

**Project Dissertation Report on**  
**Analysis of lifestyle changes of Indians during**  
**COVID 19**

Submitted by  
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2K20/DMBA/117

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## **Declaration**

I hereby declare that the project work entitled “Analysis of fast food trends in the Indian population and tracking changes to the same and general food consumption during COVID -19” submitted to DSM, DTU is a record of an original work done by me under the guidance of Mr. Yashdeep Singh, Assistant Professor, DSM, DTU and this project work is submitted in the partial fulfillment of the requirements for the award of the degree of Master of Business Administration.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of a degree or diploma.

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### **Certificate of originality**

This is to certify that the Project Dissertation entitled "*Analysis of Lifestyle changes of Indians during COVID19*" submitted to Delhi School of Management, Delhi Technological University in the partial fulfillment of the requirement for the award of Master of Business Administration is an original work carried out by Sharath Menon under the guidance of Mr. Yashdeep Singh.

The matter embodied in this project is a genuine work done by both the best of my knowledge and belief and has been submitted neither to this university nor to any other university for the fulfillment of the requirement of the course of study.

Signature of the student

Signature of the Guide

## **Acknowledgement**

I would like to express my deepest gratitude to all those who aided me in completing this report. I would like to express my thanks to my project mentor Mr. Yashdeep Singh for the guidance that he provided was invaluable.

The collection of responses would not have been possible without the help of my parents and hence I extend my thanks to them as well.

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## **Executive summary**

Like any other developing country in the world India presents itself as a market for consumption, fast food is only an aspect of it. With rising fast food consumption it is important to identify the trends that can be witnessed. Since India specific reporting on this is still limited compared to other countries, my report aimed at identifying these trends. COVID was a huge change in the erstwhile normal lives of ours. Overnight govt. took over far reaching powers and forced “lockdowns” on the general population in the name of mitigating spread. The food consumption habits were already negatively impacting the health of the Indian populace, comorbidities which are generally associated with having a poor outcome to COVID were already on the rise. In light of this it became important to identify whether lockdowns exacerbated the trends caused considering that the parcs and gyms were shut down as well, as a result the people had no recourse to maintain their health. Due to this it became possible that Indians were put at an increased risk of COVID. As lockdowns dragged on, the consequence of these measures could have been severe. In order to check the validity of these arguments, a survey form was floated through various online groups, targeting middle aged people who cooked their own food. Through the responses collected the various arguments were tested.

Some of the arguments had to be rejected due to a lack of evidence, some were rejected because there were not enough data points to make sufficient conclusions from them but overall the study’s objectives could be tested and proved. Some additional facts and figures also came out through the study. Overall the study in general is a good argument for further complementary studies of similar nature concentrated on India specifically.

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# **Analysis of lifestyle changes of Indians during COVID19**

## **Introduction**

### Background

The Indian fast food market is one which has seen an extremely large growth and is poised to continue growing into the immediate future. Right from the humble beginnings when the reforms of 91 brought in a slew of fast food MNCs (McDonald's came to India in 96 and then was followed by other brands such as Dominos, Pizza Hut, KFC etc.) to today when the industry is poised to record a CAGR of 10.3% during the period of 2021-2026 (some like Edelweiss Securities predict that growth to be 23% between 2021 and 2025 (Bansal, 2021)). Now the entrance of foreign MNCs into India after 91 does not mean that fast food restaurants did not exist before that period in India, certain domestic brands like Nirulas and Bikanerwala dominated the organized fast food industry pre liberalization, however the new players with large capital and better operational capabilities and a quick development of supply chain were able to drive them out of business (Vishal Punmiya, 2021). Quick Service Restaurants/QSRs have been witnessing a large boom for the past decade. In India it is this segment which records the highest growth rates and is followed by casual dining establishments. The current growth predicts more penetration by the QSRs into the smaller cities and towns in India. In the current scenario the largest pie of the Indian fast food segment is dominated by the Full Service Restaurants followed by QSRs and then by 100% home delivery.

Indian fast food scene is highly competitive and fragmented due to the potential growth opportunities the country provides. Major brands include Yum Brands, which control KFC, Pizza Hut, Taco Bell etc, Westlife Development which holds the franchise for McDonald's in India, Jubilant Foodworks Ltd., which holds the franchise for Dominos Pizza, Barbeque Nation Hospitality Ltd. which is a rather new domestic player, Doctor's Associate Inc. which owns the Subway chain (Mordor Intelligence, n.d.). Most companies in this segment spend about 4-6% on marketing efforts, they also tend to tap into major occasions like religious festivals and cricketing tournaments to market their products, like in other countries (Vishal Punmiya, 2021). As can be particularly identified franchising is the mode of entry for fast food chains. Franchising is a "A contractual relationship between the franchisor and the franchisee in which the franchisor offers or is obliged to maintain a continuing interest in the business of the franchisee in such areas as know-how and training; wherein the franchisee operates under a common trade name, format or



procedure owned by or controlled by the franchisor, and in which the franchisee has made or will make a substantial capital investment in his business from his own resources” (FRANCHISE DIRECT , n.d.).

COVID has in large part impacted the fast food industry, however QSRs are naturally the winners post govt. restrictions. The restrictions for the largest part shuttered down the unorganized and standalone fast food segment. In addition to this health and safety concerns prompted a shift from the unorganized segment. QSRs tapped into this shifting consumer desires and offered alternatives such as online delivery and heavily invested into brand messaging which showed their offerings as safe (sellers with good hygiene standards performed better by a margin of 20% than those who did not), as a result QSRs after the initial jerks which resulted in heavy loses and shuttering of unprofitable outlets (toxic stores which usually account for 20% of the total outlets were the target, orders declined as well by 50-60%) are poised to lead the growth post restrictions (Vishal Punmiya, 2021).

With regards to innovation contactless delivery has become commonplace, digital payments have increased, “DIY” kits have been introduced. However all is not positive for the industry. With mounting concerns amongst the general world population that fast food is not healthy and can cause serious health concerns, India does not stand an exception. Outlets have been providing healthy menus for the general world population and as the QSRs establish themselves further in India they will try to do the same.

COVID 19 has extreme risk stratification, presence of comorbidities define in large part whether an afflicted person will have sever outcomes from the disease or not. Consumption of food items that are rich in carbohydrates and saturated fats makes an individual prone to obesity and at risk for type 2 diabetes. Additionally consumption of the same can cause an activation of the intrinsic immune system and causes an impairment with the adaptive immune system. Afflicted individuals can also be at an increased risk of dementia and other neurodegenerative diseases (Jalal Bohlouli, 2021) (CDC, n.d.). In response to COVID 19 many countries implemented public health measures such as large scale quarantine measure, in general parlance called “lockdowns”, such govt. restrictions have influenced the lifestyles of many people around the world, including their snacking habits. A study found that fast food consumption had increased by 15-41.3% (Dimitra

Rafailia Bakaloudi, 2021). Not only this, the shuttering of outdoor facilities like parks and gyms also contributed to the adaptation of an unhealthy lifestyle.

