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A Study on People's Food Consumption Behaviour During the Pandemic in Coimbatore City

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Abstract: ***The alterations in food intake that had taken place during the COVID-19 pandemic are the primary focus of the present study. The objective of this study is to examine how people behave when it comes to eating, including a detailed examination of food preferences prior to and following the pandemic, awareness of the importance of eating the right foods during or after the COVID outbreak, and the impact of various factors on the decision to purchase food items. The findings of the current study will assist doctors, nutritionists, and dietary specialists in understanding how Coimbatore residents consume food, enabling them to better advise patients, raise public awareness, and promote the intake of nutritious foods during this time. Moreover, the findings of this study will also help grocery retailers better understand the elements influencing people's decisions to buy certain sorts of food and their demand for them in these historic times.***
Keywords: COVID-19; Food Consumption;

I. INTRODUCTION

The World Health Organization (WHO) proclaimed a worldwide health emergency on January 30, 2020 [1], and COVID-19 was deemed a global pandemic on March 11, 2020 [2]. The COVID-19 issue has posed particular difficulties [3]; the pandemic has brought about one of the largest economic crises since the end of World War II [4,5]. Additionally, COVID-19 has influenced people's food-choice motivations [8,9,10,11,12,13], cleanliness habits [6,7], and appetitive traits [14,15]. The pandemic and the stringent controls put in place to combat it have frequently caused supply and demand disruptions, which have eventually had an impact on product prices and household food consumption. Stockouts and purchase restrictions on many food items occurred as a result of scared shoppers acting in response to the impending threat of COVID-19, which devastated cities and neighborhoods. These actions revealed a pervasive lack of faith and mistrust in the world's food supply system. Some predict that as we get past the COVID-19 aftermath, behaviors will return to normal, while others argue that behaviors will persist and chart a new course for the food industry's future.

One hypothesis is that the pandemic has had a significant psychological impact on people. The population in 2020 was subjected to extensive risk communication and media reporting, which in and of itself was a substantial psychological stress factor, even in areas with a relatively low risk of infection. Additionally, a sizable portion of the population was affected by temporary employment, was unemployed, or was concerned about losing their job, all of which could have an adverse effect on psychological well-being. In such circumstances, eating "more" can be a coping mechanism to polarize psychological responses to the pandemic and the stress it creates.

People's food consumption may have decreased in the early stages of the pandemic as a result of things like being unable to work or having lower salaries [20,21], spending more of their funds on medical care [22], and being affected by fear [23]. Consuming less expensive alternatives [24], cutting back on fruit consumption [25,26], cutting back on animal-derived foods like meat and poultry [26], and using more shelf-stable packaged goods [27] are a few examples of these modifications. The eating habits and food sources of consumers may also shift during a pandemic. Consumers might favor food delivery services that offer online ordering and door-to-door service, as well as channels they believe to be safer and capable of supporting a larger level of household stock in order to cut down on the number of trips to the store. The primary objective of the present study is to examine how people in the Coimbatore district of Tamil Nadu consume food. This includes a thorough analysis of food preferences before and after the pandemic, awareness of the need to consume the right foods during or after the COVID outbreak, and the impact of various factors on product purchases. The demographic profile of the respondents and their commitment to eating healthy food will be determined by this survey. Additionally, it will look at how the marketing mix affected consumers' decisions to buy food during COVID-19. It is also possible to analyze the changes in consumption patterns that occurred during COVID-19. There are few studies conducted and analysed which are discussed in the next section.

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II. LITERATURE REVIEW

Consumer spending on some household items surged dramatically compared to the first few months of 2020 in the days leading up to shelter-in-place and social-distance orders that prevented people from going shopping or dining out. Pandemic-related anxiety encouraged stockpiling actions (Hobbs, 2020). DecaData's analysis reveals that on March 10, when purchases of hand sanitizer, household cleansers, facial tissue, and toilet paper soared to roughly 30 times the rate from preceding weeks, consumer panic buying habits started. By the end of March, purchases of these items began to level off. However, rather than established behaviors, this may have been caused by inventory stockouts (DecaData, 2020).

Furthermore, when customers enter a store to find aisles of empty shelves and are unsure of when necessary items will be restocked, stock-outs can successfully reinforce unfavorable consumer perceptions and increase levels of uncertainty. These findings are similar to those made in the literature examining consumer spending patterns in the aftermath of natural disasters like hurricanes, earthquakes, and floods(Dovarganes, 2005). According to empirical research, feeling out of control might lead to predicted shopping behaviors like obsessive shopping or "repetitive and presumably deliberate" purchases. Compulsive purchasing is not a sensible response for disaster victims; rather, it stems from emotional anguish to ease a deep-seated sense of dread (Sneath et al., 2009).

A perfect storm created by the COVID-19 epidemic led to predictable irrational reactions at supermarkets, mass merchandisers, and even dollar stores. The World Health Organization (WHO), the Centers for Disease Control (CDC), as well as the federal, state, and municipal governments, provided a lot of information that was questionable. Due to the limited availability of virus testing in the early phases of the outbreak, estimates of the rates of spread and the risk of infection were insufficient. Last but not least, the unpredictable nature of the economy—including job instability and decreased income—all contributed to feelings of helplessness that probably drove observed consumer purchase habits (Furman, 2020).

Additional data on consumer trends by mid-May, when the majority of shelter-in-place orders reached their 2-month mark, revealed that COVID-19 both amplified and accelerated pre-existing trends while also reversing some of them. Consumers' readiness to switch between food retail formats was shown by the tendency of channel shifting, which was likely the most obvious at the outbreak's beginning. For years, grocery stores' proportion of consumers' food-at-home (FAH) budgets has been declining while spending shares at mass merchandisers and other atypical formats have been rising [1, 2]. The motivations during COVID-19 that led to agnosticism about different formats were probably influenced by a number of things, including inventory limitations. In this study, we expand on the context of the locations where customers purchased food.

The transition from brick-and-mortar to online pick-up and delivery was another consistently noted pattern during the stay-at-home period [1]. By the end of March 2020, new restrictions rendered physical store shopping unfavourable. Shopping in-store was not only regarded as high risk, but there were also extra limits put in place by the shops themselves or by local laws, making it very challenging to visit a single store and find it completely stocked. Customers started using internet services as a result. Fulfilment and distribution centres became overburdened as demand for online food orders soared. Delivery times were in limited supply, and delivery delays were to be expected, forcing market players like Amazon, fulfilled by Whole Foods, to discontinue some services [2, 3].

The demand for products from neighbourhood food merchants, whose mechanisms for completing online purchases hadn't been developed prior to COVID 19, was in sharp contrast. Online grocery sales were predicted to account for 20% of the market by 2025 by Nielsen and the Food Marketing Institute before the epidemic [1]. It's possible that the reallocation of food spending between forms and buying methods was anticipated. However, category migration was one trend that almost reversed. A large decline in sales had been occurring in the "middle of the shop" aisles over the previous five to ten years, while sales of perishable goods like fresh fruit, dairy, and other goods had been rising outside the stores' "perimeter [1-3]." Large food producers responded by starting to broaden their product ranges by either acquiring businesses that produce "Better For You" foods or adding healthier brands. Food retailers were concerned about the declining sales of centre aisle products since they carry larger price markups. Rebranding the centre aisles to cater to the increasing number of health-conscious consumers was therefore a top priority at the retail level.

