

Eating Behavior and Level of Knowledge About Healthy Eating Among Gym Users: A Multinomial Logistic Regression Study

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Abstract—The World Health Organization indicates that unhealthy diets cause approximately 11 million deaths annually worldwide. In Peru, 57.9% of the population consumes highly processed foods daily. The objective of this study is to analyze the relationship between knowledge about healthy eating and eating behavior among gym users in a district of Lima, Peru. Using an exploratory and quantitative design, information was collected from 156 users through a hybrid questionnaire, analyzed with SPSS and multinomial logistic regression techniques. The results reveal that 57.42% of the participants have an intermediate knowledge of healthy eating, while only 17.42% reach a high level. Likewise, 49.03% exhibit an intermediate eating behavior. In addition, sociodemographic factors, such as the duration of gym attendance and maintenance of a specific diet, were found to influence eating behavior. It is concluded that there is a significant relationship between the level of knowledge and eating behavior, underlining the importance of nutrition education to improve eating habits in this population.

Keywords—Knowledge; healthy eating; gym; eating behavior

I. INTRODUCTION

The World Health Organization (WHO) points out that, in the world, the maintenance of unhealthy diets causes about 11 million deaths each year [1] and eight million deaths are registered as a result of an unhealthy diet [2]. In addition, it is identified that more than 40% of the world's population has inadequate knowledge about healthy eating [3]. In countries such as the United States, Saudi Arabia and Spain, 87.72% of people do not practice healthy eating habits, a situation that represents a global problem [4].

In South America, Peru is the most food-insecure country with 16.6 million people exposed [5]. The National Institute of Health (INS) warns that 57.9% of Peruvians consume foods with a high degree of processing and added chemicals on a daily basis [6]. In this context, food consumption is influenced by society and by the lack of knowledge of food practices. In Huancaayo, only 17.4% of gym users know how to interpret food nutrition labels [7].

During the last few years, people have developed a need to balance physical and psychological health, evidence of this is the insertion in sports activities [8]. In Peru, an average of 5.2

hours of exercise per week is practiced and 28% of these activities correspond to gyms [9]. However, there are barriers that prevent sports practice such as lack of time in almost half of the population [10]. On the other hand, 44% of Lima residents do physical activity frequently [11].

Healthy eating is based on the consumption of healthy, adequate and pleasant foods, to meet nutritional needs and preserve health [12]. In addition, it involves knowing the composition of food and executing practices that ensure adequate nutrition [13]. In Lima, inconsistencies have been detected in the perception of healthy eating, 1 in 2 residents believe that it is based on consuming vegetables and 39% consider that it is avoiding the consumption of harmful foods [11].

There are several reasons that prevent the implementation of healthy eating, in gym users there is a lack of knowledge to analyze the products before consuming them, 27.5% of them frequently read the nutritional information and focus mainly on the level of fat and proteins, this is how less interest is given to the nutrients of the food [7]. In Peruvian society, 1 in 2 people lives at food risk, detecting poverty as a mitigating factor represented with an impact of 25.9% at the national level [5].

Inequalities in the knowledge and practice of healthy eating behaviors represent a latent risk, which shows that in Peruvian households 33% of food expenditures are made outside the home and on unhealthy foods [14]. A much bigger problem is the development of eating disorders, which is frequently identified in people who exercise with the goal of losing weight [15]. In addition, poor diet favors the development of non-communicable diseases such as diabetes and the susceptibility of acquiring a communicable disease due to the weakening of the immune system [16].

Therefore, the main objective of this study is to analyze the influence of the level of knowledge about healthy eating on eating behavior, through the collection of information from gym users in a district of Lima, to contribute to the preservation of their health. In this way, it is particularly intended to determine the level of knowledge about healthy eating and eating behaviors through a hybrid questionnaire that integrates the Healthy Eating Knowledge Test and the Eating Behavior

Questionnaire, to then correlate the level of knowledge and healthy eating behaviors through a comparative analysis. In addition, it seeks to provide information to promote knowledge and improve behaviors in gym users.

This study is organized into sections that facilitate information management. First, a literature review is conducted, describing previous works of similar scope to contextualize the topic in Section II. Then, the description and formulation of the problem are presented, highlighting its relevance in Section III. Next, the materials and methods are presented, detailing the resources and procedures used in Section IV. Section V highlights the key findings for the subsequent stages. In the discussion, the results are interpreted and compared with previous studies, allowing for the identification of relevant similarities or differences in Section VI. Finally, Section VII offers a reflection on the entire study.