This raises an interesting question, did the govt. restrictions put people at an increased risk of severe COVID 19 outcomes.

### Problem statement

Every policy should be adequately measured for the cost and benefit that such a policy would have. Policies inadequately thought out often tend to have consequences that reach far and wide. Sometimes the consequences of a particular problem are only seen years after the problem had arose. It is the responsibility of the govt. and associated health experts to weigh in on these issues. The aim of this research is to understand the fast food eating trends in the Indian population, like in the rest of the world fast food habits were in the upswing in India owing to its growing economy and just like the rest of the world concerns over the negative health affects of a diet rich in carbohydrates and fats were increasing. This was especially true in the Indian middle class. A growing body of the “expert” class had already pointed out this issue. This was before the pandemic. In 2018 Lancet published a study, which was aimed at tracking the trend of diabetes in India, the research period was 1990 and 2016, it was found out that number of people afflicted with the disease went from 26 million to 65 million. Amongst the age group 20 and over, diabetes prevalence went from 5.5% in the population to 7.7% in 2016. Another issue was that excess weight was identified as a risk factor for diabetes. For context, amongst every 100 adults there were 38 who were overweight, more than the global average of 19. “Health loss increase due to diabetes was highest among major communicable diseases” as concluded by the paper and a recommendation was put forth that policy action needs to bet taken. (India State-Level Disease Burden Initiative Diabetes Collaborators , 2018).

This is crucial as this means that if COVID 19 had hit in 2016, that much of the population would have been at an advanced level of threat w.r.t severe outcomes. Since the disease hit in 2020 surely the number of at risk individuals were greater. It was near about guaranteed that the country would have a high mortality level.

One of the measures that were imposed by the Indian govt. in response to rising cases of COVID19 was to quarantine much of the Indian population. Strict distancing measures were imposed and people confined to their four walls, with the parks and gyms shutdown. This was similar to what happened in other parts of the world. One of the result of this was that the confined population turned towards fast foods (Dimitra Rafailia Bakaloudi, 2021). In countries such as the US which already had issues with obesity, more people were put at risk. In India a country which has issues with diabetes and where a correlation with excess weight exists, similar number of people were

put at risk, unhealthy eating habits increased in India as well (Dimple Rawat, 2021). With parks and gyms shutdown in India this meant that, adequate possibilities for exercise were also reduced.

In summary we had increasing fast food trends, a large population had diabetes from even before the pandemic which is a major risk factor for getting severe COVID outcomes. Recreational facilities like park and gyms were closed and unhealthy eating habits in the Indian population increased.

This research aims at looking into the fast food trends in the Indian population and to identify more in depth the various comorbidities that exist amongst the general population. This research will also look into how the eating habits of the population changed and also look into whether the people were getting adequate exercise or not, during the periods of general lockdowns, look into the relationship between unhealthy eating habits, comorbidities, lack of exercise and severe COVID outcomes.

Much of the human population are exiting general confinement measures, as the disease becomes milder it makes less and less sense to turn to such measures. After all periods of crises the measures taken in response must be scrutinized heavily to find out whether it was of any benefit or not. Hopefully this research contributes in a major way to this. Additionally, I hope that it sheds light on the health issues faced by the Indian population and also look into the fast food consumption of the population.

### Objectives of the study

This study aims at giving a clearer picture of the general snacking habits of the population. Fast food consumption is increasing in India, with a population that already has health issues such as diabetes, this is a major cause of concern. COVID19 was a major crises for the country, even though officially the number have been low compared to other countries, some estimate the mortality to be higher, this is something only time will confirm as more research and studies are published (Vora, 2022). The aims of this study are as following -

- Track the fast food consumption in the Indian population pre pandemic. This is to ensure that an adequate pre pandemic dataset is available to give a firm basis to further research.
- Look into the fast food consumption during the pandemic, specifically during the long periods of home confinement. This is to see whether there was any uptick in consumption due to the measures.
- Study the major health issues in the Indian population and check whether any of these match with the identified comorbidities which have an impact on having a severe response to the disease resulting in hospitalization or even death.
- Try to find out whether lockdown measures which included closing of parks and other recreational facilities had an effect on the exercise regimes of the population, whether they even have one and if they did, what effect it had.
- Correlate the findings that arise from the above points.
- Make adequate conclusions based on the same.

### Scope of the study

The aim of this study is to look at the impact of fast food and general food consumption trends in the Indian population and to look whether their association with certain external environmental changes such as closing of parks and recreational facilities along with the prevalence of existing diseases in the population led to a sever outcome with respect to COVID. The scope of this study is limited to 100 respondents who were asked to fill a google form in order to check for changes in dietary and physical habits, mostly in the age group of 40-65. The reason for targeting them is because certain questions pertained to the ability to home cook food and since this demographic tends to cook their own food, they were chosen as the target sample.

Choosing this sample size has resulted in constraints in the sense that a large section of the demographic was ignored. This is important in the sense that certain of the questions are generic in nature and that which anyone could have responded to, though the emphasis placed on questions that are crucial to accomplishing the objectives means that those individuals were not a part of this study. In addition the greatest focus on Indians living in India, even though there were some responses who were from outside India. Naturally this study's conclusions should be seen in light of the respondents who filled the google form and their age range.

## Literature review

The Indian population has been a major consumer of food items rich in carbohydrates and fats. Indian diet cannot be complete without addition of a major grain like rice or wheat. India is a major consumer and producer of rice and wheat. India is second only to China (which occupies first position) with annual rice consumption marked at 103.5 million metric tons in 2020-21 (statista - B, n.d.). Coming to production in the year 2019-20 India produced 118.9 million metric tons, which was again second only to China (statista - A, n.d.). Coming to wheat India consumed 104.25 million metric tons of wheat in the period 2021-22, which is third only to China, EU and India (statista - C, n.d.). Coming to production, India is the second largest producer of wheat with figures at a staggering 98.5 million metric tons in 2022 (World Population Review, n.d.). The relevance of these metrics is that rice and wheat have a high glycemic index, having a high glycemic level means that such foods have a very high probability to affect (raise) blood sugar levels (Diabetes Canada). (Sonia Vega-López, 2018) in their paper attempted to establish a relationship between short term (satiety) and long term (eg - weight, cardiovascular disease, Type 2 diabetes), the study was able to establish a link between GI Index and disease prevalence (the article though recommends instead of focusing on GI Index focus should be on studying fiber and whole grains as they are much better at predicting health outcomes). In order to provide a non western perspective (David J.A. Jenkins, 2021) did a study which included 137,851 individuals between the age of 35-70 years in EU, NA, South America, Africa, Middle East, South Asia, Southeast Asia and China. The result found that diets with a high GI Index was correlated with an increased risk of death from cardiovascular issues even in individuals who previously did not have preexisting issues. (Ahmad Jayedi, 2020) also found a positive relationship with GI and risk of diseases such as Type 2 diabetes, heart diseases and certain types of cancers. It is quite clear from this that the Indian diet rich in carbohydrates hence have a high GI index would cause health problems on a society level. (U Shrivastava, 2017) confirms this assertion that NCDs or Non Communicable Diseases which include coronary heart diseases and Type 2 diabetes were on the rise in the country. The number of deaths caused was around 5.8 million. Nutrition and lifestyle were identified as the major causes. It also mentions that the “presence of higher body fat, abdominal fat, liver and pancreatic fat and a relatively low lean mass” put Indians at a higher risk of cardiovascular issues.

