“EFFECT OF COVID-19 SITUATION ON HEALTH & NUTRITIONAL STATUS OF ELDERLY RESIDING IN URBAN VADODARA”

JUNE 2021

TWINKLE SHAH

P.G. Diploma

Applied Nutrition

B.Sc. (F.C.Sc.) PHN

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A Dissertation submitted in partial fulfillment of the requirement for the Degree of

MASTERS OF SCIENCE

FAMILY AND COMMUNITY SCIENCES

FOOD AND NUTRITION (PUBLIC HEALTH NUTRITION)

BY

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JUNE,2021

CERTIFICATE

This is to certify that the research work embodied in the results of this thesis has been independently carried out by Ms. Twinkle Shah under the guidance of Prof. Komal Chauhan in the pursuit of master's degree dissertation in Family and Community Sciences (M.Sc.,F.C.Sc.) with major in Foods and Nutrition (Public Health Nutrition), at The Maharaja Sayajirao University of Vadodara and this represents her original work.

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-Twinkle Shah

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATION

BMI - Body Mass Index

6CIT - Six item Cognitive Impairment Test

CDC - Centre of Disease Control

CIT - Cognitive Impairment Test

CFR - Case Fatality Rate

FFQ - Food Frequency Questionnaire

MERS - Middle East Respiratory Syndrome

MNA - Mini Nutritional Assessment

SARS - Severe Acute Respiratory Syndrome

WHO - World Health Organization

ABSTRACT

ABSTRACT

"The elderly has so much to offer. They are our link with history" – John Cusack

Nutrition is a fundamental base of human life. Every individual is striving between health and diseases across the lifespan from birth till old age. Lack of essential nutrients in diet overlaps the problem of malnutrition. The COVID-19 pandemic has led to a crisis in healthcare systems all over the world. Due to the lack of effective vaccination and pharmacological antiviral intervention, pandemic control is dependent on public health measures. Even though strategies like a decrease in face-to-face communication, restriction of public gatherings, and stay-at-home policies are effective in controlling the pandemic, social and economic influences have affected vulnerable groups of people, including the elderly. Malnutrition and morbidity create a vicious cycle with a constellation of metabolic diseases. Dementia and mental health disorders, in general, are among the major causes of disability and dependency in older people, representing one of the most serious medical and social issues.

In response, the United Nations General Assembly declared 2021-2030 the Decade of Healthy Aging. Prolonged lockdown affects the social and economic wellbeing of older persons to live alone affecting their nutrition status. Public health guidance to avoid infection will continue to alter health conditions, so further support for them may be needed to ensure healthy habits to continue. Thus, the situation demands other cost-effective and healthy alternatives to improve the nutritional status of the elderly.

The present study was carried out to assess the health and nutrition status of the elderly residing in urban Vadodara during COVID-19. The data was collected on aspects like socio-demographic profile, general meal pattern, food frequency of food groups, changes in consumption pattern during COVID-19 situation, and its effects on lifestyle pattern and mental health.

DESIGN: A total of four hundred subjects of age 60-80 years were purposely selected from the free-living population of urban Vadodara. The tools used were Mini Nutritional Assessment (MNA) scores and Cognitive Impairment Test (CIT) scores.

METHOD: During December 2020 -March of the 2021 COVID-19 social lockdown, the procedure was carried out initially by circulating Google Forms to active members and then to free living populations. It accessed physical activity, diet quality, morbidity, and how

mental/physical health had been affected by lockdown. Furthermore, at the end of the study, all the subjects received tips of a healthy diet during the COVID-19 situation. The related objectives included assessing nutritional status by using the dietary profile, Mini Nutritional Assessment (MNA) scores, and BMI scores. The health status was determined by using morbidity profile and mental health status using Cognitive Impairment Test (CIT) scores. The selected subjects were classified into age groups 60-70 years and 71-80 years.

RESULTS: A total of 400 subjects with a mean age of 68.45±6.48 years, the mean age of young elderly was 64.31±3.30 years that included 95 males (36.8%) and 163 females (63.17%). Old elderly accounted to be 142 (35.5%) with a mean age of 75.95±3.30 years; that comprised 74 males (52.11%) and 68 females (47.8%). The general characteristic showed that the majority were Hindus. It was found that 86% were married, stayed in joint families (62%) and 87% were staying greater than 10 years in Gujarat. All the mean scores of MNA fell under at risk of malnourishment category with 17-24 scores. The mean MNA scores of young elderly was 19.35±2.69 and old elderly was 19.07±2.74. The mean MNA scores of females were 19.29±2.71 and of males were 19.3±2. A significant negative correlation ($r= -0.16$, $p<0.05$) was found between age and MNA scores, which indicate increase in age shows a decline in nutritional status. The mean BMI was found 24.4 in female and 24.3 in male. Among total 6 % were underweight out of which 9% were males of 71-80 years. Out of them 34% were normal, 20% were overweight and 40% were obese. A significant positive side correlation ($r= -0.38$, $p<0.05$) was found between BMI and MNA scores, which indicates that increase in BMI, shows a decline in nutritional status. While looking at dietary profile it showed that cereals and cereal products and pulses and legumes were consumed by all the subjects. When looking at gender wise classification of frequently consumed food groups, it can be noted that consumption of foods from various food groups of male subjects was more compared to the female subjects. With regards to eating habits, more than half of the subjects felt change in their hunger/satiety. Their diet had decreased as compared to previous years. 44% of subjects incorporated ayurvedic supplements to stay fit during the times of COVID-19 situation. Herbs were chosen as “kadha” to increase their immunity during the times of COVID-19 in some or other combination with either milk, water or soup. Other food supplements like giloy, trifala, amla, etc were also incorporated. There was highest craving for foods like namkeen by 32% subjects; namkeen food items like chewda, khaman, fafda, sev, etc. descended by 25% fried foods like bhajya, samosa, chips, etc. followed by beverages. Lifestyle pattern showed that yoga and meditation were high in older males (8.11%). Among

young elderly 70% males and 68% females were watching tv on daily basis. Among older elderly 22% were involved in reading newspaper. Cognitive Impairment Test showed that mean score of males was 6.90±4.38 and of female was 6.90±4.38, that falls in between normal and mild cognitive impairment among majority of the subjects. A slight positive correlation is significant at ($r=0.108$, $p\leq0.05$) was found between Age and CIT scores, increase in CIT shows decline in cognitive status was observed. The morbidity profile reveals that more than 47 % of the older female as compared to 42% of the young female were having oral cavity problems. Young females were having 44.17% gastro intestinal problems as compared to male in young group. Diabetes, heart and endocrine problems were high in young elderly with 36%, 52% and 15% respectively. Females had greater percentages of joint pain as compared to males. Chest pain was high in young male (16.8%). Half of the older females had impaired vision.

CONCLUSION: The nutrition and health status of females are affected more in terms of nutritional status in old subjects and cognitive profiles in younger subjects. Thus, the present study has indicated that the health and nutrition status of elderly is affected during COVID-19 pandemic. In trying times of covid, it is recommended that care givers support or elderly confidence with awareness plays an important role in maintaining the health and nutritional status. Individuals should be mindful of healthy eating habits to reduce susceptibility to and long-term complications from COVID-19.

INTRODUCTION

INTRODUCTION

"The glory of elderly is their insight to life." - Lailah Gifty Akita

Aristophanes once referred to old age as a "second childhood". The elderly need a lot of care, emotional support, and being there, just the way an infant does. However, they don't always receive the much-deserved attention and care in their senior days. Aging is both favorable of denture, growth, acquisition of immunity and harmful of all intrinsic diseases and autoimmune diseases. All these age-related changes more often remain disease-free and asymptomatic for the life span of individuals. During aging elasticity of cells and fibers loses & dries out. A longer life brings with its opportunities, not only for older people and their families but also for societies. Additional years provide the chance to pursue new activities such as further education, a new career, or pursuing a long-neglected passion.

In December 2019, a new type of coronavirus (SARS-CoV-2) genetically similar to SARS-CoV, which caused pneumonia and death, was identified in Wuhan, China. Depending on how severe the outbreak is, public health officials may recommend community actions that can slow the spread and reduce the impact of disease to reduce people's risk of being exposed to COVID-19.

During the unsettling times of the COVID-19 pandemic, there has been a severe impact on individuals' health, rights, and well-being. Due to the crisis in health care systems all over the world, lack of effective vaccination and pharmacological intervention, control is largely dependent on public health measures.

After the first case confirmed positive, reported on January 30, 2020, in Kerala, now the epidemic has expanded its footprint in the country, affecting over 27 million people as of May 2021. While the central and state governments have been trying hard to track and isolate infected people, a gradual rise of pandemic became worrisome.

The COVID-19 pandemic is impacting the global population in drastic ways. In many countries, older people are facing the most threats and challenges currently. Although all age groups are at risk of contracting COVID-19, older people face a significant risk of

developing severe illness if they contract the disease due to physiological changes that come with aging and potential underlying health conditions (WHO 2020).

During the times of COVID-19 elderly are hard hit. COVID-19 has caused an unequal impact on society and the economy. People in the second half of age are burnt badly due to high risk of illness and high case fatality rate irrespective of ethnicity, gender & choice of living. In older people, the influence of the outdoor environment on their health is reflected in effect on their behavior; that is, the environment influences their behavior, and the combination of the environment and their behavior has an influence on their health. (Zhanget al, 2020)

The influences of stay-home policies and restrictions on public gatherings have obviously affected vulnerable groups of people, including the elderly (Nakayama et al, 2020).Since then, the population was first ordered to stay at home for two weeks that were later extended by another two weeks to halt the spread of coronavirus. Under that situation, people were allowed to leave home to buy essentials from supermarkets and pharmacies, go to work in those cases was essential (pharmacies, healthcare, supermarkets, etc.) while maintaining social distance. This implementation firstly caused panic buying and disruptions to food supply leading to shortages of some staple foods in most supermarkets and grocery stores. However, after the first four days, most companies ensured sufficient food supply during this period of confinement in view of COVID-19. Despite that, the situation seemed to be normalized; not all food and food products were easily available at the supermarkets, making senior citizens even more vulnerable(Rodríguez-Pérez et al., 2020).

The risk for severe illness with COVID-19 increases with age, with older adults at higher risk, people of 60-70 years are at higher risk for several illnesses or mortality than people in 50 years. According to the CDC, 8 out of 10 COVID-19 deaths reported in the US have been in adults 65 years old and older.

The rising prevalence continues to increase with Indian projections, even though Indian tradition has a large potential of traditional ways of food & living. Older people are vulnerable to malnutrition for many reasons. Malnutrition and morbidity create a vicious cycle with a constellation of metabolic diseases. In addition, ongoing research indicates that dietary habits, such as restricting one's calorie intake and consuming antioxidants, may

increase longevity. The mean nutrient intake of malnourished elderly is less than the RDA and that of the well-nourished elderly. Per capita income and self-view of educational status are strongly associated factors contributing to the nutritional status of the elderly. Since many of the elderly are staying at home and doing less in terms of social interactions and exercise, this can have a negative effect on their physical and mental health.

When infected with SARS-CoV-2, the body releases different types of inflammatory molecules called chemokines and cytokines. These molecules act as early warning systems for the body, telling the immune system the body is under attack. Since older adults have depleted reserves with lesser immunity are unable to fight effectively through the new virus strain.

A decreased metabolism, changes in taste and smell, and slower digestion may affect appetite, the foods to eat, and how the body processes that food. But now, more than ever, healthy eating is important to maintain your energy and health. Many adults complain of sleep problems as they age, including insomnia, daytime sleepiness, and frequent waking during the night. Exercising, keeping your brain active, and maintaining creativity can help to prevent cognitive decline and memory problems. One in four people will struggle with mental health at some point in their lives. And with the coronavirus pandemic and troubled economy, many are in crisis right now. As we grow older, most of the people experience physiological changes that can cause glitches in brain functions that always is taken for granted. The brain can produce new brain cells at any age, so significant memory loss is not an inevitable result of aging. But just as it is with muscle strength, we must use it or lose it. The lifestyle, habits, and daily activities have a huge impact on the health of your brain. Short-term memory is a part of the aging process, not a warning sign of serious mental deterioration or the onset of Alzheimer's or another dementia. High blood pressure (or "hypertension") has been shown to damage the tiny blood vessels in the parts of your brain responsible for cognition and memory, greatly increasing your risk of developing Alzheimer's disease or dementia. Also, experiencing normal changes in the sleeping patterns, such as becoming sleepy earlier, waking up earlier, or experiencing less deep sleep. However, disturbed sleep, waking up tired every day, and other symptoms of insomnia are not a normal part of aging (Melinda Smith, 2021). Since the pandemic has messed the living, the chances have become even higher.

Malnutrition is a threat multiplier; if no action is taken, then the effects of the current COVID-19 pandemic will only make it harder for vulnerable populations to protect themselves against malnutrition (Global Nutrition Report, 2020).

While COVID-19 affects all groups, severe pathology and mortality are disproportionately highest in the elderly, underrepresented minorities, and/or in those with underlying comorbidities. Obesity and type 2 diabetes, two prominent risk factors for severe COVID-19, may underlie the health disparity observed in these populations (Dietz & Santos-Burgoa, 2020).

Agriculture and allied activities are considered essential to harvest and supply to the market, even in the middle of the COVID-19 pandemic. But an agrarian crisis occurred and disrupted the food system. During this, the state has two primary challenges in the agriculture sector to ensure food security across the country and minimum post-harvest loss with new social distancing and safety rules. The United Nations World Food Program has estimated 265 million people to face acute food shortage after the COVID-19 crisis. India faces the threat of food security despite holding 58.4 million tonnes of food grain in addition to 3 million tonnes of pulses in godowns. In response to the crisis, the central government announced five kilograms of rice and pulses for the next three months under the Public Distribution System (PDS).

The Elderly is the fastest-growing population among developing countries and are also more susceptible to many health risks from a nutrient-poor diet during hard times. Despite having low energy intakes with age, the elderly have higher requirements for several micronutrients, making them vulnerable to deficiencies that further elevate chronic conditions with reduced immunity. There is a wide range of reasons why older individuals might not be eating the most nutritious diet. Their physical, mental, and economic capacities reduce with the passage of time. The factors that can contribute to the fact that a significant number of older men and women consume less food than required because of their poor dentition, loss of teeth and poorly fitted dentures can cause chewing problems and mouth sores, making the eating process difficult. It is found that diminished food intake, depression and negative thoughts were also seen more in the institutionalized elderly as compared to the elderly living with family. It has been demonstrated that older adults who eat meals in the company of others have better dietary quality. Hence, the family and caregivers of these

older adults should organize a schedule to be present during mealtimes using social media. Contact with family and trusted people through telephone and messages is also important, and it could help to reduce loneliness.

Furthermore, people were also encouraged to eat a healthy and balanced diet, be physically active and maintain a healthy lifestyle to support their immune system during these difficult times. This rise complements with post-retirement and multiple morbidity problems in the elderly calls for a careful planning of their total care at all levels and at all stages of their life. The present study, therefore, was focused on health and nutritional aspects during COVID-19 in particular.

Against this emerging and rapidly evolving situation, and independently of the availability/non-availability of food products, people should have had more time for cooking and for organizing their meals. But also, people had more time for watching television (TV) and even to get bored. Watching TV has been associated with snacking frequency, especially energy-dense snacks, fast foods or soda beverages (Thomson and Spence, 2008).

During the COVID-19 lockdown, the sense of hunger and satiety changed for more than half of the population:17.8% of responders had less appetite, while 34.4% of respondents increased appetite (Brake et al, 2020). There was a slight increase in the tendency to eat breakfast. Lunch remained the main meal before and during COVID-19. Compared to before COVID-19, people were much more likely to have a late-night snack or meal during COVID-19. Some changes in daily life, including changes in some eating practices, physical activity and sleeping habits during the pandemic.

The World Health Organization, 2005 estimated that the overall prevalence rate of depressive disorders among the elderly generally varies between 10% and 20% depending on the cultural scenarios, the condition deteriorates when they lose their partners and are left completely alone in the family. According to the census (2011), around 15 million elderly live all alone and three-fourth of them are women. There are not enough old age homes, especially in Indian villages, where the old man or woman could spend his or her last days of life in peace, with someone to take care of them. Hence, it is the left alone elderly population who have to do the daily chores of life and also take care of their own selves till they die. These issues demand action-oriented research programs in developing nations

where such initiatives and societal database information about the elderly class of population are scanty.

According to a study, the top contents of ways of coping up with different problems faced by elderly staying alone by importance, representativeness, or prominence are "begs or requests others for food," "goes to a government hospital," "works in the field sometimes," "utilizing old-age scheme," and "begs or requests others for money." This condition is even worse during the COVID-19 situation.

A study also stated that, it had been found that many of them beg or request their neighbors for food or sometimes skip meals and remain empty stomach. Some of them cook food themselves from the raw materials and vegetables that they purchase or get from the neighbours. They pass their time by gossiping with other people, who are mostly of their age. Some of them said worshipping God makes them feel happy and gives strength in surviving during the pandemic time. Some of them had to stay in other homes during the lockdown phase.

According to the Korea Centers for Disease Control and Prevention, the overall case fatality rate (CFR) was 2.37% in 11,344 patients with confirmed cases on May 28, 2020, but it was much higher in the elderly (10.9% in patients aged 70 – 79 years and 26.6% in patients ≥80 years). In another analysis of 44,672 cases in China diagnosed as of February 11, 2020, the overall CFR was 2.3%. However, the CFR was 8.0% in patients aged 70 – 79 years and 14.8% in patients aged ≥80 years.

A study on elderly residing in the rural villages of Raichur, stated that the prevalence of morbidity was 91.7%, with an average of 3 per person. Females (58.9%) had more morbidities than men (41.1%). The three most common morbidities were orthopedic (50.5%), cataract (50.4%), and respiratory (31.3%). 26.6% suffered from gastrointestinal morbidities, while 23.9% had dental problems. 20.9% had hypertension with equal prevalence among both sexes. Only 17.4% were diabetics with the majority being women. Central nervous system morbidities were 14.2%, while 9.6% suffered from hearing loss and varicose veins. 8.2% had genitourinary-urinary morbidities and incontinence (1.7%) was common among both sexes. Depression (71.1%) and dermatological morbidities (4.7%) were prevalent among women.

During the COVID-19 pandemic, an age-associated vulnerability in the burden of disease has been uncovered. Understanding the spectrum of illness and the pathogenic mechanism of the disease in a vulnerable population is critical, especially during the pandemic. The study among the elderly in the rural area of Vadodara has highlighted a high prevalence of morbidity and identified common existing medical problems such as like musculoskeletal disorder, depression, vision and dental problems, hypertension and diabetes mellitus. Therefore, the facilities providing geriatric health care services should be strengthened to provide comprehensive services at every level to address the health care needs of the vulnerable elderly population.

Older people cannot be quarantined within crowded living quarters, where they can be exposed to young asymptomatic carriers, and older people who live alone struggle to access care without risking contact with infected individuals. Extended families that ordinarily create a protective environment and provide informal care can engender environments that increase mental health problems and domestic abuse (Ibanez & Kosik, 2020).

The prolonged lockdown has forced the elderly to live alone. The separation from children and grandchildren has got sadness and anxiety among them. Depression affects between 10% and 20% of older people and is frequently comorbidity with anxiety disorders *(*Rodriguez et al., 2008). Therefore, it is expected that the effect of the COVID-19 in the region will have a higher impact on our elderly population and among those with mental health disorders.

Data available on the health and nutritional status of the elderly in times of the COVID-19 pandemic is scarce. Therefore, the present study was planned with a view to exploring problems of food-related crisis among elderly with different zones and belonging to 60-80 years age groups.
Further, an assessment of their nutrition, lifestyle, mental status and disease profile was also carried out.

Rationale of study

- During the times of COVID-19 elderly are hard hit.
- Older people are victims and not agents to spread COVID 19 need to be sensitized.

- People in the second half of age are burnt badly due to high risk of illness and high case fatality rate irrespective of ethnicity, gender & choice of living.
- Prolonged lockdown affects older persons' social and economic well-being to live alone, affecting their nutrition status.
- The association between nutritional status and older age group, female gender, dependent functional status, dependent financial status and inadequate calorie intake was found to be significant.

Based on this, the objectives of the study were:

Broad objectives of the study:

- To assess the health and nutritional status of the elderly in Vadodara during the COVID-19 pandemic situation.

Specific objectives of the study:

- To assess the demographic profile, nutritional status by MNA and mental health profile of the geriatric urban Vadodara during the COVID-19 pandemic situation.
- To assess the food pattern, lifestyle pattern and morbidity profile/ health status of elderly subjects during the COVID-19 pandemic situation.
- To correlate the baseline parameters of the study population between gender and age group and to share healthy diet tips to all elderly.

To fulfill the above objectives, the review of the literature used is described in the next chapter.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Nutrition is one of the key factors associated with the health and overall wellbeing of every individual. Considering the elderly population which has increased on account of demographic transition, it has been observed that there has been a transition in terms of health care especially older adults.

Coronavirus disease 2019 (COVID-19) is a threat to all of humankind and, in particular, to older people. Older people, even if in good health, are one of the most high-risk population groups, together with people with chronic and severe diseases. Consequently, older people have been living under a constant fear of death and losing their loved ones, and they have even experienced guilt for being a carrier and spreading the COVID-19 infection. In addition, the necessity for older people to self-isolate and 'cocoon' can be extremely challenging, especially for those who live alone and in isolated areas. Furthermore, because of the pandemic, most services that were helping older people to remain active and to maintain socialization are closed. The detrimental effect of social isolation, social disconnectedness, and loneliness on the mental health of older people has been well described.

Thus, the study aims to assess the impact of COVID-19 pandemic on health and nutritional status of elderly residing in urban Vadodara. Hence, the primary outcome is to study dietary pattern and Nutritional status, Major and minor illness prevalent in elderly and Mental Health status of elderly during COVID 19 situation. The related objectives were to study the information on elderly population with respect to socio-demography, nutritional status, dietary intake, mental health, morbidity status and lifestyle related factors.

The relevant review of literature has been presented under the following heads:

1. Introduction to Aging
2. Aging Scenario
3. COVID-19 statistics and fatality rate data
4. Aging and Immunity during COVID-19
5. Nutritional Status of The Elderly during COVID-19
6. Health and Morbidity in Aged during COVID-19
7. Aging and Mental Health Status during COVID-19
8. Support for elderly during COVID-19

1. INTRODUCTION TO AGING:

Geriatrics is a branch of the medicine pertaining to the diagnosis, treatment, and prevention of disease in the elder population. According to WHO, a person who is more than 65 years of age is consider as 'elderly' or older person.

Studies suggest 'age' as a powerful predictor of state of individual's health and associated risks of mortality and morbidity, other factors include diversity in terms of health status/ health trajectories, life course, environment (pollution/ accessible infrastructure) and behaviors patterns and predictors like genetic factors, individual factors like occupation, income status, education cause variability in the health status. The World Health Organization (WHO) states the mechanisms of aging (elderly) and health status as complex. The elderly experiences an array of problems which can be categorized as social, economic, health and psychological. Some serious issues that have to be addressed include poverty, social insecurity, food insecurity and health problems including malnutrition which is seen at an alarming rate. Other problems faced by elderly are lack of income, irregularity infacilities providing any allowances causing absence of finances, causing illness, health deterioration causing inability to work and also loneliness (caused due to abandonment of the family members) (Khole & Soletti, 2018).

In a report it stated that it is important to understand the nutrition status of the elderly. Here are some enlisted nutritional challenges faced by the elderly. They included vulnerability, unintentional weight loss, chronic illnesses, disabilities, increased protein, vitamin B6, calcium and vitamin D requirements and reduced energy requirements. According to the Building a Knowledge Base on Population Aging in India (BKPAI) in 2012 data on elderly in India, it was found that 648 per 1000 elderly have chronic morbidities wherein there are stark differences in prevalence according to gender, income and place of residence.

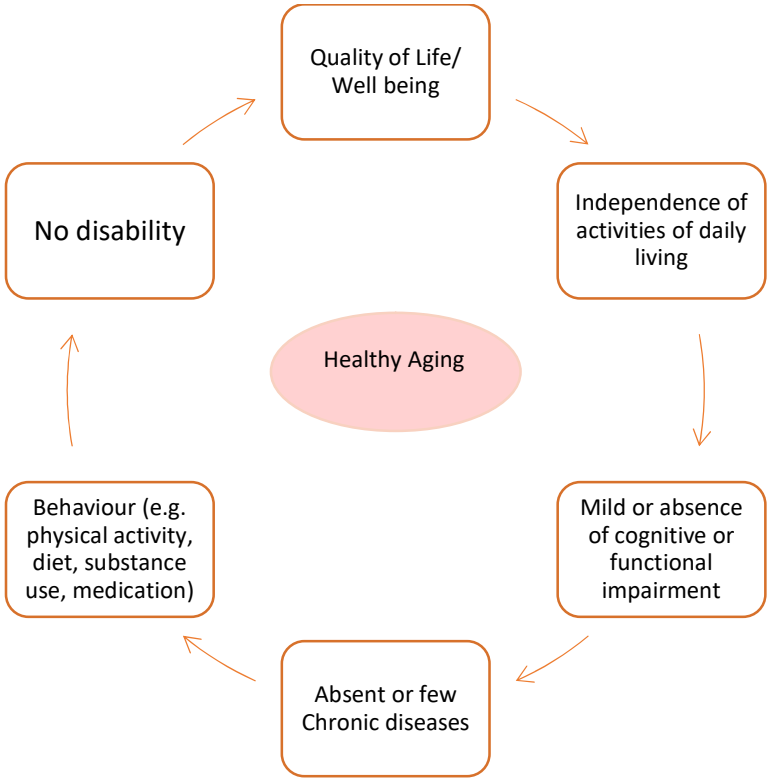
India has three types of caregivers; spouse, adult married children with their families and institutional care. The National Sample Survey Office (NSSO) in 2015 reported about three-fourth of the elderly are supported by their own children, 7 percent and 11 percent of women were supported by their spouses and 8 percent and 12 percent were supported by institutional care. Health seeking behavior and wealth had a significant relationship with each other, higher the person's wealth quintile the more likely the person can seek care (World Health Organization, 2017). Moreover, the power dynamics in the family play an essential role in affecting treatment decision. The interfamily relationship, as well as the

level of education of education of the head of household, exert considerable influence on health-seeking behavior.

Healthy Aging

Factors like genetics, environment and lifestyle, impact the rate of aging and consequent morbidity and mortality. Healthy aging can be achieved by giving due emphasis to the life style factors which include appropriate diet, physical activity and avoidance of substance use as shown in figure 2.2.1. A longer life brings with it opportunities, not only for older people and their families, but also for societies as a whole. The extent of the beneficial opportunities that arise from increasing longevity will depend heavily on one key factor: health. Good health adds life to years.

Figure 2.1.1: Healthy Aging cycle

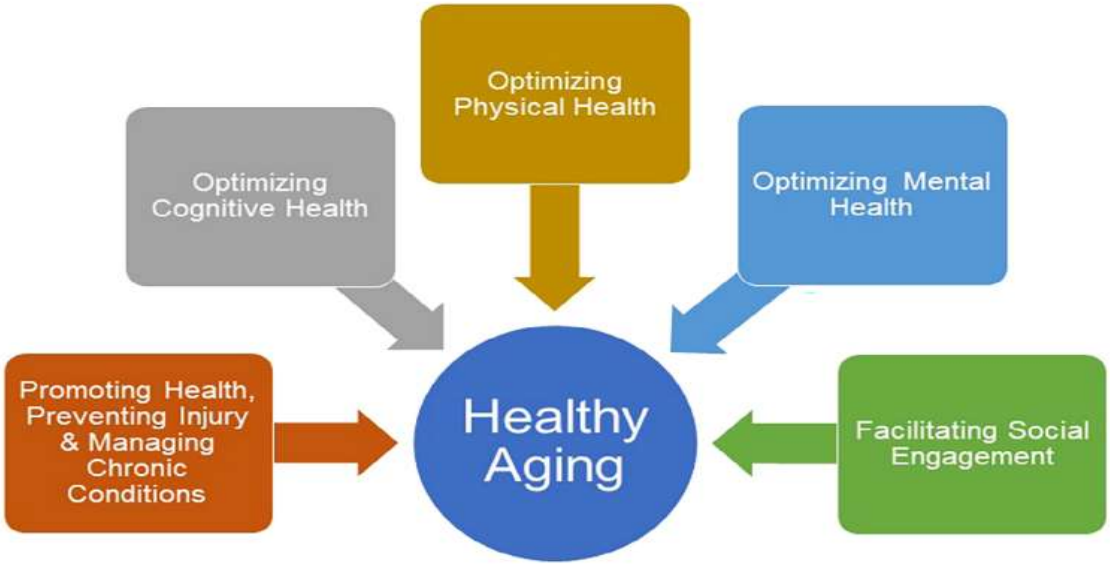


Source: (Manisha Sabharwal, 2020)

Healthy aging is defined as a multidimensional construct of five key health promotion domains focusing on promoting and optimizing: (1) promoting health, preventing injury, managing chronic conditions; (2) cognitive health; (3) physical health; (4) mental health; and (5) facilitating social engagement and resilience. COVID-19 threatens each of these

domains in older adults by compromising short- and long-term out- comes, thereby negatively impacting health and well-being as shown in figure 2.1.2 (Batsis et al., 2021).

Figure 2.1.2: Healthy aging framework around national prevention strategy in the era of COVID-19.



Source: (Batsis et al., 2021)

The process of ageing brings about physiological, psychological and immunological changes which influence the nutritional status. Heredity and good nutrition may slow the ageing process so that the individual enjoys physical and mental vigor in his eighties. Goal of nutritional care should be to help the aged achieve a healthy, purposeful and independent living.

In nearly 60-65 years of one's life habits, especially those pertaining to diet usually get molded by factors like heredity, health, family, education, occupation and numerous other socioeconomic and cultural factors. They are set in their ways and they cannot totally modify their whole pattern of eating.

Older adults are also at-risk for malnutrition and those at-risk before the pandemic are even more vulnerable now due to unhealthy eating habits and food insecurity. Food insecurity, defined as the lack of consistent physical, social, and economic access to adequate and nutritious food, has been exacerbated by increased unemployment, poverty, and higher food prices. Before the pandemic, at least 8% of households with an older adult living alone were classified as having food insecurity. That number has increased significantly since its onset.

Although adequate calorie intake is clearly a priority, a well-balanced diet, centered on non-processed foods is also important, with limited alcohol intake. Adequate consumption of protein (plant over animal) to counter increased sedentary behavior and increased risk of sarcopenia should be urged. Access to food remains problematic; taking advantage of delivery options from grocery stores, curb- side pick-up, availing of senior-only hours, or asking family or friends for help with weekly shopping can be helpful. A large national survey identified a clear increase in loneliness corresponding with the early months of the pandemic and associated isolation precautions. Those identified as being at notably increased risk were women, as well as those who live alone, who are not working, who are of lower socioeconomic status, and who report poorer physical and mental health at baseline (Batsis et al., 2021).

The COVID-19 pandemic has led to a crisis in healthcare systems all over the world. Due to the lack of effective vaccination and pharmacological antiviral intervention, pandemic control is dependent on public health measures. Even though the strategies like decrease in face-to-face communication, restriction of public gatherings and stay- at-home policies are effective in controlling the pandemic, social and economic influences have obviously affected vulnerable groups of people, including elderly.

2. THE AGING SCENARIO

Population aging is an inevitable and also irreversible demographic fact. Therefore, the three key demographic changes i.e., declining fertility, reduction in mortality and increasing survival at older ages, contribute to population aging. The global population of elderly (60 years and above) is growing faster than the general population. With globalisation coming into existence, there has also been an exchange of traditions, beliefs and practices amongst the various parts of the world. We incorporated into our lives some strands of the western way of living that brought us convenience and comfort.

Although there is no definitive United Nations (UN) standard age at which a person is considered elderly, the UN has established an agreed cut-off of $\geqslant$60 years old. A factsheet recently published by the World Health Organization (WHO) indicates that approximately 12% of the global population (900 million people) was aged $\geqslant$60 years in 2015, with projections of this value almost doubling to 22% (2 billion people) by 2050. Similar predictions have been made in research, with some suggesting that almost a quarter of the

global population will be at least 60 years of age by 2050. Indeed, the number of adults to reach the age of ⩾65 years has been estimated to be more than double that of the year 2000 by 2030. Even more substantial claims have been made by other research groups predicting that 21% of the worldwide population will be at least 80 years old by 2050. Considering current statistics and estimates for the future population, this already important public health issue will likely become even more pressing in the coming years (Corcoran et al., 2019).

The United Nations Department of Economic and Social Affairs projected that the elderly population in India is going to rise from 8% in 2015 to 11.5% in 2025 and 19% in 2050. They have also projected the old-age dependency ratio for India to increase from 9/100 (2015) to 11/100 (2025).