II. LITERATURE REVIEW

In the study by Başpınar et al. [17], the influence of nutritional knowledge and practices on the quality of nutrition in people who maintain regular physical activity was addressed in order to determine the association between diet quality, nutritional knowledge and eating practices. The research was quantitative because they applied the Healthy Eating Index-2015 questionnaire and qualitative because they added interviews with 200 users of regular gyms. The results obtained show that 47.0 % of the sample had poor nutritional knowledge and 48.0 % inadequate nutritional practices; In addition, nutritional knowledge is not related to diet quality or food consumption in general ($p < 0.05$).

The literature review conducted by Maza et al. [4] on eating habits in university students using the Systematic Review of the Literature and following the PRISMA standards (Preferred Reporting Elements for Systematic Reviews and Meta-Analyses), was composed of 57 articles. A prevalence of inappropriate dietary practices was found and they are characterized by incorrect information management; they are reflected in the consumption of unhealthy foods, easily available and with a minimum amount of nutritional use. Likewise, unhealthy behaviors were detected in the diet of young people; with this comes the risk of suffering health problems in the short term such as being overweight or underweight, and in the long term much greater complications such as cardiovascular diseases and diabetes.

During Reyes and Oyola's research [18], the level of knowledge about healthy eating was determined in university students of various professional careers, through a questionnaire developed with the Kuder-Richardson reliability measure and applied to 136 people. With the results, it was stated that 41.2% of university students have an average food knowledge and students of health careers stand out with a higher level. Therefore, the advantage of knowing more widely how to guide eating behaviors suggests greater efficiency in preserving their health. In this sense, it is pointed out that health promotion activities should focus on providing strategies to positively influence university students.

The study by Damián et al. [7] on the knowledge of gym users in the management of nutritional labels aimed to

demonstrate that using and interpreting food labels influences nutrition. The instrument used was a test composed of the variables reading, use and interpretation; which was aimed at 385 users. The information obtained shows that the participants had an average age of 27.8 ± 9.3 years, 44.7% were men and that only 17.4% correctly handle the nutritional information on the labels, so it is important to promote education in this population.

With Wanden's research [19] on the role of diet in the proper functioning of the body and the response to diseases, a study on nutrition was undertaken, prioritizing older people because they are susceptible to instability between the consumption and energy expenditure of nutrients. The proposed approach was nutritional screening, which was based on the identification of people at risk of malnutrition with the aim of applying a nutritional assessment to this group in which potentially harmful alterations are identified early. Among the most important indicators were weight, height and functional assessment; these in turn made it possible to recognize vulnerable people who received timely treatment.

In the project of Fuentes et al. [20] the objective was to demonstrate that there are dietary factors that participate in the growth and development of sports gymnasts, so a case study was carried out in phases in an adolescent athlete with signs of inadequate nutrition and stunted growth. First, they were provided with education, then balanced foods were inserted into their diet, preventive macro and micronutrients were included, and finally the amount of nutritional supplements was adjusted according to the evolution of their needs. The results collected indicated that the adolescent presented improvements in his growth, development and physical performance. Stress and excessive sports demands were identified as the main causes of eating problems, alterations in body image and different health problems.

Researchers Marquez et al. [21] specified in a study on eating behavior in university students that this group is more likely to develop alterations due to the lack of information and willingness to preserve their health. To measure eating behaviors, they designed a questionnaire composed of 31 questions, which after being validated was applied to 333 students. The results indicated that most students have a medium tendency to have healthy eating habits and evaluating eating behavior made it possible to plan interventions. The designed instrument demonstrated high effectiveness and validity to be applied in studies that aim to analyze eating behavior.

III. DESCRIPTION AND FORMULATION OF THE PROBLEM

Healthy eating and its adherence to daily life represents a public health problem. Eating behaviors directly influence the state of health of the human being, it has been shown that healthy eating is beneficial in the medium and long term because it improves the state of health and prevents some diseases [2]. Food goes through a series of stages before reaching our tables in conventional presentation, the selection of quality foods for nutrition intervenes in the preservation of health [22]. However, despite the fact that proper nutrition is a

right and a basic need, unhealthy eating is prevalent in modern society [23].

