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Student food selection behaviour after returning to face-to-face classes

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Abstract

The pandemic raised awareness about the consumption of healthy and high- quality food which was practiced at home leaving aside the consumption of "junk food" but students are returning to the consumption of these unhealthy foods in university. The objective of this research is to describe and analyze the behavior of students in the selection of their food (good and bad for health) after returning to school. The methodology applied is descriptive, correlational and predictive of a cross-sectional quantitative type in which 765 students participated anonymously and voluntarily in an online survey. Results. A low level of consumption of "good" foods was found while the consumption of "bad" foods is growing daily. Conclusion. " Good" food is only eaten at home while "bad" food is eaten everywhere A policy of selling healthy food should be implemented. If these foods are not regulated, there is a tendency to have an overweight university student population in the future.

Keywords: Anxiety, College students, Eating habits, Healthy eating, Junk food, Obesity, Post COVID -19, Student behavior.

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1. Introduction

Students are motivated to change their eating habits by the epistemology and educational messages they receive from their training environment [1] while in rural areas, there is usually little research on the benefits that can be obtained by supplementing the diet with milk, eggs and foods provided by nature itself that are not taken advantage of, this type of supplementation could give great results both in the physical development of students and in their cognitive development [2]. It has been found that people with normal body weight consume more dietary fiber and vegetables than those who are overweight or obese [3].

In the last decade, there has been a significant increase in the number of high school students who suffer from diseases resulting from a diet low in nutrients. This rise has been attributed to students' lack of knowledge about balanced nutrition and poor eating habits [4]. Healthy eating programs within schools give very favorable results with significant effects as they help students improve their eating habits in their daily lives by encouraging them to consume healthy and nutritious foods [5]. Experts with excellent professional training are required for student nutrition programs to be successful and to achieve this type of professionals, it is necessary to consider various factors that can help to have better results and requirements according to the geographical area [6].

There is a relationship between obesity and school meals due to the existence of fast food and unbalanced food stores around educational institutions [7]. So, doctors around the world are encouraged to provide care and nutritional information to their patients in order to ensure people develop better eating habits because a lack of nutritional education can lead to various health problems [8]. The canteen service is very important in many schools with the sole purpose of combating hunger in students, but due to the limited rations, it is not able to cover all students [9] and during the COVID-19 pandemic, there were changes in the diet of most students with the main factors that influenced the change being the selection of available and easily accessible food [10].

Schools should become centers of balanced nutrition because there are unhealthy foods that still contain sugar that are harmful to students' health [11]. Despite the fact that the presence of free meals for students that contribute having positive effects on students' health, i.e. the student canteen that offers free lunch has shown better results in terms of improving the students' health as well as in their academic performance. Additionally, it was also shown that the free student canteen service aided low-income families [12]. There are standard programs to improve the nutrition of low-income students that have received significant scores as healthy food for the development of energy intake and diet quality within students [13]. University students suffer from diseases due to the consumption of non-nutritious food. This pandemic affected more people with chronic diseases. Research examined the importance of the nutritional value of food sold concluded that the nutrition of the population and especially students should be improved [14].

There are impact programs that suggest selecting correct food preparation for students in educational institutions [15], because the current poor nutrition is due to a lack of nutritional knowledge and the intake of micronutrients in excess of substances that lead to obesity [16]. To avoid these consequences young people from low economic schools form clubs to spread knowledge about good nutrition through educational programs [17]. Since consuming nutrients will help young people have a good diet while avoiding the consumption of foods that are harmful to health such as excessive consumption of alcohol, cigarettes and food with excess preservatives [18].

Students who travel and study abroad become overweight due to poor diet and lack of adequate and balanced information, Mohammed, et al. [19] finding that the majority of students consume cheap food and as a result start to suffer from chronic diseases [20], as food is very important, there should be a training plan to teach the basics about the importance and raise awareness of the consumption of healthy food for health [21]. There are meals (breakfast and lunch) that are offered with the only purpose of improving the nutritional quality of students in order to have a better academic performance and an impact on the student [22] i.e. good nutrition prevents diseases such as diabetes, blood pressure, obesity and overweight [23]. Poor nutrition is a common problem in the population so teachers should be trained to guide and prevent diseases due to poor nutrition [24]. It is necessary to identify the main factors to advise a healthy lifestyle [25].