The main determinants, according to Sindhubairavi S (2019), include aspects of the marketing mix and consumer behaviour considerations. Comparable product categories exist for organic and conventional items. Organic products don't have catchy ads like conventional goods do. Even so, it holds a remarkable place in consumers' thoughts. According to the research, even though organic food goods are more expensive than conventional products, customers are still eager to purchase them. To convince themselves that they are genuinely consuming genuine organic food goods, they are anticipating some promotional strategies and certifications. In the future, organic segmentation will succeed to a large extent if the government provides a helpful hand.

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In her study, Coinciding with the Pandemic, Valeria Borsellino (2020) highlights some global trends that have emerged recently. One of these trends is the resurgence of home cooking, which has increased demand for basic foodstuffs while also giving local retailers and online food shopping preference. Despite price instability and worries about household incomes in the future, a sizeable portion of consumers have switched to purchasing healthier, more sustainable food.

Carlo Russo (2021) examines in this research the immediate and long-term impacts of the COVID-19 epidemic on consumers' decisions to alter their eating routines. Data on changes in food purchases, respondents' moods during the lockdown, conspiracist beliefs, contact with the corona virus, and pre-planned food purchasing behaviour following the lockdown were all gathered for the study. They created measurements of the psychological pressure the COVID-19 emergency placed on customers using the data. They analyse the impact of psychological pressure on the choice of new food purchases using a domestic selection regression model. The analysis identified two diametrically opposed strategies for altering food purchase decisions: impulsive strategy and reflective strategy. The former is associated with a higher likelihood of altering food purchasing but a lower likelihood of maintaining the adjustments over time than the latter. The findings imply a link between the pandemic's psychological pressure and impulsive food purchases. When the crisis is passed, it is therefore anticipated that food purchasing behaviour will return to its pre-COVID 19 state.

III. METHODOLOGY

Convenience sampling is employed to choose respondents for the current study. People who were selected based on convenience received a questionnaire. In Coimbatore city, a sample of 108 respondents who were suitable for the assessment of food consumption behaviour during the pandemic were chosen.

Primary data was gathered from replies from residents of Coimbatore city in order to fulfil the objectives. The respondents had to complete a questionnaire using Google Forms, which was used to collect the primary data. The secondary data was gathered from all relevant sources, including publications, journals, magazines, and websites. Primary data are ones that are recent and are gathered for the first time, and this particular data was unique in nature. The use of data that someone else has collected for their own reasons is referred to as secondary data.

In the current study, simple percentage analysis and the Chi-Square Test were used to analyse the data gathered with the assistance of a questionnaire.

A. Simple Percentage Analysis

One of the most extensively used statistical techniques for analysing and interpreting primary data is percentage analysis. It deals with the percentage of respondents who answered a certain question in the whole population chosen for the study. To compare two or more series, simple percentage analysis is used to determine the % value for each of the several questions. The percentage calculation formula represented by equation (1).

$$Percentage = \frac{value}{total\ value} \times 100 \quad (1)$$

B. Chi-Square Test

A statistical technique called the chi-square test is used to compare actual outcomes with predictions. The goal of this test is to establish if a discrepancy between actual and expected data is the result of chance or a correlation between the variables under investigation. The χ^2 symbol stands for the Chi-Square.

The mathematical formula can be represented by (2).

$$\chi 2 = \frac{\sum(O_i - E_i)^2}{E_i} \quad (2)$$

IV. RESULTS AND DISCUSSION

A. Simple Percentage Analysis

For this survey, a total of 108 responses were collected. The gender diversity of the respondents is depicted in Figure 1. It may be deduced that 1.9% of respondents preferred not to say, 30.6% of respondents are men, and 67.6% of respondents are women. According to the same, the majority of respondents are female.

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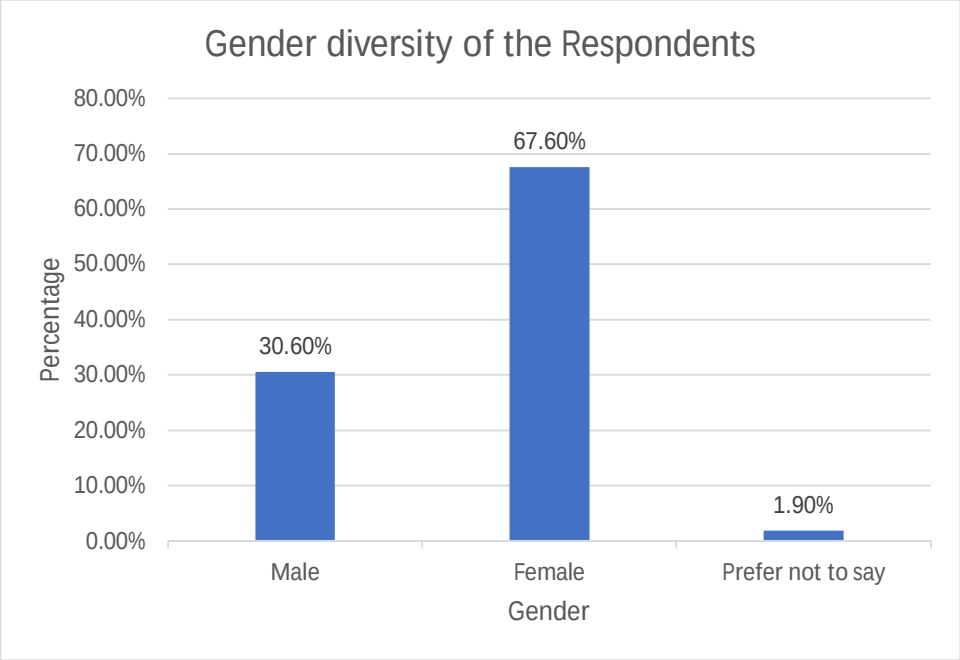


Figure 1: Gender diversity of the Respondents

The chart showing the respondents' age groups is shown in Figure 2. It may be deduced that 12% of respondents are between the ages of 41 and 50, 40.7% are between the ages of 20 and 29, 40.7% are between the ages of 20 and 30, 2.8% are between the ages of 31 and 40, and 3.7% are between the ages of 50 and over. The majority of responses are between the ages of 20 and 30 and are under 20 years old.