Fast food contains according to (Dr. Sapna Johnson, 2012) a high amount of “sugars, salts and trans fats”, trans fats in particular are responsible for chronic heart diseases. Processed food contains a high amount of carbohydrates and by extensions calories, carbohydrates are then broken down into sugar by the body (Nagvansh, 2015). In India amongst the general population there is a high demand for fast food, however they still prefer home cooked food as they believe it is more nutritional (Anita Goyal, 2007). (Prachi Hajare Wani, 2018), in a survey conducted in 2018, it was found that in around 46% of the respondents there was an increase in fast food intake, this was the case even though 74% of respondents thought that fast food had negative health issues. In teenage and college going girls, there is an increasing trend of fast food addition (Chandra, 2020). In a 2016 report (Priyadarshini, 2016) found out that out of the respondents to the survey, 64% visited fast food outlets once a week and spent >15% of their monthly income on its consumption. Western cuisine is preferred. The reasons for choosing fast food by number of respondents, largest to least – Pricing, Taste and Convenience. In (Chaturvedi, 2018) found out that in the researched children fast food consumption was very high.

In light of this it becomes important to understand the following – Indian dietary habits which included increases consumption in fast food has exacerbated health issues in the general Indian population.

Now coming over to COVID19 pandemic, in the early days of the pandemic there was little information regarding the actual targets of the disease, however with time more information was collected which gave us more insight into the disease. Diabetes and COVID have a correlation in the sense that people with the disease tend to have faulty “phagocytic cell capabilities”. Additionally those with “hypertension, COPD, heart diseases, malignancies and HIV” were at an increased risk of developing severe COVID complications (HasanEjaz, 2020). In New York, US, amongst those who died due to COVID19 had the following comorbidities – Hypertension (55.4%), Diabetes (37.3%), Hyperlipidemia (18.5%), Coronary heart disease (12.4%). COPD was at 8.3% (Adekunle Sanyaolu, 2020). (Jing Yanga, 2020) in a study conducted in China. Found that amongst COVID mortalities, hypertension lead at 21.1%, diabetes at 9.7%, cardiovascular disease at 8.4% and respiratory system disease at 1.5%. It was also found that sever cases had a



large proportion of old people. It was also found that men were more likely to get infected than women due to better immune responses. In a study conducted in Nigeria, (Akin OsibogunI, 2020) found out that most COVID cases were in males at 65.8%, and 22.5% of patients had at least one comorbidity, common were Hypertension and Diabetes, proportionate wise, more people that died had comorbidities, and this is in a country with a low mortality for COVID at 3.3%. (Cheng Sixiang, 2021) found out similarly that “chronic comorbidities led to severe COVID outcomes”, these included hypertension, cardiovascular disease and diabetes increased risk of severe COVID outcomes.

It can be said that the major comorbidities include hypertension, diabetes and cardiovascular diseases. As a result these can be taken forward as indicators for severe covid outcomes. Coming to hypertension and fast food, there was found little correlation according to (Moloud Payab, 2014), significant difference was also not found between fast food, obesity and hypertension. (Yaling Zhao, 2017) was also not able to find large relationship between fast food and health issues. Things such as Child obesity, Central obesity and hypertension was associated “positively with maternal body mass index”. (William C. Stanley, 2009) states that there is a “robust relationship between obesity and development of hypertension”, “increased sympathetic activity likely plays a crucial role in obesity-induced hypertension and could raise arterial pressure by causing peripheral vasoconstriction and by increasing renal tubular sodium retention”. Consuming items that are high in glycemic index can cause normal heart functioning, same was the conclusion for saturated fats. Similarly (Mohammad Alsabieh, 2019) concluded that fast food consumption “has an effect on blood pressure”.

In the name of battling COVID19 govts. across the world enacted upon closing down various areas where people gathered, this brings us to the next point which is the changes in level of physical activity in people. Parks and gyms were amongst those places. According to (Jennie A. Petersen, 2021) the affect of COVID shutdowns was diverse in affecting the physical activities of people. Exercises that could not be continued due to shutdowns were replaced with other forms of exercises, some were able to try on new activities. Some though had difficulty in adapting to the change. A crucial point that was established was fall in physical activity was greatly seen among those who led an inactive lifestyle previously compared those who were active. Those who liked

going to gym or swimming had difficulty in adapting. For many physical activities alleviated mental health issues caused to lockdowns. In a study conducted in Israel (Horesh Dor-Haim, 2021) found out that amongst the respondents of the questionnaire 70% had to train less than usual, 60% made use of digital devices for training and more than half, 55% witnessed an increase in weight, on average an increase of 1.2kg though around half of the respondents had a 2kg increase in weight. In order to get a more clearer picture with regards to the diversity in the population, in (Elaine A. Hargreaves, 2021) the respondents were divided into active pre-lockdown, during it and after lockdown. In those who were active pre-lockdown, during and after lockdown the time spent was lesser, the intensity was also comparatively lesser, time spent and intensity remained at a reduced level even after lockdown. For those who were “moderately active”, the difference was that post lockdown activity was higher than pre lockdown, intensity was also increased during and after lockdown. (CamilleChambonniere, 2021) found out that in children and adolescents compared to those who were not active previously, the active segment saw a reduction in physical activity due to stay at home measures. Reductions in physical activity was seen during the lockdown, according to (Adarsh Kumar Srivastav, 2020). (Tessa Strain, 2021) found that physical activity in the population decreased during lockdowns, compared to pre lockdown, there was a 30% reduction in reporting of physical activity. Physical exercise and reduction in diabetes risk, additionally they can contribute to falling in blood pressure (hypertension) and reduced levels of glucose in the blood (Eszter Füzéki, 2020).

