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IIHMR UNIVERSITY

APPLICATION OF LEAN SIX SIGMA FOR WEIGHT LOSS: A PILOT STUDY

SUBMITTED BY

BY

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UNDER THE GUIDANCE OF

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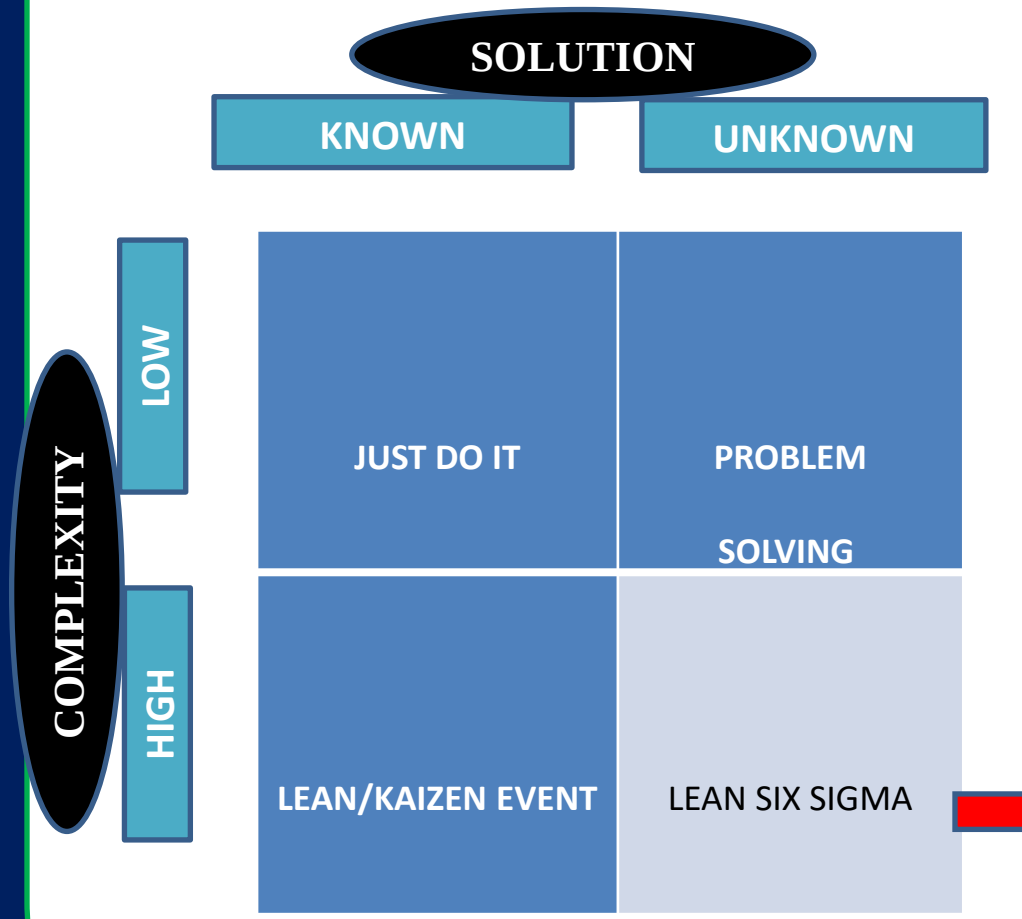
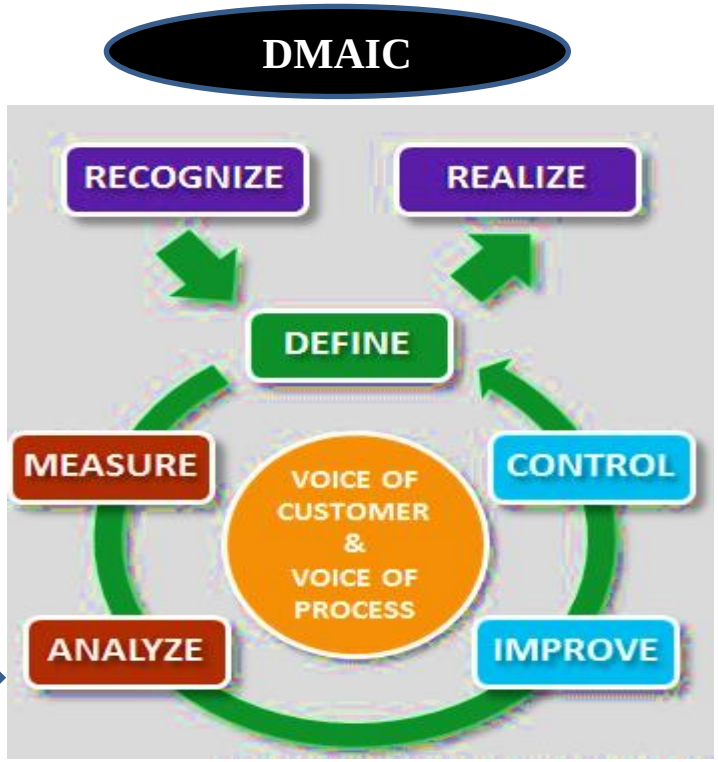
INTRODUCTION

- World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health
- India, the increasing prevalence of overweight and obesity has coincided with the demographic and epidemiological transitions, in which mortality and fertility have declined, and lifestyle-related diseases have become more common
- The prevalence of overweight increased from 8.4% to 15.5% among women between 1998 and 2018, and the prevalence of obesity increased from 2.2% to 5.1% over the same period
- This fast-paced growth has been accompanied by notable increases in the burden of non-communicable diseases (NCDs).
- Causes are sedentary life style and consumption of high calories food. Obesity results into various health problems which are having direct link to cardiovascular disease (CVDs)
- Overweight, obesity and their related non-communicable disease are preventable. By making the choice of healthier food and regular physical activity overweight and obesity can be prevented,So, that it's time to focus on the problem and take necessary steps to overcome the problem.

