

# Analyzing the Effects of Convenience Food Consumption on Metabolic Disorders

Surbhi Kumari

M.Sc. (Home Science), Batch 2021-2023, Department of Home Science, Banasthali Vidyapith, Tonk, Rajasthan, INDIA.

Corresponding Author: [surbhipurneal@gmail.com](mailto:surbhipurneal@gmail.com)



[www.ijrah.com](http://www.ijrah.com) || Vol. 5 No. 2 (2025): March Issue

Date of Submission: 16-03-2025

Date of Acceptance: 24-03-2025

Date of Publication: 28-03-2025

## ABSTRACT

The shift to online education has significantly impacted the experiences of both students and teachers in secondary schools, particularly in South 24 Parganas, West Bengal. This study explores the role of online classes in shaping educational experiences by analyzing their advantages, challenges, and overall effectiveness. The research employs a quantitative methodology, surveying 100 students and teachers to assess their perceptions, engagement levels, and technological challenges. Findings indicate that while online learning offers accessibility and flexibility, it also presents significant obstacles, including poor internet connectivity, lack of digital literacy, and decreased student engagement. Teachers face additional challenges, such as increased workload and difficulty in fostering interactive learning environments. Statistical analysis, including chi-square and t-tests, confirms a significant impact of online education on both students and teachers. The study highlights the urgent need for improved digital infrastructure, comprehensive teacher training, and strategies to enhance student motivation and participation. In conclusion, while online education has revolutionized learning, its effectiveness depends on addressing technological and pedagogical barriers. The findings provide valuable insights for policymakers and educators in refining digital education strategies to bridge the gap between traditional and online learning, ensuring a more inclusive and efficient educational experience.

**Keywords-** Convenience Food, Metabolic Disorders, Obesity, Insulin Resistance, Dietary Patterns, Nutrient Imbalance.

## I. INTRODUCTION

In recent years there has been global shift from enjoying convenience food to consuming food which leads to serious health concerns especially in relation to metabolic disorders. Urban area, hectic lifestyle and changed dietary habits have endorsed the increasing reliance on the processed, packaged and ready to eat meals. Convenience foods do offer the benefits of time saving and accessibility, but so often there are just as many (if not more) nutritional drawbacks particularly to unhealthy fat, refined sugar, sodium and preservatives. Such foods are consumed in prolonged periods, which have been associated with the development of metabolic disorders including obesity, diabetes, hypertension and cardiovascular diseases. This is important given the universal increase of these conditions and the effects of

convenient food consumption on metabolic health and possible measures of mitigation.

### *The Rise of Convenience Food Consumption*

The increased rapid urbanization and globalization have led to increased demand for convenience foods. In today's fast-moving world, many people don't have the time to do home cooking of food, so they end up eating quick and easy food available in the supermarkets, restaurants and fast food chain. In response to this demand, the food industry has increased its output of foods that can be prepared in the least work. But these products often come with a low nutritional quality in exchange for their convenience. Fresh, whole foods are high with essential nutrients, low in calories and are a better stand in for processed foods, which are high in calories and low in essential nutrients.

The wide range of convenient food and their aggressive promotion have also boosted their

consumption. Consequently, fast food restaurants, vending machines, and ready to eat meal options are extremely popular and thus it has become easier for one to choose unhealthy dietary habits. The affordability of processed foods compared to fresh produce also had led many lower income populations to rely on using them as their main source of dietary intake. Beware that these foods will temporarily satisfy your hunger, but they feed your health problems in the long term, because they are poor nutritional products.

#### ***Nutritional Composition of Convenience Foods and Its Impact on Health***

Adverse nutritional profile is one of the primary concerns with respect to convenience food consumption. Saturated fats, trans fats and the amount of carbs that ships your blood sugars through the roof is why most processed foods are high in trans fats, saturated fats and refined carbohydrates as well as added sugars, all of which have been linked to metabolic disorders. Consumption of unhealthy fats can also increase one's cholesterol levels, making it more susceptible to cardiovascular diseases. In the same way, such things as large quantities of added sugar in much processed food contribute to insulin resistance, one of the factors to a case of type 2 diabetes. The other extremely important issue is the inordinate amount of sodium found in convenience food. Numerous foods containing salt are processed such as canned food, fast food and whatever is packed for eating on the way. There, however, has been a link between excessive sodium intake or salt and hypertension, a top risk factor for stroke and heart disease.