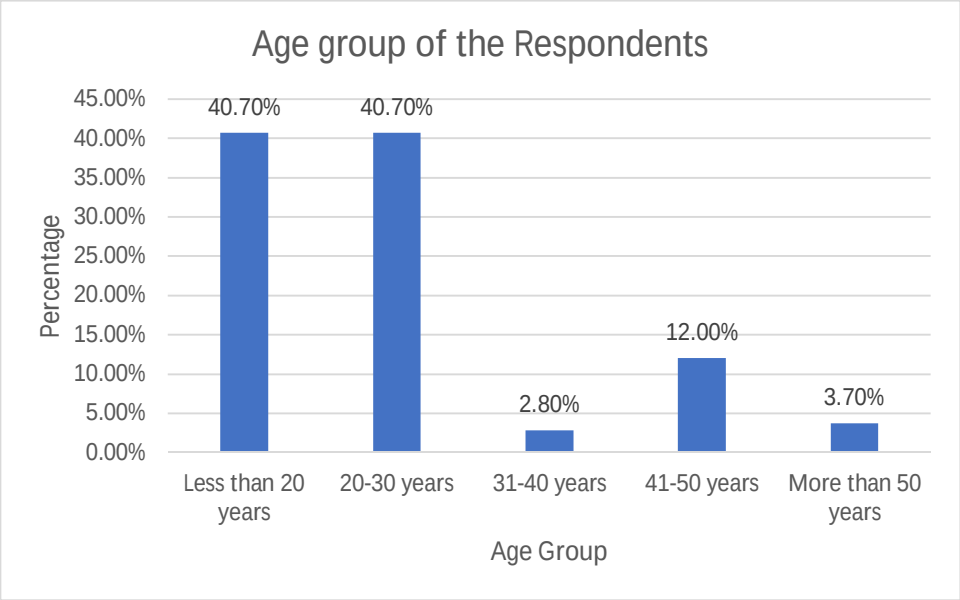


Figure 2: Age group of the respondents

The respondents' family's income is displayed in Figure 3 for comparison. According to the data, 22.2% of respondents' monthly family income is less than Rs. 50,000, 29.6% of respondents' monthly family income is between Rs. 50,000 and Rs. 100,000, and 48.1% of respondents' monthly family income is more than Rs. 100,000. As an outcome, the majority of respondents have a family income of at least Rs. 100,000.

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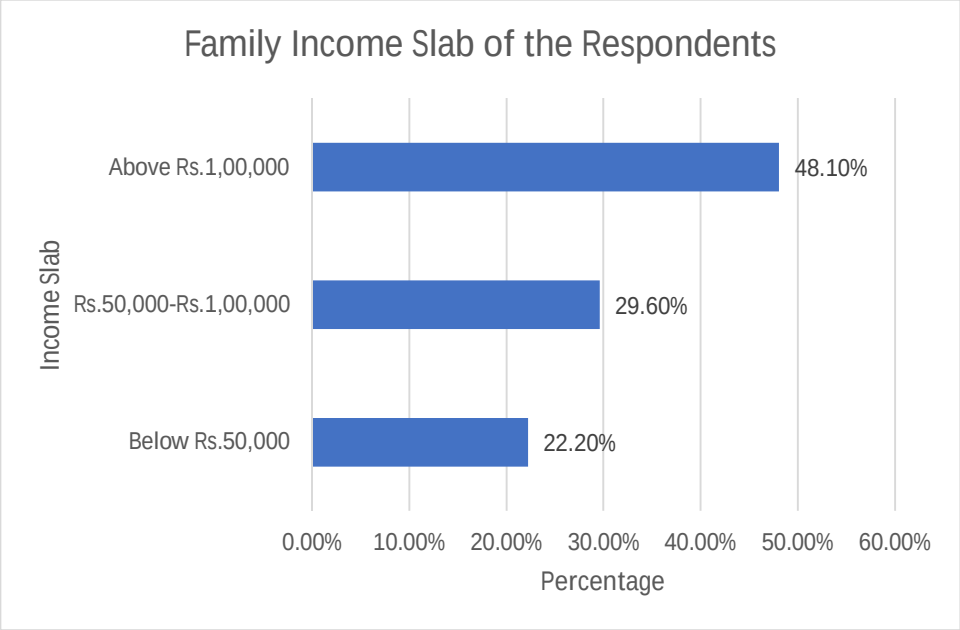


Figure 3: Family income slab of the respondents

Figure 4 represents the number of members in the respondent's family. According to the results, 0.9% of respondents have two family members, 14.8% have three, 56.5% have four, and 27.8% have five or more. Hence, the majority of responders have a family of four.

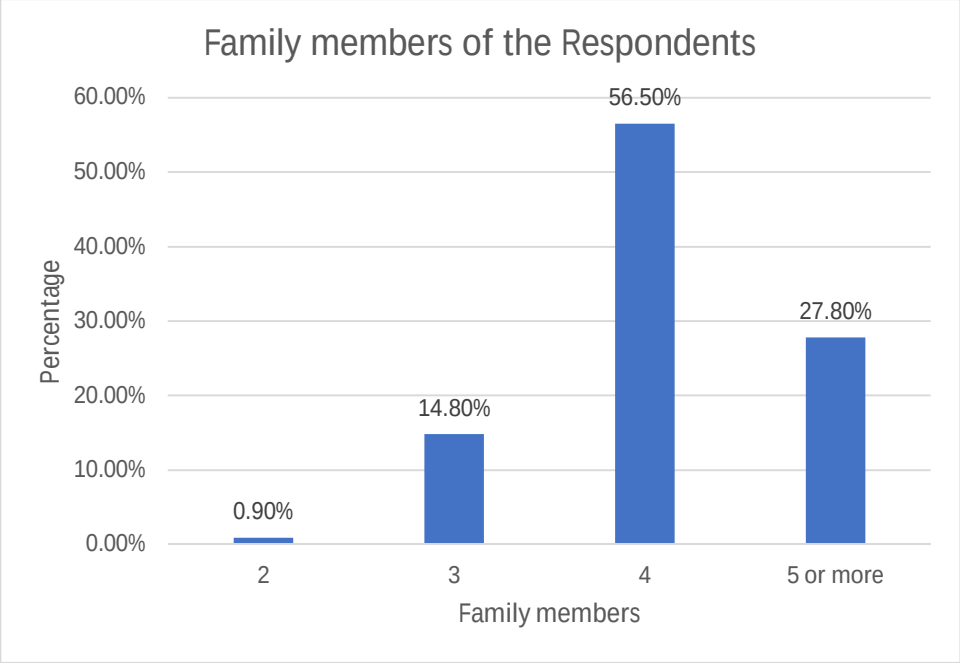


Figure 4: Family members of the respondents

Figure 5 shows the awareness towards consumption of protein rich food in the respondents. It may be inferred that 7.4% of respondents are unaware of the consumption of protein-rich foods, 13% are only somewhat aware, 21.3% are somewhat aware, 38.9% are very aware, and 19.4% are extremely aware. The majority of survey participants have a basic understanding of eating foods high in protein.