Lean Six Sigma is a systematic budding innovation in health care to remain competitive, cost-efficient, and up to date. Generally, lean six sigma will be implemented, when the complexity is **High,** and the solution is **Unknown**





This methodology is applied in healthcare which includes patient satisfaction improvement, reducing waiting times in the emergency department, reduction in prescription error, and monetary recovery by reducing waste.

REVIEW OF LITERATURE

In the health care sector lean six sigma is a modern approach to reduce the variation in process and eliminate the waste or defects **LIKE**

- **Elimination** To Eliminate the Non-value-added activities in CT scanning - Remove Wasteful processes and implement a more robust process
- **Reduction** To reduce the length of stay at the hospital – Turnaround time for the emergency department (ED) specimens - Work-related injuries in the hospital)
- **Improvement** To improve Operating room throughput - OP-MRD waiting time and Efficiency nursing - Process of nursing shift director's department - Insulin medication safety and delivery - Allocation of resources

Major tools used in these studies are process mapping, ANOVA, and cause and effect diagram, waste reduction, control charts.

Implementation of LSS has some challenges or barriers to endure in healthcare services such

- ❑ lack of knowledge and awareness,
- ❑ lack of financial resources,
- ❑ lack of leadership,
- ❑ lack of training facilities(poor training),
- ❑ lack of time, lack of human resources.
- ❑ Lack of research and education

RESEARCH QUESTION

1.What is the impact of .What is the impact of Lean Six Sigma?

- This question will be answered by examining the Lean Six Sigma approach in maintenance of weight loss in the 2-month follow-up by comparing baseline data of 1 month.
- The hypothesis is that the Lean Six-Sigma approach is used to reduce weight gain.

2. What is the impact of root cause analysis in the maintenance of weight loss?

- This question will be answered by collecting the voice of respondents about the daily activities through the questionnaire-based survey.
- The hypothesis is that root cause analysis is the specific tool that helps in better weight maintenance (i.e., less regain) in the 3-month follow-up.
- The study results will help to determine if the Lean Six Sigma application helped individuals to maintain or continue the weight loss following guided and self-monitoring interventions.
- The information will help to determine the steps to enhance the long-term efficacy of the weight loss studies.

FUTURE SCOPE : The goal to continue the effort to maintain the **Body Mass Index** (BMI) and control weight gain.

NEED OF THE STUDY

- It is critical to control weight gain for the reduction of **long-term health risks**.
- Over the past year controlling weight gain attempted with medications and changing diet, also by avoiding high glycemic calorie foods. These have been **unsuccessful** in controlling weight gain.
- To maintain the BMI, it is necessary to reduce the long-term health risks. These can include **heart disease, kidney damage, nerve problems, and loss of vision**
- In this case, the need of the study was to evaluate the **impact of the Lean Six Sigma approach** on the maintenance of weight loss in obese and overweight adults following a prospective observational study.
- This study will address the need by maintaining the weight loss for 3 months(Base line and End line data) with the completion of the intervention.

AIM

Implementation of lean six sigma approach in long term weight loss management

OBJECTIVES

- To understand the problem and analyze the root cause of weight gain.
- To control and maintain the BMI in long run.

METHODOLOGY

- **Study Design:** Prospective observational study
- **Study Site:** ANDHRA PRADESH (Telecommunication)
- **Study Duration**: 3months
- **Sample Size**: 20(based on current situation and availability)
- **Method:** DMAIC approach
- **Study Requirements**
- **Documents:**

  Questionnaires(annexure 1)

  BMI Chart((Annexure 2)