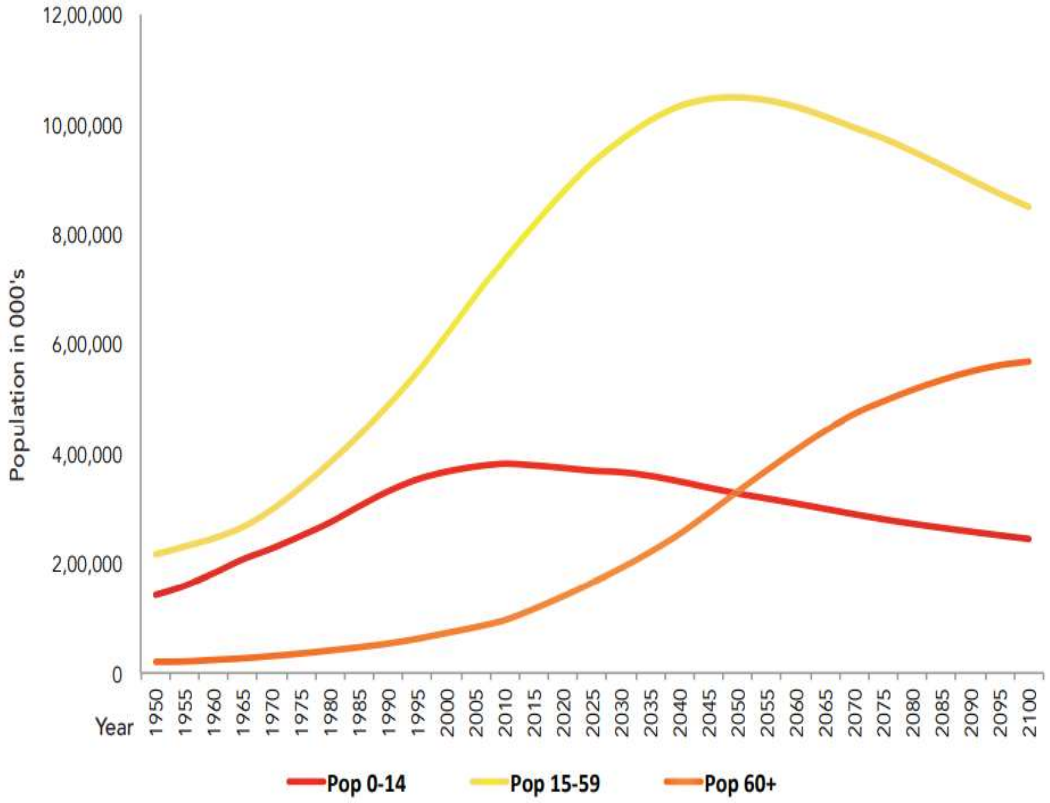
The rising prevalence continues unabated with India. Despite the facts that Indian tradition has an enormous potential of traditional way of food & living, older people are vulnerable to malnutrition for many reasons. Malnutrition and morbidity create a vicious cycle. In addition, ongoing research indicates that dietary habits, such as restricting one's calorie intake and consuming antioxidants, may increase longevity. Mean nutrient intake of malnourished elderly is less than the RDA and that of the well-nourished elderly. Per capita income and self-view of educational status are strongly associated factors contributing to the nutritional status of elderly.

Department of Economic and Social Affairs Population Division, World Population Aging 2015 stated that, Globally, the 60-plus population constitutes about 11.5 percent of the total population of 7 billion. By 2050, this proportion is projected to increase to about 22 percent when the elderly will outnumber children (below 15 years of age). In developed countries, the proportion of the elderly will increase from 22.4 percent in 2012 to 31.9 percent in 2050. This proportion is estimated to more than double in less developed countries with an increase from 9.9 percent in 2012 to 20.2 percent in 2050. In least developed countries, the proportion of the elderly in 2050 is projected to be below 11 percent (India aging report 2017).

The data given in following figures shows huge population and while looking vulnerable populations including elderly the impact of COVID-19 was studied. Thus age wise classification of following figures 2.2.3, 2.2.4, 2.2.5 and 2.2.6 it can be understood that there

is vast and very fast aging in population. As reviewed in following studies COVID-19 shows grave impact.

Figure 2.2.3: World population by age category, 1950-2100



Source: World population prospectus, United Nation, 2015.

Indian scenario

India's elderly population is also growing rapidly and is accounted for 8.1% of total population in 2011. Such rapid rise will definitely pose several challenges. Therefore, India needs to prepare to address these social, psychological, economic and health needs of aging population. 10.4 Crores elderly with approximately 75 % reporting at least one chronic illness (India Census, 2011). According to World Population Prospects 2019, by 2050, 1 in 6 people in the world will be over the age of 65, up from 1 in 11 in 2019 (United Nations, 2019).

The size and percentage of elderly population in India is increasing largely, the share of population over the age of 60 is projected to increase from 8 percent in 2015 to 19 percent in 2050. By the end of the century, the elderly will constitute nearly 34 percent of the total

population in the country. Therefore, indeed relatively young India today will turn into a rapidly aging society in the coming decades.

Figure 2.2.4: Percentage of population by broad age-groups, India 2011-2036

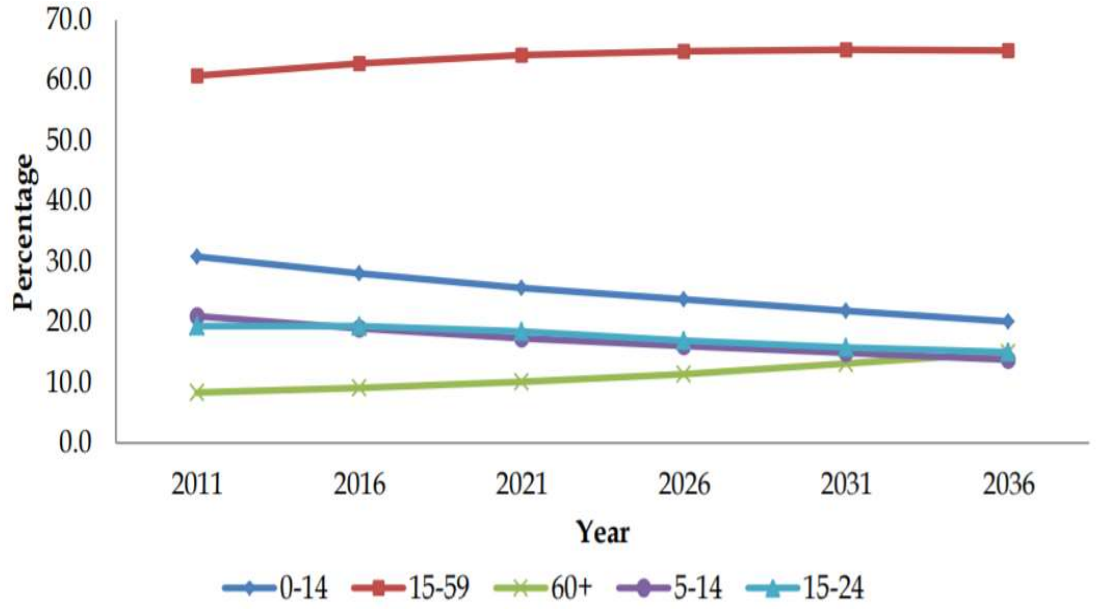
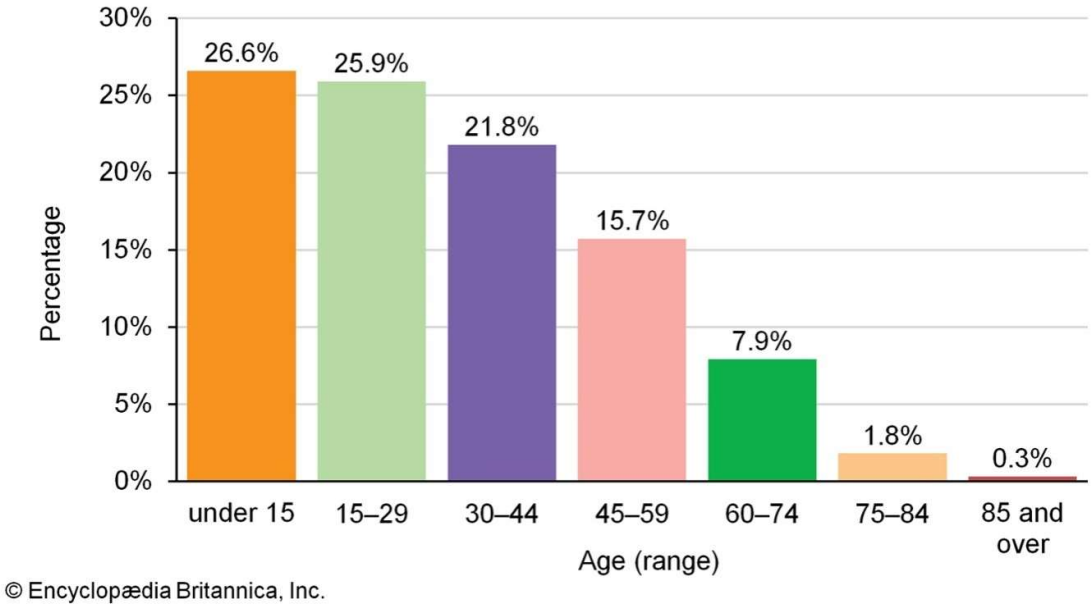


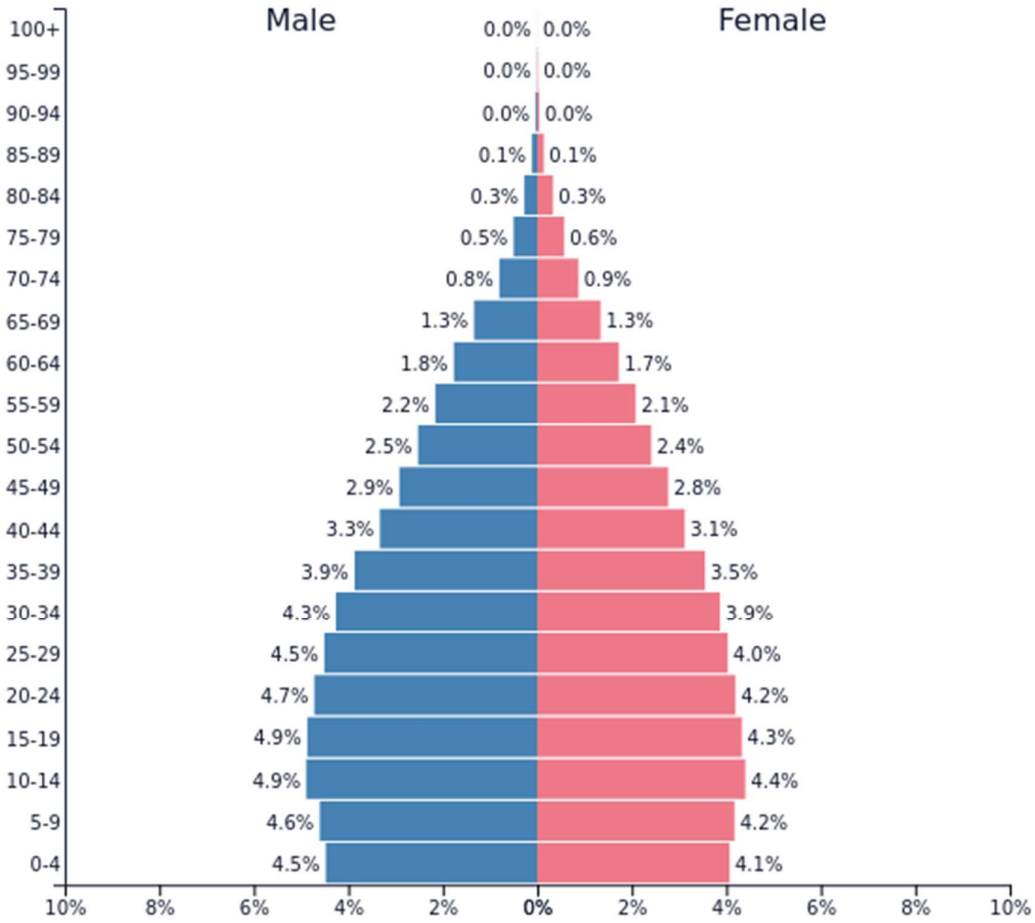
Figure 2.2.5: India age breakdown, (2018)



As per publication by the Ministry of Statistics and Programme Implementation of India regarding elderly in India, 8.6% population (104,133,528 people) belonged to elderly people were present in Census-2011 and this was projected to be around 10% (135,389,042 people) in the projected population of 2019. If the contribution of this age group in economic section

of the country is considered, then it was found that 41.6% of this age-group people are responsible for strengthening the economic ground of India and as per census-2011, the total population became 503,715,670 persons, which is at high risk in current pandemic. If the social distancing and lockdown could not be followed then this population portion could be at very high risk (Singh et al., 2020).

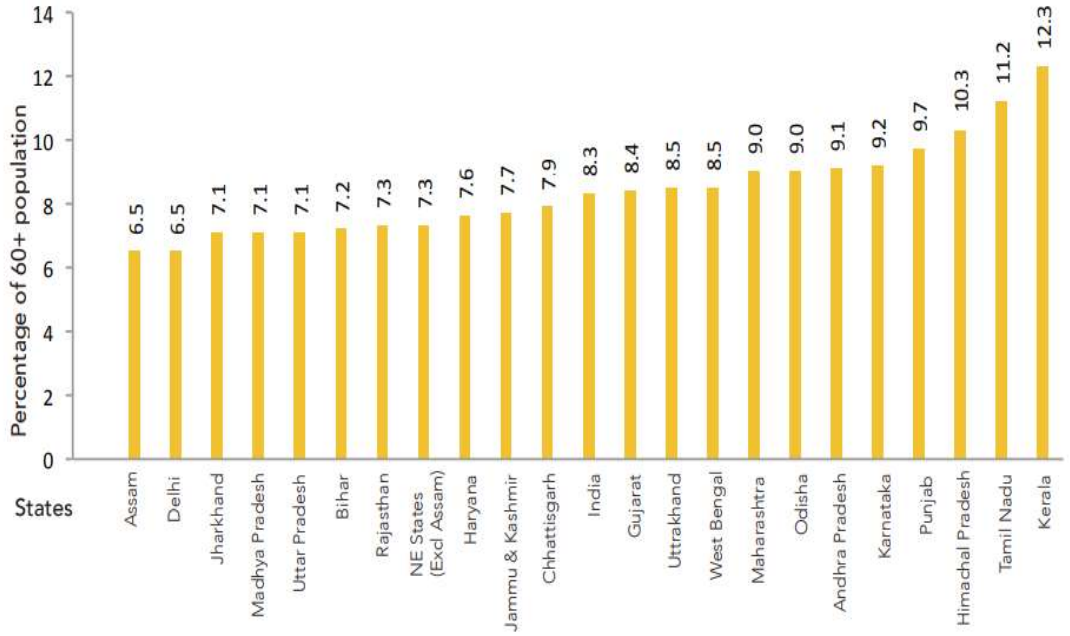
Figure 2.2.6: Age wise Indian population, 2019, population: 1,366,417,755



Source: populationpyramid.net(2019)

The elderly population in India has almost doubled in the past 20 years. While the overall population of India is projected to grow by 40 per cent from 2006 to 2050, the elderly population is projected to grow by 270 percent. Hence, the aging population is expected to surpass the population of children in another 20 years (Mudgal & Wardhan, 2020).

Figure 2.2.7: Percentage of Population in the age group 60 years and above to the total population by sex and residence, India and bigger States/UTs, 2015



Source: Census of India, 2011

Disparities exist if we compare the growth rate of elderly population of different states of India. The rate of growth of elderly population is highest in southern states such as Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu. Amongst the southern states Kerala has the largest growing rate of elder's population. Gujarat shares 8.4% of elderly shares and is in between of larger rate and lower rate along with Chhattisgarh and Uttarakhand as shown in figure 2.2.7. The other Indian states, notably Haryana, Himachal Pradesh, Maharashtra, Orissa, and Punjab are also experiencing a boom in elderly population, largely in rural areas. Hence Gujarat population is on greater side to be affected by COVID-19. According to census 2011, the population of elderly is 9% of the total population in Vadodara city which now would be much higher.

3. COVID-19 STATISTICS AND FATALITY RATE DATA

According to the World Health Organization Statement, 2020 – Older people are at highest risk from COVID-19. Over 95% of these deaths occurred in those older than 60 years. More than 50% of all deaths were people aged 80 years or older. About 8 out of 10 deaths are occurring in individuals with at least one underlying comorbidity, in particular those with cardiovascular diseases/hypertension and diabetes, but also with a range of other chronic

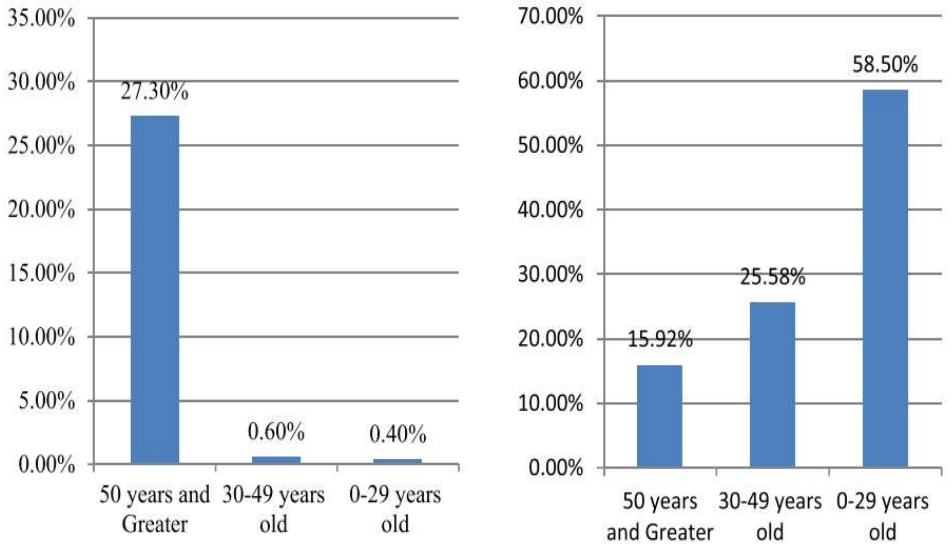
underlying conditions. There's a direct correlation between mortality and age. So if you're 60 to 69 years, the mortality rate is at 3.6%. At 70 to 79 years, it's 8%. And if you're 80 years or above, it's 15%. In some of the data, it's even higher, at 18% (WHO, 2020).

Census 2011 – 10.4 Crores elderly with approximately 75 % reporting at least one chronic illness. Elderly people (> 60 years age) are at higher risk of COVID-19 infection due to their: 1) decreased immunity 2) body reserves 3) multiple associated co morbidities like diabetes, hypertension, chronic kidney disease and chronic obstructive pulmonary disease. There's a direct correlation between mortality and age. So, if you're 60 to 69, the mortality rate is at 3.6%. At 70 to 79, it's 8%. And if you're 80 or above, it's 15%. In some of the data it is seen, it's even higher, at 18%. There is a higher risk for severe illness due to COVID-19. The is a change in body composition and progressive decline in water content and lean body mass, compensated by increase in body fat. Various organs and systems of the body show a decline in function especially gastrointestinal tract, sensory losses of vision, hearing, taste, smell and also thirst. Also, a decline in efficiency of heart, liver, gall bladder, pancreas, kidney, lung and a compromised immune system. Elderly is typically a vulnerable group as both the states of undernutrition and overnutrition pose a serious threat to their health.

A study that summarized 12 countries or regions found that the overall incidence of malnutrition in the elderly was about 23%, with a 50.5% higher incidence in rehabilitation institutions and a 38.7% incidence in hospitalized patients. The incidence of malnutrition in elderly patients with COVID-19 was higher. The main reasons may be as follows. First, the protein that made up muscles was consumed by the acute inflammatory response of neo-coronavirus infection. Patients' inflammation indicators increased generally, such as C-reactive protein, ferritin, tumour necrosis factor alpha, interleukin family factors, etc. Second, among elderly patients with COVID-19, comorbidity in diabetes mellitus was much more than general population. In other words, high rates of comorbid diabetes mellitus led to higher rates of malnutrition in elderly patients with COVID-19. Diabetes patients due to their own internal glandular dysfunction, had disorders in metabolism of the three major nutrients, which was the internal cause of malnutrition. Third, gastrointestinal symptoms caused by SARS-CoV-2 exacerbated malnutrition in elderly patients. Angiotensin-converting enzyme 2 was also highly expressed in the gastrointestinal track. So, the gastrointestinal tract was also the main target of SARS-CoV-2 attack. Diarrhoea, mild

abdominal pain, nausea, vomiting, poor appetite, and other symptoms were very common. The involvement of the digestive tract had accelerated the occurrence of malnutrition in elderly patients with COVID-19. Fourth, the poor appetite of the patients was also related to the patient's anxiety. Patients' fear of their own illness, worrying about long-term isolation, and desire for normal social communication, led to anxiety, which further reduced the appetite of the patient and further aggravated malnutrition. At the same time, anxiety disrupted homeostasis, which was also a contributing factor to malnutrition(Yang et al., 2020). Figure 2.3.1 shows impact analysis of COVID-19 on age group (50 years and greater) in India

Figure 2.3.1: Impact analysis of COVID-19 on age group (50 years and greater) in India



(a) Worldwide Age-wise Deathrate Trends (census 2011)

(b) Population Distribution in India

Source: (Singh et al., 2020)

Age distribution of patients who died during COVID 19 in India (as on May 22,2020 by Ministry of health): <15 years (0.9%); 15-30 years (2.5%);30-45 years (11.4%); 45-60 years (35.1%); >60 years (50.5%). COVID 19 in elderly could be mostly asymptomatic, exacerbation of pre-existing symptoms/diseases or unusual presentations like confusion states etc. They are also particularly at risk for social isolation, loneliness, lack of access to food and medications at this time. Figure 2.3.2 shows impact ratios show how different ages are affected relative to population share in India.

Figure 2.3.2: (a)The impact ratios show how different ages are affected relative to population share in India

(b) Case and Death Distribution by Age for India.

(a)

	Age Group								
	0-9	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**
Case % [1]	3.6	8.1	21.5	21.0	16.8	14.2	9.9	3.8	1.1
Pop % [2]	19.8	20.9	17.6	14.4	11.1	7.3	5.3	2.4	0.9
Impact [1/2]	0.2	0.4	1.2	1.5	1.5	2.0	1.9	1.6	1.2

(b)

	Age Group								
	0-9	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60-69**	**70-79**	**80+**
Cases (%)	3.6	8.1	21.5	21.0	16.8	14.2	9.9	3.8	1.1
Deaths (%)	0.8	0.9	2.4	5.5	13.5	24.0	30.4	15.7	6.7

Source: (Philip Debraj Ray Subramanian et al., 2020)

The 'case fatality rate' or CFR which is the share of deaths in all confirmed cases is highest in the older age groups. The younger 74% of the population (up to 39 years old) account to only 10% of all COVID-19 related deaths, while the 60+ years age group, making up just 9% of the population has an immensely large share of 53% of all deaths. The 60+ years age group, amount to just 15% of India's confirmed cases but 53% of deaths due to COVID-19 (Mudgal & Wardhan, 2020).

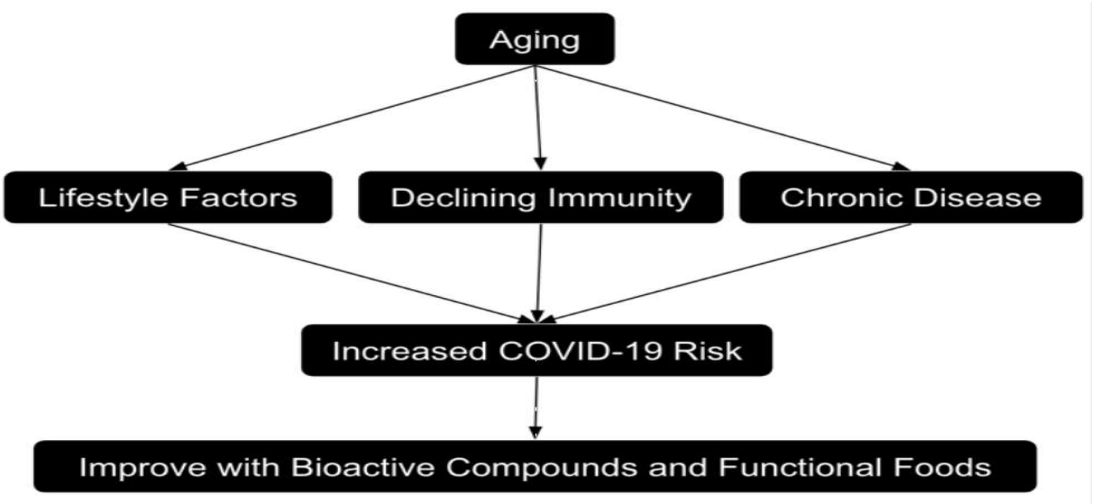
4. AGING AND IMMUNITY DURING COVID-19

Nutrition and diet are found to affect susceptibility in two ways: (1) by leading to chronic diseases or comorbidities that weaken the body—as 89.8% of fatalities from the disease had at least one comorbidity or (2) by directly affecting the body's immune system and ability to fight off viruses. Since the elderly already have declining immunity, it is substantially more important for them to receive all essential nutrients in recommended quantities while also managing chronic conditions using lifestyle changes and pharmaceuticals (Martirosyan & Polamarasetti, 2020).

A study from Journal of the American College of Nutrition stated that the importance of dietary protein cannot be underestimated in the diets of older adults; inadequate protein intake contributes to a decrease in reserve capacity, increased skin fragility, decreased immune function, poorer healing, and longer recuperation from illness. There is change in body composition as people get older. The main alteration in the body is the reduction in

total protein. There is a noticeable decrease in skeletal muscle, with a reduction in other proteins such as organ tissue, blood components, and immune bodies as well as declines in total body potassium and water. This contributes to impaired wound healing, loss of skin elasticity, and an inability to fight infection. Below figure 2.4.1 shows individuals in aging or otherwise with dysfunctional immunity.

Figure 2.4.1: Individuals in aging or otherwise with dysfunctional immunity



Source:(Martirosyan & Polamarasetti, 2020)

Our immunity response capability reduces on advancement of age. Changes in immune system translates into less effective innate and adaptive immune responses and increased susceptibility to infection. The bone marrow reduces its efficiency to produce the stem cell that give rise to cells of immune system. There is decrease in T cell from thymus gland with is atrophying with age (Wang, et al, 2020).

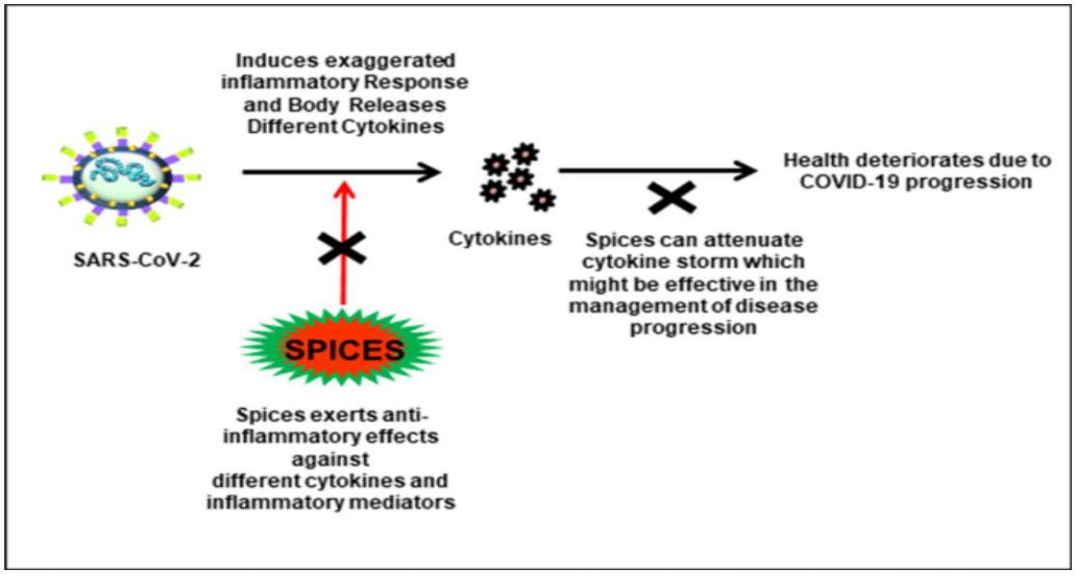
Immune system is compromised and there is decreased ability of B-cells to produce antibodies against antigens and reduced supply of T-cells which help to attack infections (American College of Physicians, Aging and Immunity guide). Dietary ingredients are significant determinants of gut microbial composition and consequently can shape the characteristics of immune responses in the body.

Aging is typically accompanied by physiological changes, including a declined immune system, increased susceptibility to infections, deteriorated kidney function, and geriatric syndrome. These conditions, added to the burden of polypharmacy, may enhance the risk of morbidity and mortality, especially in cases of acute infections. The Middle East respiratory

syndrome (MERS-CoV), severe acute respiratory syndrome (SARS-CoV), SARS- related coronavirus-2 (SARS-CoV-2), and coronavirus disease (COVID-19) are members of the same family as coronavirus. These viruses may lead to fatal outcomes in humans, including acute respiratory distress syndrome, multiorgan failure, and death, particularly in geriatrics patients with multiple morbidities (Rahman et al., 2020).

Malnutrition increases the chances of individuals getting ill, staying ill, and dying. It weakens the immune system, increasing the body's susceptibility to infections and setting in motion a vicious cycle. And just as those experiencing malnutrition and diet-related diseases face worst symtoms from COVID-19, this cycle of malnutrition, infection and death is exacerbated by the present pandemic. Micronutrient deficiencies existed before COVID-19 as a form of 'hidden hunger', but the implications of such deficiencies have been brought to the fore in the context of the current pandemic. These deficiencies in essential vitamins and minerals are common contributors to poor growth, intellectual impairments, perinatal complications and increased risk of morbidity and mortality. Vitamin D may play a special role in reducing the risk of respiratory tract infections, with a potential for lessening the effect of COVID-19 –although the evidence is not yet conclusive. Some studies also indicate that severely obese adults, including those aged under 60, develop more severe illness from COVID-19 (Okamura, 2020).

Figure 2.4.2: Cytokine storm leading to health deterioration



Source: (Kunnumakkara et al., 2021)

Cytokine storm is the exaggerated immune response often observed in viral infections. it is also intimately linked with the progression of covid-19 disease as well as associated complications and mortality. therefore, targeting the cytokine storm might help in reducing covid-19-associated health complications as shown in figure 2.4.2.

During aging, there is a gradual decline in immune function called immunosenescence, which hampers pathogen recognition, alert signaling and clearance. Aging and dysfunctional cells arrest their cell cycle and can become epigenetically locked into a proinflammatory state in which they secrete cytokines and chemokines. During aging there is also a chronic increase in systemic inflammation called inflammaging, which arises from an overactive, yet ineffective alert system. A decline in neutrophil activity and migration, depletion of T cells, a condition known as lymphopenia, and less diverse and less responsive B cells are observed with aging. In older patients, the rapid and uncontrolled inflammatory signaling cascade which typically occurs in the later stages of infection, known as a "cytokine storm," triggers inflammation in major tissues such as the lungs, kidneys, heart, liver, blood vessels and brain. The vascular inflammation results in complement associated microvascular injury and thrombosis in severe COVID-19 cases. All these factors together cause increased risk of bleeding (coagulopathy), hypoxia and finally multi-organ failure (Mudgal & Wardhan, 2020).

Recent data suggest that in humans, SARS-CoV-2 affects the respiratory systems as well as other organs indicating the high complexity of the human immune system to protect against invading pathogens or foreign material. Currently, there is no food or nutrition intervention known to stop COVID-19. However, a healthy and diverse diet and nutrition can support and modulate immune responses to viral infections. The interaction between gut microbial diversity and COVID-19 especially in elderly has been indicated, and the importance of oral microbiota and good oral hygiene has also been stressed. A well-functioning immune system is critical to a robust response to any pathogenic infections. Current dietary guidelines to follow a healthy diet has been recommended to be the best support to the immune system including possibly delaying immunosenescence or providing robust response to pathogenic infection(Knorr & Khoo, 2020). The gut microbiota plays a role in educating and regulating the immune system. Gut dysbiosis is a feature of disease including many infectious diseases and has been described in COVID-19. Dietary approaches to achieve a healthy microbiota can also benefit the immune system (Calder, n.d., 2020).

It is well known the dysbiosis association with the development of obesity, metabolic syndrome, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), type 2 diabetes (t2d), and other metabolic disorders. Dysbiosis is characterized by low microbial diversity including a reduced abundance of bifidobacterium spp., lactobacillus spp., and faecalibacterium prausnitzii. Therefore, people suffering from these disorders are much more prone to viral and intestinal sars-cov-2 infections, mainly because of the existing disturbances within their gut microbiota. In addition, the intake of medications is the second most important factor which strongly disturbs the gut microbiota. Moreover, the diversity of intestinal microbiota is low in old age, and COVID-19 has been observed to be fatal in elderly patients (Vodnar et al., 2020).

The incidence of malnutrition in elderly patients with COVID-19 was higher. The main reasons may be as follows. First, the protein that made up muscles was consumed by the acute inflammatory response of neo-coronavirus infection. Similarly, hypoalbuminemia and low calf circumference were commonly used as important indicators for evaluating malnutrition. Second, among elderly patients dealing with COVID-19, comorbidity in diabetes mellitus was much more than general population. Third, gastrointestinal symptoms caused by SARS-CoV-2 exacerbated malnutrition in elderly patients. The involvement of the digestive tract had accelerated the occurrence of malnutrition in elderly patients with COVID-19. Fourth, the poor appetite of the patients was also related to the patient's anxiety. The Chinese experienced the epidemic of SARS induced by coronavirus in 2003, just like COVID-19. People were so impressed with the SARS epidemic that many patients still had psychological problems after 6 years. Therefore, Chinese were very sensitive to COVID-19, and its epidemic could easily cause anxiety among patients (Li et al., 2020).

5. NUTRITIONAL STATUS OF THE ELDERLY DURING COVID-19

> Malnutrition is a threat-multiplier, if no action is taken, then the effects of the current COVID-19 pandemic will only make it harder for vulnerable populations to protect themselves against malnutrition." Global Nutrition Report, 2020

There are two major influences: staying at home (which includes digital-education, smart working, limitation of outdoors and physical activity) and stockpiling food, due to the restriction in grocery shopping. In addition, the interruption of the work routine caused by the quarantine could result in boredom, which in turn is associated with a greater energy

intake. In addition to boredom, hearing or reading continuously about the COVID-19 from media can be stressful. Stress leads subjects toward overeating, especially 'comfort foods' rich in sugar, defined as "food craving". Those foods, mainly rich in simple carbohydrates, can reduce stress as they encourage serotonin production with a positive effect on mood. However, this food craving effect of carbohydrates is proportional to the glycaemic index of foods that is associated with the increased risk of developing obesity and cardiovascular diseases, beyond a chronic state of inflammation, that has been demonstrated to increase the risk for more severe complications of COVID-19 (Renzo et al., 2020).

The current attraction of a virtual geriatric medicine clinic includes the provision of continued care, while incorporating the principles of "social distancing" during the current COVID-19 pandemic. Other proposed practical benefits include eliminating unnecessary travel which disproportionately affects older people attending outpatient clinics, reduced waiting times at the clinic itself, and reducing time spent on the waiting list before review, which is particularly important for patients with deteriorating health conditions. The challenges to providing a virtual geriatric clinic may include the suitability and versatility of this model for older adult populations, where challenges relating to cognition, perception, behaviour and need for support of a nutrition during the consultation are anticipated (Murphy et al., 2020).

