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Healthy and Active Lifestyles Are Not Always Environmentally Sustainable: A Dietary Water Footprint Analysis in Mexico

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Abstract: The environmental impact of unhealthy diets and the obese population is becoming clearer. However, little is known about the impact of 'healthy' diets related to 'fitness' lifestyles, such as diets directed to gain muscle mass and lose body fat, or the diets of the physically active population. This paper aims to evaluate the Dietary Water Footprint (DWF) of a representative sample of the Guadalajara Metropolitan Area, Mexico, identifying differences according to body composition (levels of fat and muscle) and physical activity (type and intensity), with a focus on contrasting active, healthy lifestyles (i.e., fitness) with sedentary and obesogenic patterns and examining protein consumption. A validated and adapted Food Frequency Questionnaire (FFQ) was applied to 400 adults (18–74 years) from the Guadalajara Metropolitan Area. The participants were grouped according to their body fat and muscle mass levels and physical activity type and intensity. DWF, food and nutrient intake, and adequacy were calculated. The DWF of the sample with a low body fat, a high muscle mass, moderate to intense exercise, and anaerobic exercise (i.e., 'fitness' lifestyle) was up to 800 L per person per day (L/p/d) higher than the sedentary/obese populations. Risks of a high DWF were found as protein intake increases (OR = 6; $p < 0.0001$). Although unhealthy diets linked to obesity are a major environmental problem, 'fitness' lifestyles can have serious environmental implications.

Keywords: water footprint; fitness diets; protein intake; sustainable diets; environmental impact of diets

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1. Introduction

The definition of a lifestyle encompasses complex behavioral strategies, routines, attitudes, values, and norms that define how a person lives. Specifically, a medical lifestyle perspective focuses on aspects such as nutrition and physical activity [1,2]. Although the concept of a healthy lifestyle can be ambiguous, it has traditionally been described as a set of attitudes, habits, and behaviors that promote wellness. However, new lifestyle patterns have emerged, promoting a 'healthy' lifestyle driven by additional motivators, such as physical appearance [3]. In this context, a new trend toward high-protein dietary patterns aimed at improving body composition and physical conditioning has gained popularity [3,4]. This dietary pattern, combined with the adoption of regular physical activity, is colloquially referred to as a 'fitness' lifestyle. The term 'fitness' is relatively new in the literature and promotes healthy living through balanced diets, toxin restriction, and the avoidance of addictive behaviors. Nevertheless, it particularly emphasizes aerobic and anaerobic physical activity to increase physical performance and conditioning [5,6].

The characteristics of what is commonly referred to as a 'fitness' diet include a high protein content and elevated caloric intake, as these diets are primarily consumed to enhance physical performance and support muscle mass growth [7]. However, these dietary patterns, unlike typical high-calorie diets (e.g., Western diets) [8], are primarily composed of high-quality carbohydrate sources such as whole grains, rice, fruits, and vegetables, along with healthy fats (e.g., nuts and olive oil). A distinguishing feature is the high consumption of animal-based protein foods, particularly lean meats, including beef, chicken, fish, and pork. Additionally, large amounts of eggs and dairy products are typically included [4,7,9–11].

Animal-based protein is considered to have a high biological value (often referred to as 'complete') compared to vegetable protein, which has historically been labeled as 'incomplete' [12,13]. From a nutritional standpoint, animal protein offers certain advantages, such as being a dense source of nutrients like vitamin B12, heme iron, and essential amino acids [14]. Nevertheless, its consumption has been associated with the development of non-communicable diseases, including diabetes, hypertension, hypercholesterolemia, and various types of cancer. Additionally, a high intake of red and processed meats has been linked to an increased risk of colorectal cancer and cardiovascular diseases [15]. In contrast, vegetable protein has been associated with improved kidney health and the potential to increase muscle mass when consumed in adequate amounts and coupled with sufficient physical activity [13,16]. However, vegetable protein intake remains less prevalent in 'fitness' diets, despite emerging evidence showing its beneficial effects on physical performance [13,17].

Beyond the protein type, the quantity of protein consumed is crucial [18,19]. Current protein intake recommendations vary by age group: for infants < 4 months, 2.5–1.4 g/kg body weight (BW) per day; for children, 1.3–0.8 g/kg BW/day [20], for adults < 65 years, 0.8 g/kg BW/day [20,21], and for adults > 65 years, 1.0 g/kg BW/day [20]. However, recent evidence suggests that higher protein intakes (>3.0 g/kg BW/day) may have positive effects on body composition, particularly in resistance-trained individuals (e.g., promoting fat loss). To build and maintain muscle mass through a positive muscle protein balance, an overall daily protein intake of 1.4–2.0 g/kg BW/day is considered sufficient for most active individuals [19]. Nevertheless, actual protein consumption in physically active individuals and athletes often exceeds the recommended amounts, with the excess protein typically sourced from animal-based foods [22–24].

Although protein and new dietary patterns, such as 'fitness' diets, are primarily discussed in terms of their health implications, their environmental impact has received less attention [3,25]. Over the last decade, research has increasingly focused on quantifying the natural resources used in food production, with mounting evidence indicating that animal protein has the highest environmental impact among various dietary components [22,26]. Furthermore, recent studies have evaluated the environmental impact of modern diets, such as ketogenic, paleo, vegan, and vegetarian diets, and have demonstrated that as protein intake increases, the environmental impact rises accordingly [3,27,28]. Thus, the emerging trend toward high-protein, hypercaloric diets is a concern not only from a health perspective but also from a planetary health perspective [29].

Among dietary environmental impact indicators, the water used in food production has gained particular attention in recent years due to its potential role in promoting water conservation within the food system, as agriculture can account for up to 90% of a country's water resources [30]. Water use is quantified through the Water Footprint (WF), an indicator of the freshwater used to produce a good or service, including food. The WF consists of three components: the green WF, which quantifies the rainwater used by crops through evapotranspiration; the blue WF, which measures the volume of surface or groundwater used for irrigation; and the grey WF, which estimates the amount of freshwater required to dilute pollutants to meet national or international water quality standards [31].

From an environmental perspective, the impact of animal protein compared to vegetable protein is markedly different [32,33]. For example, at the international level, beef production requires up to 15,000 L per kg (L/kg), while legumes require around 5000 L/kg, and vegetables only 400 L/kg [31,32]. As a result, diets high in animal protein have a considerably larger WF. For instance, ketogenic diets have been identified as having a higher environmental impact compared to vegan, vegetarian, and even traditional diets like the Mediterranean diet [3].

Most research assessing the WF and overall environmental impact of diets has focused on groups expected to have a higher impact, such as the obese population and those with unhealthy dietary habits [30,34]. However, little is known about the environmental impact of populations following seemingly 'healthy' dietary patterns aimed at achieving health goals, such as 'fitness' diets. Although some studies have started to address the environmental impacts of physical activity [35] or the effects of various dietary patterns with differing protein intake [32,36], the environmental impact of diets across individuals with varying levels of physical activity or differing body composition—such as variations in muscle mass and body fat—remains largely unexplored.

Currently, the world is experiencing its most severe water shortage in history, with Mexico being one of the most affected countries [37]. The nation is undergoing a major water crisis that is increasingly linked to the food system [38] and dietary patterns [39]. Although not all food consumed in the country is produced there, it has been recognized that the agricultural sector uses up to 76% of available water [40]. While some studies have examined the impact of general dietary patterns [41], or specific subgroups [30], no research has yet analyzed the WF of diets according to body composition and physical activity in relation to dietary intake, particularly of protein. Therefore, this study aims to evaluate the WF of dietary patterns across a representative sample of the Guadalajara Metropolitan Area, Mexico, identifying differences according to body composition (levels of fat and muscle) and physical activity (type and intensity), with a focus on contrasting active, healthy lifestyles (i.e., fitness) with sedentary and obesogenic patterns and examining protein consumption.

2. Materials and Methods

2.1. Socioeconomic and Demographical Characteristics of the Sample

A representative sample from the Metropolitan Zone of Guadalajara was calculated based on a probabilistic formula, from which a sample of 400 adults (18–74 years) was obtained (45% males and 55% women), once under- and over-energy intake reporters were excluded. Their specific characteristics and sample calculation have already been described elsewhere [39]. For the socio-economic data, the National Autonomous University of Mexico educational level classification was used [42], as well as the occupation level classification of INEGI [43], which were grouped into high, medium, and low [44]. The Mexican Association of Market Research Agencies was used to classify monthly income [45]. The sample was classified into four groups according to their muscle and body fat levels, physical activity levels, and type. The cut-off points for classifications are described below, and Supplementary Material S1 presents the sample groups (Figure S1).

2.2. Dietary and Nutritional Assessment and Adequacy

An adapted validated Food Frequency Questionnaire (FFQ) of 248 items was applied to all subjects [46]. The foods consumed were grouped into 35 food groups. Both the food items and group classification are shown in Supplementary Material S2 (Table S2). To minimize errors in estimating the portions and intake frequency, trained nutritionists administered the questionnaires using food replicas, food portion images, measuring cups, and scoops. The caloric and nutrient intake were calculated using Mexican food composition tables [47,48]. The energy adequacy was determined by contrasting the intake versus requirements, estimated with the Harris–Benedict formula, which was applied by each subject according to their sex, age, weight, and height [49]. The macro- and micronutrient adequacy were determined by contrasting the recommended amounts of intake established in the tables for the Mexican population of Perichart Perea [50]. When recommended nutrient intakes were not available, alternate tables were used. Those included the recommended intake of lipids, fiber, saturated, polyunsaturated, and monounsaturated fats, cholesterol, sodium, and ethanol [51,52].

2.3. Anthropometric and Body Composition Evaluation and Classification

The subjects were nutritionally assessed using specialized bioelectric impedance equipment (Omron® HBF-511T-E/HBF-511B-E). Their height was measured with a Smartmet® stadiometer according to the Frankfurt plane, with the participants barefoot. Their waist and hip circumferences were evaluated with a Lufkin® metal tape measure in the midpoint between the lower rib and the iliac crest, at the end of normal expiration, and at the most prominent point, respectively [53].

Body fat and muscle mass were used as body composition indicators for the classification of the sample groups. The visceral fat, waist, and hips circumferences were associated with the body fat percentage to confirm its reliability [30]. The body fat percentage was classified according to sex, considering the classifications from Pi-Sunyer, with levels below 15% and 18% considered low in men and women, respectively. Values between 15–22% and 18–32% were considered adequate in men and women, respectively. Values over 22% and 32% were classified as high in men and women, respectively [54].

The muscle mass was classified according to the bioelectric impedance equipment manual. In women, from 18 to 39 years old, values under 24.3% were considered low. Values between 24.3% and 30.3% were considered normal. Between 30.4 and 35.3% or above were considered as high. For men between 18 and 39 years, values under 33.3% were considered low. Values between 33.3% and 39.3% were considered normal, and values between 39% and 44% or above were considered high. In men and women, values for ages 40 and 74 years did not vary considerably. However, specific values were considered. Completed values are presented in Supplementary Material S3 (Table S3).

A certified nutritionist carried out all the measures according to Suverza and Haua [53]. Participants were asked to remove their shoes, to wear light clothes, and to have a minimum of 2 h of fasting. Women were asked not to be during their menstrual periods to avoid hydration alterations that can alter bioimpedance results. Also, metallic objects were removed from the participants during the measures.

2.4. Physical Activity Assessment and Classification

The physical activity was evaluated using the International Physical Activity Questionnaire (IPAQ) and asking about the type, frequency, duration, and intensity of the physical activity performed [55]. Two classifications were made according to the type or level of physical activity. The type of activity was divided into the following: Mild aerobic, including walking without increasing heart rate over 50% of maximum capacity. Moderate-to-intense aerobic activities include fast walking, jogging, running, swimming, aerobics, and cycling. This aerobic classification included activities that elevate heart rate from 50% to 90%. Lastly, anaerobic exercise classification included weightlifting performed for at least 20 min per day [55].

