Eating habits and physical activity before and during the health emergency due to COVID-19 in Quito – Ecuador

Roberto Ordoñez-Araque [a,b,*], Carla Caicedo-Jaramillo [a], Marcela García-Ulloa [a], Juan Dueñas-Ricaurte [c]

[a] Facultad de Salud y Bienestar, Escuela de Nutrición y Dietética, Universidad Iberoamericana del Ecuador (UNIB.E), Quito, Ecuador
[b] Escuela de Gastronomía, Universidad de las Américas (UDLA), Quito, Ecuador
[c] Facultad Ciencias de la Vida, Carrera de Ingeniería en Biotecnología, Escuela Politécnica del Ejército (ESPE), Rumiñahui, Ecuador

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ABSTRACT

COVID-19 has managed to paralyze the world for months, this paralysis has caused great changes in the habits, customs and routines of all people. Although science is directed to getting a vaccine to return to normality, these changes may remain in the population. For this reason, it is essential to identify them and observe what has improved or worsened. The IPAQ questionnaire (*international physical activity questionnaire*) was used to analyze physical activity and regarding food consumption a questionnaire on eating habits. These were applied in a representative sample of adults between 18 and 65 years old in the city of Quito (n: 1022) to collect information before and during the forced quarantine in the city. These data were analyzed and compared along with daily routines and demographic variables of age, education and income. Our working hypothesis was that enforced quarantine would have a significant impact on daily activities, including waking time, mealtimes, physical activity, and eating habits. Waking time went from 5 to 6 to 8–9 in the morning and the breakfast and lunch times changed. The physical activity of the entire population decreased while men proved to be more active than women before and during the health emergency. Our findings suggested that eating habits improved overall during the quarantine period; however, we found that a higher percentage of women reported very healthy eating habits compared to men. People from 18 to 41 years old, with a university education, regardless of their income, decreased their physical activity during quarantine, people with incomes of up to $ 400 per month changed their eating habits to unhealthy since the emergency began. The population in the city of Quito varied their daily routine of physical activity and their eating habits, this suggests that it should be analyzed what measures should be implemented to continue with what has been improved and change what has worsened, and thus avoid public health problems in the future.

1. Introduction

SARS-Cov-2 is one of the seven types of coronavirus that can infect humans, it belongs to the *Coronaviridae* family of the genus *Betacoronavirus*, and it was detected for the first time in December 2019 in hospitalized patients in Wuhan province- China [1]. It has been determined, using genomic data, that the virus originated through natural selection in an animal host and then leapt to humans, and that it is not a laboratory creation as has been erroneously speculated [2]. At first, the theory was proposed that bats are the most probable reservoir of the virus, but there is evidence that the probable intermediate hosts are pangolins, as they find a genetic sequence of coronavirus of 92%

identical to that of SARS- Cov-2 [3]. In 2007, the presence of large reservoirs of SARS-Cov-type viruses in bats was alerted and that the culture or custom of consuming exotic mammals as food in southern China would be a time bomb in the future [4]; These recommendations were not taken into account and added to other factors, in 2020 the COVID-19 disease has changed the way of life of humans around the planet, including their eating habits and physical activity [5].

It is important to identify the changes in diet and physical condition in people during the quarantine period, considering many will have to change their habits definitively if they had the disease. As it has been detected, probably between 60 to 78% of people recovered, will have cardiovascular sequelae [6]. The rate of pathologies caused by an

unhealthy diet and lack of physical activity increases more every day, and if we add the new coronavirus disease to this, we may have an increase in mortality, since there is an association between obesity and Type 1 and 2 diabetes with increased risk of death from COVID-19, regardless of people's ethnicity [7,8]; in general, people must change their habits and lifestyle, and because of this it is important to know the health status of each population.

The objective of this research seeks to determine if there were changes in eating habits and physical activity during the quarantine forced by the health emergency in Quito due to SARS-Cov-2.

