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RESEARCH ARTICLE

Overweight and Obesity among Workers of the Public Transportation Service of Lima

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Abstract:

Background:

Excess weight is a public health problem and has a negative impact on health.

Objective:

To determine the frequency of excess weight and its associated factors among workers of the public transport service in Lima.

Methods:

This was an observational, cross-sectional, and descriptive study. Workers of public transport service companies were considered as the study population. The study variable was excess body weight, which included overweight and obesity. For its determination, the Body-Mass Index (BMI) was used.

Results:

A total of 238 workers of both sexes participated in the study. The median age was 39 years (interquartile range: 47-32). Of the sample, 93.7% (n=223) were male, 63.4% (n=151) were between 30 and 49 years of age, 67.6% (n=161) worked in the driver's position, and the rest worked as ticket collectors. According to BMI, 81.1% (n=193) had excess weight, of which 44.1% (n=105) corresponded to the overweight and 37% (n=88) to the obesity category. Only 18.9% (n=45) of the sample were in the normal range. Excess weight occurred in a higher proportion among workers belonging to the age group of 30 to 49 years (p=0.002), in cohabiting and or married people (p=0.006), and in bus drivers (p=0.003).

Conclusion:

The workers of the public transport service in Lima have a very high prevalence of excess weight. It is higher than the national average. The factors associated with excess weight were the following: age group between 30 and 49 years, marital status, and working as a driver. It requires a sanitary intervention in the family and the workplace.

Keywords: Overweight, Obesity, Transportation, Occupational groups, Peru, Body-Mass Index (BMI).

1. INTRODUCTION

According to the World Health Organization (WHO), 39% of adults aged 18 years and over (39% of men and 40% of women) are overweight. These represent around 2 billion adults. Of these, more than 650 million are obese [1]. In European countries, overweight and obese adults account for 53.1% of the population [2]. In contrast, the prevalence of obesity among adults in the United States is 42.4% [3]. In Peru, 60% of people aged 15 and over suffer from excess body weight, of which 22% correspond to obesity [4].

Obesity has a multifactorial etiology. However, the most convincing factor in the increased risk of obesity is sedentary lifestyles and high intake of energy-dense foods. In contrast, regular physical activity and a high dietary intake of fiber decrease the risk of obesity [5]. Overweight and obesity have a major impact on physical, mental, and social health [6].

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Regarding physical health, obesity and overweight are associated with a variety of health problems such as cardiovascular diseases, diabetes, kidney disease, osteoarthritis, cancer, sleep apnea, gallbladder disease, fatty liver disease, *etc*. These can lead to death or chronic disability [6, 7].

In 2015, high Body-Mass Index (BMI) contributed to 4.0 million deaths, representing 7.1% of total deaths worldwide. Cardiovascular diseases were the leading causes of death, accounting for 2.7 million deaths. Diabetes mellitus was the second leading cause of BMI-related deaths and contributed to 0.6 million deaths. At the same time, chronic kidney disease and cancers each accounted for less than 10% of all BMI-related deaths [8].

About 61% of Italian professional drivers are overweight or obese; bus drivers have half the risk of being obese compared to truck drivers [9]. In Ghana, the prevalence of obesity and overweight is 19.0% and 35.3%, respectively [10]. In Iran, the prevalence of overweight and obesity in long-distance professional drivers is 39.1% and 10.8%, respectively [11].

In the transport system, the most significant problem corresponds to traffic accidents. Different factors have been evaluated among drivers, including mental health indicators, attitudes towards the consumption of alcoholic beverages, behavioral styles, levels of tiredness, and drowsiness [12]. Peruvian population shows a high proportion of overweight adults [4]. However, the drivers of public transport vehicles (characterized by a sedentary lifestyle and unhealthy eating habits) seem to show a higher proportion of excess weight compared to the general population and also compared to professional drivers from other regions [9 - 11]. The objective of the study was to determine the frequency of excess weight and its associated factors among workers of the public transport service in Lima.