The level of physical activity was classified according to the IPAQ scoring. Participants who were considered within the mild or low level of physical activity were those who did not meet the moderate or high levels criteria. The moderate level was to perform one of the three following options: (1) 3 or more days of vigorous activity of at least 20 min per day, or (2) 5 or more days of moderate-intensity activity or walking of at least 30 min per day, or (3) 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week. Finally, the population considered as the high or intense level had to meet one of the following criteria: (1) vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-min/week, or (2) 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-min/week [55].

2.5. Dietary Water Footprint (DWF) Assessment

For the DWF, the validated WF assessment methodology for Mexico was used [31]. The detailed calculation is presented elsewhere [39]. The water used to produce each item of the FFQ was calculated [56]. The total WF was obtained from the sum of green, blue, and grey WF. Green WF expresses the water resulting from the evapotranspiration agricultural process. Blue WF was an account of the irrigation water used in agriculture, depending on the crop type, production conditions, region, etc. Grey WF was accounted from the water used to assimilate pollutants used in agriculture or food cooking (herbicides, soaps, food washing water, and cooking water) [31]. These three basic steps for the dietary WF calculation were followed [31]: (1) Diet evaluation was conducted through a nationally validated questionnaire, which nutrition experts applied. (2) DWF databases were country/state-specific databases, using crop tables from Jalisco [57] and livestock tables from Mexico [58], according to the availability. According to other validated DWF studies, food imports and exports were not considered [39]. When DWF information was unavailable in national or state databases, international datasets were used for those exclusive cases [59,60]. The fish and seafood WF was calculated using the WF data of Lares-Michel et al. [31]. The culinary process of every food item was considered, and all water implicated was considered. Correction factors for cooked or peeled food were also used [31]. Finally, as the third DWF calculation step, the multi-ingredient dishes WF was estimated on Mexican tables or by reviewing nutritional labels [31]. All the DWFs were calculated per person per day (L p^{-1} d^{-1}) as established in the Global WF Standard [61]. The following formula was used for the calculation of the WF of the diet; the detailed method is described elsewhere [31]:

$$WF_{Diet} = \sum_{m} WF_{Dish} + \sum_{k} WF_{Food} \quad (1)$$

where m is equal to the number of dishes in a diet and k is equal to the number of foods in a diet.

2.6. Ethics Considerations

The study was approved by the Ethics Committee of the University of Guadalajara CEICUC (registration number CEICUC-PGE-004) and was carried out according to the Declaration of Helsinki guidelines. All participants were adults who signed informed consent before being included in the study.

2.7. Statistical Analysis

First, the data normality was checked using the Kolmogorov–Smirnov test. A descriptive analysis was carried out, reporting the means and standard deviations. Comparations between the dietary intake and WF were made between persons according to four variables: the body fat percentage, muscle mass, physical activity levels, and physical activity type. Comparisons were made using the Kruskal–Wallis test with Dunn's post hoc test. Chi-squared was used for categorical variables.

A logistic regression reporting odds ratios (ORs) was performed based on the protein intake to evaluate the water expenditure risk (i.e., increases in WF as protein intake rises). For this analysis, the sample was categorized according to their protein intake regarding the grams consumed per kilogram of corporal weight. The cutoff points were 0.8 g/kg, 1 g/kg, 1.5 g/kg, 2 g/kg, and ≥2.5 g/kg, which are the principal protein recommendations in nutrition [19]. The dependent variable was the total WF of food intake, considering the median value 6161.79 L per person per day (L/p/d) as the cutoff point. Also, the protein type (animal, vegetable, and mixed) was analyzed regarding its WF, and a logistic regression reporting odds ratios was also performed regarding the animal/vegetable protein intake ratio. Additionally, linear regressions and Spearman correlations between the protein intake and WF were performed. All analyses were conducted using STATA v12.

3. Results

3.1. Socioeconomic Characteristics of the Sample According to Classifications

Table 1 presents the sociodemographic and socioeconomic characteristics of the sample, categorized according to the established classifications. As shown, the majority of individuals with high muscle mass levels were men (83%). There was an inverse relationship between muscle mass and age, with a higher muscle mass being associated with younger participants. Across all groups, the education levels were predominantly high. However, as the muscle mass increased, the occupational level decreased.

Table 1. Sociodemographic and socioeconomic characteristics of the sample according to muscle mass levels, body fat levels, physical activity levels, and type.

	Muscle Mass Percentage				Body Fat Percentage			
	Low n (%)	**Adequate n (%)**	**High n (%)**	***p* Value**	**Low n (%)**	**Adequate n (%)**	**High n (%)**	***p* Value**
	191 (47.75) ^	**186 (46.5) ^**	**23 (5.75) ^**		**8 (2) ^**	**48 (12) ^**	**344 (86) ^**	
Sex								
Women	90 (47.12)	125 (67.20)	4 (17.39)	0.000 *	2 (25.00)	30 (62.50)	187 (54.36)	0.132
Men	101 (52.88)	61 (32.80)	19 (82.61)		6 (75.00)	18 (37.50)	157 (45.64)	
Age								
Average age	43.09	34.65	25	0.002 *	23	28.58	39.81	0.599
Standard deviation	15.28	13.80	8.93		9.51	11.66	15.08	
Minimum	18	18	18		18	18	18	
Maximum	74	70	45		45	69	74	
Residential zone								
Guadalajara	99 (51.83)	96 (51.61)	17 (73.91)	0.005 *	8 (100)	30 (62.50)	174 (50.58)	0.036 *
Zapopan	54 (28.27)	72 (38.71)	3 (13.04)		0	14 (29.17)	115 (33.43)	
Tlajomulco de Zúñiga	38 (19.90)	18 (9.68)	3 (13.04)		0	4 (8.33)	55 (15.99)	
Educational level								
No studies	0	1 (0.54)	0	0.755	0	0	1 (0.29)	0.995
Basic	8 (4.19)	5 (2.69)	0		0	1 (2.08)	12 (3.49)	
Medium	36 (18.85)	33 (17.74)	3 (13.04)		1 (12.50)	9 (18.75)	62 (18.02)	
Higher	143 (74.87)	140 (75.27)	20 (86.96)		7 (87.50)	37 (77.08)	259 (75.29)	
No reported	4 (2.09)	7 (3.76)	0		0	1 (2.08)	10 (2.91)	
Occupational level								
Low	31 (16.23)	58 (31.18)	12 (52.17)	0.000 *	6 (75.00)	23 (47.92)	72 (20.93)	0.000 *
Medium	22 (11.52)	27 (14.52)	2 (8.70)		1 (12.50)	4 (8.33)	46 (13.37)	
High	138 (72.25)	101 (54.30)	9 (39.13)		1 (12.50)	21 (43.75)	226 (65.70)	
Monthly income								
0–2699	23 (12.04)	45 (24.19)	8 (34.78)	0.001 *	5 (62.50)	16 (33.33)	55 (15.99)	0.000 *
2700–6799	21 (10.99)	30 (16.13)	8 (34.78)		2 (25.00)	13 (27.08)	44 (12.79)	
6800–11,599	51 (26.70)	40 (21.51)	4 (17.39)		1 (12.50)	8 (16.67)	86 (25.00)	
11,600–34,999	83 (43.46)	63 (33.87)	3 (13.04)		0	10 (20.83)	139 (40.41)	
35,000–84,999	10 (5.24)	5 (2.69)	0		0	0	15 (4.36)	
+85,000	3 (1.57)	3 (1.61)	0		0	1 (2.08)	5 (1.45)	

Table 1. *Cont.*

	Physical Activity Type				Physical Activity Level			
	Mild Aerobic	Moderate-to-Intense Aerobic	Anaerobic	*p* Value	Mild	Moderate	Intense	*p* Value
	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	
	236 (59) ^	116 (29) ^	48 (12) ^		219 (54.75) ^	154 (38.5) ^	27 (6.75) ^	
Sex								
Women	144 (61.02)	55 (47.41)	20 (41.67)	0.008 *	131 (59.82)	73 (47.40)	15 (55.56)	0.060
Men	92 (38.98)	61 (52.59)	28 (58.33)		88 (40.18)	81 (52.60)	12 (44.44)	
Age								
Average age	41.16	36.43	27.25	0.037 *	39.83	36.48	33.62	0.211
Standard deviation	14.42	16.36	9.73		14.49	16.48	11.34	
Minimum	18	18	18		18	18	18	
Maximum	74	74	66		74	74	62	
Residential zone								
Guadalajara	122 (51.69)	58 (50.00)	32 (66.67)	0.264	102 (46.58)	96 (62.34)	14 (51.85)	0.007 *
Zapopan	76 (32.20)	40 (34.48)	3 (6.25)		82 (37.44)	35 (22.73)	12 (44.44)	
Tlajomulco de Zúñiga	38 (16.10)	18 (15.52)	13 (27.08)		35 (15.98)	23 (14.94)	1 (3.70)	
Educational level								
No studies	1 (0.42)	0	0	0.022 *	1 (0.46)	0	0	0.572
Basic	12 (5.08)	0	1 (2.08)		9 (4.11)	3 (1.95)	1 (3.70)	
Medium	49 (20.76)	19 (16.38)	4 (8.33)		39 (17.81)	31 (20.13)	2 (7.41)	
Higher	165 (69.92)	97 (83.62)	41 (85.42)		162 (73.97)	117 (75.97)	24 (88.89)	
No reported	9 (3.81)	0	2 (4.17)		8 (3.65)	3 (1.95)	0	
Occupational level								
Low	49 (20.76)	31 (26.72)	21 (43.75)	0.010 *	45 (20.55)	50 (32.47)	6 (22.22)	0.041 *
Medium	28 (11.86)	16 (13.79)	7 (14.58)		29 (13.24)	21 (13.64)	1 (3.70)	
High	159 (67.37)	69 (59.48)	20 (41.67)		145 (66.21)	83 (53.90)	20 (74.07)	
Monthly income								
0–2699	39 (16.53)	23 (19.83)	14 (29.17)	0.097	34 (15.53)	35 (22.73)	7 (25.93)	0.052
2700–6799	28 (11.86)	19 (16.38)	12 (25.00)		26 (11.87)	32 (20.78)	1 (3.70)	
6800–11,599	63 (26.69)	27 (23.28)	5 (10.42)		58 (26.48)	31 (20.13)	6 (22.22)	
11,600–34,999	96 (40.68)	39 (33.62)	14 (29.17)		87 (39.73)	52 (33.77)	10 (37.04)	
35,000–84,999	7 (2.97)	6 (5.17)	2 (4.17)		11 (5.02)	2 (1.30)	2 (7.41)	
+85,000	3 (1.27)	2 (1.72)	1 (2.08)		3 (1.37)	2 (1.30)	1 (3.70)	

Note: ^ % from total sample; * $p < 0.05$ from chi-squared test.

Regarding the body fat percentage, women tended to have higher levels than men. The educational attainment was predominantly high across all three body fat categories, although the participants with a low body fat exhibited lower occupational levels. In contrast, those with higher body fat levels generally had a higher occupational status.

In terms of the physical activity, women were more likely to engage in mild physical activity, while men predominantly performed anaerobic exercises. Across all the groups, the physical activity type was generally associated with a medium-to-high socioeconomic level. Similar trends were observed when considering the physical activity intensity, although women reported engaging in more intense physical activity than men.

3.2. Anthropometric and Body Composition Characteristics of the Sample According to Classifications

The anthropometric and body composition characteristics of the sample, categorized according to the established classifications, are presented in Table 2. The individuals with a low muscle mass exhibited significantly higher values for weight, BMI, body fat percentage, visceral fat, waist and hip circumferences, metabolic rate, and metabolic age ($p = 0.0000$). Conversely, they had a lower muscle mass in kilograms relative to their weight ($p = 0.0000$).