1.1. Justification and Objectives of the Study

The COVID -19 pandemic has led to changes in routine and behavioral changes at the societal level, especially in eating. One of many changes is clearly reflected in the eating habits of post-pandemic university students. This research is developed in the Peruvian environment, especially in post-pandemic university students from different areas of the natural sciences, engineering and literature. Through this research, we will analyze student behavior in the selection of post pandemic eating habits. This study also aims to contribute more scientific knowledge about eating a healthy diet during pandemic and post pandemic in a Peruvian context. Based on these realities, we have set the following specific objectives:

- To identify the frequency and mean of students' assessment of the foods consumed by Peruvian university students in relation to a healthy diet.
- To determine the relationship between the research elements and the perception of food consumption in Peruvian university's students post pandemic.

2. Methodology

The research method to be developed is descriptive, correlational and predictive. This research is quantitative in nature.

2.1. Sample

This study has selected a sample of university students from the Universidad Nacional de Frontera who were confined to their homes due to the pandemic for more than two years but by order of the Peruvian State, they began to return to the classrooms to carry out semi-presential classes at the same university. This provision was complied with and the students had to comply with it, so, they were forced to attend classes and consequently, the arrival of students to the university was also forced to eat food inside and outside the university after or before classes leaving aside the good food that ruled at home. The total sample obtained in the survey is 765 university students out of a total of 1048 students enrolled in semester 2022-1 at the National Frontier University. More specifically, the sample includes students whose ages are between 16 and 20 years (70.6%), between 21 and 25 years (23.1%), between 26 and 30 years (3.9%), between 31 and 35 years (1.2%) and over 36 years (1.2%) that is, the ages are concentrated between 16 and 20 years. The gender of the participants is even with a slight

difference between the female sex (54.5%) and the male sex (45.5%). These students are part of the ten academic cycles: I (16.9%), II (7.1%), III (28.9%), IV (6.9%), V (11.9%), VI (7.5%), VII (8.1%), VIII (2.4%), IX (4.8%) and X (5.6%). The students are in six professional careers: Forestry Engineering, Environmental Engineering, Economic Engineering, Biotechnology Engineering, Hotel and Tourism Administration and Food Industry Engineering. The area where they were confined due to the pandemic was also determined and we have that 71.9% were in the urban area (consuming good and bad quality food due to easy access) while 28.1% were confined in the rural area (where there is not a large amount of bad quality food, which makes it more difficult to consume bad quality food).

A. Instrument

The data was collected using a validated survey in Spain [26] which consists of 23 items, divided into two parts in the Peruvian context: the first part is the consumption of "good" foods with 15 items, BZN: consumption of fruit juices and nectars (250 ml), BCL: consumption of milk (250 ml approx.), BCQ: consumption of cheese (50 gr), BCH: consumption of eggs (1 piece), BCCR: consumption of meat (150 gr), BCP: consumption of fish (150 gr), BCLg: consumption of legumes (200 gr), BCar: consumption of rice (150 gr), BCPs: consumption of pasta (150 gr), BCF: consumption of fruits (1 serving), BCVC: consumption of raw vegetables (salad) (approx. 200 gr), BCVC_A: consumption of cooked vegetables (approx. 200 gr), BCPn: consumption of bread (50 gr), BCCrl: consumption of whole grain cereals (bread, rice, oatmeal, etc.) and BCCRp: consumption of fast food (1 serving), the second part is made up of the consumption of "bad" foods with 8 items, MCA: consumption of alcohol (whiskey, rum, gin) (approx. 50 ml), MCC: consumption of beer (approx. 250 ml), MCV: consumption of wine (approx. 50 ml). MBG: consumption of soft drinks (coke, soda, etc.) (approx. 250 ml), MBE: consumption of energy drinks (approx. 250 ml); MCPF: consumption of fermented products (125 gr), MCB: consumption of pastries (1 serving), MCCh: consumption of sausage (150 gr). The consumption of these foods will be analyzed according to the perspectives of post-pandemic university students who acquire food in the surroundings of the university before or after receiving classes during the months of May and July.

