Research Article ISSN 2833-0307

Endocrinology, Metabolism and Nutrition

Prevention of Obesity through Healthy eating and Physical Activity in Intercity Transport Workers in Western Nicaragua

Espinoza Palma Pablo Jerson[1]* García Guzmán Lester Fidel[2], Oviedo Martínez Dulce María[3], Arriaza Altamirano Krysnethe Guadalupe[4], Peralta Soza Marcos Antonio[4] and García Sánchez Dayan José[4]

[1]Bachelor of Science in Nursing, Professor at the National Autonomous University of Nicaragua-León, Professor and Researcher in Health Sciences at UNAN-León, Nicaragua.

[2]Department of Global Public Health, Karolinska Institute, Solna, Sweden.

[3]Nurse Instructor. Bachelor of Science in Nursing, Instructor in the Department of Nursing, Coordinator of the third year of nursing in the regular modality, Member of the Nursing Research and Development Committee, CICSA– UNAN León, Nicaragua.

ORCID ID: 0000-0002-4506-0934

[4]Graduates in Nursing Science from the National Autonomous University of Nicaragua, Nicaragua.

***Correspondence:**
Espinoza Palma Pablo Jerson, Bachelor of Science in Nursing, Professor at the National Autonomous University of Nicaragua-León, Professor and Researcher in Health Sciences at UNAN-León, Nicaragua.

Received: 19 Aug 2026; **Accepted:** 02 Sep 2026; **Published:** 11 Sep 2026

Citation: Espinoza Palma Pablo Jerson, García Guzmán Lester Fidel, Oviedo Martínez Dulce María, et al. Prevention of Obesity through Healthy eating and Physical Activity in Intercity Transport Workers in Western Nicaragua. Endocrinol Metab Nutr. 2026; 5(2): 1-14.

ABSTRACT

The objective of this study was to formulate a preventive strategy for obesity through healthy eating and physical activity in intercity transport drivers in a western municipality. An analytical case-control design was applied, with a sample of 192 participants, equally distributed between cases (50%) and controls (50%).

The average age was 36 years, with a mode of 33 years. All participants were male. 87% came from urban areas and 13% from rural areas. Regarding educational level, 44.3% had incomplete secondary education and 22.4% had completed high school.

Regarding eating habits, the intake of food between breakfast and lunch (OR:1.45), the intake of pastries between breakfast and lunch (OR:1.74), and the consumption of Maruchan (OR:1.44) behave as risk factors without statistical significance.

Regarding the intake of carbonated beverages, the intake of juices with natural flavors (OR: 2.76) showed a significant association; regarding physical activity, spending little time going out for a run increases (OR: 5.22) and the low frequency of doing sports increased the probability of developing obesity.

It is recommended to replace processed drinks with water, along with a healthy diet, physical activity, and education about obesity, in order to improve the quality of life of transport workers.

Keywords
Obesity, Eating habits, Physical activity.

Introduction
Obesity is a global problem, characterized by the excessive accumulation of fat, which significantly increases the risk of developing chronic diseases such as cardiovascular disease, diabetes mellitus, and eating disorders. This condition affects all types of populations, including public transport drivers, who are more exposed to risk factors associated with sedentary behavior due to their work [1]. In Latin America, a high prevalence of overweight and obesity was observed among public transport drivers, who present various diagnostic criteria for metabolic syndrome, with obesity being one of the main risk factors [2]. Ecuador highlights that a large proportion of its driver population is overweight or obese, related to dietary habits, making them candidates for developing diseases such as diabetes, hypertension, and eating disorders [3].

In Costa Rica, 76.2% of drivers were overweight or obese, with a prevalence of 48.4% overweight and 27.8% obesity. These results reflect how working conditions in the transportation sector, such as prolonged driving time, extended shifts, and limited access to healthy food, significantly contribute to the development of chronic non-communicable diseases [4].

In Nicaragua, regarding the Among intercity transport workers, there is a high prevalence of obesity and sedentary lifestyles, along with long working hours, which limits the adoption of healthy lifestyles. This is a very common problem in this population group and all these factors could lead to the development of cardiovascular and metabolic diseases, among others. At the Santiago Hospital in Jinotepe (Nicaragua), a prevalence of obesity was found, indicating that 30.6% of workers were overweight. These figures are concerning; transport workers may be predisposed to developing obesity due to working conditions similar to those of other affected groups.

Background

In 2016, Flores J. conducted a prospective, cross-sectional study of the prevalence and risk factors associated with overweight and obesity in urban transport drivers of the company 3 de octubre SA, demonstrating a prevalence of 49.2% overweight and 28.6% obesity, indicating an odds ratio (OR: 4.6) for those who had worked for more than 3 years, high fat consumption (OR: 10.9), inadequate consumption of fruits/vegetables and fiber (OR: 8.6), and low physical activity (OR: 78) [7].

2020. Berrones D. Conducted a cross-sectional analytical study on Diet and Consumption Habits in Pedicab Drivers. A finding of 69.1% with overweight or obesity was associated with years of experience driving a pedicab ($p = 0.034$), working more than eight hours ($p = 0.066$), consuming soft drinks ($p = 0.885$), sugary drinks ($p = 0.933$), or eating out daily ($p = 0.339$) [8].

In 2024, Canales Y and Gayo M conducted a quantitative analytical study on the risk factors associated with overweight and obesity in urban transport drivers in Ayacucho. They found that 64.2% were overweight and 30.2% were obese. These conditions were associated with work overload (X^2: 23.57, $P<0.05$); 98.1% had inadequate nutrition (X^2: 1.13, $P>0.05$); 85.6% did not engage in intense physical activity (X^2: 25.29, $P<0.05$); and 77.4% consumed alcoholic beverages inappropriately. These conditions were associated with overweight and obesity (X^2: 6.34, $P<0.05$).

Problem statement

Public transport drivers are exposed to working conditions that promote unhealthy habits, such as physical inactivity and poor diet, factors that contribute to the increased prevalence of obesity in this occupational group. [12].

Obesity in drivers not only affects their health, but also has implications for road safety and the efficiency of transport services. Studies have shown that excess weight can decrease reaction time and increase the risk of traffic accidents [13].

Obesity among public transport drivers presents an opportunity to improve their well-being by promoting healthier eating and physical activity. In other countries, it has been observed that small, integrated changes in their routines can improve the health and well-being of transport workers. These initiatives not only help prevent illness but also enable them to perform their jobs with more energy and safety.

Based on the above, the following research question arises:
What is the preventive strategy for obesity through healthy eating and physical activity in intercity transport drivers in a western municipality ?

Justification

Obesity is one of the most prevalent chronic diseases worldwide. It can occur at any stage of life, but tends to manifest from age 18 onwards. It is estimated to be linked to eating disorders and a lack of physical activity. It is a determining factor in the development of other health complications, including physical and mental illnesses, causing an emotional impact.

The intercity bus drivers in western Nicaragua are characterized by demanding work schedules, often running from 6 a.m. to 6 p.m. every day of the week. This same population is also subject to the need to consume various types of food that they can purchase while working, foods that may not be the best choice due to their high sugar and fat content.

Furthermore, this population is subject to schedules that make it difficult for them to perform physical activities, which in turn leads to the progressive accumulation of fat in the body and thus weight gain.