Various literature stated below shows consumption pattern of developing and developed countries during COVID-19.

The National Poll in US on Healthy Aging in results are based on responses from a nationally representative sample of 2,048 adults aged 50 to 80 who answered a wide range of questions online. This poll reveals that many adults 50 and older enjoyed eating out pre-pandemic. Those who cooked dinner at home the most often before the pandemic were most likely to rate the overall health of their diet as excellent or very good. And those who said their physical health was excellent or very good were the most likely to say they were confident in their cooking skills or enjoyed cooking. But the poll also shows vulnerability for many older adults. One in four said they already ate most or all of their meals alone, even before the pandemic led to social-distancing rules. Solo diners reported less healthy diets than those who rarely or never ate alone. In addition, 11% of older adults ate fast food three times a week or more. This group was less likely to call their overall diet healthy.

In a study based on an online survey in Qatar using a structured questionnaire that was administered in the Arabic language through the Survey Monkey platform from 24 May until 14 June 2020. The results reveal clear changes in the way consumers are eating, shopping, and interacting with food. Indeed, the survey results suggested (i) a shift toward healthier diets; (ii) an increase in the consumption of domestic products due to food safety concerns; (iii) a change in the modality of acquiring food (with a surge in online grocery shopping); (iv) an increase in culinary capabilities; and (v) the absence of panic buying and food stockpiling in Qatar. The results are expected to inform current emergency plans as well as long-term food-related strategies in Qatar (Ben Hassen et al., 2020).

In Brazil, the Ministry of Health launched recommendations for older people, emphasizing the preference for meals prepared at home, reducing frequency of consuming meals from restaurants, coffee shops, or delivery services; preference for whole-grain foods, fruits, vegetables, rice, and beans for lunch and dinner (traditional Brazilian food habits); preference for low-fat and protein-rich foods (white meat and fish); reduction of fat, sugar, and salt intake; avoiding sweetened beverages and alcohol. However, it can be challenging for many people to follow these recommendations during the pandemic. Especially in western countries and among older adults, the diet is often marked by a high energy density and low micronutrient content. This aspect could be even more common during the quarantine period, when stress can pushes people toward overeating, mostly looking for more palatable foods rich in fat and sugar(Faria & Pietro, 2020). The short-term effects of missing meals include not only fatigue, a reduced immune function and an increased risk of communicable diseases, but also a higher rate of complications after these diseases (such as viral infections) lead to hospitalisation. Clear advice on adequate calorie intake and an optimal diet to support immune function should be provided, e.g., a variety of fresh fruit and vegetables, unsaturated fats, complex carbohydrate and sufficient protein and vitamin intakes (Mehta S., 2020).

In a study to investigate the impacts of the COVID-19- induced lockdown in Zimbabwe on nutrition, physical activity, alcohol consumption and smoking among Zimbabwean population aged ≥18 years. The results show that 96.6% (n=490) of the participants reported that their diet and consumption patterns have changed during the COVID-19-induced lockdown. Concerning individual food groups, 57.8% of the participants stated that there was a decrease in consumption of ‘other vitamin A-rich fruits and vegetables. There was

also a decrease in the intake of 'other vegetables' (48.5%), 'other fruits' (64.9%), 'nuts and seeds' (45.0%), 'cereals breads and tubers' (41.1%) and 'dairy products' (44.9%). Interestingly, they observed an increase in consumption of 'dark green leafy vegetables' (33.72%). However, 'egg' consumption largely remained the same (41.8%) as well as 'meat and meat group' (46.2%). The reported consumption patterns are reflective of a disrupted food system and prevailing food access restrictions during the lockdown. Overall, there appears to be a trend where consumption of nutritious foods was reduced, while alcohol consumption was high (Matsungo & Chopera, 2020).

The aim of the study in Spain on dietary behaviours of the Spanish adult population during the COVID-19 outbreak was evaluated on 7514 participants. Results outlined healthier dietary behaviours during the confinement when compared to previous habits. They were eating small amounts of food between meals (snaking), the intake of fried foods and fast-food were similar than before the COVID-19 confinement, and 63.7% of participant declared not to have been eating more during the confinement. Around 73% of participants kept their intake of fried foods as before the COVID-19 confinement, which meant that nearly 39% of them continued consuming fried foods 1–3 days a week and around 37% less than 1 time per week. The majority of the participants (68.4%) used olive oil for frying. Interestingly, among total participants, around 27% had difficulties finding some types of foods, especially meat (23.83%), vegetables (13.86%) and fish (12.11%) during the COVID-19 confinement. A higher adherence to MedDiet was observed among those who used not to eat out of home and among those who reduced or kept their intake of fried food, fast food and snacking frequency, as well as those who kept being active and maintained the same weight. Mean adherence to the MedDiet before the confinement was 6.53 (median = 6.0, range= 1–13). Thus, adherence to the MedDiet increased from the pre to post-confinement period, with this increase being statistically significant (p-value = <0.001). The relation between MedDiet MEDAS-derived food items MedDiet adherence levels before the confinement was also consistent (Rodríguez-Pérez et al., 2020).

A cross-sectional online survey was conducted it resulted that the lockdown resulted in increase in food prices (94.8%) and decrease in availability of nutritious foods (64%). Most (62.5%) of the participants reported a reduction in their physical activity levels. The prevalence of generalised anxiety disorder (GAD) was 40.4% and mostly affecting woman (63.5%, p=0.909), 31–40 years age group (49.6%, p=0.886). Based on the Body Mass

Index-based Silhouette Matching Test (BMISMT) 44.5% gained weight, 24.3% lost weight and 31.2% did not have weight change. The paired samples t-test showed that there was a significant increase in perceived body weight ($p<0.001$). More than half (59.6%) reported having difficulties accessing medicinal drugs and 37.8% growth monitoring services (Matsungo & Chopera, 2020).

During the COVID-19 lockdown, the sense of hunger and satiety changed for more than half of the population:17.8% of responders had less appetite, while 34.4% of responder increased appetite (Brake, et al, 2020). Participants also reported on perceived changes in weight-related behaviours and whether they had experienced barriers to weight management, compared to before the lockdown. A large number of participants reported negative changes in eating and physical activity behaviour (e.g., 56% reported snacking more frequently) and experiencing barriers to weight management (e.g., problems with motivation and control around food) compared to before lockdown. These trends were particularly pronounced among participants with higher BMI (Robinson et al., 2021).

MINI NUTRITION ASSESSMNENT

Mini Nutrition Assessment is a validated screening tool to provide a single, rapid assessment of nutritional status among the elderly with a sensitivity of 96%, a specificity of 98%, and a predictive value of 97% according to nestle nutrition institute. It has been validated and translated into several languages in many countries including India. The full MNA includes 18 items. The response of each item has a numerical value and contributes to the final score, which has a maximum value of 30. For the current study, nutritional status was classified as normal nutrition (24–30 points) and possible malnutrition. Possible malnutrition included malnourished (<17 points in MNA) and those at risk of malnutrition (17–23.5 points in MNA) (Vaish et al., 2020).

The MNA test is composed of simple measurements. Anthropometric measurements (weight, height, and weight loss); Global assessment (six questions related to lifestyle, medication, and mobility); Dietary questionnaire (eight questions, related to number of meals, food and fluid intake, and autonomy of feeding); Subjective assessment (self-perception of health and nutrition). The sum of the MNA score distinguishes between elderly patients with: adequate nutritional status, MNA ≥ 24; protein calorie undernutrition, MNA < 1, at risk for malnutrition, MNA between 17 and 23.5.

A few literatures stated below shows that in all developed and developing countries uses MNA to access nutritional status of elderly, so as the current study.

The Mini Nutritional Assessment (MNA) has been designed and validated to provide a single, rapid assessment of nutritional status in elderly patients in outpatient clinics, hospitals, and nursing homes. Most important it is possible to identify people at risk for malnutrition, scores between 17 and 23.5, before severe changes in weight or albumin levels occur. These individuals are more likely to have a decrease in caloric intake that can be easily corrected by nutritional intervention (Dewar et al., 1994).

In this cross-sectional study was performed in COVID-19 patients admitted to Sino-French new city branch of Wuhan Tongji Hospital from January to February 2020. Among 182 patients, 65 were male and 117 were female, with mean age 68.5 ± 8.8 years old. Average MNA score was 22.9 ± 2.8. Across all patients, 52.7% ($n = 96$) were malnourished, 27.5% ($n = 50$) were at risk of malnutrition. There was no difference in age, gender composition, and comorbidities among the three groups. The study found that 27.5% of patients over 65 years old were at risk of malnutrition and 52.7% were malnourished, which was generally higher than that of elderly patients with other disease spectrums (Li et al., 2020).

A community-based, cross-sectional study was conducted in two urbanized villages of East district of Delhi. Elderly residents ≥60 years, both male and female, residing in study villages for more than 6 months were included. It was observed that only around half (50.7%) of the study participants had a normal nutritional status and 4.3% of the study participants were malnourished, while a large number of participants (45%) were at risk of malnutrition. Among the different parameters, it was found that there was a statistically significant ($P < 0.05$) association between nutritional status and age and gender, of the participant. In the study, the prevalence of normal nutritional status was found to be 50.7%. The prevalence of possible malnutrition was 49.3%, showing that one out of every two elderly had a chance of having malnutrition. This reflects an enormous burden especially on the health-care system as the population of the geriatric age group is on the rise with increasing life expectancy and decrease in fertility rates (Vaish et al., 2020).

A study was carried out in Chandigarh, Northern India wherein assessment of obesity was carried out among elderly participants (n=362). The results concluded 33 percent elderly to

be overweight, 8 percent to be obese and 14 percent to be underweight. Another study was carried out in South India to assess the prevalence of malnutrition among the rural elderly (n=227), about 14 percent were malnourished and 49 percent were at a risk of malnourishment. Taking into account social factor, caregiver/ caregiving is one of the most important aspect of the elderly's health.

A cross sectional study was performed among 365 older women (age = 60 years) living both in the community (free living) and old-age homes of Kolkata. Self-structured Food Frequency Questionnaire (FFQ) was used to assess protein and energy intake. Mini Nutritional Assessment (MNA) was used to assess the nutritional status. 44.7 per cent older women were found to have anorexia. No significant difference ($p = 0.05$) was found between free living and old-age home residents in terms of anorexia. Protein and energy scores were found significantly ($p < 0.05$) correlated with appetite scores of both free living and old-age home groups. Significant association ($p <0.05$) of appetite and nutritional status was also observed for both free living and old-age home participants. Therefore, it was found that older women participants for the study, both free living and residents of old-age homes, were suffering from anorexia and no statistically different picture was found in this regard. Their protein-energy food intake and nutritional status were also associated with their level of appetite (Maity et al, 2019).

In a study out of 131 participants studied in old age home of Pune, about 59 (46 percent) were malnourished. Out of these 46 percent, 11.5 were underweight due to undernourishment and 26.2 percent were overweight. About 7.7 percent samples were either Grade I or Grade II obese. Considering role of gender in the nutrition status it can be seen that both the genders are equally susceptible to malnutrition. An interesting finding in this study is more males were underweight and females were overweight. Considering their dietary intake the RDA for any adult (elderly) in India constitutes to 55-60 percent, 15-20 percent and 20-25 percent of carbohydrate, protein and fat intake respectively. The results show that the percentage of the macronutrients intake is not within the prescribed RDA. The carbohydrate intake in case of both males and females is a little higher than the reference value, the protein intake is very low than the required value and fat intake is more (Khole & Soletti, 2018).

In a study, 129 elderly in Kerela showed that females constituted 75.2%; 81.4% were unemployed; 62% belonged to rural area. Nutritional assessment showed 41.9% to be having normal nutrition, 46.5% at risk of malnutrition, and 11.6% malnourished. Caloric intake was less than the RDA in 89.1%. There was no association between calorie intake per day and MNA status. There was significant correlation between MNA status and BMI ($p<0.001$, $r=0.329$) (Jacob Abraham, 2017).

A cross-sectional study was done from July 2012 to August 2013 in Boko-Bongaon Block, Kamrup District, Assam, India. Out of the total of 360 elderly persons, 15% were found to be malnourished and 55% were at risk of malnutrition. The association between nutritional status and older age group, female gender, dependent functional status, dependent financial status and inadequate calorie intake was found to be significant (Agarwalla et al., 2015).

6. HEALTH AND MORBIDITY IN AGED DURING COVID-19

Infectious diseases, more common in older adults, may progress more severely than in young people. Such diseases may show atypical presentations in older patients, which should be considered in this regard. Older patients, especially frail ones with multiple comorbidities, may not show typical symptoms, such as fever, cough, chest discomfort, or excessive sputum production in pulmonary infections as much as young people do, and thus atypical presentations may be an important issue that causes delayed diagnosis of Covid-19 infections. These typical symptoms occur in less than 50% seniors, but they may show such symptoms as confusion or acute mental changes, frequent falls, decreased walking/mobility, unexplained tachycardia or decrease in blood pressure, decreased appetite, difficulty swallowing, and new-onset incontinence (Isik, 2020). Below are the studies quoted related to health during COVID-19 situation.

In a study among the 62 patients in Zhejiang province, China, infected with COVID-19 symptoms, 23 (37%) resided in Wuhan and the remaining 39 (63%) had made short term trips to Wuhan before illness onset. Fifty-six (90%) patients could provide the exact date of close contact with someone with confirmed or suspected SARS-Cov-2 infection. Of the 33 patients with symptoms for more than 10 days after illness onset, 13 (39%) had underlying diseases: four (12%) patients had liver disease, four (12%) had hypertension, and one each had chronic obstructive pulmonary disease (3%), diabetes (3%), and cerebrovascular disease (3%). Among 56 patients who could provide the exact date of close contact with someone with confirmed or suspected SARS-Cov-2 infection, the median incubation period from

exposure to symptoms was 4 days. The median time from onset of symptoms to first hospital admission was 2.0 (1.0-4.3) days. The most common symptoms at illness onset were fever (48, 77%), cough (50, 81%), expectoration (35, 56%), headache (21, 34%), myalgia or fatigue (32, 52%), diarrhoea (3, 8%), and haemoptysis (2, 3%). Only two (3%) patients developed shortness of breath. Among the 33 patients who had symptoms for more than 10 days after illness onset, the median incubation period from exposure to symptoms was 3 days. The median time from onset of symptoms to first hospital admission was 6.5 (5.0-9.0) days. The most common symptoms at onset of illness were cough (27, 82%), fever (24, 73%), expectoration (19, 58%), myalgia or fatigue (19, 58%), headache (15, 45%), diarrhoea (3, 9%), and haemoptysis (2, 6%). Only one (3%) patient developed shortness of breath (Xu et al., n.d., 2020).

Wang et al, 2020 found that those who needed intensive care due to the Covid-19 were older, and that a typical findings for acute lung infection, such as weakness, dizziness, nausea/vomiting, Diarrhea, abdominal pain, and loss of appetite appeared approximately6.5 days before dyspnea. Considering that this period is 2.5 days in Covid-19 patients who do not need intensive care and are younger, the fact that dyspnea occurs approximately 6.5 days after the first symptom is also striking in terms of the importance of atypical presentations.

In a study on 3533 Italian respondents, it was found that the subjects with severe obesity ($BMI \geq 40\ kg/m^2$) are one of the groups with the higher risk for COVID-19 complications. Moreover, in regards to pulmonary physiology, subjects with obesity have decreased expiratory reserve volume, functional capacity and respiratory system compliance. The inflammatory state is also one of the most important factors of the severity of lung disease in COVID-19, which leads to the famous "*cytokine storm"* associated with the acute respiratory distress syndrome and multiple organ failure(Renzo et al., 2020).

The prevalence pre-existing cardiovascular disease seems to be linked with worse outcomes and increased risk of death in patients with COVID-19. The COVID-19 infection by itself can also induce myocardial injury, arrhythmia, acute coronary syndrome and venous thromboembolism. The individual case fatality rate of COVID-19 patients with CVD was 10.5% when compared with other comorbidities, such as chronic respiratory disease (6.3%), cancer (5.6%)), diabetes (7.3%) or hypertension (6.0%). Hypertension is also reported to

have a significantly higher ratio of mortality in patients with COVID-19, especially those who are not on any medication (Mudgal & Wardhan, 2020).

A study by (George Leyanna Susan, 2017) in Karnataka district on 230 randomly selected elderly stated that the most common morbidities suffered by the elderly in this study were cataract (50.4%) and orthopedic problems (50.4%). This was followed by respiratory illnesses (31.3%), gastrointestinal problems (26.5%), and dental problems (23.9%). Only 21.3% of them were hypertensive and 17.4% were diabetics. A very small proportion of elderly persons were suffering from cardiac illness (3.5%) and cancer (0.4%).
One of the major findings of the study by Parmar and Saikia, 2018 in India is that diabetes causes the highest likelihood of any disability among the elderly, followed by high BP and heart disease. Another major finding of study is that we were able to quantify the relative role of morbidities for each specific disability. For instance, according to the study, the likelihood of disability is always the highest among diabetes patients, whereas the disability rate is the lowest among elderly persons with heart disease. This may be due to mortality selection among heart patients. It is found that heart disease is the topmost cause of death in India, whereas diabetes is the seventh most common cause of death.

Physical Activity

Regular physical activity benefits both the body and mind. It can reduce high blood pressure, help manage weight and reduce the risk of heart disease, stroke, type 2 diabetes, and various cancers - all conditions that can increase susceptibility to COVID-19. So, the data is collected on physical activity and the association of physical activity during COVID-19 situation is been quoted here.

COVID-19 has limited the ability of older adults to stay physically active. Exercise facilities, community/senior centers, long-term care community classes, and pools have either ceased operations or have curtailed their hours. In some parts of the country, parks have been closed. As these locations re-open, their access may be limited (hours, reservations needed, lack of transportation) and safety concerns may persist. Walking is possible with appropriate physical distancing with friends, children, or grandchildren. We can support and urge the participation of older adults in regular on-line exercise classes. Reminding patients that sedentary behaviour increases risk of heart disease, declining

function, and mortality is important and that waiting until the pandemic is over to return to regular physical activity may prevent or delay a return to baseline (Batsis et al., 2021).

High quality sleep is likewise important for good physical, mental, and social health. Many older adults report a change in sleep patterns since the start of the pandemic. Sleep deprivation can have a negative impact on attention, working memory, long-term memory, and decision making. Geriatrics healthcare professionals (GHP) should ask their older patients about sleep related concerns and where appropriate give recommendations regarding good sleep practices (Batsis et al., 2021). Different studies reported an association between sleep disturbances and obesity due to increase the secretion of pro-inflammatory cytokines by the increased visceral adipose that could contribute to alter the sleep–wake rhythm. In addition, also diet seems to influence the quality of sleep, in fact very recently in a cross-sectional study included 172 middle-aged adults it has been reported that good sleepers had higher adherence to the Mediterranean diet (MD) and lower body mass index (BMI) compared to poor sleepers (Renzo et al., 2020).

7. AGING AND MENTAL HEALTH STATUS DURING COVID-19

The social isolation, loneliness, and change of routine as well as impact of quarantine among elderly due to COVID-19 pandemic may have huge psychological and social impact beside physical impact which is very difficult to quantify. Here are various studies relating to it.

COVID-19 has been shown to adversely impact the central nervous system with more than 80% of those infected demonstrating some degree of a neurologic complication, including 31.8% with encephalopathy and 11.4% with anosmia. The incidence of COVID-19 neurologic complications is even higher in older adults. Persistent fatigue is also common. COVID-19 are associated with an increased risk of cognitive decline and dementia. Older adults with normal cognition at baseline may experience new memory impairment following infection. Those with existing cognitive impairment are at high risk for both acute changes in their level of alertness and a sudden additional deterioration in their cognitive function (Batsis et al., 2021).

A major adverse consequence of the COVID-19 pandemic is likely to be increased social isolation and loneliness (as reflected in surveys), which are strongly associated with anxiety,

depression, self-harm, and suicide attempts across the lifespan. Tracking loneliness and intervening early are important priorities. Crucially, reducing sustained feelings of loneliness and promoting belongingness are candidate mechanisms to protect against suicide, self-harm, and emotional problems. Social isolation and loneliness are distinct and might represent different risk pathways. Also, SARS-CoV-2 infection of the brain could be a contributor to the core medical syndrome of respiratory distress and failure in patients with COVID-19 (Holmes et al., 2020).

Psychological stress induced by COVID-19 can also lead to cognitive decline, including reduced attention, impaired learning, memory impairment, difficulty with decision-making, and impaired problem solving. Social isolation due to stay-at-home orders disrupts daily life routines and can impact behavioural symptoms such as agitation, wandering and aggression. Caregivers of patients are also susceptible to the issues addressed above as they work to care for their loved ones (Batsis et al., 2021). In a study by (Gutiérrez-Peredo et al., 2020) they stated that call attention to a high prevalence of functional dependence in younger and older maintenance hemodialysis patients. The results suggest that the lower self-reported mental quality of life in functionally dependent MHD patients cannot be explained by differences in age and comorbidities.

In order to contrast and respond to the negative experience of self-isolation, people could be more prone to look for reward and gratification physiologically associated with food consumption, even overriding other signals of satiety and hunger. In addition, boredom feelings, which may arise from staying home for an extended period, are often related to overeating as a means to escape monotony. On the other hand, negative experiences may lead to eating restriction, due to the physiological stress reactions that mimic the internal sensations associated with feeding-induced satiety (Renzo et al., 2020).

Clinicians are gaining early experiences around a range of issues that are highly relevant to the mental health care of older adults in the context ofCOVID-19. It will be important for the field to assess the range and efficacy of these measures these may include implementing telepsychiatry for direct care and psychotherapy, using a range of technologies for social engagement and measures to facilitate physical activity and nutrition. It is equally important that we recognize how the impact on older adults will vary around the world and the factors

impacting older adults in low and middle-income countries may differ from developed countries (Vahia et al., 2020).

The mental and physical health of the elderly aged above 60 and classified as high-risk groups is more vulnerable than other age groups, requiring more attention. Strong social restraint, social distancing, and quarantine measures to prevent the COVID-19 spread have raised concerns about their mental health. Therefore, it is crucial to analyse and identify the psychological concepts and protective factors that support and constitute these guidelines and strategies and prepare practical suggestions and guidelines to protect the mental health of the elderly during COVID-19. A recent study conducted in China highlighted the negative effects of COVID-19 on individuals' psychological and mental health. In a study conducted on the general public, 53.8% of respondents reported being psychologically affected at a moderate or severe level, with 16.5%, 28.8%, and 8.1% reporting symptoms of severe depression, anxiety, and stress, respectively. Furthermore, 37.1% of the elderly had experienced depression and anxiety during the pandemic, and the emotional response of the elderly aged above 60 years was more apparent as compared to other age groups (Lee et al., 2020).

A study by Chauhan et al, 2020 on implementation of nutrition health education, reinforcement of program schedule, retention performance by elderly and probable cognitive normality. This educational tool at initial stage showed reversible changes in mild impaired subjects with beneficial up-gradation in knowledge, positive attitude and adoption of good practices. Greater reinforcement achieved for nutritional, social and general aspects. These findings propose for forthcoming nutrition behaviour studies and execution of knowledge reinforcement models.

It is well known that social isolation among older adults is a "serious public health concern" because of their heightened risk of cardiovascular, autoimmune, neuro- cognitive, and mental health problems. Santini and colleagues recently demonstrated that social disconnection puts older adults at greater risk of depression and anxiety. Interventions could simply involve more frequent telephone contact with significant others, close family and friends, voluntary organizations, or health-care professionals, or community outreach projects providing peer support throughout the enforced isolation. Beyond this, cognitive

behavioral therapies could be delivered online to decrease loneliness and improve mental wellbeing (Armitage & Nellums, 2020).

In a study among older adults in the USA: prevalence, comorbidity, and risk for new-onset psychiatric disorders in late life it resulted that Major depressive illness is scores present in about 5.7% of US residents aged ≥65 years, whereas clinically significant nonmajor or "subsyndromal" depression affects approximately 15% of the ambulatory elderly. Risk of developing subsyndromal depression increases as elderly people get older. Because they have numerous distressing ailments, everyday life can be burdensome for many elderly persons. Almost one third of Americans aged 75 years or older rate their health as "fair to poor." Yet, the physical discomforts experienced by so many elderly individuals are unlikely to generate a clinically significant depression unless other ingredients such as loneliness, impairment of mobility, loss of a spouse, a serious financial reverse (VanItallie, 2005).

About 1,046 older adults over the age of 50 who live in North America participants were asked about their basic demographic information, current health status, and the impact of the current SDG on their subjective state of mental health. Participants completed the Physical Activity Scale for the Elderly, to determine the amount and intensity of physical activity performed, as well as both the Geriatric Depression Scale and Geriatric Anxiety Scale, to ascertain the extent of their depression and anxiety-like symptoms. Results showed ninety-seven percent of participants indicated that they adhered to current SDG "Most of the time" or "Strictly." Participants who performed greater levels of physical activity experienced lower levels of depression-like symptoms when age, sex, and education were accounted for; however, no relationship between physical activity and anxiety-like symptoms was found. These results suggest that performing even light physical activity during the COVID-19 pandemic may help alleviate some of the negative mental health impacts that older adults may be experiencing while isolated and adhering to SDG during the COVID-19 pandemic (Callow et al., 2020).

According to World Health Organisation, the South-East Asia Region, (WHO SEAR), the dementia mortality rate for India is 13.5 per 1,00,000 males and 11.1 for 1,00,000 females. Global Burden of Disease report 2006, dementia is the third leading cause contributors to years if life lost due to disability in the elderly in low-income and middle-income countries.

The WHO report estimated that dementia is the second highest source of disease burden after tropical diseases.

Dementia care differs from standard medical care, in that caring for dementia must involve support for daily activities. Older people cannot be quarantined within crowded living quarters, where they can be exposed to young asymptomatic carriers, and older people who live alone struggle to access care without risking contact with infected individuals. Extended families that ordinarily create a protective environment and provide informal care can engender environments that increase mental health problems and domestic abuse (Ibanez & Kosik, 2020).

The evidence shows that changes in natural body is associated with person's risk of experiencing depression. Dementia and mental health disorders in general are among the major causes of disability and dependency in older people, representing one of the most serious medical and social issues. In addition, dementia and other mental health disorders overwhelmingly impact not only the people who have it, but also their caregivers, families, and society in general. Depression affects between 10% and 20% of older people and is frequently a comorbidity with anxiety disorders (Rodriguez *et al.*, 2008; Guerra *et al.*, 2016). Therefore, it is expected that the effect of the COVID-19 in the region will have a higher impact on the elderly population and among those with mental health disorders (Rodríguez-Pérez et al., 2020).

Mental health is a taboo subject in India, patients rarely seek help regarding their mental health problems until the situation becomes beyond their control. The heterogeneity in clinical presentations and symptoms sometimes makes diagnosis difficult. Dementia is the most common neuropsychiatric illness besides depression which is a major contributor to disability in people above 60 years of age, accounting for one-quarter of all disability affected elderly. Eight large-scale epidemiological studies have indicated that dementia prevalence for the aged who are >85 years in India ranges from 18% to 38% and, in those >90 years, it ranges from 28 % to 44 % (Mudgal & Wardhan, 2020).

8. SUPPORT FOR ELDERLY DURING COVID-19

The uncertainty of COVID-19 may exist for many months. Various scientific bodies such as CDC, WHO, UNICEF, and MOHFW, Government of India, have issued advisories for the elderly population in dealing with COVID-19 pandemic. Several NGOs including Mission Zero COVID-19, national and regional branches of Indian Psychiatric Society, Bombay Psychiatric Society, National Institute of Mental Health And Neurosciences (NIMHANS), Central Institute of Psychiatry (CIP), and Lokopriya Gopinath Bordoloi Regional Institute of Mental Health (LGBRIMH) have volunteered 24 × 7 helplines(Vahia, et al, 2021). A few of them are quoted here.

Age must not be used as the sole criterion for resource allocation among older adults with COVID-19. Simple and efficient tools are available to identify components of the comprehensive geriatric assessment, which could be useful to predict outcomes and provide high-quality care that would fit the particular needs of older adults in resource-limited settings amidst this global pandemic (Gómez-Moreno et al., 2020).

Here are a few things that young people can do to support the older generation to feel safe and connected: (UNICEF, 2020)

1. Social support
    - Check in on them regularly through phone calls. Send them a message or Whatsapp.
    - Leave a note on their front door. Just to let them know someone is thinking about them.
    - Cook something for them and leave it outside their door – ring the bell or let them know in advance that you are delivering a home cooked meal for them.
    - Remember: always give it in a disposable container, sanitize the outside of the container by wiping with disinfectant.
2. Run errands
    - Buy them daily essentials like milk, bread, eggs, vegetables, fruit etc.
    - Run to the grocery shop.
    - Ensure their medical supplies are stocked up.
    - Send them a little reminder asking them if they took their medication?
3. Practice social distancing but not social isolation
    - Limit in-person visits.

- Help them understand the need to practice social distancing to keep them safe.
- It is tough for older adults who cherish the time spent with friends and family members to maintain social distancing, so reassure them that you aren't going anywhere.

4. Help them stay connected, feel involved, purposeful and less lonely
    - Show them how to video chat with others using smartphones, laptops or tablets.
    - Encourage them to telephone their friends and family and to write kind notes to lift everyone's spirits.
5. Postpone unnecessary medical visits
    - Help them stay in touch with their doctors if they offer tele-medicine.
    - As much as possible doctors and patients should communicate over video, email or other means rather than face-to-face.
6. Set up emergency contacts and speed dials
    - Identify one person nearby who they could rely on to care for them in case you are not available or far away.
    - Help them to put all important phone numbers in speed dial.
    - Add the COVID-19 emergency helpline numbers to their contacts and speed dial.

WHO must issue different sets of expert guidance on how to work with older people, including those who are frail and cognitively impaired; for older health workers, including those coming out of retirement; and for older people and their families on managing infection risks, dealing with symptoms, and mitigating wider issues such as depression. Unless WHO acts immediately to redress its neglect of older people and covid-19, it will lose credibility as an organization with a special mandate to provide guidance to its member states. They must also ensure that they prioritize the needs of older people in their own national responses and in their support for low- and middle-income countries (Lloyd-Sherlock et al., 2020).

Recommended strategies for the prevention of Coronavirus disease 2019-related morbidity/mortality and the promotion of overall well-being of older persons (Olagundoye et al., 2020).

1. Keeping older persons who require ongoing chronic care for chronic illnesses away from health facilities as much as possible. This may be achieved in part through the deployment

of telemedicine or phone-a-doctor on dedicated toll-free phone lines by establishing remote access to healthcare for non-emergency cases. In settings where telemedicine may not be feasible, adults' clinics can operate a triage system that prioritizes older persons for prompt consultation on arrival to reduce their waiting time at healthcare facilities.

2. Adoption of a testing policy that prioritizes the screening of persons above 60 years for Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) because of the possibility of atypical presentations that are not accounted for in the current definition of suspected cases. This requires a heightened index of suspicion and prompt testing of older persons requiring hospital admissions for other morbidities that may mask the presence of the novel Coronavirus infection or be worsened by co-morbid COVID-19. In essence, older persons requiring hospital admission for other ailments should be tested for COVID-19 and their samples should be prioritized to ensure the shortest turnaround time between sample collection and results.

3. Prioritizing the elderly in the distribution of welfare packages/palliatives. Government's social intervention programmes such as the distribution of ₦20 000 ($51.55) to the poorest of the poor based on pensioners data and food items distribution on the streets may leave some older persons disadvantaged. Pensioners associations may be involved in ensuring that the packages get to their members. Additionally, non-governmental organizations should channel a portion of their relief packages directly to senior citizens in various communities by engaging with the community and religious leaders.

4. Taking cognisance of those problems that older persons are predisposed to (dependence, isolation, and depression) and how some of the current COVID-19- related safety precautions (physical distancing and self- isolation of exposed persons) may adversely accentuate these problems. This should be matched with the provision of professional psychological support through appropriate means in the light of the COVID-19 pandemic.

5. Sensitizing families and communities to their responsibilities towards older persons during this period. The emphasis should include the following: (1) Provision of food items, household essentials and refill of medications for chronic health conditions; (2) Provision of social and emotional support by maintaining regular communication via phone calls; (3) Communicating the facts about COVID-19 to the less literate older persons without creating panic; (4) Providing the necessary items for Infection Prevention and Control (IPC); (5) Avoiding physical contact in a social situation by ensuring physical distancing (at least 1 m/3 feet) between older persons and their grandchildren, this should be preceded by the proper education of both older children and older persons, and physical distancing may also

preclude visits between older persons and their grandchildren;(6)Addressing the subject of surrogate decision-making or right of attorney in the event of unforeseen circumstances amongst other things.

6. Inclusion of the older persons/senior citizens amongst the selected population groups that deserve specific guidelines on the NCDC website addressing their peculiar needs during the COVID-19 pandemic.

7. Post COVID-19 pandemic attention should be given to broadening the scope of health insurance with the inclusion of home-based care in the health insurance schemes at the national and state levels.

There are five key areas for action across sectors to address nutrition as part of the global COVID-19 response, to lessen the impact of the current crisis and build resilience against future shocks (Okamura, 2020):

1. Continue to provide critical community-based nutrition services using innovative/digital delivery systems for basic services such as promotion of breastfeeding, micronutrient supplementation, and basic primary health care including immunisations.

2. In partnership with the agriculture community, increase access to healthy and diverse food. This could include: a) National policies to dissuade trade bans on food supplies, especially for staple foods; b) Strengthening local supply chains for vegetables, fruit and other perishable foods that are subject to waste, especially in the context of lockdowns; and c) Putting in place taxation and marketing regulations on unhealthy foods such as sugar sweetened beverages and junk foods that promote obesity. This would not only prevent malnutrition but will also help provide fiscal space in developing countries at a time when budgets are severely constrained.

3. Ensure that emergency food distribution and safety net programs (including school meals) provide foods fortified with vitamins and minerals.

4. Scale up cash transfer programs, using nutritional vulnerabilities as beneficiary targeting criteria and provide adequate nutrition, health and hygiene advice using innovative solutions such as digital payments and social media messaging.

5. Roll out national communication campaigns on COVID-19, reiterating the need for social distancing while continuing to safely breastfeed infants, promoting hand washing, and emphasising the need for healthy diets, basic nutrition services such as vitamin A supplementation and immunisation.

