – Kerala Infrastructure and Technology for Education

MOE – Margin of Error

MoHFW – Ministry of Health and Family Welfare

Ms Excel – Microsoft Excel

NGO – Non Governmental Organization

NHM – National Health Mission

PPE – Personal Protective Equipment

SARS – Severe Acute Respiratory Syndrome

SMS – Short Message Service

UNICEF – United Nations International Children's Emergency Fund

WHO – World Health Organization

Part 1

Research Topic: A Survey on Knowledge and Attitude on Novel Corona Virus (COVID-19) in Kerala

CHAPTER ONE

1.1) INTRODUCTION

The Novel Corona Virus (COVID-19) had started from Wuhan province, China in December 2019(Holshue et al). A pneumonia cluster of unknown cause was found in these regions. The World Health Organisation (WHO) and Chinese health agencies tried to figure out and they found it as SARS CoV 2. The WHO has declared the outbreak as Public Health Emergency of International Concern on 30th January 2020(WHO). On 11th February, 2020 the WHO has announced a new name for the outbreak as COVID-19(WHO). On 11th March, the WHO has declared COVID-19 as a pandemic as it had already been infected in more than 114 countries (WHO).

In India the first case of COVID-19 appeared at Kerala's Thrissur district on 30th January 2020. The total number of affected cases in India as per 21st June, 2020 were 4,11,826 and 13,254 deaths in total (MoHFW). On 21st June, 2020, In Kerala, the total affected cases were 3039 and the deceased were 21 (MoHFW). In the month of March and April, Kerala had the most number of cases being recorded but due to the efficient health system the cases were controlled to high extent. A lot of studies were conducted regarding the type of virus and found that there were a lot of similarities between SARS and COVID-19. There was a rise in the anxiety and panic attack among the common people. Early measures were taken in Kerala like social distancing and enhancement of awareness among the public. In the month of February, the Government of Kerala (GoK) advised the Tourism and the health department for making matrices for the patient grid who are being diagnosed with the disease (GoK-DHS). In 22nd March 2020, guidelines were released in regarding the functioning of saloons, shopping malls, markets, laboratories, dental clinics where the usual public gatherings would happen.

The phase of lockdown then had made a huge break in all essential goods, services, the economic clock, transportation, education. A majority of Kerala's population lives outside India. When sudden lockdown came into effect, the fear grew into a high level in

people for safety in the future days. Before the lockdown started, some people managed to reach back into Kerala and the others who could not, halted outside in fear of growing deaths all across the world. In the beginning it was very hard for everyone in the state to accept the pandemic. The economic impacts, the mental happiness and the perception of people changed to grim. With the case fatality ratio (mortality) 0.69% in Kerala, it is much less when comparing to the whole India (3.23%) (MoHFW). For that the Government of Kerala worked very hard to spread the awareness among the people in social distancing, usage of PPEs and reduction in the anxiety issues. But the recent opening of the lockdown has made tremendous increase in the number of cases which are coming from out and within the state. Along with these cases, there are internal spreading between the people which is untraceable. All these are continuously increasing the concern and stigma among people. These issues can be solved by promoting more knowledge and change in their attitude towards the pandemic.

The knowledge regarding to spread of the corona virus, symptoms of the illness, availability of vaccines, essentiality of hand wash, importance of hand hygiene and attitudes regarding social distancing, acceptance of recovered patients in society, need for travelling, belief of control over COVID-19 and self isolation among the people of Kerala are the most important factor which helps the public to follow the measures for personal protection and for the protection of the society. Considering all the above factors, it is highly important to carry out a research to understand the current level of knowledge and attitude of population in Kerala towards COVID-19.

1.2) SCOPE OF RESEARCH

The research was carried out to define how the people of Kerala view the Pandemic situation. Instead of having fear due to lockdown and false concepts about the pandemic, the people must have enough knowledge towards this pandemic like how to be safe, how to keep the society safe by abiding all laws. They should take this situation in utmost seriousness and with all the precautions in mind which the Health department of Kerala and WHO gives. The Government of Kerala is doing its part smoothly but still effectiveness is not as expected. In addition, all techniques are also being suggested for the betterment for the enhancement of the knowledge on COVID-19 among people. For

conducting the study, certain tools were considered like help of online questionnaire and online search engines.

1.3) RESEARCH OBJECTIVES:

- To assess the Knowledge regarding COVID-19 disease spread, source of information, symptoms, availability of vaccines and hand hygiene in Kerala.
- To check the Attitudes towards social distancing of the people, towards usage of sanitizer and face masks and towards the belief of control of the disease in Kerala.
- To suggest the measures for improving the knowledge of COVID-19 among people of Kerala.

1.4) RESEARCH QUESTION:

- What is the Knowledge of the people regarding the COVID-19 disease spread, symptoms, availability of vaccines, source of information and hand hygiene in Kerala?
- What is the Attitude of the people regarding the use of sanitizers and face masks, social distancing and belief of control of the disease in Kerala?
- What are the measures to be taken to improve the knowledge of COVID-19 among people of Kerala?

CHAPTER TWO

METHODOLOGY:

2.1) STUDY DESIGN: Descriptive Cross-Sectional Study

2.2) SETTING: General Population of Kerala

2.3) DURATION OF THE STUDY: 30th April 2020 to 30th May 2020

2.4) SAMPLING METHOD: Convenient Sampling.

2.5) SAMPLE SIZE: Using the total population of Kerala, 95% CI and 5% Margin of Error,

Sample size $= z^2 p q/d^2$ where z = 1.96, p = 0.5(assuming 50% of the population has the knowledge), q =1-p and d = 0.05. By using the above formula, the sample size came out to be **384**. The total responses were **416**, which was above the desired sample size.

2.6) DATA COLLECTION TOOL:

Primary data was collected using Google form.

The research was divided into four sections (Demographic part, Knowledge part, Attitude part, Enhancement of Knowledge part). The Demographic part has variables like age group, gender, religion, education level, work experience and the district of residence in Kerala. In the Knowledge part, the questions included about the source of information about the COVID-19 news the respondent gets, the symptoms this virus can cause, the way of spread in an individual and the community like questions. In Attitude part the questions included issues mainly on social distancing and its effect on disease spread, about travelling to other places at that point of time, social acceptance for those people who were infected before and then recovered, related to self isolation when having such symptoms, whether face masks and sanitizers were being followed or not, the response of the person when any of their family member getting affected by COVID-19 and whether the pandemic will subside or not.

2.7) ETHICAL CONSIDERATIONS:

Here all the participants were informed prior about the voluntary participation. Along with the questionnaire, an ethical consent had also been forwarded to all the participants. The purpose of this survey had been mentioned prior to all the participants. Furthermore no questions were asked based on any issues which can cause mental morale down of the participants. Also it was made sure that at any point of time, the participant can quit the survey if not feeling comfortable. All the responses had kept confidential and the anonymity of the data had been preserved.

CHAPTER THREE

3.1) DATA ANALYSIS

An online survey was conducted on knowledge and attitude towards COVID-19 on people of Kerala. A total of 416 responses were collected. All the participants were from various districts of Kerala and all districts were covered in the survey. The raw data was entered into Ms Excel spreadsheet for further analysis.

Data from the online questionnaire were analyzed under four categories

1) Part – 1 Demographic Analysis Part
2) Part – 2 Knowledge about COVID-19
3) Part – 3 Attitude towards COVID-19
4) Part – 4 Measures to enhance the Knowledge of COVID-19 among Kerala Population.

3.2) PART 1 – DEMOGRAPHIC ANALYSIS

Number of Responses from each District in Kerala

Districts	Number of Responses
Kannur	92
Ernakulam	50
Kozhikkode	36
Malappuram	34
Thrissur	29
Thiruvananthapuram	27
Pathanamthitta	26
Palakkad	24
Kottayam	23
Kasaragod	21
Wayanad	18
Alappuzha	18
Kollam	12
Idukki	6

N = 416

Table 1: Number of Responses from Each District of Kerala

Age Wise Distribution of Respondents

Age (years)	Less than 17	18 – 35	36 - 58	59 -70	71 and above
Number of Respondents	19	154	143	68	32

Table 2: Age Wise Distribution of Respondents

Interpretation: In the age wise distribution, all the age groups were covered. It was observed that **37%** of the respondents belong to age group 18 – 35 years. **34.4%** of the respondents belong to 36 -58 years. The age group 59 – 70 years had **16.3%.** The extreme age group of 71 and above and less than 17 had **7.7%** and **4.6%** respectively.

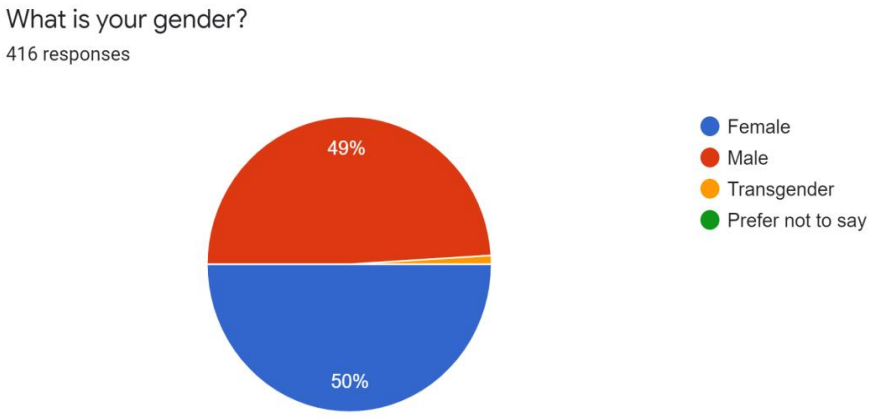

Figure 1: Pie Chart showing gender distribution

Interpretation: In gender, females responded **50% (208)** whereas males responded **49% (204)** and transgenders has responded 1% (4).