The instrument in its Peruvian version and context was divided into two parts: "good" or healthy foods and foods suitable for consumption by students, which were selected from survey list and classified according to the recommendations of nutritionists, in this part of "good" foods the 6-point Likert scale was used (1= "0 (no consumption)", 2= "1 to 3 times per week", 3= "4 to 6 times per week", 4= "7 to 9 times per week", 5= "10 to 12 times per week", 6= "more than 13 times per week") and the second part was divided as "bad" foods for health in which the 6-point Likert scale was also used (6= "0 (no consumption)", 5= "1 to 3 times per week", 4= "4 to 6 times per week", 3= "7 to 9 times per week", 2= "10 to 12 times per week", 1= "more than 13 times per week") considering that the highest point was assigned to students who do not consume "bad" foods and the lowest point was assigned to students who do consume but occasionally.

In the original manuscript there are valid and viable scales and statistics that were obtained with the confirmatory factor analysis, the adaptation to the Peruvian version is done by classifying "good" and "bad" foods for the consumption of the same by university students when they return to classes (of some courses), The original manuscript was in English, so it was translated into Spanish by two experts and then the respective validation and reliability was carried out. The results of the statistics are shown in Table 1 in which they were analyzed for "good" and "bad" foods. The results in Table 1 confirm that in both cases, the values obtained are optimal for further research.

Table 1.
Validation and viability.

Food	No. of items	Cronbach's alpha	Total mean	P. Tukey's non-additivity		Hotelling's P.
Good	15	0.936	2.69	Inter subject	8298.187	801.195
				Between elements	923.531	
				F	95.399	56.254
				Sig.	0.000	0.000
Bad	8	0.988	5.32	Inter subject	4968.939	980.416
				Between elements	229.419	
				F	409.446	138.959
				Sig.	0.000	0.000

2.2. Procedure and Data Analysis

The research began in mid-May 2022, when students returned to semi-presential classes and crowds were observed at food stands, nearby stores, cafeterias, and other locations near the National Frontier University. Thus, a group of students wondered what is the student behavior in the selection of post-pandemic eating habits? Then, they proceeded to look for an instrument with which to measure eating habits, finding four instruments, one was chosen that was adapted to our environment and Peruvian reality. A survey was designed through the Google form and distributed among teachers and students in order to have a multiplying effect among the students of the National Frontier University. The students answered only once (programmed in the form) using the institutional mail of the same university. The survey was conducted anonymously and voluntarily. More than 70% students enrolled in the 2022-1 semester.

Once the sample for our study was selected, we proceeded to download the data from the form and analyze the data to see if there were any incomplete responses for their respective cleaning. If there were no data to clean, the data were transferred to the SPSS (Statistical Package for the Social Sciences) program for their respective analyses such as

descriptive statistics (mean, standard deviation, skewness, kurtosis), confirmatory factor analysis, linear regression and to analyze the sociodemographic data of gender, age and sex.

3. Results

Table 2 shows the descriptive data of the central tendency of the "good" foods for health consumed by university students around the university city as a result of the return to blended classes, together with the variance, skewness and kurtosis. The highest frequency mean is Bcar (3.35 approximately 3) they consume more frequently rice (150 gr) from "4 to 6 times per week" and the lowest frequency mean is BCQ (2.21 approximately 2) consumes less frequently cheese (50 gr). And the consumption of "good" foods in general has a mean of 2.69 (2.41, 2.47, 2.21, 2.76, 2.76, 2.70, 2.53, 3.35, 2.50, 3.02, 2.78, 2.85, 2.73, 2.91 y 2.30) approximately 3 which is in the range of "4 to 6 times per week" the consumption of "good" foods around the university when they attend classes face-to-face.

Table 2.
Distribution of "good" food consumption.