Table 2. Anthropometric and body composition data of sample groups.

Variable	Classification						p Value
	Muscle Mass Percentage						
	Low		Adequate		High		
	n (%)		n (%)		n (%)		
	191 (47.75) ^		186 (46.5) ^		23 (5.75) ^		
	Mean	SD	Mean	SD	Mean	SD	
Height (cm)	165.35 a	9.90	165.11 a	8.96	169.93 a	6.79	0.0629
Weight (kg)	81.65 a	15.52	67.84 b	13.01	66.70 b	12.48	0.0000 *
BMI (kg m^{-2})	29.93 a	4.98	24.73 b	3.44	22.97 b	3.61	0.0000 *
Body fat (%)	39.08 a	7.69	32.27 b	6.82	19.11 c	8.85	0.0000 *
Visceral fat (kg)	10.76 a	4.33	6.75 b	2.99	5.57 b	3.38	0.0000 *
Muscle mass (kg)	26.22 a	4.29	29.41 b	4.88	40.78 c	4.08	0.0000 *
Waist C. (cm)	96.37 a	13.03	81.99 b	10.20	78.96 b	9.02	0.0000 *
Hips C. (cm)	107.62 a	8.65	99.44 b	6.67	96.38 b	6.38	0.0000 *
Metabolic rate (kcal)	1612.44 a	266.22	1461.25 b	237.17	1571.52 ab	177.48	0.0000 *
Metabolic age	57.10 a	14.57	40.85 b	13.99	28.26 c	11.38	0.0000 *
	Body Fat Percentage						
	Low		Adequate		High		p Value
	n (%)		n (%)		n (%)		
	8 (2) ^		48 (12) ^		344 (86) ^		
Height (cm)	167.98	7.79	165.80	8.17	165.41	9.56	0.7270
Weight (kg)	54.98 a	9.53	58.88 a	10.20	76.98 b	15.04	0.0000 *
BMI (kg m^{-2})	19.25 a	2.23	21.23 a	2.41	28.12 b	4.63	0.0000 *
Body fat (%)	11.41 a	3.45	24.71 b	5.17	36.71 c	7.65	0.0000 *
Visceral fat (kg)	2.25 a	1.75	4.23 a	1.74	9.36 b	4.04	0.0000 *
Muscle mass (kg)	42.54 a	6.34	31.66 b	6.17	27.78 c	5.00	0.0000 *
Waist C. (cm)	69.35 a	6.74	74.02 a	7.54	91.18 b	12.85	0.0000 *
Hips C. (cm)	90.13 ab	5.44	93.68 a	5.80	104.80 b	8.08	0.0000 *
Metabolic rate (kcal)	1419.00 ab	175.33	1383.40 a	193.11	1564.41 b	260.50	0.0000 *
Metabolic age	19.88 a	3.72	25.92 a	8.66	51.60 b	14.87	0.0000 *
	Physical Activity Type						
	Mild Aerobic		Moderate-to-Intense Aerobic		Anaerobic		p Value
	n (%)		n (%)		n (%)		
	236 (59) ^		116 (29) ^		48 (12) ^		
Height (cm)	164.12 a	9.25	166.80 b	9.56	169.20 b	8.07	0.0005 *
Weight (kg)	74.77 a	16.50	73.99 a	14.40	73.33 a	15.98	0.8105
BMI (kg m^{-2})	27.70 a	5.40	26.63 ab	4.45	25.43 b	4.11	0.0080 *
Body fat (%)	36.91 a	8.47	32.85 b	8.68	28.85 c	8.26	0.0000 *
Visceral fat (kg)	9.03	4.41	8.34	3.98	7.10	3.76	0.0117 *
Muscle mass (kg)	26.91 a	4.76	30.14 b	5.76	32.69 c	6.50	0.0000 *
Waist C. (cm)	90.44 a	14.28	87.54 ab	12.61	82.77 b	11.54	0.0010 *
Hips C. (cm)	103.98 a	9.43	102.38 a	7.57	101.08 a	7.79	0.0579
Metabolic rate (kcal)	1522.64 a	260.77	1548.72 a	248.72	1602.46 a	268.24	0.1363
Metabolic age	50.72 a	16.88	45.92 b	15.66	38.73 c	16.06	0.0000 *
	Physical Activity Level						
	Mild		Moderate		Intense		p Value
	n (%)		n (%)		n (%)		
	219 (54.75) ^		154 (38.5) ^		27 (6.75) ^		
Height (cm)	164.69 a	9.32	166.61 a	9.55	165.78 a	8.21	0.1475
Weight (kg)	74.93 a	16.40	74.66 a	15.59	68.17 a	10.69	0.1069
BMI (kg m^{-2})	27.66 a	5.50	26.75 ab	4.48	24.75 b	3.18	0.0090 *
Body fat (%)	36.68 a	8.50	32.63 b	9.15	31.46 b	7.81	0.0000 *
Visceral fat (kg)	8.89 a	4.31	8.52 a	4.30	6.67 b	2.91	0.0348 *
Muscle mass (kg)	27.24 a	5.02	30.08 b	6.10	30.31 b	5.78	0.0000 *
Waist C. (cm)	90.14 a	14.36	87.97 a	12.94	80.88 b	9.35	0.0028 *
Hips C. (cm)	104.10 a	9.29	102.50 ab	8.02	99.50 b	7.67	0.0174 *
Metabolic rate (kcal)	1527.53 a	257.26	1568.27 a	266.88	1476.70 a	210.57	0.1383
Metabolic age	49.87 a	16.65	46.71 a	17.42	38.52 b	11.40	0.0022 *

Note: C. = circumference. ^ % from the total sample. SD = standard deviation * $p < 0.05$ from Kruskal–Wallis test with Dunn's post hoc. Letters indicate differences between groups.

In contrast, the group with a low body fat percentage showed the opposite trends, with significantly lower values for weight, BMI, visceral fat, waist and hip circumferences, metabolic rate, and metabolic age ($p = 0.0000$). This group also exhibited a higher muscle mass ($p = 0.0000$).

For the individuals engaging in different types of physical activity, those performing anaerobic exercises had significantly lower levels of body fat, visceral fat, waist and hip circumferences, and metabolic age, while showing a significantly higher muscle mass and metabolic rates ($p = 0.0000$).

Similarly, the participants who engaged in high-intensity physical activity had a lower body fat, visceral fat, waist and hip circumferences, and BMI, while displaying a higher muscle mass ($p = 0.0000$). Height did not show statistically significant differences between the groups, except for those performing anaerobic physical activity ($p = 0.0005$).

3.3. Nutrient Adequacy by Muscle Mass Levels

Table 3 presents the nutrient adequacy of dietary intake according to muscle mass levels. Protein intake exceeded recommendations across all muscle mass groups, with an adequacy percentage of 251.04% in the low-muscle-mass group, 177.98% in the adequate group, and 219.27% in the high-muscle-mass group. Notably, the group with adequate muscle mass levels showed the lowest excess (178%) ($p < 0.0001$). The selenium adequacy was also significantly higher in the low-muscle-mass group ($p < 0.05$), while the pyridoxine intake was significantly higher in the high-muscle-mass group.

Although not statistically significant, the energy and fiber adequacy were higher in the group with high muscle mass levels. However, the participants with low muscle mass levels exhibited a higher adequacy for phosphorus, niacin, selenium, cobalamin, and polyunsaturated fats. Finally, the individuals with adequate muscle mass levels demonstrated a higher carbohydrate adequacy.

3.4. Nutrient Adequacy by Body Fat

Regarding the body fat percentage (Table 3), the group with low body fat levels showed a significantly higher protein intake adequacy, exceeding recommendations by 275%. This was significantly different compared to the group with a high body fat, which had an adequacy of 189%. However, the highest protein adequacy was observed in the group with adequate body fat levels, reaching 303% ($p < 0.0001$). Sodium adequacy was also highest in the group with adequate body fat levels, with an overconsumption of 274% ($p < 0.0001$). A similar trend was observed for pyridoxine, ascorbic acid, and magnesium.

In contrast, the energy, carbohydrates, sodium, cobalamin, ethanol, polyunsaturated and saturated fatty acids, selenium, vitamin A, calcium, phosphorus, and iron intake adequacy were all higher in the group with adequate body fat levels.

3.5. Nutrient Adequacy by Physical Activity Type

As shown in Table 4, a significantly higher nutritional adequacy for protein and cobalamin was observed in the group performing anaerobic exercise, with the protein intake exceeding recommendations by 248% ($p < 0.005$) and cobalamin intake exceeding the recommended amount by 406% ($p < 0.03$). Similar trends were observed for selenium and niacin, which were overconsumed by 157% ($p < 0.0003$) and 218% ($p < 0.03$), respectively, in individuals engaging in anaerobic exercise.

Although not statistically significant, a trend towards a higher energy intake adequacy (139%) was identified in the group performing mild aerobic exercises, along with a similar trend for carbohydrates (258%). Additionally, higher adequacy levels were noted for total lipids (110%), cholesterol (176%), saturated fats (153%), and monounsaturated fats (64%) in the anaerobic exercise group compared to those engaging in mild aerobic and moderate-to-intense aerobic activities.

Table 3. Nutrient adequacy by body composition.