Knowledge about healthy eating is of fundamental importance, especially for the population that maintains a healthy lifestyle. In this sense, people who attend gyms constitute a key group as they are influenced by the competitiveness of their discipline and different dietary factors [7]. It is identified that among the main motivations of gym users to go to fitness centers are the maintenance of health, body image and competition [24]. On the other hand, eating disorders are even more prevalent in people who practice endurance sports [25].

The relevance of our study in gym users is established because they are an underserved group and will be theoretically provided by determining the relationship between the level of knowledge and healthy eating. In addition, at the methodological level, the validation of the integrated instrument and the development of a plan structured by stages that facilitate the process will be contemplated. Likewise, in practice, relevant information will be collected to process it and transform it into percentages that indicate trends in relation to the indicators. In the social sphere, the availability of information will be facilitated to promote knowledge, reduce risk behaviours and contribute to the 2030 Agenda with specific support for the Sustainable Development Goal "Good health and well-being" [26].

IV. MATERIALS AND METHODS

The materials and methods should be described in sufficient detail to allow the reader to understand the methodological process that has been followed. To this end, the following subsections must be completed:

A. Design and Approach

The study will have an exploratory design because the objective is focused on evaluating a problem that has been little studied in the population made up of gym users and will bring us closer to obtaining new knowledge [27]. In addition, it will have a quantitative approach that will allow the controlled measurement of data for the processing and generalization of trends [28].

B. Population, Sample and Sampling

Due to the massive increase in gyms and fitness centers in Lima, the district of Comas is selected to make use of the services of Gymfinder Group and the presence of approximately 32 gyms in the district is determined [29]. Then, from the Stylos Fitness and Urban Gym centers, it is estimated that, per gym, there are approximately 80 people enrolled. This amount is multiplied by the number of gyms in the district and the result obtained is a population of 2560 users.

1) *Sample size:* The determination of the sample was processed by means of the statistical program "EPIDAT 4.2" in which a population of 2560 users was included, with an expected proportion of 87.72% [4], a confidence level of 95% and a design effect of 1; resulting in a sample of 156 users.

[1] Tamaño de muestra. Proporción:

Datos:

Tamaño de la población:	2,560
Proporción esperada:	87,720%
Nivel de confianza:	95,0%
Efecto de diseño:	1,0

Resultados:

Precisión (%)	Tamaño de la muestra
5,000	156
10,000	41

Fig. 1. Epidat 4.2 sample calculation.

Fig. 1 shows the result of the sample based on the process carried out by the statistical program Epidat 4.2 and the result obtained is 156 users.

2) *Sample selection:* A simple random sampling was carried out, including criteria such as the location of the establishments, ease of access and availability for intervention.

3) Inclusion criteria:

- Users of gyms in the district of Comas.
- Users enrolled in a gym in the district of Comas.
- Users over 18 years of age.
- Users of both sexes.
- Users who accept informed consent

4) Exclusion criteria:

- Users of gyms in districts not located in Comas.
- People who are not registered in a gym in the district of Comas.
- Users under 18 years of age.
- Users who do not accept informed consent.

C. Study Variables

The variables considered in the research are chosen because they are related to each other for the comprehensive assessment of the participants and make it possible to identify trends regarding possible alterations.

1) Knowledge about healthy eating:

a) *Conceptual definition:* Knowledge about healthy eating is the amount of information that each person has to justify their dietary behaviors and is of vital importance for the preservation of health. Its availability determines the behaviors that are developed in the diet, established foods, etc. [18].

b) *Operational definition:* Knowledge about healthy eating is the information that is acquired in society, its development and organization influences the eating habits of

gym users in Lima. In this way, knowledge about healthy eating intervenes in the preservation of health.

2) *Eating behavior:*

a) *Conceptual definition:* Eating behavior is the relationship that is established between human beings and food, it is a set of actions that influence daily food. It is directly involved in food consumption, nutrient absorption and health status [21].

b) *Operational definition:* Eating behavior is the way in which eating behaviors are oriented in daily life, it is defined by eating habits, handling, selection and consumption of food. Its alteration determines the nutritional condition and health status of gym users in Lima.