This study will be useful to the different national institutions that study obesity, to employ awareness strategies, and awareness of the effects that the development of obesity entails.

To future researchers, continue conducting research related to the topic, and continue proposing variables for the development of obesity, and in turn determine different strategies to solve the problem.

Goals

General objective

- Analyzing the development of obesity through healthy eating and physical activity in inter-city transport drivers in a municipality in western Nicaragua.

Specific objectives

- To characterize the study population sociodemographically.
- To establish the relationship between obesity and eating habits in intercity transport drivers in a municipality in the west.
- Describe the relationship between obesity and physical activity in intercity transport workers in a western municipality.

Methodology

Study type: Epidemiological Case-control analysis.

Analytical: The state of obesity and its relationship with eating habits and physical activity was described in inter-urban transporters in a municipality in western Nicaragua.

Cases: Inter-city transporters who underwent anthropometric assessments and body mass index and were found to have alterations in their nutritional status.

Controls: Intercity transport operators who underwent testing and obtained values within ranges normal**.**

Area of study: Public transport cooperatives, COBUL, COTRANCUL, Andrés Castro.

Unit of analysis: Inter-city transport drivers aged 20 to 70 years who were found during working hours at transport cooperative agencies.

Study population: The study population consists of 192 inter-urban transporters over 20 years of age from western Nicaragua, which represent 100% of the study population.

Source of information

Primary: The information was received directly from intercity transport drivers because anthropometric assessments of weight and height were carried out using the information collection instrument.

Secondary: Lists of partners and their intercity carriers that were studied, assigned according to work zone.

Definition of the comparison groups

Case definition: Inter-city transporters who, during anthropometric measurements, were found to have a BMI greater than 30 kg/ ^{m2}.

Definition of control: Inter-city transporters who, during anthropometric measurements, were found to have a BMI less than 29 kg/ ^{m2}

Inclusion criteria (cases)

- That meet the case definition.
- Be female or male
- That they have one year of experience working as inter-city transporters in western Nicaragua.
- That they be intercity transport operators in western Nicaragua
- That they are between the ages of 20 and 70.
- Those who want to participate in the study.

Exclusion criteria (controls)

- That they comply with the definition of controls.
- That they are between the ages of 20 and 70.
- Those who want to participate in the study.

Study variables

Dependent

- Obesity

Independent

- Eating habits
- Physical activity

Method of collecting information

Contact was established with the board of directors of each cooperative where the study was carried out, to obtain the necessary permits; a letter was presented addressed to the president of each cooperative to obtain the necessary permits.

Intercity transporters were selected from the list of drivers, and were between the ages of 20 and 70 years old, being taken as our cases and our controls, to apply our instrument which consists of a questionnaire of closed questions**.**

The description of the objectives was explained verbally with prior informed consent and their autonomy to continue or withdraw when they deemed it appropriate, as well as the confidentiality of the information collected, the filling of the instrument that was carried out in the cooperatives in written form, taking height and weight of all the inter-urban transporters who participated.

Scale was used, the important data for our instrument was recorded, such as: Weight, BMI, and a centimeter with which height and ICB were taken, the questionnaire was delivered in printed format giving them the appropriate time for its completion and questions about the questionnaire, quality control was carried out by the researchers to avoid leaving questions unanswered.

Before applying the data collection techniques, permission was requested from the board of directors of each cooperative, and consent was also given to each of the participants in the study.

Following the identification of dietary habits and physical activity that proved to be determining factors for the development of obesity, a matrix of preventive actions was developed based on the modification of each risk behavior; these actions are proposed preventive measures for the development of an altered nutritional state.

The research was conducted in **two methodological phases**. The first phase involved establishing a baseline. This baseline was developed through specialized anthropometric and nutritional measurements of biophysical characteristics, including bioelectrical impedance analysis, body mass index, waist-to-hip ratio, and mid-upper arm circumference. For diagnosis, two groups were established: patients with obesity and overweight, and patients with normal weight but nutritional deficiencies.

Baseline **variable, a survey with closed-ended questions was administered using multiple-choice** Likert or numerical scales, focusing on describing dietary habits, in addition to a questionnaire

focused on physical activity. The second phase of the research involved identifying obesity in the population and determining which dietary and physical activity habits might be contributing to it, based on the baseline data. This process involved profiling the variables with the greatest influence through odds ratio, chi-square, and 95% confidence interval analysis.

Data collection techniques and instruments

A visit was made to each of the cooperatives where the study was to be conducted, presenting the letter requesting the necessary permits. Information was requested from each participant, including their cell phone number, in order to contact them.

Each participant was contacted to schedule the survey for a specific day when they were available to complete the necessary assessments and administer the survey. Afterward, they were given an explanation of the informed consent process, being informed that the study was entirely confidential and voluntary, that their identity would not be revealed, and that the information would be used for academic purposes. Each participant was then given their survey, which they were required to complete individually.

The collection of information was carried out through a questionnaire to the cases and controls containing closed dichotomous questions, Likert scale and multiple choice questions which were marked with an X with a total of 39 questions where the information provided by the inter-city transporters, regarding the sociodemographic data which is composed of 8 items in which it asks for age, sex, academic level, origin, religion, marital status, occupation and working time.

The obesity assessment was performed using the bioimpedance test, which will contain 7 items corresponding to height, weight, BMI, WHR, WC, BHR, and MHR/W. For the eating habits variable, 16 items will be applied in which the frequency of daily intakes, intake of sugars, fats, carbohydrates, carbonated and energy drinks will be evaluated. Finally, the physical activity variable will be evaluated; this contains 11 items that correspond to time of physical activity, type of physical activity, frequency with which physical activity is performed, participation in sports, leisure time, screen time; each question will be structured by objective.

A digital scale was used to measure weight. For the procedure, the participant removed their shoes and wore as little clothing as possible. A recording sheet was used as the instrument.

To obtain the participant's height, the observation technique was used with a measuring tape ranging from 1 cm to 200 cm. For the procedure, the participant stood upright, looking straight ahead, without shoes, with feet together, keeping their back, shoulders, and feet straight. The data obtained was entered into the anthropometric data section of the surveys.

Information processing and analysis

The information was processed using SPSS version 25 statistical software and Microsoft Word. Data analysis was conducted using analytical statistics and 2x2 contingency tables to demonstrate the association of variables between cases and controls. The Chi-square (X^2) test was used; when X^2 is less than 0.05, it indicates an association between the variables, while when X^2 is greater than 0.05, the variables are independent of each other. The Odds Ratio (OR) test was used to calculate the risk associated with a variable; an OR less than 1 indicates a protective factor, while an OR greater than 1 indicates a risk factor. If the OR is equal to 1, the variable has no relationship.

The analysis will be performed using a 95% confidence interval. The lower and upper intervals will be used to determine the risk associated with the variable; if the interval contains 1, there is no statistical significance. The information will be presented in tables to facilitate understanding of the results.

Ethical aspects

Beneficence: it was reported that none of the participants would be affected in their physical, psychological, social or spiritual integrity and every effort was made to protect them as much as possible, even if this meant not participating in our research.