2. Materials and methods

2.1. Study population and sample

This study was carried out with a representative sample of the population of the Metropolitan District of Quito (MDQ), located in the province of Pichincha, Republic of Ecuador. According to the last population and housing census carried out in 2010 by the National Institute of Statistics and Censuses (INEC), the MDQ had 2.32 million inhabitants and the estimated projection for 2020 is 2.78 million. The sample was selected using the sample calculator for *Netquest* proportions, considering 50% heterogeneity, 3.88% margin of error and 99% confidence level for the population estimated in 2020. With these data, a sample size of 1022 inhabitants was determined, which are in an age range of 18 to 65 years.

2.2. Process

Data on physical activity and eating habits was obtained for 5 days, starting on April 20, 2020 (34 days after the start of the quarantine), through a survey designed on the *Google forms* platform. Two types of validated questionnaires were applied to determine the differences between physical activity and eating habits during the emergency. All participants were informed of the objectives of the study and accepted the requested approval, prior to filling out the form. Information on sociodemographic variables such as sex, age, level of education and income was collected and analyzed; in addition to physical activity, eating habits and daily routines (before and during the health emergency) such as: waking time, breakfast, lunch, dinner and food consumption at mid-morning and mid-afternoon.

2.3. Instruments

2.3.1. IPAQ questionnaire

The short version of the IPAQ questionnaire was used to analyze physical activity: *international physical activity questionnaire* which is used in national and regional surveillance systems, organizations such as EUPASS: European Physical Activity Surveillance System; EUROHIS: European Health Research; CINDI: Countrywide Integrated Non-communicable Diseases Intervention; WHO: World Health Organization, have evaluated, used and recommended the use of this questionnaire [9]. This instrument analyzes the period of repetition of physical activity for 7 days, is designed for people between 18 and 65 years old, and consists of 9 items. The results are tabulated in MET (Metabolic Equivalent of Task), where the reference values are: for walking: 3.3 MET × minutes of walking × days per week (low), for moderate physical activity: 4.0 MET × minutes × days per week, and for vigorous physical activity: 8 METs × minutes × days per week (high). The intensity of physical activity is classified as low (up to 600 METs), moderate (600-1500 METs) and high (1500-3000 METs onwards) [10].

2.3.2. Eating habits questionnaire

For the analysis of eating habits, the validated version of the questionnaire of González, Ruggiero, Antún, Mirri, & Yomal (2016) [11] was used. This is a quick tool that presents adequate temporal stability and

was designed as an instrument for evaluating changes in eating habits, it includes 18 items (where it is analyzed if: you usually have breakfast, lunch, snack, dinner, daily and weekly milk, yogurt or skim cheese, meats without visible fat, fruits and/or vegetables, legumes, whole grain varieties of bread, rice, noodles, doughs, sugar to sweeten coffee and infusions, sweets and/or snacks, sweet cookies, pastries, sodas, juices, water flavored with sugar, amount of salt, alcoholic beverages, fast foods consumption and if the purchase of food is planned to have a better diet along with possible activities that are carried out while eating). The questions have a weighted evaluation system where the answers corresponding to healthy habits are scored with two points, zero points for unhealthy habits, and with 1 point for answers that require evaluation of the amount consumed. The final score is tabulated based on 3 categories and ranges: very healthy (27-31 points), healthy (19-26 points), unhealthy (0-18 points).

2.3.3. Analysis of variables

The data collected on daily routines, physical activity and eating habits, before and during the health emergency, were analyzed in contrast to the qualitative variables of sex, education and income.

2.4. Statistical analysis

A descriptive analysis of the results obtained from the questionnaires was carried out and for the determination of statistically significant differences between groups of qualitative variables, the *chi-square* test was applied, with a level of statistical significance of (n) $p < 0.05$. MET quantitative variables were expressed in absolute frequencies and percentages. The statistical program used: SPSS, version 15.0 for Windows (Statistical Package for the Social Sciences; Chicago, Illinois).