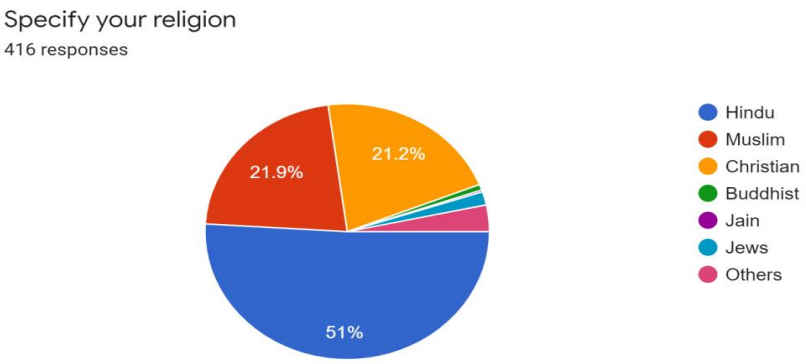

Figure 2: Pie Chart showing Religion of respondents

Interpretation: When coming to religion, with **51% (212),** Hindus have responded the most then **21.9% (91)** Muslims and then with **21.2% (88)** Christians have responded among the majority. People belonging to Jews responded to **1.7% (7),** Buddhist with **0.7% (3),** Jain with **0.2% (1)** and other minority religions with **3.4% (14).**

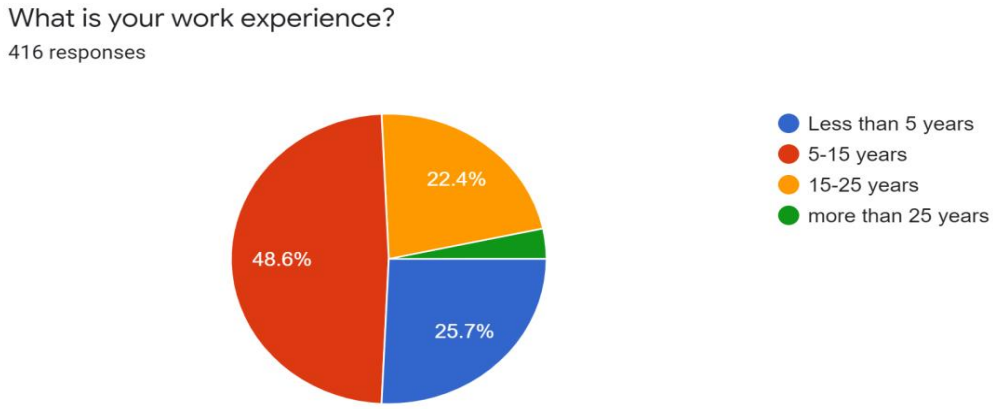

Figure 3: Pie Chart showing work experience

Interpretation: About **48.6% (202)** are having 5 – 15 years of work experience. **22.4% (93)** were having 15 – 25 years of work experience. **25.7% (107)** were having less than 5 years of work experience (this included people with no experience at all). **3.4% (14)** were having work experience of more than 25 years.

Respondents' Educational Level

Educational Level	High School	Diploma	Masters	Associate or Bachelors	Doctorates
Number of Respondents	36	75	95	205	5

Table 3: Respondents' Educational Level

Interpretation: Here about **49.3%** involved the Bachelor as well as associates. **22.8%** were acquired with Masters degree. **18%** were diploma holders. **8.7%** were with the smallest group which is high school and **1.2%** was with doctorates group. The uneducated category was not included since they might face the difficulty in reading and understanding the e-questionnaire.

3.3) PART 2 - KNOWLEDGE ON COVID-19

The Knowledge part involved questions related to COVID-19 and its spread which any citizen should know to prevent the disease transmission and remain safe.

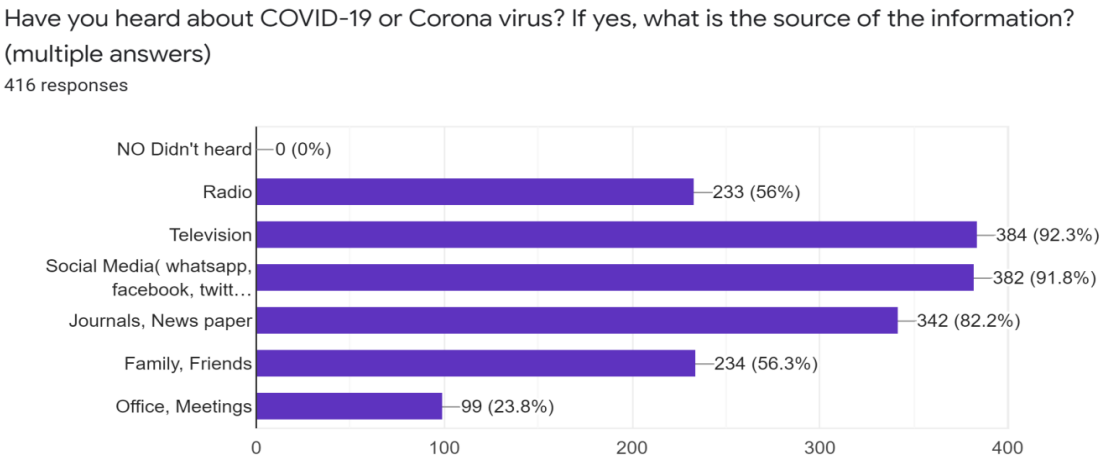

Figure 4: Bar graph showing Information source

Interpretation: The question regarding source of information was in multiple choices where more than one answers can be possible. About **91.8% (382)** had said that through Social media like Whatsapp, Facebook, Twitter etc**. 92.3% (384)** marked television as the mode. **82.2% (342)** marked as news papers and journals. **56.3% (234)** got through their family and friends. **56% (233)** got the information through Radio. **23.8% (99)** selected through office meetings.

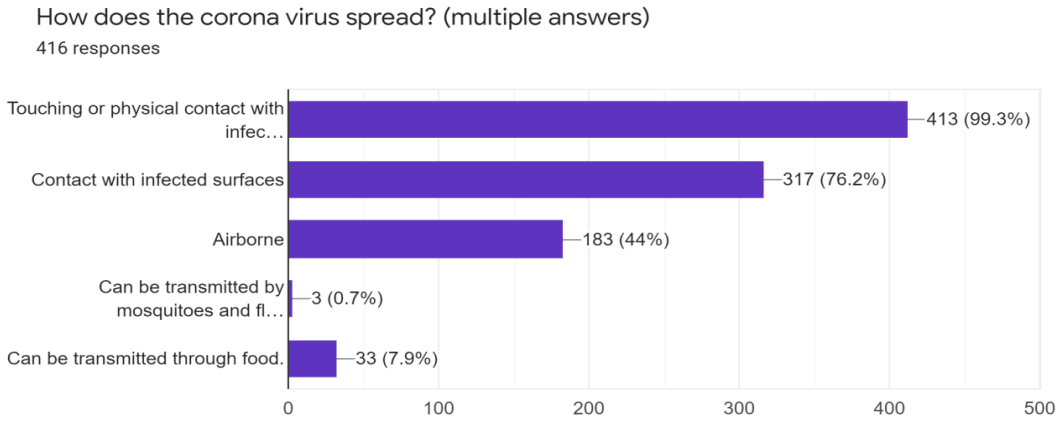

Figure 5: Bar graph showing spread of COVID-19

Interpretation: Coming on to the spread of COVID-19, here **99.3% (413)** selected spread of COVID-19 is through Touch and physical contact. **76.2% (317)** people supported that it can spread through having contact with infected surfaces. About **44% (183)** marked as airborne disease. **7.9% (33)** marked as can be transmitted through food, and **0.7% (3)** had the false belief of disease can be transmitted through mosquitoes and flies.

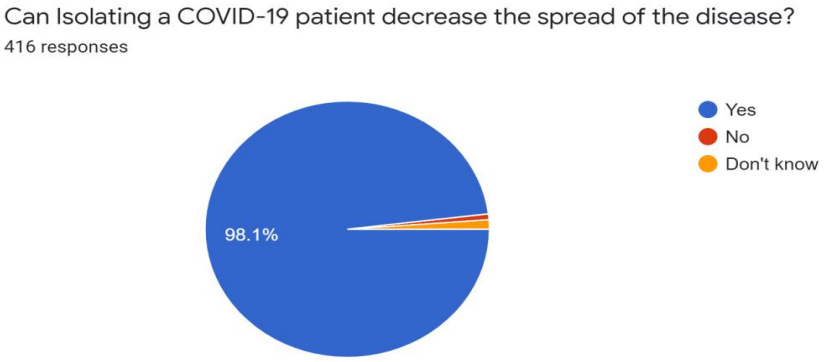

Figure 6: Pie chart showing importance of Isolation

Interpretation: About **98.1% (408)** had chosen that by isolating, spread of COVID-19 can be prevented. About **1.2% (5)** selected don't know and **0.7% (3)** marked No and isolation will not help.

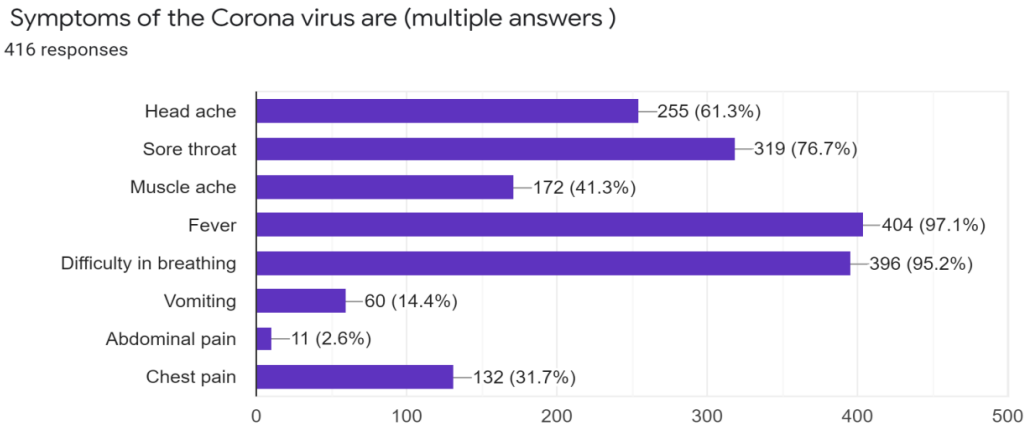

Figure 7: Bar graph showing symptoms of corona virus infection

When coming onto the symptoms, about **97.1% (404)** people marked fever. **95.2% (396)** had difficulty in breathing as a symptom of COVID-19. **76.7% (319)** marked sore throat

also as symptom. **61.3% (255)** had marked head ache. **41.3% (172)** marked muscle ache as a symptom. About **14.4% (60)** had chosen vomiting also as a symptom. **31.7% (132)** had chosen chest pain also and **2.6% (11)** had chosen abdominal pain also as a related symptom.

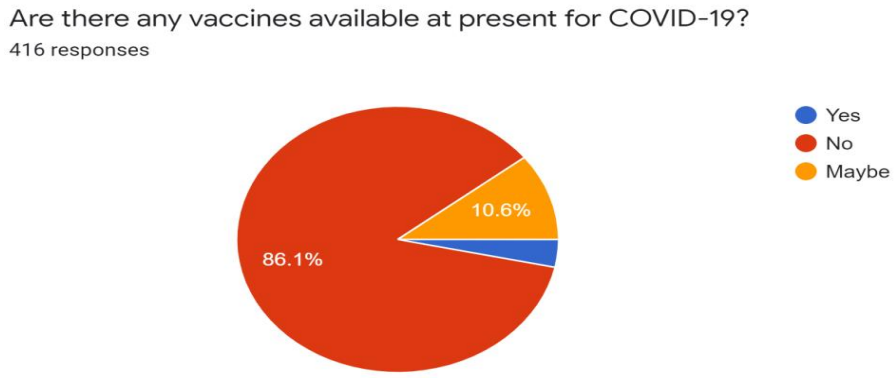

Figure 8: Pie chart showing vaccine availability

Interpretation: When considering the availability of vaccines, about **86.1% (358)** people had chosen that there are no vaccines for COVID-19 till this time. About **10.6% (44)** respondents had marked there might be vaccine present and they do not know about it. **3.4% (14)** had marked that there are vaccines for COVID-19.

