

Impact On Dietary Pattern Of Raipur City's Population During COVID-19 Pandemic

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ABSTRACT

This paper focuses on impact on dietary pattern that occurred during the COVID-19 pandemic among Raipur city's population. Eating pattern is a complex construct that is liable to be modified by external factors. During the outbreak of corona disease 2019(COVID-19), many restrictive measures were carried out with the aim of reducing the impact of the disease. **Aim:** Aim of this paper is to explore eating habits changes during the COVID-19 pandemic. **Method:** A cross-sectional study was conducted using a self-administered schedule from the 9 January 2022 to 21 July 2022. The survey questions were adapted from the tick based questionnaire, food frequency questionnaire. A total number of 1000 participants completed the questionnaire. Data were collected using face to face interview techniques and were entered and analysed by using a statistical package for the social science version 24. **Results:** The survey examined food habits, food frequency and dietary intakes shows that impact on dietary pattern of Raipur city's populations. The impact on dietary pattern during COVID-19 differed from community to community. **Conclusion:** in general, this study indicates impacts on dietary pattern during COVID-19 pandemic. It is important that the government considers the need for nutrition education programmes and campaigns particularly during this critical period of the pandemic in Raipur city.

Key words: Dietary pattern, impact, COVID-19 pandemic,

Introduction: As we know what we eat what we become. Food is key to personal health as well as to the health of the planet given that current patterns of food production and consumption have considerable environment impacts. In India it was supposed that in December 2019, WHO declared COVID-9 a global health emergency due to the exponential growth of cases in China and other countries of the world. The 2019 Coronavirus Disease or as it is now called COVID-19, is a severe acute respiratory syndrome caused by SARS Corona Virus (SARS-COV-2). COVID-19 apparently transit from animals to humans at the Human seafood market and rapidly spread from Wuhan city of Hubei province of china, to the rest of the world. Due to growing case notification rates in international locations, on the 30th January 2020, the WHO Emergency committee declared a global health emergency.

After COVID-19 emerged some of our thoughts and behaviours around eating do appear changed. Since the pandemic outbreaks people plan to eat more healthy diet.

Materials and methods

This is a cross-sectional descriptive study based on a self-administered schedule. This Self-administered schedule was addressed to the Raipur (C.G.) population (Over 18 years of age). In this study total 1000 respondents were included (based on their work group). The study comprised a structural schedule Annexure that inquired demographic Information[Name, Age, Gender, Education, Occupation, Family Income, Family Type, Family Member, House, Type of House] Anthropometric Measurements[Height, Weight, BMI, Circumference of waist, Circumference of Hip, WHR], Physical Examination[Eyes, Teeth, Gums, Skin, Hair, Nails, Lips] physical health problem[constipation, sugar, B.P Stomach-ache, Joint-pain, Deficiency of Vitamin-D, Deficiency of calcium, amoebiasis] Mental health problem [depression, stress, fatigue] dietary management [vegetarian, Non-vegetarian, Eggetarian], food frequency- once in a day, twice in a day, thrice in a day, and fourth times in a day, 24 hours recall] lifestyle habits[smoking habits- before and after lock down, sleep pattern- before and after lockdown, physical activity – before and after lockdown]. The survey was conducted from the 9 January 2022 to 21 July 2022. This survey was conducted in Raipur city with help of **GPS test App**. Present survey was conducted in totally agreement with ethical regulation. All participants were totally aware about the study requirements and were required to accept the data sharing and privacy consent form. Data are represented as a number and percentage in parentheses [%] for categorical variables or median.

Result and Discussion

A total number of 1000 respondents have been included in the study, age between 18 to 70 years [Male and Female]. Results carried out an Impact on Dietary Patterns of Raipur city Population during COVID-19 Pandemic.

