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Estimation of greenhouse gas emissions and food consumption by students of Universidad national Federico Villarreal

Luz Eufemia López-Ráez[1*], Luis Alberto Dávila-Solar[2], Edwin José Lazo-Chong[3], Santiago Díaz-Chong[4], Olegario Marín-Machuca[5]
[1,2,3,4,5]Academic Department of Food Sciences, Faculty of Oceanography, Fisheries, Food Sciences, and Aquaculture, Professional School of Food Engineering of Universidad Nacional Federico Villarreal. Lima. Peru; llopezr@unfv.edu.pe (L.E.L.R.) ldavila@unfv.edu.pe (L.A.D.S.) elazo@unfv.edu.pe (E.J.L.C.) 2022017502@unfv.edu.pe (S.D.C.) omarin@unfv.edu.pe (O.M.M.).

Abstract: The objective was to determine the relationship between Greenhouse Gas emissions (GHG) expressed in CO2equivalent (CO2eq) and food consumption by students of Universidad Nacional Federico Villarreal. For this purpose, a survey was conducted among students in 2024 using an online form distributed via Facebook, WhatsApp Web, and email. The form included the Kilometer Food Calculator developed by Gonzalez [1] and Pérez, et al. [2] and GHG values reported by Poore and Nemecek [3]. The most consumed food groups were cereals and flours: men (M) 1.8 kg and for women (W) fruits 1.6 kg. According to Mertens, et al. [4] and Ritchie, et al. [5] the most consumed food was rice: M 2.2 kg and W 1.5 kg; finding that according to the Calculator, the estimated annual CO2eq emissions in kg (M 201.3 and W 212.0 kg) are higher than those determined (M 212.1; W 152.0) by the other authors, observing that when grouping foods, the first instrument yields lower values for other foods: M 0.2 and W 0.41; compared to those obtained from other foods reported by Poore and Nemecek [3]: M 44.8 and W 37.7. Given the variability of food groups, it is necessary to study CO2eq emissions for the foods we consume in the country.
Keywords: *CO2equivalent, Food groups, Greenhouse gas emissions.*

1. Introduction

A basic human need is food, which involves resources of diverse origin and, for its production, requires the use of fertilizers in the case of agriculture, grazing areas, water accessibility, etc. However, the application of substances that alter the natural forms of cultivation, breeding, or exploitation may lead to environmental degradation; raising issues such as the relationship between GHG expressed as CO_{2eq} and food consumption by students of Universidad Nacional Federico Villarreal. According to Ellerbeck [6] the world's population is approximately 8 billion inhabitants who generate on average 0.74 kg of waste per day, with a lower limit of 0.11 kg up to a maximum of 4.54 kg, reflecting the accessibility and efficiency in the use of raw materials and their products. The United Nations [7] indicates that in some areas, waste segregation, zero waste programs, composting, and recycling are carried out; however, these environmental protection actions are still insufficient worldwide, even though 2 billion tons of organic waste are produced annually, 50% of which is biodegradable. Thus, the Ministry of the Environment [8] in Peru states that 56% of our waste is organic, making its study necessary because its deterioration under environmental conditions contributes to global warming due to GHG emissions, according to the aforementioned Ministry of the Environment [9]. Statista Research Department [10] reports that 75% of global CO_{2eq} is produced by China, the United States, and India, estimating that for every ton of organic waste per day, 4.2 tons of CO_{2eq} e produced, as indicated by Power Knot LLC [11] meaning the global population could generate 24,864 tons of the

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* Correspondence: llopezr@unfv.edu.pe

compound. Internationally, the food sector consumes 30% of energy and emits 22% of GHGs according to Wongrattanatham and Pasukphun [12] considering cultivation, land use, supply chain, processing, transportation, marketing, distribution, and waste. Meanwhile, Aguilera, et al. [13] reported that global food production emitted 27% of GHG due to human activity; corresponding to harvesting, product processing, storage, and sales, which account for approximately 70% of the energy consumed by this system, according to Armijos [14]. The 1.9 tons of CO_{2eq} per capita per year from animal-based products represent 81% of total emissions [13].