3. Results

3.1. Population

The population consisted of a total of 1102 people, of which 57.6% were women (635), compared to 42.4% who were men (467).

3.2. Daily routines

Table 1 shows us how, in general, the daily routines of the population were affected during quarantine. In this sense, it can be observed that the wake-up time for the majority of the population (69.4%), before quarantine, was between 5 and 6 in the morning; however, when isolation began, this number became the lowest (24.9%). During the quarantine, the wake-up time changed mainly between 8 and 9 a.m.

The change in daily routine was directly associated with the change in eating schedule, which is reflected in daily meals. The most common hours of breakfast consumption, before the quarantine, were 6, 7 and 8 in the morning, and during the quarantine at 9 a.m. or later (56.5%). In relation to lunch, it can be seen that, before quarantine, the majority of the population had lunch at 1:00 p.m. (56%). On the other hand, during the quarantine, it is observed that the majority of the population had lunch mainly at 2:00 p.m. and 3:00 p.m. The dinner schedule did not change significantly; 8 pm being the time with the highest percentage of preference by the surveyed population.

3.3. Physical activity (IPAQ)

Table 2 shows that, in general, the population decreased their physical activity during quarantine, both in high and moderate intensity, while low intensity became predominant during the health emergency. Another interesting fact is that men had more physical activity than women, before and during the emergency, and women had lower physical activity than men, before and during the emergency.

Table 1
Daily routines of the population before and during the health emergency in Quito.

Wake-up before n(%)		Wake-up during n(%)		Breakfast before n(%)		Breakfast during n(%)	
5 a.m. or earlier	358 (32.5%)	5 a.m. or earlier	65 (5.9%)	5 a.m. or earlier	78 (7.1%)	5 a.m. or earlier	1 (0.1%)
6 a.m.	407 (36.9%)	6 a.m.	209 (19%)	6 a.m.	255 (23.1%)	6 a.m.	43 (3.9%)
7 a.m.	215 (19.5%)	7 a.m.	232 (21.1%)	7 a.m.	320 (29%)	7 a.m.	117 (10.6%)
8 a.m.	78 (7.1%)	8 a.m.	321 (29.1%)	8 a.m.	238 (21.6%)	8 a.m.	260 (23.6%)
9 a.m. or later	44 (4%)	9 a.m. or later	275 (25%)	9 a.m. or later	136 (12.3%)	9 a.m. or later	623 (56.5%)
Total	**1102 (100%)**	**Total**	**1102 (100%)**	Doesn't eat breakfast	75 (6.8%)	Doesn't eat breakfast	58 (5.3%)
				Total	**1102 (100%)**	**Total**	**1102 (100%)**
Lunch before n(%)		**Lunch during n(%)**		**Dinner before n(%)**		**Dinner during n(%)**	
12 a.m. or earlier	80 (7.3%)	12 a.m. or earlier	38 (3.4%)	7 p.m. or earlier	327 (29.7%)	7 p.m. or earlier	250 (22.7%)
1 p.m.	617 (56%)	1 p.m.	303 (27.5%)	8 p.m.	482 (43%)	8 p.m.	446 (40.5%)
2 p.m.	298 (27%)	2 p.m.	454 (41.2%)	9 p.m.	148 (13.4%)	9 p.m.	197 (17.9%)
3 p.m. or later	95 (8.6%)	3 p.m. or later	300 (27.2%)	10 p.m. or later	69 (6.3%)	10 p.m. or later	109 (9.9%)
Doesn't eat lunch	12 (1.1%)	Doesn't eat lunch	7 (0.7%)	Doesn't eat dinner	76 (6.9%)	Doesn't eat dinner	100 (9%)
Total	**1102 (100%)**	**Total**	**1102 (100%)**	**Total**	**1102 (100%)**	**Total**	**1102 (100%)**

Table 2
Physical activity before and during the health emergency in the MDQ, using IPAQ.