Nutrient	Muscle Mass Percentage						*p* Value Intake	*p* Value Adequacy	Body Fat Percentage						*p* Value Intake	*p* Value Adequacy
	Low		Adequate		High				Low		Adequate		High			
	n (%)		n (%)		n (%)				n (%)		n (%)		n (%)			
	191 (47.75)		186 (46.5)		23 (5.75)				8 (2)		48 (12)		344 (86)			
	Mean	SD	Mean	SD	Mean	SD			Mean	SD	Mean	SD	Mean	SD		
Energy (Kcal)	127.21 a	64.05	131.52 a	56.79	138.67 a	60.90	0.9163	0.2975	147.67 a	66.39	164.11 a	73.89	132.09 a	57.47	0.5152	0.1277
Fiber (g)	72.66 a	37.13	86.56 a	39.49	89.87 a	48.04	0.4891	0.1948	93.74 a	51.60	90.81 a	46.53	86.32 a	42.42	0.8119	0.7602
Carbohydrates (g)	234.55 a	101.28	260.45 a	120.22	250.50 a	114.65	0.6484	0.6484	258.40 a	108.31	275.60 a	100.80	253.27 a	118.24	0.5987	0.5987
Sugar (g)	141.92 a	46.47	167.92 a	62.93	160.74 a	64.46	0.3337	0.1274	155.51 a	63.62	151.59 a	54.63	164.41 a	63.17	0.9079	0.4614
Protein (g)	251.04 a	123.72	177.98 b	83.46	219.27 b	111.15	0.4264	0.0001 *	274.83 a	142.82	303.15 a	124.96	188.77 b	88.76	0.4055	0.0001 *
Lipids (g)	108.85 a	15.85	109.32 a	16.78	108.90 a	15.53	0.8117	0.9346	108.11 a	15.80	113.81 a	8.76	109.12 a	16.30	0.4440	0.5385
Saturated fatty acids (g)	163.53 a	52.82	149.71 a	53.42	147.69 a	40.74	0.5622	0.2605	145.15 a	39.89	171.20 a	27.45	149.68 a	49.22	0.1963	0.1313
Monounsaturated fatty acids (g)	62.83 a	14.89	58.84 a	12.99	60.61 a	13.67	0.8338	0.3202	60.15 a	13.74	61.77 a	6.17	59.81 a	13.53	0.3954	0.7154
Polyunsaturated fatty acids (g)	97.69 a	85.16	85.67 a	70.21	81.10 a	50.17	0.7620	0.7956	86.67 a	55.70	123.48 a	111.87	82.99 a	62.07	0.2269	0.4887
Cholesterol (mg)	162.22 a	70.74	146.08 a	84.19	150.40 a	83.51	0.3789	0.3789	153.11 a	85.78	159.79 a	63.20	148.20 a	83.25	0.7317	0.7317
Calcium (mg)	133.89 a	61.79	134.31 a	66.50	134.62 a	67.23	0.8404	0.9892	136.93 a	61.18	163.51 a	56.36	133.40 a	67.33	0.3402	0.1934
Phosphorus (mg)	298.44 a	100.76	281.27 a	120.82	285.69 a	137.88	0.4476	0.5047	307.14 a	134.79	317.97 a	112.19	280.35 a	127.08	0.2503	0.2555
Iron (mg)	154.50 a	63.01	156.47 a	72.67	152.98 a	91.09	0.9019	0.5210	153.03 a	73.55	168.63 a	60.81	154.65 a	82.68	0.3010	0.7077
Magnesium (mg)	145.32 a	60.87	151.28 a	63.37	159.77 a	76.63	0.7490	0.7266	172.65 a	80.67	167.63 a	73.28	152.11 a	67.81	0.3972	0.2048
Sodium (mg)	199.76 a	97.98	190.74 a	97.90	205.01 a	149.91	0.7906	0.7906	213.05 a	176.87	274.34 a	98.73	194.00 a	115.90	0.0404 *	0.0404 *
Potassium (mg)	87.09 a	33.46	90.20 a	36.20	90.83 a	43.13	0.9645	0.9645	97.05 a	44.05	99.53 a	39.59	89.16 a	38.66	0.3529	0.3529
Zinc (mg)	109.55 a	41.59	133.90 a	62.47	130.31 a	63.64	0.8618	0.1625	139.37 a	70.55	127.70 a	57.07	129.71 a	61.09	0.3831	0.7993
Selenium (mg)	150.52 a	74.39	112.28 a	68.10	119.24 a	80.15	0.0352 *	0.0352 *	125.79 a	73.58	144.18 a	74.53	115.97 a	74.80	0.2065	0.2065
Vitamin A (µg RE)	123.12 a	75.86	129.30 a	70.59	146.12 a	82.32	0.4461	0.0699	132.76 a	75.31	167.10 a	80.55	136.62 a	77.08	0.1944	0.3777
Ascorbic acid (mg)	278.32 a	146.36	347.05 a	209.35	348.33 a	222.38	0.5871	0.3928	361.11 a	189.89	293.14 a	166.83	342.44 a	216.83	0.4673	0.3997
Thiamine (mg)	246.46 a	105.41	257.06 a	149.44	276.28 a	186.33	0.9508	0.7731	291.54 a	170.46	274.86 a	127.49	261.52 a	165.86	0.3310	0.3114
Riboflavin (mg)	302.22 a	175.40	301.73 a	176.43	336.43 a	198.16	0.6570	0.1592	357.46 a	214.04	336.41 a	176.02	311.94 a	183.22	0.3721	0.3560
Niacin (mg)	209.99 a	91.44	192.96 a	89.42	197.69 a	93.82	0.5042	0.6616	218.66 a	110.39	215.23 a	98.77	192.55 a	88.16	0.2998	0.3145
Pyridoxine (mg)	830.13 a	1126.67	707.72 a	705.42	880.76 a	633.63	0.0130 *	0.0027 *	963.92 a	923.24	687.25 a	316.24	774.20 a	677.04	0.5838	0.3910
Folic acid (µg)	90.22 a	42.65	92.08 a	42.31	92.73 a	44.42	0.9601	0.9601	98.27 a	47.92	102.50 a	50.48	91.20 a	42.39	0.6172	0.6172
Cobalamin (mg)	382.06 a	168.05	338.71 a	192.91	352.55 a	217.79	0.3581	0.3581	350.48 a	192.69	456.48 a	204.56	344.71 a	204.73	0.2045	0.2045
Ethanol (g)	94.16 a	200.32	55.59 a	94.73	63.55 a	108.28	0.2993	0.2993	44.28 a	87.12	152.99 a	292.31	61.79 a	104.60	0.1926	0.1926

Note: SD = standard deviation; * $p < 0.05$ from Kruskal–Wallis test with Dunn's post hoc. Letters indicate differences between groups. Adequacy values expressed in percentages.

Table 4. Nutrient adequacy by physical activity.

Nutrient	Physical Activity Type						*p* Value Intake	*p* Value Adequacy	Physical Activity Level						*p* Value Intake	*p* Value Adequacy
	Mild Aerobic		Moderate-to-Intense Aerobic		Anaerobic				Mild		Moderate		Intense			
	n (%)		n (%)		n (%)				n (%)		n (%)		n (%)			
	236 (59)		116 (29)		48 (12)				219 (54.75)		154 (38.5)		27 (6.75)			
	Mean	SD	Mean	SD	Mean	SD			Mean	SD	Mean	SD	Mean	SD		
Energy (Kcal)	139.49 a	60.37	129.82 a	59.01	122.12 a	51.10	0.7950	0.1098	138.93 a	60.37	129.75 a	58.22	127.13 a	53.07	0.9418	0.2194
Fiber (g)	87.90 a	40.39	89.34 a	50.79	79.42 a	40.28	0.5258	0.3199	85.05 a	39.13	90.60 a	47.93	86.68 a	52.54	0.4203	0.6015
Carbohydrates (g)	258.48 a	115.95	253.09 a	125.35	236.97 a	96.47	0.7227	0.7227	254.96 a	114.29	257.36 a	122.70	232.02 a	99.34	0.6246	0.6246
Sugar (g)	162.69 a	56.96	170.85 a	74.08	146.28 a	60.21	0.5526	0.1178	164.43 a	63.77	163.09 a	64.34	152.18 a	48.39	0.7749	0.6780
Protein (g)	191.46 a	98.07	202.19 a	94.45	248.21 b	126.51	0.0024 *	0.0047 *	193.26 a	96.04	202.96 a	100.23	258.23 a	140.94	0.2044	0.0605
Lipids (g)	109.06 a	14.86	108.80 a	17.64	110.02 a	18.43	0.8959	0.8445	109.61 a	15.27	107.99 a	17.51	111.22 a	14.61	0.9803	0.0952
Saturated fatty acids (g)	148.68 a	41.34	150.10 a	53.45	152.63 a	62.73	0.9610	0.8842	151.20 a	44.05	146.28 a	48.63	155.09 a	70.14	0.7763	0.4487
Monounsaturated fatty acids (g)	58.90 a	12.23	60.22 a	13.65	63.95 a	17.49	0.5334	0.3193	59.62 a	12.68	59.68 a	14.58	63.28 a	12.52	0.8821	0.2117
Polyunsaturated fatty acids (g)	79.57 a	58.78	96.30 a	75.94	78.03 a	38.30	0.3982	0.4894	84.03 a	68.47	85.29 a	57.87	79.89 a	35.57	0.8255	0.6451
Cholesterol (mg)	142.23 a	76.16	151.62 a	82.98	176.14 a	108.29	0.2599	0.2599	146.87 a	78.27	151.07 a	88.70	154.80 a	90.13	0.9771	0.9771
Calcium (mg)	131.13 a	57.22	143.51 a	86.57	128.71 a	49.55	0.8364	0.8209	129.54 a	59.76	141.04 a	74.88	136.36 a	65.57	0.4756	0.4473
Phosphorus (mg)	282.41 a	124.65	285.89 a	143.13	289.87 a	104.27	0.6281	0.6584	278.58 a	121.26	291.00 a	133.46	292.71 a	148.54	0.6962	0.7182
Iron (mg)	152.11 a	74.21	156.23 a	80.19	164.03 a	111.77	0.0927	0.8340	147.87 a	72.18	165.71 a	92.58	147.79 a	75.79	0.1824	0.1233
Magnesium (mg)	156.84 a	67.53	154.74 a	78.55	145.60 a	57.18	0.9682	0.7113	151.48 a	63.44	161.35 a	76.65	145.58 a	76.58	0.1377	0.2926
Sodium (mg)	197.61 a	120.30	196.03 a	142.61	203.79 a	99.70	0.4861	0.4861	199.39 a	120.69	196.64 a	136.10	192.91 a	87.28	0.6271	0.6271
Potassium (mg)	90.11 a	37.47	92.78 a	46.17	85.35 a	29.53	0.8744	0.8744	88.02 a	36.59	93.98 a	41.79	87.99 a	46.27	0.3415	0.3415
Zinc (mg)	134.42 a	61.43	126.61 a	67.54	123.37 a	50.89	0.9004	0.2601	131.67 a	58.96	128.39 a	65.66	137.92 a	68.20	0.8817	0.4813
Selenium (mg)	108.02 a	68.86	121.17 a	72.21	157.02 b	93.48	0.0003 *	0.0003 *	111.89 a	64.94	117.65 a	78.54	165.38 b	105.69	0.0275 *	0.0275 *
Vitamin A (μg RE)	130.85 a	69.56	151.09 a	92.39	131.20 a	66.19	0.0924	0.2854	134.18 a	73.23	138.44 a	81.98	148.18 a	77.35	0.5882	0.7431
Ascorbic acid (mg)	326.54 a	192.02	391.21 a	264.27	313.22 a	144.36	0.0681	0.1174	332.21 a	205.83	356.63 a	230.00	363.09 a	159.01	0.2048	0.3081
Thiamine (mg)	263.86 a	150.89	274.35 a	209.40	251.24 a	107.38	0.9511	0.8681	263.04 a	154.01	262.65 a	173.76	300.05 a	208.39	0.7057	0.6691
Riboflavin (mg)	306.22 a	173.67	331.49 a	218.76	342.45 a	166.39	0.0970	0.3052	314.59 a	182.98	312.08 a	184.43	377.90 a	229.35	0.2477	0.2411
Niacin (mg)	189.17 a	88.24	201.36 a	100.06	217.76 a	82.56	0.0163 *	0.0319 *	190.15 a	84.73	198.61 a	96.96	230.57 a	106.39	0.1934	0.2136
Pyridoxine (mg)	770.42 a	629.95	815.40 a	781.21	868.43 a	871.68	0.9668	0.8392	756.89 a	610.24	813.83 a	746.93	1000.09 a	1101.57	0.8029	0.7357
Folic acid (μg)	88.88 a	38.75	99.10 a	50.79	92.50 a	43.13	0.2501	0.2501	87.33 a	37.58	99.79 a	50.65	89.55 a	34.28	0.1162	0.1162
Cobalamin (mg)	323.58 a	180.81	372.35 a	219.82	406.17 b	248.49	0.0313 *	0.0313 *	333.89 a	178.57	349.00 a	211.19	451.28 a	304.20	0.1926	0.1926
Ethanol (g)	55.46 a	96.74	67.07 a	118.80	77.84 a	141.53	0.1980	0.1980	55.55 a	93.60	73.65 a	134.05	40.61 a	57.85	0.3058	0.3058

Note: SD = standard deviation; * $p < 0.05$ from Kruskal–Wallis test with Dunn's post hoc. Letters indicate differences between groups. Adequacy values expressed in percentages.

3.6. Nutrient Adequacy by Physical Activity Levels

Table 4 shows the nutrient intake adequacy according to physical activity levels. A statistically significant higher adequacy level was observed for selenium in the group performing intense physical activity, reaching 165% ($p < 0.05$). Although not statistically significant, the energy (139%) and sugar (164%) adequacy were higher in the group engaging in mild physical activity.

In contrast, the adequacy levels for protein (258%), lipids (111%), cholesterol (155%), saturated (155%) and monounsaturated (63%) fats, ascorbic acid (363%), riboflavin (377%), niacin (230%), pyridoxine (1000%), and cobalamin (451%) were higher in the group performing intense physical activity compared to those performing mild or moderate physical activity.