Aguilera, et al. [13] in 2020 compared GHG emissions from diets in developed countries with high consumption of animal-based resources and observed their greater negative impact on climate change mitigation, compared to vegan, vegetarian, pescatarian, and demitarian diets. Clark, et al. [15] added that approximately 16 billion tons of CO_{2eq} were produced between 2012 and 2017, raising the planet's temperature by up to 2 °C. According to Ritchie, et al. [5] reducing meat and meat product consumption by 48% could lower global warming by at least 1.5 °C. In Guatemala, GHG emissions from adolescent girls' diets were estimated by linking 24-hour dietary recall information to the SHARP database, determining that in rural areas, GHG emissions are lower than in other countries of the region, according to Alvarez Escobar, et al. [16]. By using the Thai Carbon Footprint Calculator at a university, the main GHG-generating sources were identified, in order of importance: use of electronic devices, food consumption, and transportation, as indicated by Bautista, et al. [17]. Through monitoring university students' food consumption, the types of products are identified, and GHG are estimated, which will allow the planning and dissemination of guidelines to reduce negative environmental impact, consequently leading to awareness among emitters to promote responsible consumption in the future. This research emphasizes the importance of restructuring food consumption to reduce the effects of global warming. Excluding the socio-economic assessment of participants, the estimation of food waste and changes in consumption habits, the study focuses on estimating GHG from food consumption, differing from the Carbon Footprint concept [13].

The objective is to determine the relationship between Greenhouse Gas emissions and food consumption by students of Universidad Nacional Federico Villarreal.

2. Methods

Methodology. The research was conducted in Lima with higher education students from the Faculties of Oceanography, Fisheries, Food Sciences and Aquaculture (FOPCA), Civil Engineering (FIC), and Architecture and Urbanism (FAU) of Universidad Nacional Federico Villarreal, during the 2024 academic year. The sample was non-probabilistic, based on the Federico Villarreal National University [18] population. A total of 304 students responded to the survey. Unit of analysis: Student from the architecture and engineering fields of FIC, FAU, and FOPCA.

Procedure. Data collection was carried out through a virtual questionnaire located on Google Drive. The link was freely available to users during the 2024 academic year and was also distributed via Facebook, WhatsApp messages, and email. The data were processed using Microsoft Excel 365 and IBM SPSS Statistics 25.0.0.

Materials. A food consumption frequency questionnaire was used, related to GHG represented by $CO_{2eq}{}^{2}$, indicating the equivalencies of certain foods [14]. e instrument includes the Kilometer Food Calculator developed by Gonzalez [1] and Pérez, et al. [2] who worked with food groups, and the data from Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] who conducted their studies with isolated foods. The results were stored in a Gmail cloud account.

3. Results

96% of participants gave their informed consent. Table 1 shows that 44.9% of participants were women and 55.1% were men.

Table 1.
Distribution of higher education students surveyed.

	Informed consent		Age	
Gender	**Yes**	**No**	**Minimum**	**Maximum**
Man	161	8	17	41
Woman	131	4	17	30

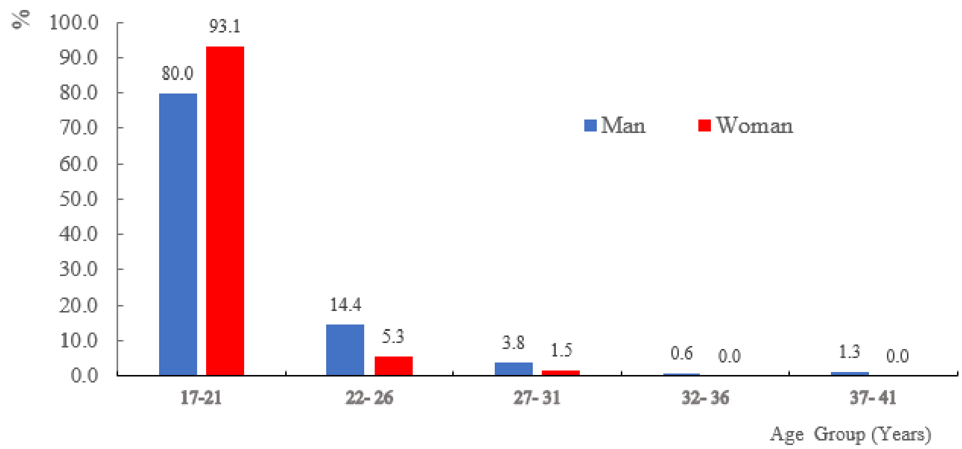

Figure 1.
Percentage distribution (%) of respondents by age.

