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Factors associated with dietary patterns in workers of a public university in Bogotá, Colombia. 2017-2018

Factores asociados al patrón alimentario en trabajadores de una universidad pública de Bogotá, Colombia. 2017-2018

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Abstract

Introduction: Adequate nutrition is part of a healthy lifestyle in work environments.
Objectives: To characterize the dietary patterns of workers of a public university in Colombia and to determine the factors associated with it.
Materials and methods: Cross-sectional study conducted in 126 workers aged 18 to 64 years of age. Information was collected between August 2017 and June 2018 using a questionnaire on food consumption frequency in the last month. Bivariate analyses were performed to determine the association between the recommended consumption pattern for each food group and sociodemographic and occupational variables using the Pearson's chi-square or the Fisher's exact test and calculating prevalence ratios (PR) with their respective 95% confidence intervals (95%CI). A significance level of $p<0.05$ was considered.
Results: Of the 126 participants, 84.13%, 56.35%, 69.05%, 32.54%, 13.49%, and 84.13% complied with the recommendations for daily consumption of fruits, vegetables, milk and dairy products, eggs, dried fruit, and water, respectively, while 9.52% and 40.48% complied with the recommendations for weekly consumption of offal and legumes. Being 47 years old or younger was associated with a higher probability of consumption of fast foods (PR=2.24; p=0.00), soft drinks (PR=2.63; p=0.00), cold meats (PR=1.34; p=0.04), and artificial juices (PR=2.73; p=0. 00); having a high school education level increased the probability of failing to eat or drink milk and dairy products on a daily basis (PR=1.75; p=0.033); and having a low socioeconomic status led to a higher probability of not eating fruits daily (PR=3.6; p=0.00). In addition, being a woman increased the probability of eating vegetables (PR=0.66; p=0.04) and dried fruit (PR=0.87; p=0.04) and reduced the risk of drinking soft drinks (PR=0.59; p=0.03).
Conclusion: The dietary consumption patterns identified here were better compared to what has been reported in similar studies. Likewise, interventions should focus on workers with one or several of the following characteristics: men, age ≤47 years of age, complete secondary education as the highest educational level, and low socioeconomic status.

Resumen

Introducción. Una adecuada alimentación es parte de un estilo de vida saludable en el entorno laboral.
Objetivos. Caracterizar el patrón alimentario de trabajadores de una universidad pública de Colombia y determinar los factores asociados al mismo.
Materiales y métodos. Estudio transversal realizado en 126 trabajadores de entre 18 y 64 años. La información se recolectó entre agosto de 2017 y junio de 2018 mediante un cuestionario de frecuencia de consumo de alimentos en el último mes. Se realizaron análisis bivariados para determinar la asociación entre el patrón de consumo recomendado para cada grupo de alimentos y las variables sociodemográficas y ocupacionales usando las pruebas chi-cuadrado de Pearson o exacta de Fisher y calculando razones de prevalencia (RP) con sus respectivos intervalos de confianza del 95% (IC95%); se consideró un nivel de significancia de $p<0.05$.
Resultados. De los 126 participantes, 84.13%, 56.35%, 69.05%, 32.54%, 13.49% y 84.13% cumplían con las recomendaciones de consumo diario de frutas, verduras, leche y derivados, huevos, frutos secos y agua, respectivamente, y 9.52% y 40.48%, con las recomendaciones de consumo semanal de vísceras y leguminosas. Tener 47 años o menos se asoció con una mayor probabilidad de consumo de comidas rápidas (RP=2.24; p=0.00), gaseosas (RP=2.63; p=0.00), embutidos (RP=1.34; p=0.04) y jugos artificiales (RP=2.73; p=0.00); tener un nivel educativo de bachillerato, con una mayor probabilidad de no consumir leche y derivados diariamente (RP=1.75; p=0.033), y tener un bajo nivel socioeconómico, con una mayor probabilidad de no consumir frutas diariamente (RP=3.6; p=0.00). Además, ser mujer incrementó la probabilidad de consumir verduras (RP=0.66; p=0.04) y frutos secos (RP=0.87; p=0.04), y disminuyó el riesgo de consumo de gaseosas (RP=0.59; p=0.03).
Conclusión. Los patrones de consumo alimentario aquí identificados fueron mejores en comparación con lo reportado en estudios similares. Asimismo, las intervenciones se deben enfocar en los trabajadores con una o varias de las siguientes características: hombres, ≤47 años, secundaria completa como máximo nivel educativo y nivel socioeconómico bajo.

Introduction

Healthy eating enables adults to lead a healthy life, reduces the burden of disease, and increases the level of well-being in work settings.[1-3]

The term "dietary pattern" is used to describe the eating patterns of individuals at their main meals (i.e. breakfast, lunch, or dinner) or smaller meals (i.e. mid-morning and mid-afternoon snacks). These patterns are influenced by three fundamental constructs: patterning, which refers to the frequency, regularity, skipping, and timing of meals; format, which relates to the types of food combinations, their sequencing, and their nutrient content; and context, which includes eating with others or with the family, eating in front of the television, or eating outside the home.[4]

The dietary pattern is characterized by diurnal and uninterrupted sequence of eating episodes (meals) and fasting intervals.[5] Meal frequency is of importance in regulating metabolism and body weight, and is inversely associated with body mass index,[6,7] so a relatively stable breakfast-feeding pattern positively influences proper metabolic and circadian regulation.[8]