The government of India has also launched a number of schemes for the benefit of the senior citizens in the country. These include

1. National Programme for the Health Care of Elderly (NPHCE), launched in 2010,to address the health issues faced by seniors, it provides free or highly subsidized facilities in district hospitals, community health centres (CHC), primary health centres (PHC), and sub-centres (SC) levels through State Health Society.
2. Varistha Mediclaim Policy, designed for senior citizens between the age of 60 and 80 years, it covers the cost of medicines, blood, ambulance charges, and other diagnosis related charges.
3. Rashtriya Vayoshri Yojana, a scheme that provides physical aids and assisted-living devices for older adults above 60 years of age that belong to the BPL (below the poverty line) category.
4. Senior Citizens' Welfare Fund which aims to make seniors financially stable for their overall welfare and health care.
5. Pradhan Mantri Jan Arogya Yojana, scheme launched in 2018 by the Ministry of Health and Family Welfare aims to cover up to 10 crore people belonging to poor and vulnerable families (Mudgal & Wardhan, 2020).

Prevention and management of both chronic diseases and infectious diseases, such as SARS-CoV-2, can be tackled through early dietary intervention and use of functional foods. Functional foods are “natural or processed foods that contain biologically active compounds; which, in defined, effective, and non-toxic amounts, provide a clinically proven and documented health benefit utilizing specific biomarkers for the prevention, management, or treatment of chronic disease or its symptoms”. A study conducted on adults over 50 years of age found that following the My Plate program actually improved dietary intake and long-term health. Looking beyond general health, this guide is an excellent model to study each food group against the backdrop of improving immune function and preventing COVID-19 infection in older populations (Martirosyan & Polamarasetti, 2020).

During the COVID-19 crisis, non-pharmaceutical interventions, e.g., maintain good personal hygiene and good respiratory practice, maintain regular physical activity, and consume natural immunity boosters, especially of food origins, should be practiced; safer alternative therapies should be explored, when available. Clinicians must avoid over-

prescription of needless drugs, use simplified regimens with the lowest possible effective dose to prevent adverse drug reactions (ADRs) and cost constraints in elderly patients. Excellent communication amongst health care personals with computerized discharge instructions and medications with reporting of any adverse drug event is needed (Rahman et al., 2020).

The current attraction of a virtual geriatric medicine clinic includes the provision of continued care, while incorporating the principles of "social distancing" during the current COVID-19 pandemic. Other proposed practical benefits include eliminating unnecessary travel which disproportionately affects older people attending outpatient clinics, reduced waiting times at the clinic itself, and reducing time spent on the waiting list before review, which is particularly important for patients with deteriorating health conditions. The challenges to providing a virtual geriatric clinic may include the suitability and versatility of this model for older adult populations, where challenges relating to cognition, perception, behaviour and need for support of a nutrition during the consultation are anticipated(Murphy et al., 2020).

The methodology that has been used to carry out this study is discussed in the next chapter.

METHODS AND MATERIALS

METHODS AND MATERIALS

During the COVID-19 pandemic, older adults and patients with chronic diseases became particularly vulnerable and most at risk of nutrition imbalance. Firstly, available research indicated that adults 60 years and older and patients with pre-existing medical conditions, especially heart disease, lung disease, diabetes, or cancer, are more likely to have severe, even deadly coronavirus infection than other groups. Second, the recommendations to stay home and abide by social distancing targeted these groups specifically, given their vulnerability. Third, the elderly and patients with chronic diseases may already be susceptible to malnutrition, given their compromised health(Naja & Hamadeh, 2020).

Hence, the study aimed to investigate the impact of the COVID-19 pandemic on sociodemographic profile, nutritional assessment (MNA scores) and morbidity profile (major and minor illness) among the elderly population aged 60-80 years in urban Vadodara. In order to achieve the objective of the study, information regarding mental health (CIT scores) and lifestyle patterns were also collected.

The present study was planned for "Effect of COVID-19 situation on health & nutritional status of elderly residing in Urban Vadodara." The details of the plan of work, tools and techniques used in the study are described in this chapter.

1. STUDY DESIGN

a) Sampling technique
b) Ethical clearance
c) Sample size
d) Inclusion criteria
e) Exclusion criteria
f) Experimental design
g) Questionnaire Designing and Pretesting

2. BASELINE DATA

Baseline data were collected on parameters like sociodemographic status, food pattern, which included: general dietary aspects, general meal pattern, food frequency. The Changes in Food Consumption, lifestyle habits and disease profile during lockdown were assessed.

The nutritional assessment was done using Mini nutritional assessment (MNA) Scores and cognitive function using Cognitive Impairment Test (CIT) was calculated. The selection of the subjects was done by a non-probability sampling method. Following the snowball sampling technique, members of the organizations and relatives of the members and local people were encouraged to join; and a total of 400 subjects at the age of 60-80 years were enrolled in the study.

1. STUDY DESIGN

I. SAMPLING TECHNIQUE:

The elderly subjects were selected for this study from the senior citizen associations and free-living population of Vadodara city, respectively. Purposive Sampling for the selection of enrolled elderly which are active members from the senior citizen associations and women's associations situated in all the four zones of urban Vadodara, were included. Consent forms were sent through the president of associations personally or in the form of a Google form. Those who had willing to participate are personally contacted with the precautions of COVID-19 protocol rules.

II. ETHICALCLEARANCE

The study had been approved by the Institutional Medical Ethics committee of the Department of Food and Nutrition, The Maharaja Sayajirao University of Baroda and granted with the Institutional Medical Ethics Committee No. IECHR/FCSC/2020/53. Prior to enrolling in the study, informed written consent was taken from all the willing respondents on the consent form.

III. SAMPLE SIZE:

Prevalence (case fatality rate)

The elderly population in India has been the most vulnerable group in the COVID-19 pandemic, contributing to ~ 53% of the reported fatalities due to COVID-19. (Mudgal & Wardhan, 2020). The 60+ years age group, making up just 9% of the population, has an immensely large share of 53% of all deaths.

Prevalence = 53% = 0.53

At 95% confidence interval, d= 5% =0.05

$n = (z_1)^2 [p(1-p)/d^2]$

= 382.7

5% non-response rate = 382 x 5/100 = 19

Therefore 400 sample size will be taken.

IV. INCLUSION CRITERIA:

- Elderly people between the age of 60 to 80 years
- Elderly of middle-income group & upper-income group
- Elderly residing at home with different living arrangements
- Elderly recovered from COVID-19 situation (hospitalized or home quarantine)

V. EXCLUSION CRITERIA:

- Hospitalized elderly & severe ill conditions
- Elderly living in old age homes
- Age less than 60 years & greater than 80 years

VI. QUESTIONNAIRE DESIGNING AND PRE-TESTING:

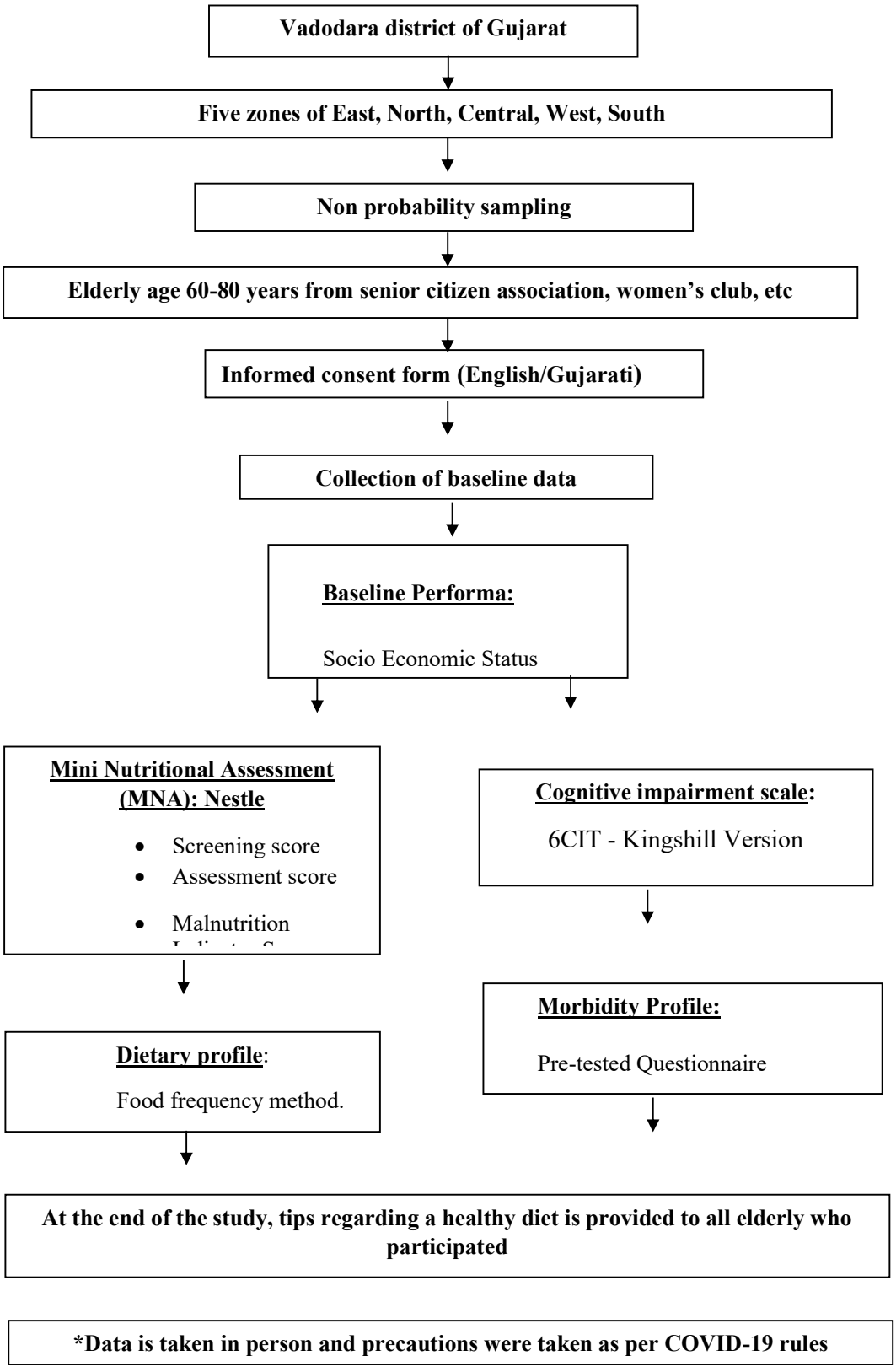
A semi-structured questionnaire was developed by the investigator. The questionnaire was developed to elicit information regarding the socioeconomic status of the family and the nutritional status of the elderly. Pre-testing was done on 20 elderly before arriving at the final questionnaire. These subjects were given printed form or google form according to their preference of mobile phone usage.

Table 3.1: Parameters and Tools

Parameters	**Tools**
Socio demographic / economic status:	Pretested semi structured questionnaire
Nutritional Status:	Mini Nutritional Assessment (MNA): Source Nestle 1994
Dietary Pattern:	Pre-tested Questionnaire
Morbidity Profile:	Pre-tested Questionnaire
Cognitive scale:	6CIT Kingshill Version 2000
Statistical analysis:	Mean SD, Paired t test

STUDY DESIGN

Figure 3.1 Schematic representation of enrolment of subjects and collection of data



METHODOLOGY:

The various tools and technique which were been used in the study to get the data on topics such as mini nutritional assessment, cognitive function, socio economic profile and diet and disease profile.

1. SOCIO DEMOGRAPHIC STATUS:

In order to the knowledge regarding the socio demographic profile, a questionnaire has been prepared. It was planned and prepared in a manner to obtain information such as age, gender, ethnic group, marital status, religion, education, occupation and type of family and total family members. The age group was further classified as 60-70 years and 70-80 years. The respondents were classified into two groups according to their income i.e., middle income and upper income.

2. MINI NUTRITIONAL STATUS (MNA):

The Mini Nutritional Assessment (MNA) has recently been designed and validated to provide a single, rapid assessment of nutritional status in elderly patients in outpatient clinics, hospitals, and nursing homes. The sum of the MNA score distinguishes between elderly patients with: 1) adequate nutritional status, MNA >= 24; (2) protein-calorie malnutrition, MNA < 17; (3) at risk of malnutrition, MNA between 17 and 23.5.

Table 3.2: Classification of MNA Scores

CATEGORY	Outcome of scores
Malnourished	<17
At risk of Malnutrition	17 to 23.5
Well nourished	>= 24

Source: Nestle research center,1994

Table 3.3: Classification of BMI according to Asia Pacific criteria,2004

CATEGORY	BMI Classification
Underweight	<18.5
Normal	18.5-22.9
Overweight	23-24.9
Obese	>=25

3. DIETARY PROFILE:

a) General Dietary Aspects

This included information regarding the general diet such as vegetarian, non-vegetarian, or eggetarian. Also, the practices such as water intake, general meal pattern, number of meals per day and other food aspects.

b) Food Frequency of Food Group Consumption

For this, a food frequency questionnaire of selected cooked and uncooked food groups was used. The frequency of consumption of foods was classified into frequent and non-frequent. Frequent consumptions include daily, once a week, 2-3 times a week, and nonfrequent consumption included once a month and occasionally.

c) Changes in Food Consumption during COVID-19

It included questions related to special health food chosen by subjects during COVID-19, special craving for certain types of food in lockdown, food consumption reduced as compared to the past few months and any changes in food consumption pattern during a lockdown situation.

d) Lifestyle Factors during COVID-19

It included questions related to physical activities, recreational activities and spiritual activities of subjects during COVID-19.

4. COGNITIVE IMPAIRMENT(6CIT) DURING COVID-19

The six-item cognitive impairment test (6CIT) is a brief cognitive screening instrument (CSI) also recommended in a community setting. 6CIT proved quick and easy to use and acceptable to patients: no patient either declined testing or failed to complete the test. Because it is an entirely oral test, no specialized equipment is required, it may be used in visually impaired patients (Rawle and Larner, 2013), and it could be administered by telephone. 6CIT is an acceptable and accurate test for the assessment of cognitive problems. The various domain includes orientation, memory and calculation, The outcome from Scores are 0-7= normal: Referral not necessary at present, 8-9 = mild cognitive impairment: Probably refer and 10-28 = significant cognitive impairment: Refer.

Table 3.4 shows Classification of 6CIT Scores

Table 3.4 Classification of 6CIT Scores

CATEGORY	CIT Scores
Normal	0-7
Mild Cognitive Impairment	8- 9
Significant Cognitive Impairment	10-28

Source: 6CIT - Kingshill Version 2000

5. DISEASE PROFILE

It included questionnaire a) Major illness and b) Minor illness experienced by the subjects during the COVID-19 situation. A detailed checklist was used for both illnesses. This included problems like oral, gastrointestinal, respiratory, psychological, cardiovascular, genitourinary and endocrine systems. Prevalence of minor problems was collected for the last 30 days. This included various conditions like infection, vomiting, body ache, malaria, diarrhea, constipation, acidity, indigestion, chest pain, eye problems, ulcers, sleep disturbance, itching, dryness, etc., during the COVID-19 situation, as showed in appendix.

STATISTICAL ANALYSIS:

After compiling the data, Mean±SD or present responses were calculated for all the parameters expressed numerically. The data were analyzed using the appropriate statistical tests as described.

1) Software used:
    a) Microsoft word 2019
    b) Microsoft excel 2019
2) Statistical methods used:
    a) Mean
    b) Standard deviation
    c) Percentage
    d) Student t test
    e) Correlation

Socio demographic status: Socio demographic status responses were calculated using mean, SD and percentages.

Mini Nutritional Status Assessment: Mini Nutritional Status Assessment was calculated by Mean, SD and percentages initially. Student t test, regression and correlation were used to compare gender wise and age wise responses.

Dietary profile, lifestyle pattern and morbidity profile: They were calculated by Mean, SD and percentages.

Cognitive Impairment Test: Cognitive Impairment Test was calculated by Student t test and correlation was used to compare gender wise and age wise responses.

Results and discussion of the study are described in the next chapter.

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

The present study was undertaken to evaluate the effects of COVID-19 situation on the health and nutrition status of the elderly residing in urban Vadodara. The related objectives included assessing nutritional status by using the dietary profile, Mini Nutritional Assessment (MNA) scores, and BMI scores. The health status was determined by using morbidity profile and mental health status using Cognitive Impairment Test (CIT) scores. The data was collected on aspects like socio-demographic profile, general meal pattern, food frequency of food groups, changes in consumption pattern during COVID-19 situation, and its effects on lifestyle pattern. The tools used were Mini Nutritional Assessment (MNA) scores and Cognitive Impairment Test (CIT) scores.

India has witnessed a steady and progressive rise in the number of elderly people (aged 60 years or above) over the last decade. This trend of aging is bringing a crisis in socio-economic status (SES), nutrition, and health of the elderly population. Per capita income and self-view of educational status are strongly associated factors contributing to the nutritional status of the elderly. While looking at the health aspect of the rapidly growing elderly population, physical changes are one of the prime changes that are infested as musculoskeletal, dental, digestive, visual, and auditory problems, etc. despite of Indian tradition having an enormous potential of traditional ways of food & living. The social isolation, loneliness, and change of routine as well as impact of quarantine among elderly due to COVID-19 pandemic may have huge psychological and social impact beside physical impact which is very difficult to quantify.

Hence, continuing with this as a background, the present study was commenced to identify the health and nutritional status of the elderly during the COVID-19 situation. In favor of attaining the set objectives, the procedure was carried out initially by circulating Google Forms to active members of the Senior Citizens Associations. With respect to the elderly not actively using their smartphones and looking at the current COVID-19 situation, 40% of subjects of free-living elderly included in the study were approached personally. The sample size was covered by both online Google form and a large number by face-to-face interview. All the parameters included were self-reported data by the subjects in Google Forms and some with phone calls. There were no differences found in both data collection processes.

A study sample of 400 subjects was enrolled from senior citizen associations, temples, women's club, Mahila Mandal's, society community halls, etc. located in five zones of urban Vadodara city.

During December 2020-March 2021 COVID-19 social lockdown, the elderly completed an online survey including measures relating to physical activity, diet quality, morbidity, and how mental/physical health had been affected by lockdown. Furthermore, at the end of the study, all the subjects received tips of a healthy diet during the COVID-19 situation. Appropriate statistical tests were applied to the data gathered. The selected subjects were classified into age groups 60-70 years and 71-80 years and Gender.

The results are described, discussed, and interpreted in accordance with the objectives of the present study as follows.

A total of four hundred subjects were purposely selected from the free-living population of urban Vadodara. The detailed methodology of the aforementioned parameters has been explained in the materials and methods chapter. In order to present the data subjects were classified in three ways, i.e., gender-wise, and age group-wise.

The results have been analysed and described in the following manner:

1. Gender and age of the elderly subjects
2. General characteristics of the subjects
3. Mini Nutritional Status Assessment of the subjects
4. Dietary Profile of the subjects
5. Lifestyle pattern of the subjects
6. Cognitive Impairment Test of the subjects
7. Morbidity Profile of the subjects

1. GENDER AND AGE OF THE ELDERLY SUBJECTS

A pre-tested questionnaire was used to obtain a socio-demographic profile of the selected subjects. The subjects aged 60-80 years were selected from the free-living population of urban Vadodara. Subjects were screened according to their age and gender. There were two age groups: young elderly i.e., 60-70 years and old elderly 71-80 years. The below table 4.1.1 shows mean and SD of subjects age wise and gender wise.

Table 4.1.1 Mean and SD of Age and Gender wise

Sr. No.	Gender	Age in Years	Total (N=400)	Mean ±SD years
1.	**Male**	**60-80**	**169 (42.2)**	**68.45±6.48**
		60-70	95(36.8)	64.35±3.27
		71-80	74(52.11)	75.87±3.53
2.	**Female**	**60-80**	**231 (57.7)**	**68.36±6.4**
		60-70	163(63.17)	64.29±3.33
		71-80	68(47.8)	76.04±3.06

Figures in parenthesis denote percentage of subjects

As depicted in table 4.1.1., a total of 400 subjects comprised of 169 (42.2%) males and 231 (57.7%) females. The mean age total of males was 68.45±6.48 years and total of females were 68.36±6.4 years. The mean age of young males was 64.35±3.27 and old male was 75.87±3.53. With respect to females mean age of young female was 64.29±3.33 and old female was 76.04±3.06. From the above table, it was seen that females were high in number. The subjects were further segregated into two age groups i.e., young elderly (60-70 years) and old elderly (71-80 years). The below table shows age and gender wise classification of subjects.

Table 4.1.2: Age Classification of subjects

Sr. No.	Age in Years	Total	Mean ±SD
1.	60-70	258 (64.5)	64.31±3.30
2.	71-80	142 (35.5)	75.95±3.30

Figures denote percentage of subjects

The table 4.1.2 shows, that the young elderly accounted to be 258 (64.5%); with mean age of 64.31±3.30 years that included 95 males (36.8%) and 163 females (63.17%) in the subjects enrolled as shown in table 4.1.2. Old elderly accounted to be 142 (35.5%) with a mean age of 75.95±3.30 years; that comprised 74 males (52.11%) and 68 females (47.8%). In a similar 2 pattern Chauhan, et.al (2013) had described the old age in two sub populations commonly referred as the young old (60-75 years), the old (76-85 years).

2. GENERAL CHARACTERISTICS OF THE SUBJECTS

General characteristics included data regarding socio demographic status, marital status, religion, ethnic group, education, occupation, type of family, etc through a structured questionnaire of subjects belonging to Urban Vadodara. Those parameters are presented in percentages. Socio-demographic data of the subjects revealed that the majority of them belong to the middle income and a few to high income group and of most of them belong to north and east areas. As seen from the table, total 169 males and 231 females were selected from the free-living population aged 60-80 years. The data collected on above parameter is presented in 4.2.1.

Table 4.2.1: Socio demographic profile of subjects belonging to the different gender groups (60-80 years) in free living populations

Sr. No.	Characteristics	Female (n=231)	Male (n=169)	Total (N=400)
1.	**Age in years**			
	Mean age ±SD	68.36±6.45	68.45±6.48	68.45±6.48
2.	**Religion**			
	Christian	2(0.87)	5(2.96)	7(1.75)
	Hindu	210(90.91)	153(90.53)	363(90.75)
	Jain	15(6.49)	7(4.14)	22(5.50)
	Muslim	3(1.30)	2(1.18)	5(1.25)
	Other	1(0.43)	2(1.18)	3(0.75)
3.	**Education Level**			
	Illiterate	0(0.00)	0(0.00)	0(0.00)
	Primary	29(12.55)	11(6.51)	40(1.00)
	Secondary	43(18.61)	7(4.14)	50(12.50)
	Under Graduate	32(13.85)	22(13.02)	54(13.50)
	Higher Secondary	56(24.24)	30(17.75)	86(21.50)
	Graduate	63(27.27)	79(46.75)	142(35.50)
	Post Graduate	8(3.46)	20(11.83)	28(7.00)
4.	**Marital Status**			
	Unmarried	4(1.73)	1(0.59)	5(1.25)

Sr. No.	Characteristics	Female (n=231)	Male (n=169)	Total (N=400)
	Married	181(78.35)	155(91.72)	336(84.00)
	Widow/Widower	45(19.48)	12(7.10)	57(14.25)
	Divorced	1(0.43)	1(0.59)	2(0.50)
5.	**Occupation**			
	Retired	17(7.36)	123(72.78)	140(35.00)
	Housewife	208(90.04)	0(0.00)	208(52.00)
	Profession	2(0.87)	22(13.02)	24(6.00)
	Shop Owner	1(0.43)	12(7.10)	13(3.25)
	Clerk	0(0.00)	1(0.59)	1(0.25)
	Semi Profession	2(0.87)	8(4.73)	10(2.50)
	Business	1(0.43)	3(1.78)	4(1.00)
6.	**Living Arrangement of Elderly**			
	Staying Alone	9(3.90)	6(3.55)	15(3.75)
	With Spouse	68(29.44)	60(35.50)	128(32.00)
	With Children	112(48.48)	74(4.79)	186(46.50)
	Extended Family	42(18.8)	29(17.16)	71(17.75)
7.	**Ethnic Group:**			
	Gujarati	209(90.48)	145(85.80)	354(88.50)
	Non-Gujarati	22(9.52)	24(14.20)	46(11.50)
8.	**Resident in Gujarat Since**			
	>10 Year	210(90.91)	152(89.94)	362(90.50)
	<10 Year	21(9.09)	17(10.06)	38(9.50)
9.	**Socio Economic Status**			
	Middle Income Group	213(92.21)	143(84.62)	356(89.00)
	High Income Group	18(7.79)	26(15.38)	44(11.00)

Figures in parenthesis denote percentage of subjects

The data presented in table 4.2.1 shows more details. The majority of subjects363(90.75%) were Hindus and Jains were 22(5.50%) with others descending it. It was found that 155(91.72%) males and 181(78.35%) females were married and 45(19.48%) females were widows and male widowers 12(7.10%) and rest of them with unmarried 5(1.25%) and divorced 2(0.50%). Education is one of the most effective paths to know about health,

nutrition, diseases, and care. Among the study population, 142(35.50%) were graduates. A very tiny chunk of males i.e. 12(7.10%) were engaged in some kind of jobs rest 123(72.78%) were retired. Around 208(90.04%) females were housewives with 2(0.87%) involved in earning through a home business.

India is a country where living in a joint family (with children) is preferred traditionally. But with the changing values and lifestyles living in a nuclear family (with spouse) is quit increasing with the current trend. The living arrangement has a definite correlation with the overall health of individuals. More than half of the subjects 128(32.00%) were living with a spouse, 15(3.75%) living alone, 186(46.50%) lived with their children and 15% staying alone. The percentage of elderly from the Gujarati community (67%) was double compared to Non-Gujarati. More than half of the subjects were 354(88.50%) living greater than 10 years in Vadodara with 362(90.50%), especially the females i.e., 210(90.91%). Overall socio-economic status identified 356(89.00%) subjects belonged to the middle-income group.

3. MINI NUTRITIONAL STATUS ASSESSMENT OF THE SUBJECTS

Mini Nutritional Status Assessment is the most efficient, simple, and appropriate nutritional assessment tool for older people which can detect malnutrition or at risk of malnutrition but also favor early nutritional intervention in order to improve quality of life. A detailed understanding of the nutritional status of the elderly has become the focus of intense investigation in recent years. The table below shows classification of MNA scores.

Table 4.3.1 Classification of MNA Scores

CATEGORY	Outcome of scores
Malnourished	<17
At risk of Malnutrition	17 to 23.5
Well nourished	>= 24

Source: Nestle research center,1994

The MNA test is composed of Anthropometric measurements, questions related to lifestyle, medication, and mobility; Dietary questionnaire and Subjective assessment. The sum of the MNA score distinguishes between elderly subjects with: adequate nutritional status, MNA ≥

24; protein calorie undernutrition, MNA < 17; at risk for malnutrition, MNA between 17 and 23.5. Table 4.3.2 represents mean MNA scores of age wise and table 4.3.3 shows gender wise.

Table 4.3.2: Age wise and gender wise mean scores

Nutrition status	**60-70 years**	**71-80 years**	**Total**
MNA Scores	19.35±2.69	19.07±2.74	19.3±2.7
Nutrition status	**Male(n=169)**	**Female(n=231)**	**Total**
MNA Scores	19.3±2.7	19.29±2.71	19.3±2.7

As shown in table 4.3.2 mean MNA scores of young elderly was 19.35±2.69 and old elderly was 19.07±2.74. The mean scores of females were 19.29±2.71 and of males were 19.3±2.7. Further the data on each MNA scores was collected which is described in below table 4.3.3.

Table 4.3.3: Percentage of subjects showing MNA score distribution

Sr. No.	**MNA Scores Range**	**Male**		**Female**		**Total (N=400)**
		60-70 years (n=95)	**71-80 years (n=74)**	**60-70 years (n=163)**	**71-80 years (n=68)**	
1.	9-10	0 (0)	1 (1.35)	0 (0)	1 (1.47)	2 (0.50)
2.	10-11	0 (0)	0 (0)	0 (0)	0 (0)	0 (0.00)
3.	11-12	0 (0)	0 (0)	1 (0.61)	0 (0)	1 (0.25)
4.	12-13	0 (0)	0 (0)	3 (1.84)	0 (0)	3 (0.75)
5.	13-14	2 (2.11)	1 (1.35)	2 (1.23)	1 (1.47)	6 (1.50)
6.	14-15	1 (1.05)	2 (2.70)	2 (1.23)	0 (0)	5 (1.25)
7.	15-16	5 (5.26)	7 (9.46)	7 (4.29)	1 (1.47)	20 (5.00)
8.	16-17	9 (9.47)	9 (12.16)	12 (7.36)	4 (5.88)	34 (8.50)
9.	17-18	12 (12.63)	6 (8.11)	14 (8.59)	10 (14.71)	42 (10.50)
10.	18-19	9 (9.47)	13 (17.57)	22 (13.50)	6 (8.82)	50 (12.50)
11.	19-20	17 (17.89)	11 (14.86)	22 (13.50)	15 (22.06)	65 (16.25)
12.	20-21	11 (11.58)	8 (10.81)	17 (10.43)	8 (11.76)	44 (11.00)
13.	21-22	13 (13.68)	7 (9.46)	26 (15.95)	7 (10.29)	53 (13.25)
14.	22-23	4 (4.21)	4 (5.41)	23 (14.11)	6 (8.82)	37 (9.25)

15.	23-24	9 (9.47)	3 (4.05)	9 (5.52)	3 (4.41)	24 (6.00)
16.	24-25	2 (2.10)	2 (2.70)	2 (1.23)	6 (8.82)	12 (3.00)
17.	25-26	1 (1.05)	0 (0)	1 (0.61)	0 (0)	2 (0.50)
18.	26-28	0 (0)	0 (0)	0 (0)	0 (0)	0 (0.00)

Figures in parenthesis denote percentage of subjects

With the respect to data elicited from table 4.3.3 it shows the subjects falling under different categories of MNA score. The mean scores for majority of subjects were falling under at-risk category in both gender groups and there were more subjects in female of young elderly group. Males belonging to old elderly group were higher because they were at high risk of malnutrition as compared to females. Also, males had higher malnourishment in 71-80 years age group as compared to in 60-70 years group. The total subjects were classified into different categories of MNA scores as shown in Table 4.3.4.

Table 4.3.4: Percentage of subjects showing MNA score belonging to different gender and age groups during COVID-19 situation

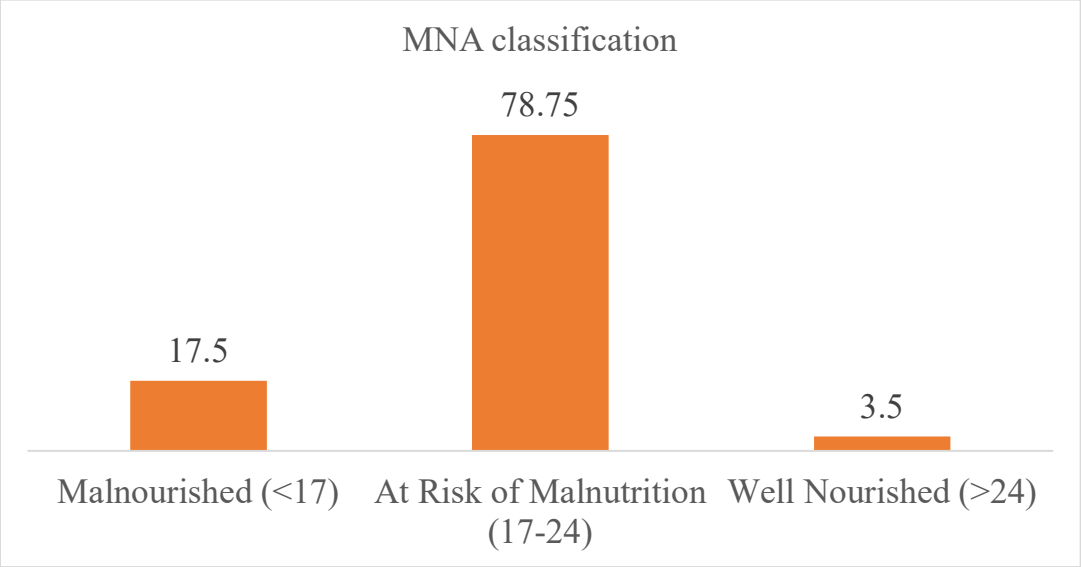
Sr. No.	**MNA Range**	**Male**		**Female**		**Total (N=400)**	**T TEST**
		60-70 years (n=95)A	**71-80 years (n=74)B**	**60-70 years (n=163)C**	**71-80 years (n=68)D**		**P value**
1.	Malnourished (<17)	17 (17.89)	20 (27.03)	27 (16.56)	7 (10.29)	71 (17.75)	0.36(A+C) 0.43(B+D) 0.12(A+B) 0.33(C+D)
2.	At Risk of Malnutrition (17-24)	75 (78.95)	52 (70.27)	133 (81.60)	55 (80.88)	315 (78.75)	0.15(A+C) 0.44(B+D) 0.22(A+B) 0.05(C+D)*
3.	Well Nourished (>24)	3 (3.16)	2 (2.70)	3 (1.84)	6 (8.82)	14 (3.50)	0.11(A+C) 0.14(B+D) 0.5(A+B) 0.18(C+D)

Figures in parenthesis denote percentage of subjects

*significant at $p \leq 0.05$

Table 4.3.4 shows that overall in gender wise classification of At Risk of malnutrition category it can be seen that females (81%) is affected more as compared to males in both age groups. When it was compared to females with males of 71-80 years, it shows statistically significant results where Malnourishment category was higher in males (27%) as compare to females in other two category. With regard to at risk status, females (81.60%) were significantly higher as compared to male especially within 60-70 years, where females (80%) in 71-80 years were significantly greater than young group. Figure 4.3.1. shows classification of MNA scores.