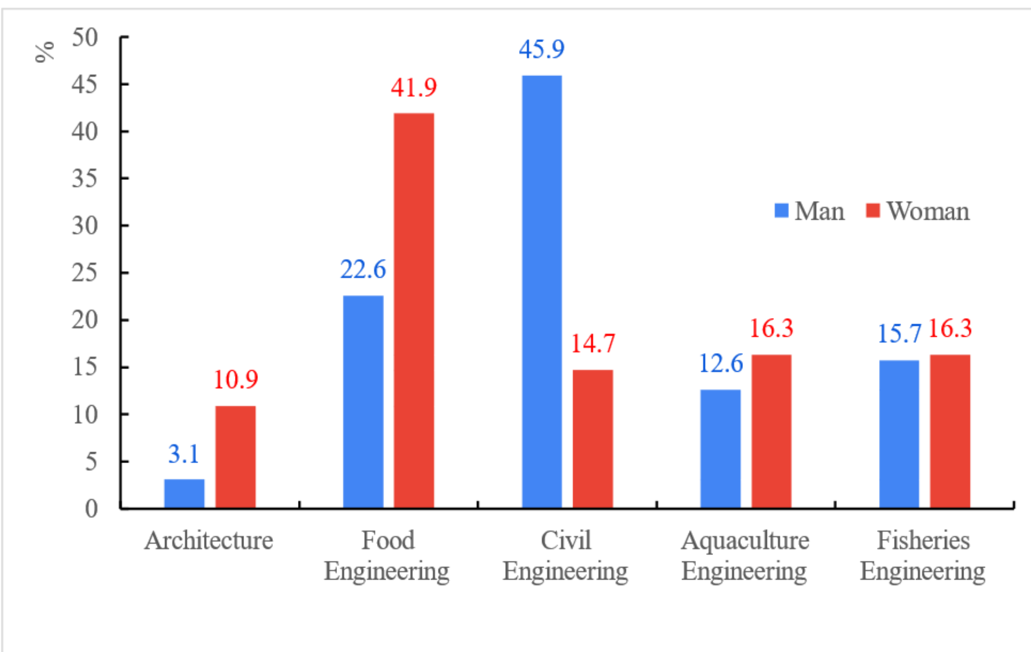

Figure 2.
Percentage distribution (%) of respondents by degree program.

In Figure 2, it is observed that Architecture students were those who participated the least, while students from Food Engineering and Civil Engineering were the most represented, with 41.9% of women and 45.9% of men, respectively. First-year students were the ones who responded the most. In

61% of respondents of both sexes, a Normal Body Mass Index was determined, with values ranging from 19.3 to 24.9; 23.9% of the men were overweight, as well as 32.6% of the women who participated, with 15.2% being obese and 7.0% obese women.

In Table 2, the weekly food consumption in kg by groups is presented. The highest consumption for men was cereals and flours (1.8 kg), fruits (1.7 kg), and vegetables (1.5 kg). For women: fruits (1.6 kg), vegetables (1.5 kg), and cereals-flours (1.5 kg). The highest standard deviation (SD) was 1.1 kg in cereals and flours, along with fruits, vegetables, and other foods for the former, and fruits (1.1 kg) for the latter, indicating the greatest variability in these groups. Coinciding with Alvarez Escobar, et al. [16] probably due to the association of eating habits with gender and cultural factors.

Table 2.
Weekly food consumption in kg according to the Kilometric Food Calculator.