The dietary pattern has changed over time, resulting in an increase in dietary risks attributed to social changes such as urbanization, the incorporation of women into the labor market, and greater consumption of processed and ultra-processed products.[9,10] This is coupled with low consumption of fruits, vegetables, dried fruit, seeds, and foods rich in omega-3 fatty acids, and high consumption of salt, sugars, and trans and saturated fats.[9]

Ultra-processed products (i.e. packaged snacks, ice cream, chocolates, sweets, cookies, soft drinks, energy drinks, milk-based sugary drinks, and frozen meals such as pizza, hamburgers, among others) have a poor nutritional quality[11,12] due to their high energy content and low nutrient content, and their consumption is perhaps the main cause of weight gain[12] and the incidence of non-communicable diseases (NCDs).[10,13] Moreover, it has been established that the consumption of this type of food can be addictive.[13,14] Conversely, following a healthy diet through the daily consumption of foods from all food groups in adequate amounts allows us to maintain an optimal state of health and to carry out daily activities.[15]

Healthy eating in adults can reduce the risk of illness and death from NCDs such as obesity, hypertension, heart disease, cancer, diabetes mellitus, among others.[9,16] It is critical to prevent these diseases as they are a serious public health problem since, for example, obesity in adults has a major socio-health impact due to the costs and the demand for health services.[17]

Often, work environments, instead of facilitating proper nutrition, are an obstacle to maintaining healthy eating due to the availability of vending machines that deliver unhealthy food. In addition, workers may not have the money to buy quality food, the time to prepare and consume their food, or an adequate place to eat, so they must resort to street food.[18]

The prevalence of overweight and obesity in administrative workers at universities in Latin America varies between 52% and 64%.[19,20] However, this figure is higher in Colombian universities, where, according to Uribe-Bustos *et al.*,[21] it is 61.83% in workers at the Bogotá Campus of the Universidad Nacional de Colombia (UNAL) and, according to Hoyos-Loaiza *et al.*,[22] it is 92.15% in employees of a university in Manizales, Colombia. This situation is worrisome, as these data are even above the prevalence of overweight and obesity estimated for the Colombian population (56.5%) in the *Encuesta Nacional de Situación Nutricional - ENSIN de 2015* (2015 National Survey of Nutritional Status).[23]

Studies carried out in international universities report that the adult working population has inadequate eating habits such as low consumption of fruits, vegetables[20,24] and water,[25] and high consumption of salty foods, soft drinks,[25] sweet foods, and soft drinks/artificial juices.[26] They have also revealed that the prevalence of consumption of breakfast, lunch, dinner and mid-morning and mid-afternoon snacks is 86%, 93%, 91%, 63%, and 25%, respectively.[24]

Few studies have demonstrated the association between dietary patterns and socio-demographic and occupational variables, and the results of the available studies are not conclusive. For example, while da Cruz Ferreira-Silva *et al.*[27] report that there is a relationship between fruit and vegetable consumption with age, sex, income level, educational level, and marital status, but not with other types of food,[27] Gamboa-Delgado *et al.*[28] found no such relationship.

Regarding the desirable dietary pattern in Colombia, the Food-Based Dietary Guidelines (FDBG)[15] recommend daily consumption of milk and derivatives, eggs, whole fruits, fresh vegetables, and water (4-6 glasses); weekly consumption of offal; and consumption ≥2 times/week of dried legumes. On the other hand, the 2010 ENSIN[29] recognizes 5 mealtimes during the day, 3 main meals (breakfast, lunch, and dinner), and 2 snacks (a mid-morning and a mid-afternoon snack).

At the time of writing this article, no studies had been published that showed the dietary pattern of UNAL workers, so the objective of this study was to characterize the dietary pattern of this population and to determine the factors associated with it. The importance of this research lies in the fact that, based on its results, interventions that contribute to promoting healthy eating and increase the well-being of these workers could be proposed. Furthermore, it should be noted that the study was carried out taking into account that the dietary pattern of these individuals is possibly better than that of the general population given their working conditions and labor welfare.

Materials and methods

Study type and sample

Cross-sectional study carried out using data on food consumption in workers at the Bogotá Campus of the UNAL. The universe consisted of 1 409 employees and the sample was chosen by convenience, given that the employees who were interested in the study and signed the informed consent form were included. Pregnant women were excluded, resulting in a final sample of 126 workers.

Procedures

Food consumption patterns were measured with an adapted version of the questionnaire on food consumption frequency in the last month taken from the *Encuesta Nacional de Situación Nutricional – ENSIN de 2010 (2010 National Nutritional Situation Survey)*,[29] which had already been used in a similar study.[30] This instrument was used to ask about the frequency of consumption of 7 food groups, water, and supplements (Annex 1).

Information was collected between October 2017 and June 2018, and was handled by students of the course *Semillero de Promoción de la Salud* (Health Promotion Seedbed) of the UNAL Faculty of Medicine, who contacted the workers by email or visited their work site to conduct the interview.

The questionnaire collected data on the following variables: sex (male or female), socioeconomic stratum (1-6) (Table 1), marital status (single/separated/widowed or married/domestic partnership), age, type of occupation (according to the International Standard Classification of Occupations - ISCO-08 and obtained from the database provided by the University),[31] tenure (in decades), and educational level (incomplete high school, completed high school, technical or associate degree, and undergraduate and postgraduate education).