Figure 4.3.1: Classification of MNA scores in total number of subjects



According to category wise, 14(3.50%) people were seen in the well-nourished category, of which 6(2.32%) belonged to the younger age group and 8(5.63%) were found in the older age group. While the majority of subjects 315(78.75%) were in the At Risk of Malnutrition category of which 208(80.62%) and 107(75.35%) in younger and older age groups respectively. Majority of them 71(17.75%) were in the Malnourished category whereas only 44(17.05%) were found to be malnourished in the younger group. On comparing the MNA score specifically for at risk of malnutrition it showed more prevalence in the younger age group than the older age group. Correlation with age group was also attempted which is shown in table 4.3.5

Table 4.3.5: Mean of MNA score of subjects belonging to different age group showing MNA score

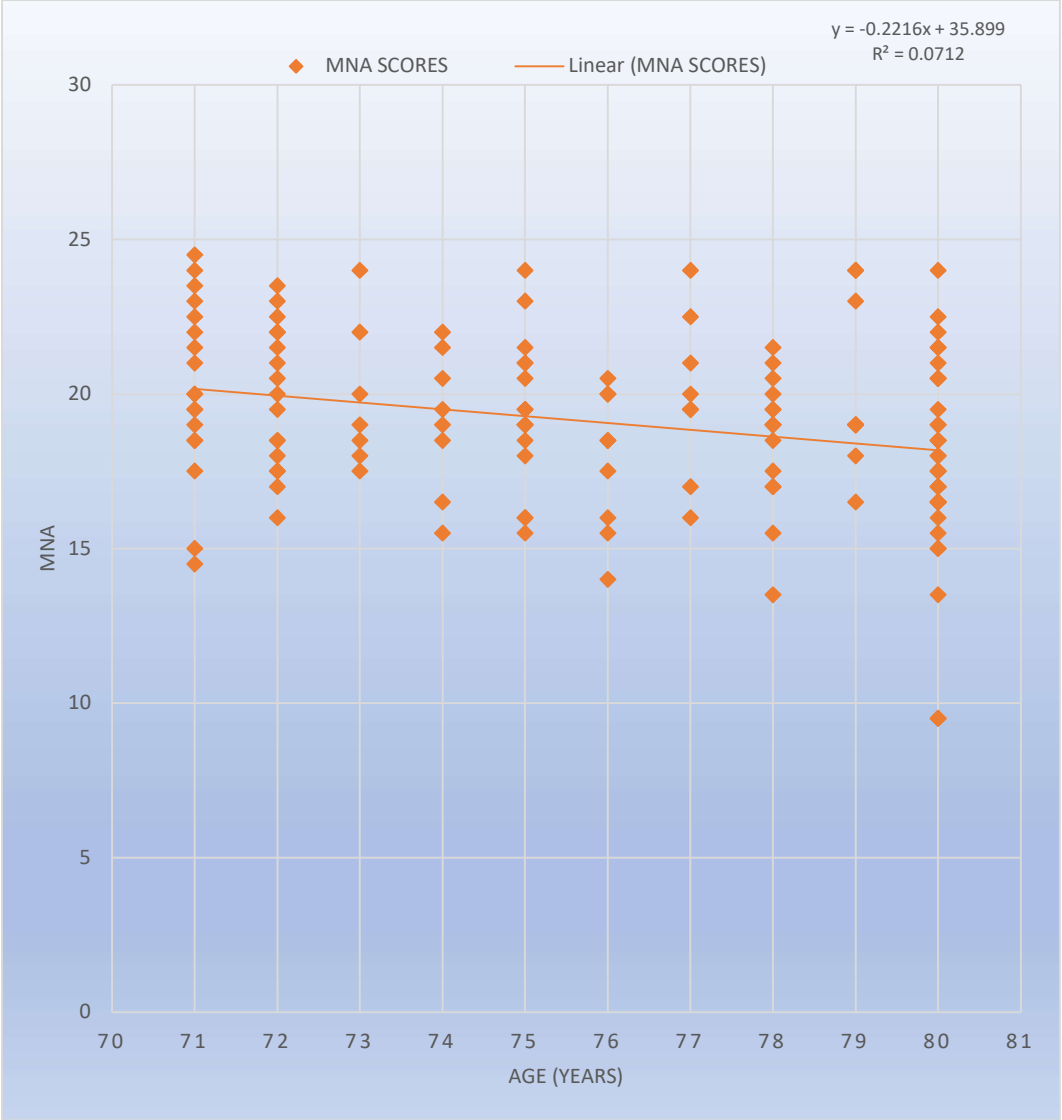
Sr. No.	Nutritional Status	60-70 years	71-80 years	Total
1	MNA	19.35±2.69	19.07±2.74	19.25±2.71
2	Age	64.31±3.30	75.95±3.30	68.45±6.48
3	Correlation	-	-	-0.16
4	Regression	0.01**	-	0.004**

*significant at p≤0.05, **p≤0.01, ***p≤0.001

The table above showed that MNA score was slightly higher in younger group. A significant negative correlation (r=-0.16, p<0.05) was found between age and MNA scores, which indicate increase in age, a decline in nutritional status was observed. In a study by Agarwal et al, 2016 it was found that significant (p< 0.01) estimation was calculated between scores of old-old (70-85 years) and young-old (60-69 years) highlighting towards presence of the majority of subjects in the 'at risk of malnutrition' category. It represented that there was significant as well as negative impact on the nutritional status with the increasing age. Thus, it revealed that age is not correlated with MNA scores.

The studied elderly subjects which can be seen in figure 4.3.2. It represented that there was a significant impact on the nutritional status with the increasing age.

Figure 4.3.2: Scatter plot of regression between age and MNA scores



When it was attempted to compare with other studies, similar evidence has been documented by researcher(Patil & Shindhe, 2018)*it was a* cross sectional study carried out among the elderly population of RHTC, Uchgaon rural which caters a total population of 42,461 and has 6 subcentres .Data was collected from eligible elderly by using mini nutritional assessment (MNA) tool. Out of 7272, total of 5.53% of subjects were malnourished and 42.10% were at risk of malnutrition. Malnutrition was more prominent in males (3.16%) as compared to the females (2.37%) in the study. Majority of the participants (65.1%) were between the age group of 60-69 years. 55% were females. 23.5% were malnourished, 49% were at risk of malnutrition and 27.5% had normal nutritional status.

There was a significant association found between lower MNA score and advanced age($p<0.001$). However, there was no statistically significant association found between gender and MNA score. The similar kind of results were obtained in the current study.

Similar type of finding was seen in a study, 129 elderly in Kerela showed that females constituted 75.2%; and nutritional assessment showed 41.9% to be having normal nutrition, 46.5% at risk of malnutrition, and 11.6% malnourished. Caloric intake was less than the RDA in 89.1%. There was no association between calorie intake per day and MNA status. Education, place of residence, marital status, and family income were factors significantly influencing nutritional status in elderly. There was significant correlation between MNA status and BMI ($p<0.001$, $r=0.329$) (Jacob Abraham, 2017). The prevalence of having normal nutrition and at risk of malnutrition were lower than present study with significant correlation as shown in figure 4.3.4.

A different type of observation was found in a study carried out in COVID-19 patients admitted to Sino-French new city branch of Wuhan Tongji Hospital from January to February 2020. Among 182 patients, 65 were male and 117 were female, with mean age 68.5 ± 8.8 years old. Average MNA score was 22.9 ± 2.8. Across all patients, 52.7% ($n = 96$) were malnourished, 27.5% ($n = 50$) were at risk of malnutrition. The study found that 27.5% of patients over 65 years old were at risk of malnutrition and 52.7% were malnourished, which was generally higher than that of elderly patients with other disease spectrums (Li et al., 2020).

Low nutritional status is likely to be related to higher oxidative stress levels and inflammation status that can impair immune function. The immune system is highly dependent on sufficient nutrient intake and diet consumed to be optimum.

- **BODY MASS INDEXOF THE SUBJECTS**

Further to described detail analysis of subjects with respect to BMI which is shown in table 4.3.6.

Table 4.3.6: Classification of BMI according to Asia Pacific criteria,2004

CATEGORY	BMI Classification
Underweight	<18.5
Normal	18.5-22.9
Overweight	23-24.9
Obese	>=25

Source: Asia Pacific criteria,2004

The below table 4.3.7 presented data of Mean ± SD of subjects.

Table 4.3.7: Mean of subjects showing BMI score belonging to different gender

Sr. No.	Gender	Mean±SD
1.	Male	24.3±3.8
2.	Female	24.4±3.8

The mean BMI of various subjects is presented in Table 4.3.7. The mean BMI was found to be high upto 24.4 in female and 24.3 in male. It suggests that there was weight gain in both the group. However, BMI was found to be higher in females. Below table 4.3.8 shows BMI classification in details.

Table 4.3.8: Percentage of subjects showing BMI score belonging to different gender and age groups during COVID-19

Sr. No.	BMI Range	Male		Female		Total (N=400)	p value
		60-70 years (n=95) A	71-80 years (n=74)B	60-70 years (n=163) C	71-80 years (n=68)D		
1.	Underweight (≤18.5)	4 (4.21)	7 (9.46)	9 (5.52)	4 (5.88)	24 (6.00)	0.46(A+C) 0.47(B+D) 0.29(C+D) 0.24(A+B)
2.	Normal (18.5-22.9)	36 (37.89)	27 (36.48)	51 (31.29)	19 (27.94)	133 (33.25)	0.31(A+C) 0.21(B+D) 0.26(C+D) 0.25(A+B)
3.	Overweight (23-24.9)	23 (24.21)	13 (17.57)	30 (18.40)	18 (26.47)	84 (21.00)	0.33(A+C) 0.28(B+D) 0.016(C+D)* 0.19(A+B)
4.	Obese (≥25)	32 (33.68)	27 (36.49)	73 (44.79)	27 (39.71)	159 (39.75)	0.29(A+C) 0.008(B+D)** 0.02(C+D)* 0.44(A+B)

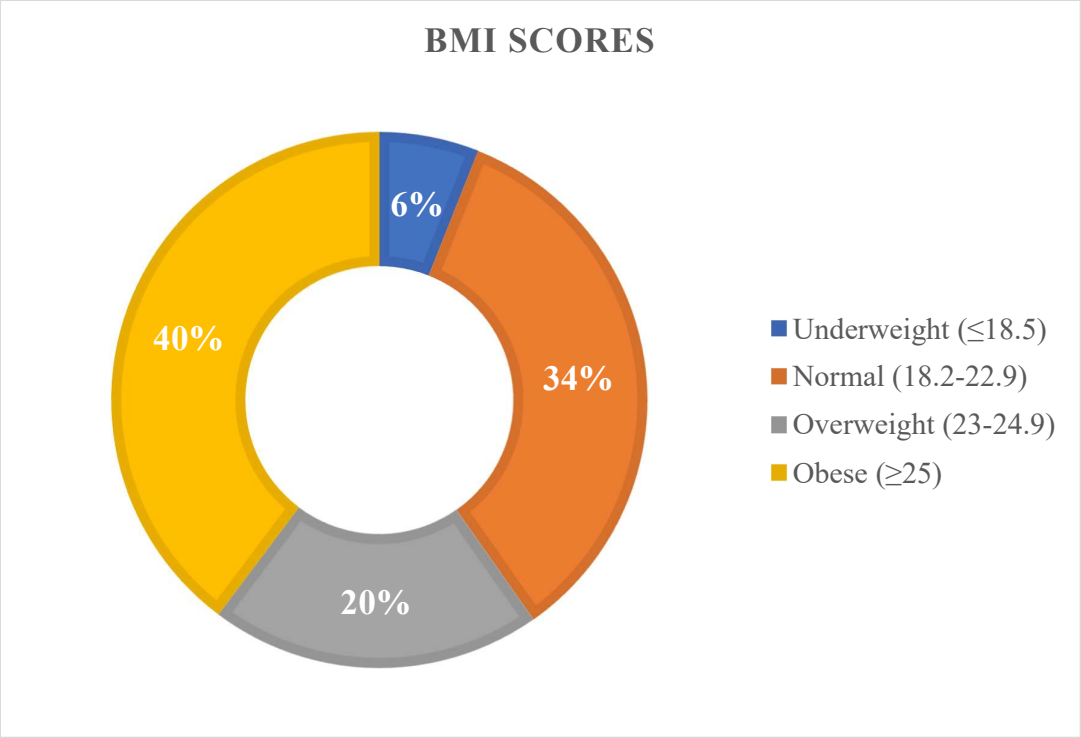
Figures in parenthesis denote percentage of subjects

*significant at p≤0.05,**p≤0.01, ***p≤0.001

When BMI classification was studied as shown in table 4.3.8,In the case of females (60-70 years), the underweight was found to be 9 (5.52%) which was significantly lower than males. The data on BMI cut-offs revealed that significantly high i.e.26 % of the older females were overweight. A total of 39 % of the females had a normal BMI as seen from the above table. Obesity was found to be present in 44 % of the younger subjects.

In the case of males (71-80 years), the underweight was found to be 7 (9.46%) which was significantly higher than the female. The data on BMI cut-offs revealed that more than 24 % of the younger males were overweight. A total of 19 % of the male had a normal BMI as seen from the above table. Obesity was found to be the same as females of the older subjects. Thus, irrespective of gender or age there is no association found with BMI of the subjects. Figure 4.3.3 shows classification of BMI scores.

Figure 4.3.3: BMI distribution of subjects (N=400)



As shown in figure 4.3.3, it was found that 24 (6.00%) were underweight and 159 (39.7%) of subjects were obese. In the younger age group, 13(5.03%) were underweight; normal category was on second i.e., 90 (34.88%) followed by overweight which is 50(19.37%) with 105(40.69%) of obese. While in the older age group 24(6.00%) were underweight, 47(33.09%) were falling in the normal range; 30(21.12%) in overweight, and 54(38.02%) were obese. Thus, the prevalence of obese was higher in 60-70 years 105(40.69%) and prevalence of normal range 47(33.09%) in 71-80 years. The reason may be more of a sedentary lifestyle with may be high morbidity rate and a low physical activity. Table 4.3.9 below shows correlation between BMI and MNA scores.

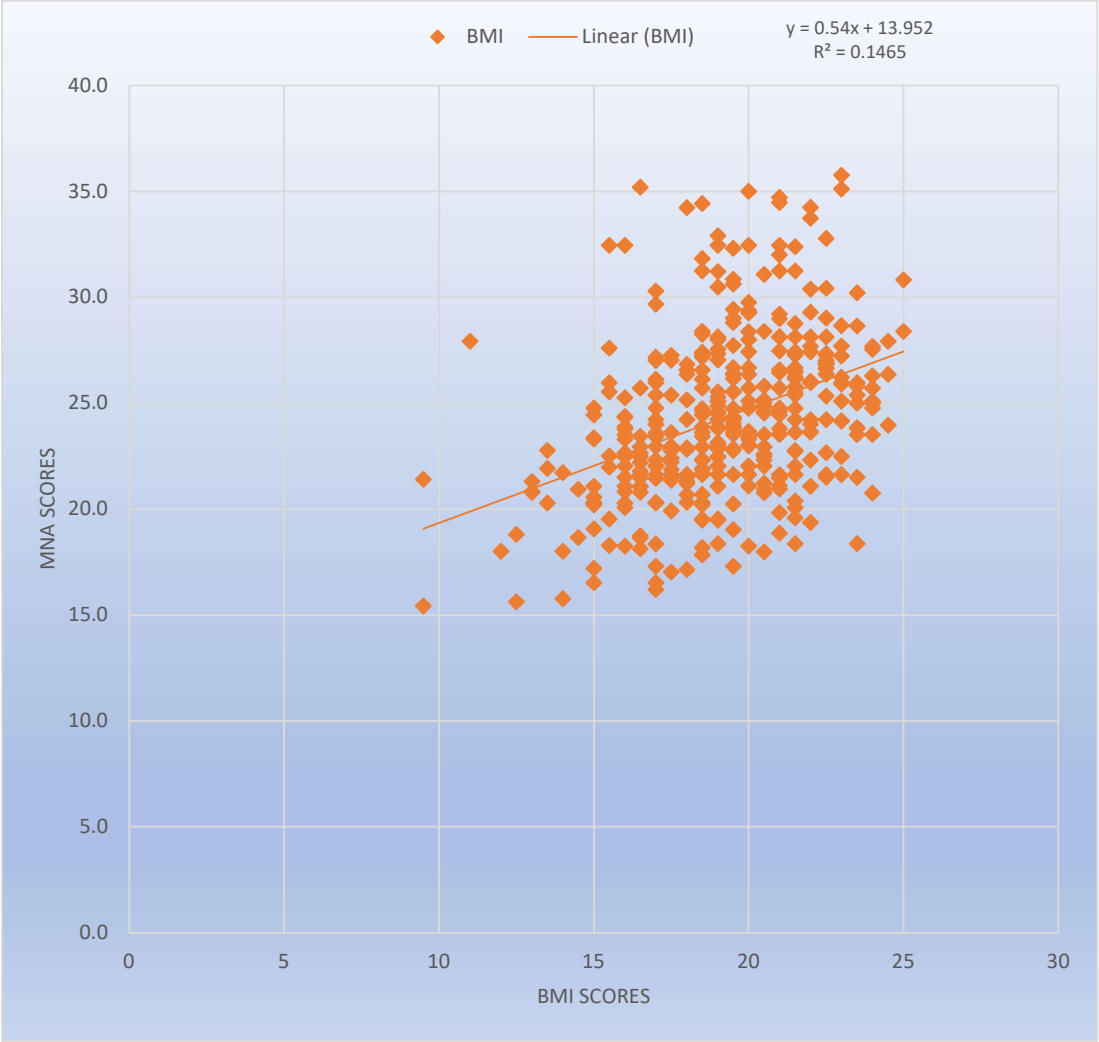
Table 4.3.9: Mean of BMI score of subjects showing MNA score

Sr. No.	Nutritional Status	Total
1	BMI	24.3±3.83
2	MNA	19.25±2.71
3	Correlation	0.38

*significant at p≤0.05

Table 4.3.9 shows a significant positive side correlation (r=-0.38, p<0.05) was found between BMI and MNA scores, which indicates that increase in BMI, shows a decline in nutritional status was observed as shown in figure 4.3.4.

Figure 4.3.4: Scatter plot of regression between BMI and MNA scores



To show a similar trend in COVID-19 social lockdown during April-May of the 2020, UK adults (N = 2002) a researcher completed an online survey including measures relating to physical activity, diet quality, overeating, and how mental/physical health had been affected by lockdown. A large number of participants reported negative changes in eating and physical activity behaviour (e.g., 56% reported snacking more frequently) and experiencing barriers to weight management (e.g., problems with motivation and control around food) compared to before lockdown. These trends were particularly pronounced among participants with higher BMI. During the lockdown, higher BMI was associated with lower levels of physical activity and diet quality, and a greater reported frequency of overeating

(Robinson, et al.,2020). Similar kind of finding was seen in present study which indicated that increase in BMI, shows a decline in nutritional status. Being obese would increase the probability of having a higher viral load, extend the virus shedding period to the community, and increase mortality. (Octavia & Harlan, 2021)

A study was carried out in Chandigarh, Northern India wherein assessment of obesity was carried out among elderly participants (n=362). The results concluded 33 percent elderly to be overweight, 8 percent to be obese and 14 percent to be underweight. Another study was carried out in South India to assess the prevalence of malnutrition among the rural elderly (n=227), about 14 percent were malnourished and 49 percent were at a risk of malnourishment (Khole. et al.,2018). Whereas, in present study underweight was comparatively less and obesity was found high upto 44%.

Eating, physical activity and other weight-related lifestyle behaviours may have been impacted by the COVID-19 crisis and people with obesity may be disproportionately affected. It examined weight related behaviours and weight management barriers among older adults during the COVID-19 lockdown.

4. DIETARY PROFILE OF THE SUBJECTS

Nutrition has been a development priority for a decade. The elderly diet is influenced by several internal and external factors. '9 Ds' outlined by as dentition, dysgeusia, dysphagia, diarrhoea, depression, disease, dementia, dysfunction and drugs. Some of these factors can influence the environment of the elderly population, which has been shown to have a significant impact on nutrition

a) General Dietary Aspects

This included information regarding the general diet such as vegetarian, non-vegetarian or eggetarian. The habitual dietary pattern in terms of consuming vegetarian, non-vegetarian, or, eggetarian diets was also studied as given in table 4.4.1

Table 4.4.1 Percentage showing General Dietary Aspects of subjects

Sr. No.	Characteristics	Male		Female		Total (N=400)
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	71-80 years (n=68)	
1.	Type of Diet					
	Vegetarian	92 (96.84)	71 (95.95)	159 (97.55)	65 (95.59)	387(96.75)
	Non-Vegetarian	2 (2.11)	1 (1.35)	1 (0.61)	3 (4.41)	7(1.75)
	Eggetarian	1 (1.05)	2 (2.70)	3 (1.84)	0 (0)	6(1.50)
2.	How Much Water Do You Consume in a day?					
	<4 Glass	6 (6.32)	6 (8.11)	12 (7.36)	9 (13.24)	33 (8.25)
	5-6 Glass	26 (27.37)	23 (31.08)	53 (32.52)	23 (33.82)	125 (31.25)
	6-7 Glass	0 (0)	0 (0)	0 (0)	0 (0)	0 (0.00)
	7-8 Glass	36 (37.89)	29 (39.19)	62 (38.04)	24 (35.29)	151 (37.75)
	>8 Glass	27 (28.42)	16 (21.62)	36 (22.09)	12 (17.65)	91 (22.75)

Figures in parenthesis denote percentage of subjects

The above table 4.4.1 presented that the majority of subjects in both male and female categories were vegetarian. 163(96.45%) males and 224(96.97%) females were vegetarian and 3(1.78%) males among 224(96.97%) females Non-Vegetarian.

The above table also reveals that more than 97 % of the younger male as compared to 95% of the elderly male were vegetarians. Non-vegetarian diets were followed by double the younger male 2% against 1% of their elderly counterparts. Similar observations were noted for the female between the two age groups. The majority of the females followed vegetarian diets habitually. A higher percentage of the younger female (60-70 years) reported consumed non-vegetarian 3(4.41%) and eggetarians 3(1.84%) foods as compared to the elderly female.

With regard to water intake of the total subjects, it was found that 125(31.25%) subjects were drinking 5-6 glasses of water and 151(37.75%) subjects 7-8 glasses. According to seasonal changes, water intake was less in winter only 33(8.25%) with <4 glasses and >8

glasses i.e., 91(22.75%) in general. No much difference in the data was observed when compared gender wise.

With respect to general meal pattern table 4.4.2 is stated below.

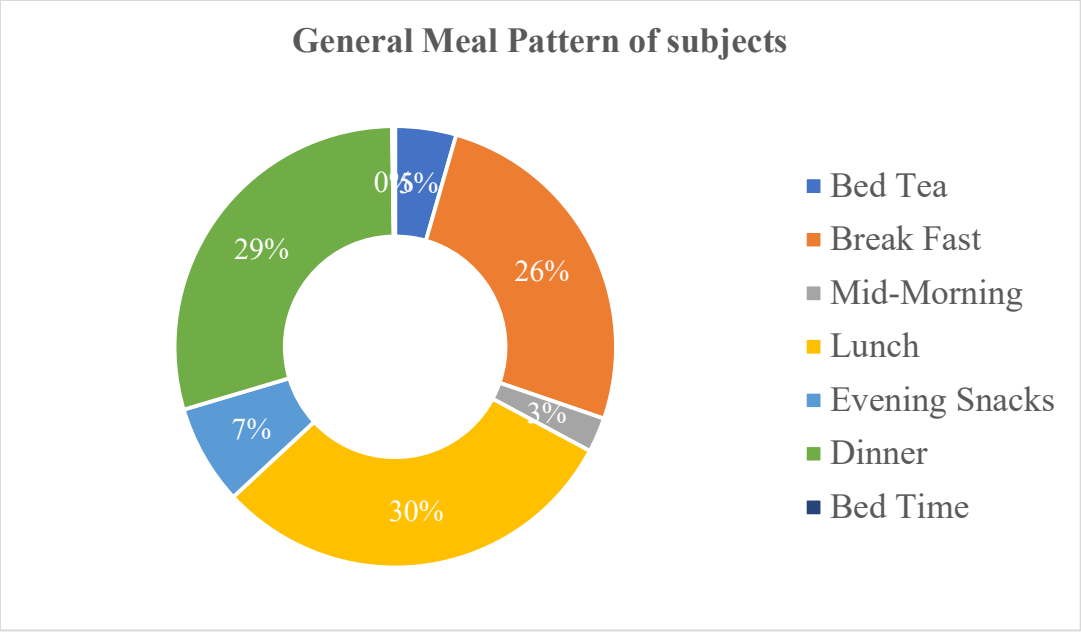
Table 4.4.2 Percentage showing General Meal Pattern of subjects (N=400)

Meal Pattern	Regular	Irregular
Bed Tea	58 (14.5)	342 (85.5)
Break Fast	335 (83.75)	65 (16.25)
Mid-Morning	33 (8.25)	367 (91.75)
Lunch	393 (98.25)	7 (1.75)
Evening Snacks	95 (23.75)	305 (76.25)
Dinner	381 (95.25)	19 (4.75)
Bed Time	3 (0.75)	397 (99.25)

Figures in parenthesis denote percentage of subjects

The presented in table showed that 335 subjects were regular in breakfast as they are consuming medicines. Figure 4.4.1 shows detailed insights, it was found that most elderly only had 2 meals a day which are lunch and dinner. Bed tea, mid-morning and evening snacks were mostly irregular in their daily life. With regard to gender and age group the data is presented below there were was no significant difference found.

Figure 4.4.1: General meal pattern of subjects



To show a similar trend in an UK article by AHDB, it stated that breakfasts get the smallest boost as it was normally eaten at home, however it can be still expect to see at least a 9% growth. And while people are not eating dramatically more in the mornings, what people eat could change. Lunch was likely to see the most significant change as more than half of all lunches (54%) were eaten out-of-home prior to the lockdown. While sandwiches and quick toast meals, such as beans on toast, will remain popular, 'pester power' from young children will influence lunch choices. Savoury snacks are expected to feature at 10% of all lunches as well as fromage frais (11%) and ice cream (7%) bringing a further boost to the dairy sector. Spend on items for evening meals tend to be higher than that of breakfast/lunch so Kantar's predicated a rise of 113 million more occasions per week – resulting in £227 million extra spend per week. With people looking for some 'pick me up' moments due to the lockdown, it can expect to see a significant rise in home snacking.

b) Food Frequency of Food Group Consumption

Data regarding food frequency was collected from the subjects using an exhaustive list of food groups. The frequency of consumption of foods were classified into frequent and non-frequent. Frequent consumptions include daily, once a week, 2-3 times a week, and nonfrequent consumption included once a month and occasionally.

(1) Uncooked Foods

Data on frequency of foods that can be consumed without cooking were collected from the subjects which is presented in table 4.4.3.

Table 4.4.3 Percentage of subjects belonging to different age groups according to frequency of Food Group Consumption of uncooked foods

Sr. No.	Food Groups	60-70 Years (n=258)	71-80 Years (n=142)	Total (N=400)
Frequently				
1.	Fruits	224 (86.82)	127(89.44)	351(87.75)
2.	Milk Products	243 (94.19)	131(92.25)	374(93.5)
3.	Nuts and Oilseeds	195 (75.58)	105(73.94)	300(75)
4.	Salads	202 (78.29)	96 (67.61)	298(74.5)
Nonfrequent				

1.	Fruits	34(13.18)	15 (10.56)	49(12.25)
2.	Milk Products	15(5.81)	11(7.75)	26(6.5)
3.	Nuts and Oilseeds	63(24.42)	37(26.06)	100(25)
4.	Salads	56(21.71)	46(32.39)	102(25.5)

Figures in parenthesis denote percentage of subjects

Table 4.4.3 shows the frequency, the basic food group classification is based on the physiological role played by the foods of each group in our body. It shows that 86.8% of 60-80 years subjects frequently consumed fruits and milk products as compared to 90% in 71-80 years. Nuts and Oilseeds and Salads were often consumed by 60-70 years as compared to 71-80 years because old elderly had chewing, digestion and swallowing problems. Hence, there is no significant difference found in consumption of uncooked foods on daily basis between two gender groups.

(2) Cooked Foods

Data on frequency of foods that is consumed after cooking were collected from the subjects which is presented in table 4.4.4.

Table 4.4.4 Percentage of subjects belonging to different gender and age groups according to frequency of Food Group Consumption of cooked foods

Sr. No.	**Food frequency**	**Male**		**Female**		**Total (N=400)**
		60-70 years (n=95)	**71-80 years (n=74)**	**60-70 years (n=163)**	**71-80 years (n=68)**	
Frequent						
1.	Cereal & cereal product	95(100)	74(100)	163(100)	68(100)	400(100)
2.	Pulses	95(100)	74(100)	163(100)	68(100)	400(100)
3.	Vegetables	92(96.84)	67(90.54)	158(96.93)	66(97.06)	383(95.75)
4.	Green leafy vegetables	85(89.47)	64(86.49)	144(88.34)	61(89.71)	354(88.5)
5.	Snacks	90(94.74)	66(89.19)	145(88.96)	59(86.76)	360(90)
6.	Sweets	56(58.95)	39(52.70)	88(53.99)	34(50.00)	217(54.25)

Sr. No.	Food frequency	Male		Female		Total
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	60-70 years (n=95)	
7.	Baked Items	29(30.53)	18(24.32)	35(21.47)	10(14.71)	92(23)
8.	Fermented	26(27.37)	26(35.14)	39(23.93)	14(20.59)	105(26.25)
9.	Beverages	41(43.16)	30(40.54)	66(40.49)	30(44.12)	167(41.75)
10.	Seasonal	42(44.21)	22(29.73)	60(36.81)	32(47.06)	156(39)
Nonfrequent						
1.	Vegetables	3(3.16)	7(9.46)	5(3.07)	2(2.94)	17(4.25)
2.	Green leafy vegetables	10(10.53)	10(13.51)	19(11.66)	7(10.29)	46(11.5)
3.	Snacks	5(5.26)	8(10.81)	18(11.04)	9(13.24)	40(10)
4.	Sweets	39(41.05)	35(47.30)	75(46.01)	34(50.00)	183(45.75)
5.	Baked Items	66(69.47)	56(75.68)	12(7.36)	58(85.29)	308(77)
6.	Fermented	69(72.63)	48(64.86)	124(76.07)	54(79.41)	295(73.75)
7.	Beverages	54(56.84)	44(59.46)	97(59.51)	38(55.88)	233(58.25)
8.	Seasonal	49(51.58)	60(81.08)	103(63.19)	32(47.06)	244(61)

Figures in parenthesis denote percentage of subjects

The consumption of various food groups of males and females has been shown in the above table 4.4.4. It showed that cereals and cereal products were consumed by all the subjects with pulses and legumes too. When looking at gender wise classification of frequently consumed food groups, it can be seen that consumption of foods from various food groups of male subjects was more compared to the female subjects in both age groups. Further it was noted that sweets was consumed more by young elderly.

With respect to non-frequent food groups, older males were consuming less amount of vegetables. Snacking was less in older female groups. When it was compared to females with males, it showed that there was no significant difference in cooked food consumption even when compared to young subjects and old subjects.

It also depicted that green leafy vegetables were not consumed by old elderly as they were facing chewing, swallowing problems and some were on liquid diet due to their health

condition as compared to young elderly. Snacking habits were more similar among both groups. With regards to eating habits, more than half of the participants feel a change in their hunger/satiety. Their diet has decreased as compared to previous years. Fermented items and baked items were chosen occasionally and on demand. Beverages like tea/coffee were chosen daily by 41% among which old females were high in number. Liquids like chaas, juices, soups were rarely chosen according to health conditions. Sweets were chosen often in the form of seasonal sweets, magaz, laddo, etc. Fast foods and heavy meals were avoided or replaced with lighter versions and less spicy in 71-80 years subjects.

Different type of finding was found in an article by IFPRI, it stated that a nutritional surveillance study found dramatic declines in egg, meat, and vegetable consumption. The COVID-19 economic crisis will affect diets primarily through declining demand for vegetables, fruits, and animal-sourced foods, which are the main sources of essential micronutrients in diets. The researcher found that from previous IFPRI research that in poor countries calories from nutrient-rich, non-staple foods like eggs, fruits, and vegetables are often as much as 10 times more expensive than calories from rice, maize, wheat, or cassava. In the face of drastic declines in income, vulnerable households will quickly give up nutrient-rich foods in order to preserve their caloric intake. Public food distribution programs are gearing up in several countries to mitigate these types of problems, but such programs deliver non-perishable staples, oils, and pulses, potentially compounding the tendency toward poor-quality diets.

One such study carried out in Vadodara city by Agarwal and Chauhan, 2019 showed the promising health profiles are manageable through food sources which are locally available, multi-beneficial, cheap and highly nutritious. The concern lies in identifying age specific foods for maximized overall health benefits.

c) Changes in Food Consumption during COVID-19

It included questions related to special health food chosen by subjects during COVID-19; like special craving for certain types of food in lockdown; whether food consumption reduced as compared to past few months and any changes in food consumption pattern during lockdown situation. Self-reported changes made in food habits, over a period of

COVID-19 situation by the subjects was studied. Most of the subjects did not report any changes in their dietary pattern. Few changes that were made attributed mainly to one or the other minor health problems or food inaccessible. Reduction in food consumption was mainly reported because of digestion problems occurring with advancing age and due to chewing problems. The below table shows data about consumption of special immunity giving food / healthy food eaten by the subjects,

Table 4.4.5(a) Percentage of Consumption of any Special Immunity Foods / Health Food during COVID-19 situation by Elderly Subjects (N=400)

Supplementary Food	Yes	No
Ayurvedic Supplements	178(44.5)	222(55.5)
Nutritive Supplements	268(67)	132(33)
Herbs Supplements	263(65.75)	137(34.25)
Any Other (Giloy And Others)	33(8.25)	367(91.75)

Figures in parenthesis denote percentage of subjects

Table 4.4.5(a)stated special immunity providing foods that, about 178(44%) of subjects incorporated ayurvedic supplements to stay fit during the times of COVID-19 situation. As prescribed by doctor the nutritive supplements were incorporated by a total of 268(36%) as shown in figure 4.4.2 with different morbidity profile irrespective of gender and age group.