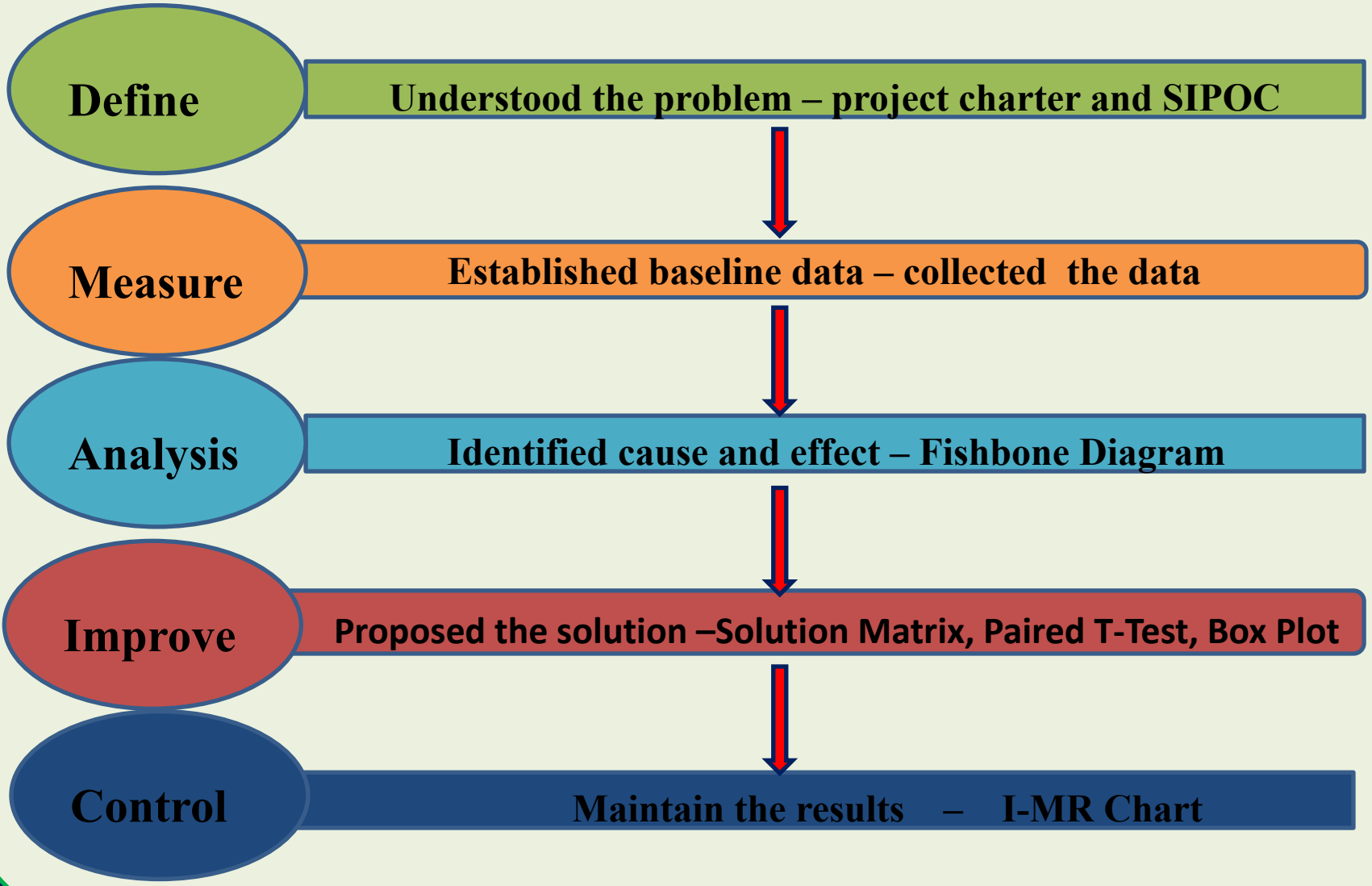
  Diet Chart(Annexure 3)

  Baseline and End data((Annexure 4)

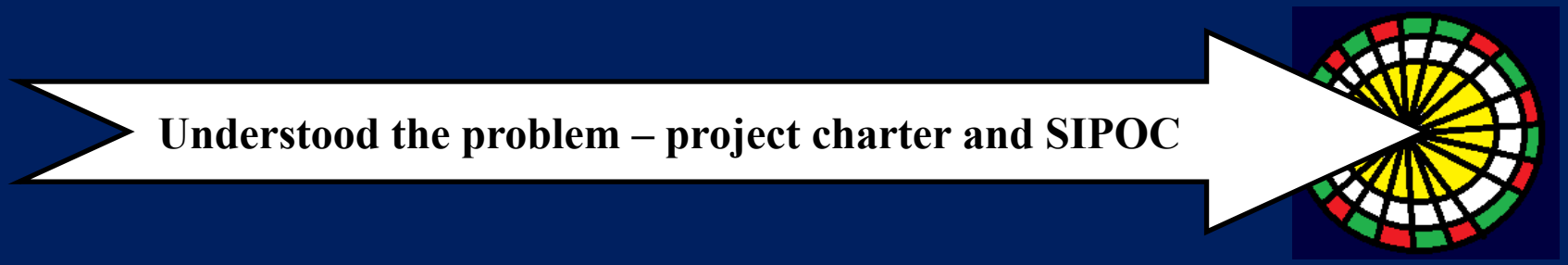
INCLUSION CRITERIA:
Working women age (25- 45)
Women who have more than 24 and less than 35 BMI
volunteers who are healthy individual

EXCLUSION CRITERIA
volunteers who showed their unwillingness towards the daily recommendations and continuity of recommendations and hesitated to give the informed concern form.
volunteers who have diseases like Diabetic and Thyroid and other comorbidities
a volunteer who has past medication and surgical (like cesarean) history

METHOD OF STUDY


Define
Understood the problem – project charter and SIPOC
Measure
Established baseline data – collected the data
Analysis
Identified cause and effect – Fishbone Diagram
Improve
Proposed the solution –Solution Matrix, Paired T-Test, Box Plot
Control
Maintain the results – I-MR Chart

RESULTS


Understood the problem – project charter and SIPOC

Project Title: Application of Lean Six Sigma for Weigh Loss: A Pilot Study

Business Case: Since lockdown, most people have started complaining about weight gain. There is a constant increase in weight because of that some people delaying taking vaccine. If this is not resolved within a couple of months, then there is a potential threat of increasing health risks which will result in mass morbidity.

Problem Statement: in the past 1 month, the weight gain is too high. it is ranging between 25.5—30.9 against the ideal BMI range of 18.5—24. 9. This leads to an overweight that in turn increases the risk for obesity. this also affects the overall life expectancy rate

Project Objective : Improve physical activity and lifestyle modification by maintaining a diet chart and controlling weight which reflects reduce the weight by June 15.