		High	Moderate	Low	Total
		Physical activity before the emergency			
Female	n(%)	207 (32.6%)	145 (22.8%)	283 (44.6%)	635
	median MET-min/wk - (IQR)	3317.09[a] (10764–1539)	1084.09[a] (2148–495)	190.06[a] (3120–0)	
Male	**n(%)**	213 (45.6%)	127 (27.2%)	127 (27.2%)	467
	median MET-min/wk - (IQR)	4513.80[a] (19278–1518)	1375.12[a] (3702–495)	367.44[a] (1920–0)	
	Total n (%)	**420 (38.1%)**	**272 (24.7%)**	**410 (37.2%)**	**1102 (100%)**
		Physical activity during the emergency			
Female	**n(%)**	155 (24.4%)	151 (23.8%)	329 (51.8%)	635
	median MET-min/wk - (IQR)	3057.75[b] (8262–1539)	1174.46[b] (3756–495)	181.06[b] (2940–0)	
Male	**n(%)**	177 (37.9%)	132 (28.3%)	158 (33.8%)	467
	median MET-min/wk - (IQR)	4078.15[b] (18090–1575)	1425.02[b] (3672–495)	404.62[b] (2880–0)	
	Total n (%)	**332 (30.1%)**	**283 (25.7%)**	**487 (44.2%)**	**1102 (100%)**

The statistical analysis of physical activity indicates that the means of the MET-min/wk of the group of men was higher than that of women (p <0.05). IPAQ: international physical activity questionnaire. MET-min/wk: metabolic equivalent minutes per week. IQR: interquartile range.

Table 3
Eating habits before and during the health emergency in the MDQ.

	Very healthy	Healthy	Unhealthy	Total
	Eating habits before the emergency			
Female n(%)	79 (12.4%)	407 (64.1%)	149 (23.5%)	635
Male n(%)	21 (4.5%)	284 (60.8%)	162 (34.7%)	467
Total n(%)	**100 (9.1%)**	**691 (62.7%)**	**311 (28.2%)**	**1102 (100%)**
	Eating habits during the emergency			
Female n(%)	91 (14.3%)	410 (64.6%)	134 (21.1%)	635
Male n(%)	22 (4.7%)	291 (62.3%)	154 (33%)	467
Total n(%)	**113 (10.3%)**	**701 (63.6%)**	**288 (26.1%)**	**1102 (100%)**

There are significant differences between eating habits and sex (P < 0,005); this occurred before quarantine, and the results repeated during the quarantine. Results showed that women have healthier habits than men.

3.4. Eating habits

In Table 3 it can be seen that, during quarantine, the population improved to a certain extent their eating habits, increasing very healthy habits and healthy habits, unhealthy habits were also reduced.

Both before and during the emergency, differences were found between men and women, regarding eating habits. Women had healthier habits than men, this data being more evident in very healthy eating habits, since before and after quarantine, the group of women increased their percentage and that of men remained.

3.5. Analysis of variables

In Table 4 it can be observed that the group of people with very healthy eating habits presented the lowest percentages of high, moderate, and low levels of physical activity, both before (9.1%) and during the emergency (11.2%).

On the other hand, the people who had more physical activity are those who made up the group with healthy eating habits. Of this group, those who performed moderate physical activity before the emergency, presented a reduction in their activity during the emergency, increasing the number of people who performed low physical activity.

Finally, in the group of people with unhealthy eating habits, a reduction in people who performed high physical activity before

Table 4
Physical activity versus eating habits, before and during the health emergency in the MDQ.