Figure 4.4.2: Total Consumption of any special immunity foods

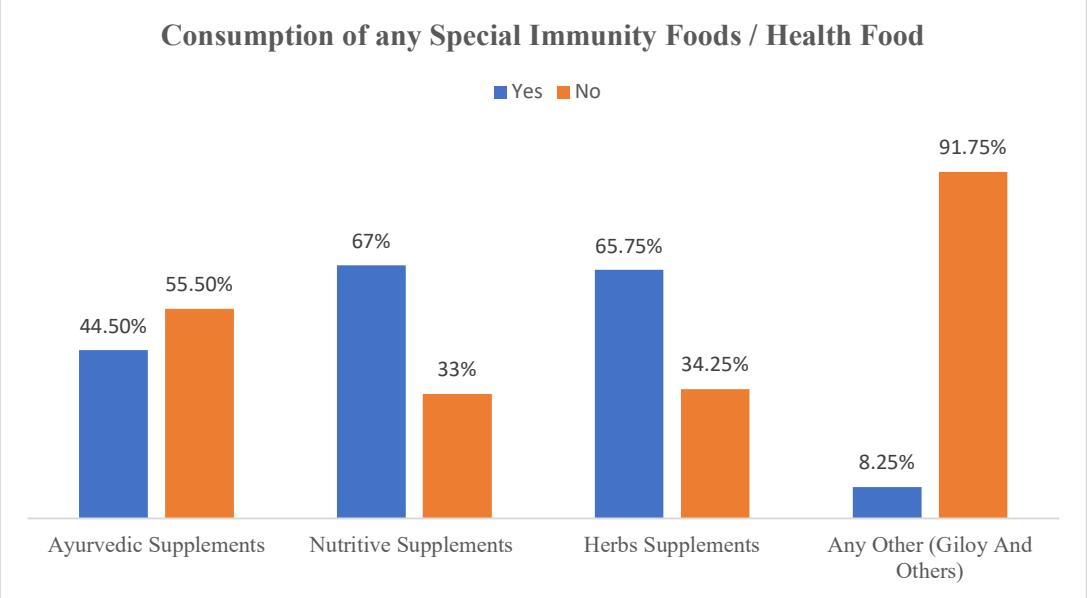


Table 4.4.5(b) shows Consumption of any Special Immunity Foods / Health Food by Gender

Table 4.4.5(b)Percentage of Consumption of any Special Immunity Foods / Health Food by Gender

Supplementary Food	Male(n=169)	Female(n=231)
Ayurvedic Supplements	90 (53.25)	88 (38.10)
Nutritive Supplements	112 (66.27)	156 (67.53)
Herbs Supplements	109 (64.50)	154 (66.67)
Any Other (Giloy And Others)	15 (8.88)	18 (7.79)

Figures in parenthesis denote percentage of subjects

As shown in table 4.4.5(b), in case of males, 90out of total 169 subjects were taking ayurvedic supplement,112 subjects taking Nutritive Supplements and 109 subjects taking Herbs. In case of females, 88 out of total 231 subjects were taking ayurvedic supplement, 156 subjects taking Nutritive Supplements and 154 subjects taking Herbs. Thus, it depicts that half of the males were consuming ayurvedic supplements and female were 38%. Majority of females which is 67% were consuming nutritive supplements like Vitamin C, Vitamin B12 and omega 3 & 6, etc. Among the Herbs supplements 66% females were consuming it as “kadha” to protect themselves from infectious COVID-19 and 64% were males.

Herbs were chosen as “kadha” to increase their immunity during the times of COVID-19 in some or other combination with either milk, water or soup. Other food supplements like giloy, trifala, amla, gado etc were also incorporated. The data on food craving faced by elderly during COVID-19 situation was also studied and the data obtained is presented in table 4.4.6.

Table 4.4.6 Percentage of Craving for certain Types of Food during COVID-19 situation (N=400)

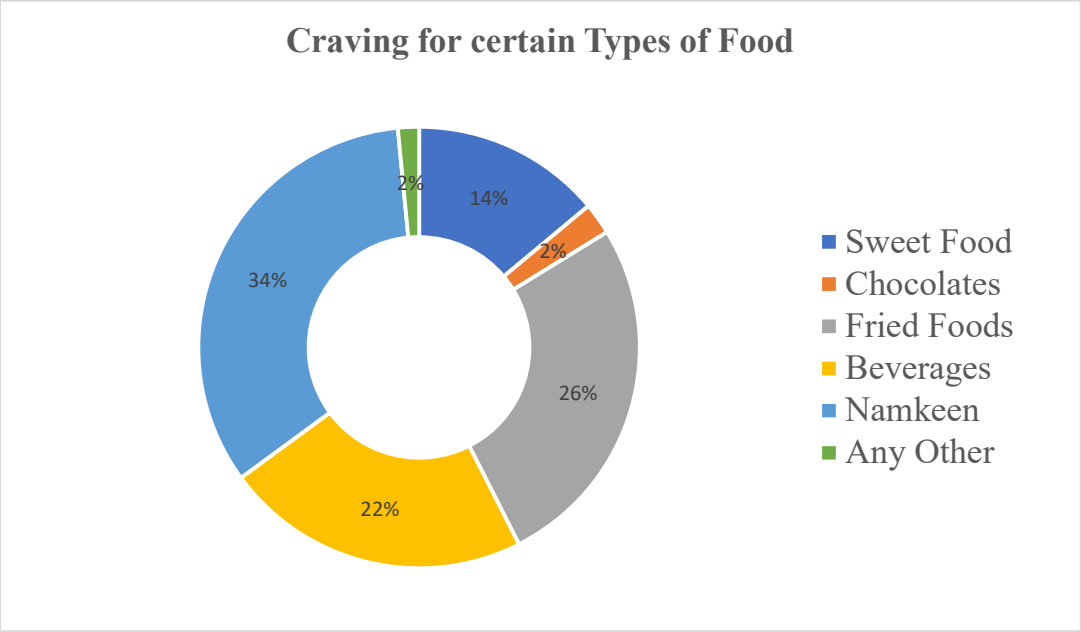
Food Item	Yes	No
Sweet Food	54(13.50)	346(86.50)
Chocolates	9(2.25)	391(97.75)
Fried Foods	102(25.50)	298(74.50)
Beverages	87(21.75)	313(78.25)
Namkeen	130(32.50)	270(67.50)
Any Other	6(1.50)	394(98.50)

Figures in parenthesis denote percentage of subjects

Table 4.4.6 showed that there was highest craving among namkeen with 130(32%) subjects; namkeen food items like chewda, khaman, fafda, sev, etc. descended by 25% fried foods like bhajya, samosa, chips, etc. Half of the subjects revelled that namkeen was first followed by fried foods and beverages as shown in figure 4.4.3.

Females have 14% more craving of sweet food, males had more of fried foods and 28% beverages of male as compared to females. Among 28.8% people stated that they had GI problems like constipation, flatulence, gas, bloating, etc. Nearly 10% people stated that they don't taste good. Also 8.8 % people said that they don't have enough food and 28% people had chewing, swallowing problems. Among them 9 % people stated that they have increased the non veg consumption. It was found that 40% people were taking more than 3 prescription drugs per day. With regards to pressure sores only 16% had them. Majority of them had 2 complete meals rest all had 1 or 3 meals in day during pandemic period. It was found that nearly 70% of people had consumed two or more servings of fruit or vegetables per day. More than 30 % of them consumed more than 3 cups of tea/coffee.

Figure 4.4.3: Craving for certain variety of food



Identical data was presented in a study by Renzo et al., 2020.the project aimed at explore and analyse the changes in eating behaviour and adherence to the Meditarian Diet (MD) and lifestyle during lockdown among the Italian population, according to the regional distribution of the COVID-19 epidemic and to age. They stated that in order to contrast and

respond to the negative experience of self-isolation, people could be more prone to look for reward and gratification physiologically associated with food consumption, even overriding other signals of satiety and hunger. In addition, boredom feelings, which may arise from staying home for an extended period, are often related to overeating as a means to escape monotony. Stress leads subjects toward overeating, especially 'comfort foods' rich in sugar, defined as "food craving". An enhanced appetite and after dinner hunger were both associated with an increased risk of junk food intake. People who decrease the junk food consumption (29.8%) were significantly more representative than those who increase it.

Table 4.4.7 Percentage of changes in Food Group Consumption during COVID-19 situation (N=400)

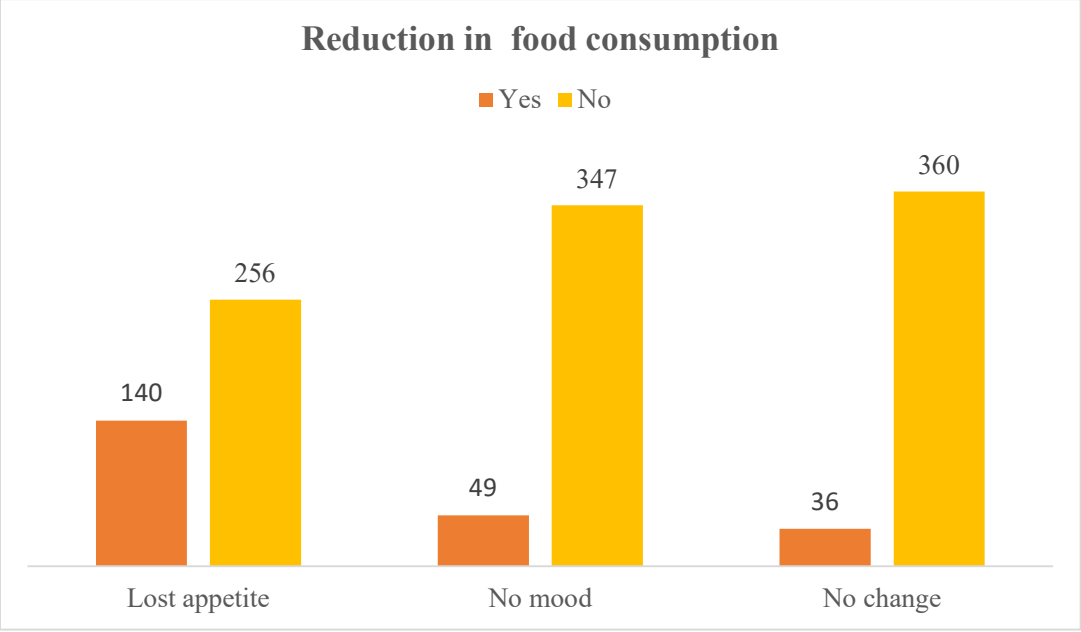
Sr. No.	Food Group	Reduced	Increased	No Change	Totally Omitted
1.	Cereal & Cereal Products	17(4.25)	54(13.50)	323(80.75)	6(1.50)
2.	Pulses	22(5.50)	61(15.25)	311(77.75)	6(1.50)
3.	Milk	21(5.25)	14(3.50)	358(89.50)	7(1.75)
4.	Other Vegetable	20(5.00)	21(5.25)	353(88.25)	6(1.50)
5.	Green leafy vegetables	23(5.75)	20(5.00)	350(87.50)	7(1.75)
6.	Oil	15(3.75)	28(7.00)	352(88.00)	5(1.25)
7.	Sugar	34(8.50)	17(4.25)	345(86.25)	4(1.00)
8.	Spices	25(6.25)	31(7.75)	344(86.00)	0(0.00)
9.	Vit C Rich Fruits	0(0.00)	61(15.25)	327(81.75)	12(3.00)
10.	Dry Snacks	0(0.00)	16(4.00)	384(96.00)	0(0.00)
11.	Fried Foods	23(5.75)	20(5.00)	339(84.75)	18(4.50)

Figures in parenthesis denote percentage of subjects

Table 4.4.7 depicted that more than ¾ of subjects had no change in consumption pattern and is same as previous, while 13% and 15% believed that there was increased in cereals and pulses intake respectively as compared to 5% increase in vegetable. Spices and oil consumption both increased to 7% according to a few female subjects. They believed to increase 15% of vitamin C rich fruits as compared to other fruits available in market. Females believed that there is no change in food consumption. Only 4% of them increased consumption of snacks. Some also believed that there was reduction in consumption foods

like sweets, fried foods. Only 5% of them reduced the intake of dairy and green leafy vegetables. Consumption of green leafy vegetables was on lower level of the scale with majority of the subjects eating them less frequently. Majority of subjects gave higher importance to vegetables like brinjal, cauliflower etc. in their palate having them on frequent basis in comparison to the green leafy vegetables. Almost half of the people were consuming fruits infrequently. Milk products were also very popular in the subjects frequently consuming them especially milk in the tea form. Some of them even reduced their sugar, spice and fried foods intake. Interestingly, more than half of the subjects have not changed the number of their daily meals (57.8%), while 17.5% and 23.5% declare to skip or introduce a break meal or a main meal respectively according to their mood. Figure 4.4.4 shows reduction in food consumption with highest in 140 out of 400 in lost appetite, followed by 49 out of 400 in no mood and 38 out of 400 in no change in pattern.

Figure 4.4.4: Reasons for reduction in food consumption during COVID situation



The highest cause of reduction in food intake was 37% high among females for lost appetite and 135 males believed to have no mood to consumed food. Only 6% males believed to have change in consumption pattern. When asked about reasons for change in food consumption, a greater number of males stated that they had chewing, swallowing problems and 35 males believed that food don't taste good. GI problems were high upto 31% in females as compared to males.

Similar finding was found by Renzo et al.,2020. With regards to eating habits, more than half of the participants feel a change in their hunger/satiety perception: 627 (17.7%) and 1214 (34.4%) of them have less or more appetite, respectively and female gender are associated to modified appetite, either negatively and positively.

A similar study carried out by (Richardson & Lovegrove, 2021) showed that common nutritional problems in the community and in care homes are low energy intakes, weight loss and vitamin and mineral deficiencies due to loss of appetite and age-related loss of senses of taste, smell and chewing for reasons including illness, infections and some medications.

Results outlined of the study in Spain on dietary behaviours of the Spanish adult population during the COVID-19 outbreak was evaluated on 7514 participants. The healthier dietary behaviours during the confinement when compared to previous habits. They were eating small amounts of food between meals (snaking), the intake of fried foods and fast-food were similar than before the COVID-19 confinement, and 63.7% of participant declared not to have been eating more during the confinement. Around 73% of participants kept their intake of fried foods as before the COVID-19 confinement, which meant that nearly 39% of them continued consuming fried foods 1–3 days a week and around 37% less than 1 time per week. Interestingly, among total participants, around 27% had difficulties finding some types of foods, especially meat (23.83%), vegetables (13.86%) and fish (12.11%) during the COVID-19 confinement(Rodríguez-Pérez et al., 2020).

One such study was conducted to investigate the impacts of the COVID-19 induced lockdown in Zimbabwe on population aged ≥18 years. The results show that 96.6% (n=490) of the participants reported that their diet and consumption patterns have changed during the COVID-19-induced lockdown. Concerning individual food groups, 57.8% of the participants stated that there was a decrease in consumption of ‘other vitamin A-rich fruits and vegetables. There was also a decrease in the intake of ‘other vegetables’ (48.5%), ‘other fruits’ (64.9%), ‘nuts and seeds’ (45.0%), ‘cereals breads and tubers’ (41.1%) and ‘dairy products’ (44.9%). Interestingly, they observed an increase in consumption of ‘dark green leafy vegetables’ (33.72%). However, ‘egg’ consumption largely remained the same (41.8%) as well as ‘meat and meat group’ (46.2%). The reported consumption patterns are reflective of a disrupted food system and prevailing food access restrictions during the

lockdown. Overall, there appears to be a trend where consumption of nutritious foods was reduced, while alcohol consumption was high (Matsungo & Chopera, 2020). Since this study was carried out including adults it stated 96% change in consumption pattern only during lockdown period, in this study it was found that 56% change in consumption pattern.

In a purposive study carried out by Chauhan et al, 2013 for selection of free-living elderly males (≥60 years, n=30). From this group, 10 subjects were selected as change agents for four weeks NHE intervention (4 sessions) covering aspects of psychological and physiological ageing. It resulted that Post NHE (n=30), improvement was found in upto 10 scores for health ailments' identification, deficiency signs and specific nutrient foods. The awareness for medicinal supplements increased from 60% to 90%. Average response for change in food group quantities along with recommended daily serving rose to 5.53%. Majority considered that daily three meal intake, avoiding fast/ processed/canned foods, recommended water intake with ageing and yoga or walks as physical activity were necessary considerations. Overall change was noted in mean knowledge scores of elderlies for educating their peers after intervention.

The COVID-19 economic crisis will affect diets primarily through declining demand for vegetables, fruits, and animal-sourced foods, which are the main sources of essential micronutrients in diets. Considering that COVID-19 has no effective preventive and pharmacological therapies available, healthy eating habits are crucial and elective micronutrient supplementations (e.g., vitamins, trace elements, nutraceuticals and probiotics) may be beneficial especially for vulnerable populations, such as the elderly.

5. LIFESTYLE PATTERN OF THE SUBJECTS

Lifestyle pattern of the subjects from the free-living population was assessed by collecting information related to physical activities, recreational activities and spiritual activities of subjects during COVID-19.

Table 4.5.1 Percentage of subjects belonging to different gender and age groups showing activities performed most often during COVID-19 situation (N=400)

Sr. No.	Characteristics	Male		Female	
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	71-80 years (n=68)
1.	Physical Activities				
	Gardening	10(10.53)	7(9.46)	24(14.72)	9(13.24)
	Walking	52(54.74)	33(44.59)	69(42.33)	21(30.88)
	Yoga	8(8.42)	6(8.11)	3(1.84)	1(1.47)
	None	25(26.32)	28(37.84)	67(41.10)	37(54.41)
2.	Recreational Activities				
	Listening music	6(6.32)	3(4.05)	11(6.75)	3(4.41)
	Reading (newspaper, books)	18(18.95)	17(22.97)	24(14.72)	14(20.59)
	Watching TV	67(70.53)	46(62.16)	112(68.71)	41(60.29)
	None	4(4.21)	8(10.81)	16(9.82)	10(14.71)
3.	Spiritual Activities				
	Prayer	55(57.89)	36(48.65)	84(51.53)	40(58.82)
	Bhajans	22(23.16)	23(31.08)	64(39.26)	23(33.82)
	Meditation	10(10.53)	9(12.16)	1(0.61)	2(2.94)
	None	8(8.42)	6(8.11)	14(8.59)	3(4.41)
4.	Sleep less	30(31.57)	26(35.13)	63(38.65)	33(48.52)

Figures in parenthesis denote percentage of subjects

Table 4.5.1 presented that walking was chosen as easiest physical activity suitable for COVID-19 situation followed by gardening and yoga. Subjects in young elderly group spent their maximum time inactively. Apart from that they spent, 46 subjects among 258 were in walking and 179 subjects in watching TV as with highest spiritual activity that is prayer. Subjects in older elderly were 54 out of 142 subjects in walking, 18 subjects were for watching TV and 76 subjects involved in prayer. A large number of subjects were not involved in any kind of activity due to their sedentary lifestyle or in mobility. Many of them were facing difficulty in sleeping.

The above table also reveals that 54% of young males were involved in walking, as compared to 42 % females of young elderly. Yoga and meditation were high in older males (8.11%). Among young elderly 70% males and 68% females were watching tv on daily basis. Among older elderly 22% were involved in reading newspaper. With regard to prayer 48 % of males and 58% females of older age group were involved. Majority of young females (40%) were doing bhajans on daily basis.

In all, a large group of elderly was seen 45% walking as physical activity and 69% watching TV as recreational activity as shown in figure 4.5.1 and 4.5.2

Figure 4.5.1: Recreational activity of subjects during COVID-19 situation

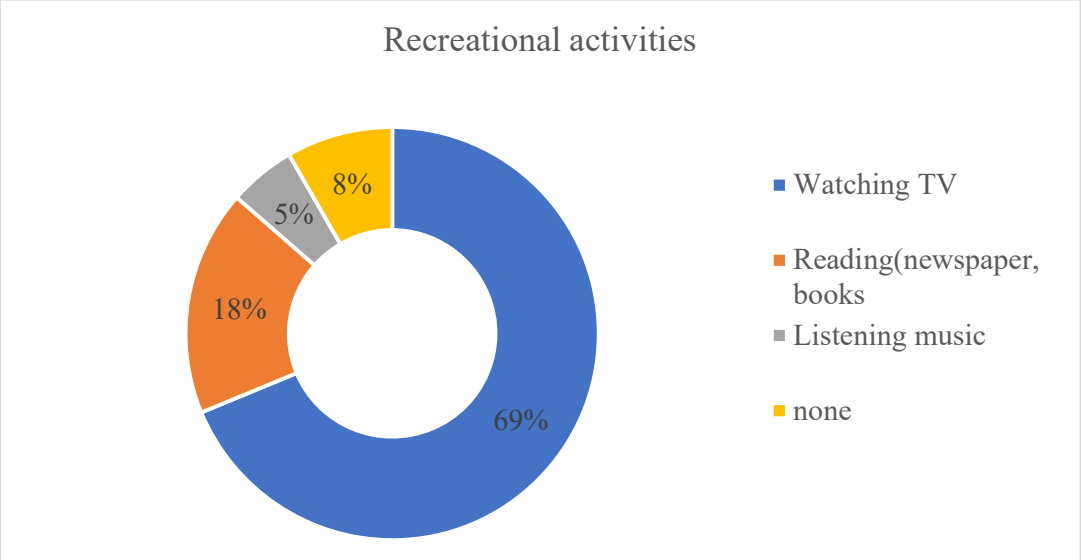
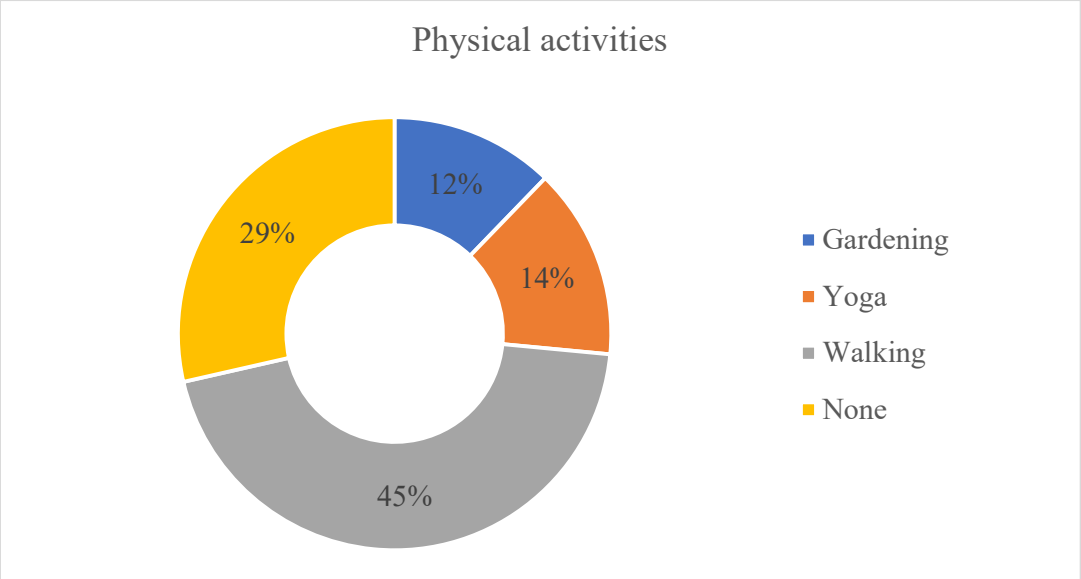


Figure 4.5.2: Physical activity of subjects during COVID-19 situation



There is an excellent study which found facts similar to our findings by Renzo et al.,2020 they stated that with regards to lifestyle changes during the COVID-19 lockdown, most of the population declares not to have changed its habits (46.1%), while 16.7% and 37.2% feel to have improved them or made them worse, respectively. In particular, smoking habits have been reduced during the lockdown ($p < 0.001$), and sleep hours have increase.

A study untaken pointed that majority of the patients were leading a sedentary lifestyle. Physical inactivity was independently associated with MMSE based MCI in elderly. Similarly, various other studies have also reported that involvement in physical activities by the older groups seems to reduce the risk of MCI. (Covell et al, 2012)

6. COGNITIVE IMPAIRMENT TEST OF THE SUBJECTS

The Six-Item Cognitive Impairment Test (6-CIT) is a feasible instrument for cognitive screening among older adults attending a general check-up. The Six-Item Cognitive Impairment Test (6-CIT) takes only 2–3 min, is not influenced by educational level, can be used in bed-bound patients who are unable to write, and showed comparable test characteristics. It is scored out of 28; higher scores indicate greater impairment. The 6-CITcontains items on orientation, attention, and memory with a range from 0 to 28; a score ≥11 indicates cognitive impairment.

Table 4.6.1: Classification of 6CIT Scores

CATEGORY	CIT Scores
Normal	0-7
Mild Cognitive Impairment	8- 9
Significant Cognitive Impairment	10-29

Source: 6CIT - Kingshill Version 2000

Table 4.6.2: Gender wise mean CIT scores

Indicator	Male	Female	Total
CIT Scores	6.90±4.38	6.90±4.38	6.90±4.38

Table 4.6.2 shows that mean score of males was 6.90±4.38 and of female was 6.90±4.38 that falls in between normal and mild cognitive impairment among majority of the subjects.

Below given table 4.6.3 shows gender and age wise Cognitive impairment score distribution during COVID-19 situation

Table 4.6.3: Percentage of subjects showing CIT score distribution during COVID-19 situation

Sr. No.	CIT Scores	Male		Female		Total (N=400)
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	71-80 years (n=68)	
1.	0	16 (16.84)	12(16.22)	18 (11.04)	7 (10.29)	53 (13.25)
2.	1	0 (0)	0 (0)	0 (0)	0 (0)	0 (0.00)
3.	2	6 (6.32)	8 (10.81)	14 (8.85)	7 (10.29)	35 (8.25)
4.	3	2 (2.11)	1 (1.35)	1 (0.61)	0 (0)	4 (1.00)
5.	4	11 (11.58)	6 (8.11)	17 (10.43)	6 (8.82)	40 (10.00)
6.	5	1 (1.05)	0 (0)	1 (0.61)	0 (0)	2 (0.50)
7.	6	11 (11.58)	10 (13.51)	21(12.88)	15 (22.06)	57 (14.25)
8.	7	2 (2.11)	1 (1.35)	1 (0.61)	0 (0)	4 (1.00)
9.	8	20 (21.05)	11 (14.86)	29 (17.79)	11 (16.18)	71 (17.75)
10.	9	2 (2.11)	1 (1.35)	2 (1.23)	0 (0)	5 (1.25)
11.	10	7 (7.37)	12 (16.22)	27 (16.56)	9 (13.24)	55 (13.75)
12.	11	3 (3.16)	2 (2.70)	5 (3.07)	0 (0)	10 (2.50)
13.	12	4 (4.21)	3 (4.05)	9 (5.52)	5 (7.35)	21 (5.25)
14.	13	2 (2.11)	4 (5.41)	6 (3.68)	1 (1.47)	13 (3.25)
15.	14	4 (4.21)	3 (4.05)	6 (3.68)	4 (5.88)	17 (4.25)
16.	15	0 (0)	0 (0)	2 (1.23)	2 (2.94)	4 (1.00)
17.	16	0 (0)	0 (0)	1 (0.61)	0 (0)	1 (0.25)
18.	17	4 (4.21)	0 (0)	3 (1.84)	1 (1.47)	8 (2.00)

Figures in parenthesis denote percentage of subjects

The above table 4.6.3 shows that distinction of subjects based on the degree of cognitive impairment. CIT test scores indicated that 49% of the subjects were normal with 19% suffering from mild cognitive impairment and 32% from significant cognitive impairment. In the two gender groups, 4% more subjects in male young elderly group and 2% female old

elderly groups were higher because of higher number of females were suffering from mild cognitive impairment than the other group. Also, males had significant cognitive impairment in 71-80 years group as compared to in 60-70 years group (Figure 4.6.2). Table 4.4.6 shows CIT scores according to their classification.

Table 4.6.4: Percentage of subjects belonging to different gender and age groups showing CIT Score

Sr. No.	CIT Scores	Male		Female		Total (N=400)	T test
		60-70 years (n=95)A	71-80 years (n=74)B	60-70 years (n=163)C	71-80 years (n=68)D		P value
1.	Normal (0-7)	49 (51.58)	38(51.35)	73 (44.79)	35(51.47)	195 (48.75)	0.29(A+C) 0.09(B+D) 0.42(A+B) 0.02(C+D)*
2.	Mild Cognitive Impairment (8-9)	22 (23.16)	12 (16.22)	31 (19.02)	11 (16.18)	76 (19)	0.36(A+C) 0.16(B+D) 0.47(A+B) 0.08(C+D)
3.	Significant Cognitive Impairment (10-28)	24 (25.26)	24 (32.43)	59 (36.20)	22 (32.35)	129 (32.25)	0.08(A+C) 0.09(B+D) 0.03(A+B)* 0.25(C+D)

Figures in parenthesis denote percentage of subjects

*significant at $p \leq 0.05$

The above data showed that total 48% elderly belong to normal range with 51 % in older females. It also indicated that more of 23% of young male were in mild cognitive impairment range with total of 19% subjects. Of 36% young females were belonging to significant cognitive range of total 32% subjects. Thus 129(32%) subjects were significant cognitive impaired with 10-28 CIT score. Figure 4.6.1. and figure 4.6.2 shows prevalence among males and females of young elderly. Figure 4.6.3 and figure 4.6.4 shows classification of CIT scores.