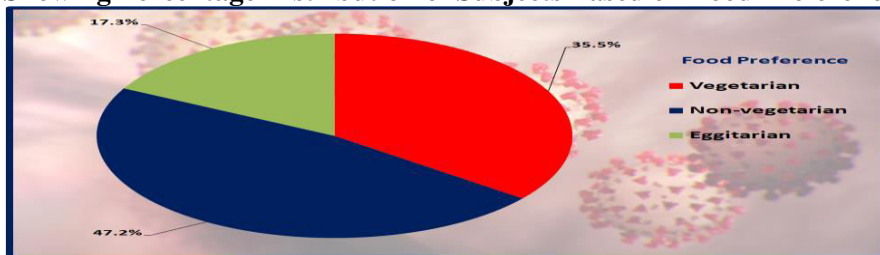
Food habits: A perusal of entries shown in table 1 indicates that during COVID-19, out of the total 1000 subjects 35.5% were vegetarian, 47.2% were non-vegetarian and 17.3% were eggetarians. The food preference of selected subjects is also shown in figure 1.

Food Frequency: Food frequency shows that Table 2 and its data indicate the food frequency of selected subjects during COVID-19. It shows that 17.7% consume food twice a day, 59.1% consume food thrice a day and 23.2% tended to consume food four times a day. Hence the figure -2 shows that majority of the subjects consume food thrice a day which shows that sitting idle during COVID-19 had not resulted in higher food frequency among subjects.

Table No. 1
Distribution of Subjects Based on Food Preference

Food Preference	Number	Percentage (%)
Vegetarian	355	35.5
Non-vegetarian	472	47.2
Eggetarians	173	17.3
Total	1000	100.0

Figure 1
Showing Percentage Distribution of Subjects Based on Food Preference



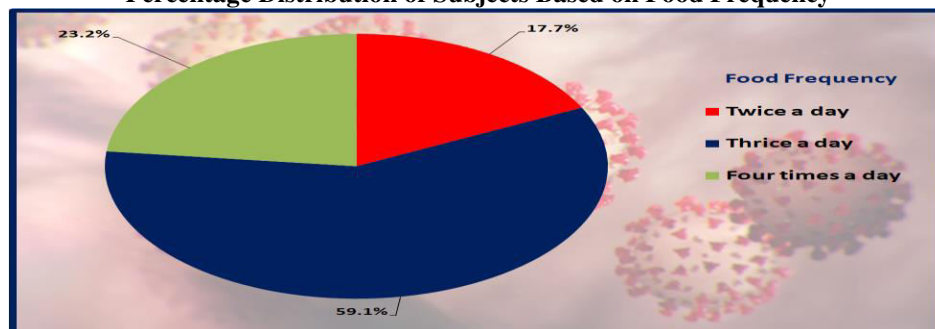
The distribution of subjects based on their food preference is given in table 1.

Table No. 2
Distribution of Subjects Based on Food Frequency

Food Frequency	Number	Percentage (%)
Twice a day	177	17.7
Thrice a day	591	59.1
Four times a day	232	23.2
Total	1000	100.0

$\chi^2 = 304.54, p < .01$

Figure - 2
Percentage Distribution of Subjects Based on Food Frequency



Hence the majority of the subjects consume food thrice a day which shows that sitting idle during COVID-19 had not resulted in higher food frequency among subjects.

Dietary Intake: The dietary intake of selected subjects surveyed during COVID-19 is shown in the following tables. Table-03 showing calories intake in different study groups

Table -03
Assessment of Calories Intake in Different Study Groups

Groups	N	Calorie Intake (Kcal)	
		Mean	S.D.
Students	250	1396.00	302.83
Full time Employed / Business	250	1304.80	323.84
Daily Wages	250	1484.40	317.89
Unemployed / Homemakers	250	1385.68	317.58
F=13.54, p<.01			

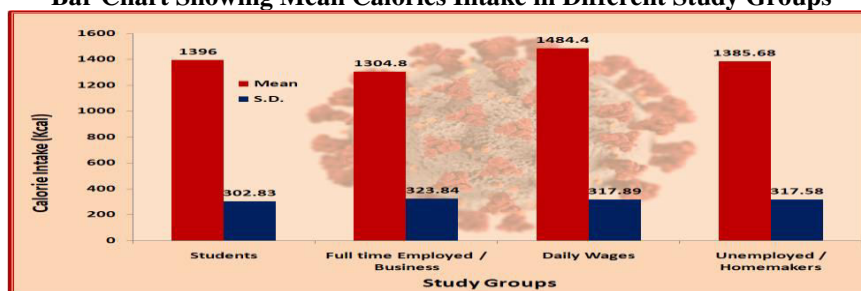
Table -03 (a)
Pairwise Comparisons: Least Significant Difference Test (p>.05)

