

Trends and determinants of fruit and vegetable consumption in Peru: A national survey analysis from 2016 to 2022

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ABSTRACT

Introduction: The intake of five or more servings of fruits and/or vegetables is recommended for the prevention of various diseases. However, the level of consumption has varied over time.

Objective: This study analyzed the trend in fruit and vegetable consumption in Peru from 2016 to 2022 and explored associated factors.

Materials and Methods: A secondary data analysis of the Peru Demographic and Health Survey (ENDES) was conducted, calculating adjusted Prevalence Ratios (aPR) with their respective 95% confidence intervals (CI95%).

Results: The trend in consumption showed a significant decrease in 2020. In the regression analysis, associations were found with being male (aPR=1.23; CI95% 1.18-1.27); being between 26 to 35 years old (aPR=0.80; CI95% 0.77-0.83), between 60 to 69 years old (aPR=0.78; CI95% 0.72-0.85) and 70 years or older (aPR=0.75; CI95% 0.67-0.83); the year 2020 (aPR=0.58; CI95% 0.54-0.63) and 2021 (aPR=0.83; CI95% 0.83-0.94); having a partner (aPR=0.58; CI95% 0.54-0.63); living on the coast (aPR=0.87; CI95% 0.83-0.91), in the highlands (aPR=0.74; CI95% 0.70-0.78) and in the jungle (aPR=

0.93; CI95% 0.88-0.98); being poor (aPR=1.13; CI95% 1.06-1.21) and of middle status (aPR=1.10; CI95% 1.02-1.18); smoking daily (aPR=0.78; CI95% 0.67-0.89); drinking alcohol (aPR=1.12; CI95% 1.07-1.17) and having T2DM (aPR=1.26; CI95% 1.15-1.38).

Conclusion: Consumption has varied over the years, with a decrease in 2020. Associated factors include being male, having T2DM, and drinking alcohol. Additionally, having a partner, living on the coast, in the highlands or in the jungle, being poor or of middle status, and smoking daily were associated with lower consumption.

Keywords: Fruit, Vegetables, Epidemiologic factors, Public health.

INTRODUCTION

The eating of fruits and greens has been conclusively identified for its health advantages [1]. However, inadequate intake is common all over, resulting in a worldwide health crisis [2]. Nutrition that ideally incorporates fruits and greens has been shown to have a positive effect in preventing non-communicable sicknesses, an increasingly pressing issue for health methods [3].

In Latin America along with the rest of the planet, the use of fruits and veggies has declined [4]. This has been more recognizable during the COVID-19 global pandemic [5]. The consumption of fruits, lean proteins, grains, and dairy goods, in line with current analysis, substantially fell, while the intake of sugars, fats, and sweets significantly

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increased during the pandemic [6].

In Peru, until now, few reports have been developed in which the tendencies and aspects related to the intake of greens and fruits have been examined. Therefore, this work targeted to analyze this hole in the literature, for which data from the National Demographic and Health Survey (ENDES) were utilized to explore the tendency in the consumption of fruits and vegetables in Peru from 2016 to 2022. Also, the variables connected with the consumption of fruits and vegetables were investigated, with the aim of recognizing likely areas of intervention and thus improving the diet and health of Peruvians.

The findings of this research have the potential to profoundly impact the shaping of public health policies and health promotion initiatives within the nation going forward. By obtaining a better understanding of the tendencies and factors linked to the intake of fruits and vegetables, more powerful strategies can be applied to encourage nutritious eating habits and move towards the avoidance of non-communicable illnesses in individuals of Peru.

MATERIALS AND METHODS

Study design

This constitutes an investigating, cross-sectional analysis, based on in advance obtainable data from ENDES [7]. A two-stage stratified example design was utilized to confirm the representativeness of the specimen at the nationwide level. The information originates from 2016 to 2022, which were analyzed as per the Strengthening of Reporting of Observational reports in Epidemiology (STROBE) rules for observational investigation [8].