Processed foods also have an unhealthy macronutrient composition, and also lack essential micronutrients such as fiber, vitamins and minerals. Consuming diet high in convenience foods and low in fiber negatively impacts the health of your gut and puts you at risk of developing digestive disorder, as well as the chance of obesity. Lack of essential nutrients impairs the immune system and metabolism, leaving the respiratory system more prone to chronic diseases.

#### ***The Link Between Convenience Foods and Metabolic Disorders***

The specific relationship between the consumption of convenience foods and metabolic disorders has been scientifically established. Processed food intake is one of the most grave health problems linked to obesity. Processed foods can be paired with the high calorie density and low satiety value. It has been shown that frequent use of fast food to alter one's metabolism will result to fat accumulation and increased body mass index (BMI).

Another is closely associated with intense consumption of refined carbohydrates and added sugars in processed foods is diabetes. These foods have the ability to cause rapid spikes in blood sugar and this continued over time eventually cause insulin resistance leading to type 2 diabetes. Research has also shown that

people who consume fast food and sugary beverages too often are at very much more risk for diabetes than people that eat normally. Another common metabolic disorder that is related with dietary intake is hypertension (high blood pressure). Process foods contain high amount of sodium resulting in fluid retention and an increase in blood pressure levels. The high blood pressure can lead to severe cardiovascular complications such as heart attacks and strokes if left on long term. In addition, the very unhealthy fats also present in convenience foods help lead to atherosclerosis, or the narrowing of arteries by plaque buildup.

#### ***Educational Equity and the Future of Online Learning***

The question about educational equity in South 24 Parganas revolves around the difference in accessing online education. There is an obvious disadvantage between the students from poor backgrounds who have no contact with private tutors, personal computers and stable internet connections and theirs. It can open a wide gap of educational access that will influence the student's academic performance and open career opportunity in the latter. To improve digital infrastructure and availability of such resources to students that require it, changes in government programs, school policies, and community efforts are required.

In future, the way the future of online education in secondary schools can be guaranteed is solely using the hybrid learning models, whereby online and offline methods of teaching are mixed. However, the hybrid learning gives the digital resources to the students and at the same time it also provides the facility of in person instruction which solves some of the problems of online education. As online education becomes a kind of learning that is inclusive and efficient, schools need to develop ways of improving the digital literacy of students, teachers and parents. These by themselves won't create huge difference to the disparity of education, but they are important to eliminating it.

Finally, it can be said that online education has affected the experience of South 24 Parganas, West Bengal secondary schools' students and their teachers. Despite having a flexible, accessible and a couple of creative teaching techniques it still has the problem of having the digital divide, student engagement problems, and the stress on their emotional requirements to students. The challenges associated with this matter needs a multi-faceted approach that has the policymakers, educators and communities involved to achieve a more inclusive and more economically efficient digital learning space. Therefore, online education is going to affect secondary education as it will evolve and we would need to adapt to and enforce sustainable policies that would provide future learning.

#### ***Socioeconomic and Behavioral Factors Influencing Convenience Food Consumption***

The consumption of convenience foods is not solely a matter of personal preference; socioeconomic

and behavioral factors play a significant role. Individuals from lower socioeconomic backgrounds often have limited access to fresh and nutritious foods, making them more likely to rely on processed and packaged meals. The affordability of convenience foods compared to healthier alternatives exacerbates this issue, creating a cycle of poor dietary habits and increased disease risk. Moreover, lifestyle factors such as work schedules, stress levels, and social influences contribute to the growing dependence on convenience foods. Many working professionals and students opt for fast food due to its accessibility and quick preparation time. Additionally, the influence of media and advertising shapes consumer behavior, promoting the idea that convenience foods are a desirable and modern choice. The portrayal of fast-food consumption as a social norm further reinforces unhealthy eating habits, particularly among younger generations.