Physical activity before	Eating habits before			
	Very healthy	Healthy	Unhealthy	Total
High	53 (12.6%)	267 (63.6%)	100 (23.8%)	420
Moderate	23 (8.5%)	180 (66.2%)	69 (25.4%)	272
Low	24 (5.9%)	244 (59.5%)	142 (34.6%)	410
Total	**100 (9.1%)**	**691 (62.7%)**	**311 (28.2%)**	**1102 (100%)**
Physical activity during	**Eating habits during**			
	Very healthy	**Healthy**	**Unhealthy**	**Total**
High	47 (14.2%)	219 (66%)	66 (19.9%)	332
Moderate	25 (8.8%)	174 (61.5%)	84 (29.7%)	283
Low	41 (8.4%)	308 (63.2%)	138 (28.3%)	487
Total	**123 (11.2%)**	**755 (68.5%)**	**224 (20.3%)**	**1102 (100%)**

confinement can be observed, from 23.8% to 19.9% during it.

3.6. Physical activity and eating habits vs age

In Table 5 it can be observed that in the age group between 18 and 41 years old, before the emergency, the majority of the population had a high physical activity. During the emergency, the percentage of people engaging in high physical activity decreased, while the percentage of people engaging in moderate and low physical activity increased. Within the 41 to 65 age group, the highest percentage of people engaged in low physical activity before the emergency, and during the emergency this percentage increased. Healthy eating habits prevail in all age groups, both before and during the health emergency. Eating habits remained relatively constant between the difference in years, the 34 to 41-year-old group showed the greatest change since they increased their healthy habits in a more significant way than the rest.

3.7. Physical activity and eating habits vs education

In Table 5 it can be observed that physical activity, depending on the level of education, does not present considerable variations, before and during the emergency. On the other hand, the level of instruction did have a certain impact on the physical activity carried out. People with university and postgraduate education, during the emergency, reduced high physical activity and increased moderate and low physical activity. Healthy eating habits prevail at all levels of education, followed by unhealthy habits and lastly very healthy habits, the percentages

generally do not vary, except for people with postgraduate degrees who increase healthy eating habits and reduce unhealthy habits.

3.8. Physical activity and eating habits vs income

In Table 5 it can be observed that the population that carried out high physical activity was reduced in all levels of economic income, with the exception of the group with incomes greater than $2500 per month. Likewise, in most income groups, the population that engaged in low physical activity increased.

Across all income groups, the least amount of the population had very healthy eating habits, while the majority had healthy eating habits. The biggest change was registered in the group with income of $801-$1200, whose unhealthy eating habits were reduced during the emergency, while the population with healthy and very healthy habits increased.

Finally, in the group with incomes of up to $400, there was an increase in the population with unhealthy habits, and a reduction in the population with healthy and very healthy habits decrease.

4. Discussion

During the first months of the health emergency in the city of Quito, as in many Latin American countries, there was an impact on the food supply chain, both due to access to food and due to the limitation in the transport of food [12]. Additionally, the low purchasing power of a part of the population to get food must be considered, due to the crisis

Table 5

Demographic variables versus physical activity and nutritional habits, before and during the health emergency in MDQ.