D. *Measuring Technique and Instrument*

1) *Data collection technique:* The data collection process was carried out through the application of an integrated questionnaire with sections extracted from two validated tools, each of them focused on the individual study variables, so its constitution is of great relevance.

a) *For the variable knowledge about healthy eating:* The questionnaire called "Knowledge test on healthy eating" was selected, which is used to measure the level of knowledge and was developed by Reyes and Oyola [18] following the parameters established by the WHO and other authors. It is made up of 2 dimensions, the first collects general data on age and sex and the second corresponds to knowledge about healthy eating with 16 questions. For the evaluation, a value of 2 is scored for the correct answers and a total classification of: <17 "low", 17-25 "medium" and > 25 "high".

- *Validity and reliability:* The reliability of the instrument was determined based on the Kuder Richardson coefficient with a reliability value of 80.7% classified as acceptable and its validation is proven in the Peruvian population.

b) *For the variable eating behavior:* The "Eating Behavior Questionnaire" was chosen, consisting of 31 questions distributed in eight dimensions and was designed by Márquez et al. [21]. The dimensions that compose it are meal times, food and beverage consumption preferences, way of preparing food, reading nutritional labels, consumption of food outside the home, satiety, following therapeutic or special diets, and perception of healthy eating, barriers to change and beliefs, each item is evaluated from 1 to 5 according to the Likert scale.

- *Validity and reliability:* The level of reliability was calculated according to the evaluation of 15 health experts in the clinical and research area. The validity of the tool was established abroad, due to which its reproducibility in our country and in the target population was validated by trained professionals from the local environment.

2) *Hybrid sizing:* Based on the aforementioned tools and the dimensions that correspond to each of them, in order to satisfy all the objectives set and optimize the collection of

information, a hybrid dimensioning was carried out by summarizing the aspects that most cohesively the information obtained during the collection of relevant data for our study. Therefore, it was decided to use the Healthy Eating Knowledge Test because it is the one that offers a greater approximation to the main variable of the study, excluding questions 10 and 16 from the instrument because they have shown ambiguity in the results of their respective study. In addition, the first section of the Eating Behavior Questionnaire is taken exclusively composed of 8 items, as it is the one that offers the greatest opportunity to collect data that complement the defined objectives, excluding questions 5 and 7. Finally, after a detailed analysis of the effectiveness of the indicators of each of the instruments in their respective backgrounds, a total of 20 items are established for the instrument of this study. For the evaluation of this new instrument, a score of 1 for each of the correct answers and a total classification of: <11 "low", 11-15 "medium" and > 16 "high" are considered.

TABLE I. HYBRID INSTRUMENT SIZING

Healthy knowledge test	eating	Knowledge about healthy eating	14 items
Eating Questionnaire	Behavior	Eating behaviors	6 items

Table I shows the hybrid instrument designed to efficiently integrate the practical dimensions of each of the tools studied, this construction was evaluated by five national experts in health and scientific research, an evaluation with which a final Anyken V of 0.93 was obtained, which qualifies the integrated tool as valid for its application. On the other hand, to determine the reliability of the instrument, a pilot test was carried out with 20 users; then, the information obtained was processed using the Kuder Richardson coefficient – KR20 as it is the ideal one to analyze dichotomous variables, with which a total value of 0.86 was found, cataloguing the instrument as good in terms of reliability.

E. *Procedure for Data Collection*

1) *Bio-ethical aspects:* This project prioritizes respect for the bioethical principles of autonomy, beneficence, non-maleficence and justice; They contain aspects that ensure the protection of the participant [30]. Prior to the execution of the visualized fieldwork, the approval of the ethics committee is required, so the product was directed to the responsible committee for evaluation by experts in the field of research and approval was obtained for the application of the study in the selected field.

- *Autonomy:* By distributing informed consent as the first step of intervention so that users can freely choose to participate in the study.
- *Beneficence:* It will be used to provide information that contributes to the strengthening of knowledge about healthy eating in gym users.
- *Non-maleficence:* By establishing a bond with each person to facilitate explanation and understanding

regarding the absence of questions of a personal nature that may transgress the individuality of the participants.

- *Justice*: Evidenced by the egalitarian approach of all members without differences of any kind.

2) *Informed consent*: Informed consent represents research ethics, ensuring respect for the principle of autonomy of all those who, by their own decision, decide to participate in the study. With this document, participants will have the assurance that their rights and privacy will not be violated and will be used for strictly academic purposes. During the fieldwork, it will be provided physically before starting with the application of the designed instrument.