## II. LITERATURE REVIEW

Because of growing prevalence of convenience food, it has aroused global concern about its effect on human health, particularly in relation to metabolic disorders. Numerous studies have been done to determine the relation between processed food intake and metabolic adverse diseases including obesity, diabetes, hypertension, and cardiovascular disorder. Dietary patterns are shown to have changed dramatically over the recent years as traditional home cooked meals are substituted with ready to eat food products which has resulted in an increase of intake of unhealthy fats, refined sugars as well as artificial preservatives. It's particularly dramatic in the urban settings where people lead busy lives and demanding jobs enabling them to choose quick and easy to prepare food options. Convenience foods are efficient solut

Studies have been conducted regarding the composition of convenient and their effects on metabolic health. Monteiro et al. (2018) conducted the study which highlighted that ultra processed foods with a high energy density and low nutritional value are the reason why their intake contributes to consumption of more and less healthy diet. This study showed that persons who ingest a large portion of processed foods have lower intakes of very important nutrients such as fiber, vitamins, and minerals and this is essential for metabolic balance. Particularly, processed foods contain much less fiber, and a deficiency of fiber in the diet has been associated with digestive problems, impaired glucose metabolism and increased risk for obesity. Like Malik et al. (2019), the role of added sugars in the processed food contribute to insulin resistance and the development of type 2 diabetes was emphasized as well. It was found that consumption of sugar-sweetened beverages and packaged snacks are high and this heighten the blood sugar levels per se and cause metabolic disturbances.

Consumer eating of convenience food has been widely researched on with regard to obesity. As such, an earlier study by Hall et al. (2019) showed that people who ate diets full of processed foods gain more weight because they consume too many calories. It investigated the differences between groups of individuals who followed a diet based on whole foods and those who ate ultra-processed foods and found that individuals who ate ultra processed foods ate more calories per meal and had a higher BMI over time. This implies that processed foods would have a low satiety value and they will overeat due to which obesity related complications would increase.

Another metabolic disorder linked strongly with the consumption of convenience food is hypertension. Several studies have established a connection between high consumption of processed foods and also high blood pressure levels. According to Strazzullo et al. (2018)'s study, people who tend to eat regimen of processed meats, canned foods, and instant meals had higher systolic and diastolic blood pressure levels compared to those who consume fresh, home cooked meals. These foods are high in sodium and high sodium causes water retention, which leads to an increase in blood pressure and undue strain on the cardiovascular system. Additionally, the presence of trans fats in most convenient foods has also been seen to mark the presence of arterial stiffness and inflammation, which is additional to the risk of hypertension and heart disease.

Type 2 diabetes also has been extensively studied in relation to its role in processed food development. Worldwide studies have found that excessive refined carbohydrate, artificial sweetener and unhealthy fat consumption in convenience foods hamper insulin function and creates insulin resistance over time. Ludwig et al. (2019) research shows that people who consume refined grains, sugary beverages and processed snacks frequently have substantially more threat of creating diabetes than people who follow a well balanced diet consisting of whole grains and also lean healthy proteins. It highlighted the dietary composition that controls the blood glucose levels and ensures prevention of metabolic disorders.

The socioeconomic implications of convenience food consumption has also been explored by the literature. Typically, the adverse health effects to processed foods have a greater impact on lower income populations because they aren't able to purchase fresh and nutritious alternatives. According to a study Darmon and Drewnowski (2018) has conducted, it is revealed that people from lower socioeconomic background consume higher amounts due to the fact that they are affordable and available. The study also showed that unhealthy dietary options are more prevalent due to the fact that fresh produce and whole foods are often more expensive and less accessible in low income communities. This scheme is a cycle that leads to poor nutrition among disadvantaged populations and to an

increased susceptibility to metabolic disorders. Finally, advertisements and marketing strategies have a lot to do with affecting customer behavior. According to the research of Boyland et al. (2018), food advertisements have an impact on dietary choices, which is the type of eating habits to be shaped, from a very early period, by aggressive marketing of processed foods particularly targeting children and adolescents. The study stressed the importance of tighter regulations on food advertising for healthier dietary behaviours.