Gender	Statistical	Cereals and flours	Meats	Eggs	Dairy products	Legumes	Fruits	Vegetables	Other foods
Man	Mean	1.8	1.4	0.9	1.1	1.3	1.7	1.5	1.3
	Median	1.5	1.5	1.0	1.0	1.0	1.8	1.0	1.0
	SD.	1.1	0.7	0.7	0.9	0.9	1.1	1.1	1.1
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Maximum	5.0	3.2	6.0	4.0	5.0	5.0	6.0	5.0
Woman	Mean	1.5	1.1	0.8	0.9	1.0	1.6	1.5	1.3
	Median	1.0	1.0	0.8	1.0	1.0	1.0	1.0	1.0
	SD	1.0	0.6	0.8	0.7	0.8	1.1	1.0	0.9
	Minimum	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Maximum	5.0	2.5	4.0	3.5	4.0	6.0	6.0	4.0

Note: The Kilometric Food Calculator was developed by Gonzalez [1] and Pérez, et al. [2].

In Table 3, kg of CO_{2eq} per food group are observed, obtained through the instrument by Gonzalez [1] and Pérez, et al. [2] for men, with 201.3 kg, a value that increases by approximately 11 kg for women; with a footprint calculated for men of 23.3 m^2 of footprint/kg of food consumed, which is approximately half of that determined for women, 58.6 m^2 of footprint/kg of food consumed. The total food consumed by the former was higher than that of the latter (11.9 to 9.7), but in percentage terms, the distribution of food of animal origin was 30.9 for male students and 28.9 for female students.

Table 3.
Environmental impact generated by food consumption according to the Kilometric Food Calculator.

Gender	Statistical	m^2 footprint/kg of food consumed	Annual environmental impact in kg CO_{2eq}
MAN	Mean	23.3	201.3
	Median	16.7	172.4
	SD	65.9	139.7
	Minimum	0.0	30.0
	Maximum	680.7	815.9
WOMAN	Mean	58.6	212.0
	Median	15.7	139.4
	SD	159.8	227.2
	Minimum	1.0	0.4
	Maximum	931.3	1005.2

Note: The Kilometric Food Calculator was developed by Gonzalez [1] and Pérez, et al. [2].

Table 4 shows the weekly consumption in kilograms by gender of different food categories that affect GHG emissions, according to data from Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5]: for men, rice consumption is 2.2 kg, meat products 1.4 kg, other legumes 1.1 kg. For women in Table 5, the highest values of food consumption are: rice 1.5 kg, fruit products 1.3 kg, vegetables and their products 1.1 kg, poultry meat 0.9 kg, other legumes 0.8 kg.

Table 4.
Weekly food consumption in kg according to Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] by groups - Case: Men.

Statistical	C1	C2	C3	C4	C5	C6	M1	M2	M3	M4	M5	M6	M7	M8	M9
Media	0.5	0.9	0.5	0.7	0.5	2.2	1.0	0.5	1.4	0.5	1.1	0.2	0.8	0.7	0.2
Median	0.3	0.5	0.2	0.5	0.2	2.0	0.8	0.3	1.0	0.3	1.0	0.0	0.5	0.5	0.0
SD	0.6	0.9	0.7	0.7	0.8	1.5	0.8	0.6	1.2	0.4	0.8	0.4	0.7	0.7	0.4
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	2.3	5,0	3.7	3.7	4.0	9.0	4.0	2.9	7.0	2.0	4.0	2.0	3.9	3.5	2.0

Statistical	E1	E2		D1	D2	D3		L1	L2
Media	0.9	0.8		0.9	0.9	0.5		1.1	0.6
Median	1.0	0.5		0.6	0.8	0.3		1.0	0.4
SD	0.7	0.9		0.9	0.9	0.5		1.0	0.5
Minimum	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Maximum	4.0	6.8		3.5	4.0	2.5		5.0	2.0

Statistical	F1	F2	F3	F4	F5	F6	F7	V1	V2	V3	V4	V5	V6
Media	0.7	0.4	0.7	1.1	1.4	1.1	1.0	0.6	0.7	1.0	0.6	0.6	0.5
Median	0.5	0.3	0.5	1.0	1.0	1.0	0.9	0.5	0.5	1.0	0.4	0.5	0.2
SD	0.7	0.4	0.6	1.0	1.6	1.1	0.9	0.6	0.6	0.8	0.6	0.6	0.7
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.0
Maximum	5.0	2.1	3.0	5.0	9.0	5.0	4.0	3.0	3.0	3.0	3.0	11.6	5.0