Mean (I)	Mean (J)	Mean Difference (I-J)
Students	Fully employed / Business	91.20*
	Daily Wages	-88.40*
	Unemployed / Homemakers	10.32
Fully Employed / Business	Daily Wages	-179.60*
	Unemployed / Homemakers	-80.88*
Daily Wages	Unemployed / Homemakers	98.72*

* Significant at .05 level

A perusal of table -03 related to calories intake revealed that the mean calorie intake of group of students was 1396 Kcal during COVID-19, the mean calorie intake of group of fully employed / business oriented subjects was 1304 Kcal, the mean calorie intake of daily wages workers was 1484.40 Kcal and the mean calorie intake of daily wages workers was 1385.69 Kcal respectively. The calculated F=13.54 revealed that the mean calorie intake of four study groups is significantly dissimilar at .01 level of statistical significance.

Figure -03
Bar Chart Showing Mean Calories Intake in Different Study Groups



It was found that the calorie intake of students was significantly higher than that of fully employed subjects or having a business but significantly lower than daily wage workers. The calorie intake of groups comprising students and unemployed subjects did not differ significantly from each other. The calorie intake of subjects who are fully employed or have a business was significantly lower than the daily wage workers and the

unemployed/homemaker group. The calorie intake of daily wage workers was significantly higher than the unemployed/homemakers group.

Table -04 shows protein intake in different study groups.

Table -04
Assessment of Protein Intake in Different Study Groups

Groups	N	Protein Intake (g)	
		Mean	S.D.
Students	250	30.02	4.63
Full time Employed / Business	250	28.18	5.37
Daily Wages	250	31.16	4.46
Unemployed / Homemakers	250	29.77	5.17
F=15.45, p<.01			

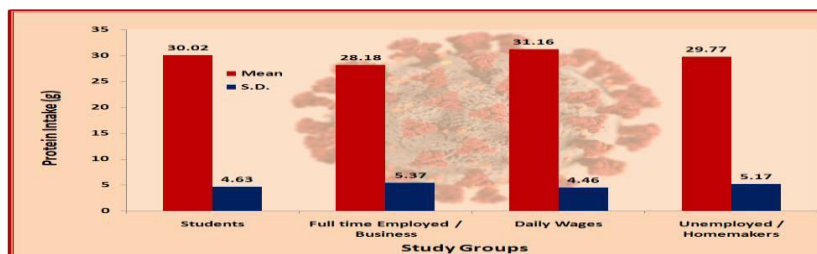
Table -04 (a)
Pairwise Comparisons: Least Significant Difference Test (p>.05)

Mean (I)	Mean (J)	Mean Difference (I-J)
Students	Fully employed / Business	1.84*
	Daily Wages	-1.14*
	Unemployed / Homemakers	0.25
Fully Employed / Business	Daily Wages	-2.98*
	Unemployed / Homemakers	-1.59*
Daily Wages	Unemployed / Homemakers	1.39*

* Significant at .05 level

A perusal of table -04 related to protein intake revealed that the mean protein intake of the group of students was 30.02g during COVID-19, the mean protein intake of the subjects belonging to the group of fully employed / business-oriented was 28.18g, the mean protein intake of daily wages workers was 31.16g and the mean calorie intake of daily wages workers was 29.77g respectively. The calculated F=15.45 revealed that the mean protein intake of four study groups is significantly dissimilar at .01 level of statistical significance.