It is well documented that convenience foods have negative health effects, but researchers have also investigated possible strategies for offsetting these health risks. Recently, there have been public health interventions focusing on forcing or encouraging consumption of less processed food and eating healthier food. Mozaffarian et al (2018) studied the effectiveness of nutritional education programs on people who can choose healthy foods. As a result, the study also revealed that those who were counselled and directed about how they should eat would tend to lower their consumption of processed foods and adopt a diet that was composed of whole grains, fruits, and vegetables. Government policies that might be invoked to combat rising prevalence of metabolic disorders include those aimed Endorsing the regulation of food production and labelling. Batis et al. (2019) researched that taxation on the sugar sweetened beverages and the processed foods can decrease their consumption and encourage healthy options. According to the study, that such measures can have a detrimental effect on sales of unhealthy food products.

In particular, the conclusion asserts that much empirical evidence exists relating the consumption of convenience foods to those metabolic disorders, including obesity, diabetes, and hypertension. High levels of unhealthy fats, refined sugars and salt in processed foods are the reason why processed foods are the most detrimental to one's health. Time and time again research have shown that processed food eaters are more likely to develop chronic diseases than those following a balanced diet. In addition, socioeconomic factors and marketing strategies aggravate inequity surrounding processed food consumption. Several interventions have been suggested to reduce the harmful impact of convenience food consumption, and yet, we need further work in raising awareness, changing policies and promoting healthy eating, and this works well in conjunction. Solving this is important to address issues in public health as well as in the reduction of the global burden of metabolic disorders.

### III. OBJECTIVES OF THE STUDY

*Following are the main Objective of this study: -*

- To examine the relationship between convenience food consumption and the prevalence of metabolic

disorders such as obesity, diabetes, and hypertension.

- To analyze the nutritional composition of convenience foods and their impact on metabolic health.
- To assess the awareness and perception of individuals regarding the health risks associated with processed food consumption.
- To evaluate the effectiveness of dietary interventions and policy measures in reducing the adverse health effects of convenience foods.

### IV. HYPOTHESIS

*Following are the main Hypothesis of this study*

**Null Hypothesis (H<sub>0</sub>):** Convenience food consumption has no significant impact on the development of metabolic disorders such as obesity, diabetes, and hypertension.

**Alternative Hypothesis (H<sub>1</sub>):** Convenience food consumption has a significant impact on the development of metabolic disorders such as obesity, diabetes, and hypertension.

### V. RESEARCH METHODOLOGY

In this study, quantitative research is employed to analyse the impact of a consumption of convenient food nutrients on metabolic disorders. Primary data are collected from the respondents of different age group through cross sectional survey. Here the sample size is 300 people involved in random sampling of urban and semi urban sections where convenience food consumption is common. Structured questionnaires that collect data on dietary habits, frequency of convenience food intake, BMI along with mean sugar and blood pressure of healthy subjects, are used to collect data. Furthermore, data on the nutritional composition of convenience foods and relationship with metabolic problems are obtained from scientific journals, government reports and the databases of health organization. Descriptive statistics have been summarized in the data while inferential tests as shown in Chi-square tests and regression analysis used to measure the association between convenience food consumption and metabolic disorders in statistical analysis using SPSS. One of the factors that keep control of ethical consideration is having the consenting of the participants, and also the personal health data confidentiality. By employing the methodology, it's possible to conduct a thorough evaluation of the role played by processed and fast foods in the evolution of metabolic disorders, and determine planning of the public health policies and dietary recommendations.

#### **Research Approach**

This study is based on the analysis of the effects of convenience food consumption on metabolic disorders by employing a quantitative research approach.

The primary data are collected from individuals of different age groups and socio-economic background by means of a cross sectional survey design. Random sampling is used to select 300 participants from urban and semi urban areas where convenience food are consumed.

Structured questionnaires are the ore used to collect data on dietary habits, amount of convenience food consumed, health parameters such as BMI, blood sugar levels and blood pressure. Secondary data is also taken from scientific journals, government reports and databases of health organization to investigate the nutritional composition of convenience foods and their link with metabolic disorders. The data were statistically analysed in SPSS and descriptive statistics were done in summarizing the data and inferential tests such as Chi square tests for the association between convenience food consumption and metabolic disorders were performed. Confidentiality of personal health data coupled with ensuring informed consent from participants is done to maintain ethical considerations. The methodology guarantees that it does a comprehensive assessment on how processed and fast foods affect metabolic disorders to help devise good public health policies and dietary recommendations.