Table 1. Socioeconomic strata in Colombia according to the National Administrative Department of Statistics.

Stratum	Description
1	Low-Low. Beneficiaries of home utility subsidies.
2	Low. Beneficiaries of home utility subsidies.
3	Low-Middle. Beneficiaries of home utility subsidies.
4	Middle. They are not beneficiaries of subsidies, nor do they pay surcharges; they pay exactly the amount that the company defines as the cost for providing home utilities.
5	Middle-High. They pay surcharges (contribution) on the value of home utilities.
6	High. They pay surcharges (contribution) on the value of home utilities.

Source: Own elaboration based on DANE reports.[32]

The dietary pattern was established on the basis of the frequency of consumption of various food groups in the last month: 1) cereals (and derivatives), roots, tubers, and plantains; 2) fruits and vegetables; 3) milk and dairy products; 4) meats, eggs, legumes, dried fruit, and seeds; 5) fats (fried foods, mayonnaise, heavy cream, butter, margarine); 6) sugars (added sugars and sweets); 7) processed and ultra-processed products; and 8) water and nutritional supplements. The frequency of consumption of each food group was categorized into: daily (consumption of one or more foods from the group once, twice, or more times in a day); weekly (consumption of one or more foods from the group once, two to three, or four to five times a week); biweekly (consumption of one or more foods from the group once every two weeks); monthly (consumption of one or more foods from the group once a month); and never (no consumption of foods from the group in the last month).

In addition, the proportion of workers who complied with the recommendations for daily consumption of fruits, vegetables, milk/dairy products, eggs, dried fruit and water, and weekly consumption of meat (at least once/week) and legumes (at least twice/week) was established according to the recommendations of the Colombian GABA[15] and the recommendation of the Pan American Health Organization (PAHO)[10] of not consuming artificial juices, fast foods, soft drinks, packaged foods, sweets, and cold meats. Participants were also asked about their eating habits at different mealtimes throughout the day (breakfast, mid-morning snack, lunch, mid-afternoon snack, and dinner).

Statistical analysis

Data are described using absolute and relative frequencies for categorical variables and means and standard deviations (SD) for quantitative variables. To determine the association between the independent variables (sociodemographic and occupational) and the dependent variables (recommended consumption pattern of each food or food group and daily consumption of the 3 main meals), bivariate analyses were performed using Pearson's chi-square or Fisher's exact tests and calculating prevalence ratios (PR) with their respective 95% confidence intervals (95%CI); a significance level of $p<0.05$ was considered.

It should be mentioned that the following variables were recategorized for the analysis: age (≤47 and ≥48 years), educational level (high school and technician/professional),

stratum (low and medium/high), marital status (with a partner and without a partner), and position (administrative/managerial [includes university/specialized professional, executive secretary, advisors, administrative assistants, cashier, coordinator and head of unit] and operators [includes auxiliary, orderly, mechanical driver, operator, technician, and officer]). Statistical analysis was performed in SPSS Statistics (version 26).

Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Medicine of the UNAL according to Minutes No. 016-244-17 of October 26, 2017. Similarly, the ethical principles for biomedical research involving human subjects of the Declaration of Helsinki[33] and the scientific, technical and administrative standards for health research of Resolution 8430 of 1993 of the Colombian Ministry of Health[34] were observed, guaranteeing the protection and confidentiality of the participants' data and their exclusive use for this research. Informed consent was obtained from the participants.

Results

Of the 126 participants, 53.97% were women. The average age was 46.85±8.65 years, with ages ranging from 25 to 64 years. In addition, 42.06% were between 50 and 59 years old. The average length of tenure was 16.15±10.27 years (minimum length of time 0.67 and maximum of 42 years), and 35.71% had worked for ≤10 years at the university. Likewise, 50.79% were from the lower-middle stratum, 30.95% had a technical/associate degree, 68.25% were married or living in a domestic partnership, and 31.58% had an occupation classified as technicians and mid-level professionals (Table 2).

Table 2. Characterization of the administrative staff of the Universidad Nacional de Colombia, Bogotá campus. 2017-2018.

Characteristic		n	Percentage (%)
Total		126	100
Sex	Male	58	46.03
	Female	68	53.97
Age (years)	<30	6	4.76
	30-39	22	17.46
	40-49	40	31.75
	50-59	53	42.06
	≥60	5	3.97
Educational level	Incomplete secondary education	10	7.94
	Completed secondary education	18	14.29
	Technical or associate degree	39	30.95
	Undergraduate	27	21.43
	Postgraduate	32	25.4
Stratum	1. Low-low	1	0.79
	2. Low	36	28.57
	3. Middle-low	64	50.79
	4. Middle	24	19.05
	5. Middle-high	1	0.79
	6. High	0	0

Table 2. Characterization of the administrative staff of the Universidad Nacional de Colombia, Bogotá campus. 2017-2018. (Continued)

Characteristic		n	Percentage (%)
Marital status	Single/separated/widowed	40	31.75
	Married/domestic partnership	86	68.25
Occupation (ISCO-08)	Managers	4	3.01
	Elementary occupations	8	6.02
	Craft related trades workers	27	20.30
	Plant and machine operators, and assemblers	11	8.27
	Clerical support workers	16	12.03
	Professionals	25	18.80
	Technicians and associate professionals	42	31.58
Tenure (years)	≤10	45	35.71
	11-20	38	30.16
	21-30	29	23.02
	31-42	14	11.11

The foods most consumed daily were fruits (whole and in juice) and cereals and derivatives (84.13% and 80.95%, respectively); only 56.35% of the participants ate vegetables daily (Table 3).