Population and sample

The ENDES is representative at the national level. The sample was selected, for which a balanced, stratified, and independent probabilistic sampling design was used, at the departmental level and by rural and urban area. At each stage, the sampling units were randomly selected, and non-responses and missing data were handled using optimal imputation techniques to preserve the representativeness of the sample. It should be noted that people with incomplete or inconsistent data from the variable of interest were discarded.

Definition of variables

The first outcome variable was fruit consumption, which was evaluated through the question: How many portions

of fruit did you consume daily? Then, it was formulated whether they consumed less than five servings a day compared to five or more. Vegetable intake was the second outcome variable, which was evaluated with the following question: How many portions of vegetable did you eat daily? Subsequently, it was categorized into whether they consumed less than five servings a day versus five or more. The decision of the cut-off points was according to the World Health Organization (WHO) recommendations [9].

The factors to be evaluated were sex (male versus female), age categorized (15–34, 35–60, 61–69, and ≥ 70 years), marital status (with partner, without partner), educational level (primary, secondary, and higher), wealth index (poor, middle, rich, and richest), natural region (Metropolitan Lima, rest of the coast, highlands, and jungle), daily tobacco consumption (yes versus no), self-reported alcohol intake in the previous 12 months (yes versus no), year (from 2016 to 2022), Body Mass Index (BMI) (normal weight, overweight, and obesity), history of arterial hypertension (yes versus no), and history of Type 2 Diabetes Mellitus (T2DM). The way each variable was measured can be reviewed in the ENDES report [7].

Statistical analysis

The statistical analysis was developed with the statistical software STATA 17. Descriptive variables were shown in absolute and relative frequencies. The factors for evaluation were presented bivariately, and crude Prevalence Ratios (R_{Pc}) and adjusted (R_{Pa}) were calculated with their respective confidence intervals, at 95% (CI95%), for which generalized linear models with robust variance estimation were used; a Poisson distribution with logarithmic link functions was assumed.

To measure whether the effects of the associated factors vary according to the variables already mentioned, stratified analyses were carried out. Likewise, a trend analysis was carried out over time to identify whether the prevalence of fruit and vegetable consumption has changed over the years. The analyses were developed, for which it was considered that they were complex samples.

Ethical aspect

This manuscript was based on an analysis of public domain survey data sets and freely available online, with all identifier data removed; the downloaded information was presented anonymously, so the possible harms to the people in the primary study were minimal.

RESULTS

The sample is 247,857 people, of which 51.50% were women. 32.31% had a higher level of education; 78.35% lived in urban areas; the majority did not smoke daily (98.51%) and did not drink alcohol (88.28%); 24.30% were obese; 9.52% of the participants reported having a history of arterial hypertension and 3.98% had type 2 diabetes mellitus. Regarding the intake of fruits and vegetables, only 9.00% reported consuming five or more servings daily. This proportion remained relatively stable over the years, with the exception of a significant decrease in 2020. The rest of the results can be seen in Table 1.

Table 1. Descriptive characteristics of the factors associated with the consumption of fruits and vegetables (≥ 5 servings per day)

Characteristic	n=247,857
Sex	
Female	127,653 (51.50%)
Male	120,204 (48.50%)
Group age	
15 to 35 years old	106,800 (43.09%)
36 to 59 years old	99,845 (40.28%)
60 to 69 years old	22,093 (8.91%)
70 years to more	19,119 (7.71%)
Year	
2016	35,508 (14.33%)
2017	35,649 (14.38%)
2018	35,450 (14.32%)
2019	35,296 (14.24%)
2020	34,027 (13.73%)
2021	35,695 (14.40%)
2022	36,182 (14.60%)
Educational Level	
No Level	461 (0.23%)
Primary	42,229 (20.97%)
Secondary	93,653 (46.10%)
Superior	65,073 (32.31%)
Civil status	
Single	82,474 (33.27%)
With a partner	164,884 (66.73%)
Natural region	
Metropolitan Lima	70,767 (28.55%)
Resy of coast	75,717 (30.48%)
Montain Range	66,777 (26.94%)
Jungle	34,596 (13.99%)