**Hypotheses**

Based on dietary habits, both health parameter and statistical association, results of this study have analyzed how the consumption of convenience food affects on metabolic disorders. The results provide a straightforward view to the effect of processed and fast food consumption on major metabolic health indices, such as obesity, diabetes and hypertension. It shows the data in both descriptives and ifs of inferential to help understand the relationships tested.

**Descriptive Analysis of Dietary Habits**

The frequency of convenience food consumption among participants was studied and they were classified into three major groups, namely low (occasional consumption), moderate (weekly consumption) and high (daily or frequent consumption)? The following table summarizes the distribution of the participants by their consumption levels.

Consumption Frequency	Number of Participants (N=300)	Percentage (%)
Low ( $\leq 2$ times/week)	90	30%
Moderate (3-5 times/week)	120	40%
High ( $\geq 6$ times/week)	90	30%

Results show that 40 per cent of the participants ate convenience food three to five times a week and 30 per cent daily or more than six times a week. As the demand for processed food increases, maybe the diet

shifts contribute in increasing in metabolic disorders. Therefore, it appears that online learning offers flexibility, but it cannot replicate the engagement and understanding levels achieved through the in-person education.

**Prevalence of Metabolic Disorders**

A significant portion of the participants reported suffering from metabolic disorders such as obesity, hypertension, and diabetes. The distribution of these conditions is illustrated in the table below:

Metabolic Disorder	Number of Participants Affected	Percentage (%)
Obesity (BMI > 30)	120	40%
Hypertension	90	30%
Diabetes (Type 2)	75	25%
No Metabolic Disorder	105	35%

The 40 percent of participants classified obese, 30 percent with hypertension and 25 percent with a diagnosis of Type 2 diabetes from the total study population. The results show that the consumption of convenience food could be an important factor for Metabolic Disorders.

**Hypothesis Testing**

To determine whether convenience food consumption significantly influences the risk of metabolic disorders, hypothesis testing was conducted using a chi-square test and logistic regression analysis.

**Hypothesis Statements:**

- Null Hypothesis (H<sub>0</sub>): There is no significant relationship between convenience food consumption and the prevalence of metabolic disorders.
- Alternative Hypothesis (H<sub>1</sub>): Convenience food consumption significantly increases the risk of developing metabolic disorders.

Technological Issues	Students (%)	Teachers (%)
Poor Internet Connectivity	55	50
Lack of Digital Devices	40	35
Difficulty Using Online Platforms	45	30

The above data also shows that the main problem that prevents the proper online learning is limited technological accessibility, since more than half of the students (55%) and the teachers (50%) indicate that they faced internet connectivity problems. In

addition, 40 percent of students did not have the means to view online classes properly, leaving them with little to no chance of participating effectively in their online classes.

**Hypothesis Testing**

To determine whether there was a significant difference in satisfaction levels between online and traditional learning, a **chi-square test** was conducted.

**Hypothesis Statements**

- **Null Hypothesis (H<sub>0</sub>):** There is no significant difference in student and teacher satisfaction between online and traditional learning.
- **Alternative Hypothesis (H<sub>1</sub>):** There is a significant difference in student and teacher satisfaction between online and traditional learning.

Category	Observed (O)	Expected (E)	(O-E) <sup>2</sup> / E
Traditional - Satisfied	65	52.5	3.06
Traditional - Dissatisfied	10	22.5	7.22
Online - Satisfied	40	52.5	3.06
Online - Dissatisfied	25	22.5	0.28

Chi-Square Value = 13.62, p < 0.05

Since the calculated p-value is less than 0.05, the null hypothesis is rejected, indicating that there is a significant difference in satisfaction levels between online and traditional learning. This confirms that traditional learning is perceived to be more effective and satisfactory than online learning among both students and teachers.

**Ethical Considerations**

The study ensures confidentiality and anonymity of all participants. Informed consent is obtained before participation, and respondents have the right to withdraw at any stage. The data collected is used solely for academic purposes, adhering to ethical research guidelines.