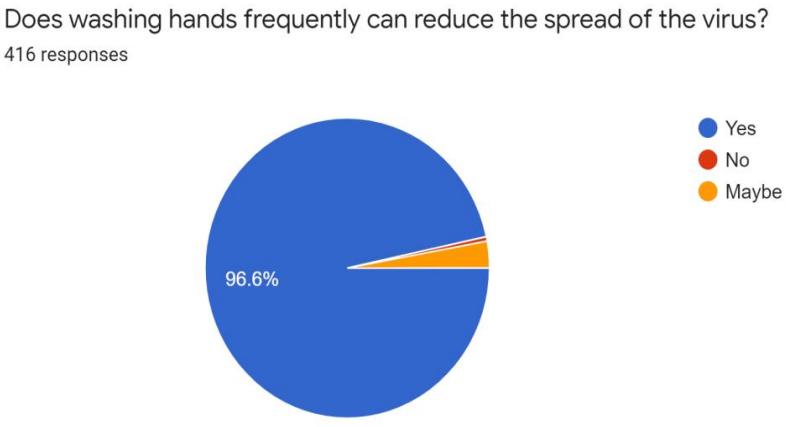

Figure 9: Pie chart showing importance of hand washing

Interpretation: When the essentiality of Hand washing was considered, about **96.6% (402)** had chosen that it is important. **2.9% (12)** had marked they do not know about importance of hand washing and **0.5% (2)** had selected that hand washing is not important.

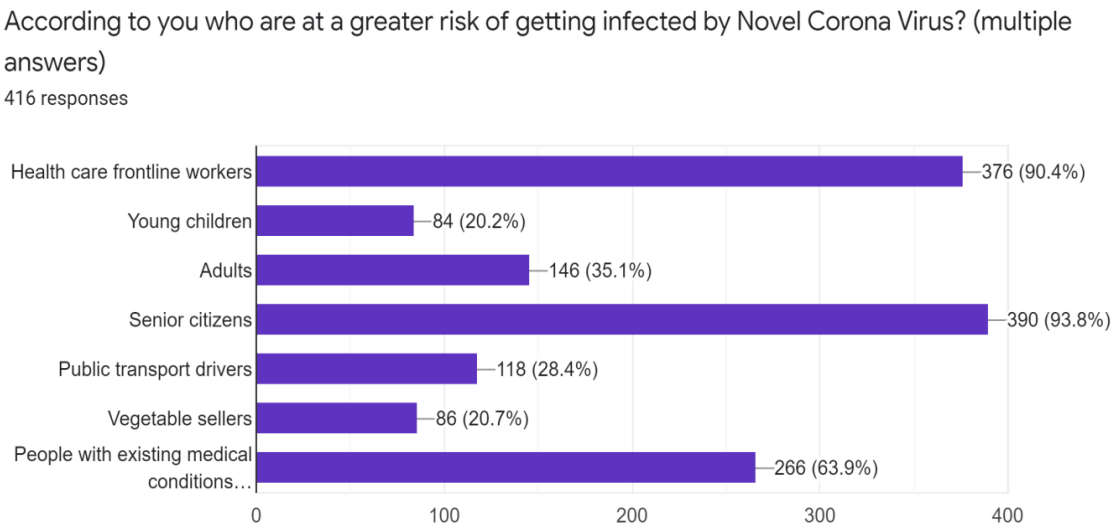

Figure 10: Bar graph showing risk prone categories

Interpretation: Next question considering the people who are at high risk. About **93.8% (390)** people had chosen as senior citizens are more prone. **90.4% (376)** had responded that all health care frontline workers were prone to infection. **63.9% (266)** had responded that people with major health issues and other medical conditions were more prone. **35.1% (146)** marked as adults. **28.4% (118)** had marked as public transport drivers. Also **20.7% (86)** people responded as vegetable seller and **20.2% (84)** respondents had chosen young children also.

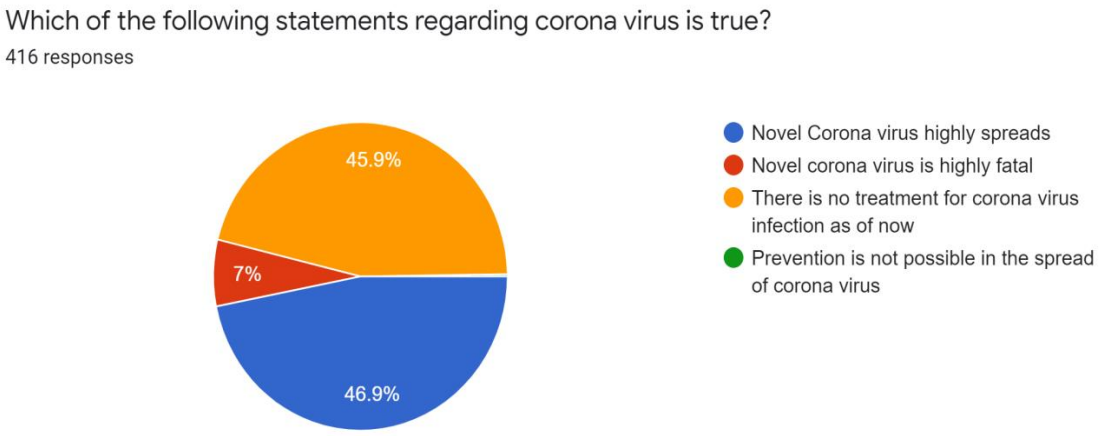

Figure 11: Pie chart showing responses on COVID-19

The next question was regarding COVID-19 generally. Here four sentences were listed out of which any one suitable is marked. About **46.9% (195)** had chosen that COVID-19 highly spreads. **45.9% (191)** marked that COVID-19 has no treatment as of now and **7% (29)** selected that COVID-19 is highly fatal.

3.4) PART 3 - ATTITUDE TOWARDS COVID-19

The Attitude towards COVID-19 part had questions to understand what people's frame of mind towards the disease spread is and how they will react upon a situation when they themselves or their family members if getting infected by the disease. The questions will help us to identify whether a positive or negative attitude is there towards the disease. The attitude is very important since it helps in people to follow up required instructions for the individual as well as the community well being.

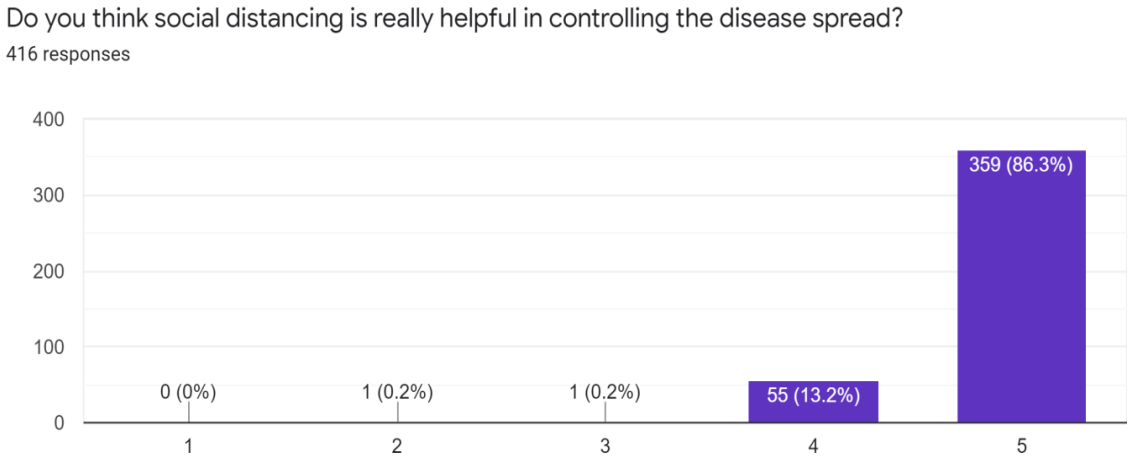

Figure 12: Column chart showing importance of social distancing

Interpretation: Regarding the social distancing, here five point likert scales is used with left as extremely no and right as extremely yes. About **86.3% (359)** respondents had chosen extremely yes for the benefit of social distancing in the spread of the disease. **13.2% (55)** people had marked as yes for the same question. **0.2% (1)** respondent had chosen to be neither yes nor no. **0.2% (1)** respondent marked no.

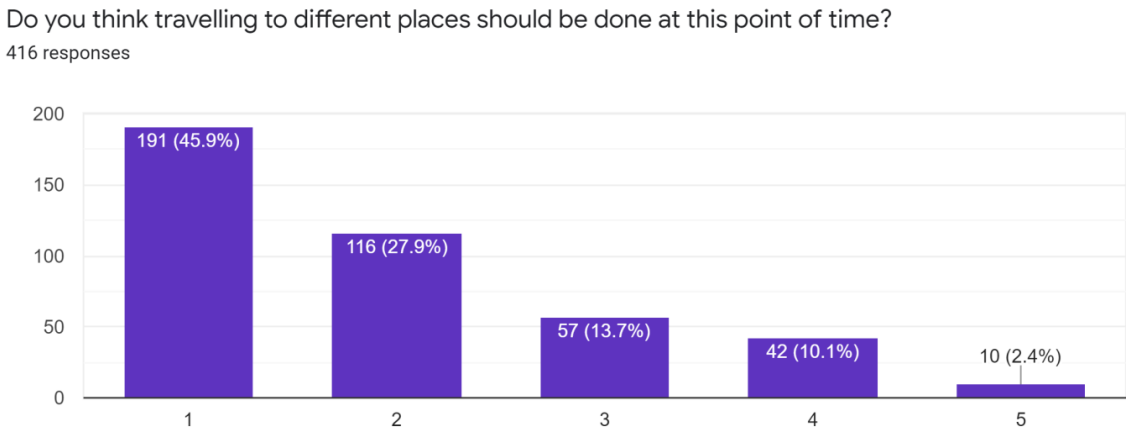

Figure 13: Column chart showing travel during pandemic situation

Interpretation: When attitude towards travelling was considered, here most of the people **45.9% (191)** had chosen that they extremely are not in support of travelling during COVID-19. **27.9% (116)** had selected no to the travelling. About **13.7% (57)** were with neither yes nor no. Very few **10.1% (42)** and **2.4% (10)** supported for travelling.