Figure -04
Bar Chart Showing Mean protein Intake in Different Study Groups



It was also observed that the protein intake in a group of students was significantly higher than the group of subjects who are either fully employed or carrying business but lower than

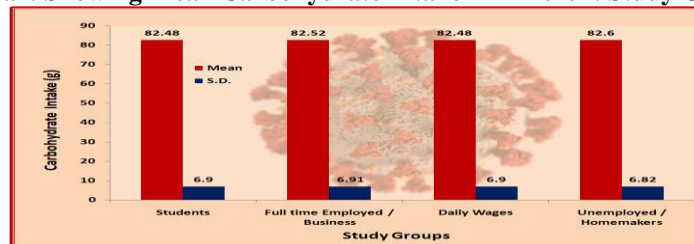
the daily wage workers. The protein intake of students and unemployed / homemakers did not differ significantly from each other.

Table -05 shows carbohydrate intake in different study groups.

Table -05
Assessment of Carbohydrate Intake in Different Study Groups

Groups	N	Carbohydrate Intake (g)	
		Mean	S.D.
Students	250	82.48	6.90
Full time Employed / Business	250	82.52	6.91
Daily Wages	250	82.48	6.90
Unemployed / Homemakers	250	82.60	6.82
F=0.01, p>.05			

Figure -05
Bar Chart Showing Mean Carbohydrate Intake in Different Study Groups



A perusal of table -05 related to carbohydrate intake revealed that the mean carbohydrate intake of the group of students was 82.48g during COVID-19, the mean carbohydrate intake of the group of fully employed / business-oriented subjects was 82.52g, the mean carbohydrate intake of the daily wages workers was 82.48g and the mean calorie intake of daily wages workers was 82.60g respectively. The calculated F=0.01 revealed that the mean carbohydrate intake of the four study groups did not differ significantly at an acceptable level of statistical significance.

Table -05 showing fat intake in different study groups.

Table -05
Assessment of Fat Intake in Different Study Groups

Groups	N	Fat (g)	
		Mean	S.D.
Students	250	15.03	2.28
Full time Employed / Business	250	14.02	2.59
Daily Wages	250	14.17	1.29
Unemployed / Homemakers	250	13.25	2.09
F=29.73, p<.01			

Table -05 (a)

Pairwise Comparisons: Least Significant Difference Test (p>.05)

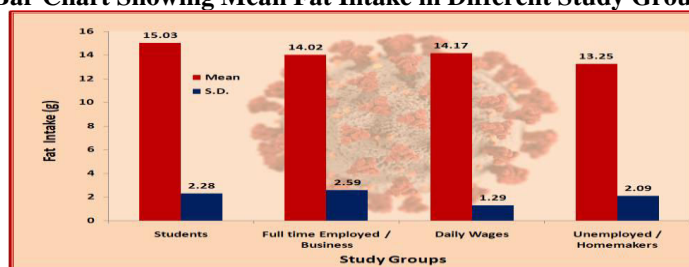
Mean (I)	Mean (J)	Mean Difference (I-J)
Students	Fully employed / Business	1.01*
	Daily Wages	0.86*
	Unemployed / Homemakers	1.78*
Fully Employed / Business	Daily Wages	-.015
	Unemployed / Homemakers	.77*
Daily Wages	Unemployed / Homemakers	.92*

* Significant at .05 level

A perusal of table -05 related to fat intake revealed that the mean fat intake of the group of students was 15.03g during COVID-19, the mean fat intake of the group of fully employed / business-oriented subjects was 14.02g, the mean calorie intake of daily wages workers was 14.17g and the mean fat intake of daily wages workers was 13.25g respectively. The calculated F=29.73 revealed that the mean fat intake of four study groups is significantly dissimilar at .01 level of statistical significance.

Figure -05

Bar Chart Showing Mean Fat Intake in Different Study Groups



It was also observed in table -05 (a) that the fat intake by students was significantly higher than the other three groups consisting of fully employed/business, daily wages and unemployed / homemakers. The fat intake in fully employed / business oriented subjects was found to be significantly higher than unemployed/homemakers but did not differ significantly from the group of daily wages workers. The fat intake in daily wage workers was found to be significantly higher as compared to the group of unemployed/homemaker subjects.

Table -06 shows vitamin C intake in different study groups.