Area of residence	
Urban	194,207 (78.35%)
Rural	53,650 (21.65%)
Wealth index	
The poorest	42,527 (17.53%)
Poor	40,934 (21.16%)
Medium	54,200 (21.29%)
Rich	39,956 (20.65%)
Richest	37,486 (19.37%)
Daily smoking	
No	244,175 (98.51%)
Yes	3,682 (1.49%)
Alcohol consumption	
No	218,677 (88.28%)
Yes	29,043 (11.72%)
Body mass index	
Normal Weight	73,572 (36.63%)
Overweight	78,474 (39.07%)
Obesity	48,809 (24.30%)
History of hypertension arterial	
No	224,095 (90.48%)
Yes	23,589 (9.52%)
History of T2DM	
No	237,863 (96.02%)
Yes	9,865 (3.98%)
Fruit and vegetable consumption ≥ 5 servings per day	
No	225,560 (91.00%)
Yes	22,297 (9.00%)

A statistically significant association was found with consuming five or more servings per day with being male (aPR: 1.23; 95% CI 1.18, 1.27) versus being female, in the multivariable regression analysis; being between 26 to 59 years old (aPR: 0.80; 95% CI 0.77, 0.83), between 60 to 69 years old (aPR: 0.78; 95% CI 0.72, 0.85) and 70 years or older (aPR: 0.75; 95% CI 0.67, 0.83) compared to being 15 to 35 years old; the year 2020 (aPR: 0.58; 95% CI 0.54, 0.63) and the year 2021 (aPR: 0.88; 95% CI 0.83, 0.94); having a partner (aPR: 0.58; 95% CI 0.54, 0.63); living in the coast (aPR: 0.87; 95% CI 0.83, 0.91), highlands (aPR: 0.74; 95% CI 0.70, 0.78) and jungle (aPR: 0.93; 95% CI 0.88, 0.98); being poor (aPR: 1.13; 95% CI 1.06, 1.21) and middle class (aPR: 1.10; 95% CI 1.02, 1.18); being a daily smoker (aPR: 0.78; 95% CI 0.67, 0.89); drinking alcohol (aPR: 1.12; 95% CI 1.07, 1.17) and having T2DM (aPR: 1.26; 95% CI 1.15, 1.38) (Table 2).

Table 2. Bivariate characteristics and simple and adjusted multivariate regression analysis of factors associated with the consumption of fruits and vegetables (≥ 5 servings per day)