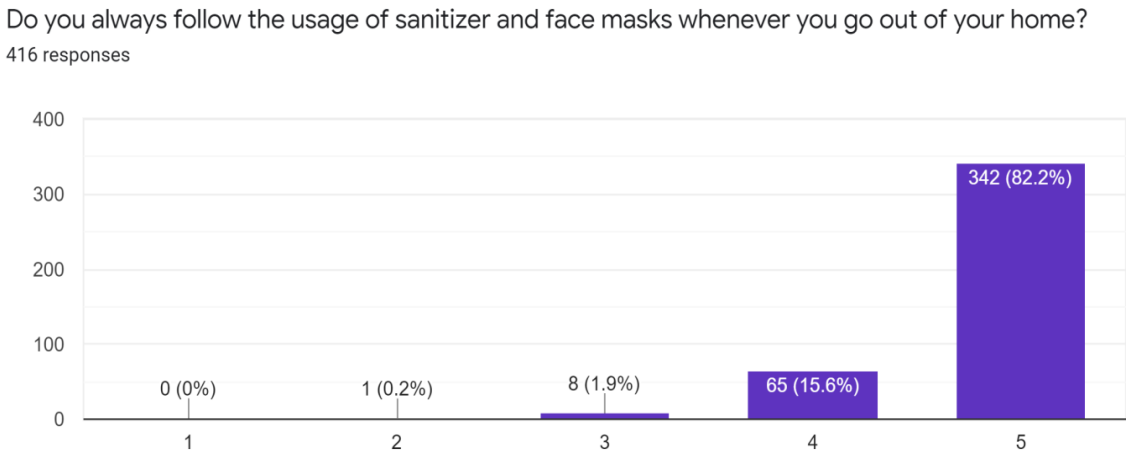

Figure 14: Column chart showing importance of sanitizer and face mask.

Interpretation: The attitude towards usage of Sanitizer and face masks are as about **82.2% (342)** respondents had marked extremely yes in the usage of sanitizer and face masks. **15.6% (65)** respondents had chosen yes. **1.9% (8)** people marked neither yes nor no and **0.2% (1)** had responded to no.

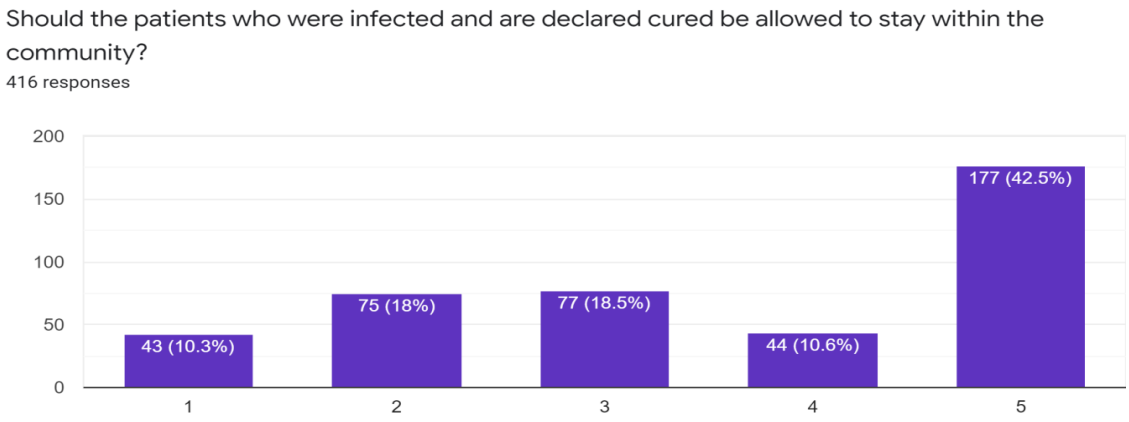

Figure 15: Column chart showing social acceptance of recovered people

Interpretation: Most of the people were in support of social acceptance of the recovered people, about **42.5% (177)** marked as extremely yes, **10.6% (44)** people supported marking on yes. **18.5% (77)** people marked on neither yes nor no. About **18% (75)** and **10.3% (43)** had chosen not to support the recovered patients with no and extremely no respectively.

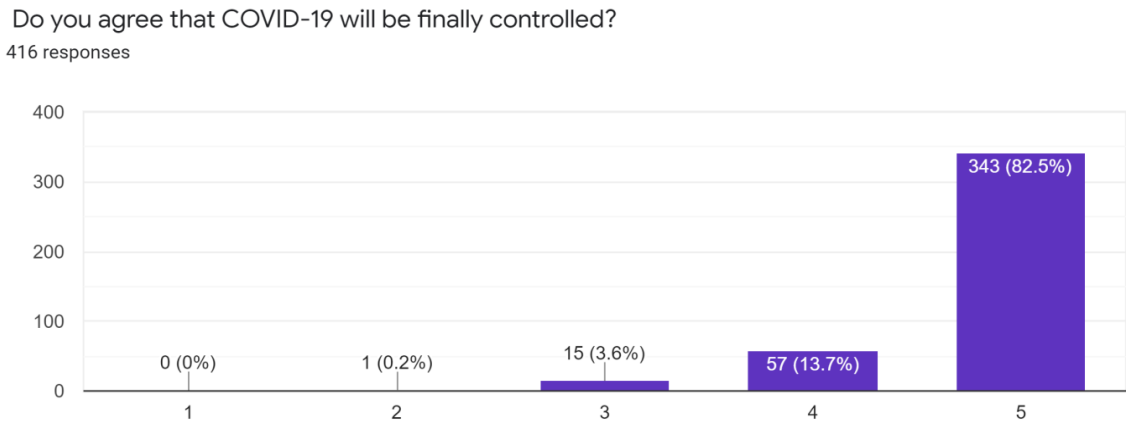

Figure 16: Column chart showing the belief among people regarding COVID-19 control

Interpretation: When coming to the belief of COVID-19 getting control, here about **82.5% (343)** had full belief of getting control whereas, **13.7% (57)** people had marked yes and with **3.6% (15)** and **0.2% (1)** had marked with no belief of control from COVID-19.

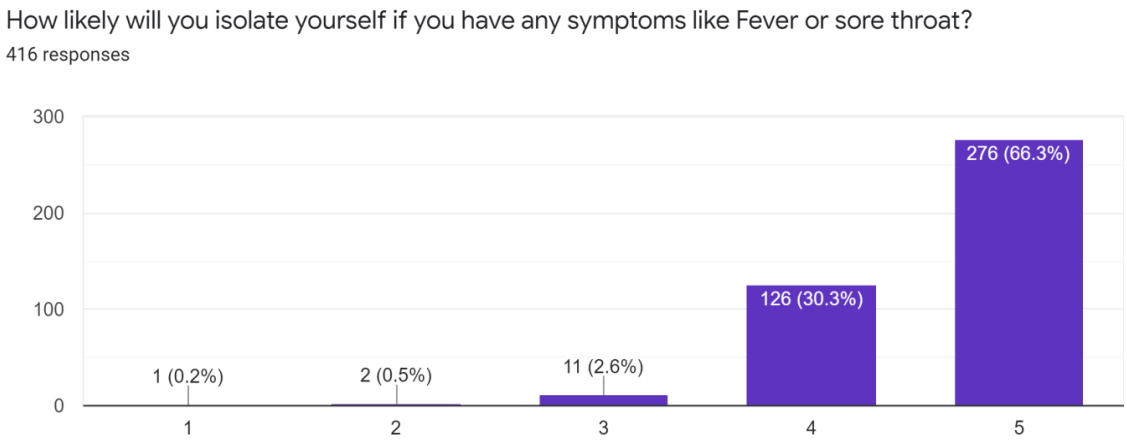

Figure 17: Column chart showing readiness of self isolation during emergency

Interpretation: Considering the attitude towards self isolation, most respondents were in support. About **66.3% (276)** people had chosen extremely yes, **30.3% (126**) had also supported by selecting yes. **2.6% (71)** had chosen neither yes nor no. **0.5% (2)** and **0.2% (1)** were not in support of self isolation and had selected no and extremely no respectively.

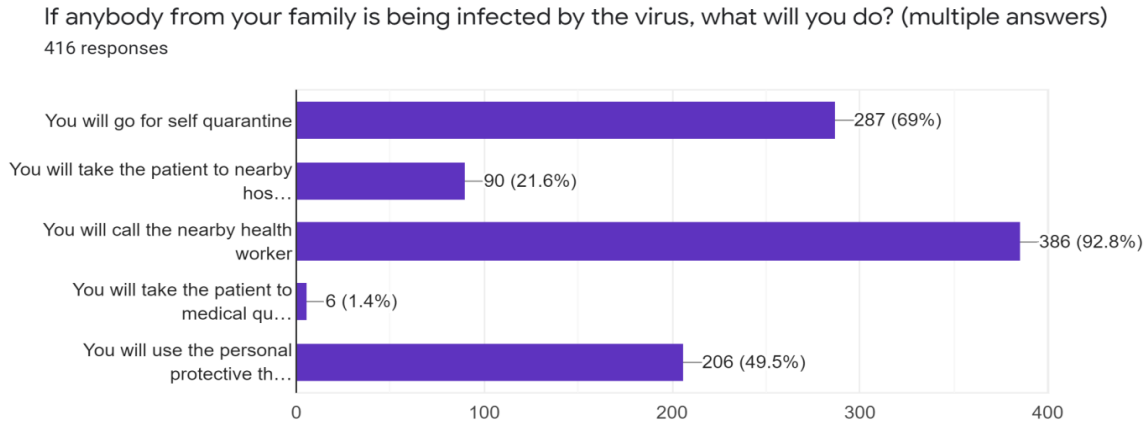

Figure 18: Bar chart showing response to hypothetical situation

Interpretation: The next question was with the hypothetical situation where respondent's family member is diagnosed with COVID-19. About **92.8% (386)** supported to call the nearby health worker. **69% (287)** respondents had chosen to take up self quarantine also. **49.5% (206)** people had selected to use of the personal protective things. **21.6% (90)** had

accepted to take the patient to nearby hospital and **1.4% (6)** had selected to show the patient to quacks.

3.4.1) Five Point Likert Scale Analyses for Attitude towards COVID-19

Questions	Strongly disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Total	Mean Value
Need of social distancing.	0	1	1	55	359	416	4.85
Need for travelling.	191	116	57	42	10	416	1.95
Social Acceptance of recovered Patients.	43	75	77	44	177	416	3.57
Need for self isolation.	1	2	11	126	276	416	4.62
Importance of sanitizer and masks.	0	1	8	65	342	416	4.79
Belief of Control over the COVID-19	0	1	15	57	343	416	4.78

Table 4: Analysis of People's 'Attitude towards COVID-19' part

Interpretation: The issues which are directly related to the attitude part of the people are included here. The means were calculated accordingly which gave us the most number of responses areas. The first mean of need for social distancing was *4.85* which were closer to 5. Thus it is in between *Strongly Agree* and *Agree*. The question of whether travelling should be allowed or not had a mean of *1.9*. In the social acceptance of already recovered patients, a mean of *3.57* was seen here, most of the people are in between agree and neither agree nor disagree. In the next question of preference of self isolation in presence of any symptoms, mean of *4.62* was seen. Here most of the people were in great support for self isolation during any symptoms. In the usage of sanitizers and face masks, a mean of *4.79* was seen depicting that a good number of the target population were in large support of usage of the masks and sanitizers. In the belief of controlling the COVID-19 fully, *4.78* were seen here again depicting that people having strong belief of fully controlling the pandemic.