Informed consent: The voluntary participation of the people in the study was requested, explaining to them the objectives of the research and its usefulness, each driver signed the informed consent document indicating that they were willing to participate in the study.

Autonomy: It was explained that each participant has the freedom to withdraw from this study whenever they deem it appropriate, with the right to decide whether the information provided during their participation can be used in the study.

Anonymity: They were informed that the interview does not include a name because the information is completely anonymous and does not expose information to third parties, only for the purposes of our research.

Confidentiality: Participants were informed that the information would not be disclosed, being handled solely by the research team and used only for study purposes.

Results

Sociodemographic data

The study, "Obesity Prevention through Healthy Eating and Physical Activity in Intercity Transport Drivers in a Municipality in Western Colombia", consisted of a total sample of 192 participants, 96 cases and 96 controls. The mean age was 36 years, with a mode of 33. Of the participants, 131 were married and 61 were single. The majority (167) came from urban areas, while 25 came from rural areas. Regarding the participants' educational level, 24 did not complete primary school, while 28 did. Eighty-five did not complete secondary education, while 43 completed high school. Twelve participants had accessed higher or university education. (See Table 1).

Table 1: Sociodemographic data.

Sociodemographic data		Amount	Percentage
Cases		96	50%
Controls		96	50%
Sex	Male	192	100%
Age	Average	36	
	Fashion	33	
Marital status	Single	131	68.2%
	Married	61	31.8%
Origin	Rural	25	13%
	Urban	167	87%
Academic level	Incomplete primary education	24	12.5%
	Completed primary education	28	14.6%
	Incomplete secondary education	85	44.3%
	Bachelor	43	22.4%
	Higher education	12	6.3%
Time worked	Under 10 years old	98	52%
	Older than 9 years	94	49%

Source: Questionnaire applied October 2025.

Eating Habits

According to the association between egg intake and the development of obesity, it was found that 94 cases had a high egg intake and 2 had a normal intake; of the controls, 93 had a high egg intake and 3 had a normal intake. This yielded a chi-square value of 0.50, an odds ratio (OR) of 1.51, a lower limit of 0.24, and a lower limit of 9.28. (See Table 2)

According to the relationship between breakfast meat intake and the development of obesity, it was found that 50 cases had a high breakfast meat intake and 46 had a normal intake; among the controls, 53 had a high meat intake and 43 had a normal intake. This yielded a chi-square value of 0.38, an odds ratio (OR) of 0.88, a lower limit of 0.50, and a lower limit of 1.55. (See Table 2)

According to the relationship between rice intake at breakfast and the development of obesity, it was found that of the cases, 86 had high rice intake at breakfast, and 10 had normal intake; of the controls, 94 had high rice intake, and 2 had normal intake. Thus obtaining a X^2: 0.01, OR: 0.18, Li: 0.03, and Ls: 0.85. (See Table 2)

According to the association between fried plantain consumption at breakfast and the development of obesity, it was found that of the cases, 89 had high plantain consumption and 7 had normal consumption; of the controls, 91 had high plantain consumption and 5 had normal consumption. Thus obtaining a X^2: 0.38, OR: 0.69, Li: 0.21, Ls: 2.28. (See Table 2).

According to the relationship between tortilla consumption at breakfast and the development of obesity, it was found that 93 cases had a high tortilla intake and 3 had a normal intake; of the controls, 89 had a high tortilla intake and 7 had a normal intake. This yielded a chi-square value of 0.16, an odds ratio of 2.43, a lower limit of 0.61, and a lower limit of 9.72. (See Table 2).

According to the relationship between cheese intake at breakfast and the development of obesity, it was found that 91 cases had a high cheese intake and 5 had a normal intake; of the controls, 91 had a high cheese intake and 5 had a normal intake. This yielded a X^2 of 0.62, OR of 1, L1 of 0.28, and Ls of 3.57. (See Table 2).

According to the breakfast cereal intake associated with the development of obesity, it was found that of the cases, 82 had low cereal intake and 14 had high intake; of the controls, 77 had low cereal intake and 19 had high intake. Thus obtaining a X^2: 0.22, OR: 1.44, Li: 0.67, Ls: 3.08. (See Table 2).

According to the analysis of fruit intake at breakfast, which is associated with the development of obesity, it was found that 40 cases had low fruit intake and 56 had high intake; among the controls, 36 had low fruit intake and 60 had high intake. This yielded a X^2 of 0.32, OR of 1.19, L1 of 0.66, and Ls of 2.12. (See Table 2).

Regarding breakfast salad intake and its association with obesity development, it was found that 95 cases had low intake and 1 had high intake; among controls, 93 had low intake and 3 had high intake. This yielded a X^2 of 0.31, OR of 3.06, Li of 0.31, and Ls of 29.99. (See Table 2).

Regarding the consumption of pastries between breakfast and lunch associated with the development of obesity, it was found that 32 cases consumed them, and 64 did not; among the controls, 37 consumed them, and 59 did not. This yielded a X^2 of 0.27, OR of 0.79, Li of 0.44, and Ls of 1.43. (See Table 3)

Regarding the consumption of sweets between breakfast and lunch associated with the development of obesity, it was found that 26 cases consumed sweets, and 70 did not; of the controls, 30 consumed sweets and 66 did not. This yielded a X2: 0.31, OR: 0.81, Li: 0.43, Ls: 1.52. (See Table 3).

Regarding the consumption of fried foods between breakfast and lunch associated with the development of obesity, it was found that 44 cases consumed them, and 52 did not; among the controls, 56 consumed them and 40 did not. This yielded a X^2 of 0.05, OR of 0.60, Li of 0.34, and Ls of 1.07. (See Table 3).

Regarding the consumption of pastries between breakfast and lunch associated with the development of obesity, it was found that 44 cases consumed them, and 52 did not; of the controls, 51 consumed them, and 45 did not. This yielded a X^2 of 0.19, OR of 1.74, Li of 0.42, and Ls of 1.31. (See Table 3)

Regarding bread consumption between breakfast and lunch associated with the development of obesity, it was found that 57

Table 2: Foods eaten at breakfast associated with the development of obesity.

Egg	Cases	Controls	Total	X ²	OR	Lni	Lns
High intake	94	93	187	0.50	1.51	0.24	9.28
Normal intake	2	3	5				
Total	96	96	192				
Meat	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	50	53	103	0.38	0.88	0.50	1.55
Normal intake	46	43	89				
Total	96	96	192				
Rice	**Cases**	**Control**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	86	94	180	0.01	0.18	0.03	0.85
Normal intake	10	2	12				
Total	96	96	192				
Fried ripe plantain	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	89	91	180	0.38	0.69	0.21	2.28
Normal intake	7	5	12				
Total	96	96	192				
Tortilla	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	93	89	182	0.16	2.43	0.61	9.72
Normal intake	3	7	10				
Total	96	96	192				
Bread	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	75	75	150	0.56	1	0.50	1.98
Normal intake	21	21	42				
Total	96	96	192				
Cheese	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
High intake	91	91	182	0.62	1	0.28	3.57
Normal intake	5	5	10				
Total	96	96	192				
Cereal	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
Low intake	82	77	156	0.22	1.44	0.67	3.08
High intake	14	19	33				
Total	96	96	192				
Fruit	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
Low intake	40	36	76	0.32	1.19	0.66	2.12
High intake	56	60	116				
Total	96	96	192				
Salad	**Cases**	**Controls**	**Total**	**X ²**	**OR**	**Lni**	**Lns**
Low intake	95	93	188	0.31	3.06	0.31	29.99
High intake	1	3	4				
Total	96	96	192				