Characteristic	Fruit and vegetable consumption ≥ 5 servings per day		Univariable		Multivariable	
	No, n=225,560	Yes, n=22,297	cPR	OR	aPR	95% CI
Sex						
Female	117,547 (92.08%)	10,106 (7.92%)	Ref.		Ref.	
Male	108,013 (89.86%)	12,191 (10.14%)	1.31	1.25, 1.37	1.23	1.18, 1.27
Group age						
15 to 35 years old	95,283 (89.22%)	11,516.93 (10.78%)	Ref.		Ref.	
36 to 59 years old	91,703 (91.85%)	8,141.46 (8.15%)	0.81	0.77, 0.83	0.8	0.77, 0.83
60 to 69 years old	20,548 (93.01%)	1,544.86 (6.99%)	0.73	0.7, 0.73	0.78	0.72, 0.85
70 years to more	18,026 (94.28%)	1,093.63 (5.72%)	0.46	0.46, 0.54	0.75	0.67, 0.83
Year						
2016	31,964.46 (90.02%)	3,543.73 (9.98%)	Ref.		Ref.	
2017	32,172.21 (90.25%)	3,477.33 (9.75%)	0.98	0.93, 1.03	0.97	0.90, 1.04
2018	32,054.58 (90.29%)	3,445.29 (9.71%)	0.93	0.89, 0.98	0.98	0.91, 1.05
2019	31,874.18 (90.31%)	3,421.32 (9.69%)	0.89	0.85, 0.94	0.94	0.88, 1.00
2020	32,483.41 (95.46%)	1,544.13 (4.54%)	0.44	0.41, 0.47	0.58	0.54, 0.63
2021	32,398.46 (90.77%)	3,296.07 (9.23%)	0.89	0.85, 0.94	0.88	0.83, 0.94
2022	32,613.19 (90.14%)	3,569.01 (9.86%)	0.93	0.93, 1.03	0.94	0.88, 1.00
Educational Level						
No Level	435.97 (94.52%)	25.27 (5.48%)	Ref.		Ref.	
Primary	39,587.38 (93.74%)	2,641.97 (6.26%)	0.91	0.85, 2.06	0.97	0.60, 1.70
Secondary	84,221.80 (89.93%)	9,431.41 (10.07%)	1.38	1.25, 3.01	1.23	0.76, 2.17
Superior	58,760.70 (90.30%)	6,312.61 (9.70%)	1.86	1.24, 2.99	1.21	0.75, 2.13
Civil status						
Single	73,605.76 (89.25%)	8,868.07 (10.75%)	Ref.		Ref.	
With a partner	151,954.72 (91.88%)	13,428.81 (8.12%)	0.78	0.75, 0.80	0.87	0.83, 0.90
Natural region						
Metropolitan Lima	63,344.78 (89.51%)	7,422.22 (11.49%)	Ref.		Ref.	
Resy of coast	68,835.63 (91.11%)	6,718.95 (8.89%)	0.81	0.77, 0.85	0.87	0.83, 0.91
Montain Range	61,982.36 (92.82%)	4,794.28 (7.18%)	0.68	0.65, 0.72	0.74	0.70, 0.78
Jungle	31,397.71 (90.33%)	3,321.79 (9.67%)	0.89	0.84, 0.93	0.93	0.88, 0.98
Area of residence						
Urban	175,872.07 (90.56%)	18,334.82 (10.44%)	Ref.		Ref.	
Rural	49,688.41 (92.62%)	3,967.55 (7.38%)	0.84	0.82, 0.87	1.03	0.96, 1.10
Wealth index						
The poorest	31,363.70 (92.47%)	2,522.89 (7.53%)	Ref.		Ref.	
Poor	37,016.56 (90.43%)	3,222.99 (8.57%)	1.17	1.12, 1.22	1.13	1.06, 1.21
Medium	37,172.36 (90.22%)	4,022.70 (10.77%)	1.21	1.16, 1.27	1.1	1.02, 1.18
Rich	36,158.82 (90.50%)	3,797.50 (9.50%)	1.24	1.18, 1.31	1.03	0.95, 1.11
Richest	33,950.05 (90.57%)	3,339.99 (9.43%)	1.22	1.16, 1.30	0.99	0.91, 1.07
Daily smoking						
No	222,223.16 (91.01%)	21,952.29 (8.99%)	Ref.		Ref.	
Yes	3,337.32 (90.64%)	342.68 (9.36%)	1.17	1.04, 1.32	0.78	0.67, 0.89
Alcohol consumption						
No	199,688.63 (91.32%)	18,988.15 (8.68%)	Ref.		Ref.	
Yes	25,747.13 (88.65%)	3,295.41 (11.35%)	1.39	1.33, 1.45	1.12	1.07, 1.17
Body mass index						
Normal Weight	66,407.74 (90.26%)	6,564.60 (9.74%)	Ref.		Ref.	
Overweight	71,477.57 (90.76%)	6,996.16 (8.92%)	0.94	0.91, 0.98	0.97	0.94, 1.01
Obesity	44,296.16 (90.22%)	4,512.82 (9.25%)	0.97	0.93, 1.02	1.02	0.98, 1.07
History of hypertension arterial						
No	203,680.12 (90.88%)	20,414.42 (9.11%)	Ref.		Ref.	
Yes	21,717.29 (92.06%)	1,872.01 (7.94%)	0.93	0.88, 0.98	1.06	0.99, 1.14
History of T2DM						
No	216,475.51 (90.87%)	21,387.36 (8.99%)	Ref.		Ref.	
Yes	8,960.02 (90.87%)	905.28 (9.18%)	1.01	0.92, 1.09	1.26	1.15, 1.38