3) *Instrument application*: During the first two weeks of May 2024, the entry to the physical conditioning establishments that belong to the district of Comas was coordinated through an official letter addressed to the management demonstrating the approval by the ethics committee and the material to be evaluated according to the inclusion and exclusion criteria. Then, the instrument was applied on the premises allowing the development of the study.

The acquisition of information was directly through a virtual form distributed through a link sent to the telephone application of convenience per user at the time of the intervention. If an electronic device or an appropriate application was not available at the time of the study, participation was carried out from the interviewers' mobile phones.

4) *Data analysis*: For the storage of the information extracted during the research, the Google Sheets program was used for its easy handling and the organization it has to quantify what was obtained [31]. On the other hand, the data was processed in the SPSS software that specializes in advanced statistical analysis determining the correlation of Spearman's coefficients between the level of knowledge about healthy eating and eating habits [32]. Likewise, to establish the reliability of the instrument, Cronbach's alpha coefficient was calculated based on the questionnaires already validated by this same statistical technique.

F. Data Processing

1) *Multinomial logistic regression model*: This tool is used to predict the outcome of a variable categorized as dependent with a large number of categories. This model is characterized by reducing the extension limitations found in other tools, since it allows the dependent variable to take two or more categories. Their inclusion in this study is important for the management of categorical variables at multiple levels because it allows us to understand in detail the influence of predictor variables on the probability of belonging by category [33].

V. RESULTS

Table II shows that 62.18% (97) of the participants were between 18 and 27 years old, 19.87% (31) were between 28 and 37 years old, 14.74% (23) were between 38 and 47 years old,

and only 0.64% (1) were between 58 years and older. With respect to sex, 53.85% (84) are women and 46.15% (72) are men. Regarding the time spent attending the gym, 26.28% (41) attended 1 month or less ago, 27.56% (43) from 2 to 6 months, 3.21% (5) from 7 to 11 months, 17.95% (28) for 1 year or more and 25% (39) attended non-continuously. Regarding the time elapsed since attending a nutritionist, 20.51% (32) have had guidance 1 month or less ago, 18.59% (29) have had guidance from 2 to 6 months ago, 7.69% (12) from 7 to 11 months, 6.41% (10) have been assisted by a nutritionist 1 year or more ago, and 46.8% (73) have not been assisted by a nutritionist. In relation to the maintenance of a specific diet, 25% (39) have maintained it for 1 month or less, 32.5% (50) for 2 to 6 months, 12.82% (20) for 1 year or more and 30.13% (47) do not maintain a specific diet. The origin of nutritional information in 58.97% (92) is from social networks, 25.64% (40) obtain it from a nutritionist, 8.33% (13) from friends and 7.06% (11) from family members.

TABLE II. SOCIODEMOGRAPHIC DATA OF GYM USERS OF A COMAS GYM

Sociodemographic data	n= 156	
	fi	%
Age		
18 - 27	97	62,18
28 - 37	31	19,87
38 - 47	23	14,74
48 - 57	4	2,57
58 years or older	1	0,64
Sex		
Female	84	53,85
Male	72	46,15
Gym attendance		
1 month or less	41	26,28
2 to 6 months	43	27,56
7 to 11 months	5	3,21
1 year or more	28	17,95
Non-Continuous Support	39	25,0
Assistance to nutritionist		
1 month or less	32	20,51
2 to 6 months	29	18,59
7 to 11 months	12	7,69
1 year or more	10	6,41
There was no attendance	73	46,80
Maintaining a specific diet		
1 month or less	39	25,0
2 to 6 months	50	32,05
7 to 11 months	0	0,0
1 year or more	20	12,82
Doesn't maintain a diet	47	30,13
Source of Nutrition Information		

Social Media	92	58,97
Nutritionist	40	25,64
Friends	13	8,33
Family	11	7,06
University	0	0,0

A. Sample Setting

During the organization of the data, it has been possible to detect that one of the 156 intervened users has provided insufficient information to be analyzed in the study results, a situation for which it has been decided to exclude him from the next stage, therefore, the sample processed later will be made up of a total of 155 participants.