Regarding the food consumption recommendations or food groups of the Colombian GABAS15 and PAHO,10 we found that 13.49%, 32.54% and 69.05% of the participants complied with the recommended daily consumption of dried fruit, eggs and milk, and dairy products, respectively. We also observed that 45.83% had not consumed sweets in the last month, and that 44.17% added sugar, raw sugarcane or honey to their food preparations on a daily basis. Although 69.05% of the workers consumed dry legumes weekly, only 40.48% complied with the recommendation of consumption ≥2 times/week. Also, 9.52% consumed offal once a week, of which 7.35% were women (Table 3).

On the other hand, a low proportion of daily consumption of fried foods (6.35%) and mayonnaise, heavy cream, butter and/or margarine (7.50%) was found (Table 3).

Regarding the consumption of processed and ultra-processed products, it was found that in the last month 76.19%, 65.08% and 64.17% of the participants had not drunk boxed juices or powdered soft drinks, packaged foods, or soft drinks, respectively. On the contrary, there was a lower proportion of consumption of fast foods and cold/processed meats in the last month (46.83% and 34.92%, respectively), with the weekly intake of these foods being the most representative (25.40% and 44.44%). Finally, 84.13% complied with the daily water consumption recommendation (Table 3).

Regarding mealtimes, 92.9% of the participants had breakfast, 98.4% had lunch, 91.3% had dinner, 69.00% had a mid-morning snack, and 43.70% had a mid-afternoon snack.

As for the place of origin of the three main meals, 79.37%, 52.38% and 85.71% of workers reported eating breakfast, lunch and dinner, respectively, at home or bringing meals prepared at home, while 46.03%, 46.83% and 24.06% consumed lunch, mid-morning snacks and mid-afternoon snacks at university cafeterias or restaurants near the university.

The most frequently omitted main meal was dinner (8.73%), followed by breakfast (7.14%), and lunch (1.59%). 30.16% and 56.35% of the participants did not have a mid-morning or mid-afternoon snack, respectively.

Table 3. Frequency of food consumption in the last month among workers of the Universidad Nacional de Colombia, Bogotá Campus. 2018.

Feeding practices		n total	Diary		Weekly		Biweekly		Monthly		Never	
			n	%	n	%	n	%	n	%	n	%
Cereals, roots, tubers, and plantains	Cereals and derivatives	126	102	80.95	23	18.25	1	0.79	0	0.00	0	0
	Roots, tubers, and plantains	125 *	69	55.20	52	41.60	0	0.00	0	0.00	4	3.20
Fruits and vegetables	Whole fruits	126	69	54.76	46	36.51	2	1.59	0	0.00	9	7.14
	Fruits in juice	125 *	85	68.00	29	23.20	0	0.00	1	0.80	10	8.00
	Fruits (whole and in juice)	126	106	84.13	16	12.70	1	0.79	0	0.00	3	2.38
	Vegetables	126	71	56.35	54	42.86	0	0.00	0	0.00	1	0.79
Milk and dairy products	Milk and dairy products (not cheese)	126	62	49.21	49	38.89	1	0.79	2	1.59	12	9.52
	Cheese	123 *	36	29.27	71	57.72	3	2.44	2	1.63	11	8.94
	Whole milk and dairy products	126	87	69.05	27	21.43	0	0.00	1	0.79	11	8.73
Meat, eggs, legumes, dried fruit, and seeds	Meat and chicken	126	85	67.46	40	31.75	0	0.00	0	0.00	1	0.79
	Fish	126	2	1.59	70	55.56	30	23.81	9	7.14	15	11.90
	Offal	126	0	0.00	12	9.52	17	13.49	28	22.22	69	54.76
	Dried legumes	126	8	6.35	87	69.05	10	7.94	8	6.35	13	10.32
	Egg	126	41	32.54	82	65.08	1	0.79	1	0.79	1	0.79
	Dried fruit and dried fruit	126	17	13.49	42	33.33	15	11.90	7	5.56	45	35.71
Fats	Fried foods	126	8	6.35	76	60.32	8	6.35	6	4.76	28	22.22
	Mayonnaise, heavy cream, butter, margarine	120 *	9	7.50	40	33.33	10	8.33	4	3.33	57	47.50
Sugars	Added sugars	120 *	53	44.17	18	15.00	2	1.67	2	1.67	45	37.50
	Sweets	120 *	19	15.83	30	25.00	11	9.17	5	4.17	55	45.83
Processed and ultra-processed products	Packaged foods	126	4	3.17	29	23.02	6	4.76	5	3.97	82	65.08
	Fast food	126	1	0.79	32	25.40	14	11.11	20	15.87	59	46.83
	Soft drinks	120 *	8	6.67	27	22.50	6	5.00	2	1.67	77	64.17
	Artificial juices (boxed or powdered soft drinks)	126	2	1.59	17	13.49	5	3.97	6	4.76	96	76.19
	Cold meats, processed meats	120 *	1	0.79	56	44.44	8	6.35	11	8.73	44	34.92
Water and nutritional supplements	Water	126	106	84.13	14	11.11	2	1.59	0	0.00	4	3.17
	Supplements	126	11	8.73	5	3.97	0	0.00	1	0.79	109	86.51

* The number of participants is lower due to failure to respond to these items.