Goal Statement: Measure the BMI pre(Weekly Once Per Month) and post-intervention (15 Days Once Per Two Months), incorporate healthy foods, and consider exercise for the next 45 days

Scope: Good scope in weight loss and fit the body within few months

Project Schedule

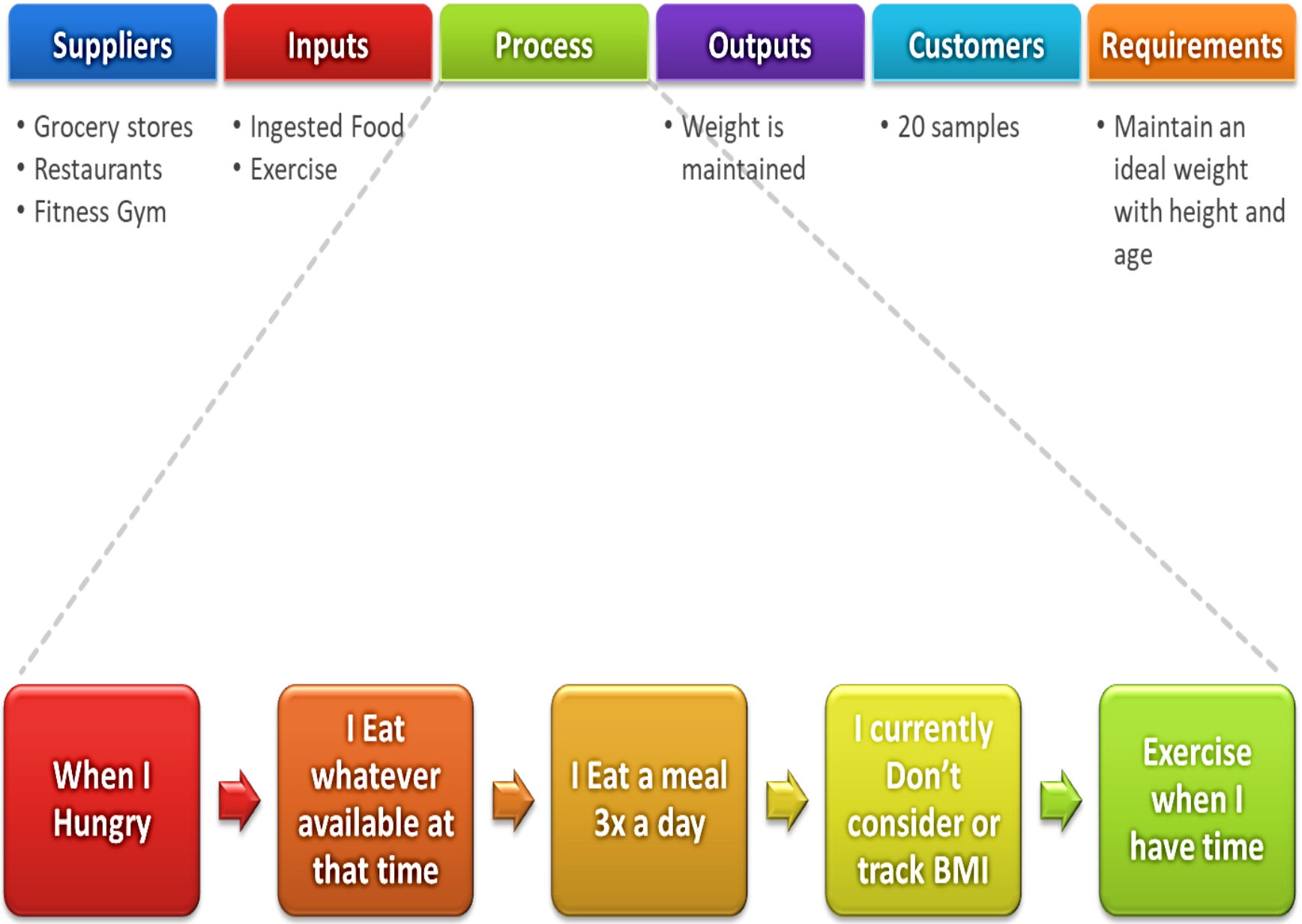
Define Phase	22/3/2021 TO 31/3/2021	Improve Phase	3/5/2021 TO 25/6/2021
Measure Phase	1/ 4 /2021 TO 30/4/2021	Control Phase	16/6/2021+
Analyze Phase	1/5/2021 TO 2/5/2021	Presentation	5/7/2021

Expected Benefits Weight loss would decrease many long-term health risks, increase energy levels, and improve my overall wellness/appearance.