Variable	Physical Activity				Eating habits			
Age	High	Moderate	Low	Total	Very Healthy	Healthy	Unhealthy	Total
Before-18 a 25 years old n(%)	139 (47.9%)	70 (24.1%)	81 (27.9%)	290	21 (7.2%)	175 (60.3%)	94 (32.4%)	290
During-18 a 25 years old n(%)	115 (39.7%)	88 (30.3%)	87 (30%)	290	25 (8.6%)	164 (56.6%)	101 (34.8%)	290
Before-26 a 33 years old n(%)	91 (37.3%)	68 (27.9%)	85 (34.8%)	244	19 (7.8%)	156 (63.9%)	69 (28.3%)	244
During-26 a 33 years old n(%)	59 (24.2%)	74 (30.3%)	111 (45.5%)	244	20 (8.2%)	147 (60.2%)	77 (31.6%)	244
Before-34 a 41 years old n(%)	95 (33.5%)	65 (22.9%)	124 (43.7%)	284	19 (6.7%)	168 (59.2%)	97 (34.2%)	284
During-34 a 41 years old n(%)	72 (25.4%)	65 (22.9%)	147 (51.8%)	284	26 (9.2%)	190 (66.9%)	68 (23.9%)	284
Before-41 a 65 years old n(%)	95 (33.5%)	69 (24.3%)	120 (42.3%)	284	41 (14.4%)	192 (67.6%)	51 (18%)	284
During-41 a 65 years old n(%)	86 (30.3%)	56 (19.7%)	142 (50%)	284	42 (14.8%)	200 (70.4%)	42 (14.8%)	284
Total before	420 (38.1%)	272 (24.7%)	410 (37.2%)	1102 (100%)	100 (9.1%)	691 (62.7%)	311 (28.2%)	1102 (100%)
Total during	332 (30.1%)	283 (25.7%)	487 (44.2%)	1102 (100%)	113 (10.3%)	701 (63.6%)	288 (26.1%)	1102 (100%)
Education	High	Moderate	Low	Total	Very Healthy	Healthy	Unhealthy	Total
Before-Elementary n(%)	0 (0%)	2 (100%)	0 (0%)	2	2 (100%)	0 (0%)	0 (0%)	2
During-Elementary	0 (0%)	2 (100%)	0 (0%)	2	2 (100%)	0 (0%)	0 (0%)	2
Before-High School n(%)	73 (37.1%)	72 (36.5%)	52 (26.4%)	197	14 (7.1%)	128 (65%)	55 (27.9%)	197
During-High School n(%)	71 (36%)	71 (36%)	55 (27.9%)	197	15 (7.6%)	123 (62.4%)	59 (29.9%)	197
Before-University n(%)	272 (39.2%)	259 (37.4%)	162 (23.4%)	693	59 (8.5%)	437 (63.1%)	197 (28.4%)	693
During-University n(%)	198 (28.6%)	312 (45%)	183 (26.4%)	693	71 (10.2%)	429 (61.9%)	193 (27.8%)	693
Before-Postgraduate	75 (35.7%)	77 (36.7%)	58 (27.6%)	210	25 (11.9%)	126 (60%)	59 (28.1%)	210
During-Postgraduate	63 (30%)	102 (48.6%)	45 (21.4%)	210	25 (11.9%)	149 (71%)	36 (17.1%)	210
Total before	420 (38.1%)	410 (37.2%)	272 (24.7%)	1102 (100%)	100 (9.1%)	691 (62.7%)	311 (28.2%)	1102 (100%)
Total during	332 (30.1%)	487 (44.2%)	283 (25.7%)	1102 (100%)	113 (10.3%)	701 (63.6%)	288 (26.1%)	1102 (100%)
Income (dollars/month)	High	Moderate	Low	Total	Very healthy	Healthy	Unhealthy	Total
Before-Up to $400	128 (35.8%)	148 (41.3%)	82 (22.9%)	358	23 (6.4%)	216 (60.3%)	119 (33.2%)	358
During- Up to $400	98 (27.4%)	176 (49.2%)	84 (23.5%)	358	24 (6.7%)	197 (55%)	137 (38.3%)	358
Before- $401 - $800	110 (43.8%)	74 (29.5%)	67 (26.7%)	251	24 (9.6%)	147 (58.6%)	80 (31.9%)	251
During- $401 - $800	88 (35.1%)	82 (32.7%)	81 (32.3%)	251	28 (11.2%)	147 (58.6%)	76 (30.3%)	251
Before-$801 - $1200	67 (32.1%)	97 (46.4%)	45 (21.5%)	209	29 (13.9%)	125 (59.8%)	55 (26.3%)	209
During-$801 - $1200	51 (24.4%)	115 (56%)	43 (20.6%)	209	31 (14.8%)	146 (69.9%)	32 (15.3%)	209
Before-$1201 - $1600	42 (33.6%)	43 (34.4%)	40 (32%)	125	12 (9.6%)	87 (69.6%)	26 (20.8%)	125
During–$1201 - $1600	31 (24.8%)	48 (38.4%)	46 (36.8%)	125	13 (10.4%)	87 (69.6%)	25 (20%)	125
Before-$1601 - $2500	54 (48.2%)	31 (27.7%)	27 (24.1%)	112	12 (10.7%)	80 (71.4%)	20 (17.9%)	112
During-$1601 - $2500	42 (37.5%)	43 (38.4%)	27 (24.1%)	112	15 (13.4%)	88 (78.6%)	9 (8%)	112
Before- Over $2500	19 (40.4%)	17 (36.2%)	11 (23.4%)	47	0 (0%)	36 (76.6%)	11 (23.4%)	47
During – Over $2500	22 (46.8%)	23 (48.9%)	2 (4.3%)	47	2 (4.3%)	36 (76.6%)	9 (19.1%)	47
Total before	420 (38.1%)	410 (37.2%)	272 (24.7%)	1102 (100%)	100 (9.1%)	691 (62.7%)	311 (28.2%)	1102 (100%)
Total during	332 (30.1%)	487 (44.2%)	283 (25.7%)	1102 (100%)	113 (10.3%)	701 (63.6%)	288 (26.1%)	1102 (100%)