Concerning the factors related to the consumption pattern, it was found that being a female reduces the risk of not meeting the daily recommendation for vegetable and dried fruit consumption by 44% (PR=0.66; p=0.04) and 13% (PR=0.87; p=0.04), respectively, as well as the risk of consuming soft drinks by 41% (PR=0.59; p=0.03), and increases the risk of not meeting the recommended weekly consumption of dried legumes (≥2 times/week) by 70% (PR=1.7; p=0.00), compared to being male (Table 4).

It was also found that: i) being 47 years old or younger was associated with a higher likelihood of consuming fast foods (PR=2.24; p=0.00), soft drinks (PR=2.63; p=0.00), cold meats (PR=1.34; p=0.04), and artificial juices (PR=2.73, p=0.00) in the last month compared to being 48 years or older; ii) having a high school degree was associated with a higher likelihood of not consuming milk and dairy products on a daily basis (PR=1.75; p=0.033) compared with having a higher education level (technical or higher); iii) having a low socioeconomic status (stratum 1 and 2) was associated with a higher probability of not consuming fruit daily (PR=3.6; p=0.00) compared to having a middle/higher stratum, and iv) working in an operator position increased the probability of not complying with daily water consumption recommendations (PR=2.74; p=0.02) compared with holding administrative/managerial positions. No significant association was found between marital status and food/water intake and consumption of three meals a day (Table 4).

Table 4. Sociodemographic factors associated with the consumption of food, water and daily meals among workers of the Universidad Nacional de Colombia, Bogotá Campus. 2018.

Characteristic		Vegetables (daily)					Fruit including juices (daily)					Whole fruit (daily)				
		No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *
Sex	Female	24	44	0.66	0.44-0.98	0.04	11	57	1.04	0.46-2.34	0.92	30	38	0.95	0.65-1.39	0.78
	Male	31	27	Reference			9	49	Reference			27	31	Reference		
Age (years)	≤47	28	30	1.22	0.82-1.8	0.33	8	50	0.78	0.34-1.78	0.55	29	29	1.21	0.83-1.78	0.32
	≥48	27	41	Reference			12	56	Reference			28	40	Reference		
Educational level	High School	11	17	0.88	0.52-1.46	0.6	7	21	1.88	0.83-4.27	0.15 †	12	16	0.93	0.58-1.5	0.77
	Technical/professional	44	54	Reference			13	85	Reference			45	53	Reference		
Stratum	Low	17	20	1.07	0.7-1.64	0.74	12	25	3.6	1.6-8.09	0.00	19	18	1.2	0.8-1.78	0.37
	Middle/high	38	51	Reference			8	81	Reference			38	51	Reference		
Position	Operator	23	35	0.84	0.56-1.26	0.4	9	49	0.84	0.38-1.81	0.92	27	31	1.06	0.72-1.55	0.78
	Administrative/ managerial	32	36	Reference			13	57	Reference			30	38	Reference		
Marital status	With a partner	41	45	1.36	0.84-2.19	0.18	14	72	1.09	0.45-2.62	0.86	40	46	1.09	0.71-1.67	0.67
	Without a partner	14	26	Reference			6	34	Reference			17	23	Reference		
Characteristic		**Milk and dairy products (daily)**					**Legumes (≥2 times/week)**					**Egg (daily)**				
		No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *
Sex	Female	19	49	0.81	0.48-1.36	0.43	50	18	1.7	1.22-2.36	0.00	50	18	1.22	0.95-1.57	0.11
	Male	20	38	Reference			25	33	Reference			35	23	Reference		
Age (years)	≤47	16	42	0.82	0.48-1.39	0.45	37	21	1.14	0.86-1.52	0.37	40	18	1.04	0.82-1.33	0.74
	≥48	23	45	Reference			38	30	Reference			45	23	Reference		
Educational level	High School	13	15	1.75	1.04-2.93	0.04	15	13	0.88	0.59-1.28	0.47	18	10	0.94	0.69-1.28	0.68
	Technical/professional	26	72	Reference			60	38	Reference			67	31	Reference		
Stratum	Low	13	24	1.2	0.69-2.07	0.51	19	18	0.82	0.57-1.16	0.23	25	12	1.00	0.77-2.28	0.99
	Middle/high	26	63	Reference			56	33	Reference			60	29	Reference		
Position	Operator	19	39	1.11	0.66-1.88	0.69	36	22	1.08	0.81-1.44	0.59	38	20	0.95	0.74-1.21	0.67
	Administrative/ managerial	20	48	Reference			39	29	Reference			47	21	Reference		
Marital status	With a partner	28	58	1.18	0.66-2.13	0.57	50	36	0.93	0.69-1.25	0.64	59	27	1.06	0.81-1.38	0.69
	Without a partner	11	29	Reference			25	15	Reference			26	14	Reference		
Characteristic		**Dried fruit (daily)**					**Artificial juices (never)**					**Fast foods (never)**				
		No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *
Sex	Female	55	13	0.87	0.76-0.99	0.04	15	53	0.85	0.47-1.59	0.62	31	37	0.73	0.53-1.02	0.06
	Male	54	4	Reference			15	43	Reference			36	22	Reference		
Age (years)	≤47	48	10	0.92	0.8-1.06	0.26	21	37	2.73	1.36-5.49	0.00	44	14	2.24	1.56-3.22	0.00
	≥48	61	7	Reference			9	59	Reference			23	45	Reference		
Educational level	High School	24	4	0.99	0.83-1.17	1.00 †	4	24	0.54	0.2-1.41	0.18	13	15	0.84	0.54-1.3	0.42
	Technical/professional	85	13	Reference			26	72	Reference			54	44	Reference		
Stratum	Low	35	2	1.14	1-1.28	0.15 †	9	28	1.04	0.52-2.03	0.93	20	17	1.02	0.72-1.46	0.90
	Middle/high	74	15	Reference			21	68	Reference			47	42	Reference		
Position	Operator	50	8	0.99	0.86-1.14	0.93	16	42	1.34	0.72-2.5	0.36	32	26	1.07	0.77-1.49	0.68
	Administrative/ managerial	59	9	Reference			14	54	Reference			35	33	Reference		
Marital status	With a partner	76	10	1.07	0.91-1.26	0.37	19	67	0.8	0.42-1.52	0.51	48	38	1.18	0.8-1.71	0.38
	Without a partner	33	7	Reference			11	29	Reference			19	21	Reference		