Statistics	BZN	BCL	BCQ	BCH	BCCR	BCP	BCLg	BCar
Mean	2.41	2.47	2.21	2.76	2.76	2.70	2.53	3.35
Median	2.26	2.30	2.08	2.58	2.60	2.51	2.38	3.12
Mode	2	2	2	2	2	2	2	3
Deviation	1.067	1.213	1.024	1.102	1.052	1.133	1.188	1.335
Variance	1.138	1.472	1.048	1.214	1.108	1.283	1.411	1.781
Skewness	1.505	0.971	1.371	1.184	1.099	1.157	0.993	0.629
Kurtosis	2.507	0.618	2.507	1.141	0.991	0.976	0.784	-0.507
	BCPs	**BCF**	**BCVC**	**BCVC_A**	**BCPn**	**BCCrl**	**BCCRp**	
Mean	2.50	3.02	2.78	2.85	2.73	2.91	2.30	
Median	2.33	2.79	2.55	2.63	2.52	2.66	2.11	
Mode	2	2	2	2	2	2	2	
Deviation	1.100	1.236	1.238	1.239	1.227	1.229	1.124	
Variance	1.211	1.528	1.533	1.536	1.506	1.510	1.263	
Skewness	1.363	0.889	1.051	1.032	1.036	1.096	1.529	
Kurtosis	1.837	0.072	0.558	0.488	0.586	0.530	2.467	

Note: BZN: consumption of fruit juices and nectars (250 ml), BCL: consumption of milk (250 ml approx.), BCQ: consumption of cheese (50 gr), BCH: consumption of eggs (1 piece), BCCR: consumption of meat (150 gr), BCP: consumption of fish (150 gr), BCLg: consumption of legumes (200 gr), BCar: consumption of rice (150 gr), BCPs: consumption of pasta (150 gr), BCF: consumption of fruits (1 serving), BCVC: consumption of raw vegetables (salad) (approx. 200 gr), BCVC_A: consumption of cooked vegetables (approx. 200 gr), BCPn: consumption of bread (50 gr), BCCrl: consumption of whole grain cereals (bread, rice, oatmeal, etc.) and BCCRp: consumption of fast food (1 serving).

Table 3 shows the descriptive data on the central tendency of the "bad" foods for health consumed by university students in the university city as a consequence of the return to semi-presential classes, together with the variance, asymmetry and kurtosis. The means with the highest frequency are MCA and MCB both with 5.48 (approximately 5) indicating that they consumed alcohol (Whisky, rum, gin of an approximate of 50 ml) from "1 to 3 times per week", as well as pastry which is one of the foods that they consumed from "1 to 3 times per week" and the mean with lowest frequency is MBG (4. 96 approximately 5) indicating that they consume less (although it does not seem so) soft drinks (coca cola, soda, etc. of 250 ml approx.). The consumption of "bad" foods in general has a mean of 5.32 approximately 5 which is in the range of "1 to 3 times per week" for the consumption of "bad" foods around the university when they attend classes face to face.

Table 3.
Distribution of "bad" food intake.

Statistics	MCA	MCC	MCV	MBG	MBE	MCPF	MCB	MCCh
Mean	5.48	5.46	5.47	4.96	5.27	5.38	5.48	5.06
Median	5.60	5.57	5.59	5.09	5.44	5.52	5.63	5.23
Mode	6	6	6	5	6	6	6	5
Deviation	0.866	0.861	0.879	0.964	1.027	0.933	0.941	1.029
Variance	0.750	0.741	0.773	0.930	1.054	0.870	0.886	1.059
Skewness	-2.614	-2.605	-2.563	-1.698	-2.013	-2.114	-2.407	-1.521
Kurtosis	8.946	9.189	8.369	4.371	4.810	5.553	6.549	2.798

Note: MCA: consumption of alcohol (whiskey, rum, gin) (approx. 50 ml), MCC: consumption of beer (approx. 250 ml), MCV: consumption of wine (approx. 50 ml). MBG: consumption of soft drinks (coke, soda, etc.) (approx. 250 ml), MBE: consumption of energy drinks (approx. 250 ml); MCPF: consumption of fermented products (125 gr), MCB: consumption of pastries (1 serving), MCCh: consumption of sausage/sausage (150 gr).