Table -06

Assessment of Vitamin C in Different Study Groups

Groups	N	Vit. C (mg)	
		Mean	S.D.
Students	250	26.45	4.72
Full time Employed / Business	250	26.64	3.81
Daily Wages	250	28.60	2.48
Unemployed / Homemakers	250	27.41	3.17
F=17.89, p<.01			

Table -06 (a)

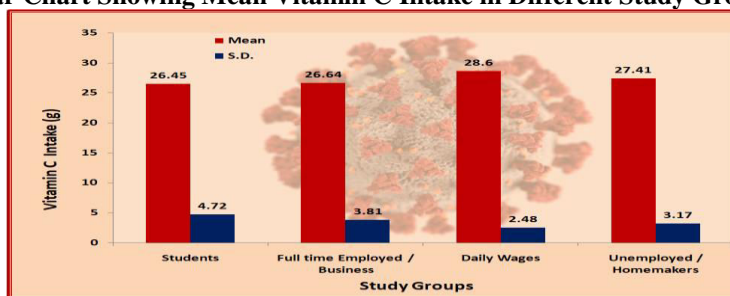
Pairwise Comparisons: Least Significant Difference Test ($p > .05$)

Mean (I)	Mean (J)	Mean Difference (I-J)
Students	Fully employed / Business	-.19
	Daily Wages	-2.15*
	Unemployed / Homemakers	-.96*
Fully Employed / Business	Daily Wages	-1.96*
	Unemployed / Homemakers	-.77*
Daily Wages	Unemployed / Homemakers	1.19*

* Significant at .05 level

A perusal of table -06 related to fat intake revealed that the mean vitamin C intake of the group of students was 26.45g during COVID-19, the mean vitamin C intake of the group of fully employed / business oriented subjects was 26.64g, the mean vitamin C intake of daily wages workers was 28.60g and the mean vitamin C intake of unemployed/homemaker was 27.41g respectively. The calculated $F=17.89$ revealed that the mean vitamin C intake of four study groups is significantly dissimilar at .01 level of statistical significance.

Figure -06
Bar Chart Showing Mean Vitamin C Intake in Different Study Groups



It was also observed in table -06(a) that the mean vitamin C intake was significantly lower in students as compared to daily wages workers and unemployed/homemakers while it was almost the same as in the group of fully employed / business related subjects. The mean vitamin C intake of fully employed subjects was significantly lower than the daily wage workers and unemployed / homemakers. The vitamin C intake of daily wage workers was found to be significantly higher as compared to unemployed / homemakers.

The Mean Adequacy Ratio is used to analyse individual intake of nutrients. The overall nutritional adequacy can be determined by MAR (Hatloy et al., 1998). The MAR is based on NAR which is called the Nutritional Adequacy Ratio. It is determined by obtaining an adequacy ratio by capping the values to 1. The NAR is based on dividing actual intake with RDA classified according to age, sex, physical activity status etc. In the present study 2020 RDA was used.

The MAR is reported on a scale from 0 to 100% (or 1), where 100% (or 1) indicates the requirements for all the nutrients were met.

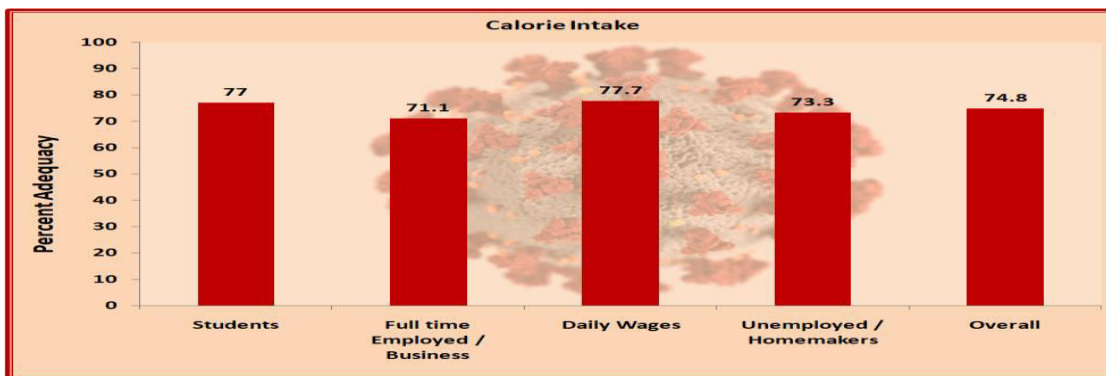
In table -07, the mean adequacy ratio of dietary intake is given.