Table 4. Sociodemographic factors associated with the consumption of food, water and daily meals among workers of the Universidad Nacional de Colombia, Bogotá Campus. 2018. (Continued)

Characteristic		Packaged food (never)					Soft drinks (never)					Sweets (never)				
		No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *
Sex	Female	24	44	1.02	0.63-1.65	0.92	18	48	0.59	0.36-0.96	0.03	40	26	1.3	0.92-1.85	0.12
	Male	20	38	Reference			25	29	Reference			25	29	Reference		
Age (years)	≤47	24	34	1.4	0.87-2.27	0.16	30	26	2.63	1.64-4.54	0.00	30	26	0.98	0.7-1.36	0.9
	≥48	20	48	Reference			13	51	Reference			35	29	Reference		
Educational level	High School	8	20	0.78	0.4-1.48	0.42	9	19	0.87	0.48-1.59	0.64	13	15	0.82	0.53-1.27	0.35
	Technical/professional	36	62	Reference			34	58	Reference			52	40	Reference		
Stratum	Low	12	25	0.9	0.52-1.55	0.70	12	25	0.87	0.5-1.49	0.6	19	18	0.93	0.64-1.34	0.68
	Middle/high	32	57	Reference			31	52	Reference			46	37	Reference		
Position	Operator	25	33	1.54	0.95-2.5	0.07	20	36	0.99	0.61-1.6	0.98	35	21	1.33	0.96-1.86	0.09
	Administrative/ managerial	19	49	Reference			23	41	Reference			30	34	Reference		
Marital status	With a partner	28	58	0.81	0.5-1.32	0.41	26	54	0.76	0.47-1.23	0.28	39	41	0.75	0.54-1.03	0.09
	Without a partner	16	24	Reference			17	23	Reference			26	14	Reference		
Characteristic		Cold meats (never)					Water (daily)					Main meals (3 per day)				
		No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *	No	Yes	PR	95%CI	*p*-value *
Sex	Female	39	27	0.86	0.66-1.13	0.29	9	59	0.69	0.31-1.56	0.38	13	55	1.38	0.62-3.1	0.42
	Male	37	17	Reference			11	47	Reference			8	50	Reference		
Age (years)	≤47	41	15	1.34	1.02-1.76	0.04	10	48	1.1	0.68-2.62	0.69	7	51	0.59	0.25-1.35	0.2
	≥48	35	29	Reference			10	58	Reference			14	54	Reference		
Educational level	High School	18	10	1.02	0.74-1.4	0.90	3	25	0.62	0.19-1.96	0.56 †	7	21	1.75	0.78-3.91	0.24 †
	Technical/professional	58	34	Reference			17	81	Reference			14	84	Reference		
Stratum	Low	23	14	0.97	0.72-1.31	0.86	5	32	0.80	0.31-2.04	0.64	9	28	1.8	0.83-3.91	0.14
	Middle/high	53	30	Reference			15	74	Reference			12	77	Reference		
Position	Operator	34	22	0.93	0.7-1.22	0.58	14	44	2.74	1.12-6.66	0.02	8	50	0.72	0.32-1.62	0.42
	Administrative/ managerial	42	22	Reference			6	62	Reference			13	55	Reference		
Marital status	With a partner	49	31	0.90	0.69-1.2	0.50	13	73	0.86	0.37-1.99	0.73	11	75	0.51	0.24-1.1	0.09
	Without a partner	27	13	Reference			7	33	Reference			10	30	Reference		

PR: Prevalence ratio; 95%CI: 95% confidence interval.
* Pearson's chi-square test *p*-value.
† Fisher's exact test *p*-value.