In Figure 1, the phenomenon in the intake of fruits and veggies (five or a lot of serving's everyday time) in Peru, from 2016 to 2022, is observed. In 2016, 9.98% of the citizens announced taking in five or a lot of servings daily time. This proportion decreased marginally in the subsequent ages, with 9.75% in 2017; 9.71% in 2018, and 9.69% in 2019. In 2020, a substantial reduce in the intake of fruits and vegetables was observed, with merely 4.54%; in 2021, it increased again to 9.23% and in 2022, this proportion rose even further to 9.86% and approached the levels observed before the pandemic.

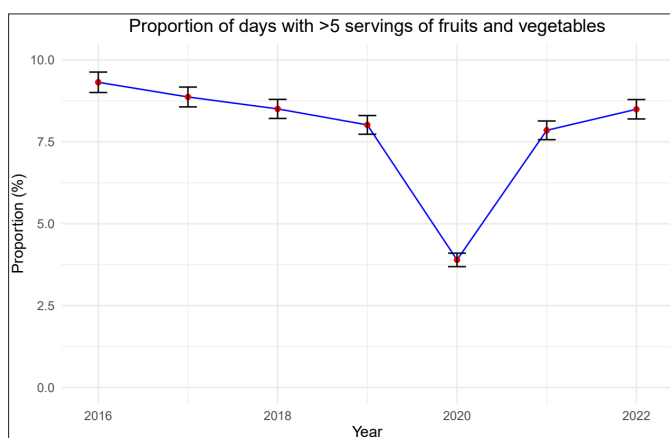


Figure 1. Prevalence of fruit and vegetable consumption (≥ 5 servings per day) per year

DISCUSSION

Trend in the consumption of fruits and vegetables

This research shows a shocking surge in the quantity of fruits and vegetables consumed in Peru from 2016 up till the present year 2022. Though for most of that time percentage of individuals eating four or more helpings of citrus fruit and vegetables daily was at about 9% to 10%, the proportion was utilized to indicate location inside. 2020, there was a notable decline, accompanied by an increase in 2021 and 2022. This example may mirror the impacts of the COVID-19 pandemic on eating propensities. Recent studies have illuminated different changes in eating designs over the span of the pandemic, for instance, lessening in the utilization of vegetables and organic product, as indicated by examinations and indicated by investigations [10,11]. Likewise, it is seen that the pandemic affected the eating designs and way of life of underserved and specialists in the food science field [12]. These findings support the idea that the COVID-19 pandemic could have had a significant effect on the utilization of organic products and vegetables in Peru.

The drop in people taking in greens and fruits is noticeable and likely demonstrates the impact of the COVID-19 pandemic in the year 2020. The pandemic has caused disruptions to food structures in their entirety as well as has interrupted social networks; as a result, it has hampered reach to fresh and nutritionally rich meals like the yield of gardens and orchards [13]. The reduction in consumption of fruits and vegetables all through the pandemic year symbolizes an occurrence far from exclusive to Peru. It has in the same way been a decline in partaking of such nutritious victuals within an identical timeframe [14]. However, it is heartening to think the routine switched in 2021 and 2022, signifying a recovery in the intake of fruits in the country.