2. MATERIALS AND METHODS

2.1. Design

The study was observational, descriptive, and cross-sectional. The study sites comprised the northern area of Metropolitan Lima and the northern area of the Callao Region in the period between July and December 2019. This study arises from the initiative of the authors in the academic period from July to December 2019 at the University of Sciences and Humanities.

2.2. Population and Sample

Workers of the public transport service companies were considered as the study population. The initial and final bus stations in the districts of Carabayllo (belonging to North Lima) and Ventanilla (North of the Callao Region) were also considered.

Between July and December 2019, the public transport companies that had one of the two following types of transport vehicles were randomly chosen: minibus vehicles with 17 to 33 seats and buses with more than 33 seats. The selection was made according to the classification of the Ministry of Transport and Communications of Peru [13]. Only the workers of the companies that gave verbal authorization to carry out the study were included.

The study considered adults over 18 years of age who worked as drivers or ticket collectors (inclusive of both sexes). Written informed consent was obtained from all workers who voluntarily agreed to participate in the study.

The total number of transport service workers was estimated based on 14,840 vehicles of public transport reported by the Municipality of Lima [14]. Assuming two workers for each vehicle, a total of 29680 workers was obtained. The estimation of the sample was carried out with the following formula: n = [N * Za2 * p * q] / [d2 * (N-1) + Za2 * p * q], considering N = 29680, Za^2 = 1.962 for a 95% confidence, p = 50%, q = 1-p, precision (d) = 7%. The minimum sample required was 195 subjects.

During that period, 243 workers of both sexes were recruited, and five subjects were excluded due to incomplete data. The analysis was carried out with 238 subjects.

2.3. Study Variables and Instruments

The study variable was excess body weight, which includes overweight and obesity. For its determination, Body Mass Index (BMI) was used, which was calculated by dividing weight in kilograms by height in meters squared.

An individual is considered underweight if the BMI <18.5, normal if BMI is 18.5-24.99, overweight or preobese if BMI is 25.00-29.99, and obese if BMI is $\geq$ 30. Obesity, in turn, is classified into class I obesity (BMI: 30.00-34.99), class II obesity (BMI: 35.00-39.99), and class III obesity (BMI $\geq$ 40.00). Excess body-weight has been considered either overweight or preobese and obese [15].

Bodyweight measurement was made with a digital foot scale (Tian Shan®, with a capacity of 180 kg and a scale of 100 grams). A wooden height ruler was used to measure the height of the participants. Measurement of weight and height was carried out by previously trained nursing students.

As possible factors for excess bodyweight, the sociodemographic characteristics, food consumption, healthy habits, and harmful habits of the workers were considered.

2.4. Procedures

The selection of study participants was carried out in two stages. In the first stage, the public transport service companies were selected. Later, a visit to the bus station was made to request authorization from the heads of the companies and set the evaluation dates. The second stage consisted of the selection of the workers. In this stage, the fieldwork team went to the initial or final bus station of the companies that agreed to participate. All workers who voluntarily agreed to participate during the visit were included. In some cases, the survey team had to return once to continue applying the instrument.

2.5. Statistical Analysis

The data were entered into a matrix and filtered according to the study criteria. Descriptive statistics were calculated for

all variables (median, interquartile range, and percentages). To evaluate the statistical difference, the chi-square statistic was used, taking the values of p <0.05 as significant. The data processing was carried out with the IBM SPSS Statistics 25.

3. RESULTS

A total of 238 workers of both sexes participated, with a median age of 39 years (interquartile range: 47-32; min. 18, max. 70). Of the sample, 93.7% (n = 223) were male, 63.4% (n = 151) were between 30 and 49 years of age, 67.6% (n = 161) worked in the driver's position and the rest as ticket collectors. Other characteristics of the participants are shown in Table **1**.

Table 1. Sociodemographic characteristics of public transport service workers in Lima, 2019.