Changes in dietary habits of people were witnessed according to (Ahmad Salman, 2021) which was a study conducted in Kuwait, adults showed an increased consumption of vegetables, fruits and carbohydrates and a reduced consumption in fish and sugar beverages. 34.4% responded that they had increased consumption of food during the pandemic, and 35.8% reported an increase in weight, 33.1% did not have the minimum 30 min physical activity per week target. Smoking also saw an increase in the population. Similarly according to (Grace Bennett, 2021) in a review of studies found out that in 10 studies there was a increase in snacking confirmed, in 6 the result was that meal frequency had increased as well as meal number. This was balanced by 11 studies which found out that there was an augmentation in consumption of fresh products as well as participants increased home cooking. However 9 identified a fall in consumption of fresh products and 6 reported marked increases in sweets, fried items, snacks and processed food items. Additionally 8

studies reported an increase in weight and 7 saw a fall in exercise. In (Ricard Celorio-Sardà, 2021) the survey respondents identified an increase in consumption of “fruits, vegetables and legumes, eggs, fish, yogurt”. The increases were in the range of healthy diet. The study also found a marked increase in consumption of homemade pastries, chocolate and salted snacks. Certain other changes like adoption of healthier cooking oils also point towards adoption of a healthy lifestyle. A study conducted on the Indian population (Ramasamy Rajesh Kumar, 2020) for the first lockdowns, found out that Indians in general had stopped ordering food from outside, craving for non vegetarian food was also reduced, consumption of homemade food has increased. (Alqurashi, 2021) in his research on dietary changes in Saudi Arabia during lockdowns found out that more than half (51,5%) of the reported participants started skipping breakfast, which has been reported as increasing food intake during later part of the day. Skipping breakfast (due to late waking up and going to sleep late and lack of an appetite) has also been associated with increased risk of “type 2 diabetes, obesity and coronary heart disease”. Consumption of fast food and sweets had increased during lockdown (reported by 58.1% of the participants). Increased home cooking was reported in this study as well, fruits and vegetables consumption had increased. The study reported on the physical activity of the population during lockdowns. 36.5% of the respondents did not do any kind of physical activity during lockdowns, 39% responded as exercising using YouTube videos. Generally physical activity decreased in the population. It was concluded that “individuals who stayed at home to control the spread of infection developed unhealthy eating habits with a high intake of foods containing fat and sugar and became physically inactive, putting them at increased risk of weight gain and developing diseases in the future”.

The literature on dietary changes points us to some interesting things, this includes the following facts-

- Increase in home cooking
- Increase in food consumption generally
- Increase in consumption of unhealthy food items.
- Certain studies pointed out to increase in consumption of fresh products and healthy items in general.
- Lifestyle changes like skipping breakfast was witnessed.
- Smoking increased in the population

On changes in physical activity, overall they have pointed to a reduction in frequency and intensity of physical activity. Many people have adopted a sedentary lifestyle and this puts them at an increased risk of developing diseases in the future. There are three interesting things that have been identified through the literature review till this point – Govt. restrictions have fueled changes in dietary habits in populations across the world that puts them at an increased risk of not only COVID but other diseases down the line. (Hadia Radwan, 2021) was able to make this link when it concluded that lifestyle changes that could happen due to lockdowns include – “increased dietary intake, Increased weight, decreased physical activity, increased smoking and decreased sleep”. Around half of the people living in UAE had developed 1 or two of the bad habits mentioned above. (Giuseppe Lippi, 2020) found out as early as in April 2020 that lockdowns can cause increases in physical inactivity, weight gain, various addictions, reduced sunlight exposure and social isolation”.

Social isolation is the less talked of talking point in many of these studies, the mental health of people was adversely affected during COVID 19 lockdowns, (Shweta Singh, 2020) found out that the mental health of adolescents and college age people were affected negatively during lockdowns due to prolonged school closures. (Nirmita Panchal, 2021) found out increased anxiety disorder in the population compared between 2019 and 2021. Certain studies such as (Hoda Zahedi, 2014) have established a correlation between psychiatric distress and junk food. This is a less spoken, with mental health of a large segment of the population disturbed, could it have contributed to an increase in fast food consumption.

From the review of the present literature certain things can be said for the general population, vast swathes of data exist which support the sentiment that the trend of fast food consumption was increasing in the general population before the pandemic, with the implementation of stay at home orders around the world, there was an increase in consumption of unhealthy items, food items rich in sugars and fats were being consumed. Fast food consumption increased in general in the population. Physical inactivity increased in the population due to the measures. This combined with the consumption of unhealthy items should have pushed an already at threat population to getting severe outcomes to COVID.

## **Research methodology**

In order to accomplish the objectives of this project a primary research initiative was undertaken. The eventual goal was to question a sample populace on various eating habits of theirs which included questions on their general food consumption and fast food consumption habits, including items such as what is their preferred cuisine when it comes to fast food, their reason for choosing fast food over traditional meals etc. Since effects of COVID lockdowns was a central tenet of this project the data collected has been compared with similar data during and after lockdowns ended, consumption of food was compared with pre and during lockdowns, fast food consumption levels was similarly checked pre and post lockdowns, consumption of fresh fruits and vegetables, prevalence of home cooking, preference for healthy dishes while home cooking, breakfast habits, smoking habits, weight pre and post lockdowns. Since it was important to identify if the sample had any comorbidities a question was posed which listed out the comorbidities that can cause a severe bout of COVID and the respondents were asked to choose from amongst them. Availability of parks and recreational facilities during lockdowns was also questioned, post which the level of physical activity of respondents was tested pre, during and post lockdowns.

Through literature review it was found out that mental state and food consumption might be correlated, questions were posed which measured the mental stress levels of the sample. In order to test the validity of the argument that certain comorbidities increase the chances of catching a severe version of COVID, it was necessary to have the respondents describe the severity of COVID that they had. In order to test the knowledge of respondents they were asked whether they were aware of the negative effects of fast food and whether they were aware that having certain comorbidities can lead to poor outcomes with regards to COVID.

The survey form which had all these questions was floated through the online space. Since I was looking mostly for respondents who were middle aged and who had the option to cook their own food, I decided to target friends and coworkers of my parents, some younger people have also been included. As a result most of the respondents fall in the 40-60 age group. Both males and females have responded in adequate numbers hailing from diverse regions of India (majority responses are from India), certain respondents hail from places such as the UAE, Bahrain, UK, Singapore and the US though their numbers are significantly low. The average age has come out to be ~43 years. The number of males are 60 and number of females at 45, hence in total the number of responses

are at 105. The sourced data then was cleaned for errors and missing figures or dissimilar information, once that process was completed the number of responses stood at 101, with the number of male respondents at 57 and number of female respondents at 44.

On this information, statistical test such as T-Test on excel would be used and in addition to that the mean values will be calculated to find out whether there was an increase over a particular period. The T-Test values will be used to confirm hypothesis which will be made.

Certain additional values such as fast food preferences will be presented in the form of % ages to identify general trends in the population.

## **Findings**

### Cuisine preferred

When it comes to cuisine preferred, the respondents were asked as to what sort of cuisine did they order whenever they visited a fast food outlet or ordered in fast food and subsequently 3 options were provided – Western (Burger, Pizza etc.), Chinese (Chowmein, Fried Rice etc.) and Other for the respondents to mention if they had any preference for any other cuisine. According to the results of the survey, 50 of the survey respondents identified a preference for “Western (Burger, Pizza etc.) and 33 identified a preference for “Chinese (Chowmein, Fried Rice etc.)”. The rest of the respondents, numbering at 18 had a diverse preferences but mostly for regional variations of Indian cuisine, such as Chaat, Mughlai, South Indian etc.

### Reason for preference for fast food over traditional cooked meals

Coming to reasons for preferring fast food over traditional cooked meals, 4 reasons were provided to the respondents which were (referring to why they prefer fast food) “Because they are tasty”, “Because they are convenient”, “Because they are cheap”, “All three of the above” and an “Other” option to provide any additional or other reason. According to the results of the survey, 35 respondents agreed with “Because they are tasty” (~35%), 26 agreed with “Because they are convenient” (~26%), only 1 respondent agreed with “Because they are cheap” and 20 agreed with “All three of the above” (~20%). The rest 19 had various other reasons such as “They do not prefer fast food”, “For a change”, “Just to feel a different taste” etc.