generated by confinement [13]. In Quito, all the aforementioned factors could have influenced the change towards unhealthy habits of people with incomes less than 400 dollars. On the other hand, people with incomes of more than $800 were able to maintain or improve their habits, since most of the food outlets that were open were supermarkets or grocery stores.

Among the most important data on eating habits in Quito, it was observed that, people from 18 to 33 years old, increased their unhealthy habits, while, on the contrary, people from 34 to 65 years old, decreased unhealthy habits and increased healthy habits.

As various investigations indicate [14,15], young adults show a more uninhibited attitude towards food, without worrying about the effects it may have on their health, in contrast to what happens in adults and older adults, who tend to have a greater care about their diet for the benefit of their health. The state of confinement generated modifications in the daily activities of the population worldwide, adopting new forms of work from home, the development of virtual classes in the case of students, and in those who have had lifestyle habits based on sports, limitations for its performance [16].

The impact of the change in daily routine on the schedules, eating habits, and the intensity of physical exercise was evidenced. The development of activities from the place of confinement changed the wake-up time, along with breakfast, which moved 2 to 3 hours later than usual, as well as lunch, which was moved up to 1 hour later. Only dinner was not altered in terms of schedules, since the number of people who stopped consuming it increased during the pandemic. This phenomenon would be the result of the consumption of the first 2 meals at later times.

According to research [17], these changes could lead to health damage as calorie intake rises while eating schedules are modified or suppressed which, consequently, influences weight gain with a higher percentage of body fat, the development of obesity and chronic diseases.

The routine is a sequence of actions that are executed daily, constantly and periodically, that allow us to involve habits and activities [18], some positive indicators of routine change are observable through the evaluation of eating habits. In the population studied, people's daily routines changed significantly; the number of people who eat breakfast and lunch when before the pandemic they did not increased. Changes in eating habits were also recorded in people who had unhealthy habits, these changes can be explained by the psychological, economic and social impact generated by the pandemic [19], in which people in front of all the information generated by different local media and worlds looked for ways to improve their health through the consumption of healthier and cheaper foods [20]. A second explanation is found in family life, with the possibility of acquiring and preparing healthy food at home, reducing the consumption of food outside the home with high calorie content, unhealthy fats, excessive sodium and simple sugars [21]. However, according to a study conducted in Italy [22], the change in eating habits during the pandemic is due to anxiety about the situation and confinement, incurring sleep disorders and psychological illnesses.