Source: Questionnaire applied October 2025.

cases consumed bread, and 39 did not; among the controls, 56 consumed bread and 40 did not. This yielded a X^2 of 0.50, OR of 1.04, Li of 0.58, and Ls of 1.85. (See Table 3)

Regarding fruit consumption between breakfast and lunch associated with the development of obesity, it was found that 64 cases did not consume fruit and 32 did; among the controls, 58 consumed fruit and 38 did not. This yielded a X^2 of 0.22, OR of 1.31, Li of 0.72, and Ls of 2.36. (See Table 3)

Regarding the consumption of skimmed dairy products between breakfast and lunch associated with the development of obesity, it was found that 3 cases consumed them and 93 did not; 7 controls consumed them and 89 did not. This yielded a X^2 of 0.16, OR of 0.41, Li of 0.10, and Ls of 1.63. (See Table 3)

Regarding the consumption of whole dairy products between breakfast and lunch associated with the development of obesity, it was found that 8 cases consumed them and 88 did not; 7 controls consumed them and 89 did not. This yielded a X^2 of 0.50, OR of 1.15, Li of 0.40, and Ls of 3.32. (See Table 3).

Regarding rice consumption at lunch and its association with the development of obesity, it was found that 94 cases consumed rice and 2 did not; all 96 controls consumed rice at lunch. This yielded a X^2 of 0.24, OR of 0.49, Li of 0.42, and Ls of 0.57. (See Table 4)

Table 3: Foods consumed between breakfast and lunch associated with the development of obesity.

Cakes	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	32	37	69	0.27	0.79	0.44	1.43
No	64	59	123				
Total	96	96	192				
Sweets	Cases	Controls	Total	X^2	OR	Lni	Lns
Yeah	26	30	56	0.31	0.81	0.43	1.52
No	70	66	136				
Total	96	96	192				
Fried foods	**Cases**	**Control**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	44	56	100	0.05	0.60	0.34	1.07
No	52	40	92				
Total	96	96	192				
Confectionery	Cases	Controls	Total	X^2	OR	Lni	Lns
Yeah	44	51	95	0.19	1.74	0.42	1.31
No	52	45	97				
Total	96	96	192				
Bread	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	57	56	113	0.50	1.04	0.58	1.85
No	39	40	79				
Total	96	96	192				
Fruit	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
No	64	58	122	0.22	1.31	0.72	2.36
Yeah	32	38	70				
Total	96	96	192				
Skimmed dairy products	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	3	7	10	0.16	0.41	0.10	1.63
No	93	89	182				
Total	96	96	192				
Whole dairy products	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	8	7	15	0.50	1.15	0.40	3.32
No	88	89	177				
Total	96	96	192				

Source: Questionnaire applied October 2025.

Regarding meat consumption at lunchtime associated with the development of obesity, it was found that 92 cases consumed meat, and 4 did not; of the controls, 95 consumed meat and 1 did not. This yielded a X^2: 0.18, OR: 0.24, Li: 0.02, Ls: 2.20. (See Table 4)

According to the consumption of chicken during lunch, associated with the development of obesity, it was found that of the cases, 86 consumed it, and 10 did not; of the controls, 91 consumed it and 5 did not. Thus obtaining a X^2: 0.14, OR: 0.47, Li: 0.15, Ls: 1.43. (See Table 4)

According to the consumption of fried plantains during lunch, associated with the development of obesity, it was found that of the cases, 65 consumed them, and 31 did not; of the controls, 54 consumed them and 42 did not. Thus obtaining a X^2: 0.06, OR: 1.63, Li: 0.90, Ls: 2.93. (See Table 4)

Regarding the consumption of vegetables at lunch associated with the development of obesity, it was found that of the cases, 27 did not consume vegetables and 67 did; of the controls, 17 did not consume vegetables and 77 did. Thus obtaining a X^2: 0.18, OR: 1.58, Li: 0.81, Ls: 3.10. (See Table 4)

According to the lunchtime legume intake associated with the development of obesity, it was found that of the cases, 22 did not consume legumes and 74 did; of the controls, 16 consumed legumes and 80 did not. Thus obtaining a X^2: 0.18, OR: 1.48, Li: 0.72, and Ls: 3.04. (See Table 4)

According to the consumption of Maruchan noodles at lunch, associated with the development of obesity, it was found that of the cases, 19 consumed them and 77 did not; of the controls, 14 consumed them and 82 did not. Thus obtaining a X^2: 0.22, OR: 1.44, Li: 0.67, Ls: 3.08. (See Table 4)

Regarding hot dog consumption at lunch and its association with the development of obesity, it was found that 18 cases consumed hot dogs and 78 did not; among the controls, 24 consumed hot dogs and 72 did not. This yielded a chi-square value of 0.19, an odds ratio of 0.69, a lower limit of 0.34, and a lower limit of 1.38. (See Table 4).

According to the association between pizza consumption and the development of obesity, it was found that 12 cases consumed pizza and 84 did not; of the controls, 13 consumed pizza and 83 did not.

This yielded a X^2 of 0.50, OR of 0.91, Li of 0.39, and Ls of 2.11. (See Table 4).

Regarding the consumption of french fries at lunch associated with the development of obesity, it was found that of the cases, 26 consumed them and 70 did not; of the controls, 24 consumed them and 72 did not. Thus obtaining a X^2: 0.43, OR: 1.11, Li: 0.58, Ls: 2.12. (See Table 4).

Table 4: Foods eaten during lunch related to the development of obesity.

Rice	Cases	Controls	Total	X^2	OR	Lni	Lns
Yeah	94	96	290				
No	2	0	2	0.24	0.49	0.42	0.57
Total	96	96	192				
Meat	**Cases**	**Control**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	92	95	187				
No	4	1	5	0.18	0.24	0.02	2.20
Total	96	96	192				
Chicken	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	86	91	177				
No	10	5	15	0.14	0.47	0.15	1.43
Total	96	96	192				
Fried ripe plantain	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	65	54	119				
No	31	42	73	0.06	1.63	0.90	2.93
Total	96	96	192				
Vegetables	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
No	27	17	46				
Yeah	69	77	146	0.18	1.58	0.81	3.10
Total	96	96	192				
Legumes	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
No	22	16	38		1.48		3.04
Yeah	74	80	154	0.18		0.72	
Total	96	96	192				
Maruchan	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	19	14	33				
No	77	82	159	0.22	1.44	0.67	3.08
Total	96	96	192				
hot dog	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	18	24	42		0.69		1.38
No	78	72	150	0.19		0.34	
Total	96	96	192				
Pizza	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	12	13	25				
No	84	83	167	0.50	0.91	0.39	2.11
Total	96	96	192				
French fries	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	26	24	50				
No	70	72	142	0.43	1.11	0.58	2.12
Total	96	96	192				
Burgers	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
Yeah	19	20	39				
No	77	76	153	0.50	0.93	0.46	1.89
Total	96	96	192				

Source: Questionnaire applied October 2025.