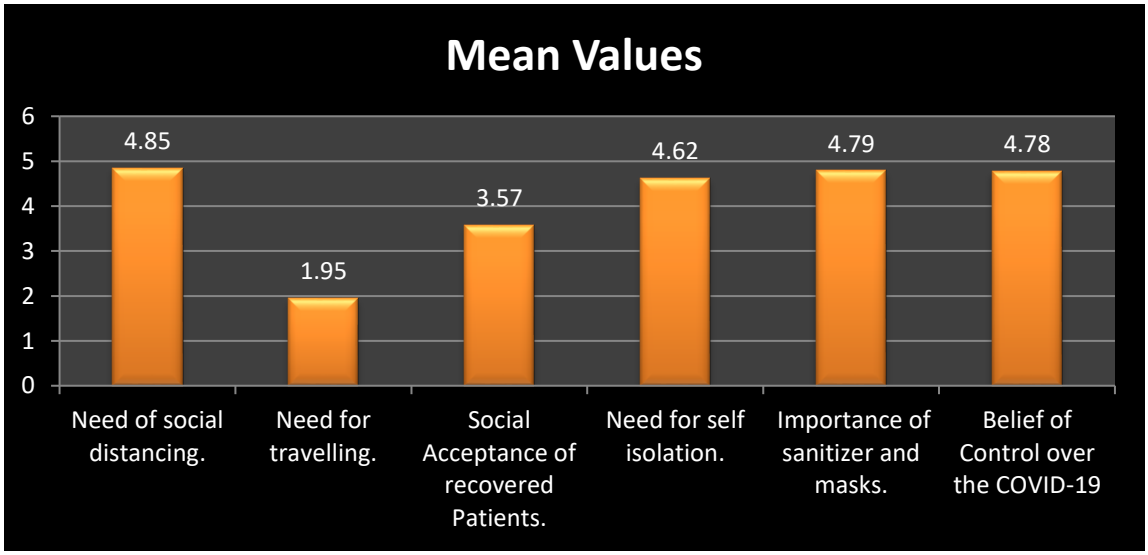

Figure 19: Bar Chart showing comparison of different means

Interpretation: A total of six questions were asked and means were calculated as above. The highest value is for Importance of sanitizer and masks with **4.79** and next is the belief that COVID-19 will be controlled with a mean of **4.78**. Here need for travelling is even though having very small mean of **1.95** but that answer is a positive one implying it should be having low mean. The other questions come in between these range.

3.5) PART – 4 ENHANCING KNOWLEDGE ABOUT COVID-19 IN KERALA POPULATION

For the effective and efficient public, it is highly required that enhancement of the knowledge about the pandemic should be well updated and preserved. As awareness of each individual increases, it directly affects the community by reducing the spread, causing less chaos. The following are some suggestions which were taken from Government of Kerala – DHS (Directorate of Health Services) and MoHFW which may be used.

3.5.1) Suggestions for Individual Awareness

- Each individual in the state may use the information displayed in websites like WHO(Facebook, Twitter, Instagram), UNICEF(Facebook, Twitter, Instagram), DHS(Kerala)
- The valuable messages based on COVID-19 from UNICEF, WHO, MoHFW and GoK may be shared to all other people.
- Each individual could be getting registered in Aarogya Setu application by MoHFW for getting knowledge and to identify whether each individual is at safe locality or not.
- There are online COVID-19 classes and quizzes available under WHO, MoHFW, Ministry of AYUSH, NHM Thiruvanathapuram which when attended properly will help other people regarding enhancement of knowledge.
- The people who are not that active on social media and with poor internet service, they can use the newspapers, supplementary health magazines for getting up to date news.
- The checklist given by various health organisations in Kerala, India and around the world so that activities can be easily checked by individual.

3.5.2) Suggestions for Community Awareness

- ASHA workers, who are given proper training and charge of particular ward should be efficiently working. Proper sharing of information to people residing

and should take necessary steps that will help the higher authorities to get proper information (local).

- The social media where one can share important information like hand washing, face mask designing, and boosting up the morale of the depressed may be done using live videos. Use dance, painting, poetry and short films to spread awareness.
- The usage of fun and humour may be used as a technique to spread information. For example corona virus shaped helmets used by traffic police and health workers and going to local people's home.
- Drones may be used to spread the information to people residing in the containment zones where high chances of disease spread are there for health workers.
- Posters and banners may be used by health workers and other political parties to spread dos and don'ts during this period and enhance their knowledge.
- For the community needs, setting up the virtual activity with friends or neighbours to show solidarity and support during the crisis. Getting registered in any NGO and can spread awareness to the deprived people who are poor and are most affected.

The Kerala state health department had already done a lot of strategies for the enhancement of the knowledge among the population. Already the government has given guidelines to the media in reporting about the virus related information and has deployed police teams to provide information to the common people as much as possible.*(Indiatoday)

Another measure which has already been taken by the government is the use of 'GoK Direct' mobile application, which in the first 48hours, had 2 lakh downloads. The application gave details about medical dos and don'ts, all government orders and notices, helpline numbers, updates from WHO*(Indiatoday) . The link of the application is given in the reference.

Under the Govt of Kerala, the education department has prepared a nine and half minutes long video on the corona virus in the government schools and government aided schools, it has helped in the increasing of awareness among teachers and students. It also aimed at awareness of myths regarding the corona virus among

students and teachers. The video was run with the help of KITE (Kerala Infrastructure and Technology for Education).*(Edexlive) . The usage of latest robotic technology has been a good way to spread awareness among the public. Usage of robots (Asimov Robotics) with face masks and hand sanitizers in Kochi.*(Business Standard)

Also by the GoK Government of Kerala under the Information and Public Relations Department has started SMS alert system by giving a missed call in 830 220 1133.*(Times of India)

The Kerala Police with the usage of a folk song to dance for highlighting the importance of hand washing*(The Print) . And the Kerala Government has also started 'Mid day Meals' to homes with nursery class students. And the government school students had made videos to spread awareness about the do's and don'ts.*(Livemint)

The Kerala's traditional dance forms like '*Ottam Thullal*' artists had been performing to give the awareness about the COVID-19s do's and don'ts. This had occurred in the Palakkad district of Kerala.

The Kerala Police had also used the 'Tracer Bullet Challenge' where the usage of drones to check out the efficiency of all of the Lockdown. This is for watching the common public and any sort of violators of Law using drones.

CHAPTER FOUR

4.1) CONCLUSION

During this Novel Corona virus pandemic (COVID-19), most of the educated people of Kerala are well aware of this infection. The attitude towards the pandemic is taken as a serious thing by the Kerala government and its public. The knowledge among people about the basic preventive measures, spread of the virus, symptoms, use of sanitizer and face mask, knowledge of greater risk communities and availability of vaccines are quite convincing. Based on the analysis of their attitude part about social distancing, travel restrictions, belief of control over COVID-19, how to handle when an infected case happens in their family are also depicting a positive attitude which is needed in this situation. The suggestions for the enhancement of the awareness about COVID-19 already initiated by the GoK are also helping the state's population and health team in tracing the problem. However, the present COVID-19 pandemic is still rising in Kerala. There is a need to intensify knowledge and attitude towards the disease which will further help in decreasing the individual related confusions about the disease and the community spread. Although there were a few studies which already took place regarding the knowledge and attitude of public regarding the pandemic, but there are no studies yet regarding the study on knowledge, attitude of public of Kerala. Thus, it is always important to study theses attributes in not only Kerala but all states' diverse population for betterment.

4.2) LIMITATIONS

The main limitation of this study is that it is conducted with that group of people who are having access to internet and social media. Also this study is pertained to those people who are having a good grip in English language thus depicting that study done with the educated group of people.

References

1) Deblina Roy, Sarvodaya Tripathy, Sujita Kumar Kar, Nivedita Sharma, Sudhir Kumar Verma and Vikas Kaushal. Study of Knowledge, attitude,anxiety and perceived mental healthcare need in Indian Population during COVID-19 pandemic[Internet], 2020 April 8[cited 2020 April 29]: Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7139237/*

2) Bao Liang Zhong, Wei Luo, Hai- Mei Li, Qian-Qian Zhang, Xiao-Ge Liu, Wen-Tian Li, Yi Li. Knowledge, attitudes and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey[Internet],2020 March 15[cited 2020 May 7,Int J Biol Sci 2020; 16(10):1745-1752,]:Available from: *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7098034/*

3) Rajib Acharya , Mukta Gundi , Thoai D. Ngo, Neelanjana Pandey , Sangram K. Patel , Jessie Pinchoff , Shilpi Rampal, Niranjan Saggurti, K.G. Santhya, Corinne White , A.J.F. Zavier.COVID-19-related knowledge, attitudes, and practices among adolescents and young people in Bihar and Uttar Pradesh, 2020 April 23:Available from: *https://www.popcouncil.org/uploads/pdfs/2020PGY_CovidIndiaKAPStudyDescription.pdf*

4) World Health Organization[Internet], Geneva, Available from: *https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200407-sitrep-78-covid-19.pdf?sfvrsn=bc43e1b_2*

5) My Government [Government of India],New Delhi,[cited 2020 April 22], Available from: *https://www.mygov.in/covid-19*

6) Akshaya Bhagavathula, Jamal Rahmani, Deepak Kumar Bhandari, Mohammedjaved Ashrafi Mahabadi, Wafa Ali Aldhaleei, Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study[Internet], March 2020: Available from: *https://www.researchgate.net/publication/339911843_Novel_Coronavirus_COVID-19_Knowledge_and_Perceptions_A_Survey_on_Healthcare_workers*

7) World Health Organization[Internet], Geneva, [cited 2020, April, 22]: Available from: *https://covid19.who.int/?gclid=Cj0KCQjwirz3BRD_ARIsAImf7LNhxJ6cr_XdJEJBYQl-Ha__w55rsdKzKiyaiTd3wz4DT8TmeOZvObkaAtvTEALw_wcB*

8) Directorate of Health Services(DHS), Kerala, COVID-19 Daily Bulletin: Available from: *https://dhs.kerala.gov.in/%e0%b4%9c%e0%b4%be%e0%b4%97%e0%b5%8d%e0%b4%b0%e0%b4%a4-%e0%b4%a8%e0%b4%bf%e0%b4%b0%e0%b5%8d%e2%80%8d%e0%b4%a6%e0%b5%87%e0%b4%b6%e0%b4%99%e0%b5%8d%e0%b4%99%e0%b4%b3%e0%b5%8d%e2%80%8d/*

9) Ministry of AYUSH, Government of India, New Delhi, Ayurveda's immunity boosting measures for self care during COVID 19 crisis: Available from: *https://www.ayush.gov.in/docs/123.pdf*

10) Directorate of Health Services, Thiruvanthapuram, Government of Kerala Notice to various departments regarding control in spread of COVID-19, 2020 March 11, Available from: *https://dhs.kerala.gov.in/wp-content/uploads/2020/03/Govt.-Order-COVID-19.pdf*

11) Johns Hopkins University and Medicine , Baltimore, USA, Corona Virus Resource Centre [COVID-19 Basics], Available from: *https://coronavirus.jhu.edu/*

12) American Red Cross Society, Washington DC , COVID-19 safety tips: Available from: *https://www.redcross.org/about-us/news-and-events/news/2020/coronavirus-safety-and-readiness-tips-for-you.html*

13) Wikipedia, COVID-19 pandemic in Kerala: Available from: *https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Kerala*

Appendix

1) Link for the questionnaire used available from:

https://docs.google.com/forms/d/e/1FAIpQLSeg16I39tigQfaDe2VYri6hUwNCpAoIVQ1qNcgesWRyqYgtdg/viewform?