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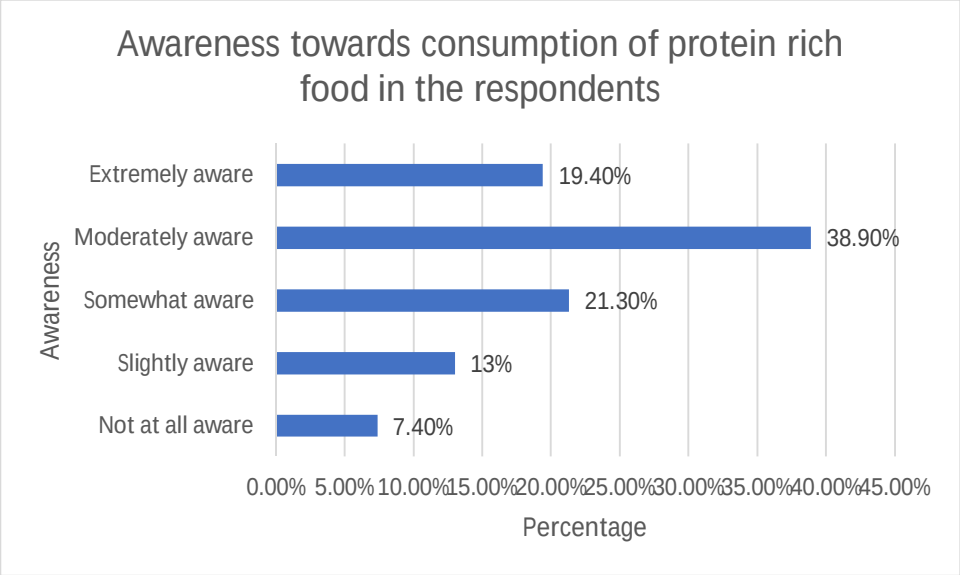


Figure 5: Awareness towards consumption of protein rich food in the respondents

Figure 6 depicts the Frequency of purchase of groceries by the respondents. It may be deduced that 8.3% of respondents buy groceries every day, 38% buy them once per week, 13% buy them twice per week, 6.5% buy them three times per week, 11.1% buy them once per month, and 23.1% buy them only when they are absolutely necessary. The majority of responders make one grocery purchase once a week.

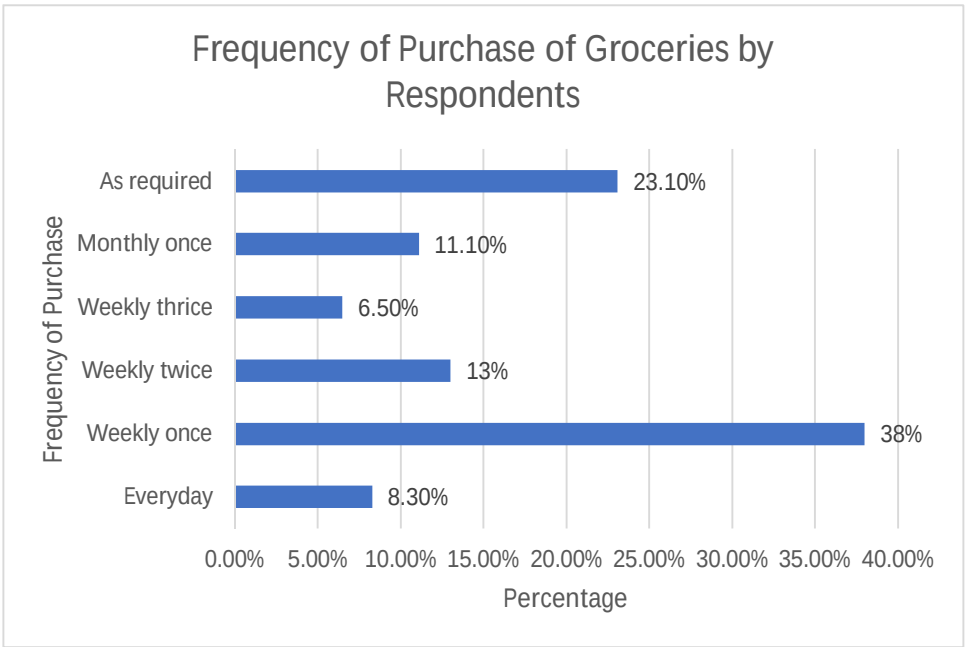


Figure 6: Frequency of purchase of groceries by the respondents

Figure 7 represents the Influence of Certain Factors on Respondents' Purchase of Groceries. The influence on various factors is described here.

1) *Availability of the Product:* It can be interpreted that 9.3% of the respondents found it not at all influential, 26% of the respondents found it slightly influential, 23% of the respondents found it somewhat influential, 26% of the respondents found it very influential and 15.7% of the respondents found it extremely influential.

2) *Price of the Product:* It can be interpreted that 11.1% of the respondents found it not at all influential, 27.7% of the respondents found it slightly influential, 31.4% of the respondents found it somewhat influential, 22.2% of the respondents found it very influential and 7.4% of the respondents found it extremely influential.
3) *Location of the Store:* It can be interpreted that 8.3% of the respondents found it not at all influential, 24% of the respondents found it slightly influential, 26.8% of the respondents found it somewhat influential, 22.2% of the respondents found it very influential and 18.5% of the respondents found it extremely influential.
4) *Promotion of the Product:* It can be interpreted that 17.5% of the respondents found it not at all influential, 39.% of the respondents found it slightly influential, 26.8% of the respondents found it somewhat influential, 10%) of the respondents found it very influential and 5.5% of the respondents found it extremely influential.

Most of the respondents are very influenced by the availability of the product while purchasing products for consumption, 31.4% of the respondents are somewhat influenced by the price of the product, 26.8% of the respondents are somewhat influenced by the location of the store and 39.8% of the respondents are slightly influenced by the promotion of the product.