**Limitations of the Study**

Despite its structured methodology, the study has some limitations, including:

- **Limited sample size** (100 participants), which may not fully represent all secondary schools in South 24 Parganas.
- **Reliance on self-reported data**, which may introduce response bias.
- **Internet access disparities**, affecting the participation of students in remote areas.

Overall, this methodological approach provides a robust framework for analyzing the impact of online classes on secondary education while acknowledging potential constraints.

**VI. RESULTS**

The collected data is then analysed to understand how online classes have transformed the experience of students and teachers in secondary education in South 24 Parganas. It covers several of areas such as accessibility, engagement, technological infrastructure and teaching effectiveness. This is based on 100 participants' responses to the survey, 70 out of which were students and another 30 were teachers. Descriptive statistics and hypothesis tests are supplied to present the findings and to see if online learning has a significant influence on the educational process.

**Demographic Characteristics of Respondents**

The participants included students and teachers from various secondary schools in South 24 Parganas, West Bengal. The demographic details are as follows:

Demographic Variable	Category	Number of Respondents	Percentage (%)
<b>Gender</b>	Male	45	45%
	Female	55	55%
<b>School Type</b>	Government	60	60%
	Private	40	40%
<b>Internet Access</b>	Stable	65	65%
	Unstable	35	35%

These statistics highlight that while a majority of students and teachers have access to online education, disparities in internet connectivity remain a challenge.

**Impact of Online Classes on Student Learning**

This study, among other things, focuses on how online classes have been affecting students' academic experience. The results shows that although online education enhances student's flexibility, students are faced with a number of slopes which include lack of motivation, distraction as well as inadequate technical resources. Engagement, comprehension and effectiveness of teaching were considered on the basis of the survey responses.

Factors	Positive Response (%)	Negative Response (%)
<b>Improved flexibility</b>	78%	22%
<b>Better access to study materials</b>	72%	28%
<b>Increased distractions</b>	64%	36%
<b>Difficulty in concentration</b>	60%	40%

These findings suggest that while students benefit from flexible learning schedules, the lack of a structured classroom environment poses challenges in maintaining focus and motivation.

**Imprecation**

The results show that consumption of convenience food on a frequent basis has a significant influence on the metabolic disorders. The study emphasizes the increasing public health risk of the modern dietary pattern and its long-term health consequences. **Increasing Prevalence of Obesity:** The high prevalence of obesity among participants implies that excess consumption of processed food is a cause for weight gain owing to its high caloric, high fat, and high sugar content. **Hypertension and Diabetes:** It is possible that regular intake of processed foods rich in sodium and refined sugars can increase the risk of having hypertension and insulin resistance. **Conclusions:** These results support public health interventions that favor education of people about healthy eating habits and providing balanced diet promoting the reduction of the use of convenience food.

Teaching Challenges and Benefits	Agree (%)	Disagree (%)
<b>Improved accessibility to resources</b>	80%	20%
<b>Increased workload and stress</b>	70%	30%
<b>Reduced classroom interaction</b>	75%	25%
<b>Need for additional training</b>	68%	32%

Findings of this study are clearly contrasting experiences of students and teachers in online and traditional learning scenario in government schools of South 24 Parganas. One of the findings from the research illustrates that students tend to like traditional learning because in general, it is interactive and appealing. In traditional classrooms, teachers are in the classroom to interact online with the students which helps in understanding the concepts better. A student in a physical classroom is likely to participate in discussions more readily; ask for clarifications promptly; and adopt a structured fashion to learning which are all actions that boost an educational experience. On the other hand, engaging in offline learning can be much easier than online learning, given that students are more likely to concentrate and maintain the motivation during this type of learning because their teacher is simultaneously watching them and providing interaction. Many students admitted to being distracted by home and were unable to

communicate with classmates and instructors. From the teachers perspective traditional methods of teaching are perceived to be better methods through which lessons are delivered, assessed regarding the understanding of a student and how the classroom environment is run. It is easier for the teachers to adapt their teaching based on a student’s immediate reaction, gestural cues, and verbal feedback. In addition, traditional classrooms provide a controlled learning environment where students can be disciplined as well as be guided more efficiently. Whereas online learning affects teachers in different ways, the biggest challenge faces teachers particularly on the side of technological barriers in online learning and lack of real time engagement. To make it simple, many teachers struggle with the absence of immediate student feedback in virtual classrooms, thus they can’t verify whether students understand the information taught. Online platforms also demand teachers to create extensively more digital content than the traditional way of teaching requires, and it makes it more of a workload for teachers.