3.7. Food Intake According to Sample Groups

3.7.1. Food Group Consumption According to Muscle Mass

Figure 1 shows the dietary intake by food groups according to the muscle mass classification. As shown, pork and egg consumption were significantly higher in the population with high muscle mass levels ($p < 0.05$), with the pork intake reaching 15.54 ± 21.24 g per person per day (g/p/d) in the low-muscle-mass group versus 23.70 ± 17.70 g/p/d in the high-muscle-mass group. Similarly, egg consumption was higher in the high-muscle-mass group, with an intake of 66.31 ± 67.20 g/p/d compared to 39.76 ± 38.23 g/p/d in individuals with low muscle mass levels.

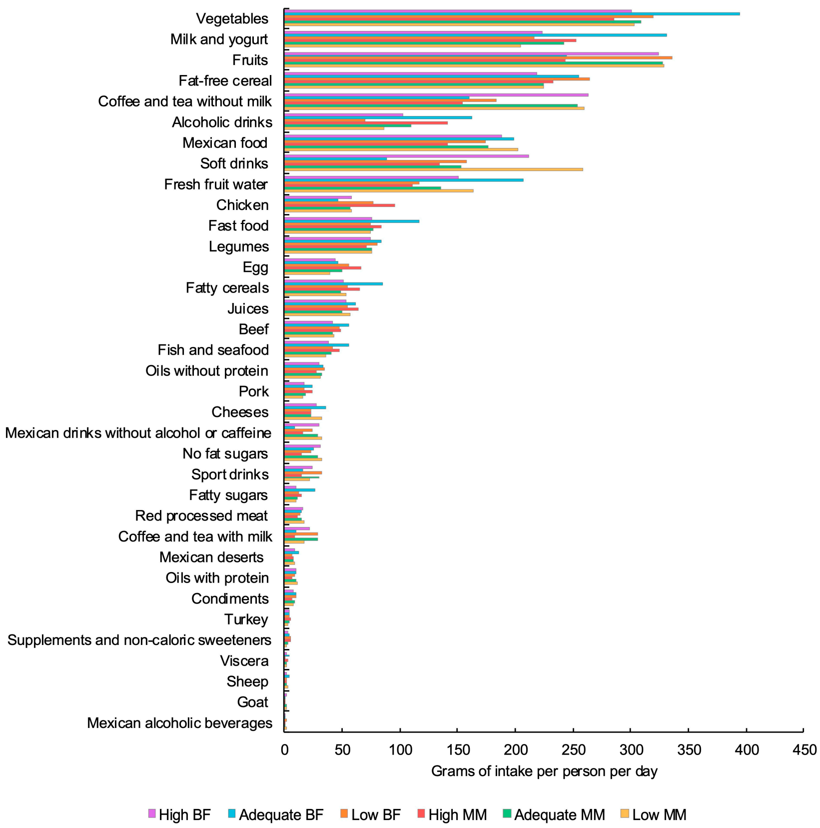

Figure 1. Food group intake by body composition (body fat and muscle mass levels). Note: BF = body fat percentage; MM = muscle mass levels. Detailed descriptive and comparative analyses reporting p values are shown in Supplementary Material S4 (Tables S4.1 and S4.2).

In contrast, the group with low muscle mass levels showed a significantly higher intake of traditional Mexican foods, sugar-added foods, soft drinks, coffee and tea with milk, non-caffeinated Mexican beverages, and Mexican alcoholic beverages (i.e., fermented drinks such as *Pulque*) ($p < 0.05$). Although not statistically significant, the high-muscle-mass group tended to consume more milk and yogurt, beef, organ meats, turkey, chicken, fish and seafood, fat-free cereals, fatty cereals (i.e., sweet bread, fries, cookies), fast food, juices, alcoholic beverages, and supplements, as well as non-caloric sweeteners. Detailed descriptive and comparative data for these results are presented in Supplementary Material S4 (Table S4.1).

3.7.2. Food Group Consumption According to Body Fat Levels

Regarding the sample groups categorized by body fat percentage, Figure 1 shows that the individuals with normal fat levels had a significantly higher intake of fatty cereals, reaching 85.57 ± 35.02 g/p/d, compared to those with low body fat levels, who had an intake of 50.93 ± 44.80 g/p/d ($p < 0.05$). Conversely, the high-body-fat group showed a higher intake of soft drinks, with a consumption of 211.51 ± 329.09 mL/p/d ($p < 0.05$).

Although not statistically significant, the individuals with high body fat levels tended to consume more red and processed meats, goat meat, and coffee and tea without milk. In contrast, the low-body-fat group, although not significantly different, showed a higher intake of eggs, chicken, fruits, and sports drinks compared to the other groups. Detailed data for these results are available in Supplementary Material S4 (Table S4.2).

3.7.3. Food Group Consumption According to Physical Activity Types

For the individuals engaging in different types of physical activity (Figure 2), it was observed that those performing anaerobic exercise consumed significantly more eggs, with an intake of 83.23 ± 88.57 g/p/d compared to 38.01 ± 32.49 g/p/d in those performing mild aerobic exercise ($p = 0.0093$). A similar trend was found for fish and seafood, with an intake of 63.19 ± 60.50 g/p/d in the anaerobic group versus 30.47 ± 31.81 g/p/d in the mild aerobic group ($p < 0.01$).

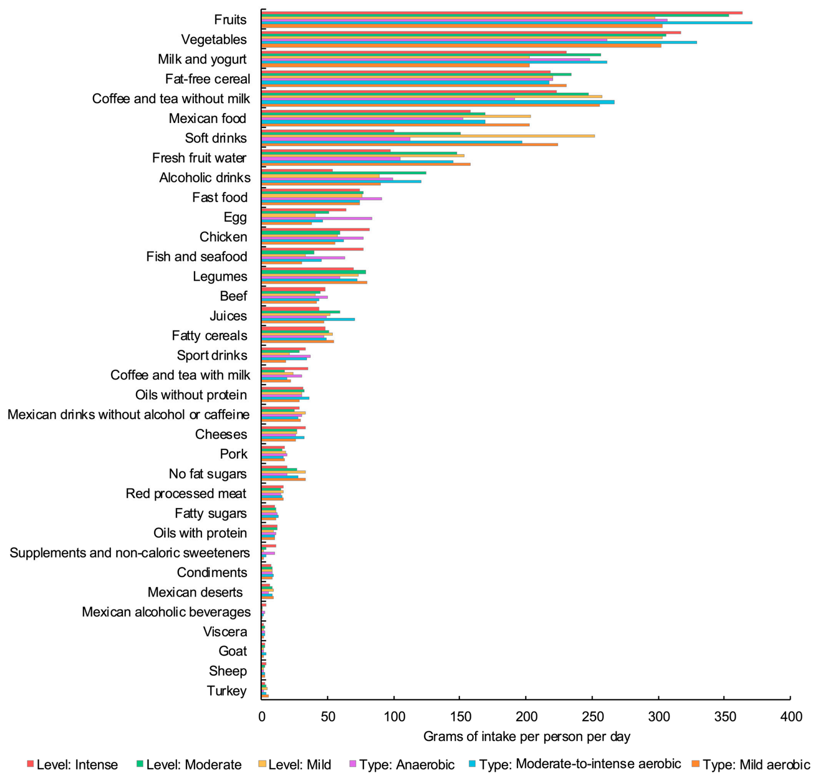

Figure 2. Food groups intake by physical activity (type and level). Detailed descriptive and comparative analyses reporting p values are shown in Supplementary Material S5 (Tables S5.1 and S5.2).

Although not statistically significant, the individuals performing anaerobic exercise also tended to consume more supplements and non-caloric sweeteners, sports drinks, and beef. In contrast, the participants engaging in moderate-to-intense aerobic exercise showed higher intakes of milk and yogurt, cheese, vegetables, fruits, and juices. For those performing mild aerobic exercise, higher intakes of red and processed meats, turkey, legumes, cereals (with and without added fat), Mexican foods, desserts, and soft drinks were observed compared to the other groups. Detailed data for these results are provided in Supplementary Material S5 (Table S5.1).

3.7.4. Food Group Consumption According to Physical Activity Level

Figure 2 presents the dietary intake according to physical activity levels. As shown, the individuals performing intense physical activity consumed significantly higher amounts of fish and seafood (76.96 ± 79.48 g/p/d), fruits (363.67 ± 240.14 g/p/d), and supplements and non-caloric sweeteners (11.32 ± 17.87 g/p/d) compared to those performing mild physical activity (33.28 ± 32.32 g/p/d; 297.23 ± 206.01 g/p/d; 1.89 ± 4.80 g/p/d, respectively) ($p < 0.05$). A trend towards a higher vegetable intake was also observed in this group.

Individuals with mild physical activity levels showed a significantly higher consumption of turkey and soft drinks ($p < 0.05$) and a trend towards a greater intake of fatty cereals, Mexican food, sugar-added foods, and fresh fruit water. The group with moderate levels of physical activity exhibited a tendency for a higher consumption of milk, yogurt, and legumes. Detailed descriptive and comparative data for these results are presented in Supplementary Material S5 (Table S5.2).

3.8. Dietary Water Footprint According to Sample Groups

Figure 3 shows the WF of the dietary intake according to muscle mass and body fat classifications. The total WF, expressed in L per person per day (L/p/d), was higher in the group with high muscle mass levels (6739.87 ± 2345.87 L/p/d) and a lower body fat percentage (7388.09 ± 2875.73 L/p/d), compared to individuals with low muscle mass levels (6661.37 ± 3260.13 L/p/d) and a high body fat percentage (6584.53 ± 3200.40 L/p/d).

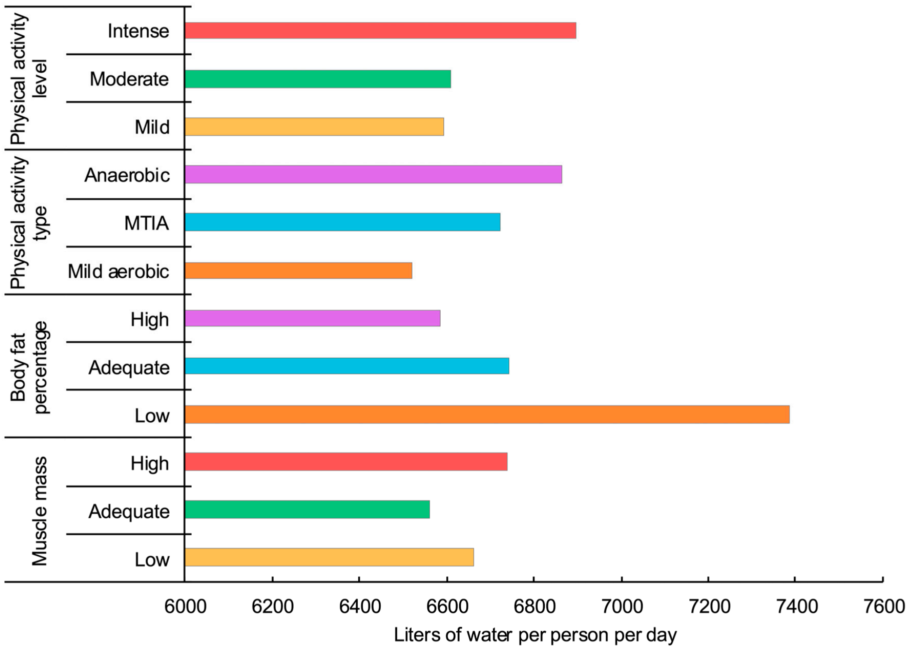

Figure 3. Total dietary water footprint of the sample according to muscle mass levels, body fat levels, physical activity levels, and type. MTIA = moderate-to-intense aerobic. Detailed descriptive and comparative analyses reporting *p* values are shown in Supplementary Material S6 (Table S6.1).