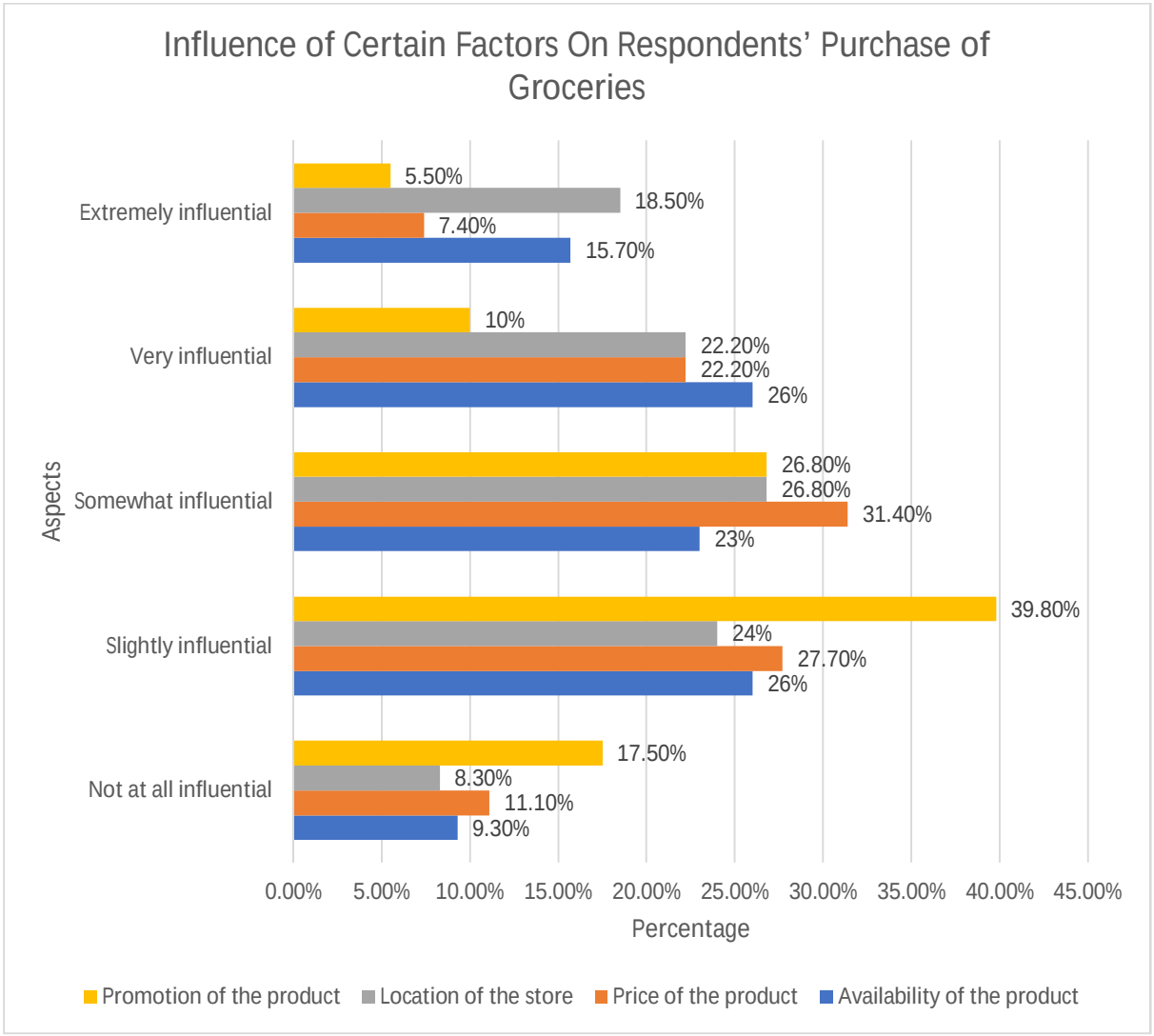


Figure 7: Influence of Certain Factors on Respondents' Purchase of Groceries

Figure 8 shows the chart representation of the respondent's change in diet during the pandemic. It can be concluded that 21.3% of respondents' diets may have changed during the pandemic, 29.6% of respondents' diets did not change during the pandemic, and 49.1% of respondents' diets actually did change. The majority of respondents said that the pandemic changed their diets.

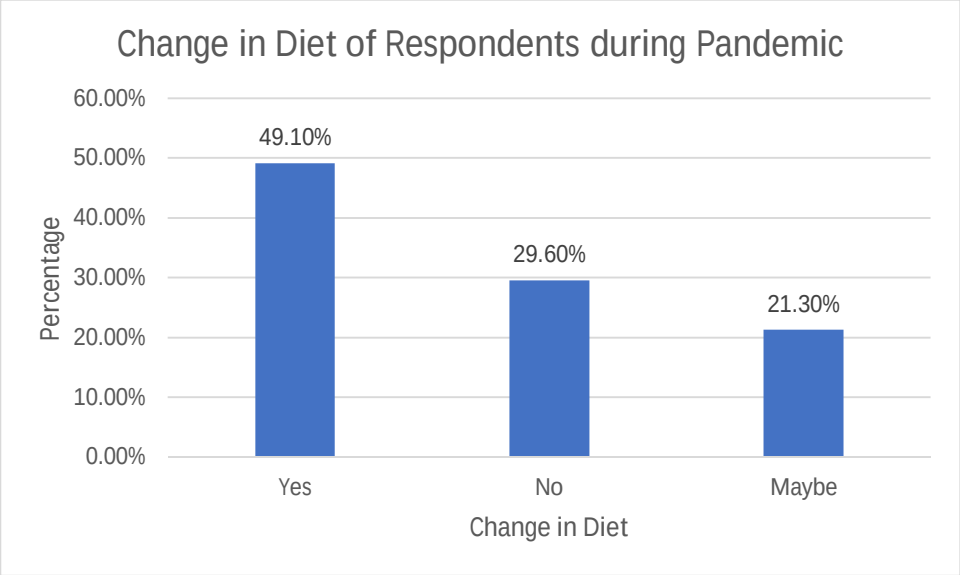


Figure 8: Change in Diet of Respondents during Pandemic

Figure 9 depicts the Comparison of type of foods consumption before and during pandemic. There was significant change observed in type of consumption during and before the pandemic. The fruit consumption increased from 6.50% to 9.30%. The fast-food consumption decreased to 13.90% from 14.80%. The consumption of protein rich food increased to 12% from 6.50%. The dairy consumption decreased to 0.90% from 3.70%.