On the other hand, for the analysis of the data by age, the current classification of age groups according to the WHO has been applied, which has allowed the distribution of the sample data in a group composed of young people aged 18 to 26 years and another made up of adults between 27 and 59 years of age [34], [35].

B. Level of Knowledge and Behavior by Gender

TABLE III. LEVEL OF KNOWLEDGE ABOUT HEALTHY EATING BY GENDER

Level of knowledge	Value	Gender		Total
		Female	Male	
Low	n	20	19	39
	%	12,9	12,26	25,16
Intermediate	n	51	38	89
	%	32,9	24,52	57,42
High	n	12	15	27
	%	7,74	9,68	17,42
Total	n	83	72	155
	%	52,55	46,45	100

Table III shows that 12.9% (20) women and 12.26% (19) men have a low level of knowledge about healthy eating, representing 25.16% (39) of the total. The intermediate level of knowledge is present in 32.9% (51) women and 24.52% (38) men, which constitute 57.42% (89) of the total. Finally, 7.74% (12) females and 9.68% (15) males make up the high level of knowledge, an amount that represents 17.42% (27) of the total.

TABLE IV. EATING BEHAVIOR BY GENDER

Eating behavior	Value	Gender		Total
		Female	Male	
Low	n	23	28	51
	%	14,84	18,06	32,9
Intermediate	n	47	29	76
	%	30,32	18,71	49,03
High	n	13	15	28
	%	8,39	9,68	18,06
Total	n	83	72	155
	%	53,55	46,45	100

Table IV presents healthy eating behavior by gender, where low eating behavior is manifested in 14.84% (23) women and 18.06% (28) men, which corresponds to 32.9% (51) of the total. The intermediate behavior is manifested by 30.32% (47) women and 18.71 (29) men, which represents 49.03% (76) of the total. Finally, 8.39% (13) females and 9.68% (15) males make up 18.06% (28) of the total.

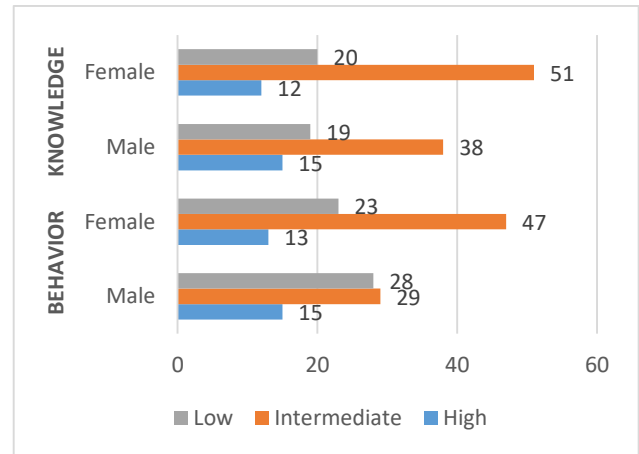


Fig. 2. Relationship between the level of knowledge and behavior according to gender.

Fig. 2 shows that high male eating behavior is present in only 15 users, intermediate in 29 and low in 28. In the female sex, there was a high level of behavior in 13 people, intermediate in 47 and low in 23. Likewise, the male knowledge about healthy eating is made up of 15 users with high knowledge, 38 with an intermediate level and 19 with low knowledge. In the female sex, high knowledge was detected in 12 participants, intermediate knowledge in 51 and a low level in 20. These results demonstrate the predominance of the intermediate level of knowledge and behavior over the low and high.

C. Level of Knowledge and Behavior by Age

TABLE V. LEVEL OF KNOWLEDGE ABOUT HEALTHY EATING BY AGE

Level of knowledge	Value	Age		Total
		Young	Adult	
Low	n	25	14	39
	%	16,13	9,03	25,16
Intermediate	n	59	30	89
	%	38,06	19,35	57,42
High	n	13	14	27
	%	8,39	9,03	17,42
Total	n	97	58	155
	%	62,58	37,42	100

Table V shows that 16.13% (25) young people and 9.03% (14) adults have a low level of knowledge about healthy eating, representing 25.16% (39) of the total. The intermediate level of knowledge is present in 38.06% (59) young people and 19.35% (30) adults, which constitute 57.42% (89) of the total. Finally,

8.39% (13) young people and 9.03% (14) adults make up the high level of knowledge, an amount that represents 17.42% (27) of the total.