Sociodemographic Characteristics	n	%
Total	**238**	**100.0**
Sex	-	-
Female	15	6.3
Male	223	93.7
Age group	-	-
<30	38	16.0
30 a 49	151	63.4
≥ 50	49	20.6
Civil status	-	-
Single	79	33.2
Cohabiting/married	144	60.5
Others	15	6.3
Education	-	-
Basic	184	77.1
Technical	36	15.1
University	18	7.6
Health Insurance	-	-
State insurance (SIS)	59	24.8
Others	21	8.8
Uninsured	158	66.4
Occupation	-	-
Driver	161	67.6
Ticket collector	77	32.4
History of personal illness	-	-
No	197	82.8
Yes	41	17.2
Family history of illness	-	-
No	182	76.5
Yes	56	23.5
Health services user	-	-
No	190	79.8
Yes	48	20.2

Table **2** shows the information about food consumption and healthy and harmful habits. Breakfast, lunch, and dinner are mainly consumed at home. There is the regular consumption of snacks and sugary drinks. A high proportion of

workers report consuming fruits and vegetables with low frequency. However, less than half perform any physical activities. Regarding the consumption of harmful substances, 66% (n=157) reported the consumption of alcoholic beverages, and 25.6% (n=61) reported the consumption of tobacco.

Table 2. Food consumption, healthy and harmful habits among public transport service workers of Lima, 2019.

Food Consumption, Healthy and Harmful Habits	n	%
Total	238	100
Breakfast	-	-
Home	35	14.7
Restaurant	203	85.3
Lunch	-	-
Home	26	10.9
Restaurant	212	89.1
Dinner	-	-
Home	59	24.8
Restaurant	179	75.2
Appetizers	-	-
No	75	31.5
Yes	163	68.5
Sugary drinks	-	-
Usually consume	212	89.1
Does not consume	26	10.9
Water consumption	-	-
Does not consume	15	6.3
Usually consume	223	93.7
Consumption of fruits and vegetables	-	-
Usually consume	228	95.8
Does not consume	10	4.2
Physical activity	-	-
No	125	52.5
Yes	113	47.5
Alcohol consumption	-	-
No	81	34.0
Yes	157	66.0
Tobacco consumption	-	-
No	177	74.4
Yes	61	25.6

According to BMI, 81.1% (n=193) had excess weight, of which 44.1% (n=105) corresponded to the overweight and 37% (n=88) to the obesity category. Of the sample, only 18.9% (n = 45) were in the normal range (Table **3**).

Excess weight occurred in a higher proportion in workers of the age group of 30 to 49 years (p=0.002), in cohabiting or married people (p=0.006), and in bus drivers (p=0.003). No statistically significant association was found between excess weight and the other variables grouped within the general characteristics, *i.e.*, food consumption and healthy and harmful habits (Table **4**).

Table 3. Body Mass Index (BMI) of public transport service workers in Lima, 2019.

Classification According to BMI	n	%
Total	**238**	**100.0**
Normal	45	18.9
Excess body weight	193	81.1
Overweight	105	44.1
Obesity	88	37.0
Class I	58	24.4
Class II	24	10.1
Class III	6	2.5

Table 4. Variables associated with excess body weight in public transport service workers of Lima, 2019.

Variables	Normal		Excess Body Weight		p value
	n	%	n	%	
Total	45	100	193	100	-
Age group	-	-	-	-	-
< 30	15	33.3	23	11.9	0.002
30 a 49	23	51.1	128	66.3	-
≥ 50	7	15.6	42	21.8	-
Civil status	-	-	-	-	-
Single	23	51.1	56	29	0.006
Cohabiting/married	22	48.9	122	63.2	-
Others	0	0	15	7.8	-
Job position	-	-	-	-	-
Driver	22	48.9	139	72	0.003
Ticket collector	23	51.1	54	28	-

4. DISCUSSION

In accordance with the objectives of the present study, among workers of the public transport service, the frequency of excess bodyweight was very high; 44% were overweight, and 37% were obese. Excess bodyweight had a significant association with age group, marital status, and bus driver position.