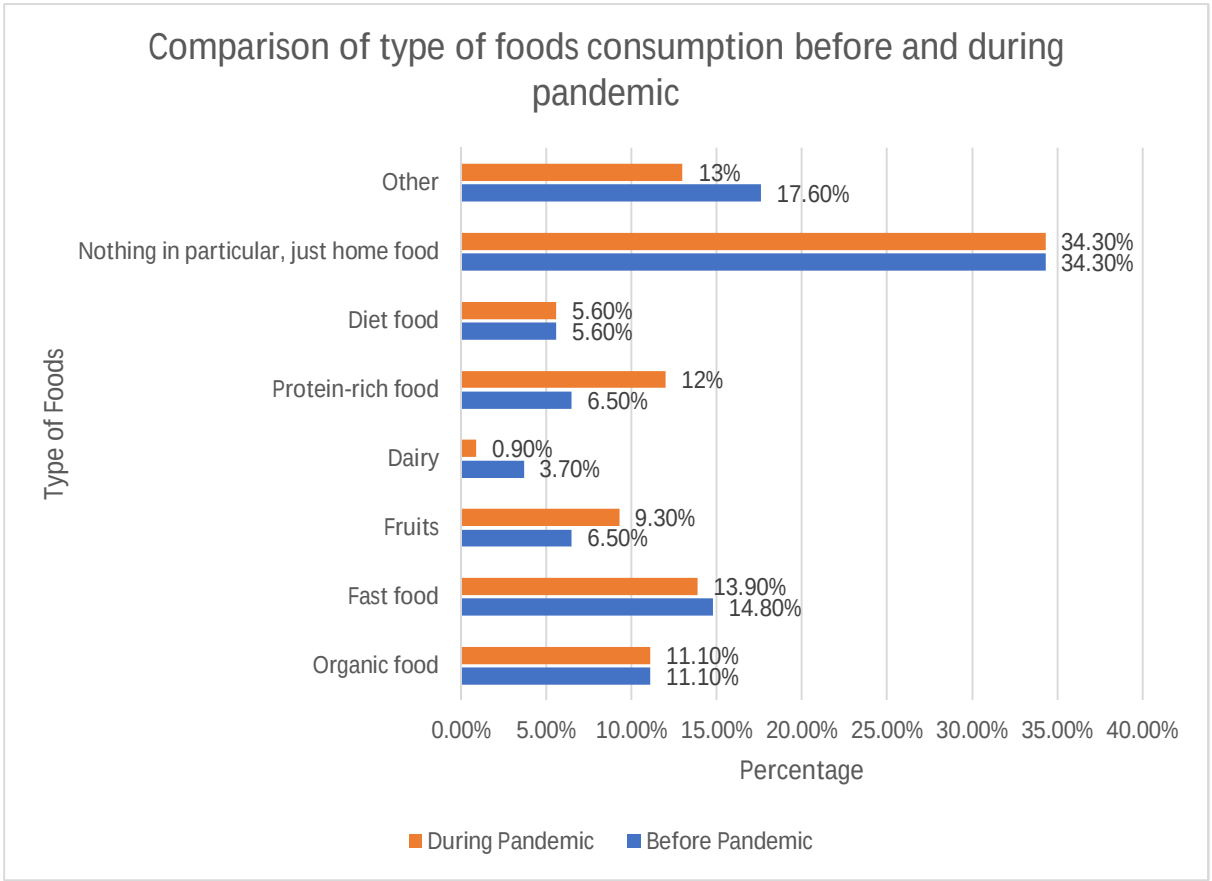


Figure 9: Comparison of type of foods consumption before and during pandemic

Figure 10 shows the Comparison of Consumption of Outside Food by Respondents during and before Pandemic. The consumption of fast food of rarely category increased by 52.80% from 19.40%, never category, increased from 2.80% to 12 %. Whereas, for sometimes category, the number decreased to 26.90% from 52.80%. Overall, it can be concluded that the majority of the person decreased their intake of the fast-food consumption.

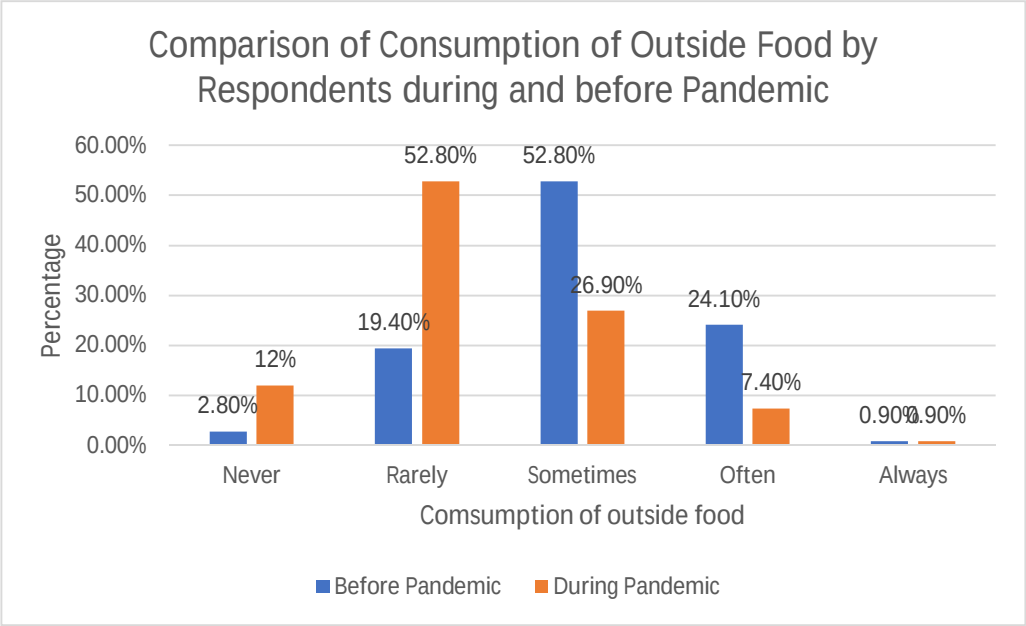


Figure 10: Comparison of Consumption of Outside Food by Respondents during and before Pandemic

Figure 11 depicts Respondents' Grocery Expenses Before and During Pandemic. The expenses increased in 6000-8000 category (3.70% to 7.40%) and 4000-6000 category (13.90% to 20.40%). Whereas for category below 2000, the expenses reduced to 25% from 35.20%.

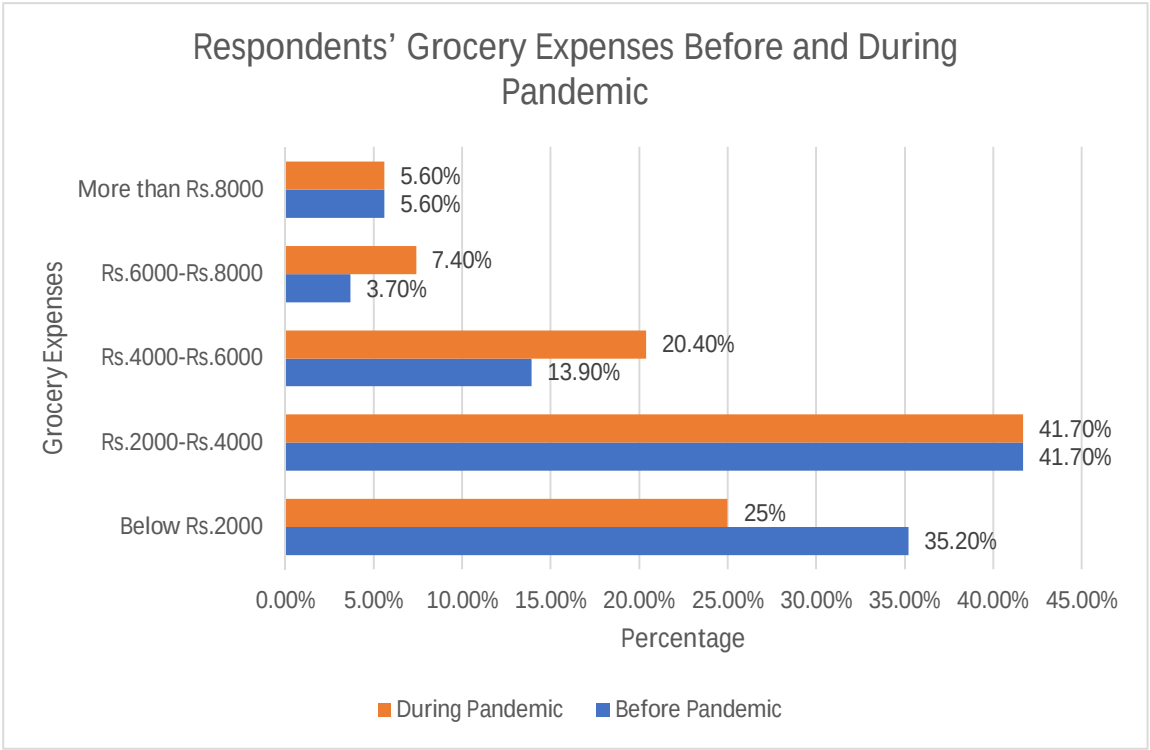
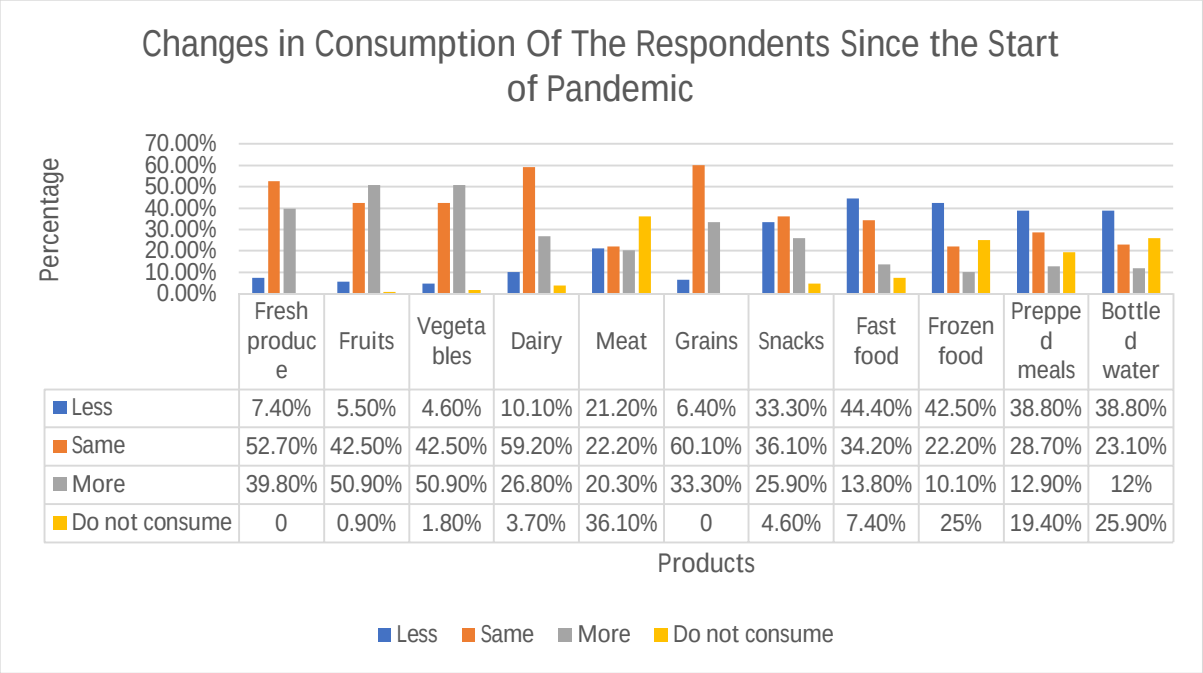