Regarding physical activity, the individuals engaging in anaerobic and intense physical activity had a higher WF, with values of 6863.75 ± 2835.16 L/p/d and 6897.08 ± 3330.16 L/p/d, respectively, compared to those performing mild aerobic physical activity (6519.00 ± 3073.70 L/p/d) and those engaging in mild levels of activity (6591.61 ± 3069.48 L/p/d). Although these differences were not statistically significant, variations of more than 300 L/p/d were observed. Detailed data for these results are provided in Supplementary Material S6 (Table S6.1).

3.8.1. Dietary Water Footprint According to Muscle Mass

Figure 4 presents the DWF according to muscle mass levels. Statistically significant higher values were identified in the WF of pork (296.78 ± 221.74 L/p/d) and eggs (335.26 ± 339.75 L/p/d) in the group with high muscle mass levels compared to the groups with a low and adequate muscle mass. Individuals with a low muscle mass had a WF of 194.68 ± 266.04 L/p/d from pork and 200.99 ± 193.30 L/p/d from eggs.

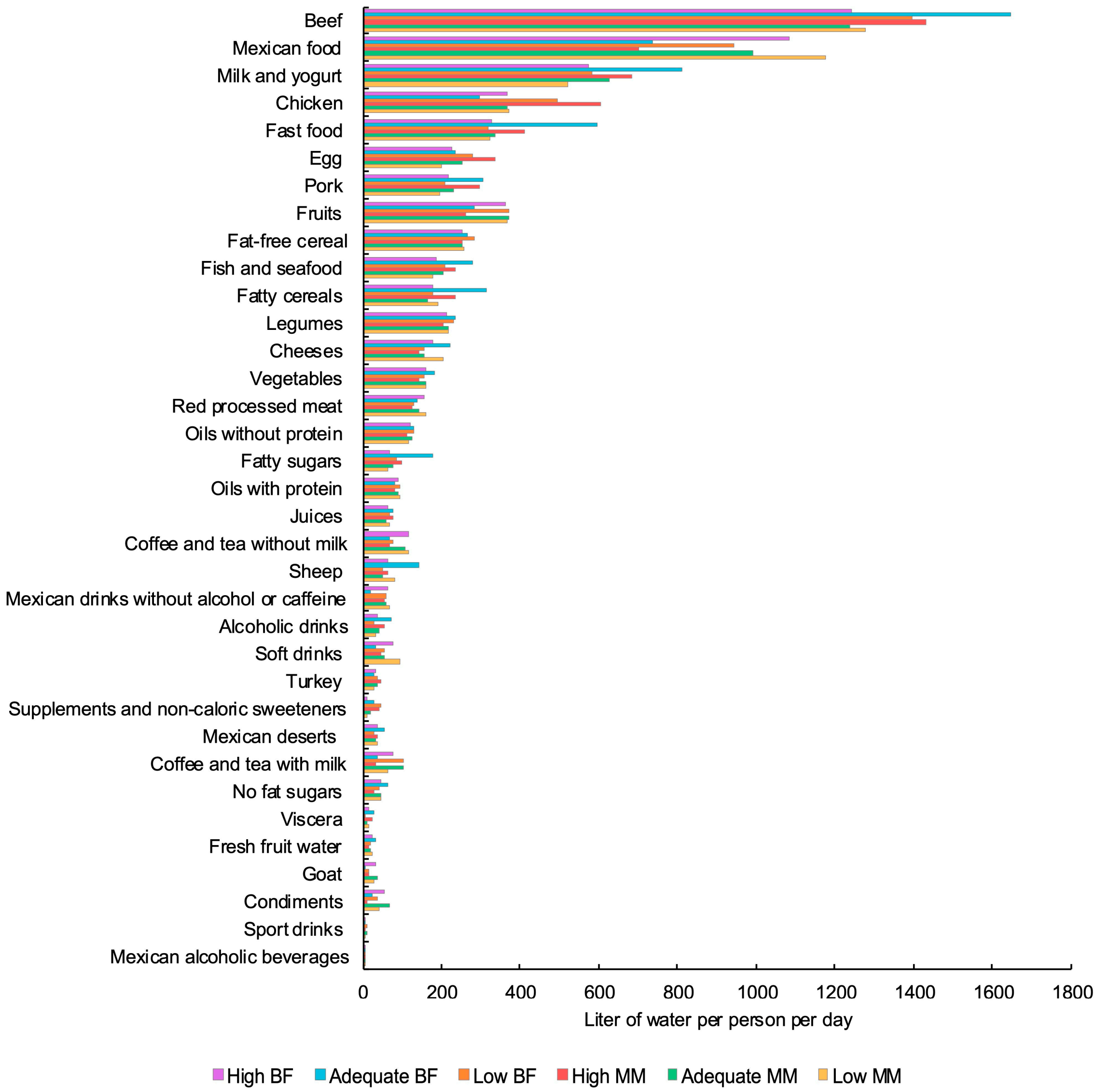

Figure 4. Dietary Water Footprint by food groups intake according to body composition (body fat and muscle mass levels). Note: BF = body fat percentage; MM = muscle mass levels. Detailed descriptive and comparative analyses reporting *p* values are shown in Supplementary Material S7 (Tables S7.1 and S7.2).

Additionally, the low-muscle-mass group showed a higher WF derived from Mexican food and soft drinks, with values of 1174.93 ± 1039.88 L/p/d and 92.85 ± 143.50 L/p/d, respectively. In contrast, the high-muscle-mass group had a lower WF from Mexican food (699.58 ± 758.53 L/p/d) and soft drinks (48.06 ± 53.64 L/p/d).

The WF from coffee and tea with milk was higher in individuals with adequate muscle mass levels. Although not statistically significant, the WF associated with protein-rich foods such as milk and yogurt, beef, turkey, chicken, fish, and seafood tended to be higher in the group with a high muscle mass. Detailed data for these results are presented in Supplementary Material S7 (Table S7.1).

3.8.2. Dietary Water Footprint According to Body Fat

Figure 4 presents the WF of the food group intake according to body fat levels. The WF of fish and seafood was significantly higher in individuals with low body fat levels compared to those with high levels (209.14 ± 176.47 L/p/d vs. 187.59 ± 209.26 L/p/d, respectively). Meanwhile, the WF of fatty cereals was higher in the population with high body fat levels (178.97 ± 171.33 L/p/d) compared to the group with a low body fat (176.72 ± 149.20 L/p/d), but not when compared to the group with adequate levels (314.88 ± 150.18 L/p/d).

Although not statistically significant, the WF of sports drinks, chicken, turkey, and eggs was higher in the group with a low body fat. In contrast, the WF of soft drinks and red processed meats was higher in the group with a high body fat. Interestingly, the WF of fast food, beef, cheese, milk, and yogurt was higher in the group with adequate body fat levels. Detailed data for these results are provided in Supplementary Material S7 (Table S7.2).

3.8.3. Dietary Water Footprint According to Physical Activity Type

Regarding the WF of food groups based on the physical activity type, Figure 5 shows that the WF of eggs, protein-rich oils (e.g., nuts), and supplements, including whey protein, was significantly higher in the group performing anaerobic exercise compared to those engaging in mild aerobic and moderate-to-intense aerobic exercise ($p < 0.05$). Specifically, the WF of eggs in the anaerobic group was 420.77 ± 447.79 L/p/d, while in the mild aerobic group, it was 192.14 ± 164.28 L/p/d. For protein-rich oils, the WF in the anaerobic group was 135.04 ± 143.71 L/p/d, compared to 108.53 ± 91.60 L/p/d in the mild aerobic group. Regarding supplements, the WF for the anaerobic group was 78.07 ± 136.34 L/p/d, while the mild aerobic group showed a much lower value of 4.59 ± 28.44 L/p/d.

On the other hand, the group performing moderate-to-intense aerobic exercise had a higher WF associated with the intake of non-protein fats compared to the other two physical activity groups ($p < 0.05$). Additionally, the group performing mild aerobic exercise showed a significantly higher WF for Mexican food and fresh fruit water, with values of 1180.81 ± 1108.64 L/p/d and 25.28 ± 44.07 L/p/d, respectively ($p < 0.05$).

Although not statistically significant, a trend towards a higher WF was observed for milk, yogurt, cheese, beef, chicken, fish and seafood, and sports drinks in individuals performing moderate-to-intense aerobic or anaerobic exercise. Detailed data for these results are provided in Supplementary Material S8 (Table S8.1).

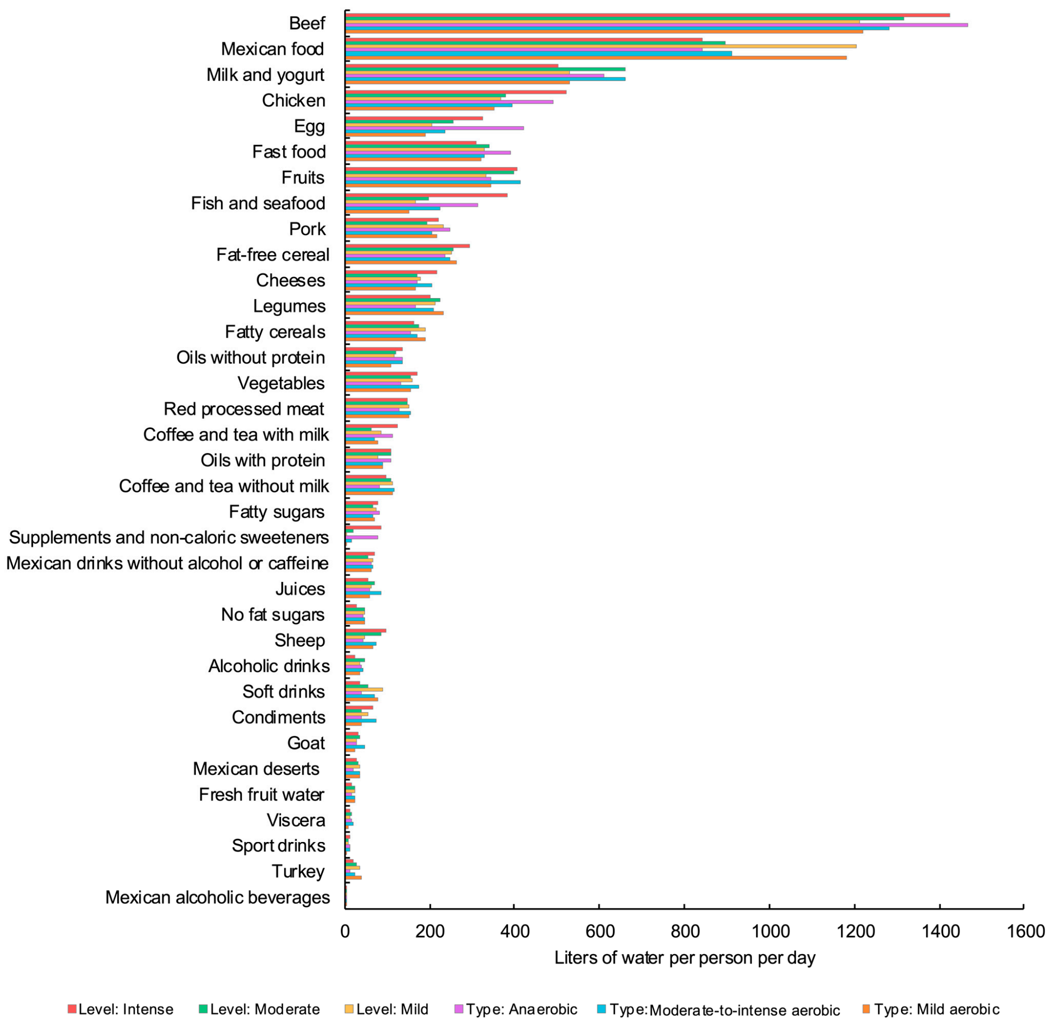

Figure 5. Dietary Water Footprint by physical activity (type and level). Detailed descriptive and comparative analyses reporting *p* values are shown in Supplementary Material S8 (Tables S8.1 and S8.2).