## **Effects of lockdowns**

### Changes in general food consumption, before lockdowns and during lockdowns

In order to find this two questions were asked which were “Before lockdowns how many times did you consume food in a day (including all 3 major meals and any additional food items or snacks in between) (if more than 8 times, mention in "Other")” and then followed by another question which asked “During lockdowns how many times did you consume food in a day (including all 3 major meals and any additional food items or snacks in between) (if more than 8 times, mention in "Other")”. In order to provide for responses for the two question options between once up to eight times were provided and if it was more than 8 an “Other” option was also provided.

*Hypothesis testing*

*Null hypothesis: Lockdowns did not have an impact on the general food consumption.*

*Alternative hypothesis: Lockdowns had an impact on the general food consumption.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	3.336634	3.564356
Variance	1.345545	1.488317
Observations	101	101
Hypothesized Mean Difference	0	
df	199	
t Stat	-1.3595	
P(T<=t) one-tail	0.087764	
t Critical one-tail	1.652547	
P(T<=t) two-tail	0.175528	
t Critical two-tail	1.971957	

Since this is a two tail test, the p value comes out to be 0.176, which is greater than the alpha. A p-value greater than the significance level concludes that the difference between the means of the two categories is statistically insignificant. Hence for an Alpha of 0.05, we have failed to reject the null hypothesis.

Changes in fast food consumption before and during lockdowns.

For getting the desired result, in the survey form two questions were asked which were the following – “Before lockdowns, how many times did you order in fast food or visited fast food outlets in a week? (Specify number times)” and “During lockdowns, how many times did you order in fast food or visited fast food outlets (if they were open?) in a week. (Specify number times)”. And for responses a linear scale was provided which went from 0 – which was “Never in a week” and 10 – which was “10 times a week” were provided.



*Hypothesis testing*

*Null Hypothesis : Fast food consumption was not impacted as a result of lockdowns*

*Alternative Hypothesis : Fast food consumption was impacted as a result of lockdowns in the.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	1.39604	1
Variance	2.321584	2.62
Observations	101	101
Hypothesized Mean Difference	0	
df	199	
t Stat	1.790467	
P(T<=t) one-tail	0.03745	
t Critical one-tail	1.652547	
P(T<=t) two-tail	0.074899	
t Critical two-tail	1.971957	

Using a two tail test result, the p-value comes out to be 0.075 which is greater than the assumed significance level, showing statistical insignificance between the two means, hence in this case we cannot reject the null hypothesis.

Changes in consumption of fresh fruits and vegetables, before and during lockdowns.

In order to find out dietary changes with regards to in consumption of fresh fruits and vegetables, two questions were proposed which were the following, “Before lockdowns, how often did you consume fresh fruits and vegetables in a day ?(This includes any fresh vegetables used during home cooking) (If greater than 7 mention number of times in "Other")” and “During lockdowns, how many times did you consume fresh fruits and vegetables in a day ?(This includes any fresh vegetables used during home cooking) (If greater than 7 mention number of times in "Other")”. The possible responses were once a day to seven times a day, and if their consumption was greater than 7, then an “Other” option was provided as well.

*Hypothesis testing*

*Null Hypothesis : Lockdowns did not impacted the consumption of fresh fruits and vegetables.*

*Alternate Hypothesis : Lockdowns had an impact on the consumption of fresh fruits and vegetables.*

*Alpha – 5% or 0.5*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	2.24	2.653465
Variance	1.901414	1.728713
Observations	100	101
Hypothesized Mean Difference	0	
df	198	
t Stat	-2.17523	
P(T<=t) one-tail	0.015399	
t Critical one-tail	1.652586	
P(T<=t) two-tail	0.030798	
t Critical two-tail	1.972017	

Considering the p-value and comparing it to the significance level of 0.05,  $0.031 < 0.05$ , it can be said that the difference between the means is of statistical significance. In this case it is possible to reject the Null hypothesis and accept the Alternate hypothesis which is that, “*Lockdowns had an impact on the consumption of fresh fruits and vegetables.*”.

Frequency of home cooking – before and during lockdowns

For this question the following two questions were proposed to the respondents – “How often did you cook all three of your meals in a day before lockdowns? Any day you did not cook one of your major meals - Breakfast, Lunch or Dinner is not to be added? For example if you cooked all three of your meals only 6 days in a week and one day you ordered in your dinner, then the answer will be 6.”, followed by “How often did you cook all three of your meals in a day during lockdowns? Any day you did not cook one of your major meals - Breakfast, Lunch or Dinner is not to be added? For example if you cooked all three of your meals only 6 days in a week and one day you ordered in your dinner, then the answer will be 6.”. Responses provided were Daily to Six times a week with the additional option of “Other”.

*Hypothesis testing*

*Null Hypothesis : Frequency of home cooking was not impacted as a result of lockdowns.*

*Alternative Hypothesis : Frequency of home cooking was impacted as a result of lockdowns.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	5.920792	6.247525
Variance	2.493663	1.968119
Observations	101	101
Hypothesized Mean Difference	0	
df	197	
t Stat	-1.55453	
P(T<=t) one-tail	0.060832	
t Critical one-tail	1.652625	
P(T<=t) two-tail	0.121663	
t Critical two-tail	1.972079	

The p-value for two tail is 0.122 which is greater than the significance level, hence it is not possible to conclude that a significant difference between the means exist. In this situation it is not possible to reject the Null Hypothesis, which is that “*Frequency of home cooking was impacted as a result of lockdowns.*”.

Pre and post lockdown changes in weight

In order to identify whether there was a change in weight, with regards to pre and post lockdowns the following two questions were asked – “What was your weight pre-lockdowns?” and “What was your weight post lockdowns?”. The respondents were supposed to provide self measured values for these questions.

*Hypothesis testing*

*Null Hypothesis : Lockdown did not have an impact on the weight of respondents.*

*Alternative Hypothesis : Lockdown had an impact on the weight of respondents.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	70.68812	71.21584158
Variance	254.5943	269.1863465
Observations	101	101
Hypothesized Mean Difference	0	
df	200	
t Stat	-0.23174	
P(T<=t) one-tail	0.40849	
t Critical one-tail	1.652508	
P(T<=t) two-tail	0.816981	
t Critical two-tail	1.971896	

From the T-Test, the p-value comes out to be 0.817 which is greater than the significance level of 0.05, hence the difference between the means is not of statistical significance. Hence it is not possible to reject the Null Hypothesis of “*Lockdown did not have an impact on the weight of respondents.*”.