Note: Cereals and flours represented by C1: maize, C2: oat, C3: barley, C4: grains and products, C5: wheat and rye, C6: rice. Meats by M1: beef, M2: veal meat, M3: meat products, M4: pig meat, M5: poultry meat, M6: farmed shrimp, M7: fish, M8: fish products, M9: lamb. Eggs by E1: eggs, E2: eggs products. Dairy products by D1: milk, D2: dairy products, D3: cheese. Legumes by L1: other legumes, L2: peas. Vegetables by V1: Broccoli, cabbage, turnips and cauliflower; V2: onions and pores, V3: other vegetables, V4: tomatoes, V5: vegetables and their products , V6: root vegetables.

Table 5.
Weekly food consumption in kg according to Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] by groups – Case: Women.

Statistical	C1	C2	C3	C4	C5	C6	M1	M2	M3	M4	M5	M6	M7	M8	M9
Media	0.5	0.6	0.3	0.6	0.4	1.5	0.6	0.7	0.7	0.2	0.9	0.1	0.5	0.4	0.1
Median	0.3	0.5	0.1	0.5	0.2	1.0	0.5	0.5	0.5	0.2	0.8	0.0	0.4	0.3	0.0
SD	0.5	1.1	1.1	1.1	1.0	1.6	0.6	0.6	0.6	0.3	0.8	0.2	0.5	0.5	0.3
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	2.0	7.0	7.0	7.0	5.0	10	3.0	3.0	3.0	1.0	3.0	1.0	2.0	2.0	2.0

Statistical	E1	E2		D1	D2	D3		L1	L2
Media	0.7	0.6		0.6	0.7	0.4		0.8	0.5
Median	0.5	0.5		0.4	0.5	0.3		0.5	0.3
SD	0.5	0.6		0.7	0.7	0.5		0.8	0.6
Minimum	0.0	0.0		0.0	0.0	0.0		0.0	0.0
Maximum	2.0	3.0		3.5	3.8	2.0		3.5	4.0

Statistical	F1	F2	F3	F4	F5	F6	F7	V1	V2	V3	V4	V5	V6
Media	0.4	0.5	0.6	1.0	1.3	0.9	0.9	0.6	0.6	0.9	0.6	1.1	0.5
Median	0.3	0.3	0.4	1.0	1.0	0.6	0.5	0.4	0.4	0.7	0.3	1.0	0.1
SD	0.4	0.5	0.6	0.8	1.3	0.9	0.8	0.7	0.6	0.8	0.8	1.0	0.8
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	2.0	2.0	2.5	3.0	7.0	5.0	4.0	4.0	3.0	3.0	4.0	4.0	4.0

Note: Cereals and flours represented by C1: maize, C2: oat, C3: barley, C4: grains and products, C5: wheat and rye, C6: rice. Meats by M1: beef, M2: veal meat, M3: meat products, M4: pig meat, M5: poultry meat, M6: farmed shrimp, M7: fish, M8: fish products, M9: lamb. Eggs by E1: eggs, E2: eggs products. Dairy products by D1: milk, D2: dairy products, D3: cheese. Legumes by L1: other legumes, L2: peas. Vegetables by V1: Broccoli, cabbage, turnips and cauliflower; V2: onions and pores, V3: other vegetables, V4: tomatoes, V5: vegetables and their products, V6: root vegetables.

The highest GHG emission is for the intake of meats 95.3 kg of CO_{2eq}, leaving a footprint of 120.1 m² for the respondents and for the female participants the highest item of 58.1 kg of CO_{2eq}, with a footprint of 74 m², which are presented in Table 6 denoting for women a difference of 9.4 kg less for other foods consumed, as well as 60 kg of CO_{2eq} emitted, with less than 86 m² of footprint.

Table 6.
Environmental impact generated by food consumption.