In Peru, 60% of people aged 15 and over belong to the excess weight category, reaching 63.5% in urban areas. The frequency of excess weight is greater in women than in men, affecting 62.9% and 57.2%, respectively [4]. Compared with national data [4] and studies conducted in other countries [9 - 11], the prevalence in the group of workers of the urban transport service is worrying in our study; 8 out of 10 workers belong to the excess weight category.

In the United States, according to the occupational group, transportation workers have the highest prevalence of obesity, irrespective of gender, race, or ethnicity [16]. Among school bus drivers in rural Arkansas, 91% of drivers were overweight or obese, and most did not meet dietary or physical activity guidelines [17].

Mexican drivers who request the revalidation of their license have a higher BMI than those who request it for the first time, suggesting the link between obesity and dedication to transport activity [18].

In our study, the majority of workers consumed the three main meals outside the home. Likewise, during work, the vast majority consumed snacks and sugary drinks. However, no statistically significant differences were found between overweight workers and those with BMI within the normal range. In Peru, workers belonging to the public transport service spend long hours at work. In our study population, they reported a mean of 15 hours of work per day; considering the transport time to return home, they reduce the hours of sleep. On the other hand, a quarter of the workers had dinner at home. According to the workers' routines, they usually had dinner late at night.

The increase in obesity worldwide seems to be driven mainly by passive overconsumption of energy. This is likely in response to the changes in the global food system, which is producing more processed, affordable, and effectively marketed food than ever before [19]. Individuals who regularly slept less than 7 hours per night were more likely to have higher average body mass indexes and develop obesity compared with those who slept more [20]. People who ate between 11:00 p.m. and 5:00 a.m. (NE) consumed more total calories than the non-NE group. The difference in intake was due to calories ingested at night, with a significant weight gain among the NE [21].

Obesity among public transport service workers is alarming. A significant proportion does not have health insurance, and 80% are not users of health services. Most of the workers also reported the absence of both personal and

familial illnesses. The perception that obesity is synonymous with well-being is common (the good life), so it is likely that among carriers, excess weight is not considered a disease. Therefore, they assume that they can do without health services.

One of the limitations of our study is that it was carried out in only two points of Lima and Callao. However, the public transport companies do not circulate within the same jurisdiction but rather move to or from multiple districts of Lima and Callao. Another limitation is that the weight measurement was carried out at different times of the working day, depending on the accessibility of both the workers and the study team. Despite these limitations, the results clearly reflect the problem of public transport workers.

The study has also made it possible to identify other problems for workers in the transport sector, such as access to health insurance and health services. More than 80% of the workers assume that they do not have any disease. However, the findings prove otherwise. The same proportion of workers are overweight, which is a risk factor for a set of long-term health problems [6, 7]. If no action is taken early, subsequent interventions will have fewer benefits. Due to the labor characteristics of the workers of the public transport service, a chain of sanitary interventions [22], preferably in the workplace, are required.

Finally, in our study, we have found unequal access to jobs according to gender. Less than 7% of workers were women. The presence of women in public transport companies is only symbolic [23]. This is far from fulfilling the mandates of the International Labour Organization [24], which promotes equality between women and men in the working world.

CONCLUSION

The workers of the public transport service in Lima have a very high prevalence of excess weight. It is higher than the national average. The factors associated with excess weight were: the age group between 30 and 49 years of age, marital status, and working as a driver. A sanitary intervention in the family and the workplace is required.

ETHICS APPROVAL AND CONSENT TO PARTI-CIPATE

This study was approved by the Ethical Committee of the University of Sciences and Humanities, Peru (ID-073-2019).

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Written informed consent was obtained from all workers who voluntarily agreed to participate in the study.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article is available from corresponding author [J.M.] upon reasonable request.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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