Figure 11: Respondents' Grocery Expenses Before and During Pandemic



	Fresh produce	Fruits	Vegetables	Dairy	Meat	Grains	Snacks	Fast food	Frozen food	Prepped meals	Bottled water
Less	7.40%	5.50%	4.60%	10.10%	21.20%	6.40%	33.30%	44.40%	42.50%	38.80%	38.80%
Same	52.70%	42.50%	42.50%	59.20%	22.20%	60.10%	36.10%	34.20%	22.20%	28.70%	23.10%
More	39.80%	50.90%	50.90%	26.80%	20.30%	33.30%	25.90%	13.80%	10.10%	12.90%	12%
Do not consume	0	0.90%	1.80%	3.70%	36.10%	0	4.60%	7.40%	25%	19.40%	25.90%

Figure 12: Changes in Consumption of The Respondents Since the Start of Pandemic

Figure 12 depicts the changes in consumption of the respondents since the start of pandemic.

5) *Fresh Produce:* It can be said that 52.7% of respondents did not modify their consumption, 39.8% of respondents increased their consumption, and there are no respondents who do not consume. 7.4% of respondents reported consuming less since the start of COVID-19.
6) *Fruits:* It may be deduced that 5.5% of respondents have consumed fewer fruits since the start of COVID-19, 42.5% have not changed their consumption, 50.9% have increased their consumption, and 0.9% have not consumed any fruits at all.
7) *Vegetables:* It may be interpreted that 4.6% of respondents have consumed fewer vegetables since the start of COVID-19, 42.5% have not changed their consumption, 50.9% have increased their consumption, and 1.8% have not consumed any vegetables at all.
8) *Dairy:* It can be deduced that 10.1% of respondents have consumed less dairy since the beginning of the COVID-19, 59.2% have not changed their consumption, 26.8% have consumed more, and 3.7% have not consumed.
9) *Meat:* It can be said that 21.2% of respondents have consumed less meat since the beginning of the COVID-19, 22.2% have not changed their consumption, 20.3% have consumed more, and 36.1% have not consumed.
10) *Grains:* It can be concluded that 6.4% of respondents have consumed less since the beginning of the COVID-19, 60.1% have not changed their consumption, 33.3% have consumed more, and there are no respondents who have not consumed.
11) *Snacks:* According to the results, 33.3% of respondents have cut back on their snacking since the start of COVID-19, 36.1% haven't changed their snacking habits, 25.9% have increased their snacking, and 4.6% have stopped altogether.
12) *Fast Food:* It can be interpreted that 44.4% of respondents have decreased their consumption since the beginning of COVID-19, 34.2% have not changed their consumption, 13.8% have increased their consumption, and 7.4% have not changed their consumption at all.
13) *Frozen Food:* According to the results, 42.5% of respondents have cut back on their intake since the start of COVID-19, 22.2% haven't changed their consumption, 10.1% have increased it, and 25% have stopped altogether.
14) *Prepped Meals:* Based to the results, 12.9% of respondents have increased their intake since the start of COVID-19, 38.8% of respondents have decreased their consumption, 28.7% have not changed their consumption, and 19.4% have stopped consuming altogether.
15) *Bottled Water:* It can be deduced that 12% of respondents have increased their usage, 23.1% haven't changed their consumption since the beginning of COVID-19, and 25.9% haven't changed their consumption at all.

Since the beginning of COVID-19, the majority of respondents have consumed the same amount of fresh produce, while 50.9% have increased their intake of fruits and vegetables, 59.2% have maintained their dairy intake, 36.1% have decreased their consumption of meat, 60.1% have maintained their intake of grains, and 36.1% have maintained their intake of snacks. Fast food consumption has decreased for 44.4% of respondents, frozen food consumption has decreased for 42.5% of respondents, prepared meals have decreased for 38.8% of respondents, and bottled water consumption has decreased for 38.8% of respondents.

B. CHI Square Test (Bivariate Analysis)

The comparison between age and preferred food since the start of pandemic has been performed in the present sub-section. The hypothesis were considered as the following.

- H_o: There is no significant relationship between age and preferred food since the start of pandemic.
- H_1: There is a significant relationship between age and preferred food since the start of pandemic.