Gen.	Mertens and Poore	Cereals and flour	Meats	Eggs	Dairy	Legumes	Fruits	Vegetables	Other foods	TOTAL
Man	kg consumed	5.3	6.2	1.6	2.3	1.6	6.3	5.0	12.6	40.9
	kg of CO_{2eq}	19.4	95.3	8.7	26.1	3.4	6.0	8.5	44.8	212.1
	Footprint in m²	27.5	120.1	26.5	26.1	12.8	5.2	4.0	64.6	286.9
Woman	kg consumed	3.9	4.2	1.4	1.7	1.3	5.5	4.3	9.4	31.5
	kg of CO_{2eq}	14.1	58.1	7.2	19.8	2.7	5.2	7.2	37.7	152.0
	Footprint in m²	19.8	74.0	21.9	19.8	10.1	4.6	3.4	46.1	199.8

Note: Other foods included tea, coffee, bitter chocolate, cocoa, potatoes, starches from roots or tubers and their products, yuca, soy milk, tofu, sweet products, seed oil, animal and vegetable oils and fats, alcoholic beverages, wine, mixed dishes, miscellaneous.

Table 7 shows that the CO_{2eq} values determined by Gonzalez [1] and Pérez, et al. [2] in the Food Kilometer Calculator are close for eggs, being lower than those calculated by Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] in the meat, dairy and other food groups. By gender those for fruits and vegetables are equal or close for both sources.

Table 7.
Comparison of the annual calculation of CO_{2eq} emission in kg according to the Kilometric Food Calculator and the reports of Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5].

Gender	Statistical	Cereals and flour	Meats	Eggs	Dairy	Legumes	Fruits	Vegetables	Other foods
MAN									
	Mean[1]	9.6	19.2	9.6	14.4	19.2	19.2	19.2	9.6
	Mean[2]	19.4	95.3	8.7	26.1	3.4	6.0	8.5	44.8
WOMAN	Mean[1]	14.4	14.4	9.6	9.6	14.4	19.2	19.2	19.2
	Mean[2]	14.1	58.1	7.2	19.8	2.7	5.2	7.2	37.7

Note: [1] c corresponds to the values obtained using the Kilometric Food Calculator according to Gonzalez [1] and Pérez, et al. [2] and to the works of Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5].

4. Discussion

Table 1 shows that 96% of respondents gave their informed consent to use their data; likewise, most of the young participants have a normal BMI. Table 2 estimates similar trends in food consumption by gender, but the highest consumption corresponds to students [15] implying a diversity of GHG emissions. Men reported a lower average consumption of eggs at 0.9 kg and women of dairy products at 0.9 kg, with cereals and flours being the highest consumed among the former at 1.8 kg, and fruits among the latter at 1.6 kg; both coinciding in the intake of vegetables at 1.5 kg/week and other foods at 1.3 kg/week; the latter including processed products, which present a greater negative environmental impact. Even though plant-based products (11.9) constitute the highest quantity of kilograms consumed weekly, their carbon footprint per kg of food is, for men (23.3 m²), approximately half of that recorded for women (58.6 m²), according to the Food Miles Calculator, which treats food groups collectively, whereas Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] address them separately, reporting a footprint of 286.9 m² for men and nearly 87 m² less for women. Likewise, the greatest differences in the emission of the representative GHG are observed in meats and dairy products according to both measuring instruments, as shown in Table 7; with the distinction of that generated by legumes determined by the Food Miles Calculator, a value that may be influenced by cultural and economic factors according to Wongrattanatham and Pasukphun [12].