3.8.4. Dietary Water Footprint According to Physical Activity Levels

Figure 5 shows the WF of the food group intake according to physical activity levels. As shown, the group with a mild physical activity had a significantly higher WF for turkey (37.60 ± 222.93 L/p/d), soft drinks (90.41 ± 137.28 L/p/d), and Mexican food (1205.87 ± 1109.46 L/p/d), with *p*-values lower than 0.05 in all cases. In contrast, fruits (406.26 ± 275.79 L/p/d), protein-rich oils (110.58 ± 80.08 L/p/d), and supplements (87.98 ± 155.80 L/p/d), including whey protein, had a significantly higher WF in individuals performing intense physical activity ($p < 0.001$).

Although not statistically significant, the WF of milk and yogurt, legumes, fast food, and fruit juices was higher in the group engaging in moderate physical activity compared to the other physical activity groups. The WF for cheese, beef, eggs, chicken, fish and seafood, vegetables, fruits, fat-free cereals, protein oils, coffee and tea with milk, and sports drinks was also higher in the group with intense physical activity levels. In contrast, the WF of fatty cereals, sugar-added foods, soft drinks, fresh fruit water, and coffee and tea without milk tended to be higher ($p > 0.05$) in the group with a mild physical activity. Detailed data for these results are provided in Supplementary Material S8 (Tables S8.1 and S8.2).

3.9. Risk Analysis of Protein Intake

A complementary analysis was conducted regarding the amount of protein intake. Supplementary Material S9 presents a descriptive and comparative analysis (Tables S9.1 and S9.2) of the sample's WF according to the protein intake, expressed in grams per kilogram of body weight per day (g/kg/bw/d), as summarized in Figure 6. As shown, the WF increases with a higher protein intake, starting from a total WF of 3091.52 L/p/d in the group consuming 0.8 g/kg/bw/d and reaching up to 11,470 L/p/d in the group consuming ≥2.5 g/kg/bw/d (Table S9.1).

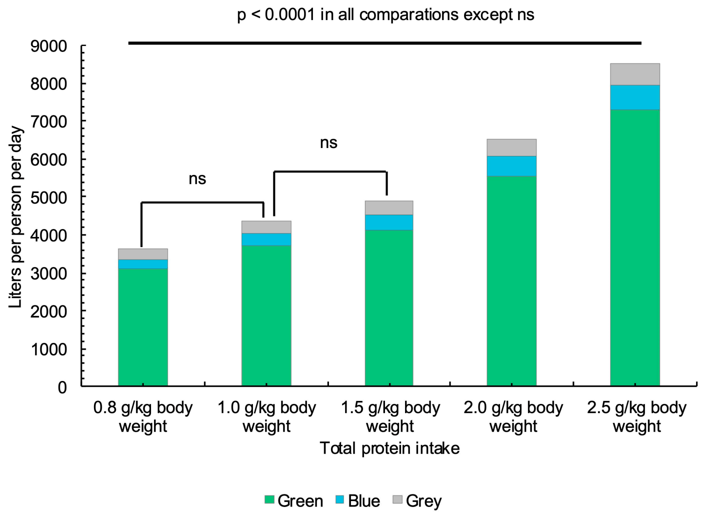

Figure 6. Water footprint of the sample according to the protein intake. Detailed descriptive and comparative analyses reporting *p* values are shown in Supplementary Material S9 (Tables S9.1 and S9.2).

Statistical differences ($p < 0.000$) were observed in the WF values between the protein intake groups (Table S9.2), except between the groups consuming 0.8 and 1 g/kg/bw/d and between 1 and 1.5 g/kg/bw/d ($p < 0.05$).

A logistic regression analysis reporting odds ratios (ORs) for the water expenditure risk according to the median WF and protein intake is presented in Table 5. Statistically significant risks were identified for a protein intake above 0.8 g/kg/bw/d ($p < 0.001$). The highest risk was observed at an intake of 1 g/kg, with a 6-fold higher probability of exceeding the sample's median WF ($p < 0.001$). Additionally, a risk greater than 3 was found for protein intakes above 1.5 and 2 g/kg ($p < 0.005$). Although not statistically significant, a protein intake of ≥2.5 g/kg was associated with a risk of 5.74. In contrast, no significant risk was identified for a protein intake of 0.8 g/kg.

Table 5. Logistic regression analysis reporting odds ratios of water expenditure risk regarding median water footprint (WF) and protein intake.

Protein Intake					***p* Value: 0.0000 ***
	OR	**Std. Err.**	**z**	***p* Value**	**[95% CI]**
0.8 g/kg body weight	1	0	-	-	-
1.0 g/kg body weight	6.02	3.34	3.23	0.001 *	2.02–17.87
1.5 g/kg body weight	3.29	0.95	4.10	0.000 *	1.86–5.81
2.0 g/kg body weight	3.69	1.70	2.83	0.005 *	1.49–9.13
≥2.5 g/kg body weight	5.74	6.25	1.60	0.109	0.67–48.57

g/kg = grams per kilogram of body weight. * Statistical significance was considered at $p \leq 0.05$. Confidence interval at 95%.

Table 6 presents a logistic regression analysis reporting odds ratios (OR) for the water expenditure risk based on the median WF and the ratio of animal to vegetable protein intake (animal/vegetable). A risk of 1.72 ($p < 0.01$) was observed for the animal/vegetable protein ratio, indicating that when the proportion of animal protein exceeds that of vegetable protein, the risk of surpassing the sample's median WF significantly increases.

Table 6. Logistic regression analysis reporting odds ratios of water expenditure risk regarding average water footprint (WF) and protein intake ratio (animal/vegetable).

Protein Intake					*p* Value: 0.0123 *
	OR	Std. Err.	z	*p* Value	[95% CI]
Ratio animal/vegetable	1.72	0.37	2.48	0.01 *	1.11–2.64

* Statistical significance was considered at $p \leq 0.05$. Confidence interval at 95%.

Finally, Figure 7 presents a simple linear regression model between the protein intake and dietary total WF by protein type, categorized as total, animal, vegetable, and mixed protein. Spearman correlation coefficients are also reported. All models showed a statistically significant positive relationship, indicating that as the protein intake increases, the WF also increases ($p < 0.0001$). However, the strongest relationships were found for the total and animal protein intake. In contrast, the lowest R^2 value was observed for vegetable protein, followed by mixed protein (animal + vegetable) ($p < 0.0001$).

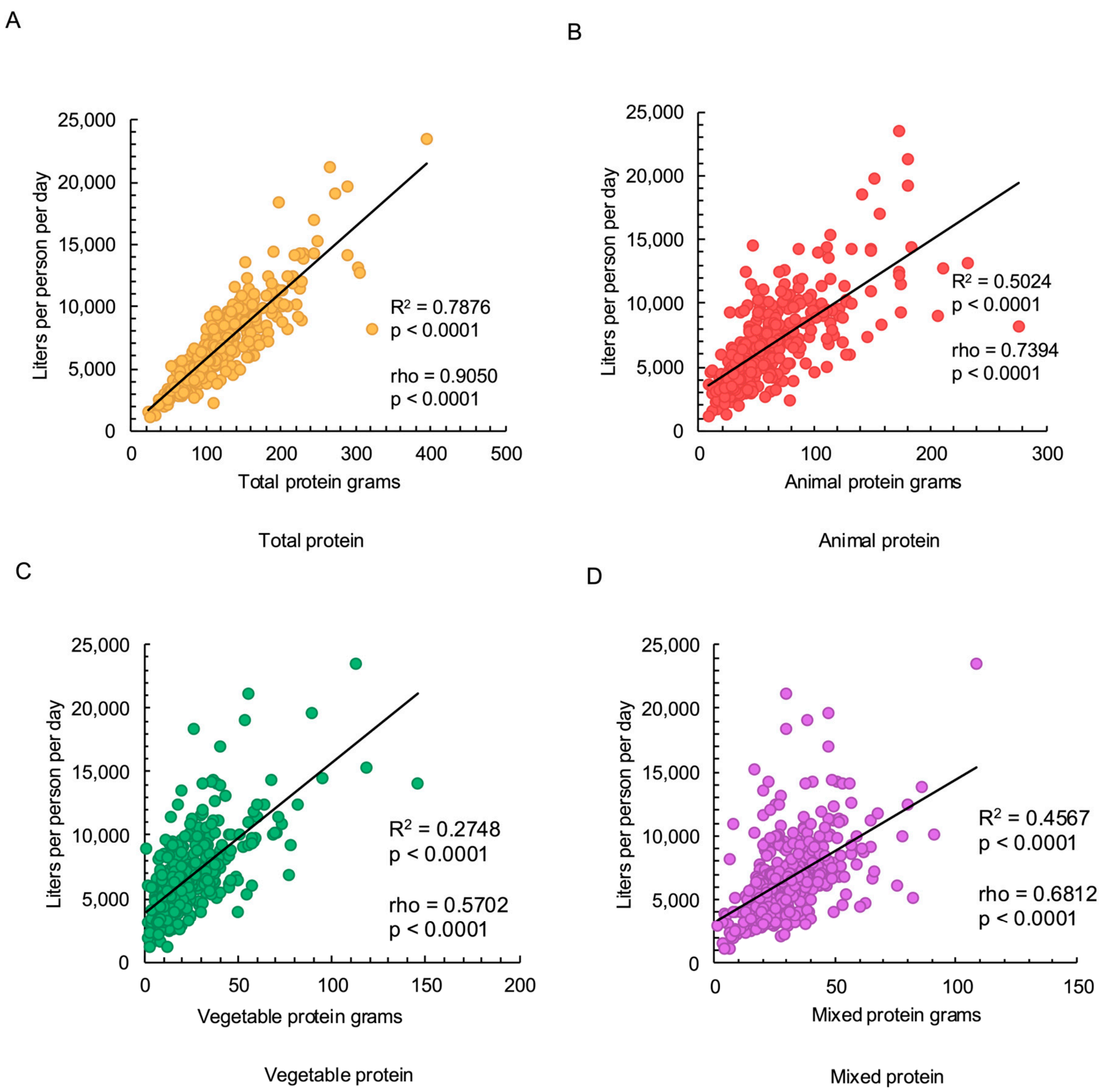

Figure 7. Simple linear regression model between protein intake and dietary total water footprint (WF) by protein type. Statistical significance was considered at $p \leq 0.05$. rho was obtained from Spearman correlation.

4. Discussion

Food choices have the power to alter the course of the planet [62]. Currently, the types of diets that should be avoided to improve population health and reduce environmental impact are well known. These include high-energy-dense diets, rich in sugars, saturated fats, sodium, ultra-processed foods, and processed and red meats [30,63]. Conversely, there is consensus that healthy and sustainable diets are a viable solution for mitigating environmental crises and improving public health, while also respecting cultural and economic factors [64,65]. However, the population is diverse and often includes groups that cannot always adhere to general dietary recommendations. Individuals who engage in physical activity or follow specific diets aimed at 'fitness' or body composition modification have been largely overlooked in the context of sustainability [22]. To the best of our knowledge, this study is the first cross-sectional analysis to examine the DWF of a sample based on body composition and physical activity levels, providing insight into the environmental impact of population groups that may exert significant pressure on vital resources such as water.

To date, the diets of populations affected by obesity have been identified as having the highest environmental impact, particularly from the perspective of the DWF [30]. Recent findings show that the diet of the Mexican obese population results in a DWF that is up to 800 L per person higher than that of individuals with adequate adiposity levels ($p < 0.05$) [30]. Similar trends have been observed in studies conducted in other countries with different dietary patterns, such as Turkey [34].

Although these studies provide valuable contributions to this research area, it is important to note that most have used the Body Mass Index (BMI) as the primary indicator of obesity due to its widespread use in population studies [30,34,66]. However, the BMI has been criticized for its limitations in accurately assessing body fat [67,68]. In the study by Lares-Michel et al. [30], the BMI was associated with adiposity indicators such as the body fat percentage, waist circumference, and visceral fat; however, the BMI was still the main classificatory index.