Team

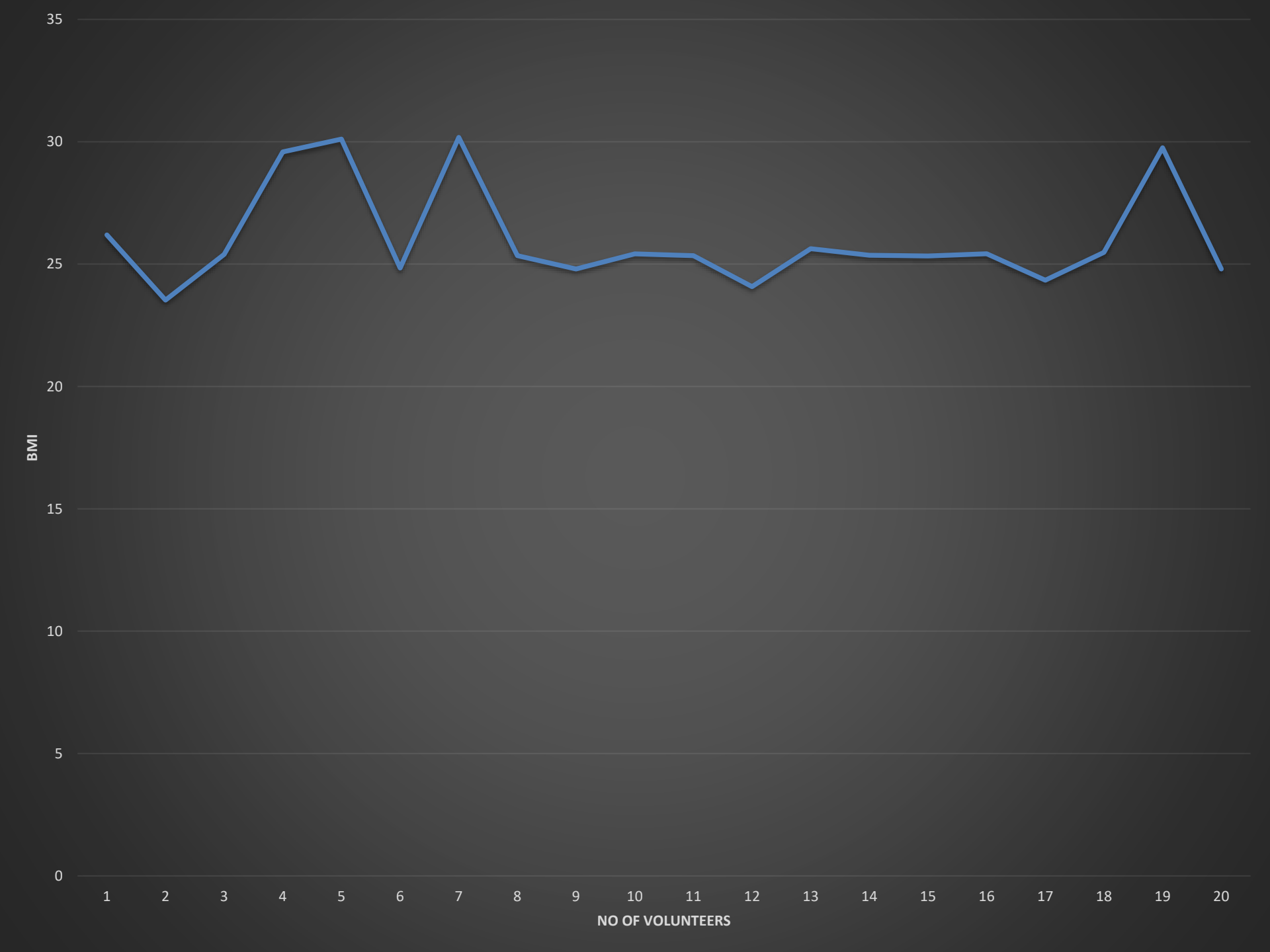
Sponsor:	NO	Leader:	BALAJI NAIK BUKKE	Members:	NO

Charter Prepared by: Balaji Naik | **Charter Approved by: Piyusha Majumdar**


Suppliers
Inputs
Process
Outputs
Customers
Requirements
• Grocery stores
• Restaurants
• Fitness Gym
• Ingested Food
• Exercise
• Weight is maintained
• 20 samples
• Maintain an ideal weight with height and age
When I Hungry
I Eat whatever available at that time
I Eat a meal 3x a day
I currently Don't consider or track BMI
Exercise when I have time

Understood the problem – project charter and SIPOC

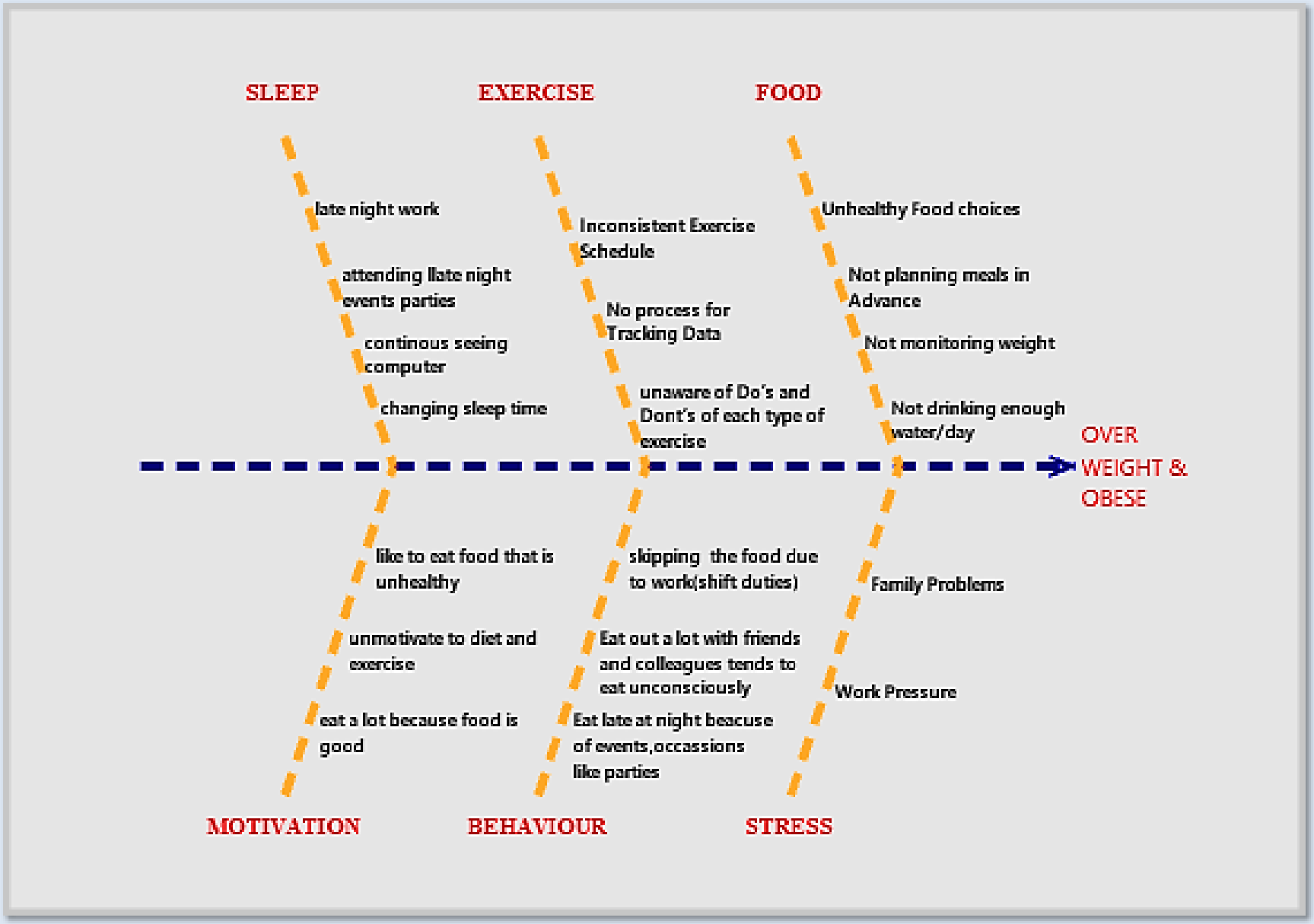
Established baseline data – collected the data