Table -07
Assessment of Nutritive Adequacy Ratio of Dietary Intake in Study Groups

Groups	N	Nutritive Adequacy Ratio				
		Calorie	Protein	Carbohydrate	Fat	Vit.C
Students	250	0.770	0.78	0.624	0.704	0.469
Full time Employed / Business	250	0.711	0.746	0.625	0.649	0.482
Daily Wages	250	0.777	0.779	0.624	0.648	0.484
Unemployed / Homemakers	250	0.733	0.758	0.626	0.610	0.491
		F=15.38, p<.01	F=5.93, p<.01	F=0.01, p>.05	F=23.33, p<.01	F=1.94, p>.05

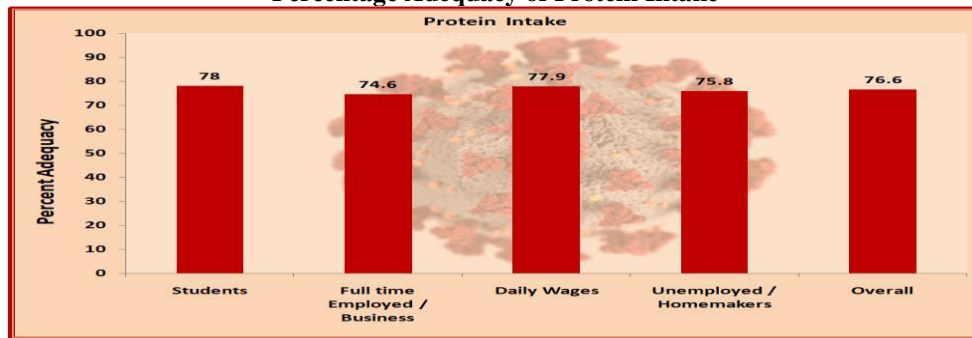
The analysis of the nutritive adequacy ratio for dietary intake gives the following facts:
 The overall percentage adequacy ratio for calorie intake was 0.748 i.e. 74.8%. The mean adequacy ratio for the group of students was 0.771 i.e. percentage adequacy for calorie intake was 77.1%. The mean adequacy ratio for the group of full time employed / subjects with their own business was 0.711 i.e. percentage adequacy for calorie intake was 71.1%. The mean adequacy ratio for the group of daily wage workers was 0.777 i.e. percentage adequacy for calorie intake was 77.7%. The mean adequacy ratio for the group of unemployed/homemaker subjects was 0.733 i.e. percentage adequacy for calorie intake was 73.3%. The F=15.38 revealed that the percentage adequacy for calorie intake was lowest in a group labelled as fully employed / business while it was highest in the group of daily wage workers.

Figure -07
Percentage Adequacy of Calorie Intake



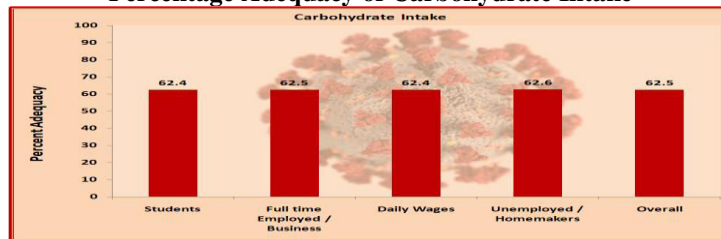
The overall percentage adequacy ratio for protein intake was 0.766 i.e. 76.6%. The mean adequacy ratio for the group of students was 0.78 i.e. percentage adequacy for protein intake was 78%. The mean adequacy ratio for the group of full time employed and subjects with their own business was 0.746 i.e. percentage adequacy for protein intake was 74.6%. The mean adequacy ratio for the group of daily wage workers was 0.779 i.e. percentage adequacy for protein intake was 77.9%. The mean adequacy ratio for the group of unemployed/homemaker subjects was 0.758 i.e. percentage adequacy for protein intake was 75.8%. The F=5.93 revealed that the percentage adequacy for protein intake was lowest in a group labelled as fully employed / business while it was highest in group of students.