Figure 1 shows the histograms of student behavior when selecting and consuming the "good" foods before or after entering classes due to face-to-face classes at the National Frontier University, whose result show that students in 14 out of 15 items (BZN, BCL, BCQ, BCH, BCCR, BCP, BCLg, BCPs, BCF, BCVC, BCVC_A, BCPn, BCCrl and BCCRp)

consume the "good" foods from "1 to 3 times per week", but there is the item (BCar) that deals with meat consumption, those who do consume "4 to 6 times per week" and do so in different forms such as breakfast, lunch, fried foods or others.

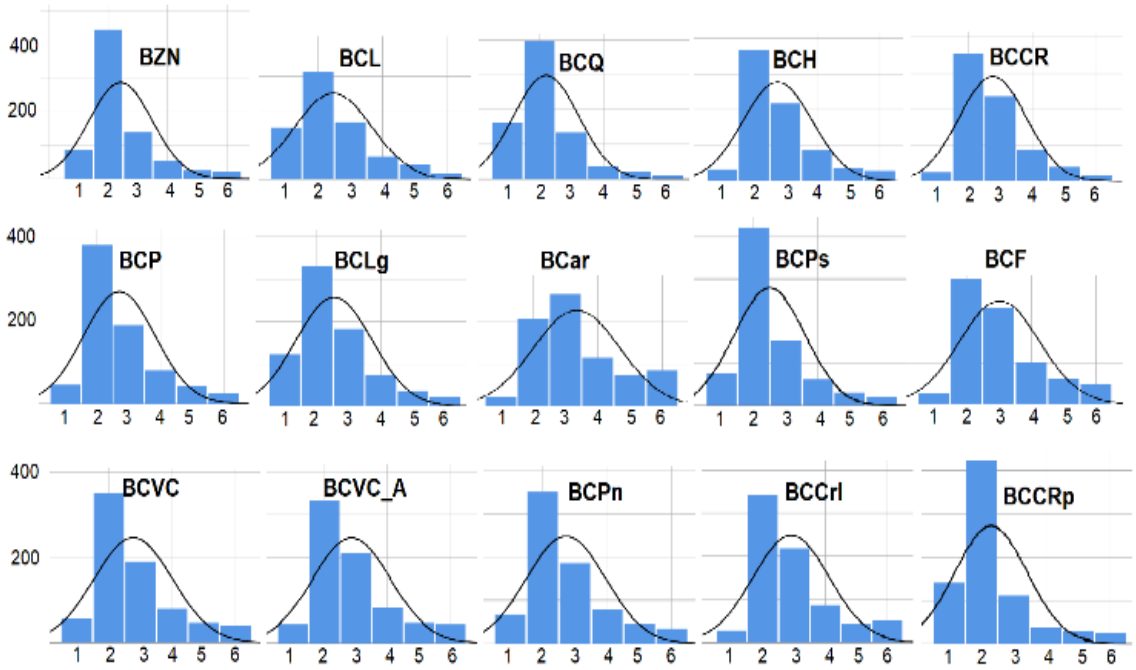

Figure 1.
Histograms of "good" food consumption behavior.

Figure 2 shows the histograms of student behavior when selecting and consuming "bad" foods before or after entering classes due to face-to-face classes at the National Frontier University, the result of which shows that students in 6 out of 8 items (MCA, MCC, MCV, MBE, MCPF, MCB) do not consume the "bad" foods before or after classes but there are two items (MBG AND MCCh) that refer to soft drinks and sausages that abound in the surroundings of the university, such consumption is done "1 to 3 times per week".