35
30
25
20
15
10
5
0
BMI
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
NO OF VOLUNTEERS

Understood the problem – project charter and SIPOC

Established baseline data – collected the data

Identified cause and effect – Fishbone Diagram


SLEEP
EXERCISE
FOOD
late night work
attending llate night events parties
continous seeing computer
changing sleep time
Inconsistent Exercise Schedule
No process for Tracking Data
unaware of Do's and Dont's of each type of exercise
Unhealthy Food choices
Not planning meals in Advance
Not monitoring weight
Not drinking enough water/day
OVER WEIGHT & OBESE
like to eat food that is unhealthy
unmotivate to diet and exercise
eat a lot because food is good
skipping the food due to work(shift duties)
Eat out a lot with friends and colleagues tends to eat unconsciously
Eat late at night beacuse of events,occassions like parties
Family Problems
Work Pressure
MOTIVATION
BEHAVIOUR
STRESS

Understood the problem – project charter and SIPOC

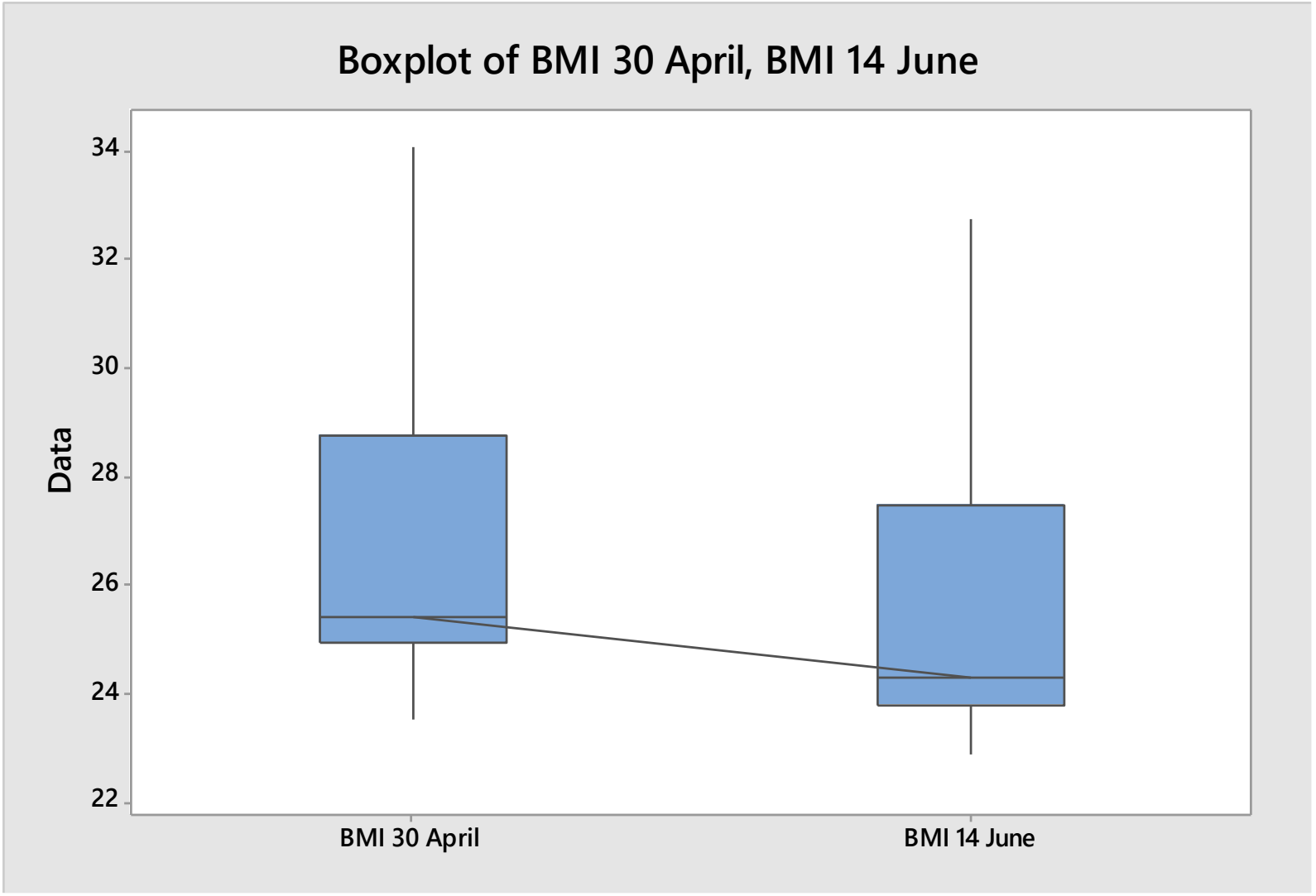
Established baseline data – collected the data