#### Identifying changes in physical activity pre, during and post lockdowns.

For this segment, the following 3 questions were asked to the respondents – “ On a scale of 1 to 7, describe your physical activity pre lockdowns.”, “On a scale of 1 to 7, describe your physical activity during lockdowns” and “On a scale of 1 to 7, describe your physical activity post lockdowns”. These three questions were supposed to track the changes in physical activity. As responses a linear scale was provided from 0 to 7, with “0” meaning “Not active at all” and “7” meaning “Highly active with a regular exercise regime”. For this multiple Hypothesis testing will be required, as following –

#### *Hypothesis testing 1*

*Null Hypothesis : The level of physical activity of respondents did not change during lockdowns*

*Alternative Hypothesis : The level of physical activity of respondents did change during lockdowns.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	4.534653	3.534653
Variance	2.771287	4.151287
Observations	101	101
Hypothesized Mean Difference	0	
df	192	
t Stat	3.819679	
P(T<=t) one-tail	9.02E-05	
t Critical one-tail	1.652829	
P(T<=t) two-tail	0.00018	
t Critical two-tail	1.972396	

Using the T-Test, the p-value comes out to be 0.00018 which is less than the significance level, as a result it is safe to reject the Null Hypothesis, and it is possible to go with the Alternative Hypothesis, “*The level of physical activity of respondents did change during lockdowns.*”

#### *Hypothesis testing 2*

*Null Hypothesis : The level of physical activity of respondents did not change after lockdowns compared to during lockdowns.*

*Alternative Hypothesis : The level of physical activity of respondents did change after lockdowns compared to during lockdowns.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	3.534653	4.425743
Variance	4.151287	2.906931
Observations	101	101
Hypothesized Mean Difference	0	
df	194	
t Stat	-3.37081	
P(T<=t) one-tail	0.000452	
t Critical one-tail	1.652746	
P(T<=t) two-tail	0.000904	
t Critical two-tail	1.972268	

The p-value comes out to be 0.00009 which is lesser than the significance level of 0.05, hence it is possible to reject the Null Hypothesis and go with the Alternative Hypothesis, “*The level of physical activity of respondents did change after lockdowns compared to during lockdowns.*”.

In addition, when it comes to people who had an active exercise regime before lockdowns the following was seen – 15 respondents had an activity level of 7, out of which 8 saw no change before during and after lockdowns in physical activity, 3 saw a reduction in physical activity during lockdowns though the level went up after the restrictions were lifted, 2 saw a fall in physical activity after lockdowns even though they were able to maintain their regime during lockdowns. Out of the 15 respondents, only 3 saw a fall in physical activity comparing pre and post lockdown activity levels.

When it comes to those who were “moderately active” (respondents who checked 5 in the pre lockdown question” option, out of a total 24 respondents only 7 saw a rise in physical activity after lockdowns.

#### Changes in mental stress levels pre and during lockdowns.

In order to find out changes to the mental health levels the respondents were asked two sets of questions – “On a scale of 1 to 7 describe your level of mental stress before lockdowns” and “On a scale of 1 to 7 describe your level of mental stress during lockdowns”. The response was in the form of a linear scale from 0 to 7, with 0 being “Not stressed at all” and 7 being “High levels of stress”.

*Null Hypothesis : The mental stress levels were not affected by lockdowns*

*Alternative Hypothesis : The mental stress levels were affected by lockdowns.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	2.594059	3.831683
Variance	3.743564	4.961386
Observations	101	101
Hypothesized Mean Difference	0	
df	196	
t Stat	-4.21567	
P(T<=t) one-tail	1.9E-05	
t Critical one-tail	1.652665	
P(T<=t) two-tail	3.8E-05	
t Critical two-tail	1.972141	

From the test the p-value comes out to be 0.0000380008488215506 which is lesser than the significance levels of 0.05. Hence we can comfortably reject the Null Hypothesis and accept the Alternative Hypothesis which states that *“The mental stress levels were affected by lockdowns.”*.

#### Changes in Breakfast habits, pre and during lockdowns.

For this two sets of questions were again asked, which were the following – “Before lockdowns how many times did you skip breakfasts in a week?” and “During lockdowns how many times did you skip breakfast in a week?”. The respondents were asked to provide responses in a linear scale from 0 to 7, with 0 being “Never skip a breakfast” and 7 being “Do not have breakfast”.

*Null Hypothesis : The breakfast habits were not affected as a result of lockdowns.*

*Alternative Hypothesis : The breakfast habits were affected as a result of lockdowns.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	1	0.980198
Variance	3.32	3.199604
Observations	101	101
Hypothesized Mean Difference	0	
df	200	
t Stat	0.07794	
P(T<=t) one-tail	0.468977	
t Critical one-tail	1.652508	
P(T<=t) two-tail	0.937954	
t Critical two-tail	1.971896	

From the test the p-value comes out to be 0.938 which is higher than the significance value hence the difference between the means is not statistically significant. As a result we cannot reject the null hypothesis.

#### Changes in smoking habits pre and during lockdowns

In order to check the chance, the following two questions were asked – “If you smoke, how many times did you smoke in a day before lockdowns? (If greater than 5, mention in "Other")” and “If you smoke, how many times did you smoke in a day during lockdowns? (If greater than 5, mention in "Other")”. For responses, the options were provided from “Don’t smoke” to “5 times”, for greater than that the “Other” option was provided.

There were not sufficient enough responses to identify changes in smoking habits as most of the respondents did not have a smoking habit. However those that did the following data was seen.

29.If you smoke, how many times did you smoke in a day before lockdowns? (If greater than 5, mention in "Other")	30.If you smoke, how many times did you smoke in a day during lockdowns? (If greater than 5, mention in "Other")
10	10
20	20
1 Don't smoke	
5	5
4	3
2 Don't smoke	



## Checking correlation

### Comorbidities and fast food consumption

The respondents with comorbidities were matched with their fast food consumption levels pre-lockdowns. For those diagnosed with Obesity, the frequency of fast food consumption in a week was seen as follows – 1, 2, 1, 1, 2. For diabetes, the following frequency was seen – 2, 7, 0, 0, 0, 2, 1, 7, For Hypertension, 0, 1,4,2,0, 1, 1,6, 1, 0, 1. Coming to Hyperlipidemia, 1. Coronary heart disease, 2. One individual had Diabetes, Hypertension, Hyperlipidemia and Coronary heart disease and he/she had a frequency of 2.

### Disease severity and comorbidity correlation

The respondents were asked the following question – “Have you been diagnosed in the past with any of the following diseases? (Multiple choices are possible)”, and provided with the list of diseases which were as follows – “Diabetes”, “Obesity”, “Hypertension (high blood pressure), “Hyperlipidemia”, “Coronary heart disease”, “Any other cardiovascular diseases” and “None of the above”, the respondents could choose multiple options. The presence of any of these diseases was matched to the severity of COVID. There were 22 respondents who had one of the major comorbidities associated with a severe response to COVID, among them, the severity was recorded as follows –

Severity of “1”	3
Severity of “2”	3
Severity of “3”	2
Severity of “4”	3
Severity of “5”	8
Severity of “6”	2
Severity of “7”	1
Total	22

The greatest value is attributed to a Severity of “5”. Out of 22, 11 had a severity greater than “4”.