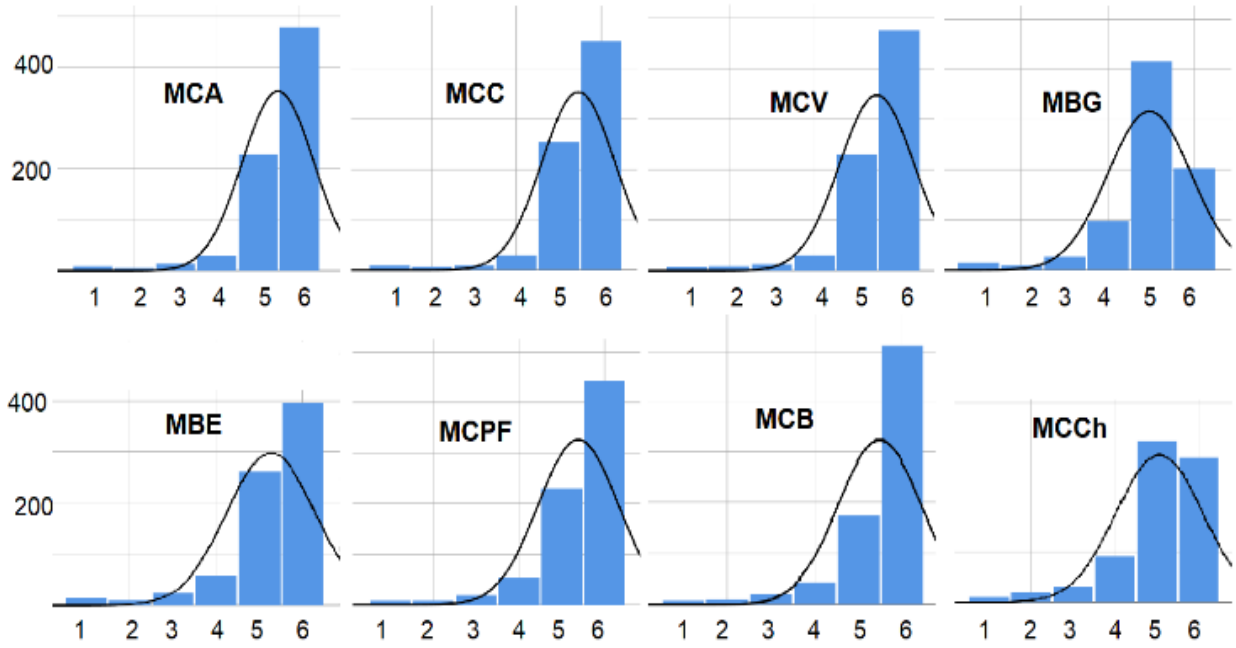

Figure 2.
Histograms of "bad" food consumption behavior.

Table 4 shows the correlation between the elements of student behavior in the selection of "good" eating habits before or after attending classes revealing a significant and positive correlation.

Table 4.
Correlation between elements of student behavior in the selection of "good" eating habits.

Food	BZN	BCL	BCQ	BCH	BCCR	BCP	BCLg	BCar	BCPs	BCF	BCVC	BCVC_A	BCPn	BCCrl	BCCRp
BZN															
BCL	0.384														
BCQ	0.326	0.504													
BCH	0.408	0.547	0.615												
BCCR	0.351	0.406	0.494	0.647											
BCP	0.380	0.443	0.487	0.593	0.694										
BCLg	0.296	0.399	0.471	0.546	0.542	0.550									
BCar	0.230	0.330	0.334	0.533	0.557	0.496	0.510								
BCPs	0.355	0.401	0.499	0.572	0.550	0.551	0.610	0.523							
BCF	0.398	0.450	0.429	0.591	0.547	0.568	0.568	0.540	0.554						
BCVC	0.385	0.421	0.455	0.537	0.514	0.595	0.563	0.483	0.573	0.776					
BCVC_A	0.420	0.453	0.493	0.576	0.572	0.629	0.585	0.520	0.591	0.794	0.863				
BCPn	0.309	0.403	0.435	0.556	0.543	0.469	0.483	0.603	0.522	0.492	0.465	0.527			
BCCrl	0.337	0.367	0.409	0.550	0.543	0.550	0.553	0.602	0.539	0.586	0.574	0.624	0.656		
BCCRp	0.266	0.309	0.408	0.424	0.476	0.419	0.403	0.392	0.511	0.391	0.398	0.416	0.477	0.446	