Identified cause and effect – Fishbone Diagram

Proposed the solution –Solution Matrix, Paired T-Test, Box Plot

	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5
	Stick To Diet Guidelines	Walk After Meals	Stabilizing Exercise Schedule	Document Data	Preplan Meals
Unhealthy Food Choices	x				x
Inconsistent Exercise Schedule		x	x		
Data Not Documented				x	

Time	Daily Activities
06:30 AM	Wake up with prayer and take 500 ml of water on empty stomach (start with 1 glass and extend up to 500 ml over a period of one week)
06:45 AM – Detox Water	1 glass of water – 200 ml + 1 spoon chia seeds (5 grams)
07:00-08:00 AM	Exercise (If not possible, do in the evening times)
08:30 AM	Salad one plate (Carrot-3 + Tomato-1 + Onion + Beetroot) and 1 cup sprout bowl (green gram or channa or Kabul or black-eyed beans or toor dhal or rajma (red kidney beans)
09:00 AM	Breakfast: Dosa -2 or Idly -3 or Chapati – 2 (wheat, no maida) or 1 cup of upma
11:30 AM	Any 1 seasonal fruit (Apple must) with 1 spoon of flax seeds.
01:00 AM	Salad one plate (Carrot-3 + Tomato-1 + Onion-1)
01:30 PM	Rice + curry + curd + rasam; 1 ½ cup rice, dhal/vegetable curries (if possible, replace rice with roti for 40 days)
04:30 PM	Green tea plus pumpkin or sesame seeds or flax seeds plus one fist size dry fruits with protein shake.
07:00 PM Before dinner	Fiber powder – 1 scoop in 250 ml water to be stirred till it gets dissolved. (at 7 PM)
Before meal - 1 cup salad bowl – boiled broccoli, cauliflower, cabbage or repeat same morning salad bowl (onion/tomato/carrot/radish) or any vegetable salad of choice	
08:00 PM	Dinner: Body key sachet
NOTE: 1) In case, exercise not possible (only could not be able to do because of heavy work), 10-20 minutes of walk after 20 mins of every meal (three times a day) or 10,000 steps per day. 2) No fried food and non-vegetarian food also only boiled stuff. 3) No mobile and TV before one hour going to sleep, before going to bed have a good prayer and read a good book to have sound sleep with positive thoughts. 4) Please use HealthifyMe application and include daily food intake to check total protein intake 5) Please track all the recommended suggestions diligently. 6) Please do not take fruits after 4 PM	
Foods To Avoid	Processed foods, soft drinks, sugar, white bread, chocolates, cakes, biscuits, tea/coffee, fried items, excess Butter, whole milk and heavy cream.
Belly Fat	12 sets of Suryanamakaras (6 sets in initial days; can be included in routine exercise), Plank (30 secs for first week, 1 min for next two weeks, followed by 2 ½ mins)


Boxplot of BMI 30 April, BMI 14 June
Data
34
32
30
28
26
24
22
BMI 30 April
BMI 14 June