Figure -08
Percentage Adequacy of Protein Intake



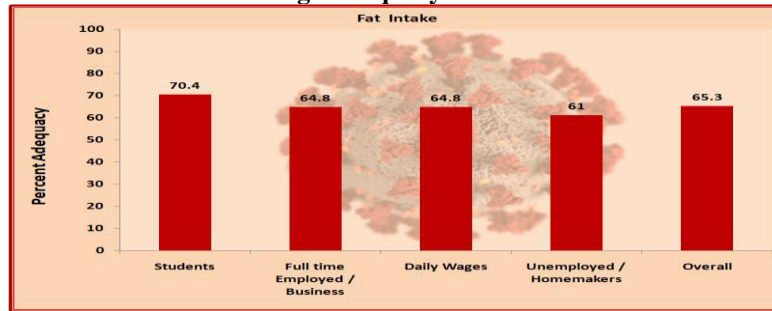
The overall percentage adequacy ratio for carbohydrate intake was 0.625 i.e. 62.5%. The mean adequacy ratio for the group of students was 0.624 i.e. percentage adequacy for carbohydrate intake was 62.4%. The mean adequacy ratio for the group of full time employed and subjects with their own business was 0.625 i.e. percentage adequacy for carbohydrate intake was 62.5%. The mean adequacy ratio for the group of daily wage workers was 0.624 i.e. percentage adequacy for carbohydrate intake was 62.4%. The mean adequacy ratio for the group of unemployed/homemaker subjects was 0.626 i.e. percentage adequacy for carbohydrate intake was 62.6%. The $F=0.01$ revealed no significant difference in percentage adequacy for carbohydrate intake in different study groups.

Figure -09
Percentage Adequacy of Carbohydrate Intake



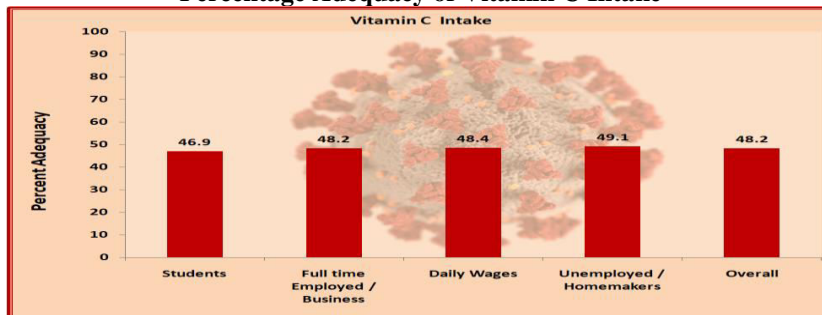
The overall percentage adequacy ratio for fat intake was 0.653 i.e. 65.3%. The mean adequacy ratio for the group of students was 0.704 i.e. percentage adequacy for protein intake was 70.4%. The mean adequacy ratio for the group of full time employed and subjects with their own business was 0.649 i.e. percentage adequacy for fat intake was 64.9%. The mean adequacy ratio for the group of daily wage workers was 0.648 i.e. percentage adequacy for fat intake was 64.8%. The mean adequacy ratio for the group of unemployed/homemaker subjects was 0.610 i.e. percentage adequacy for fat intake was 61%. The $F=23.33$ revealed that the percentage adequacy for fat intake was lowest in a group labelled as unemployed/homemakers while it was highest in a group of student.

Figure -09
Percentage Adequacy of Fat Intake



The overall percentage adequacy ratio for vitamin C intake was 0.482 i.e. 48.2%. The mean adequacy ratio for the group of students was 0.469 i.e. percentage adequacy for vitamin C intake was 46.9%. The mean adequacy ratio for the group of full time employed / business-oriented subjects with their own business was 0.482 i.e. percentage adequacy for carbohydrate intake was 48.2%. The mean adequacy ratio for a group of daily wage workers was 0.484 i.e. percentage adequacy for carbohydrate intake was 48.4%. The mean adequacy ratio for the group of unemployed/homemaker subjects was 0.491 i.e. percentage adequacy for protein intake was 49.1%. The $F=1.94$ revealed no significant difference in percentage adequacy for vitamin C intake in different study groups.