Factors associated with the consumption of fruits and vegetables

The study discovered that males ate more veggies and produce compared to females as it was linked to being a male. That closing result matches what came previously. For example, a study that included Kuwait found that guys ate more veggies and fruits each day than women [15]. In a similar way, a study performed in 49 lower and middle-income nations found that males consumed guidelines for fruit and vegetable intake to more of an extent than females did [16]. However, research in Sweden found that women consumed more unfried vegetables than men [17]. Those findings emphasize the value of thinking of sex when arranging and performing ways to promote the eating of veggies and fruits.

Our results indicate a major connection between time and eating greens and produce. Specifically, it demonstrated that being amidst 26 to 59 years of age, 60 to 69 years of age, and 70 years or more contrasts from being amidst 15 to 35 years of age. This outcome matches earlier research. This showed that intake reduced as time passed. In a lifelong study in Finland, the result revealed that physical work along with the uptake of greens and produce from childhood to midlife, likely, go together [18]. Added study within the United States established that the consumption of produce was found to be less among younger persons in comparison to older persons [19]. In a similar manner, a German study found that intake of produce diverged dependent on sexual sort, age, BMI, and socioeconomic level [20]. The discoveries highlight the significance of health promotion interventions aimed towards motivating the intake of vegetables and fruits at all ages, but especially amongst the youngest, in boosting intake.

The fact that you were wed at the alike time became a deciding element in using fruits and greens. During our exploration, it was perceived that having a partner contributed to a reduced probability of consuming 5 or more helpings of fruits and vegetables every day when holding the lack of a spouse as the thing compared. This finding goes with previous research displaying that hitched or joined persons eat less healthily compared to singles [21,22]. It is likely that shared tasks and family relationships impact food selections, which can result in a reduced usage of fruits and vegetables [23]. However, one must recognize that such outcomes are probable to vary depending on the prevailing cultural and financial environment. In this regard, more study is necessary to identify those connections more precisely.

Regarding geographical area, the findings match up with the preceding study, which highlighted modifications in result based on place's spot [24,25]. The reasons for such variations can be attributed to things like the supply and availability of vegetables and fruits, which can vary by place [26]. For example, in more distant or mountainous areas, there can be less access to marketplaces or shops that sell these fresh products. Likewise, cultural aspects must be thought of, as eating habits and food preferences could differ by district [27]. So, further study is fundamental to comprehend such regional variations more precisely and how they can be tackled to boost the intake of veggies and fruits.

In the part that follows, the relationship between socioeconomic position and expenditure of greens and fruits is examined. The findings of this document reveal that being in a needy situation and having a moderate position in society were joined with greater use of fruits and vegetables. These outcomes coordinate with what has been stated, which proposes that position in society might affect eating habits, counting the expenditure of them [28-30].

For example, in a study by Assari et al., [31] it turned out that foods rich in nutrients tend to cost more, which can limit their intake among people with lower incomes. However, in our review, it came out that smokers within the lowest socioeconomic groups reported greater usage of vegetables and fruits. This may be due to cultural or availability factors that weren't given in this research. Additionally, in a report done in Ghana, it turned out that socioeconomic level was positively related to dietary diversity, an indication of diet quality [29]. Those with higher socioeconomic status do partake in a wider selection of nutrients including eating more vegetables and fruit, as evidenced by the examination. After a

long period of study, the investigation conducted with American teenagers aged 14 to 18 years found that a higher diet quality, calculated using the Healthy Eating Index-2010, was inversely linked to both BMI and WC while being directly connected to total cholesterol levels [28]. The research suggests that a diet including ample portions of vegetables and fruits, apart from facilitating the avoidance of weight gain, can further provide additional benefits regarding one's wellbeing, due to supplying abundant nutrients from vegetables and fruits.