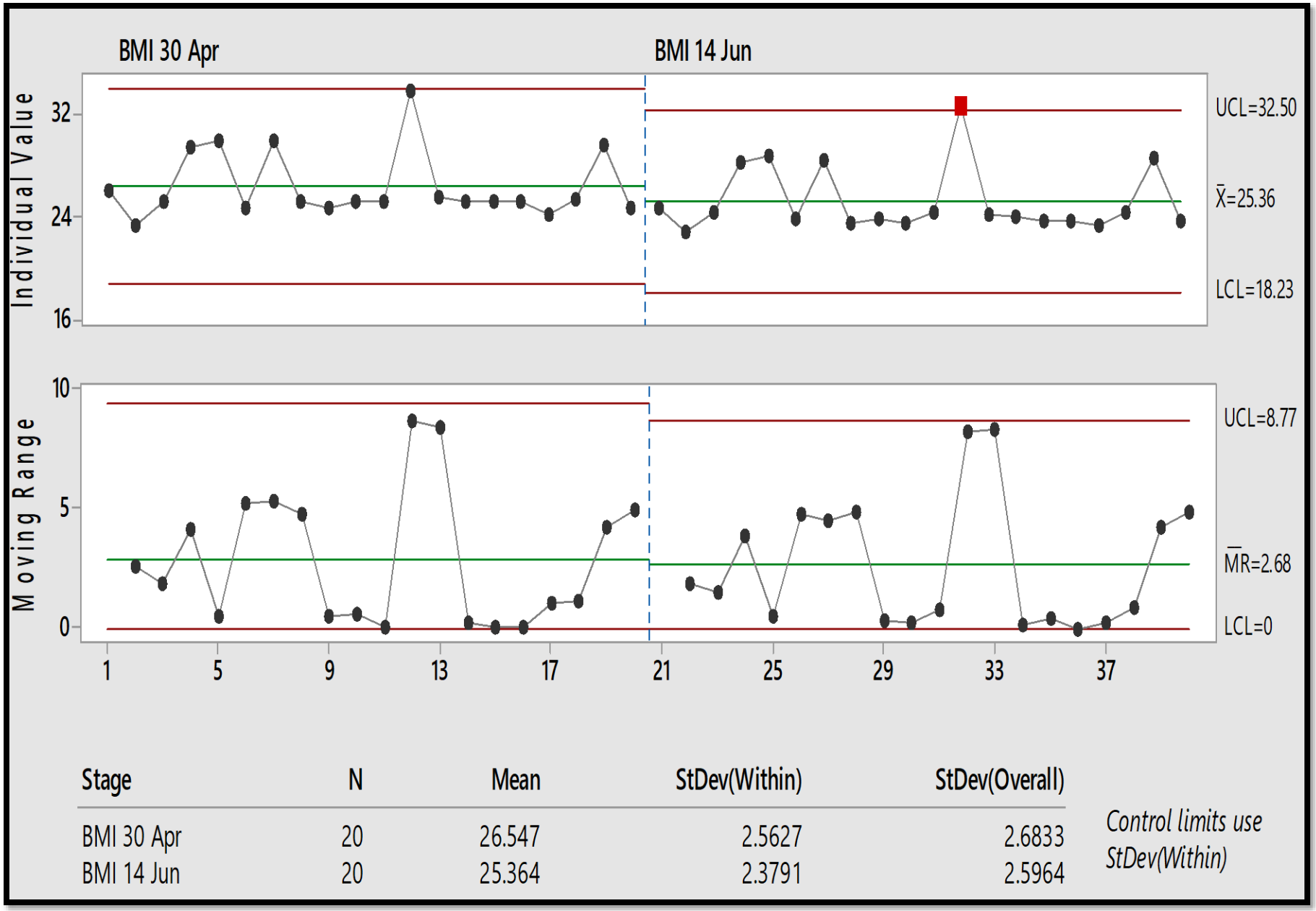
Understood the problem – project charter and SIPOC

Established baseline data – collected the data

Identified cause and effect – Fishbone Diagram

Proposed the solution –Solution Matrix, Paired T-Test, Box Plot

Maintain the results – I-MR Chart



Stage	N	Mean	StDev(Within)	StDev(Overall)
BMI 30 Apr	20	26.547	2.5627	2.6833
BMI 14 Jun	20	25.364	2.3791	2.5964

Control limits use StDev(Within)

DISCUSSION

- Everyone has known how to reduce weight by taking special cautions on diet and physical fitness like exercise and yoga. But still, there is a **gap where weight is regained**, and the cause is unknown.

- Several studies recommended that a combination of **diet and physical fitness** is not a permanent solution for weight loss.

- **self-regulation and self-perception** are the two key factors in maintaining and controlling BMI with the help of applicable strategies based on individual daily activities.

- **lean six sigma is the better option or solution** to resolve and sustain weight loss on daily basis.
- It is crucial to support and encourage the strategies like lean six sigma, especially among oappropriate preventive mechanisms and control **Overweight working women**

- This study aimed to implement lean six sigma for weight loss. The results confirmed that working on the root cause and identifying specific solutions with daily tracking and changing the lifestyle had a greater impact on the control phase.

- In this study analysis and improve phase has a crucial role in sustaining a healthier weight. In addition, Maintaining or controlling a healthier weight is not easy and on the other side isn't painful because it depends on the approach and strategy based on individual needs and daily lifestyle

CONCLUSION

- The study will help many researchers and policymakers to conduct further research in this field.
- Root cause analysis and lifestyle modifications in the control phase are the primary approaches in the DMAIC methodology of lean six sigma to resolve overweight and obesity.
- eventually, there will be a decline in the rate of new emerging problems or risk factors associated with non-communicable diseases like overweight and obesity.
- Moreover, the findings will empower individuals, researchers, and practitioners to include the results of the study in LSS application within the healthcare domain to enhance the possibility of effective implementation.
- Additionally, the study will support greater motivation across the field of various departments in the hospital for a larger and clearer application of LSS for establishing and maintaining process improvements

LIMITATIONS

The strengths and weaknesses of the study were considered, and the presented results reflect it.
primary limitation
The weights and heights were derived from **self-reports and that itself** (Telecommunication)
second limitation
Duration of the study which is very less for interpret the concepts of being on a diet and weight by using the LSS approach.
Third limitation
was Lean six sigma methodology is a promising approach in the healthcare domain, resolving many problems by creating and applying different processes but the awareness and knowledge are very little.in addition to this availability of research work and kinds of literature are less in the count.

RECOMMENDATIONS

- Addressing the drawbacks and making changes to ensure the proper approach delivery is the need of the hour to reduce the mortality and morbidity
- The importance of LEAN SIX SIGMA must be educated to the researchers and the healthcare workers.
- There is a need of research works in this field is essential and which will be helpful for forthcoming studies

ANY SUGGESTIONS /QUERY?


Thank You!