Figure 4.6.1: Age 60-70 years females showing CIT scores

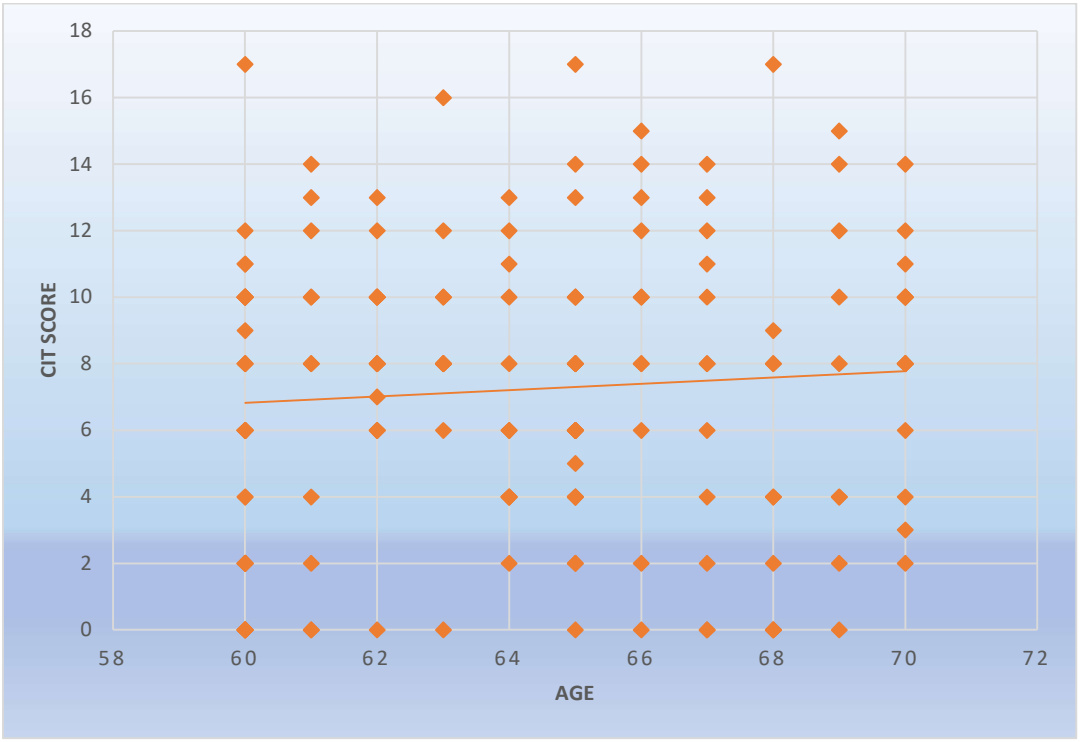


Figure 4.6.2: Age 60-70 years males showing CIT scores

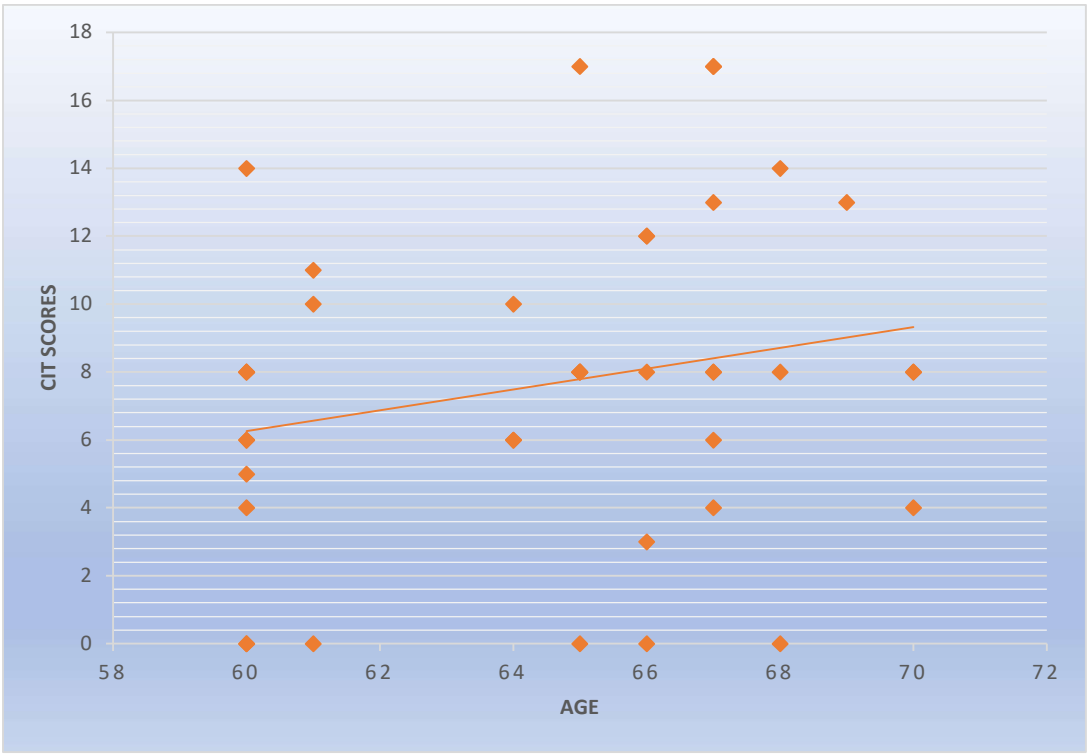


Figure 4.6.3: Age wise and gender wises CIT scores

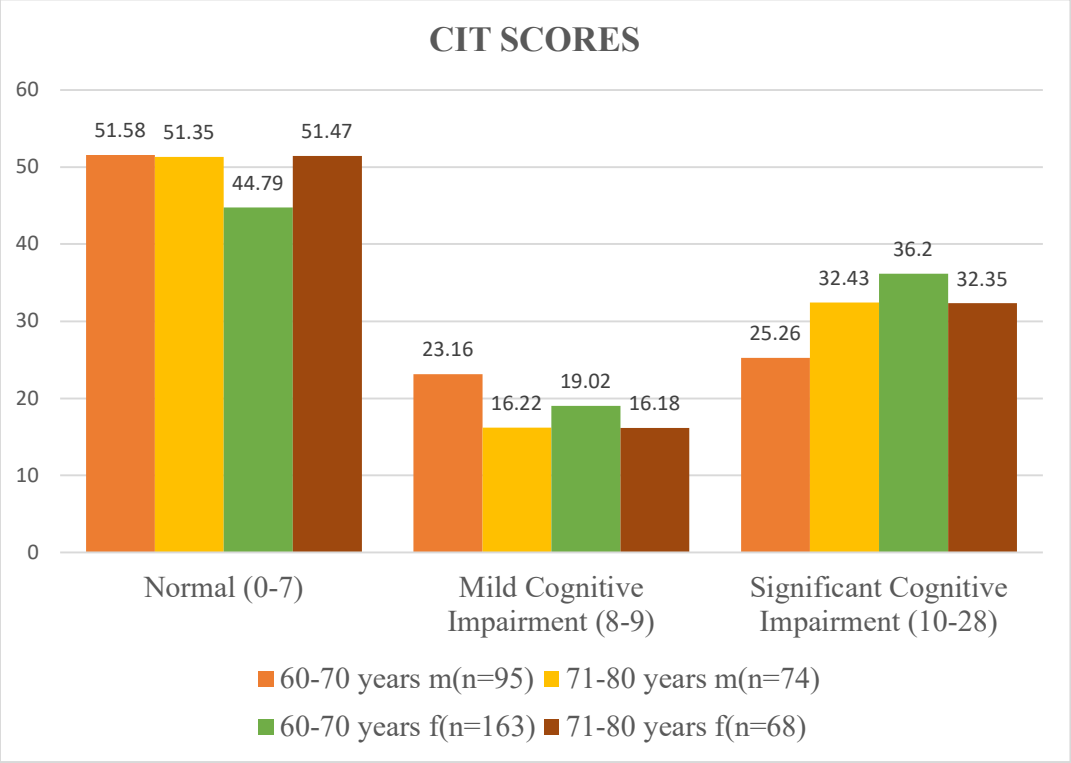
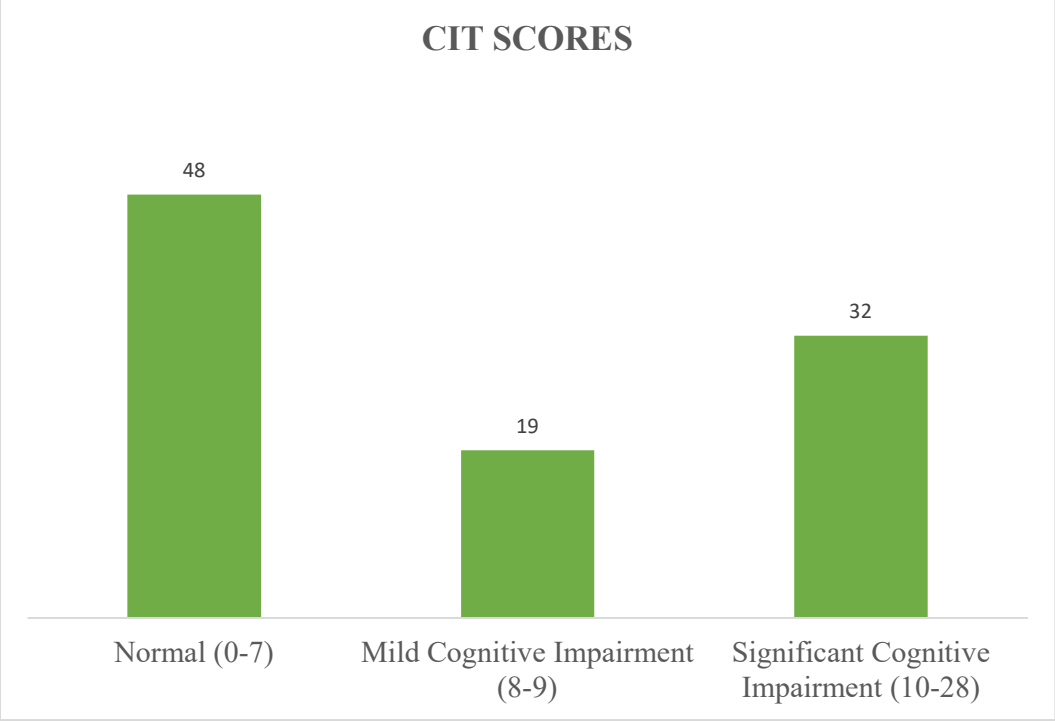


Figure 4.6.4: Classification of CIT scores



Correlation with age group was also attempted which is shown in table 4.6.5

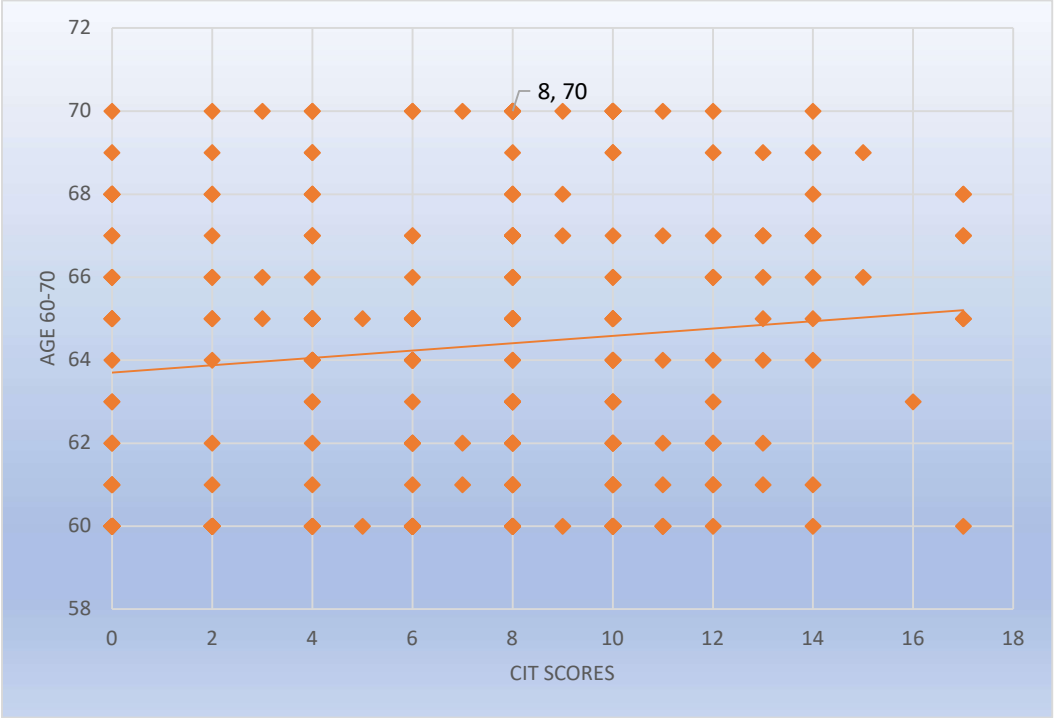
Table 4.6.5: Mean of CIT score of subjects belonging to different age group showing CIT score

Sr. No,	Cognitive function	60-70 years	71-80 years	Total
1	CIT	6.99±4.41	6.76±4.33	6.91±4.38
2	Age	68±3.30	75.95±3.30	68.45±6.48
3	Correlation			0.108

*significant at p≤0.05, **p≤0.01, ***p≤0.001

As seen in table 4.6.5, a slight positive correlation with significant at (r=0.108, p≤0.05) was found between Age and CIT scores, increase in CIT shows decline in cognitive status was observed as shown in figure 4.6.5

Figure 4.6.5: Scatter plot of correlation between age and CIT scores



Different type of finding was found in an study by (Lucke et al., 2018)shows that, in acutely hospitalized older patients with impaired cognition, as defined by a 6-CIT score ≥11, there was an association with increased risk of 90-day adverse outcome (functional decline and mortality). They interpret the fact that statistical significance was lost after adjustment as a

result of adding more variables in the model, as the estimate remained virtually unchanged. Further, it was shown that impaired cognition was independently associated with a hospital LOS ≥7 days as well as increased in-hospital mortality and institutionalization.

In a UK study, the diagnostic accuracy of the 6-CIT was tested using dementia diagnosis and severity as a reference standard in mild dementia (n = 70; mean age 68.1 years), severe dementia (n = 82; mean age 73.8 years) and healthy individuals recruited by local newspaper advertising (n = 135; mean age 81.7 years).

A recent study conducted in China highlighted the negative effects of COVID-19 on individuals' psychological and mental health. In a study conducted on the general public, 53.8% of respondents reported being psychologically affected at a moderate or severe level, with 16.5%, 28.8%, and 8.1% reporting symptoms of severe depression, anxiety, and stress, respectively. Furthermore, 37.1% of the elderly had experienced depression and anxiety during the pandemic, and the emotional response of the elderly aged above 60 years was more apparent as compared to other age groups (Xiong et al., 2020). Similar type of effects on mental health was found in current study.

In this context a recent study by Chauhan K and Shah V., 2020 on stimulating nutrition health education practices in 351 elderly subjects screened cognitively in Vadodara city. Cognition was examined using Mini-Mental State Examination (M.M.S.E.) and Cognitive Impairment Tool (C.I.T.) cognitive function tests. Nutritional, psycho-social and general awareness assessed through developed NHE tools. Highly Significant difference ($p \leq 0.001$) was found in the total knowledge-based scores of the elderly subjects in experiment group after intervention. This educational tool at initial stage showed reversible changes in mild impaired subjects with beneficial up-gradation in knowledge, positive attitude and adoption of good practices. Greater reinforcement achieved for nutritional, social and general aspects. If similar kind of intervention is provided then there will be greater achievement on mental health reducing anxiety among elderly.

It is well known that social isolation among older adults is a "serious public health concern" because of their heightened risk of cardiovascular, autoimmune, neuro- cognitive, and mental health problems. Santini and colleagues recently demonstrated that social disconnection puts older adults at greater risk of depression and anxiety. Interventions could

simply involve more frequent telephone contact with significant others, close family and friends, voluntary organisations, or health-care professionals, or community outreach projects providing peer support throughout the enforced isolation. Beyond this, cognitive behavioural therapies could be delivered online to decrease loneliness and improve mental wellbeing(Armitage & Nellums, 2020). This can defiantly improve the health of elderly.

In a study among older adults in the USA: prevalence, comorbidity, and risk for new-onset psychiatric disorders in late life, relevant to this discussion, resulted that Major depressive illness scores were present in about 5.7% of US residents aged ≥65 years, whereas clinically significant nonmajor or "subsyndromal" depression affects approximately 15% of the ambulatory elderly. Risk of developing subsyndromal depression increases as elderly people get older. Because they have numerous distressing ailments, everyday life can be burdensome for many elderly persons. Almost one third of Americans aged 75 years or older rate their health as "fair to poor." Yet, the physical discomforts experienced by so many elderly individuals are unlikely to generate a clinically significant depression unless other ingredients such as loneliness, impairment of mobility, loss of a spouse, a serious financial reverse (VanItallie, 2005).

7. MORBIDITY PROFILE OF THE SUBJECTS

Data on disease profile was assessed with respect to the age group using a check list for major and minor health problems. The results are given in the following table 4.7.1.

Table 4.7.1 Percentage of subjects belonging to different age groups showing prevalence of various Major Health Problems (N=400)

Sr. No.	Major Health Problems	60-70 Years (n=258)	71-80 Years (n=142)
1.	Oral cavity problems	99(38.37)	61(42.96)
2.	Gastrointestinal problems	108(41.86)	60(42.25)
3.	Breathing problems	60(23.26)	42(29.58)
4.	Heart, Blood Pressure	143(55.43)	71(50)
5.	Diabetes	95(36.82)	52(36.62)
6.	knee-Bone related problems	116(44.96)	71(50)
7.	Neurological problems	13(5.04)	14(9.86)

8.	Psychiatric problems	88(34.11)	44(30.99)
9.	Endocrine problems	41(15.89)	13(9.15)
10.	Genito-urinary problems	18(6.98)	13(9.15)

Figures in parenthesis denote percentage of subjects

Table 4.7.1 gives us a picture of occurrence of chronic morbidities among the study population. Few noticeable morbidities like oral problems (denture problems, pyorrhoea etc.), gastro intestinal problems (acidity, gas, indigestion etc.), cardio vascular problems (chest pain, high blood pressure), locomotor problems (joint pain, problems in knees, difficulties in walking etc.) and problems with central nervous system (Parkinson's, dementia etc.) were prevalent among40%, 42%, 53%, 46.5% and 6.75% subjects respectively in young eldelry. It was also observed that most of the chronic diseases were more prevalent among females (significant for oral problems, GI problems, locomotor problems and CVD problems) compared to males. When the subjects were classified age wise, of all oral problems, heart problems and knee problems were most prevalent in older elderly. It was also noted that oldest elderly age group included the maximum females of subject suffering from oral problems, respiratory problems, CVDs and problems with CNS, compared to the other two age groups.

Table 4.7.2 Percentage of subjects belonging to different gender and age groups showing prevalence of various Major Health Problems (N=400)

Sr. No.	Major health problems	Male		Female	
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	71-80 years (n=68)
1.	Oral cavity problems	30(31.58)	29(39.19)	69(42.33)	32(47.06)
2.	Gastrointestinal problems	36(37.89)	33(44.59)	72(44.17)	27(39.71)
3.	Breathing problems	24(25.26)	25(33.77)	36(22.09)	17(25.00)
4.	Heart, Blood Pressure	50(52.63)	36(48.64)	93(57.06)	35(51.47)
5.	Diabetes	35(36.84)	27(36.48)	60(36.81)	25(36.76)
6.	knee-Bone related problems	29(30.53)	26(35.13)	87(53.37)	45(66.18)

7.	Neurological problems	5(5.26)	12(16.21)	8(4.91)	2(2.94)
8.	Psychiatric problems	29(30.53)	21(28.37)	59(36.20)	3(4.41)
9.	Endocrine problems	14(14.74)	5(6.75)	27(16.56)	8(11.76)
10.	Genito-urinary problems	4(7.37)	5(6.75)	11(6.75)	8(11.76)

Figures in parenthesis denote percentage of subjects

The above table reveals that more than 47 % of the older female as compared to 42% of the young female were having oral cavity problems. Young females were having 44.17% gastro intestinal problems as compared to male in young group. Diabetes, heart and endocrine problems were high in young elderly with 36%, 52% and 15% respectively. Psychiatric and knee related problems were higher in young and older females respectively. There was a significant difference found between age groups and gender.

Relation of morbidity with age has been explained well in a study conducted by (George et al., 2017) states that the most common morbidities suffered by the elderly in this study were cataract (50.4%) and orthopaedic problems (50.4%). This was followed by respiratory illnesses (31.3%), gastrointestinal problems (26.5%), and dental problems (23.9%). Only 21.3% of them were hypertensive and 17.4% were diabetics. A very small proportion of elderly persons were suffering from cardiac illness (3.5%) and cancer (0.4%). The study showed less prevalence as compared to present study.

In relation to the current findings, the major findings of another study stated that diabetes causes the highest likelihood of any disability among the elderly, followed by high BP and heart disease. Another major finding of the study was they were able to quantify the relative role of morbidities for each specific disability. For instance, according to their study, the likelihood of disability was always the highest among diabetes patients, whereas the disability rate was the lowest among elderly persons with heart disease. This may be due to mortality selection among heart patients. It was found that heart disease was the topmost cause of death in India, whereas diabetes was the seventh most common cause of death (Parmar & Saikia, 2018).

The table below shows prevalence of various Minor Health Problems. Data on minor health problems was collected using checklist method of last 30 days.

Table 4.7.3 Percentage of subjects belonging to different age groups showing prevalence of various Minor Health Problems last 30 days (N=400)

Sr. No.	Minor Health Problems	60-70 Years (n=258)	71-80 Years (n=142)
1.	Cold & cough	94(36.43)	54(38.03)
2.	Viral fever	66(25.58)	36(25.35)
3.	Malaria	3(1.16)	5(3.52)
4.	Infections	24(9.30)	8(5.63)
5.	Throat infection	13(5.04)	8(5.63)
6.	Skin infection	5(1.94)	12(8.45)
7.	Impaired vision	101(39.15)	62(43.66)
8.	Pain in joints	104(40.31)	70(49.30)
9.	Chest ache	40(15.50)	19(13.38)
10.	Back ache	73(28.29)	39(27.46)
11.	Muscle ache	55(21.32)	35(24.65)
12.	Vomiting	11(4.36)	6(4.23)
13.	Dizziness	45(17.44)	31(21.83)
14.	Dryness of skin	13(5.04)	12(8.45)
15.	Trembling of limbs	7(2.71)	15(10.56)
16.	Diarrhoea	23(8.91)	8(5.63)

Figures in parenthesis denote percentage of subjects

As presented in table 4.7.3 Minor Disease profile of the subjects selected for the present study was also assessed. More than 60 % of the age (71-80years) complained of problems related to the lymphatic system which included tension, pain in joints and muscle ache. Of age (60-70years) complained of problems related to the lymphatic system which included chest ache, backpain and vomiting. Respiratory problems in terms of frequent cough and cold were reported by half of the older elderly with 38% cold and cough and 5% throat infection. While fever was 25% and 5% other infection which is higher than older elderly. 10% Trembling of limbs, 21% dizziness and 8% dryness of skin was found higher in older elderly. 43% of older elderly had impaired vision and 7% higher skin infection than young elderly.

Table 4.7.4 Percentage of subjects belonging to different gender and age groups showing prevalence of various Minor Health Problems last 30 days (N=400)

Sr. No.	Minor health problems	Male		Female	
		60-70 years (n=95)	71-80 years (n=74)	60-70 years (n=163)	71-80 years (n=68)
1.	Cold & cough	36 (37.89)	29 (39.18)	58(35.58)	25(36.76)
2.	Viral fever	20(21.05)	17(22.97)	46(28.22)	19(27.94)
3.	Malaria	1(1.05)	2(2.70)	2(1.23)	3(4.41)
4.	Infections	6(96.32)	4(5.41)	18(11.04)	4(5.88)
5.	Throat infection	4(4.21)	4(5.41)	9(5.52)	4(5.88)
6.	Skin infection	4(4.21)	6(8.11)	0(0.00)	6(8.82)
7.	Impaired vision	36(37.89)	28(37.84)	65(39.88)	34(50.00)
8.	Pain in joints	30(31.58)	36(48.65)	74(45.40)	34(50.00)
9.	Chest ache	16(16.84)	9(12.16)	24(14.72)	10(14.71)
10.	Back ache	23(24.21)	18(24.32)	50(30.67)	21(30.88)
11.	Muscle ache	19(20.00)	13(17.57)	36(22.09)	22(32.35)
12.	Vomiting	3(3.16)	2(2.70)	8(4.91)	4(5.88)
13.	Dizziness	13(13.68)	11(14.86)	32(19.63)	20(29.41)
14.	Dryness of skin	6(6.32)	7(9.46)	7(4.29)	5(7.35)
15.	Trembling of limbs	3(3.16)	8(10.81)	4(2.45)	7(10.29)
16.	Diarrhoea	5(5.26)	4(5.41)	18(11.04)	4(5.88)

Figures in parenthesis denote percentage of subjects

The above table reveals that there was high prevalence of cough and cold among female with highest 36.7% in older females. Skin infection was more in older age group of females (8.82%). Females had greater percentages of joint pain as compared to males. Half of older Females had pain in joints. Chest pain was high in young male (16.8%). Half of the older females had impaired vision. With regard to muscle ache females of older elderly had 32% prevalence. Males had more percent of drying in skin in old elderly (10%). Whereas diarrhoea was high in young females (11%). There was no significant difference between

age groups and gender as such. Table 4.7.5 showing Minor Health Problems and COVID-19 suffered patients in first half of 2021.

Table 4.7.5 Number of patients suffered from COVID-19 and data on minor illness in first half of 2021

Sr. No.	Covid diagnosed individuals	Male		Female	
		60-70 years	71-80 years	60-70 years	71-80 years
1.	Muscle ache	0	0	0	1
2.	Cold & cough	0	0	2	0
3.	Throat infection	0	0	1	0
4.	Impaired vision	1	0	2	0
5.	Pain in joints	1	0	1	0
6.	Chest ache	1	0	0	0
7.	Back ache	0	0	2	0
8.	Dizziness	0	0	3	0

Figures in parenthesis denote number of subjects

Table 4.7.5 shows that out of 11 subjects, 8 were females and 3 were males irrespective of their number of illness in covid diagnosed patients.

Further, a different study established that the presence of these comorbidities might have increased the risk of mortality independent of COVID-19 infection. The most common symptoms reported are fever, followed by cough and sputum in the elderly population. Pneumonia Severity Index (PSI) score of the elderly group is higher than that of the young and middle-aged group (Tandon, et al, 2020).

In a study by (Richardson & Lovegrove, 2021) similar health problems were found like sarcopenia, depression, co-morbidities such as obesity, changing body composition with increased adiposity and loss of lean body mass, hypertension, diseases of the intestinal tract (resulting in impaired absorption of nutrients), lack of intrinsic factor for absorption of vitamin B12, respiratory diseases and cognitive impairments are also common.

After collecting data among elderly of 60-80 years, the mini nutritional assessment scores revealed that the 27% of older males were highly malnourished and 81% young females were at risk of malnutrition during these times showing nutritionally vulnerable. With respect to BMI scores more of young females were obese and overweight among old

females showing poor nutrition and weight management. It was also found that 32% elderly were significantly cognitive impaired with 36% females as compared to 25% males of young elderly. Mild cognitive impairment was high 23% among young males. Though the frequency of food consumption was good and supplements were also taken, as the age increases, health status declines. The nutrition and health status of females are affected more in terms of nutritional status in old subjects and cognitive profiles in younger subjects. At end of study tips regarding healthy diet during COVID-19 was provides to elderly as shown in ANNEXURE 3. Despite the times of COVID-19, the nutritional and health status is affected slightly more as compared to non-COVID-19 times in terms of mortality and morbidity ratios. Thus, the nutritional and health status of elderly in urban Vadodara is affected during COVID-19.

The situational analysis of effects of COVID-19 on the health and nutrition status of the elderly residing in urban Vadodara highlighed that:

- A total of 400 subjects with a mean age of 68.45±6.48 years, the mean age of young elderly was 64.31±3.30 years that included 95 males (36.8%) and 163 females (63.17%).
- All the mean scores of MNA fell under at risk of malnourishment category with 17-24 scores. The mean MNA scores of young elderly was 19.35±2.69 and old elderly was 19.07±2.74. The mean MNA scores of females were 19.29±2.71 and of males were 19.3±2. A significant negative correlation ($r=-0.16$, $p<0.05$) was found between age and MNA scores, which indicate increase in age shows a decline in nutritional status.
- The mean BMI was found to be high to 24.4 in female and 24.3 in male. Among total, only 6 % were underweight out of which 9% were males of 71-80 years. More number of females of 71-80 years were 26% among overweight and 44% females of 60-70 years were in obese category.
- With regards to eating habits, more than half of the subjects felt change in their hunger/satiety. Their diet had decreased as compared to previous years. Special immunity providing foods showed that about 44% of subjects incorporated ayurvedic supplements to stay fit during the times of COVID-19 situation.
- Lifestyle pattern showed that yoga and meditation were high in older males (8.11%). Spiritual activity as prayer was performed by highest number of subjects 48 % of males and 58% females of older age group. Subjects in young elderly group spent their maximum time inactively.

- Cognitive Impairment Test showed that mean score of males was 6.90±4.38 and of female was 6.90±4.38, that falls in between normal and mild cognitive impairment among majority of the subjects. A slight positive correlation with significant at ($r=0.108$, $p\leq0.05$) was found between Age and CIT scores, increase in CIT shows decline in cognitive status was observed.
- The morbidity profile reveals that more than 47 % of the older female as compared to 42% of the young female were having oral cavity problems. Young females were having 44.17% gastro intestinal problems as compared to male in young group. Diabetes, heart and endocrine problems were high in young elderly with 36%, 52% and 15% respectively.
- The nutrition and health status of females are affected more in terms of nutritional status in old subjects and cognitive profiles in younger subjects.

The finding of the study has been summarised in the next chapter.

SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

The current projections have considered COVID-19 as a pandemic challenge blasting for low-middle income countries especially India. Undeniably, India today stands third among the ten countries being home to over a million COVID-19 infected people. In this context, the older adults are confronted with challenges like non-availability of attendants to help them with tasks of daily living, difficulty in accessing medical help, and perceived apprehension of adverse course of existing morbidity.

As per the India data from the Indian Council of Medical Research, the COVID-19 infection attack rate (per million) by age was highest among those aged 50–69 years and was higher among males than females(Tandon, et al,2020). The uncertainty of COVID-19 may exist for many months. Various scientific bodies such as CDC, WHO, UNICEF, and MOHFW, Government of India, have issued advisories for the elderly population in dealing with COVID-19 pandemic.

The social isolation, loneliness, and change of routine as well as impact of quarantine among elderly due to COVID-19 pandemic may have huge psychological and social impact beside physical impact which is very difficult to quantify. However, a study has reported long-term negative impact on health outcomes in the elderly which include negative psychological effects, including increase incidence of mood disorders. Further, it can heighten the risk of cardiovascular, autoimmune, neurocognitive, and mental health problems. Beside this, there can be a negative impact of quarantine on elderly population in the form of increasing sarcopenia, dependence, risk of falls, loss of disease control which need extra health-care attention by the health-care providers. (Tandon & Meeta, 2020).

Several NGOs including Mission Zero COVID-19, national and regional branches of Indian Psychiatric Society, Bombay Psychiatric Society, National Institute of Mental Health and Neurosciences (NIMHANS), Central Institute of Psychiatry (CIP), and Lokopriya Gopinath Bordoloi Regional Institute of Mental Health (LGBRIMH) have volunteered 24 × 7 helplines. The Board of administrators of the Medical Council of India, the apex medical regulatory body in India, has released telemedicine guidelines to facilitate the practice of telemedicine service for existing patients as well as new patients. (Vahia, et al, 2021)

Present study was planned therefore to collect information on "Effects of COVID-19 on the health and nutritional status of the elderly in urban Vadodara". The summary drawn from the above study is as follows:

General characteristics of the subjects

- The mean age of total males was 68.45±6.48 years and total of females were 68.36±6.4 years. The mean age of young males was 64.35±3.27 and old male was 75.87±3.53.
- Socio-demographic data found that majority (90%) of elderly were Hindus. Maximum subjects fulfilled the literacy levels, 86% were married, stayed in joint families (62%) and 87% were staying at home.

Mini Nutritional Status Assessment of the subjects

- Nutritional status was assessed considering the following cutoff points: <17 points (malnutrition); 17–23.5 points (risk of malnutrition) and 24–30 points (non-malnutrition).
- The mean MNA scores of young elderly was 19.35±2.69 and old elderly was 19.07±2.74. The mean scores of females were 19.29±2.71 and of males were 19.3±2.7
- Malnourishment was 17% high in males of age 71-80 years. Majority of subjects belong to high risk of malnutrition category they were (78%). Among it, females of 60-70 years were found 81%. Only 3% of them belong to well-nourished category.
- A significant negative correlation ($r=-0.16$, $p<0.05$) was found between age and MNA scores, which indicate increase in age, a decline in nutritional status was observed.

Body mass index (BMI) of subjects

- Body mass index was assessed considering the following cutoff points: <18.5 is Underweight; 18.5-22.9 is Normal; 23-24.9 is Overweight and >=25 is Obese according to Asia Pacific criteria, 2004.
- The mean BMI was found to be high to 24.4 in female and 24.3 in male.
- Among total, only 6 % were underweight out of which 9% were males of 71-80 years. Out of them 34% were normal, 20% were overweight and 40% were obese.

- More number of females of 71-80 years were 26% among overweight and 44% females of 60-70 years were in obese category. Thus, the prevalence of obesity was higher in 60-70 years 105(40.69%) and prevalence of normal range 47(33.09%) in 71-80 years.
- A significant positive correlation ($r=-0.38$, $p<0.05$) was found between BMI and MNA scores, which indicates that increase in BMI, shows a decline in nutritional status was observed.

Dietary Profile of the subjects

- The study presented that the majority of subjects in both male and female categories were vegetarian. A higher percentage of the younger female (60-70 years) reported consumed non-vegetarian 3(4.41%) and eggetarians 3(1.84%) foods as compared to the elderly female.
- With regard to water intake of the total subjects, it was found that 125(31.25%) subjects were drinking 5-6 glasses of water and 151(37.75%) subjects 7-8 glasses. Only 33 (8.25%) were consuming <4 glasses and 91 (22.75%) were >8 glasses.
- It showed that 335 (83%) subjects were regular in breakfast as they were consuming medicines daily, it was found that most elderly used to consume only 2 meals a day i.e. lunch and dinner. Bed tea, mid-morning and evening snacks were mostly consumed only by 10%-20% of subjects. No differences were found with regard to gender or age groups.
- It also showed that cereals and cereal products were consumed by all the subjects with pulses and legumes too. When looking at gender wise classification of frequently consumed food groups, it can be noted that consumption of foods from various food groups of male subjects was more compared to the female subjects which could be the reason for decline nutritional status in females.
- It shows that 86.8% of 60-70 years of subjects frequently consumed fruits and milk products as compared to 90% in 71-80 years. Nuts and oilseeds and salads were often consumed by 60-70 years as compared to 71-80 years, because old elderly had chewing, digestion and swallowing problems.
- Further it was noted that sweets was consumed more by young elderly subjects. With respect to non-frequent food groups, older males were consuming less amount of vegetables. Habit of snacking was less in older female groups.

- With regards to eating habits, more than half of the subjects felt change in their hunger/satiety. Their diet had decreased as compared to previous years. Fermented items and baked items were chosen occasionally and on demand. Fast foods and heavy meals were avoided or replaced with lighter versions and less spicy in 71-80 years subjects.

Changes in Food Consumption during COVID-19

- Special immunity providing foods showed that about 178 (44%) of subjects incorporated ayurvedic supplements to stay fit during the times of COVID-19 situation. In case of males, 90 out of total 169 subjects were taking ayurvedic supplement, 112 subjects were taking Nutritive Supplements and 109 subjects were preferring to consume Herbs. In case of females, 88 out of total 231 subjects were taking ayurvedic supplement, 156 subjects taking Nutritive Supplements and 154 subjects taking Herbs. Thus, it depicts that more than half of the males were consuming ayurvedic supplements and female were only 38%.
- Herbs were chosen as "kadha" to increase their immunity during the times of COVID-19 in some or other combination with either milk, water or soup. Other food supplements like giloy, trifala, amla, etc were also incorporated.
- There was highest craving for foods like namkeen by 32% subjects; namkeen food items like chewda, khaman, fafda, sev, etc. descended by 25% fried foods like bhajya, samosa, chips, etc. Half of the subjects reported namkeen as first preference followed by fried foods and beverages.
- Among 28.8% people stated that they had GI problems like constipation, flatulence, gas, bloating, etc. Nearly 10% people stated that food don't taste good because of loss in sensory.
- Interestingly, more than half of the subjects have not changed the number of their daily meals (57.8%), while 17.5% and 23.5% declare to skip or introduce a break meal or a main meal respectively according to their mood.

Lifestyle pattern of the subjects

- The study presented that walking was chosen as easiest physical activity suitable for COVID-19 situation followed by gardening and yoga.

- Subjects in young elderly group spent their maximum time inactively. Apart from that, 46 subjects among 258 were in walking and 179 subjects were in watching TV. Spiritual activity as prayer was performed by highest number of subjects 48 % of males and 58% females of older age group.
- Yoga and meditation were high in older males (8.11%). Among young elderly 70% males and 68% females were watching tv on daily basis. Among older elderly 22% were involved in reading newspaper.

Cognitive Impairment Test of the subjects

- Cognitive Impairment Testis scored out of 28; higher scores indicate greater impairment. The 6-CIT contains items on orientation, attention, and memory with a range from 0 to 28; a score ≥11 indicates cognitive impairment.
- It shows that mean score of males was 6.90±4.38 and of female was 6.90±4.38, that falls in between normal and mild cognitive impairment among majority of the subjects.
- CIT test scores indicated that 49% of the subjects were normal with 19% suffering from mild cognitive impairment and 32% from significant cognitive impairment.
- In the two gender groups, 4% more subjects in male young elderly group and 2% female old elderly groups were higher because of higher number of females were suffering from mild cognitive impairment than the other group.
- A slight positive correlation with significant at ($r=0.108$, $p\leq0.05$) was found between Age and CIT scores, increase in CIT shows decline in cognitive status was observed.

Morbidity Profile of the subjects

- The data reveals that more than 47 % of the older female as compared to 42% of the young female were having oral cavity problems. Young females were having 44.17% gastro intestinal problems as compared to male in young group.
- Diabetes, heart and endocrine problems were high in young elderly with 36%, 52% and 15% respectively. Psychiatric and knee related problems were higher in young and older females respectively.
- Respiratory problems in terms of frequent cough and cold were reported by half of the older elderly with 38% cold and cough and 5% throat infection. While fever was 25% and 5% other infection which is higher than older elderly.

- There was high prevalence of cough and cold among female with highest 36.7% in older females. Skin infection was more in older age group of females (8.82%).
- Females had greater percentages of joint pain as compared to males. Half of older Females had pain in joints. Chest pain was high in young male (16.8%). Half of the older females had impaired vision.
- Only 10% had Trembling of limbs, 21% dizziness and 8% dryness of skin was found higher in older elderly. 43% of older elderly had impaired vision and 7% higher skin infection than young elderly.
- Thus, the present study has indicated that the health and nutrition status of elderly is affected during COVID-19 pandemic.