Regarding meat consumption at dinner and its association with the development of obesity, it was found that 70 cases consumed meat and 26 did not; among the controls, 64 consumed meat and 32 did not. This yielded a X^2 of 0.21, OR of 1.34, Li of 0.72, and Ls of 2.49 (See Table 5).

Regarding egg consumption at dinner and its association with the development of obesity, it was found that 87 cases consumed eggs at dinner and 9 did not; 93 controls consumed eggs and 3 did not. This yielded a X^2 of 0.06, OR: 0.31, Li: 0.08, Ls: 1.19 (See Table 5).

Regarding the consumption of chorizo at dinner and its association with the development of obesity, it was found that 72 cases consumed it and 24 did not; among the controls, 81 consumed it and 15 did not. This yielded a X^2 of 0.07, OR of 0.55, Li of 0.27, and Ls of 1.14 (See Table 5).

Regarding the consumption of gallo pinto at dinner and its association with the development of obesity, it was found that 94 cases consumed it and 2 did not; 95 controls consumed it and 1 did not. This yielded a X^2 of 0.50, OR of 0.49, Li of 0.04, and Ls of 5.54 (See Table 5).

Regarding cheese consumption at dinner and its association with the development of obesity, it was found that 89 cases consumed cheese and 7 did not; 93 controls consumed cheese and 3 did not. This yielded a X^2 of 0.16, OR of 0.41, Li of 0.10, and Ls of 1.63 (See Table 5).

Regarding the association between pizza consumption at dinner and the development of obesity, it was found that 18 cases consumed pizza and 78 did not; among the controls, 26 did and 70 did not. This yielded a X^2 of 0.11, OR of 0.62, Li of 0.31, and Ls of 1.22 (See Table 5).

Regarding the consumption of french fries at dinner and its association with the development of obesity, it was found that 33 cases consumed them and 63 did not; among the controls, 38 consumed them and 58 did not. This yielded a X^2 of 0.27, OR of 0.79, Li of 0.44, and Ls of 1.43 (See Table 5).

Regarding the association between hamburger consumption at dinner and the development of obesity, it was found that 21 cases consumed hamburgers and 75 did not; 27 controls consumed hamburgers and 69 did not. This yielded a X^2 of 0.20, OR of 0.71, Li of 0.37, and Ls of 1.38 (See Table 5).

Regarding the consumption of fried plantains at dinner associated with the development of obesity, it was found that 70 cases consumed them and 26 did not; among the controls, 64 consumed them and 32 did not. This yielded a X2: 0.21, OR: 1.34, Li: 0.72, Ls: 2.49 (See Table 5).

According to the association between soda consumption and the development of obesity, it was found that of the cases, 86 had high soda consumption and 10 had low consumption; of the controls, 87

had high consumption and 9 had low consumption. A chi-square value of 0.50, an odds ratio of 0.8, a lower limit of 0.3, and a lower limit of 2.2 were found (See Table 6).

Table 5: Foods eaten at dinner associated with the development of obesity.

Meat	Cases	Controls	Total	X²	OR	Lni	Lns
Yeah	70	64	134	0.21	1.34	0.72	2.49
No	26	32	58				
Total	96	96	192				
Eggs	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	87	93	180	0.06	0.31	0.08	1.19
No	9	3	12				
Total	96	96	192				
Sausage	**Cases**	**Control**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	72	81	153	0.07	0.55	0.27	1.14
No	24	15	39				
Total	96	96	192				
Gallo pinto	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	94	95	189	0.50	0.49	0.04	5.54
No	2	1	3				
Total	96	96	192				
Cheese	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	89	93	182	0.16	0.41	0.10	1.63
No	7	3	10				
Total	96	96	192				
Pizza	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	18	26	44	0.11	0.62	0.31	1.22
No	78	70	148				
Total	96	96	192				
French fries	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	33	38	71	0.27	0.79	0.44	1.43
No	63	58	121				
Total	96	96	192				
Burgers	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
Yeah	21	27	48	0.20	0.71	0.37	1.38
No	75	69	144				
Total	96	96	192				
Fried Slices	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
No	70	64	134	0.21	1.34	0.72	2.49
Yeah	26	32	58				
Total	96	96	192				
fried chicken	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
No	80	80	160	0.57	1	0.46	2.13
Yeah	16	16	32				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the canned juice intake associated with the development of obesity, it was found that of the cases, 30 had high intake and 66 had low intake, while of the controls, 33 had high intake and 63 had low intake. The X² was 0.37, OR 0.8, and L1 0.4 and Ls 1.5 (See Table 6).

According to the beer intake associated with the development of obesity, it was found that of the cases 53 had high intake, and 43 had low intake; of the controls 55 had high intake, and 41 had low intake, finding a X² of 0.44, an OR of 0.9, and Li of 0.5 and Ls of 1.6 (See table 6).

According to the intake of juices with natural flavors associated with the development of obesity, it was found that of the cases 72 had high intake, and 24 had low intake, of the controls 50 had high intake and 46 had low intake; finding a X² of 0.00, an Lni: 1.49 and Lns 5.08 (See Table 6).

According to the Ensa intake associated with the development of obesity, it was found that of the cases 54 had high intake, and 42 had low intake; of the controls 62 had high intake and 34 had low intake; finding a X² of 0.15, an OR of 0.70, Li of 0.39 and Ls of 1.26 (See Table 6).

Table 6: Consumption of carbonated beverages associated with the development of obesity.

Soda	Cases	Controls	Total	X²	OR	Lni	Lns
High intake	86	87	173	0.50	0.89	0.34	2.97
Low intake	10	9	19				
Total	96	96	192				
Canned juices	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
High intake	30	33	63	0.37	0.86	0.47	1.58
Low intake	66	63	129				
Total	96	96	192				
Beer	**Cases**	**Control**	**Total**	**X²**	**OR**	**Lni**	**Lns**
High intake	53	55	108	0.44	0.91	0.51	1.62
Low intake	43	41	84				
Total	96	96	192				
Juices with natural flavors	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
High intake	72	50	122	0.00	2.76	1.49	5.08
Low intake	24	46	70				
Total	96	96	192				
Ensa	**Cases**	**Controls**	**Total**	**X²**	**OR**	**Lni**	**Lns**
High intake	54	62	116	0.15	0.70	0.39	1.26
Low intake	42	34	76				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the Monster Energy intake associated with the development of obesity, it was found that of the cases, 7 had high intake and 89 had low intake; of the controls, 9 had high intake and 87 had low intake. The X² was 0.39, OR 0.76, Li 0.27, Ls 2.13 (See Table 7).

According to the raptor intake associated with the development of obesity, it was found that of the cases, 71 had high intake and 25 had low intake; of the controls, 81 had high intake and 15 had low intake. Obtaining a X² 0.05, OR 0.52, Li 0.25 and Ls 1.07 (See Table 7).

According to the coffee intake associated with the development of obesity, it was found that of the cases, 55 had high intake and 41 had low intake; of the controls, 63 had high intake and 33 had normal intake. Obtaining a X² of 0.15, OR 0.70, Li 0.39 and Ls 1.26 (See Table 7).