The development of physical activity decreased in the entire population studied; the change of schedules and the physical space were determining factors to alter daily practice, intensity and type of activity. An interesting fact, and that is contrasted in this study, is that before and during the pandemic, men performed more physical activity than women, according to various data [23]; there are differences in sports culture, due to the hours of weekly practice that, in men is higher, and focuses on autonomous high-intensity physical activity, compared to women who prefer collective physical activity of low to moderate intensity, but who generate greater well-being and relaxation.

It was observed, that high physical activity habits decreased, while low physical activity habits increased in all age groups. An important factor that strongly influences physical activity habits is related to family practices, it has been demonstrated [24] that parents normally find it difficult to establish healthy routines of physical activity, both for themselves and their children, and this is even more affected when there is forced confinement and mobility restriction.

When comparing physical activity vs eating habits, we found that, before the health emergency, most of the population performed high physical activity; however, of that group, the minority had a very healthy diet. These results are different from those found in a study of eating habits and physical activity [25], which shows a directly proportional relationship between food restriction or self-regulation, with a greater practice of physical activity. Once the health emergency started, the percentage of the population with high physical activity decreases, while the population with low physical activity increases, this occurs since one of the characteristics of the emergency generated by the SARS Cov-2 virus is the confinement, which by its nature promotes a sedentary lifestyle [26]. For this reason, the early adoption of healthy eating habits and physical activity is important for these habits to last.

One option that has become very popular is physical activity at home virtually. Today, there are several options to maintain an active life during the health emergency; either through social media, YouTube channels, exercise video games, virtual gyms, among others. Promoting recreational activities and physical activity can help both the physical and mental health of the population [27].

Today there is the phenomenon known as screen sedentary lifestyle, which consists of the time spent watching television, being in front of the computer, playing video games or checking social media [28]. It is very likely that, by the time that you must stay indoors, this phenomenon has increased in all age groups. Consequently, sedentary lifestyle increases, which is an important risk factor for various chronic diseases; currently, screen technology or sedentary lifestyle added to confinement, may possibly cause a more noticeable increase in overweight, obesity and myopia in the population along with the comorbidities associated with this practice [29].

A systematic revision [30], indicates that a sedentary lifestyle is directly related to obesity, cardiovascular disease, diabetes, cancer, and mental health. Therefore, it is important to emphasize the importance of maintaining regular physical activity despite isolation.

Both eating habits and physical activity play an important role in people's wellbeing. Some of the health consequences of lack of physical activity and unhealthy habits are: increased insulin resistance, increased total and visceral fat, and the production of pro-inflammatory cytokines [31]. These problems are strongly linked to the development of metabolic disorders and risk factors linked to non-communicable chronic diseases. In normality, all these aspects mentioned are harmful to health, even more so today where it is known that metabolic disorders are important risk factors in the course of the SARS Cov-2 virus in a person [32].

There is a part of the population of Quito that has been forced to consume unhealthy food due to the low purchasing power that has been generated during the pandemic. In this case, the double burden of malnutrition could play a role, since both malnutrition due to excess and deficiency weaken the immune system and make people more vulnerable to the spread of the virus [33,34].

5. Conclusions

What was stated in the development of this research has allowed concluding that the state of confinement due to the health emergency due to SARS-Cov-2 influenced the lifestyle of the studied population, the change in routine in relation to schedules, activities and mobility restriction were determining factors that had a negative impact on physical activity habits.

In the study it was possible to verify the decrease in the intensity of the activity carried out before quarantine, the increase in low physical activity and sedentary lifestyle, which according to the evidence, whether it is maintained in the medium or long term has a direct relationship with the development of chronic non-communicable diseases and therefore a greater deterioration of health due to the decrease in musculoskeletal mass and increase in adiposity if combined with

unhealthy eating habits.

It is important to take measures and actions regarding personal eating habits; the health emergency and isolation had a considerable impact on the eating habits of the Quito population. As mentioned, a person's diet defines their overall health, development, and well-being. However, there is no awareness about the importance of maintaining and creating healthy eating habits.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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