2) Mobile application of GoK. It is also available from:

https://play.google.com/store/apps/details?id=com.qkopy.prdkerala

Part 2

Online Course: Data Analytics for Lean Six Sigma

Table of Contents

Course Name: **DATA ANALYTICS FOR LEAN SIX SIGMA**

Course Instructor: **Dr. Inez Zwetsloot (Amsterdam Business School, Economics & Business)**

Course Duration: **16 hours**

COURSE DESCRIPTION:

The course is conducted by **University of Amsterdam** in the study platform Coursera. The course had been done in non paid form (without certificate). In this course, data analytics techniques that are typically useful within Lean Six Sigma improvement projects are being dealt. This provides an overview of Six Sigma concepts and language and an introduction to the Define-Measure-Analyze-Improve-Control (**DMAIC)** process improvement cycle and also enhances technical solving skills. The course is beginner level with five weeks of study out of which 7.5 hours were for various examinations and remaining hours for class. The course is based on several levels like understanding, analyzing, application, evaluation and remembering.

Lean Six Sigma is a quality tool for solving organizational problems through a series of action for product delivery or service Example: handling phone calls at the call centre. Lean Six Sigma focuses how to quantify a given issue and how to analyze, interpret and use data for solving the problem (Lean Six Sigma→Roadmap→DMAIC→Measurements and evidences based improvements). The process DMAIC is also categorized into different belts.

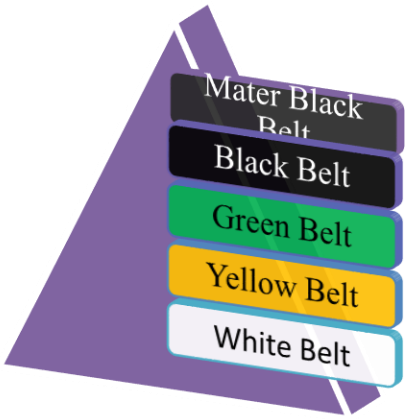

Figure 1: Belts of Lean Six Sigma Process

TIMELINE TABLE FOR THE COURSE

WEEK	MODULE	DETAILS	METHODS	TIME
WEEK 1	MODULE 1	Introduction to LSS and Minitab	11 Videos and 2 Quizzes	3 hours and 15 minutes
WEEK 2	MODULE 2	Visualize data and graphs	8 Videos 1 Reading and 2 Quizzes	3 hours and 10 minutes
WEEK 3	MODULE 3	Probability distributions	7 Videos and 2 Quizzes	2 hour and 50 minutes
WEEK 4	MODULE 4	Modelling CTQs, introduction to causality.	3 Videos and 1 Quiz	45 minutes
	MODULE 5	Relation with numerical Y and categorical X variables	6 Video Lectures, 2 Video exercises and 2 Quizzes	2 hours 15 minutes
WEEK 5	MODULE 6	Relationship between numerical X and numerical Y	6 Video Lectures, 1 Video exercise and 1 Quiz	2 hour 55 minutes
	MODULE 7	Testing Categorical Y	2 Video Lectures, 2 Video exercises and 2 Quizzes	50 minutes

Total Hours = 16 hours

Understanding the CTQs (Critical To Quality) is also a big part of this course where the CTQs are taken as Y variable in the selection method for the different test analyses. Sampling and organizing the data based on our requirements, usage of Descriptive Statistics, Visualisation of numerical data and categorical data techniques and Pareto analysis are discussed in the visual analysis of data part. Also emphasis on Data Estimation, Probability Plot and Cumulative Distribution Function were given in the Minitab session. In the data analysis and testing part, based on numerical or categorical data, tests are categorized as Regression, Logistic regression, Chi square Test, One way ANOVA, two sample Test and Kruskal-Wallis test are discussed here. Along with this, Hypothesis testing, Causality, Residual Analysis and Quadratic regression are discussed theoretically as well as practiced in the Minitab.

In this course the DMAIC process has been split up as follows

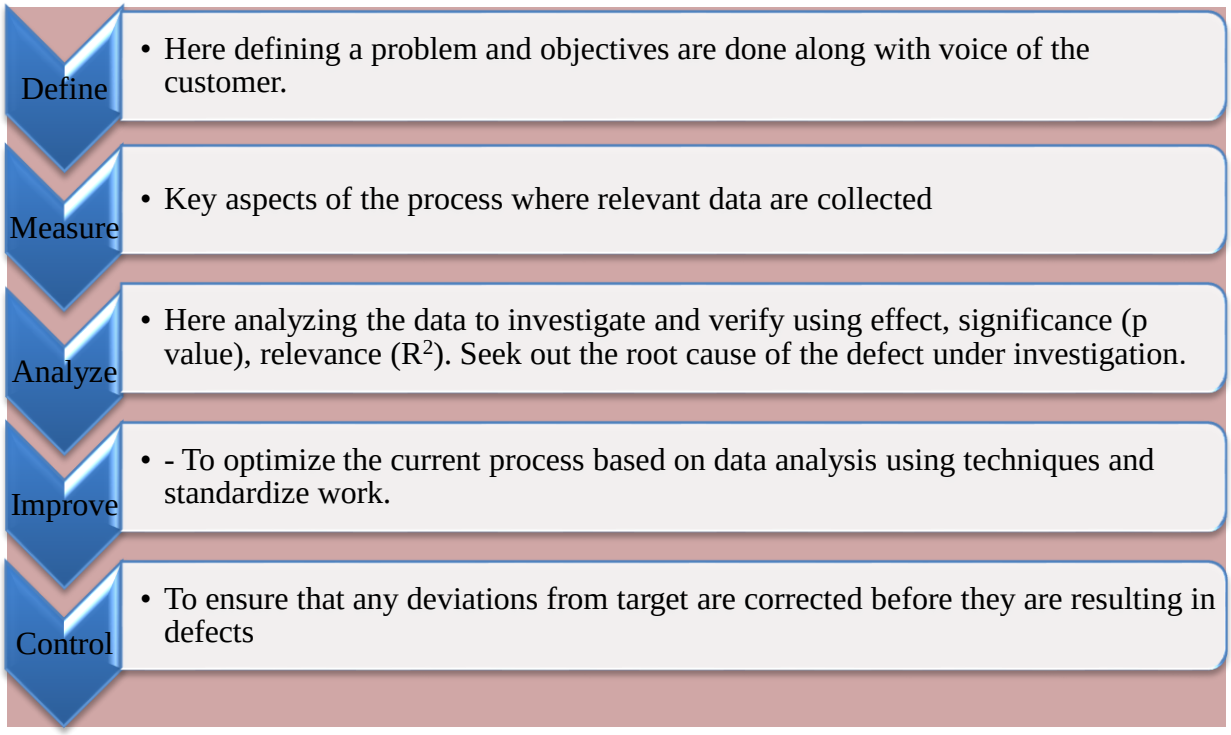

Figure 2: Phases of DMAIC process

COURSE OBJECTIVES:

1.) Able to analyze and interpret data gathered within such a project.
2.) Emphasize on use of data analytics tools and the interpretation.
3.) Able to use Minitab to analyze the data
4.) To visualize the graphical representation for numerical and categorical variables.

COURSE CONTENTS:

1.) Data and Lean Six Sigma

Explaining what Lean six sigma is. Distinguishing between the five phases of DMAIC. Selecting CTQs to make a problem quantifiable and measurable. Units and operational definition corresponding to a CTQ. Organising data distinguishing between units and variable. Distinguish between the five phases of DMAIC. CTQs to make a problem quantifiable and measurable.

2.) Understanding and visualizing data

Judge if data is numerical or categorical. Interpret descriptive statistics. Create a histogram and box plot, and interpret both graphs. Creating a bar chart, pie chart and a tally table and interpret the results. Creating a Pareto chart and interpreting the chart. Creating suitable graphical visualization for two variable and interpretation.

3.) Using probability distribution

Understanding the relationship between a sample and its population. Understand the concept of estimation and quantify the precision of an estimate (using confidence intervals). Distinguish the different types of probability distributions (normal, lognormal, weibull). Determine the distribution of a numerical variable using probability plots. Determine probability percentages using the Empirical CDF and understand the parameters of the normal distributions. Use the rule of thumb to compare probabilities for normally distributed variables.

4.) Introduction to testing

Identifying x and y in practice and select the appropriate test interpret p-values of hypothesis tests. Interpret results by distinguishing between causality and relation.

5.) Testing: numerical Y and categorical X

Judge when ANOVA is the applicable method. Perform ANOVA and interpret the output, especially p-value and relevance. Judge the validity of ANOVA using a residual analysis and judge when Kruskal-Wallis is the applicable method. Performing and interpreting a Kruskal- Wallis test. Comparing two groups by means of the two sample t-test. Test whether different groups have equal variance.

6.) Testing: numerical Y and numerical X

Interpreting and using correlation. Judging when regression is the applicable method. Performing a regression and interpret the output, especially p-value and R squared. Judging the validity of regression using a residual analysis. Compute and interpret a prediction interval. Perform and interpret a quadratic regression.

7.) Testing: categorical Y

Performing and interpreting Chi square analysis and judge when a Chi square analysis is the applicable method. Perform and interpret a logistic regression analysis and judge when a logistic regression analysis is the applicable method.

LEARNING METHODOLOGY:

As already mentioned before, the learning methods included in this course are Understanding, Applications, Analyzing, Evaluating and Remembering. The five week course had theoretical lectures, practical examples in solving the problem, practical knowledge about usage of Minitab, graded quizzes after end of the particular week's portion .The examples which were used here were crisp and clear to the point which helped me to understand and apply the concept further.

WEEK ONE

All the videos here had been based on pure understanding phenomenon.

1) Here an idea about what Lean Six Sigma is, had been given along with the idea that it can be used for product and services. Different processes combines to form the LSS* completely. An overview about Pareto chart was given here by citing examples taken from Pharmaceutical sector (improvement in the medicine production) and Hospital sector (reducing the medical errors happening).
2) What are CTQs* and how to select them was told here in the theoretical lecture. CTQ means Critical to Quality and it is the main step in identification of any problem. CTQs are also known as Y variable/dependent variable. It was taught that to make the CTQs, quantifying things should be used. Example like number of visits, Time etc. Moreover under the CTQ topic, differentiation between a UNIT and MEASUREMENT UNIT was given.