According to the volt intake associated with the development of obesity, it was found that of the cases, 33 had high intake and 63 had low intake; of the controls, 31 had high intake and 65 had low intake. Obtaining a X^2 of 0.43, OR 1.09, Li 0.60 and Ls 2.00 (See Table 7).

According to the Fury intake associated with the development of obesity, it was found that of the cases, 45 had high intake and 51 had low intake; of the controls, 44 had high intake and 52 had low intake. Thus obtaining a X^2: 0.50, OR: 1.04, Li: 0.59, Ls: 1.83 (See Table 7).

Table 7: Consumption of energy drinks associated with the development of obesity.

Monster Energy	Cases	Controls	Total	X^2	OR	Lni	Lns
High intake	7	9	16	0.39	0.76	0.27	2.13
Low intake	89	87	176				
Total	96	96	192				
Abductor	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
High intake	71	81	152	0.05	0.52	0.25	1.07
Low intake	25	15	50				
Total	96	96	192				
coffee	**Cases**	**Control**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
High intake	55	63	118	0.15	0.70	0.39	1.26
Low intake	41	33	74				
Total	96	96	192				
Volt	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
High intake	33	31	64	0.43	1.09	0.60	2.00
Low intake	63	65	128				
Total	96	96	192				
Fury	**Cases**	**Controls**	**Total**	**X^2**	**OR**	**Lni**	**Lns**
High intake	45	44	89	0.50	1.04	0.59	1.83
Low intake	51	52	103				
Total	96	96	192				

Source: Questionnaire applied October 2025.

Physical activity associated with the development of obesity

According to the time spent on daily walks associated with the development of obesity, it was found that of the cases, 91 walked between 0 and 30 minutes, and 5 walked for 31 minutes or more; of the controls, 92 walked between 0 and 30 minutes, and 4 walked for 31 minutes or more. This yielded a X^2 of 0.50, OR of 0.79, Li of 0.20, and Ls of 3.04. (See Table 8).

Table 8: Daily walking time associated with the development of obesity.

Indicator	Cases	controls	Total	X^2	OR	Lni	Lns
From 0-30 min	91	92	183	0.50	0.79	0.20	3.04
31 minutes and up	5	4	9				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the amount of time spent running associated with the development of obesity, it was found that of the cases, 95 ran from 0 to 30 minutes and 1 from 31 minutes or more; of the controls, 91 ran from 0 to 30 minutes and 1 from 31 minutes or more. Obtaining a X^2: 0.10, OR: 5.22, Li: 0.59 and Ls: 45.5. (See table 9).

Table 9: Time spent running associated with the development of obesity.

Indicator	Cases	controls	Total	X^2	OR	Lni	Lns
From 0 to 30 min	95	91	186	0.10	5.22	0.59	45.5
31 minutes and up	1	5	6				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the amount of time spent sitting associated with the development of obesity, it was found that of the cases, 59 spent 6 hours or more sitting, and 37 spent 5 hours or less sitting; of the controls, 66 spent 6 hours or more sitting, and 30 spent 5 hours or less sitting. Thus obtaining a X^2: 0.18, OR: 0.72, Li: 0.39, Ls: 1.31. (See Table 10).

Table 10: Time spent sitting associated with the development of obesity.

Indicator	Cases	controls	Total	X^2	OR	Li	Ls
≥ 6 hours	59	66	125	0.18	0.74	0.39	1.31
≤ 5 hours	37	30	67				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the screen time associated with the development of obesity, it was found that of the cases, 65 spent 4 hours or more, and 31 spent 3 hours or less; of the controls, 72 spent 4 hours or more, and 24 spent 3 hours or less. Thus obtaining a X^2: 0.16, OR: 0.37, Li: 0.37, Ls: 1.31. (See Table 11).

Table 11: Time spent on screens associated with the development of obesity.

Indicator	Cases	controls	Total	X^2	OR	Lni	Lns
≥ 4 hours	65	72	137	0.16	0.69	0.37	1.31
≤ 3 hours	31	24	55				
Total	96	96	192				

Source: Questionnaire applied October 2025.

According to the screen time associated with the development of obesity, it was found that of the cases, 65 spent 4 hours or more, and 31 spent 3 hours or less; of the controls, 72 spent 4 hours or more, and 24 spent 3 hours or less. Thus obtaining a X^2: 0.16, OR: 0.37, Li: 0.37, Ls: 1.31. (See Table 12).

Table 12: How much time spent lying down per day is associated with the development of obesity.

Indicator	Cases	controls	Total	X^2	OR	Lni	Lns
≥ 31 min	16	10	26	0.14	1.72	0.73	4.01
≤ 30 minutes	80	86	166				
Total	96	96	192				

Source: Questionnaire applied October 2025.

Discussion of the Results

Sociodemographic data

Analysis of the sociodemographic data of the studied population revealed that obesity among transport workers is most common in the 33-36 age range, with a mode of 33. The majority of

transport workers were single. Most were from urban areas and had completed high school. The study also found that the majority of transport workers had been employed for more than a year.

Eating habits associated with the development of obesity

An analysis of the relationship between egg consumption at breakfast and obesity revealed an association between the variable and the risk factor, increasing the probability of obesity by 1.51 times in those who consume eggs. However, this finding is not statistically significant. Therefore, it contradicts the findings of the **University of Navarra Clinic**, which state that eggs contain proteins that help strengthen the immune system and contribute to the body's development and growth.

When measuring the relationship between meat consumption at breakfast and obesity, an association was found between the variable and the risk of obesity, indicating a protective factor that reduces the probability of obesity by 0.88 times in people who consume meat. This finding is not statistically significant. This confirms the findings of the **University of Navarra Clinic**, which states that meat consumption supports biological functions and contains animal proteins, considered among the best sources of amino acids, which are obtained from red meat, fish, and chicken [16].

Analyzing the relationship between rice consumption at breakfast and obesity revealed a statistically significant association between the variables, with rice acting as a protective factor, decreasing the likelihood of obesity by 0.18 times in those who consume it. This finding confirms **Manzanas J's** assertion that rice, a polysaccharide carbohydrate and a starch, is fundamental for nutritional health and is considered a primary source of energy [17].

When measuring the relationship between fried plantain consumption at breakfast and obesity, an association was found, indicating a protective factor that reduces the probability of obesity by 0.69 times in those who consume fried plantains at breakfast. This finding is not statistically significant. This contradicts the proposal of **Moreno Cruz MJ**, who states that plantains are part of the natural carbohydrates, providing sugars and starch, which are sources of energy. He argues that consuming them in large quantities and without control can increase the amount of adipose tissue, and that frying adds fat, thus increasing the caloric intake [18].

Analyzing the relationship between tortilla consumption at breakfast and obesity reveals an association between the variable and a risk factor that increases the probability of obesity by 2.43 times in those who consume it at breakfast, although this finding is not statistically significant. This confirms the findings of **Moreno Cruz MJ,** who states that tortillas, being made from corn, are a carbohydrate containing starches. Due to their various components, frequent and uncontrolled consumption of tortillas can lead to increased adipose tissue in different parts of the body [18].