Significant differences were found when comparing our results with those of Lares-Michel et al. [30]. Our group with low body fat levels showed a higher DWF than individuals with high adiposity levels. This contrasts with the findings of Lares-Michel et al. [30], who used the BMI as the classification criterion for body composition. These discrepancies suggest that obesity's environmental impact should be analyzed differently, as individuals with low body fat levels may not necessarily consume healthier diets or generate a lower environmental impact, as observed in our study.

Although the DWF is currently one of the most important environmental impact indicators [69,70], the environmental impact of obesity has also been assessed using other metrics, such as the carbon footprint [71,72]. These studies have produced results similar to those based on the BMI, demonstrating that populations with excessive food consumption leading to obesity are significant contributors to climate change [73,74]. However, the same limitation arises with the use of the BMI, suggesting that studies should begin incorporating body fat levels instead of relying solely on the BMI. Although the carbon footprint of the population was not evaluated in this study, it is likely that a similar pattern would be observed [30]. Therefore, further research incorporating diverse environmental indicators is warranted.

Beyond the environmental impact of obesity, our findings provided interesting insights into the environmental effects associated with muscle mass levels. Our results indicate that individuals with higher muscle mass tend to consume more animal-based protein. Although this outcome is expected [23], its impact on the WF has not been previously reported. This study provides the first evidence of the significant contribution to the WF made by the diets of individuals aiming to build muscle mass (e.g., weightlifters).

Although little is known about sustainable diets that support muscle development and exercise performance, particularly in terms of maintaining adequate muscle levels and ensuring optimal performance, a growing number of scientific studies suggest that a diet with a low environmental impact can be compatible with maintaining adequate muscle mass levels [22,23]. For example, in 2020, the environmental impact of the Athlete's Plate Nutrition Education Tool was assessed [24]. The study found that greenhouse gas emissions are directly associated with the level of training, with emissions increasing as training intensity rises. Specifically, the carbon footprint for the Athlete's Plate for easy training loads was 5.7 kg CO_2 eq/day, while the moderate load reached 6.4 kg CO_2 eq/day, and the hard load increased to 8.0 kg CO_2 eq/day [24]. Although our results are not directly comparable, as the aforementioned study did not include the DWF in its environmental impact assessment, similar trends are likely to be observed, as has been reported in studies that included both carbon and water footprints [30,74].

An interesting finding was that, as the muscle mass levels increased, the educational level of the sample decreased. This highlights the need for educational programs targeting the entire population, as low nutritional knowledge could have a significant impact not only on health but also on the environment [75]. Additionally, the overconsumption of nutrients such as selenium and cobalamin was observed, which reflects the high consumption of animal-based foods. Moderation in protein intake should be promoted across all population groups, as excessive consumption, while it may offer some body composition benefits, is not justifiable from both nutritional and environmental perspectives [76,77].

Although existing data clearly demonstrate the impact of overconsumption, particularly of high-calorie and ultra-processed foods, on the environment [66] and specifically on the DWF [39], this study offers valuable contributions by analyzing the complete dietary intake. This includes macronutrient intake—especially protein—as well as micronutrients such as vitamins and minerals, focusing on those predominantly found in animal-source foods, like cobalamin, and their related environmental impact. Our nutrient adequacy analysis showed that, in general, the population tends to overconsume most nutrients. However, our findings also indicate that specific elements, such as protein intake, play a critical role in determining the environmental impact of diets, particularly when considering the source of the protein (i.e., animal or vegetable) [77].

Protein intake recommendations for a healthy adult with minimal physical activity currently stand at 0.8 g/kg body weight (BW) per day [78]. However, the scenario changes significantly when considering the diets of individuals who exercise regularly, ranging from low to high levels of physical activity, to competitive athletes [22,23]. Although the recommended minimum protein requirements for athletes vary depending on the nature of the activity [79], Meyer [23] suggests that current protein recommendations have increased for athletes, ranging from 1.2 to 2 g/kg BW per day, particularly if the goal is muscle protein accretion.

In athletes' diets, protein recommendations are typically distributed throughout the day according to their training schedules, with intakes divided into amounts ranging from 0.25 to 0.3 g/kg BW per meal [80], which often corresponds to approximately 20 g per meal [81]. This pattern leads athletes to consume multiple meals, typically every 4 h [81]. Our results demonstrated a significantly higher DWF impact as the protein intake increased from 0.8 g/kg BW to 2.5 g/kg BW ($p < 0.0001$). Moreover, the logistic regression analysis performed in this study revealed up to a 6-fold increase in total DWF risk when protein intake exceeded 1 g/kg BW ($p < 0.001$). However, it is important to note that the protein adequacy was not adjusted according to the participants' physical activity levels, which could influence the DWF risk associated with higher protein intakes. For the individuals engaging in regular, strenuous physical activity, the increased protein intake might be necessary to meet metabolic and muscle repair demands [23]. Thus, while the logistic regression analysis revealed up to a 6-fold increase in the total DWF risk when the protein intake exceeded 1 g/kg BW ($p < 0.001$), this result might reflect general trends rather than an optimal approach for physically active individuals.

Although the amount of protein intake plays an essential role in a diet's environmental impact, the type of protein consumed is a crucial element to consider [23]. While animal protein is considered a rich source of nutrients, our results showed that as the animal-to-vegetable protein ratio increases, the risk of having a total DWF higher than the median rises by 1.72 times ($p < 0.01$). Future studies could further explore protein intake adequacy by adjusting for physical activity levels to provide insights into both the environmental and health-related outcomes of protein consumption across diverse activity groups.

Beyond environmental implications, from a health perspective, a study conducted in France demonstrated that shifting from animal to vegetable protein can improve overall nutrient adequacy, promoting environmentally sustainable dietary patterns while optimizing health and nutritional status in the population [17]. However, it is important to note that replacing animal protein with vegetable protein may raise concerns about potential nutrient deficiencies in the general population.

Nevertheless, a recent systematic review analyzing 147 studies found that dietary inadequacies are present in both plant-based diet followers (vegans and vegetarians) and meat-eaters [82]. According to the study, individuals following plant-based diets showed a lower intake and status of vitamin B12 and D, as well as EPA, DHA, calcium, zinc, iodine, and iron (especially in women) compared to meat-eaters, thereby increasing their risk of deficiency. However, despite higher intakes among meat-eaters, they were still at risk of deficiency in certain nutrients. Interestingly, vegans and vegetarians consumed higher amounts of other nutrients such as PUFA, ALA, fiber, folate, magnesium, vitamin E, B1, B6, and vitamin C [82].

Other studies also support plant-based diets for health preservation. For example, a large prospective cohort study in the United States demonstrated that higher plant protein intake was inversely associated with mortality from all cardiovascular diseases [14]. Dietary plant protein has been linked to reduced cardiovascular risk factors, such as lower blood pressure, improved lipid profiles, and better glucose control [15]. Conversely, although epidemiological studies have focused on the potential adverse effects of animal protein on risks such as elevated blood pressure and central obesity [83,84], individuals following plant-based diets may still be at risk of nutrient deficiencies [82].

Although no age comparisons were conducted in our study, it is important to note that certain age groups, such as older adults, are more vulnerable to protein deficiency. Increasing their protein intake also raises the environmental impact of their overall diet [77,78]. This is particularly relevant, as current dietary guidelines recommend a protein ratio of 60:40 (animal/vegetable) for older adults [78]. However, recent proposals suggest modifying this ratio to 50:50 to promote a more environmentally sustainable protein intake [78]. Current recommendations for adults aged 65 years and older suggest a minimum protein intake of 1.0 to 1.2 g/kg BW per day. For certain older adults with acute or chronic illnesses, higher intakes of 1.2 to 1.5 g/kg BW per day are considered appropriate [18].

As a response to the environmental crisis, new proposals are emerging to provide alternative sources of meat or protein with a lower environmental impact [22,23]. The most common are Plant-Based Meat Alternatives (PBMAs), which are increasingly accepted by consumers due to their flavor and similarity to meat. PBMAs have been highlighted as a sustainable solution for replacing meat without causing nutritional imbalances and without compromising taste [85].

In this context, another promising option to meet protein requirements, especially for populations with specific needs such as athletes and older adults, is mycoprotein. Mycoprotein is a sustainably produced, protein-rich whole food source that can provide a nutritional composition of 45% protein, 20.9% essential amino acids, 24.6% non-essential amino acids, 9% branched-chain amino acids, and 3.9% leucine [86]. However, further studies are needed to assess its acceptability among the general population and evaluate its viability as a dietary alternative.

Despite the contributions of this study, several limitations should be considered. First, although the sample was representative of the Metropolitan Zone of Guadalajara, the classification of the population into groups based on body composition and physical activity resulted in some subgroups being relatively small. For instance, the high-muscle-mass group consisted of only 23 participants, while the low-body-fat subgroup included just 8 participants. Similarly, the intense-physical-activity group comprised 27 individuals, and the anaerobic group, although larger than the others, accounted for only 12% of the total sample, with 48 participants. This limitation may prevent our results from being generalizable at the population level.

Nevertheless, it is important to note that the subgroup sizes correspond to the actual distribution found in a statistically representative sample from one of the most urbanized and significant regions of Mexico [87,88]. This indicates that the proportion of individuals following fitness lifestyles is relatively small compared to the sedentary and overweight/obese population. Although these groups do not represent the majority of the population, their environmental impact could be nearly four times higher than that of individuals consuming adequate amounts of protein (e.g., 0.8 g/kg BW per day). Therefore, our findings could support the development of new dietary strategies and nutrition education programs targeting broader population sectors.

5. Conclusions

The environmental impact of diets plays a crucial role in mitigating the current environmental crisis, particularly with respect to water use. Although the impact of unhealthy diets associated with obesity is significant and should be addressed in dietary guidelines and intervention programs, other population groups—such as athletes and individuals following fitness lifestyles to increase muscle mass and enhance physical performance—should also be considered in this context. Our findings suggest that their contribution to environmental impact could be even higher than that generated by individuals consuming unhealthy diets or those who are obese. Therefore, dietary guidelines and nutritional interventions aimed at achieving sustainability goals across all population segments are urgently needed.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/dietetics4010003/s1: Supplementary Material S1. Sample size classification groups; Supplementary Material S2. Food group classification; Supplementary Material S3. Muscle mass classification used for classifying groups; Supplementary Material S4. Food groups intake by body composition; Supplementary Material S5. Food groups intake by physical activity; Supplementary Material S6. Water footprint of the sample according to muscle mass levels, body fat levels, physical activity levels, and type; Supplementary Material S7. Water footprint by body composition; Supplementary Material S8. Water footprint by physical activity; and Supplementary Material S9. Detailed analysis of dietary water footprint of the sample according to protein intake.

Author Contributions: Conceptualization, M.L.-M.; methodology, M.L.-M. and F.E.H.; formal analysis, M.L.-M.; validation, M.L.-M. and F.E.H.; investigation, M.L.-M., A.R.-L., S.C.L.-S., M.G.C.-B., N.O. and D.B.M.-R.; data curation, M.L.-M., A.R.-L., S.C.L.-S., M.G.C.-B., N.O. and D.B.M.-R.; writing—original draft preparation, M.L.-M.; writing—review and editing, M.L.-M., F.E.H., A.R.-L. and J.R.H.;

visualization, M.L.-M., A.R.-L., S.C.L.-S., M.G.C.-B., N.O. and D.B.M.-R.; supervision, M.L.-M., F.E.H. and J.R.H.; project administration, M.L.-M., F.E.H. and J.R.H.; funding acquisition, M.L.-M., F.E.H. and J.R.H. All authors have read and agreed to the published version of the manuscript.

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