TABLE VI. EATING BEHAVIOR BY AGE

Eating behaviour	Value	Age		Total
		Young	Adult	
Low	n	41	10	51
	%	26,45	6,45	32,9
Intermediate	n	35	41	76
	%	22,58	26,45	49,03
High	n	21	7	28
	%	13,55	4,52	18,06
Total	n	97	58	155
	%	62,58	37,42	100

Table VI shows eating behavior by age, where low eating behavior is manifested in 26.45% (41) young people and 6.45% (10) adults, which corresponds to 32.9% (51) of the total. The intermediate behavior is represented by 22.58% (35) young people and 26.45% (41) adults, which makes up 49.03% (76) of the total. Finally, 13.55% (21) young people and 4.52% (7) adults make up 18.06% (28) of the total.

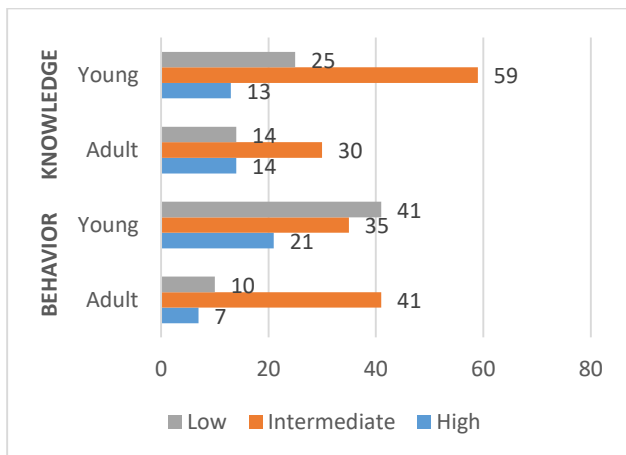


Fig. 3. Relationship between the level of knowledge and behavior according to age.

In Fig. 3 it can be seen that adult eating behavior is high in only seven participants, intermediate in 41 and low in 10. The young population is made up of 21 people with high behavior, 35 with intermediate behavior and 41 with low behavior. In addition, knowledge about healthy eating in adults is represented by 14 users with a high level, intermediate knowledge with 30 and low knowledge with 14. In young people, the level of knowledge is high in 13 people, intermediate in 59 and low in 25. These data affirm the trend of the intermediate level of knowledge and behavior over the low and high.

D. Application of the Multinomial Logistic Regression Model

The model has been applied to analyse the factors that influence eating behaviour, specifically considering the level of

knowledge and the most relevant socio-demographic data, the process has been defined using the following formula:

$$C = 0.1891033 + 0.8314438(V1) - 0.0868413(V2) + 0.1306843(V3) - 0.0927213(V4)$$

Where:

C: Eating behavior

V1: Knowledge Level

V2: Time of attendance with a nutritionist

V3: Time in which you maintain a specific diet

V4: Continuous Gym Attendance Time

By means of this calculation, it can be stated that the Multinomial Logistic Regression Model is acceptable, since it has a p value of 0.00 demonstrating its significance and an adjusted Spearman's Rho correlation coefficient level of 0.54.

TABLE VII. PROBABILITY OF CONTRAST OF THE LOGISTIC MODEL FOR BEHAVIOR BASED ON THE LEVEL OF KNOWLEDGE

p value (Sig.)		Eating behaviour	
		Intermediate	High
Level of knowledge	Intermediate	0,99	0,994
	High	0,0	0,996

p value = probability that is used to contrast with the level of significance or alpha value (α=0.05).

Table VII presents the association between the level of knowledge about healthy eating and the eating behavior of the participants. It can be detected that the p value (Sig.) is greater than 0.05 in the variables, except for the relationship between high level of knowledge and intermediate behavior; which statistically shows that the greater the knowledge, the greater the risk of having an intermediate behavior.

TABLE VIII. PROBABILITY OF CONTRAST OF THE LOGISTIC MODEL FOR BEHAVIOR BASED ON SOCIODEMOGRAPHIC DATA

p value (Sig.)		Eating behaviour	
		Intermediate	High
Sociodemographic data	Nutritionist Assistance 1 month or less	0,462	0,328
	Specific diet for 2 to 6 months	0,01	0,994
	Gym attendance 1 month or less ago	0,00	0,00

p value = probability that is used to contrast with the level of significance or alpha value (α=0.05).