Discussion

In the present study, most participants reported consuming fruits daily (84.13%), thus complying with the recommendations of the Colombian GABA[15] of including whole fruits and fresh vegetables in each meal. This number is higher than what has been reported in other research carried out in Latin America. For example, Rosales-Hidrobo,[35] in a study conducted in 70 workers of the Ministry of Agriculture and Livestock of Ecuador, reported daily fruit consumption in 75.7% of the participants (40% 2-3 times a day and 35.7% once a day); Liska de León & García,[24] in a study conducted in 125 employees of the Faculty of Chemistry and Pharmacy of a university in Guatemala (69 professors and 56 administrative and service personnel), found that 55% of the administrative workers

complied with this recommendation; and Tonini *et al.*,[25] in a study of 130 employees of a Brazilian university, found that only 19.2% of the participants ate fruit daily, although the latter study only inquired about consumption during the working day.

The foregoing suggests that UNAL employees have better fruit consumption habits, which can be attributed to better knowledge of healthy eating. In this sense, in order to increase daily fruit consumption,[15,36] it is recommended to offer these foods on campus, thereby improving the intake of vitamins, minerals, and fiber.[37]

Daily vegetable consumption in the present study (54.14%) was higher than what was reported by the 2010 ENSIN[29] for the Colombian population (5-64 years) (9.6% cooked vegetables and 16.1% raw vegetables), which could be attributed to the fact that vegetable consumption was higher in women, who had a slight predominance in our sample (53.97%). Moreover, this could also be related to the fact that 52.38% and 85.71% of workers ate lunch and dinner, respectively, at home, or alternatively such meals were prepared at home, so one might expect a high probability of including vegetables in these home preparations compared to the lunch/dinner options available at the university and nearby places such as cafeterias and restaurants, where one may choose not to include this food group on the plate.

In the present study, only 40.48% of the workers complied with the weekly legume consumption recommendation established by the Colombian GABA15 (≥2 times/week), with these foods being important because of their protein, fiber, vitamin, and mineral content. Also, consumption was higher in men than in women (26.19% vs. 14.285), a result similar to that reported by Domínguez-Gabriel *et al.*,[38] who, in a group of 141 workers from a higher education institution in Medellín (Colombia), found that each week, on average, men consumed 2 servings of legumes while women consumed 1 serving, and by Santín *et al.*,[39] who, in a study conducted with data from the 2019 Brazilian National Health Survey that included 88 531 adults, found that 74.9% of men and 62.5% of women consumed legumes according to healthy food consumption markers for this country.

The frequency of daily egg consumption in the present study (32.54%) was higher than that reported in the 2010 ENSIN[29] (27.7%), but similar the one described by Chamorro-Pinchao,[8] who, in a study conducted in 182 workers of the Alpina company headquarters in San Gabriel (Ecuador), found that 32.4% consumed eggs daily. It should be noted that the Colombian GABA[15] recommends consuming eggs on a daily basis due to their high biological value protein content and their low cost.

On the other hand, although the GABA[15] in Colombia recommends consuming milk and dairy products every day, only 69.05% of the workers complied with this recommendation. However, this proportion is higher than what was described in the 2010 ENSIN[29] (48.7%) and what was reported in the studies by Rosales-Hidrobo[35] (52.9%) and Chamorro-Pinchao[8] (53.2%). This demonstrates the need to promote better habits, as these foods are an important source of protein, calcium, and vitamins.[37]

An outstanding finding is that the frequency of daily consumption of added sugars in the present study (44.17%) was much lower than the one reported in the 2010 ENSIN[29] (94.6%). Although the Rosales-Hidrobo[35] study, as the present study, only included workers, the difference with the ENSIN finding could be explained by the inclusion of children and adolescents in the national survey. In contrast, Rosales-Hidrobo[35] reported a high daily sugar consumption (92%). At this point, it is worth noting that the recommendation of the Colombian GABA[15] is to reduce the consumption of this group of foods with added sugars in order to maintain a healthy weight, which should be promoted among UNAL workers.

On the other hand, only 7.50% of the participants reported consuming saturated fats (mayonnaise, heavy cream, butter, and/or margarine) on a daily basis, a much lower proportion than reported in the 2010 ENSIN[29] (32.7%). This difference could be attributed to university workers' knowledge of the harmful effects of high consumption of these foods, such as increased risk of obesity and/or cardiovascular disease.[40]

Ultra-processed foods are considered unhealthy due to their high sodium and saturated fat content, which is why PAHO does not recommend their consumption.[10] In the present study, 65.08% of the participants reported that they had not consumed packaged foods in the last month, a figure higher than that reported in the 2010 ENSIN[29] (30.4%), so it could be assumed that, compared to the general Colombian population, UNAL workers have better eating habits and, therefore, a lower risk of developing NCDs.[10] However, this difference could be explained by the differences in the age groups analyzed, since the ENSIN includes children and adolescents, and also by the fact that these workers are more aware of the disadvantages of consuming this group of foods.