Example: In a highway, Variable is Speed, Unit is Vehicle and Measurement Unit is Km/hr. The measurement unit will be linked to the variable.

3) An idea about sampling was given. It was taught that why sampling is important and how difficult it is to cover up all the population. Usage of Minitab for random sampling was taught. The idea of Representative sampling had been made understood here.
4) Also organizing the data based on units and variables (measurable properties) had also been taught. Organizing in rows and columns, where y variable (CTQs) are always arranged in columns.
5) Along with these, understanding the usage of Minitab was also taught. How to download Minitab 17 from onthehub.com. Difference between Minitab and Microsoft excel was explained. Minitab is used for applying statistical tools to the data whereas excel is used for simple operations and storing data. Also importing of data by simply copying and pasting from excel can done.
6) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions.

WEEK TWO

All the videos used here were based on Evaluation, Application, and Analyze with Remember phenomenon.

1) Judging between numerical and categorical data. For numerical data, at least 30 observations should be used and for categorical data, 300 observations must be used. This difference is because numerical data has more valuable content than categorical.

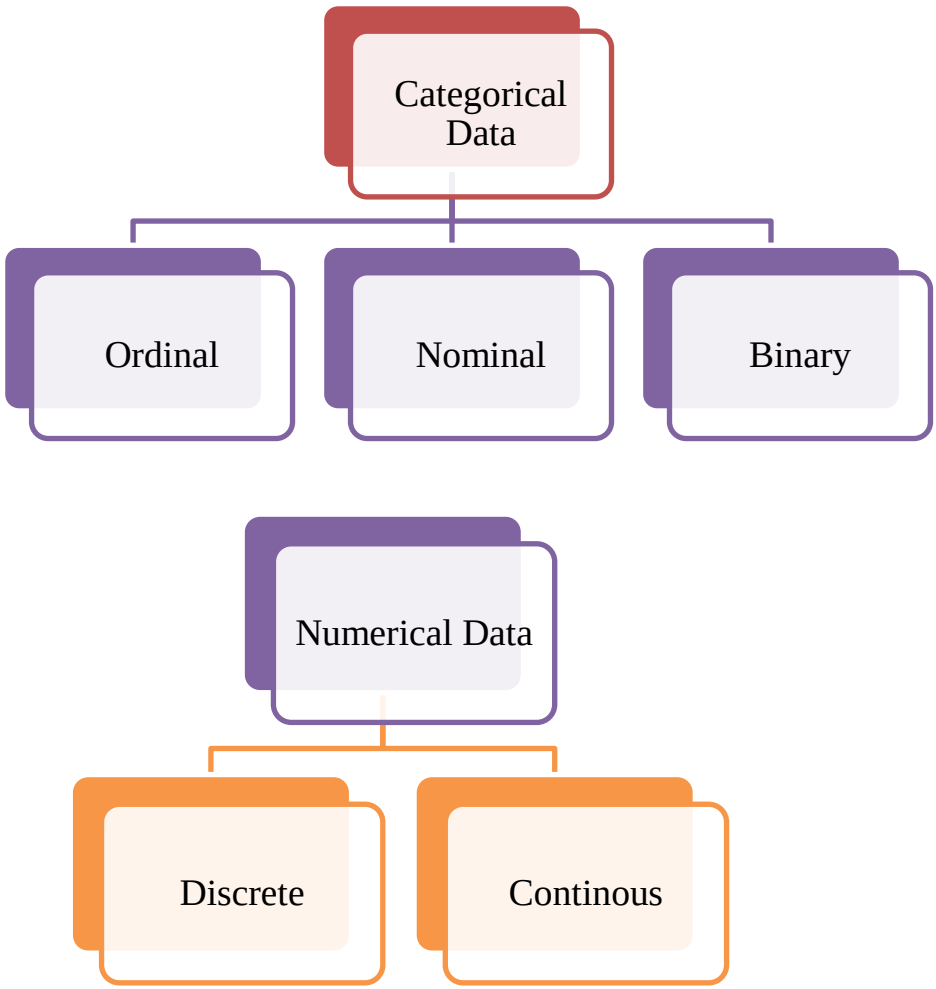

Figure 3: Classification of data

2) Interpretation of the descriptive statistics had been done there. How to describe a given data and summarize the data using Minitab was effectively taught here. In Minitab the option of descriptive statistics Mean, Standard Deviation, Minimum, Maximum, Median, Q1 and Q3 (first and third quartile respectively).

Q1 is that value which separate lowest 25% of the data from the highest 75% of the data.

Q3 is that value which separate lowest 75% of the data from the highest 25% of the data.

Also interpreting a *box plot* and *histogram* where a histogram is used for distribution. Histogram can be symmetrical, bimodal and skewed. A box plot is used for checking the spread of the data.

A *box plot* contains the following – 1) The Median of the data

2) The Bulk of the data (Q1 to Q3)

3) The Whiskers (tails)

4) Possible outlier

Interpretation of the categorical data with the help of Pie and Bar chart and tally table.

3) Creating *Pareto chart* and interpreting it. The usage of 80/20 principle which tells that 80% of all problems can be attributed to 20% of the cause is used in the Pareto analysis. With the use of the Pareto analysis, single out the problem that occurs most often.

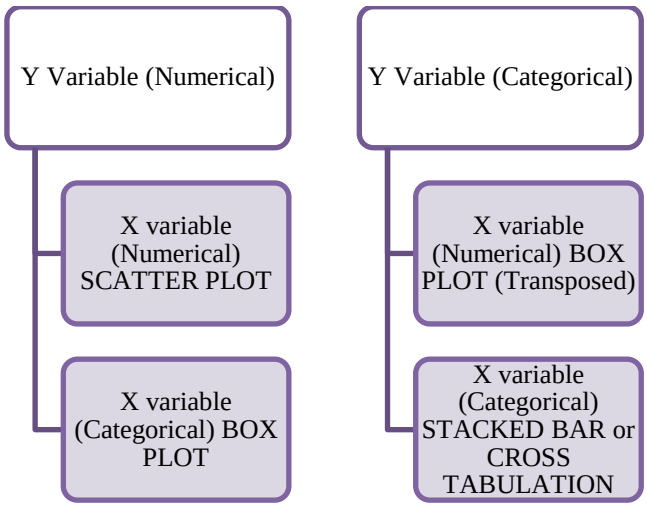

Figure 4: Visualizing two variable

4) An exercise was conducted to get an idea about descriptive analysis and based on the visualization of data. The matching of Y variable and X variable was done and respective visual method was selected.

5) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions.

WEEK THREE

Week three had a mixture of analyzing, understanding, practical sessions.

1) Understanding what is the relation between sample and population. Also had an understanding of Estimation and Confidence Intervals. In Estimation for location, Mean and Median were discussed and in the estimation for spread, Standard deviation, Range and Inter Quartile Range were discussed.

2) Interpreting *Normal, Lognormal* and *Weibull* distributions.

3) Analyzing Probability Plot. Probability Plot is used to identify which theoretical outline fits our data. Checking of this plot is done with the help of a factor called Anderson Darling. It helps to measure between our data and theoretical distribution.

4) The properties of the Normal Distribution had been discussed effectively with the application of standard deviation in it. The CDF* had also been discussed. The empirical CDF is used in the Minitab after the use of Probability Plot. It helps in finding the percentage of the distribution.

5) An exercise was conducted on LOS, in which percentage of the workers left were to be calculated. Hence the probability plot and empirical CDF were calculated.

6) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions.

WEEK FOUR:

Week four had an introduction to data analysis. Here Application of the concept, Analyzing and Evaluation comes into play.

1) Here the prime objectives were to model the CTQ and influence factor and to identify several tools for data based testing. Identifying the X and Y variable in the practical use.

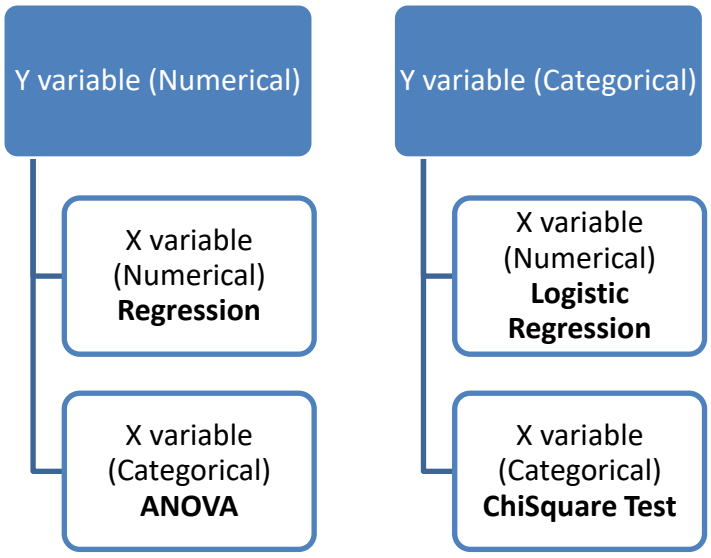

Figure 5: Identification of variables

2) Understanding the hypothesis testing.

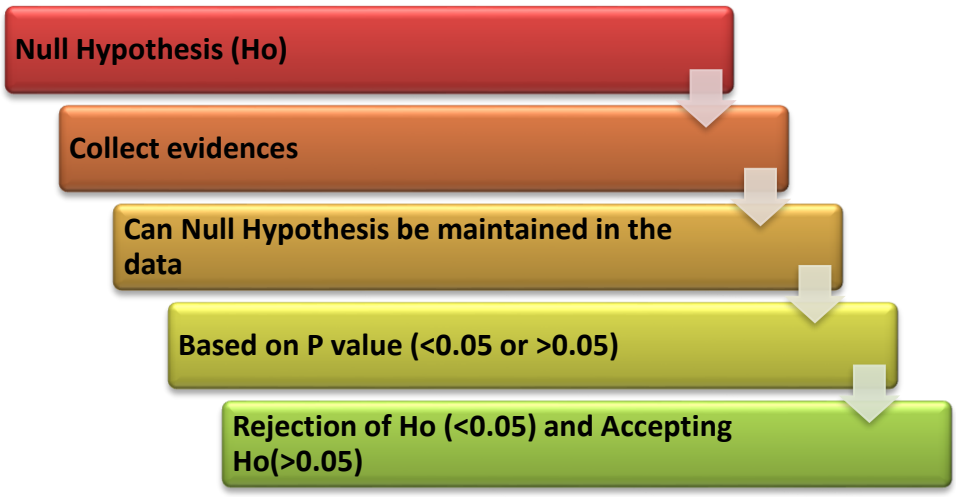

Figure 6: Steps in Hypothesis Testing

3) Understanding what Causality is. It gives us idea of what causes the problem. Wrong direction, Time Problem, Third Variable Problem

4) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions

WEEK FIVE

Week Five gave an idea about numerical Y and categorical X.

1) An introduction to ANOVA (ANalysis Of VAriance). It makes groups according to categorical influence factors.