It is observed that the environmental impact of food consumption, measured in terms of carbon footprint (m^2/kg of food consumed) and annual GHG emissions expressed in kg of CO_{2eq}, shows differences between men and women, both in consumption patterns and in the resulting emissions; therefore, gender-focused GHG mitigation policies are required. The greater impact caused by women may be attributed to the frequency of consumption of certain food groups, such as cereals, flours, and legumes, consistent with what was reported by Aguilera, et al. [13]. This also aligns with the findings of Clark, et al. [15] who reported that animal-based foods, although consumed in smaller quantities, have a higher carbon footprint than plant-based sources, hence the interest in diets based on these resources to mitigate negative environmental impacts. Likewise, the disproportionate impact of certain foods in women's diets reinforces the conclusions of Wongrattanatham and Pasukphun [12] who found that access to healthy and sustainable foods may be limited by cultural and economic factors, leading to variability in individual emissions. It is necessary to note that a 50% reduction in meat consumption could significantly reduce global CO_{2eq} emissions, in addition to providing health benefits, according to Ritchie, et al. [5]. The variability in the standard deviations of men's consumption of meat products (1.2 kg) and rice (1.5 kg), and 1.6 kg for women, indicates marked individual differences in food choices. According to Wongrattanatham and Pasukphun [12] variability in access and food preferences significantly influences individual emissions, leading, according to Ritchie, et al. [5] the design of gender-specific strategies aimed at promoting sustainable diets to reduce GHG emissions individually and collectively. Women consume 1.9 kg less meat, meat products, and similar foods (including fish, seafood products, shrimp), generating 37.2 kg less CO_{2eq} from meat, as determined by the reports of Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5]. For Wongrattanatham and Pasukphun [12] the variability in the results may be attributed to the presence of processed foods, causing differences in consumption patterns. In terms of plant-based foods, women stood out in the consumption of fruits and vegetables, with lower but significant environmental impacts due to the volume consumed; this is the case of legumes, with 29.9 kg of CO_{2eq}, a notable value considering their low impact per unit, as indicated by Aguilera, et al. [13]. Therefore, it is necessary to promote more sustainable diets to reduce the environmental impact of food consumption; among men, reducing the consumption of meats and processed foods could be a key strategy, while among women, the diversification of protein sources and the reduction in the volume of processed foods consumed could be encouraged. This would contribute to reducing global emissions, helping to limit the increase in global temperature to 1.5 °C according to Ritchie, et al. [5].

Animal and processed foods are the largest contributors to GHG emissions, Clark, et al. [15] emphasize that reducing consumption of meat and dairy products could avoid up to 70% of food-related emissions.

Ritchie, et al. [5] and Poore and Nemecek [3] reveal significant discrepancies between the methods, highlighting limitations in local calculation tools and the need to regionalize data. The emissions estimated by the Calculator for eggs and dairy—Men: 0.5 kg and 0.5 kg; and Women: 10.9 kg and 0.7 kg respectively—are lower than the values reported by international sources, 11.1 kg and 28.6 kg respectively, yet they remain substantially higher than those from the local Calculator. The discrepancies emphasize the importance of including more representative data from the Peruvian context, as suggested by Wongrattanatham and Pasukphun [12]. The inclusion of broader databases, such as those used by Poore and Nemecek [3]; Mertens, et al. [4] and Ritchie, et al. [5] would allow for more accurate estimates tailored to the Peruvian reality, where food consumption and agricultural practices vary considerably between regions. This difference in consumption is of interest as it denotes the intake of more processed foods, which have a greater negative environmental impact; this coincides with Alvarez Escobar, et al. [16] who state that sociocultural, economic, and gender factors influence GHG emissions. Considering that Clark, et al. [15] indicate that a 48% reduction in the meat intake and its derivatives could prevent a global temperature increase of 1.5 °C, it is a priority to disseminate this information among our consumers to contribute to environmental protection. Likewise, since 56% of waste, according to the Ministry of the Environment [9] corresponds to organic waste, it is essential for our population to become aware of the management of the waste generated from food preparation, aiming for a circular economy to reduce GHG emissions by taking more comprehensive advantage of resources and their products. Furthermore, the reduction of food waste, which represents 56% of solid waste in Peru [9], can have a significant impact on climate change mitigation. Circular economy strategies have proven effective in minimizing organic waste and reducing GHG emissions according to García [19].

5. Conclusion

The conclusions of the study are based on gender-based differences in food consumption; the promotion of more sustainable diets focused on reducing the intake of meat products and processed foods is required to minimize GHG emissions. Given the intake of meat and its products, which represent high GHG emission values, the negative environmental impact of this consumption is emphasized. This highlights the importance of promoting more sustainable eating habits within the academic community, such as those oriented toward plant-based diets and the reduction of organic waste, in order to mitigate negative environmental impact. Based on the results, food consumption trends by gender can be determined and related to the population's eating habits and awareness, in order to engage them with the Sustainable Development Goals, particularly SDG 12.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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