### Change in physical activity and access to parks, gyms and other facilities.

The respondents were asked – “Were the parks and other facilities such as gyms closed in your area during lockdowns?” and were provided with a simple “Yes” and “No” as options to respond

to the question. A total 94 respondents agreed that the parcs and other recreational facilities were closed and 7 said that the parcs and recreational facilities were not closed. The following data was extracted :

Response provided	Physical activity went up	Physical activity went down	No change
Yes	17	51	27
No	1	3	2

Severity with respect to COVID, changes in food consumption and weight of respondents.

Severity of COVID, measured against changes in food consumption. For this study, the severity of COVID was limited to 5,6 and 7. These figures were compared to changes in food consumption and changes in weight.

26. On a scale of 1 to 7 (0 if you did not have the disease), describe your severity of COVID 19.	8. Before lockdowns how many times did you consume food in a day (including all 3 major meals and any additional food items or snacks in between) (if more than 8 times, mention in "Other")	9. During lockdowns how many times did you consume food in a day (including all 3 major meals and any additional food items or snacks in between) (if more than 8 times, mention in "Other")	Change	17. What was your weight pre-lockdowns?	18. What was your weight post lockdowns?	Change
5	4	4	0	89	92	3
5	4	4	0	62	67	5
5	4	4	0	110	112	2
5	4	6	2	64	64	0
5	5	4	-1	75	76	1
5	5	6	1	68	67	-1
5	3	3	0	83	83	0
5	4	4	0	65	64	-1
5	3	3	0	86	86	0
6	1	2	1	75	76	1
6	3	2	-1	69	64	-5
6	4	6	2	87	91	4
6	3	4	1	51	47	-4
7	2	2	0	86	86	0
7	4	5	1	98	104	6
7	3	3	0	89	85	-4
7	4	5	1	80	83.8	3.8

Age and severity of COVID.

The respondents were asked their age and the age and severity of COVID will be related to one another. The average severity of COVID with respect to age group is as follows –

Age range	Severity
17-30	2.88
31-40	4.5
41-50	3.031
51-65	5.11

Gender and severity of COVID

The number of men who had COVID is 32 and number of women who had COVID is 22. The average severity for men is 3.625 and the average severity for women comes out to be 3.091. T-Test has been used.

*Hypothesis testing*

*Null Hypothesis : The severity of COVID did not differ between men and women.*

*Alternative Hypothesis : The severity of COVID did differ between men and women.*

*Alpha – 5% or 0.05*

t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	Variable 2
Mean	3.625	3.090909
Variance	3.983871	3.038961
Observations	32	22
Hypothesized Mean Difference	0	
df	49	
t Stat	1.04218	
P(T<=t) one-tail	0.151222	
t Critical one-tail	1.676551	
P(T<=t) two-tail	0.302443	
t Critical two-tail	2.009575	

The p-value is coming out to be greater than 0.05 which means it is not possible to reject the Null Hypothesis that “*The severity of COVID did not differ between men and women*”.

Skipping breakfast and disease correlation, specifically diabetes, obesity and coronary heart disease

For this the pre lockdown breakfast skipping tendencies were compared with the identified diseases which were Diabetes, Obesity and Coronary heart disease.

19. Have you been diagnosed in the past with any of the following diseases? (Multiple choices are possible)	27. Before lockdowns how many times did you skip breakfasts in a week?
Obesity	0
Diabetes	1
Diabetes, Hyperlipidemia	0
Diabetes	1
Diabetes, Hypertension (high blood pressure)	2
Coronary heart disease	0
Diabetes	0
Diabetes	0
Diabetes	0
Diabetes, Hypertension (high blood pressure), Hyperlipidemia, Coronary heart disease	0
Diabetes, Coronary heart disease	1
Obesity	2
Diabetes	0
Obesity	7
Obesity, Hypertension (high blood pressure)	0
Obesity	0
Obesity, Hypertension (high blood pressure)	1
Obesity	7

Mental stress and increased food consumption

For this changes in mental stress levels was compared with changes in general food consumption. On average, the changes in mental stress levels was correlated with changes in food consumption using the “=correl()” function. The correlation came out to be -0.013 which shows a negative correlation between the two datasets.

## **Limitations of the study**

The study has various limitations

- The biggest issue here is the limited number of respondents which is 105 has caused issues with arriving at certain conclusions. The limited number of people who smoke and those who have certain comorbidities, means that it is difficult to arrive at certain conclusions.
- In addition to this certain data points were self measured meaning that their validity is questionable, like severity of COVID. Whenever the aspect of self reporting comes into the question there exist the possibilities of underreporting or over reporting. There is a possibility that such things have happened in the survey as well. People are unlikely to tell the exact weight for example, there exist potential for over or underreporting, in situations such as these Controlled trials are the ideal solution.
- T-test value and the subsequent rejection or not rejection of the Null Hypothesis is based on Alpha values, for the convenience of this study the value was taken to be 0.05, if the values were to be changed the conclusions will change as well.
- For some of the values the respondents had to look back in time and rely upon their memories to answer the questions, memories can often be unreliable.

## Discussion

With regards to Indians, for the most part they have a preference for Western, followed by Chinese fast food items which is similar to most parts of the world. It is important to track the demand for exotic regional cuisines in the Indian population as this is a possible segment which has an untapped potential, fast food providers can tap into this to improve margins. Indians are in line with rest of the world when it comes to preference for fast food which comes down to “Taste, Convenience and Affordability”. Speaking of fast food, it is not possible to say that amongst Indians they have led to a development of certain diseases, again in this regard the developments in other countries match those in India.

Coming to general food consumption, it cannot be said that Indians increased their food consumption during lockdowns, as a result India bucks the trend witnessed by the rest of the world. Not only this, the same thing can be said for consumption of fast food the change in which was insignificant. As a result it is possible to conclude that in addition to the above factors as well as owing to the fact that the consumption of fresh fruits and vegetables increased by a significant margin during lockdowns and because of having a cultural tendency to have a proper breakfast, the people were able to buck the trend witnessed in other countries which was a significant increase in weight. However with regards to home cooking the change was not significant, this is possible because Indians in general like home cooking food from scratch. Most of the data point mentioned in the literature review came from other countries where cultural preference might dictate a general low levels of home cooking pre lockdown which increased exponentially during the lockdown period.

Physical activity changes were significant and can be said to be a result of lockdowns and the physical activity of the people have not returned to pre lockdown levels. The closing of parks, gyms and other recreational facilities could be identified as one of the reasons for it. Similar changes in mental stress was detected as the lockdowns caused a large amount of mental distress in the people. However this did not translate to an increase in food consumption amongst Indians.

Comorbidities cannot be concluded as having caused a severe reaction to COVID which is against all forms of established literature. It is highly likely that the limited dataset has skewed results in this regard. Further research with a larger number of respondents is needed to arrive at proper conclusions.

According to the result of the study it is not possible to say that the measures of the Indian govt. put Indians at an exaggerated risk of having a severe reaction to COVID. The study confirms some findings of the literature review and rejects others. Hopefully this study adds to the growing body of research which is India specific and pertains to the situation in the country. Cultural difference can have a heavy impact on the habits of the people which can drive the statistical curves of the pandemic.