Table 1: Comparison between age and preferred food since the start of pandemic

Age	Preferred food since the start of pandemic								
	Organic food	Fast food	Fruits	Dairy	Protein rich food	Diet food	Home food	Other	Total
Less than 20 years	7	7	4	1	4	1	12	6	42
20-30 years	2	7	7	0	7	3	15	5	46
31-40 years	1	0	0	0	1	0	1	0	3
41-50 years	1	1	0	0	0	2	7	2	13
Above 50 years	1	1	0	0	1	0	1	0	4
Total	12	16	11	1	13	6	36	13	108

The degree of freedom is evaluated from equation (3) and obtained as 28. The level of significance is obtained as 0.5 from equation (4).

$$Degree\ of\ Freedom = (Row - 1)(Column - 1) \quad (3)$$

$$Expected\ value\ (E) = \frac{Row\ total \times Column\ total}{Grand\ total} \quad (4)$$

Since the pandemic began, there has been no discernible correlation between age and preferred foods, therefore the null hypothesis is accepted.

Table 2: Test Statistic

Observed value (O)	Expected value (E)	O-E	$(O-E)^2$	$(O-E)^2/E$
7	4.6	2.4	5.76	1.25
7	6.2	0.8	0.64	0.10
4	4.2	-0.2	0.04	0.009
1	0.3	0.7	0.49	1.6
4	5.05	-1.05	1.1025	0.21
1	2.3	-1.3	1.69	0.73
12	14	-2	4	0.28
6	5.05	0.95	0.9025	0.17
2	5.1	-3.1	9.61	1.8
7	6.8	0.2	0.04	0.005
7	4.6	2.4	5.76	1.25
7	5.5	1.5	2.25	0.40
3	2.5	0.5	0.25	0.1
15	15.3	-0.3	0.09	0.005
5	5.5	-0.5	0.25	0.04
1	0.33	0.67	0.4489	1.36
1	0.36	0.64	0.4096	1.13
1	1	0	0	0
1	1.4	-0.4	0.16	0.11
1	1.9	-0.9	0.81	0.42
2	0.72	1.28	1.6384	2.27
7	4.3	2.7	7.29	1.69
2	2.7	0.3	0.09	0.03
1	0.44	0.56	0.3136	0.71
1	0.59	0.41	0.1681	0.28
1	0.48	0.52	0.2704	0.56
1	1.3	-0.3	0.09	0.06
Total$\sum$(O-E)2/E= 16.569				

Table 2 demonstrates the test statistic of the study. Test statistic follows chi-square distribution with (5-1) (8-1) = 28 degree of freedom (df). Therefore, critical value or table value at 5% level of significance is 41.337. Since, the computed value of test statistic (16.569) is smaller than the critical value (41.337) we accept the null hypothesis and hence there is no significant relationship between age and preferred food since the start of pandemic.

V. CONCLUSION

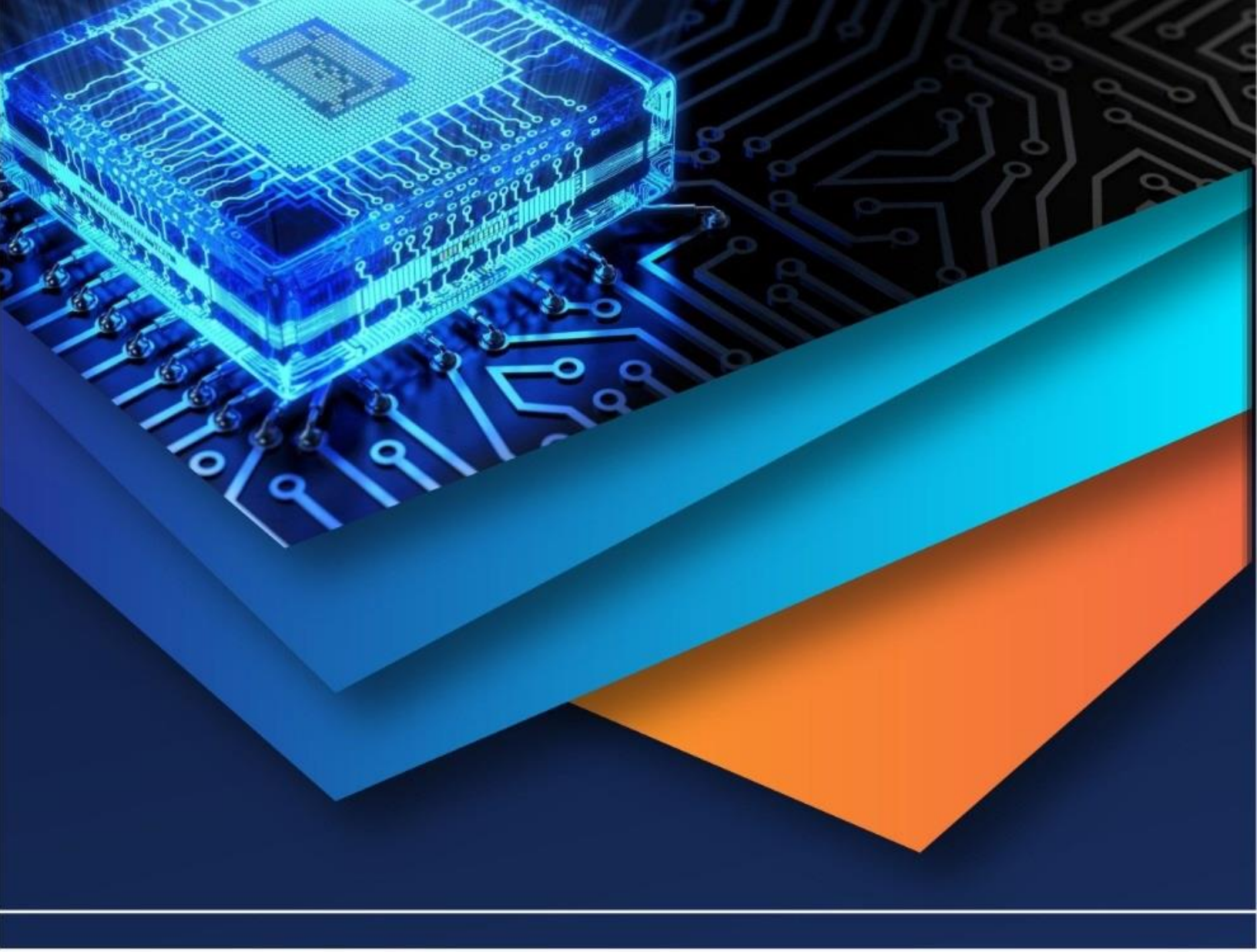
As the consumption of outside food has decreased from before the pandemic, Coimbatore residents are now more aware of the need to consume protein-rich foods and have grown even more selective about the foods they eat both before and after the COVID outbreak. The expense of groceries has not changed significantly between before and after the COVID, though, with an increase in the consumption of fresh produce—especially fruits and vegetables—the consumption of outside food has somewhat decreased from before the pandemic, however, the consumption of meat—has increased, which is not recommended during the pandemic according to good food safety practices. With the aid of this study, it is now evident that the majority of Coimbatore residents are taking the global issue more seriously and are also acting appropriately to maintain their health and exercise caution in order to live better.

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