In the present study, 64.17% of the workers interviewed did not consume soft drinks in the last month, a finding that differs from that reported in the study by Rosales-Hidrobo,[35] where 57.1% of the participants consumed this type of beverage 2 to 3 times a day. In this sense, although the prevalence of consumption of this type of beverages was not as high in the present study, it is necessary to implement strategies to further reduce the frequency of their consumption among UNAL workers, since these foods are not healthy due to their high content of sugar, colorants, and additives.[40]

Regarding fast foods, 25.40% of the participants reported that they consumed them weekly, this figure being lower than that reported in the 2010 ENSIN[29] (49.4%) and by Rosales-Hidrobo[35] (64.3%). These differences may be related to the age ranges of the population included in the studies, considering that in the present study most of the participants were middle-aged, whereas the 2010 ENSIN[29] included a population between 5 and 64 years of age, and in the Rosales-Hidrobo study[35] a high percentage were young adults. Therefore, it is important to remember that the consumption of fast foods is not recommended because they are rich in saturated fats, sodium, and calories, and may increase the risk of developing NCDs.[10]

In the present study, belonging to a low socioeconomic stratum was a risk factor for not consuming fruit daily, while being a female was a protective factor against not consuming vegetables daily. This is similar to the findings of Da Cruz Ferreira-Silva *et al.*,[27] who found in a study using data from people aged 18 years and older that participated in the National Survey of Risk Factors in Argentina that women and people with income >4 501 Argentine pesos were more likely to consume fruits and vegetables 5 or more times per week. However, it should be pointed out that, given that said study does not include only workers and that the consumption of these foods is measured weekly and not daily, their results are not entirely comparable with ours, but we include this information because no other studies were found that took into account the association of these variables with the consumption of fruits and vegetables. In any case, the findings highlight the need to keep the cost of fruits on the university campus low so that low-income workers can access them, and to promote the consumption of vegetables among male workers.

In the present study, being female also reduced the risk of soft drinks consumption, which coincides with the findings reported by Rombaldi *et al.*,[41] in a study of 972 adults aged 20-69 years in Brazil, in which they found that being male was a risk factor for regular consumption (≥5 times/week) of these beverages. This is attributed to the fact that women are generally more concerned about their diet, take more care of their body image and health, and prefer healthier beverages.

On the other hand, being 47 years of age or younger was a risk factor for soft drink consumption in the present study, which is also consistent with the findings reported by Rombaldi *et al.*[41] for participants between 20 and 39 years of age. It is worth mentioning that such study differs from the present one in that here the recommendation was not to consume soft drinks in the last month, while Rombaldi *et al.*[41] considered regular consumption to be the intake ≥5 times per week of a food, and that no other studies were found that took these variables into account. Considering these results, it is evident that it is necessary to implement actions aimed at limiting the supply of soft drinks in vending machines, replacing them with water, and to promote the use of water filters placed in different parts of the campus. This should be supported by an information, education and communication strategy on the risks of soft drink consumption focused on workers under 48 years of age.

It is worth emphasizing that one limitation of the present study was the small sample size, which is why the results reported here cannot be extrapolated to other populations and new studies with representative samples are needed. Likewise, due to the cross-sectional design of the study, the associations established between the consumption pattern and the sociodemographic and occupational variables analyzed do not allow establishing causality. Consequently, further studies on the subject should focus on the measurement of daily fruit and vegetable consumption and on the effect of the food environment on the consumption pattern of fruits and vegetables.

Conclusions

The dietary patterns identified in the present study were better in comparison with those reported in similar studies. However, among UNAL workers, there was a prevalence of inadequate dietary intake, which occurred more as a function of personal characteristics than of the work structure and environment. Despite the high weekly consumption of fast foods and soft drinks, the daily consumption of fruits, vegetables, and milk and dairy products is noteworthy. The factors associated with consumption were sex, age, educational level, position, and socioeconomic stratum, so interventions should focus on workers with one or more of the following characteristics: men, ≤47 years old, and low socioeconomic status.

Conflicts of interest

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Annex 1. Data collection questionnaire.

# Survey _____	Name of interviewer _____	Administration date: Day _____ Month ___ Year _____
General information		
Name		
ID	(CC) (CE) (T.I) No: _____ Year of entry to the university: _____	
Sex	1. Male ___ 2. Female ___	Age: _____
Educational level	1. Incomplete high school ___ 2. Completed high school ___ 3. Technician or associate ___ 4. Professional ___ 5. Postgraduate ___	
Socioeconomic background information		
Stratum	1___ 2___ 3___ 4___ 5___ 6___	
Marital status	1. Single ( ) 2. Married ( ) 3. Domestic partnership ( ) 4. Separated ( ) 5. Widowed ( )	

Eating habits			
Which of the following meals do you eat on a daily basis?	Yes	No	Place of origin of the food
Breakfast			
Mid-morning snack			
Lunch			
Mid-afternoon snack			
Dinner			

Questionnaire on frequency of food consumption in the last month								
Food	**2 or more times a day**	**Once a day**	**4 to 5 times per week**	**2 to 3 times a week**	**Once a week**	**Biweekly**	**Monthly**	**Never**
1) Cereals and derivatives								
2) Roots, tubers, and plantains								
3) Vegetables and greens								
4) Whole fruits								
5) Fruit juice								
6) Milk and dairy products (kumis, yogurt)								
7) Cheese								
7) Beef and chicken								
8) Fish								
9) Offal								
10) Dried legumes								
11) Egg								
12) Dried fruit								
13) Boxed juices or powdered soft drinks								
14) Soft drinks								
15) Fast foods								
16) Packaged foods								
17) Fried foods								
18) Mayonnaise, heavy cream, butter, margarine								
19) Added sugars (sugar, sugar cane, honey)								
20) Sweets								
21) Cold meats, processed meats								
22) Water								
23) Supplements								