## **Implications and recommendations**

The study has yielded some interesting results.

### Fast food Cuisine preferred

A little over half the Indian population prefers Western cuisine when it comes to fast food, which is followed by Chinese and then “Other”. Often in the case of literature review the focus was mostly on Western and Chinese fast food consumption, yet here it has been found that a significant number of people have a preference for regional and rather exotic fast food items as well.

### Reason for preference for fast food over traditional cooked meals

Out of all the survey respondents 35% consumed fast food because they are tasty, 26% consumed it because they are convenience and only 1 person consumed it because they were cheap, 20% consumed it because of all three of the above listed reasons. This was followed by 19% who had marked the other option. It is interesting to note that only 1 person marked his preference for fast food on the condition that it is cheap.

### Changes in general food consumption, before lockdowns and during lockdowns

The Null hypothesis could not be rejected which means that it is not possible to say that the respondents’ food consumption was impacted a result of lockdowns, even though the mean values went from 3.44 to 3.56. This is against the findings that came from the literature review which said that food consumption in general increased during lockdowns.

### Changes in fast food consumption before and during lockdowns

It is not possible to reject the Null hypothesis hence it is not possible to draw the conclusion that fast food consumption was affected as a result of lockdowns, even though the literature review points to the same. It is interesting to note that the mean values went down from 1.39 to 1 which is to say that on average the consumption of fast food went down during lockdowns.



### Changes in consumption of fresh fruits and vegetables, before and during lockdowns

In this case it is possible to reject the Null hypothesis and the Alternate Hypothesis could be accepted, comparing mean values, the consumption of fresh fruits and vegetables was affected by lockdowns and that the increase in mean was significant enough. This is line with the findings of the literature review which said that the consumption of fresh fruits and vegetables increased during lockdowns.

### Frequency of home cooking – before and during lockdowns

The Null hypothesis could not be rejected which meant that the change in home cooking was not impacted. Though the mean values went down from 5.94 to 6.25 which is against the findings that came from the literature review that home cooking frequency was increased, when looking at the mean values it can be seen that it has not been the case.

### Pre and post lockdown changes in weight

The Null hypothesis could not be rejected in this case, which means that the weight of the respondents was not affected. The mean weight increased from 70.69 kg to 71.22 kg which is in agreement with what was found out from the literature review, on average the weight of the people did increase but it was not statistically significant.

### Identifying changes in physical activity pre, during and post lockdowns

In both the hypotheses the Null hypothesis was rejected due to low p-values, according to the data, the physical activity of the people was affected due to lockdowns and when the lockdowns were lifted their physical activity levels were affected again. The mean values went down from 4.53 to 3.53 and back up to 4.43. This is in correspondence with the findings arrived at during literature review.

However those who were very highly active before lockdowns, there was not much fall post lockdowns, this means that those people with active regimes were able to return back to their previous levels of physical activity. For those who were only moderately active, post lockdowns the vast majority were not able to return to their previous levels of physical activity. Both of these findings are opposite to what was found through the literature review.

### Changes in mental stress levels pre and during lockdowns

The Null hypothesis was rejected in this instance and the Alternate hypothesis accepted which points out to the fact that the mental stress levels were impacted by lockdowns and the impact was negative as the mental stress levels went up. This is a finding which has been corroborated by the literature review.

### Changes in Breakfast habits, pre and during lockdowns

The Null hypothesis could not be rejected, which means that the breakfast habits of respondents was not impacted by lockdowns. The mean values went from 1 to 0.98 which is not significant. This is in contrast to the findings of the literature review.

### Changes in smoking habits pre and during lockdowns

The responses were not adequate enough to derive any conclusions from it.

### Comorbidities and fast food consumption

It is not possible to conclude that fast food consumption and Obesity, Diabetes and Hypertension had a correlation, meaning that high levels of consumption of fast food cannot be identified as the reason for the occurrence of these diseases, for Hyperlipidemia and Coronary heart disease, there were not enough responses to make the necessary conclusions. This is in agreement with the findings from the literature review, which also rejects a correlation between fast food consumption and obesity and hypertension.

### Disease severity and comorbidity correlation

Amongst those who had major comorbidities severity of 1 was witnessed in 3 people, severity of 2 in 3 people, severity of 3 in 2 people, severity of 4 in 3 people, severity of 5 in 8 people, severity of 6 in 2 people and severity of 7 in 1 person. If we divide severity between “Low” (1 to 3), “Moderate”(4,5) and “High”(6,7), the largest group was in the moderate category. This is a finding which contradicts the literature review which states that comorbidities are associated with severity with regards to COVID. Though it is possible that the limited data set could be a factor in this finding.

### Change in physical activity and access to parks, gyms and other facilities

Whenever the respondents agreed with Yes to the question whether the parks in their locality were closed, for 51 respondents this was correlated with a fall in physical activity, for 27 there was no change and for 17 the physical activity went up. For those respondents who answered No when asked whether their parks and recreational facilities were closed down, there haven't been sufficient responses to derive any conclusions. It can be said that for a large number of respondents a fall in physical activity was seen at a time when the parks and centers for recreational activities were shut down.

### Severity with respect to COVID, changes in food consumption and weight of respondents

Since the changes in weight and changes in food consumption pre, during and post values are statistically insignificant it is not possible to corroborate them with severity with respect to COVID.

### Age and severity of COVID

Since most respondents lie in the 40-65 age group the values pertaining to them would be the most significant, for 41-50 it is 3.03 and 51-65, 5.1. This corroborates with the scientific findings with regards to age stratification with respect to COVID, which means that the older one is the more likely they are to have a severe reaction to the infection.

### Gender and severity of COVID

Even though the mean severity with regards to COVID is higher for Men compared to Women, the difference is not statistically significant as can be seen from the Hypothesis testing. Hence it is not possible to conclude definitely that men had a more severe reaction to COVID compared to Women.

### Skipping breakfast and disease correlation, specifically diabetes, obesity and coronary heart disease

As can be inferred from the dataset, it is not possible to say that a higher preference of skipping breakfast can be identified as being a reason for the development of diabetes, obesity and coronary heart disease. This is in opposition to the findings from the literature review.

### Mental stress and increased food consumption

The two had a negative correlation meaning that whenever mental stress went down it was correlated with an increase in food consumption and vice versa which is opposite to the findings from the literature review.

## **Conclusion**

The study provides an interesting perspective in the unique habits, preferences and cultural value systems of the Indian population and how possible these very interesting traits possible ensured that the negative effects of lockdowns on the human physique which were witnessed in most other parts of the world were not seen in India or at the very least were not seen to a similar extent. Some facts regarding the pandemic which continue to be confirmed via additional literature does not hold true in the case of India as seen in this case.

Though certain aspects like mental stress levels saw a huge rise in India like it was the case in other countries. Having a regular exercise regime can have a positive impact on the stress levels of an individual and considering the fact that outdoor transmission is low there lies the potential for a change in pandemic response. Similar conclusions can be drawn from this study which can be used to dictate new avenues for research.

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