2) Furthermore ideas of how to use the Minitab to do the ANOVA had been taught. Always the P value and the R^2 values are being calculated and checked.

3) Another important test which is Kruskal Wallis Test and Two sample t tests were also discussed. Kruskal Wallis test is an alternative to ANOVA and it is a non parametric test. In this test, the median and the P value are being considered as important.

4) The Two sample t test is used for comparison of the means. Here mean with the standard deviation and p values are checked.

5) Two exercises had been conducted based on ANOVA one way analysis based on productivity and variance. All exercises had been done in Minitab with residual checks using four in one plot.

6) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions

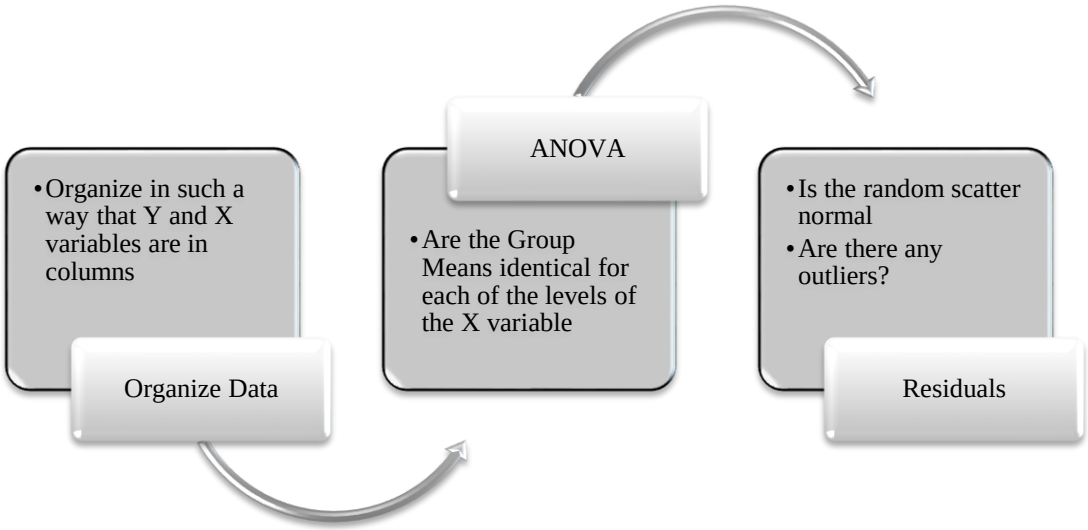

Figure 8: Steps in ANOVA

WEEK SIX

Week Six had a session on correlation, regression which are based on understanding, analyzing and evaluation with practice.

1) Correlation had been taught efficiently. Correlation is that index which expresses relation between two numerical variables.

2) Rule Of Thumb for Correlation value are 1) 0 – 0.4 (No/weak)
2) 0.4 – 0.8 (Moderate)
3) 0.8 – 1 (Strong)
4) 0 – (-0.4) (Weak negative)
5) (-0.4) – (-0.8) (Moderate negative)
6) (-0.8) – (-1) (Strongly negative)

3) Regression is performed when Y numerical and X numerical. Here the usage of Minitab was done and the P value and R^2 values are important. R^2 value helps in the relevance and how strong the relation is. Also the residual analysis should be done to check the outliers had been taught. The application of regression prediction interval (with two times standard deviation = 95%), which can be used to determine the level of influence factor which ensures the CTQ factors.

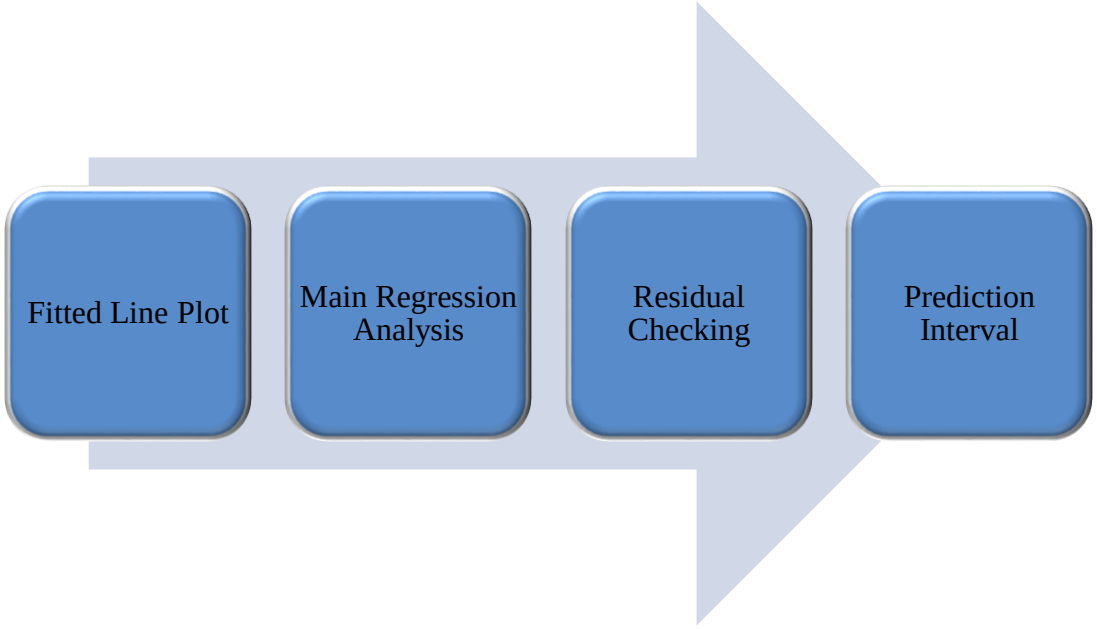

Figure 9: Steps in Regression

4) Quadratic regression had been discussed which is an extension of Linear regression. The basic formula of quadratic equation is $y=a + bx + cx^2$, which can be easily got in the Minitab.

5) An exercise based on regression had been performed which helped in understanding the concept well.

6) Two set of quizzes were conducted here as 1) Practice quiz with 12 question 2) Graded quiz with 10 questions.

WEEK SEVEN

The seventh week had a effort based on application and evaluation. Based on Y variable as a categorical and X variable as both categorical and numerical.

1) The first test was Chi square test where both x and y are categorical in nature.

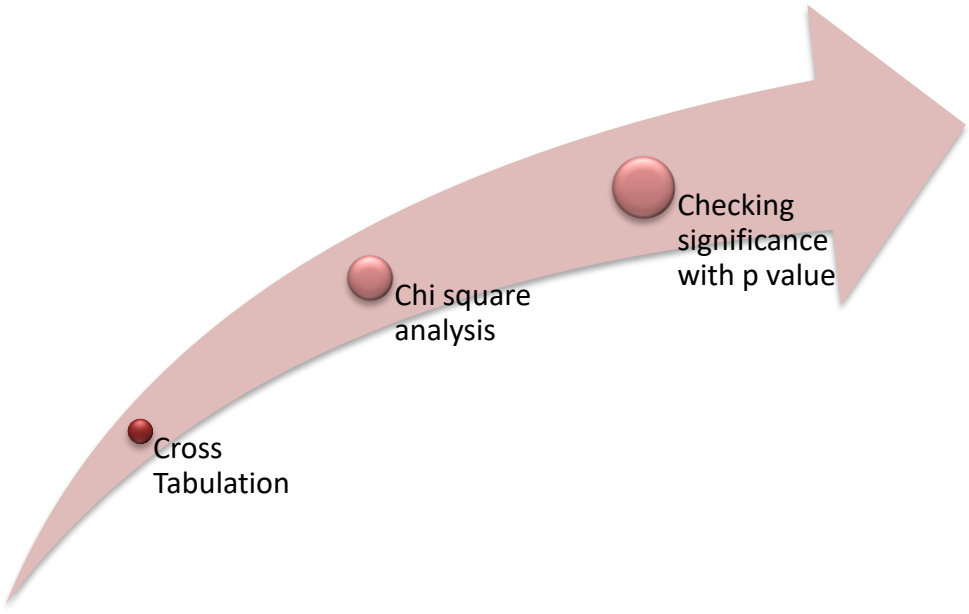

Figure 10: Steps in Chi Square test

2) In the example of Chi square test, an example had been taken where, x variable were three specialist P, Q, R. and y variable were two departments A1 and A4. By the usage of Minitab, cross tabulation and chi square analysis had been done.

3) The second test discussed here was based on Logistic Regression where, y is categorical and x is numerical in nature.

Figure 11: Steps in Logistic Regression analysis

4) The event/trail format could be easily done with the help of Minitab. An example of this format is given where an issue from a call centre had been considered.

(Hold Time/Hung Up/Calls) **=** ***(x variables/events/trials)***

Here Hold time is the x variable and its all possible outcomes. The Hung Up is the number of the events. Calls are the number of times the event had occurred.

5) Whenever we are doing logistic regression, either event/trail format or binary response/frequency format is used.

6) An exercise based on chi square test was done. Here functioning of the printers Ax2 and Ax4 had been conducted. Here x variable were categorical. In data using Minitab the expected print and original prints of the two printers were compared. The p value for significance had been observed.

7) Two set of quizzes were conducted here as 1) Practice quiz with 12 questions 2) Graded quiz with 10 questions.

KEY LEARNING:

Overall the course was a great success because of the concepts and the instructor was very efficient.

1) Statistical idea about organizational problems.
2) Data Analysis and distinction between categorical and numerical data.
3) Downloading and usage of Minitab 17
4) Usage of DMAIC framework (D-Define, M-Measure, A-Analyze, I-Improve, C-Control)
5) Identifying CTQs and modeling them accordingly.
6) Interpretation of various graphical way of numerical distributions(scatter plot and box plot) in Minitab.
7) Interpretation of various graphical way of categorical distribution (bar, pie and tally charts) in Minitab.
8) Understanding Descriptive statistics with pareto analysis theoretically and in Minitab.
9) Interpretation of precise levels of Estimation for location and spread and Confidence Intervals (CI).
10) Analyzing Probability Plot and Empirical CDF (cumulative distribution function).
11) How to test hypothesis and what are steps involved there.
12) Causality and three errors related to the causality.
13) Introduction to ANOVA, interpretation with the help of p value and R^2(relevance) with residual analysis.
14) Mentioning about an alternative to ANOVA – Kruskal Wallis Test (non parametric test)
15) Usage of two sample t test for small samples
16) Introduction to Regression analysis, residual analysis after regression and quadratic regression for numerical y variable.
17) Usage of Chi square test and logistic regression for categorical y variable.
18) Based on the graded quizzes and practical exercises, each of the concepts had been systematic and methodically being covered.

BIBLIOGRAPHY:

- Data Analytics for Lean Six Sigma, University of Amsterdam Available from https://www.coursera.org/learn/data-analytics-for-lean-six-sigma
- Six Sigma Black Belt, Six Sigma Academy, Amsterdam Available from https://www.udemy.com/share/101yHQCEofdl1VQ3o=/