CONCLUSIONS

To our knowledge, this study was among one of the first to investigate the immediate impact of the COVID-19 on the health and nutritional status of the elderly in Vadodara. It was study over the elderly population, with limited or satisfactory health resources available since the virus outbreak affected almost all parts of the world irrespective of development in the medical sector. The work in the present study analysed the trends of coronavirus outbreak. To evaluate the responses, it was divided into two age groups i.e. young elderly and old elderly. The nutrition and health status of elderly showed that 27% of older males were highly malnourished and 81% of young elderly females were at risk of malnutrition. It was also found that 32% elderly were significantly cognitively impaired with 36% females as compared to 25% males of young elderly. Mild cognitive impairment was high 23% among young males. While analysing data of MNA, though BMI point of view majority of subjects were overweight and obese, the mental health profile was found to be declining which must have led to fall subjects into at risk of malnutrition category. It was found that though they were taking nutritional supplements but cravings of sweets, beverages, fried and salted foods leads to “obesogenic environment” which predisposes to weight gain and susceptibility to COVID-19 with very less physical activity. Lifestyle factors such as remaining idle, spending more or less in sleep and unsocial behaviour may be a risk factor for cognitive impairment. With regards to eating habits, more than half of the participants felt a change in their hunger/satiety. Their diet has decreased as compared to previous years. However, during the lockdown, elderly have paid attention to nutritive food, and the nutritional quality has remained high, especially in old elderly subjects. Respiratory

problems in terms of frequent cough and cold were reported by half of the older elderly with 38% cold and cough and 5% throat infection. While fever was 25% and 5% other infection which is higher than older elderly. It is known that more severe forms of respiratory failure are present in patients with obesity. The hypothesis and the specific objectives of the study were achieved satisfactorily.

Thus, it can be stated that good nutrition and health care is a prerequisite to healthy aging and longevity. Good care and support of family member or caregiver can delay aging. In trying times of covid, care givers support or elderly confidence with awareness plays an important role in maintaining the health and nutritional status. Individuals should be mindful of healthy eating habits to reduce susceptibility to and long-term complications from COVID-19. Though authors have attempted to counsel over dietary tips at end of study.

LIMITATIONS

Considering that COVID-19 has lots of unknowns, online surveys offer perfect opportunities to collect real- time data to monitor and understand the rapidly evolving COVID-19 epidemiology in various settings. The main limitation of the current study is that although our study had respondents from 60-80 years old subjects from Vadodara city it did not cover all the age groups. Online surveys have tend to restrict to individuals with access to internet with potential under representation of people using smart phone and technology, hence authors included free living elderly also. Online surveys does not allow to probe the overestimated and underestimated reported data. Due to the COVID-19 restrictions, the study had the only option to collect the self-reported data on all health and dietary aspects. It was seen that participants tend to report higher weight. Unfortunately, in the current study, there was paucity of data to understand the different portion sizes of foods and the pre COVID and post COVID data.

RECOMMENDATIONS

- The present study doubtlessly indicates that an association exists between BMI and MNA scores, increased risk of nutritional status with increase in BMI. It indicates that increase in age shows a decline in nutritional status. Females were found to be more overweight and obese.
- As age increases there is decrease in mental status, increase in CIT scores with age shows decline in cognitive status was observed. Females were found to be more cognitively decline during COVID-19 situation as compared to non-COVID-19 situation.
- It also indicated that nutritional supplements were taken then also MNA score found to be poor with a poor BMI status shows there is no impact of nutritional supplements. Factors like poor quality & quantity and comorbid state can be explored further.
- Based on the study which are similar of this type, it shows that more number of subjects should be selected for urban population as it was comparative less in present study as compared to quoted studies.
- Lifestyle changes such as exercising regularly and cessation of smoking, alcohol consumption or tobacco chewing along with higher fruit and vegetable intake would further reduce the risk of various chronic degenerative diseases. Having regular exercise at home will be beneficial for avoiding the coronavirus infection and maintain physical fitness.
- Awareness of changes occurring with advancing age should be created among elderly themselves and their care-givers both in families to improve the health of the elderly as well as their quality of life.
- Long-term nutrition and chronic disease management can create numerous opportunities for healthy lifestyles in senior citizens.
- Proper Nutrition Health Education on helpline numbers and telemedicine can be helpful at a moment, with proper counselling to boost their confidence.

FUTURE SCOPE

- Ultimately, senior citizens are most vulnerable to COVID-19 due to nutrition deficiencies and aging associated chronic diseases and immunity decline which should be more in focus.
- With pandemic situation extending, dietary aspects should be focused more for consumption of immunity providing foods as well as seasonal food frequency data.
- Further investigations need to facilitate future studies with effective biomarkers for identification of the disease risk and outcome of the intervention response in COVID-19 infected individuals.
- Nutrition Health Education based approaches can serve in sensitizing the families, caretakers apart from the silent sufferers and study the SBCC.
- Role of good nutrition during covid infection and post recovery among various age group subjects in different settings is demand of an hour.

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ANNEXURE 1

QUESTIONNAIRE:

AIM: To access Socio-demographic profile, health, nutrition and mental status of elderly during COVID-19.

A. BASELINE PROFORMA / SOCIO ECONOMIC STATUS:

1. Date of form filling:
2. Area of Residence:
3. Zone of residence: (a) East (b) West (c) Central (d) North (e) South
4. City:
5. State:
6. Contact Number:
7. Name of elderly:
8. Date of birth of elderly:
9. Gender of elderly: (a) Male (b) Female
10. Marital status of elderly: (a) Married (b) Unmarried (c) Divorced (d) Widow/Widower
11. Religion: (a) Hindu (b) Muslim (c) Christian (d) Jain (e)Any other , Specify
12. Ethnic group: (a) Gujarati (b) Non gujarati
13. Resident in Gujarat since: (a) < 10 year (b) >10 year
14. Socio-economic status: (a) Middle income group (b) High income group
15. Level of education of elderly:

    (a) Illiterate (b) Primary (c) SSC (d) HSC (e) Undergraduate (f) Graduate

    (g) Post Graduate
16. Current Occupation of elderly:

    (a) Unemployed (b) Retired (c) Housewife (d) Profession (e) Clerical , shop – owner

    (f) Semi-profession
17. Living arrangement of elderly:

    (a) staying alone (b) with spouse (c) with children -(d) extended family
18. Total family members:

    Adults: Children:

    Total:

B) Mini Nutritional Assessment (MNA):

Source: Nestle research center,1994

(Screening + Assessment)

Name:
Sex:
Age:
Weight, kg:
Height, cm:
Date:

Anthropometric assessment:
A. Body Mass Index (BMI) = weight in kg / (height in m)2
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

B. Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC greater than 22

C. Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

D. Weight loss during the last 3 months
0 = weight loss greater than 3kg
1 = does not know
2 = weight loss between 1 and 3kg
3 = no weight loss

General assessment:
E. Lives independently (not in nursing home or hospital)
1 = yes 0 = no

F. Takes more than 3 prescription drugs per day
0 = yes 1 = no

G. Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

H. Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

I. Pressure sores or skin ulcers
0 = yes 1 = no

Dietary assessment:
J. How many full meals does the elderly eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K. Selected consumption markers for protein intake
• At least one serving of dairy products (milk, cheese, yoghurt) per day? no / yes
• Two or more servings of legumes or eggs per week? no / yes
• Meat, fish or poultry every day? no / yes

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L. Consumes two or more servings of fruit or vegetables
per day?
0 = no 1 = yes

M. Has food intake declined over the past 3 months due to loss
of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

N. How much fluid (water, juice, coffee, tea, milk...) is
consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

O. Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

Self assessment:
P. Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

Q. In comparison with other people of the same age, how does
the elderly consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Outcome of Scores

- **>= 24 points – well nourished**
- **17 to 23.5 points – at risk of malnutrition**
- **<17 – malnourished**

C) FOOD PATTERN

A. General Dietary Aspects

- Are you a
  1. Vegetarian 2. Non-vegetarian 3. Eggetarian?
- How much water do you consume in a day during lockdown?_____ltrs.

B. General meal pattern:

Meal Pattern	Regular	Irregular
Bed Tea		
Break Fast		
Mid Morning		
Brunch		
Lunch		
Evening Snacks		
Dinner		
Bed time		

C. Food frequency

(a)Uncooked foods

Uncooked foods	Daily	2-3 times / week	Once a week	Once a month	Occasionally
Fruits(orange, banana, apple, etc)					
Milk products (cheese, paneer, dahi, buttermilk)					
Nuts & oilseeds (almond, walnut, raisin, etc)					
Salads (tomato, cucumber, beet, onion, cabbage, etc)					

(b) Cooked foods

Raw foods	Daily	2-3 times / week	Once a week	Once a month	Occasionally
Cereal & cereal products (rice, wheat, sooji, poha,corn/maize, sorghum, millet or any other grains or foods made from (e.g. bread, noodles, porridge or other grain products)					

Pulses/legumes (Chana dal, Chana whole, Besan, Masoor, Turver dal, Soyabean)					
Vegetables (onion, Karela, Brinjal, Cauliflower, Drumstick, Capsicum, etc)					
Green leafy Vegetables (Tandalja, Cabbage, Arvi, Coriander, Methi, Pudina, Moli leaves)					
Sweets (sonpapdi, magaz, laddo, etc)					
Baked items (cake, pastry, puff, etc)					
Fermented food **Items** (idli,dokla,utap a, etc)					
Other varieties (noodle, porridge, etc)					
Beverages (tea, coffee, etc)					
Seasonal health **foods** Summer Winter Monsoon					

D. Changes in Food Consumption

1. Do you consume any special health food during lockdown?
   a. If yes, specify

Items	Quantity	Frequency	Reasons
Ayurvedic supplements			
Nutritive supplements (Vitamin c, B-12, Fe, etc.)			
Herbal supplements (turmeric, tulsi, pudina,etc)s			
Any other			

2.Do you have special craving for certain types of food during lockdown?

1.Yes 2.No

a. If yes, specify

Food	1.Yes 2.No
1. Sweet Food	
2. Chocolates	
3. Salty Foods	
4. Beverages	
5. Any other	

3. Has your food consumption reduced as compared to past few months of lockdown?

Sr. No.	Reasons	1. Yes 2. No
1.	Lost appetite	
2.	No mood	
3.	Developed aversion/dislike	
4.	Any other	

4. Have you made any changes in your food consumption during lockdown?

1.Yes 2. No

(a) If yes, specify

Type of food	1. Totally omitted	2. Reduced	3. Increased	4. No change	Since when 1. 5 months 2. 1yr 3. >5yr	Reasons a. Do not taste good b. Chewing /swallowing problem c. GI problems (constipation/ diarrhea/flatulence/gas) d. Medicines e. Others
1. Cereal & cereal products (rice, wheat, sooji, poha,corn/maize, sorghum, millet or any other grains or foods made from (e.g. bread, noodles, porridge or other grain products)						
2.Pulses/legumes (Chana dal,Chana whole, Besan,Masoor Turver dal,Soyabean)						
3. Milk & milk Products(cheese, dahi, paneer, shrikand)						
4. Non-veg Foods(meat, fish etc)						
5. Fried foods (chips, chevda, chakri)						
6. Ghee,oil, fats or butter added to food or used for cooking						
7. Spices						

(black pepper, salt), condiments, soy sauce, hot sauce, coffee, tea)						
8. Pickles						
9. Sweets (sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes)						
10. Sugar						
11. Vegetables (onion,- Karela,Brinjal ,Cauliflower,Drumstick ,French beans,Capsicum, Kankoda)						
12. Green leafy Vegetables (Tandalja'Bathuva, Cabbage, Arvi Alupan, Coriander L, Methi – L,Pudina,Sarason ka sag, Moli leaves, Shepu , Spinach,amaranth, cassavaleaves,kale, spinach)						
13. Vit-C rich Amla Guava Lemon Mausambi						
14. Other fruits Mango, ripe Orange-Jambu Phanas-Sakerteti Papaya, ripe Plums Pineapple Seethaphal Tomato Ber						
15.Dry Snacks (eg chewda)						

E. Lifestyle factors

- What kind of activities are you involve in?
  (a) none (b) gardening (c) walking (d) yoga
- What kind of recreational activities are you involve in?
  (a) none (b) watching TV (c) reading (newspaper, books) (d) listening music
- What kind of spiritual activities are you involve in?
  (a) none (b) prayer(c) bhajans (d) meditation

D)Morbidity profile

- **Major health problems**

Health problems	**1.Yes 2.No**
1. Oral cavity problems	
2. Gastrointestinal problems	
3. Respiratory problems	
4. Cardiovascular problems	
5. Genito-urinary problems	
6. Bone related problems	
7. Neurological problems	
8. Psychiatric problems	
9. Endocrine problems	
10. Any other	

- **Minor health complaints**

Health complaints	**1. Yes 2. No**	**Health complaints**	**1.Yes 2.No**
1. Cold & cough		7. Ulcers	
2. Viral fever		8. Body aches	
3. Malaria		a Backache	
4. Infections		b Headache	
a) Throat		c Muscle ache	
b) Skin		9. Pain in joints	
c) Eyes		10. Dizziness	
5. Vomiting		11. Dryness of skin	
6. Diarrhea		12. Trembling of limbs	

E) Cognitive test: (6CIT)

Source: 6CIT - Kingshill Version 2000

Question (Score Range)

1. What year is it? (**0 – 4)**
Correct - 0 points
Incorrect – 4 points

2. What month is it? (**0 – 3)**
Correct – 0 points
Incorrect – 3 points

Give the subject an address phrase to remember with 5 components,
e.g., **Seemaben Patel, A7 Gokul park, Alkapuri**

3. About what time is it (within 1hour) (**0 – 3)**
Correct – 0 points
Incorrect – 3 points

4. Count backwards from 20-1. (**0- 4)**
Correct - 0 points
1 error – 2 points
More than I error – 4 points

5. Say the months of the year inreverse (**0- 4)**
Correct - 0 points
1 error – 2 points
More than I error – 4 points

6. Repeat address phrase

Address phrase to remember: Seemaben Patel, A7 Gokul park, Alkapuri (0 – 10)
Correct - 0 points
1 error – 2 points
2 errors – 4 points
3 errors – 6 points
4 errors – 8 points
All wrong – 10 points

TOTAL SCORE 0 – 28 /28

Outcome from Score

- **0-7 = normal, Referral not necessary at present**
- **8- 9 = mild cognitive impairment, Probably refer**
- **10-28 = significant cognitive impairment, Refer**

ANNEXURE 2

CONSENT FORM:

Informed consent form for adults participating in the research titled: "Effect of Covid 19 situation on health & nutritional status of elderly residing in Urban Vadodara".

Research Guide - Prof. Komal Chauhan

Research Student – Ms. Twinkle Shah

Name of Organization – Department of Foods & Nutrition, Faculty of Family & Community Sciences, The MS University of Baroda, Vadodara

Name of Project – EFFECTS OF COVID 19 SITUATION ON HEALTH & NUTRITIONAL STATUS OF ELDERLY RESIDING IN URBAN VADODARA.

Part 1: Information Sheet

Purpose of the study:

Ageing is a gradual but inevitable phenomenon which is accompanied by a decrease in the individual's functional capacity and vitality.There is a change in body composition and progressive decline in water content and lean body mass, compensated by increase in body fat.

Various organs and systems of the body show a decline in function especially gastrointestinal tract, sensory losses of vision, hearing, taste, smell and also thirst. Also a decline in efficiency of heart, liver, gall bladder, pancreas, kidney, lung and a compromised immune system.

According to World Health Organization Statement(april 2020) – Older people are at highest risk from COVID-19. Over 95% of these deaths occurred in those older than 60 years. More than 50% of all deaths were people aged 80 years or older. About 8 out of 10 deaths are occurring in individuals with at least one underlying co-morbidity, in particular those with cardiovascular diseases/hypertension and diabetes, but also with a range of other chronic underlying conditions

The study aims to assess the impact of covid 19 pandemic on health and nutritional status of elderly residing in urban Vadodara.

The permission has been obtained from institutional ethical committee(Department of Foods & Nutrition, Faculty of Family & Community Sciences, The MS University of Baroda, Vadodara)

Procedure:

You will have to participate in Google form-based interview which will include questionnaire with respect to background information, mini nutritional assessment, food frequency and morbidity profile during lockdown phase. There is no cost on participant's side to participate in study.

Confidentiality:

The data collected through Google form interview will be used for research purpose only. The name and personal information of the participant will be kept confidential. The data shared will be used for academic purpose only.

Voluntary participation:

Participation in the study is entirely voluntary.

Whom to contact:

Twinkle Shah - 9725200443

Part 2: certificate of consent

Investigator's Statement

I certify that the elements including the nature & purpose of the study as described in this consent document have been fully explained to the subjects. The results of the research may provide benefits to the society in terms of advancement of medical knowledge and/or therapeutic guide lines and benefit to future patients with COVID 19

Participant's Statement

I, _____, have read the information in this form. I was free to ask any questions and they have been answered. In the difficult times like COVID-19, I have concern towards elderly; hereby give my consent to be included as a participant in this study.

1. I have read and understood this consent form and the information provided to me.
2. I have had the consent document explained to me.
3. I have been explained about the nature of the study.
4. I have had a chance to ask questions about the study
5. My rights and responsibilities have been explained to me by the investigator.
6. My identity will be kept confidential if my data are publically presented.
7. I have had my questions answered to my satisfaction.
8. I have decided to be in the research study.

For further information/questions, you can contact us.

Prof. Komal Chauhan- 9898790340

Twinkle Shah - 9725200443

સંમતિ ફોર્મ

સંશોધન માટે ભાગ લેનારા લોકો માટે જાણકાર સંમતિ ફોર્મ:

સંશોધન માર્ગદર્શિકા - પ્રો.કોમલ ચૌહાણ

સંશોધન વિદ્યાર્થી - ટ્વિંકલ શાહ

સંગઠનનું નામ - ડીપાર્ટમેન્ટ ઓફ ફૂડ્સ એન્ડ નયૂટીશન.,ફેકલ્ટી ઓફ ફેમિલી એન્ડ કોમ્યુનીટી સાયન્સીસ. એમ.એસ. યુનિવર્સિટી, વડોદરા

પ્રોજેક્ટનું નામ - "EFFECTS OF COVID 19SITUATION ON HEALTH & NUTRITIONAL STATUS OF ELDERLY RESIDING IN URBAN VADODARA".

ભાગ 1: **માહિતી શીટ**

અભ્યાસનો હેતુ :

વૃદ્ધાવસ્થા એ ક્રમિક પરંતુ અનિવાર્ય ઘટના છે જેની સાથે વ્યક્તિની કાર્યકારી ક્ષમતા અને જોમમત્તામાં ઘટાડો થાય છે. શરીરની રચનામાં ફેરફાર અને પાણીની માત્રામાં દુર્બળ ઘટાડો અને દુર્બળ શરીરના સમૂહમાં શરીરની ચરબીના વધારા દ્વારા વળતર આપવામાં આવે છે.

શરીરના વિવિધ અવયવોઅને સિસ્ટમો કાર્યમાં ઘટાડો દર્શાવે છે, ખાસ કરીને જઠરાંત્રિય માર્ગના, દ્રષ્ટિનું સંવેદનાત્મક નુકસાન, સુનાવણી, સ્વાદ, ગંધ અને તરસ પણ. હૃદય, પિત્તાશય, સ્વાદુપિંડ, કિડની, ફેફસા અને એક સમાધાન રોગપ્રતિકારક શક્તિની કાર્યક્ષમતામાં ઘટાડો.

વર્લ્ડ હેલ્થ ઓર્ગેનાઇઝેશન સ્ટેટમેન્ટ (એપ્રિલ 2020) અનુસાર - વડીલ લોકોને કોવિડ -19 થી સૌથીવધુ જોખમ છે. આમાંથી મૃત્યુ 60 વર્ષથી વધુ વયના લોકોમાં થયા છે. તમામ મૃત્યુ માંથી 50% કરતા વધારે લોકો 80 વર્ષ કે તેથી વધુ વયના લોકો હતા. ઓછામાં ઓછા એક અંતર્ગત સહ-રોગ ધરાવતા વ્યક્તિઓમાં, ખાસ કરીને કાર્ડિયોવાસ્ક્યુલર રોગો / હાયપરટેન્શન અને

ડાયાબિટીસ વાળા વ્યક્તિઓમાં પણ લગભગ લાંબી અંતર્ગત શરતોની શ્રેણીમાં, લગભગ 10 માંથી 8 મૃત્યુ થાય છે.

આ અધ્યયનમાં વડોદરા શહેરમાં વસતા વડીલના આરોગ્ય અને પોષક સ્થિતિ ઉપર કોવિડ19 રોગચાળાની અસરની આકારણી કરવાનો છે.

સંસ્થાકીય નૈતિક સમિતિ (ડીપાર્ટમેન્ટ ઓફ ફૂડ્સ એન્ડ નયૂટીશન, ફેકલ્ટી ઓફ ફેમિલી એન્ડ કોમ્યુનીટી સાયન્સીસ, એમ. એસ. યુનિવર્સિટી, વડોદરા) ની પરવાનગી પ્રાપ્ત થઈ છે.

કાર્યવાહી:

તમારે ગૂગલ ફોર્મ આધારિત ઇન્ટરવ્યુમાં ભાગ લેવો પડશે જેમાં પૃષ્ઠભૂમિ માહિતી, મિનિ પોષકમૂલ્યાંકન, ખોરાકની આવર્તન, વિકલાંગતા અને લકડાઉન તબક્કા દરમિયાન પ્રોફાઇલના સંદર્ભમાં પ્રશ્નાવલિ શામેલ હશે. અભ્યાસમાં ભાગ લેવા માટે સહભાગીની બાજુ પર કોઈ ખર્ચ થતો નથી.

ગુપ્તતા :

ગૂગલ ફોર્મ ઇન્ટરવ્યૂ દ્વારા એકત્રિત કરવામાં આવેલા ડેટાનો ઉપયોગ ફક્ત સંશોધન હેતુ માટે કરવામાં આવશે. સહભાગીનું નામ અને વ્યક્તિગત માહિતી ગુપ્ત રાખવામાં આવશે. શેર કરેલા ડેટાનો ઉપયોગ ફક્ત શૈક્ષણિક હેતુ માટે કરવામાં આવશે.

સ્વૈચ્છિક ભાગીદારી:

અધ્યયનમાં ભાગ લેવો એ સંપૂર્ણ સ્વૈચ્છિક છે.

કોનો સંપર્ક કરવો:

ટ્વિંકલ શાહ - 9725200443

ભાગ 2: **સંમતિનું પ્રમાણપત્ર**

તપાસકર્તાનું નિવેદન

હું પ્રમાણિત કરું છું કે આ સંમતિ દસ્તાવેજમાં વર્ણવ્યા અનુસાર અભ્યાસના સ્વભાવ અને હેતુ સહિતના તત્વો વિષયોને સંપૂર્ણ રીતે સમજાવી દેવામાં આવ્યા છે. સંશોધનનાં પરિણામો સમાજને તબીબી જ્ઞાનની વૃદ્ધિ અને / અથવા રોગનિવારક માર્ગદર્શિકા લાઇનની દ્રષ્ટિએ **ફાયદાઓ અને** COVID 19 વાળા ભાવિ દર્દીઓ માટે લાભ પ્રદાન કરી શકે છે.

સહભાગીનું નિવેદન

મેં, _____, આ ફોર્મમાંની માહિતી વાંચી છે. હું કોઈપણ પ્રશ્નો પૂછવા માટે મુક્ત હતો અને તેઓના જવાબ આપવામાં આવ્યા છે. **COVID-19** જેવા મુશ્કેલ સમયમાં, મને વૃદ્ધો પ્રત્યેની ચિંતા છે; આ દ્વારા આ અધ્યયનમાં સહભાગી તરીકે શામેલ થવા માટે મારી સંમતિ આપો.

1. મેં આ સંમતિ ફોર્મ અને મને પ્રદાન કરેલી માહિતી વાંચી અને સમજી છે.

2. મને સંમતિ દસ્તાવેજ મને સમજાવ્યો છે.

3. મને અધ્યયનની પ્રકૃતિ વિશે સમજાવવામાં આવ્યું છે.

4. મને અભ્યાસ વિશે પ્રશ્નો પૂછવાની તક મળી છે

5. તપાસકર્તા દ્વારા મારા હક્કો અને જવાબદારીઓ મને સમજાવવામાં આવી છે.

6. જો મારો ડેટા જાહેરમાં પ્રસ્તુત કરવામાં આવે તો મારી ઓળખ ગુપ્ત રાખવામાં આવશે.

7. મારા સંતોષ માટે મારા પ્રશ્નોના જવાબ આપ્યા છે.

8. મેં સંશોધન અધ્યયનમાં રહેવાનું નક્કી કર્યું છે.

વધુ માહિતી / પ્રશ્નો માટે, તમે અમારો સંપર્ક કરી શકો છો.

પ્રો.કોમલ ચૌહાણ- 9898790340

ટ્વિંકલ શાહ - 9725200443

ANNEXURE 3

DEPARTMENT OF FOODS AND NUTRITION

FACULTY OF FAMILY AND COMMUNITY SCIENCES

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

Research Student – MS. TWINKLE SHAH

Research Guide - PROF. KOMAL CHAUHAN

Name of Project - EFFECTS OF COVID 19 SITUATION ON HEALTH & NUTRITIONAL STATUS OF ELDERLY RESIDING IN URBAN VADODARA.

DIET TIPS OF HEALTHY LIVING FOR ELDERLY DURING COVID-19

Nutrition is a fundamental base of human life. Every individual is striving between health and diseases across the lifespan from birth till old age. Lack of essential nutrients in diet overlaps the problem of malnutrition. Various organs and systems of the body show a decline in function especially gastrointestinal tract, sensory losses of vision, hearing, taste, smell and also thirst. Also a decline in efficiency of heart, liver, gall bladder, pancreas, kidney, lung and a compromised immune system. Malnutrition and morbidity create a vicious cycle with a constellation of metabolic diseases. Disability and dependency in older people represent one of the most serious cause medical and social issues. Thus, it becomes essential to consume the right kind of diet. So, you should eat a variety of fresh and unprocessed foods every day to get the vitamins, minerals, dietary fiber, protein and antioxidants your body needs. Avoid sugar, fat and salt to significantly lower your risk of overweight, obesity, heart disease, stroke, diabetes and certain types of cancer. Drink enough water and liquid foods, even mild fever is associated with loss of fluids which can lead to dehydration. If dry cough and sore throat are severe, solid food intake may decrease. Therefore, warm, soft foods and supplements can be used. Small frequent meals would be better if the appetite is less, timing of fluid consumption should be in between meals and not with the meal.

Dietary Guidelines:

1. Eat small amounts frequently, preferably eat 5-6 meals in a day. Poor digestive system than eat light food in dinner.

2. Consume of more calories and protein to maintain muscles integrity.

3. Drink 3-4 liters of water per day. Drink every hour in some form to hydrate your body. You can have fresh fruit juices, soups, coconut water, herbal tea, etc. Water is essential for body. It transports nutrients and compounds in blood, regulates your body temperature, gets rid of waste, and lubricates and cushions joints.

4. Eat calcium rich food daily. Vitamin D rich foods like milk and milk products, fish and green leafy vegetables should be included in the diet. Try using nutritional supplements between meals to improve your nutritional intake (for e.g., on doctor's advice vitamin C, D, Zinc, etc. can be taken).

5. Consume whole grains, especially unprocessed maize, millet like ragi, jowar, bajra, oats, wheat, brown rice. Consume fiber rich foods like whole fruits, green leafy vegetables and whole grains. Fiber would help in controlling blood sugar and cholesterol levels and better digestion.

6. Beans, legumes / pulses / lentils should be consumed regularly for good quality protein. Non vegetarians can have meat / fish / chicken /eggs 2-3 times a week.

7. Eat 2 cups of fresh fruits and 2.5 cups of vegetables to maintain good health. Do not overcook vegetables and fruit as this can lead to the loss of important vitamins. Have colourful foods for improving immunity.

8.. Do not to consume too much tea/coffee and avoid readymade fruit juices, syrups, fruit juice concentrates as they all contain high amount of sugar. Thin buttermilk, soups, coconut water (unless there is a potassium restriction), salted lemon water and ORS can be used. Add mint, tulsi, ginger powder, ajwain, jeera wherever possible.

9. Consume unsaturated fats (e.g., found in fish, avocado, nuts, olive oil, soy, canola, sunflower and corn oils) rather than saturated fats (e.g., found in fatty meat, butter, cream, cheese, ghee and lard). One handful of nuts and oilseeds in a day is advisable.

10. Avoid snacks that are high in sugar, salt and oils. Limit your daily salt intake to less than 5 g (approximately 1 teaspoon) per person and use iodized salt.

11. We recommend maintaining a distance of at least 6 feet, wear mask and sanitize your hands regularly. Based on the normal nutritional status, the generalized sample diet is given below. Adverse condition may require personal diet counselling after doctors advice and from the qualified dietitian.

Sample Menu during COVID-19 and Post Recovery for elderly:

Type of meal	Suggested diet / food
Early morning (8 am)	3-4 soaked almonds/ Soaked walnuts (2-3 nos) and 1 glass luke warm water
Before breakfast	Haldi milk, Morning meditation 20 mins
Breakfast (9 am)	1 glass milk (low fat)/1 cup tea- Without sugar / fruit juice Oat's porridge/Daliya/Idli/Upma (Rava/Wheat)/Dhokla/ Egg White ½ katori boiled chana / boiled moong / 1 besan chila / ½ katori paneer, poha / 4-5 dhokla / 2 boiled eggs / 2 idli with chutney
Mid-morning	½ cup Home-made Tomato soup/ Moringa leaves soup/ Vegetable soup (Avoid Cornflour /Cream /Instant soup) Beetroot and Amla juice without sugar or honey / any Fruit (Guava/Sweet Lime/Orange/Pineapple) / Salad
Lunch (1pm)	2 roti (plain) / daliya / porridge and sabji (without potato) and salad (carrot, cucumber, sweet potato), 1 katori dal, 1 small katori curd or chaas
4 pm	Fruit juice / luke warm water with lime and honey, 2-3 dates
Evening snacks (6 pm)	1 cup ginger tea / coffee / milk / chicken soup / orange or lemon juice and 2 khakhra / 1 katori roasted mamra / 1 katori roasted poha chevda / 1 katori roasted makhana or Whole grams – Boiled (Channa/Rajma/Sundal/Boiled Sweet Potato with few drops of lime juice sprinkled/Gingelly seeds) Jaggery balls/ Roasted Bengal gram/ Nuts chikki
Evening meditation / Activity you like	20 mins, Small cup tulsi water / kokum water

Dinner (7:30 pm)	1 bowl tomato/spinach/spinach carrot beet tomato/mix veg soup Daliya vegetable khichadi / Moong khichadi kadhi / 2 vegetable uttapam green chutney / Dal fry and 2 roti / Vegetable upma / Vegetable poha / Moong dal chilla / Besan (pithla) and 2 roti / vegetable pulao / mutton pulao / curd rice and suji kheer / 2 meethi thepla
Bed time	Warm water + pinch of turmeric You can also have turmeric in milk or milk if desired

Tips for Healthy Living:

1. Do yoga and meditation as it gives better sleep with mental peace and exercise for mobility of joints and stability.
2. Never skip meals instead have small amount and try to included fruits daily.
3. Regular medical checkup to ensure medical condition and blood pressure levels.
4. Involve oneself in social activities to remain active.
5. Reading and religious activity helps in preventing tension and isolation.
6. Be positive and have cheerful mind.
7. Maintain cleanliness in order to live healthy life.
8. Avoid addictions if any.

References:

- Nutrition Counselling Centre. (2021). *DIET TIPS DURING AND POST COVID-19 INFECTION FOR ADULTS* . Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University Of Baroda.

- Mrs Meenakshi Bajaj, (Dietician), Tamil Nadu Govt. Multi Super Specialty Hospital, Govt. Omandurar Estate, Chennai & Aadya, Sridarshini, Kritika R, Lawvanya P, Vinodhini E, Surbhi.P, Hari Priya N Sneha, Malini, Soundharya.M. G, Vidya, Anbareen Fathima, Alladi Nagayoujanavalli (Bajaj Interns). MAY 12,2021

Permission letter

To,

Dear sir,

Season's Greetings!

I, Ms.Twinkle Shah, am a postgraduate student of Department of Foods & Nutrition, Faculty of Family & Community Sciences, The MS University of Baroda, undertaking a research on topic, "EFFECTS OF COVID 19 SITUATION ON HEALTH & NUTRITIONAL STATUS OF ELDERLY RESIDING IN URBAN VADODARA". This project is conducted under guidance of Prof. Komal Chauhan. I am hereby seeking your consent to provide us the list of members of your association as participants for research.

Purpose of the study:

According to World Health Organization Statement(april 2020) – Older people are at highest risk from COVID-19. Over 95% of these deaths occurred in those older than 60 years. More than 50% of all deaths were people aged 80 years or older. About 8 out of 10 deaths are occurring in individuals with at least one underlying co-morbidity, in particular those with cardiovascular diseases/hypertension and diabetes, but also with a range of other chronic underlying conditions

The study aims to assess the impact of COVID 19 pandemic on health and nutritional status of elderly residing in urban vadodara.

Confidentiality:

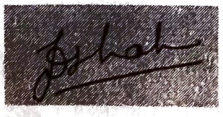
The data collected through Google form interview will be used for research purpose only. The name and personal information of the participant will be kept confidential. The data shared will be used for academic purpose only.

Voluntary participation:

Participation in the study is entirely voluntary.

We hope of your positive response on this matter. Your approval to conduct the study will be greatly appreciated.

Thanking you.



Twinkle Shah

Komal

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Prof. Komal Chauhan

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Prof. & Head

Dept. of Foods and Nutrition

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Institutional Ethics Committee for Human Research (IECHR)

FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

Ethical Compliance Certificate 2020 – 2021

This is to certify that **Ms. Twinkle Dharmendra Shah**'s study titled, "**Effect of Covid 19 on Health & Nutritional status of Elderly residing in Urban Vadodara**" has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Science, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number **IECHR/FCSc/2020/53.**

Prof Mini Sheth
Member Secretary
IECHR

Prof Shagufa Kapadia
Chairperson
IECHR