Note: BZN: consumption of fruit juices and nectars (250 ml), BCL: consumption of milk (250 ml approx.), BCQ: consumption of cheese (50 gr), BCH: consumption of eggs (1 piece), BCCR: consumption of meat (150 gr), BCP: consumption of fish (150 gr), BCLg: consumption of legumes (200 gr), BCar: consumption of rice (150 gr), BCPs: consumption of pasta (150 gr), BCF: consumption of fruits (1 serving), BCVC: consumption of raw vegetables (salad) (approx. 200 gr), BCVC_A: consumption of cooked vegetables (approx. 200 gr), BCPn: consumption of bread (50 gr), BCCrl: consumption of whole grain cereals (bread, rice, oatmeal, etc.) and BCCRp: consumption of fast food (1 serving).

Table 5 shows the correlation values between the elements of student behavior in the selection of "bad" eating habits before or after attending classes revealing a significant and positive correlation.

Table 5.
Correlation between elements of student behavior in the selection of "bad" eating habits.

Food	MCA	MCV	MBG	MBE	MCPF	MCB	MCCh	MCC
MCA		0.992	0.856	0.918	0.945	0.946	0.876	0.973
MCV			0.857	0.921	0.950	0.949	0.878	0.974
MBG				0.894	0.864	0.863	0.936	0.856
MBE					0.950	0.917	0.917	0.927
MCPF						0.945	0.891	0.958
MCB							0.878	0.925
MCCh								0.872
MCC								

Note: MCA: consumption of alcohol (whiskey, rum, gin) (approx. 50 ml), MCC: consumption of beer (approx. 250 ml), MCV: consumption of wine (approx. 50 ml). MBG: consumption of soft drinks (coke, soda, etc.) (approx. 250 ml), MBE: consumption of energy drinks (approx. 250 ml); MCPF: consumption of fermented products (125 gr), MCB: consumption of pastries (1 serving), MCCh: consumption of sausage/sausage (150 gr).

4. Discussion

University students have been successfully motivated to have a healthier and more nutritious eating behavior [1]. Some ministries of health in Peru have developed some measures for the sale of food in educational centers greatly enhancing the nutrition of students at the primary and secondary levels.

In order to promote good health in students and people and lower the morbidity level of excess obesity, necessary measures should be taken to achieve an increase in vegetables consumption and awareness.

Health professionals receive little or no training in promoting healthy eating habits in population. It is suggested that educational policies on nutrition should be improved and nutrition education in medical training should be included in the curricula [8] to raise awareness among students and the general population. Research has shown that to achieve less food waste, it is necessary to promote school nutrition by using various strategies to combat "junk" food [9] and cultivate a healthy and nutritious eating habit.

By identifying the effects of poor nutrition in university students university welfare and some NGOs (Non-Governmental Organization) that support the population were able to provide permanent training. With this background, the perception of knowledge about nutrition and eating habits improved. Its effects are expected in school performance and especially in student athletes in developing attitude, knowledge and rigorous nutrition practices to improve positive results in their competitions [27].

The "good" or "bad" foods for college students health is only theory, because they only want to keep a full stomach with which they can resist classes or resist hunger until they get home and consume the foods that day by day they do without knowing if it is good or bad, leaving as a future question, whether these habits will change over time? or will they remain. We will also ask ourselves if the "bad" eating habits will disappear or increase over time? This research work will be the basis for requesting guidance from the respective office to encourage good nutrition and will also serve as a theoretical and practical basis for future work on "good" and "bad" nutrition.

5. Conclusion

It was found that after two years of returning to the university classrooms, they did not forget their favorite "kiosk", returning to consume these foods in less quantity. It was found that the consumption of "good" habits is at a low level with the hope that in the future university students will improve their eating habits. In addition, the consumption of "bad" foods is at a low level. This level will decrease and not increase but university students did not forget about carbonated beverages, sausages and cold cuts which they were not reluctant to indulge in.

The frequencies and values representing each item were identified, interpreted and analyzed, providing significant positive and negative results.

In determining the correlation between the elements of the "good" and "bad" food perspectives, there are significant and positive effects to represent and compare the results with other research on college students' back-to-school eating behavior.

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