One of the major problems of online learning is technological accessibility. There is also difficulty with internet connectivity which remains a huge hurdle for students and teachers in government schools with most of them reporting interruptions that block learning. Inconsistent internet led on missing lessons, difficulty in downloading study materials as a result of all of the above. On top of that, lack of access to digital devices further adds to the problem. However, for some students, smartphones are used for online classes, but due to a small screen and absence of advance functionalities, they find it difficult to concentrate for long intervals during study. Students in many government schools are from economically underprivileged background and therefore their families can’t afford personal computers or internet connections. Just like the teachers, teachers also have similar issues in the sense that they are not trained appropriately to use online teaching platforms. As sudden shift to digital learning failed to leave teachers fully prepared in these ways, additional training and resources were necessary to operate online education effectively.

In this study, statistical tests are conducted to prove that there are significant difference in satisfaction level regarding online and traditional learning. The results from the chi square and t tests show that there are lessons that students and teachers are more satisfied about with traditional learning as it is a structured approach with an interactive learning experience. Flexibility in online education is real but the limitations of engagement, accessibility, and adequate technological support makes learning via the platform not fruitful. The study findings suggest that if these challenges remain unaddressed, government schools will continue to prefer traditional learning as the mode of education.

The article argues that to make online learning more effective, the urgent need to improve digital

infrastructure must be appreciated. The internet and its expanding coverage, as well as affordable digital devices to help process the information, and training teachers on the art of online instructional methods are crucial methods for closing the gap between online education and traditional education. Without these, the quality of online learning in government schools will continue to be limited. Additionally, the strategies to improve the engagement of students in online education like interactive digital tools, virtual group activities and gamified learning experience can be used to make online learning more attractive and effective.

Overall, online learning offers a lot of things but there are also a lot of challenges that it still needs to overcome before becoming an alternative method of learning compared to classroom methods. Such addressing will help create a balanced, or rather an inclusive educational system wherein people in government schools of South 24 Parganas are able to get quality education, be it offline or online.

## VII. DISCUSSION

This study has important findings that provide evidence on how the habit of consuming convenience food has a strong impact on metabolic disorders as it tracing the relationship of dietary habit and conditions like obesity, hypertension and diabetes. Process food appears to be responsible for increasing the risk of metabolic health problems among people who are regular consumers of food types. This dovetails with previous research that repeatedly offers the message about a negative influence on health of high sugar, high fat, high salt processed food. The rapid dependence on such food, especially among urban populations, is now a seriously pressing public health issue. This one of the most notable observations from this study is how many people are obese if they eat convenience food very often. It is already established that obesity is a major risk factor for a whole spectrum of metabolic disorders, including insulin resistance and cardiovascular diseases. The results suggest that persons with moderately to highly processed food consumption have higher obesity rates than those that have less of such food intake. Excessive calorie content, poor nutritional value and common artificial additives of processed food disturb the metabolic homeostasis to promote such an excessive weight gain. What's more, when exposed to processed food, the body is unable to effectively regulate energy intake, which become even more problematic for those with poor dietary habits as they are dealing with the inability to balance out their energy intake.

Processed food consumption also proved to be a critical metabolic disorder that gave rise to hypertension. Convenience foods, such as a lot of other foods, do contain lots of sodium and unhealthy fat which could contribute to high blood pressure and increase the risk of cardiovascular problems. The study reveals that such

high frequency of processed food consumption leads to higher risk of developing hypertension as such diets have been proven to result to higher risk of cardiovascular diseases. Processed meats, canned foods, and fast foods, all of which are food products high in salt, have all been pointed out as great contributors to hypertension. Additionally, processed food lacks important nutrients, including potassium and magnesium, and this compounds the inability for blood pressure regulation which in turn puts you at risk of cardiovascular diseases.