The consumption of alcohol and tobacco also showed a significant association with the consumption of vegetables and fruits. The results indicated that smokers were less likely to have the effect. This result is consistent with previous studies, which have shown that smokers tend to follow less healthy diets *versus* non-smokers [31]. Other studies, however, they found that drinking alcohol was directly connected to the usage of greens and fruits. This conclusion could appear paradoxical at first glance, as particular studies have proposed that individuals who consume alcoholic beverages in modest quantities might tend to have more healthy diets compared to those who abstain altogether [32]. Although enjoying alcohol in moderation can be acceptable, remember that overindulgence poses risks to your wellbeing. This is true if you fail to incorporate a diet full of fruits and vegetables on a consistent basis [33].

With the assessment of the elements associated with how much farm produce and edibles persons take in, a strong connection was observed with the existence of T2DM. This outcome agrees with the writings, which propose that persons with T2DM may be more likely to follow nutritional suggestions, like consuming vegetables and produce, as a part of coping with their condition [34]. Also, in some reports it has been advised that consuming more fruits and vegetables could have a protective impact against establishing non-communicable sicknesses, like T2DM [35,36]. However, one must recognize that the connection between fruit and vegetable consumption and T2DM can go in either direction. On the one hand, higher usage may decrease the chance of developing T2DM [36]. While supplementing their diet with additional fruit and vegetable consumption could be beneficial, patients with T2DM may alternatively increase their intake of such produce as one way of managing their condition [22].

Public health importance

The results of this work have helpful effects for general health. Taking enough vegetables and fruits is a basic part

of a balanced diet and has been linked with a reduced chance of some lingering sicknesses, like heart issues, sure forms of cancer, and strokes [37]. The WHO advises consuming a minimum of 400 grams of plants and fruits each day to help evade lingering health concerns such as cardiovascular disease, diabetes, cancer, and obesity [38].

Still, with the evident medical benefits, numerous fails to partake of the proposed amounts of vegetables and produce. Our discoveries demonstrate that definite classes of persons in Peru, such as females, more youthful individuals, and each day people, who smoke, tend to eat under five parts of vegetables and organic products on a daily reason [39].

These effects may help societal health efforts focused on increasing the consumption of vegetables and fruits in these communities. Initiatives to boost health might have to be customized to deal with the specific barriers to the intake of these foods encountered by these groupings. For instance, interventions might address the availability and price of vegetables and fruits. Additionally, ideas and info concerning the significance of a balanced diet may be presented [40].

Study limitations

Firstly, this study is based on self-reported survey data, which may lead to memory biases and the underestimation or overestimation of the consumption of vegetable and fruits. Although ENDES is a representative survey in Peru, the accuracy of the data depends on the respondents' answers [41].

Secondly, the cross-sectional design of the study limits the inference of causal relationships, and although some associations have been identified between various factors and the intake of fruits and vegetables, it cannot be established whether these factors are causes or consequences of this consumption.

Thirdly, although adjustments have been made for a number of potentially confounding factors, the possibility of residual confounding by unmeasured or poorly measured variables cannot be dismissed. For example, adjustments could not be made for additional dietary factors, such as total energy consumption, which may influence the consumption of vegetables and fruits.

CONCLUSION

This work provides a detailed overview of the trend in the intake of fruits and vegetables in Peru from 2016 to 2022, as well as the factors associated with this consumption.

The findings indicate that although the proportion of the population consuming five or more servings of vegetables and fruits daily has varied over these years: the general trend has been relatively stable, with a significant decrease in 2020, followed by a recovery in 2021 and 2022.

Factors associated with a higher consumption of fruits and vegetables include being male, having type 2 diabetes, and drinking alcohol. On the other hand, factors associated with lower consumption include having a partner, living on the coast, in the mountains or jungle, being poorer or of middle status, and smoking daily. Seeing these results, it is inferred that it is necessary to apply health promotion strategies with the purpose of increasing the consumption of vegetables and fruits, especially among the identified population groups with low consumption.

It is recommended that future health promotion interventions focus on nutritional education and the promotion of healthy diets, specifically in groups that consume less. Also, it is important to conduct more research to explore the barriers and facilitators of fruit and vegetable consumption in different contexts and populations.

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Retraction Note