Figure -09
Percentage Adequacy of Vitamin C Intake



The calculations of MAR (Mean Adequacy Ratio) are presented in table -09.

Table -10
Comparison of Adequacy Ratio in Different Study Groups

Groups	N	Adequacy Ratio	
		Mean	S.D.
Students	250	.67	0.06
Full time Employed / Business	250	.64	0.08
Daily Wages	250	.66	0.06
Unemployed / Homemakers	250	.63	0.07
$F=12.01, p<.01$			

Table -10 (a)

Pairwise Comparisons: Least Significant Difference Test (p>.05)

Mean (I)	Mean (J)	Mean Difference (I-J)
Students	Fully employed / Business	0.03*
	Daily Wages	0.01
	Unemployed / Homemakers	0.04*
Fully Employed / Business	Daily Wages	-0.02*
	Unemployed / Homemakers	0.01
Daily Wages	Unemployed / Homemakers	0.03*

* Significant at .05 level

A perusal of table 10 related to the Mean Adequacy Ratio (MAR) revealed that the mean adequacy ratio intake of the group of students was .67 during COVID-19, the mean adequacy ratio of the group of fully employed / business-oriented subjects was .64, the mean adequacy ratio of daily wages workers was .66 and the mean adequacy ratio of unemployed/homemaker was .63 respectively. The calculated F=12.01 revealed that the mean adequacy ratio of the four study groups is significantly dissimilar at .01 level of statistical significance. It was observed that the mean adequacy ratio was highest in the group of students (67%) followed by the group of daily wages workers (66%), the group of fully employed / business (64%) and lastly in the group of unemployed / homemakers (63%). The Mean Adequacy Ratio (MAR) is a member of the class of indicators that are used to evaluate individual intake of nutrients. This index quantifies the overall nutritional adequacy of a population based on an individual's diet using the current recommended allowance for a group of nutrients of interest (Hatloy et al., 1998 [1]). It was first developed in the 1970s as a way to evaluate the effectiveness of food stamps in rural Pennsylvania (Madden & Yoder, 1972 [2]). Hatloy et al. (1998). "Food variety? a good indicator of nutritional adequacy of the diet? A case study from an urban area in Mali, West Africa" [22]. The MAR is based on the Nutrient Adequacy Ratio (NAR), a measure that expresses an individual's intake of a nutrient as a percentage (capped at 100%) of the corresponding recommended allowance for that nutrient, given the respondent's age and sex. The MAR is then calculated by averaging the NAR. The other indicators in the platform that measure individual nutrient intake include: total macronutrient intake [3], probability of inadequate intake [4], total individual micronutrient intake [5], and total individual energy intake [6]. Rather than quantifying caloric intake, the MAR scales data on total nutrient intake to derive a comprehensive indicator of overall dietary adequacy, although it does not capture issues related to overconsumption or under-consumption. The first step to estimate the MAR is to estimate the NAR for all nutrients of interest. The NAR is equal to the ratio of an individual's nutrient intake to the current recommended allowance of the nutrient for his or her age and sex, and can be represented as a ratio or as a percentage. In the United States, this recommended allowance is referred to as the Recommended Dietary Allowance (RDA), whereas in many other countries, it is referred to as the Recommended Nutrient Intake (RNI). Once the NAR is calculated for each nutrient, the MAR is calculated by averaging all the NAR values together, as demonstrated in the equation below: The MAR is reported on a scale from 0 to 100% (or 1), where 100% (or 1) indicates the requirements for all the nutrients were met.

Limitation of the study: since it was cross-sectional study design, it did not display the conditions of cause and effect association. In addition, the study was limited to the Raipur city, which may not be representative of the rural area.

Conclusion: The current study demonstrates that there is a noticeable alteration in food consumption, food choices, and regular mealtime. During the pandemic some people returning to home meals and reducing fast food consumption. Consuming foods that support the immune system, planning times to eat meals, portions, having positive thoughts can help to cope with negative health effects during COVID-19 pandemic.

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