When analyzing the relationship between breakfast cereal intake and obesity, an association was found, with cereal consumption being a risk factor that increases the likelihood of obesity by 1.44 times in those who do not eat cereal for breakfast. This finding is not statistically significant. This confirms the findings of **Manzanas J**, who states that cereals are disaccharide carbohydrates containing maltose. These carbohydrates play a role in various metabolic processes in the body, are digested very quickly, and stimulate appetite. By not consuming these types of foods, we slow down the digestive process and tend to replace them with other high-calorie foods. [17].

When analyzing the relationship between food intake between breakfast and lunch and obesity, an association of variables was found, with a protective factor decreasing the likelihood of obesity by 0.77 times in those who consume food between breakfast and lunch. This data is not statistically significant. This confirms the proposal of the **Ministry of Public Health and Social Welfare of Paraguay**, which states that it is necessary to consume a little of each of 7 food groups every day, distributed across five daily meals: breakfast, mid-morning snack, lunch, afternoon snack, and dinner [19].

When analyzing the relationship between the frequency of food intake between breakfast and lunch and obesity, an association of variables was found, being a risk factor increasing the chances by 1.45 times in those who eat very frequently between breakfast and lunch. This data is not statistically significant, which confirms the proposal of **Lam Cabanillas E**, which says that high food intake and lack of control of the frequency of intake lead to cases of obesity [20].

Analyzing the relationship between pastry consumption at breakfast and lunch and obesity revealed an association between variables, with pastry consumption acting as a protective factor, decreasing the likelihood of obesity by 0.79 times in those who consume it between breakfast and lunch. This finding, however, is not statistically significant. This finding supports **Mundo Entrenamiento 's proposal**, which states that humans need these sugars because they have cells that depend on them [21].

When measuring the relationship between pastry consumption at breakfast and lunch and obesity, an association was found, with pastry consumption acting as a protective factor, decreasing the probability of obesity by 0.43 times in those who consume it. This finding is not statistically significant. According to **Scholz A**, there is a negative impact from sweets consumption, as it interferes with various metabolic alterations. However, these effects are greater when consumed in excess and accompanied by sedentary lifestyles or low levels of physical activity [22].

When analyzing the relationship between sweets intake at breakfast and lunch and obesity, an association of variables was found, without statistical significance, and behaving as a protective factor, decreasing it by 0.81 times in those who ingest it. This contradicts what **Scholz A proposed,** who says that sweets have a direct influence on the development of obesity since they contain glucose

and are present in many of the products that are manufactured and distributed in much of the world today, with sweets being the main sources of sugars [22].

When measuring the relationship between skipping lunch and obesity, a variable relationship was found, with this being a protective factor that decreases the probability by 0.58 times in those who do not skip lunch, a data without statistical significance, and which confirms what is proposed by **the Ministry of Public Health and Social Welfare of Paraguay**, where it says that to maintain a healthy diet it is necessary to consume every day a little of 7 food groups, these should be distributed in five daily meals; breakfast, mid-morning snack, lunch, afternoon snack and dinner [19].

Analyzing the relationship between carbonated beverage consumption and the development of obesity, it was found that beverages like soda showed no association with the variables, nor was the association statistically significant; however, they acted as a protective factor. This contradicts the theory proposed by **Infonutricionsalud**, which states that carbonated beverages are characterized by their high sugar content, which influences the development of obesity [23].

Analysis of the consumption of canned juices as part of carbonated beverages shows no association with other variables, nor is there statistical significance, and they act as protective factors against the development of obesity. This contradicts the theory presented by **Infonutricionsalud.** Since they are part of carbonated beverages, they contain high amounts of sugars, which increases the possibility of causing obesity [23].

Regarding beer consumption, there is no association with other variables, and it acts as a protective factor; however, this association is not statistically significant. This contradicts the theory previously proposed by **Rodríguez Burelo MR**, given that beer contains significant amounts of calories, and its preparation components, along with the gases it contains, influence the development of obesity [24].

Regarding the analysis of the consumption of naturally flavored juices, a perfect association between variables was found, with statistical significance, and this consumption acts as a risk factor that increases the likelihood of developing obesity by 2.76 times. This confirms the theory of **Rodríguez Burelo MR**, since, as part of the carbonated beverage category, these juices contain considerable amounts of sugars and calories, which contributes to an elevated lipid profile and, in turn, leads to obesity [24].

When analyzing the consumption of Ensa as a carbonated beverage, no association between variables was found, nor was there statistical significance; however, it behaves as a protective factor. This contradicts the position of **Rodríguez Burelo MR**, who states that carbonated beverages increase the likelihood of developing obesity, since Ensa is a beverage that contains artificial colorings, sugars, and carbonated water [24].

When analyzing the consumption of Monster Energy as an energy drink, no association between variables was found, and no statistical significance was observed. However, it acted as a protective factor, decreasing the probability of developing obesity by 0.76 times. This contradicts the theory of **Escorihuela Navarro E**, who explains that energy drinks influence the development of obesity due to their high sugar content [25].

Analysis of Raptor consumption reveals an association between variables; however, it is not statistically significant. Furthermore, Raptor acts as a protective factor, reducing the probability of developing obesity by 0.52 times. This contradicts the theory of **Escorihuela Navarro E,** who indicates that the amount of sugar in energy drinks exceeds recommended levels, and this plays a determining role in the development of obesity [25].

Analysis of coffee consumption reveals no statistically significant association between variables. However, coffee acts as a protective factor, decreasing the probability of developing obesity by 0.70 times. This contradicts **Escorihuela Navarro's theory,** as coffee, being an energizing beverage often prepared with considerable amounts of sugar, influences the development of obesity [25].

Analysis of Volt consumption revealed no association between variables, nor any statistical significance. However, it does act as a risk factor, increasing the probability of developing obesity by 1.09 times. This confirms the theory of **Escorihuela Navarro E**, who indicates that the consumption of these beverages does influence the development of obesity due to their high sugar content [25].

Analysis of Fury consumption revealed no association between variables and no statistical significance. However, it acted as a risk factor, increasing the probability of developing obesity by 1.04 times. This confirms the theory of **Escorihuela Navarro E**, who details the risks of high consumption of these beverages and their influence on the development of obesity [25].

Physical activity associated with the development of obesity

When measuring the relationship between daily walking time and the development of obesity, no association was found between the variables. Walking was a protective factor that reduced the likelihood of developing obesity by 0.79, but this finding was not statistically significant. The WHO states that walking 30 minutes daily reduces the risk of heart disease and stroke; adopting daily walking could prevent millions of deaths worldwide [26].

When observing the frequency of walking in relation to the development of obesity, no association was found between variables, although walking was a protective factor that decreased the likelihood of developing obesity by 0.74, without statistical significance. **Johnson A. Nathan** states that walking does influence weight loss, provided it is done efficiently [27].

When analyzing the relationship between time spent running and the development of obesity, no association was found between the variables. Running is a risk factor that increases the probability of

obesity by 5.22 times in those who run for less than 30 minutes, although this difference is not statistically significant. According to **Ana María Contreras**, engaging in 150 minutes of moderate-intensity activity per week, or 75 minutes of vigorous-intensity activity, or a combination of both, three to five times a week for 30 to 60 minutes per day, limits the development and progression of chronic diseases and disabling conditions [28].