Table VIII shows the relationship between the most significant sociodemographic data and the eating behaviour of users. We observed that the p value (Sig.) is less than 0.05 in three of the established associations. First of all, statistics show that maintaining a specific diet for two to six months means a higher risk of having an intermediate behavior. Continuous attendance for 1 month or less is associated with a lower risk of intermediate behavior. Finally, attending the gym for 1 month

or less implies a lower risk of maintaining a high eating behavior.

VI. DISCUSSION

It has been calculated that the level of knowledge about healthy eating is low in 25.16% of gym users in Lima and inappropriate eating behavior is present in 32.9%. However, in Turkey, Başpınar et al. [17] report that 47.0% of their sample had poor nutritional knowledge and 48.0% inadequate nutritional practices. This differentiation could be caused by the geographical location that is so different in both studies and the sociodemographic mitigating factors of each country. In addition, the review by Maza et al. [4] has detected the trend of unhealthy behaviors in young people, in contrast to our study, in which 57.42% tend to present intermediate eating behaviors.

In this research, it is found that 57.42% of gym users have an intermediate knowledge about healthy eating, an amount higher than the 41.2% average knowledge established by Reyes and Oyola [18] in their research on university students. This distinction may be due to the fact that in gyms there are a greater number of people looking for information to maintain a good physical condition, while in universities young people focus more on academic knowledge. In relation to eating behaviour, it has been shown that 49.03% of gym users have an intermediate behaviour, similar to the study by Marquez et al. [21], in which a medium trend is also detected.

In our study, it has been found that 62.58% of the users are between 18 and 26 years old, males make up 46.45% and 17.42% have a high knowledge of healthy eating; data that agree with the research of Damián et al. [7], in which a mean age of 27 years has been obtained, male participants represented 44.7% and only 17.4% correctly handled the information on nutritional labels. This similarity shows that in cities such as Lima and Huancayo (coast-highlands) the young population tends to attend fitness centers, women with a slight frequency and that knowledge about healthy eating is high in only a small percentage of users, which makes them susceptible to inappropriate eating behaviors.

With respect to the Multinomial Logistic Regression Model, it has been possible to identify a p value of 0.00 and an adjusted Spearman's Rho of 0.54, which has shown that eating behavior is influenced by the level of knowledge about healthy eating, the time spent attending a nutritionist, the time spent on a specific diet and the time spent continuously attending the gym. This transcendental finding differs from what was found in similar studies such as [17] in which the relationship between nutritional knowledge and the consumption of foods with a p value less than 0.05 is denied.

On the other hand, during the execution of this study, there have been limitations related to the intervention schedule of the participants, since a low average influx of users available for the intervention was evidenced, which is why the moment of greatest agglomeration for each gym had to be observed for several days. Likewise, some of the users gave up participating due to lack of time, being in the middle of training or other activities of similar scope. Finally, some gyms prevented the interviewer from passing through due to internal policies and other centers had to be resorted to.

VII. CONCLUSION

In conclusion, the present research determined a p value of 0.00 and an adjusted Spearman's Rho of 0.54 using the Multinomial Logistic Regression Model, which provides sufficient statistical evidence to affirm that there is a direct relationship between the level of knowledge about healthy eating and eating behavior. Specifically, people with high knowledge are more likely to maintain intermediate behavior. Among gym users in Lima, an intermediate level of knowledge and behavior predominates with 57.42% and 49.03% respectively.

In addition, sociodemographic factors have shown an association between the maintenance of a specific diet for 2 to 6 months and intermediate eating behavior. Attending the gym 1 month or less ago indicates a lower risk of maintaining intermediate or high behavior. Finally, it is observed that female users and young people tend to have greater knowledge about healthy eating and better eating behaviors.

It is highlighted that the design of the hybrid questionnaire to measure knowledge about healthy eating and eating behaviors was fundamental to analyze the situation in which gym users in Lima find themselves. The validity and reliability of this instrument have been evaluated by national experts and its usefulness for future studies of similar scope has been demonstrated.

Finally, the information obtained in the present study is available for future research, providing a solid basis for the generation of new knowledge and the validation of results. This information can serve as a reference for comparisons in different regions of the country and the world, allowing the consistency of the findings to be evaluated in different geographical and cultural contexts.

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