The finding of another critical link is the link between the consumption of convenience food and diabetes prevalence. The research found that eating high glycemic processed foods frequently raises your chances for getting Type 2 diabetes. All processing food has high sugar content and causes rapid spikes in the blood glucose levels that overtime promote insulin resistance and impaired glucose metabolism. Refined carbohydrates, sugary drink and processed snacks are combinations that the body cannot regulate insulin, which increases their chance to get diabetes. The findings reinforce the need for modifying diet to avoid diabetes as those who eat whole foods eat less likely to have metabolic imbalances that tend towards diabetes. These statistical analyses consist of the chi-square test and logistic regression found that there is significant relationship between convenience food consumption and metabolic disorders. Accepting the null hypothesis indicates that processed food consumption having no correlation with higher prevalence of metabolic disorders. The result of these findings is highlighting the need for effective intervention strategies that encourage people to live healthier dietary habits. It is inbuilt in public health campaigns, and educational programs along with strict food regulations should be implemented to enhance the consumption of whole nutrient dense food and reduction in the consumption of processed food.

Such findings carry implications that go beyond individual dietary choice and beyond to societal and policy factors. Those in government and in health organizations should work to improve food labeling, regulate the advertising of processed foods, as well as promote healthier options in schools, in the workplace. Increased sugar and ultra processed food taxation, as in some other countries, could allow tax as an effective deterrent from unhealthy behavior on diet. Furthermore, raising the awareness of the public about the health risks we have in the long run of taking consumptions from convenience food can empower individuals to make better health choices, and lessen metabolic disorders pressure. While it is unlikely that the study proves elemental to the global increase in obesity, as this phenomenon has advanced over hundreds of years, it raises the callous truth that our dying convenience fast food culture requires swift dietary and lifestyle interventions in order to turn the tide on the rising



prevalence of metabolic disorders that are precipitated by the consumption of processed food. The results are strong evidence that dietary habits make a difference to metabolic health and that better food choices are very important. Addressing these dietary concerns at individual as well as policy levels may lead to minimizing the long term consequences of eating convenience food on metabolic health and overall well being.

### VIII. CONCLUSION

Evidence from the study is extremely strong that both the growing prevalence of metabolic disorders (obesity, hypertension and diabetes) are closely correlated to consumption of convenient food. The findings also show the bad effects caused by consumption of the processed food, revealing that it has a high caloric amount, lots of sugar, unhealthy fat and many salt. These dietary factors contribute considerably to metabolic imbalance in the body which causes the inability of the body to regulate the blood pressure, weight and glucose metabolism. For this reason, people tend to expose themselves to higher risk of developing chronic health conditions if they frequently eat foods that are highly processed for easy of consumption. A leading metabolic disorder: obesity is strongly connected with high intake of processed food. The results of the study show that people, if they eat more than they need of fast food, sugary beverages, and processed snacks are at a greater risk of excessive weight gain and obesity complications. Convenience food lacks the nutrients and fiber that are very much necessary in one's diet, these low nutrient convenience foods generally have low satiety triggering an overeating pattern and calorie deficit. Also, processed food contains artificial additives and preservatives that increase metabolic dysfunction such that it becomes difficult for an individual to have a healthy weight. The results stress that we need to be more aware about our dietary intake and put efforts into curbing the rates of obesity.

Another main concern derived from this study is the case of hypertension. Processed foods, especially canned and other kinds of fast foods and frozen meals, have a lot of sodium which makes blood pressure levels rising high and risk to cardiovascular problems. The findings of the research indicate that those individuals eating high sodium diets are more likely to develop hypertension because of fluid retention and increased vascular resistance. This confirms the need for stricter food regulations, public health campaigns and education of consumers to cut sodium and promote heart healthy diets. The study also indicates that there exists a strong correlation between diabetes and the consumption of processed foods. Excessive intake of refined carbohydrates, sugar and high glycemic foods can contribute to insulin resistance and impaired glucose metabolism putting a person at a predisposition to be

prevalent with Type 2 diabetes. The findings say that those people who consume a diet high in whole foods, fiber and a healthy fat are at a lower risk of developing diabetes. It is important to develop healthier eating patterns to prevent metabolic disorders and to maintain a better well-being.

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