When measuring the relationship between time spent sitting and the development of obesity, no association was found between variables. Sitting time was identified as a protective factor, decreasing the probability by 0.74 times in those who rest for more than 5 hours, although this difference was not statistically significant. This aligns with the findings of Aquino JM et al. Drivers' free time is usually very limited, making it difficult to carry out [Source: Questionnaire applied October 2025] [29].

When analyzing the relationship between daily rest time and the development of obesity, no association was found between variables. Rest time was found to be a protective factor, decreasing the probability by 0.69 times in those who rest for more than 3 hours, although this finding was not statistically significant. According to **Aquino JM**, the lack of adequate rest areas during the workday for transport workers negatively impacts both their physical and emotional well-being, potentially increasing stress and decreasing their quality of life [29].

When analyzing the relationship between time spent lying down per day and the development of obesity, no association was found between variables. While it is a risk factor that increases the probability by 0.69 times in those who rest for more than 30 minutes, this difference is not statistically significant. According to Aquino JM, for drivers, free time is very limited and they often lack comfortable places to rest, affecting their physical and emotional well-being and increasing stress [29].

When examining the relationship between screen time and the development of obesity, no association was found between variables. Screen time was identified as a protective factor, decreasing the likelihood of developing obesity by 0.69, though this difference was not statistically significant. **Ortiz R,** Bermúdez V, et al. found that spending more than two hours a day in front of electronic devices decreases physical activity levels, promotes the consumption of unhealthy foods, and is linked to an increased body mass index [30].

Conclusions

Sociodemographic data

The study included a sample of 192 participants, of which 96 were cases and 96 were controls. Among these, the most frequent age was 33 years and the mean was 36 years. The majority of participants were male, from urban areas, and 131 were single. The most common level of education they had accessed was incomplete secondary school.

Eating habits

The number of times food is consumed during the day is not associated with the development of obesity in transport workers, behaving as a protective factor that decreases the probability of developing this condition by 0.69 times.

The consumption of juices with natural flavors is associated with the development of obesity in transport workers; therefore, it acts as a risk factor that increases the possibility of developing this condition by 2.76 times.

Physical activity

Not going for a run is not associated with the development of obesity in truck drivers; however, it acts as a risk factor that increases the probability of developing this condition by 1.13 times.

The amount of rest time they have during the day is not associated with the development of obesity in transport workers; however, it acts as a protective factor that reduces the possibility of developing this condition by 0.69 times.

Recommendations

Addressed to the authorities of the intercity transport cooperatives COBUL, COTRANCUL, Andrés Castro

- Conduct ongoing training on the importance of proper eating habits and physical activity.
- Develop informative talks in conjunction with the Ministry of Health, promoting nutritional health and providing medical check-ups to transporters.
- Provide information through booklets or brochures about appropriate physical activities that can be done during free time during the workday.

To the carriers

- Implement routines that involve physical activity, such as walking.
- Improve eating habits by consuming a nutritious and balanced diet, reducing the consumption of high-calorie foods, carbohydrates, and junk food.
- Encourage employees to drink water during the workday and thus eliminate the consumption of energy and carbonated drinks.

To future researchers

- Use the study as support for future research and explore other study variables that are related to the independent variable.
- To carry out proper and efficient management of the data provided by this research for new research, based on eating habits and physical activity in transporters of León

References

1. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
2. https://www.scielosp.org/article/rsap/2017.v19n4/499-505/es/

3. Escobar Sornoza J, Cárdenas Anchundia K. Eating habits and obesity in public transport drivers [Undergraduate thesis]. La Libertad (EC): Santa Elena Peninsula State University. 2016.
4. Sequeira Arce Ma Paola. Costa Rican Journal of Public Health. Anthropometric evaluation and nutritional education for overweight and obese bus drivers. 2025.
5. Espinoza Pablo. Eating habits and sedentary behavior related to obesity in intercity transporters of COBUL, CONSTRACUL, COTSUMIL and COOTRULA of the municipality of León, Third quarter 2020 [Bachelor's monograph in Nursing]. León (NI): National Autonomous University of Nicaragua, UNAN-León. 2021.
6. https://repositorio.unan.edu.ni/id/eprint/21376/
7. Flores J. The prevalence and risk factors associated with overweight and obesity in urban transport drivers of the company 3 de octubre SA Arequipa Peru 2016. National University of San Agustín. 2025.
8. https://www.researchgate.net/publication/346851438
9. Lam Cabanillas E. Relationship between feeding frequency and timing with overweight and obesity in adults from Trujillo. Faculty of Human Medicine URP. 2022.
10. https://repositorio.udh.edu.pe/bitstream/handle/20.500.14257/5844/Iturrizaga%20Nazar%2c%20Clemencia%20Carmen.pdf?sequence=1&isAllowed=y
11. https://repositorio.unsch.edu.pe/items/8c872e09-2d81-4503-8f49-521db54088d7
12. Cordero MA, Fonseca M, Fletes AM. Cardiovascular risk factors in the urban population of Nicaragua. Rev Universita (UNAN-León). 2015; 1: 23-33.
13. https://alianzasalud.org.mx/2016/06/obesos-85-de-choferes-alertan-de-riesgos/
14. https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight
15. https://www.elsevier.es/es-revista-revista-medica-clinica-las-condes-202-articulo-obesidad-sus-complicaciones-S0716864011703893
16. https://www.cun.es/chequeos-salud/vida-sana/nutricion/alimentos-ricos-proteinas?utm_source=
17. https://www.esalud.com/carbohidratos
18. Moreno Cruz MJ. Eating habits and physical activity and their relationship with overweight and obesity in workers at the Esmeraldas Onshore and Offshore Maritime Terminal of OCP [Bachelor's thesis]. Quito (EC): Pontifical Catholic University of Ecuador. 2013.
19. Ministry of Public Health and Social Welfare. Frequency of Food Consumption. Paraguay. 2015.
20. Lam Cabanillas E. Relationship between feeding frequency and timing with overweight and obesity in adults from Trujillo. Faculty of Human Medicine URP. 2022.
21. Training World. Are saturated fats bad. 2022.
22. Scholz A, Navarrete Muñoz EM, Vioque J, et al. Association between trans fatty acid intake and overweight including obesity in 4 to 5-year-old children from the INMA study. Pediatrician Obes. 2019; 14: 12528.
23. https://infonutricionsalud.com/bebidas-carbonatadas-o-gaseosas/
24. Rodríguez Burelo MR, Avalos García MI, López Ramón C. Consumption of high-calorie beverages in Mexico: a challenge for public health. Rev Salud Tabasco. 2014; 20: 28-33.
25. Escorihuela Navarro E. How much sugar and caffeine do energy drinks have?. ABC Blogs Nutrition Classroom. 2019.
26. https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight
27. Johnson NA, Sultana RN, Gill T, et al. Physical activity in the management of adult obesity: a presentation from Exercise and Sport Science Australia. Journal of Exercise and Health Sciences. 2023.
28. Contreras Ana María. Duration of Physical Exercise. 2013.
29. Aquino JM, Gomes de Medeiros SE, Terra M, et al. Working conditions of bus drivers: from public service to source of risk. Index de Enfermería. 26: 34-38.
30. https://www.redalyc.org/articulo.oa?id=55960453009