



# Nutritional intervention for housewives from Jeráhuaro, Mich. A necessity in eating behavior

## Intervención nutricional en amas de casa de Jeráhuaro, Mich. Una necesidad en la conducta alimentaria



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### Keywords:

Eating habits,  
BMI,  
nutrition intervention,  
weight,  
physical activity,  
housewives,  
obesity.

*J. Selva Andina Res. Soc.*  
**2022; 13(2):80-94.**

ID of article: [157/JSARS/2022](https://doi.org/10.157/JSARS/2022)

### Record from the article

Received February 2022.  
Returned May 2022.  
Accepted June 2022.  
Available online, August 2022.

**Edited by:**  
*Selva Andina  
Research Society*

### Palabras clave:

Hábitos alimentarios,  
IMC,  
intervención nutricional,  
peso,  
actividad física,  
amas de casa,  
obesidad.

### Abstract

The objective of this work was: to analyze the changes derived from nutritional intervention in housewives who attend the House of Culture in Jeráhuaro, Michoacán. The methodology is quantitative, longitudinal; In the first stage, a measurement instrument was designed to evaluate the nutritional status individually of every housewife, this was validated, with a Cronbach alpha of 0.9, this was applied to obtain an initial diagnosis and to know the eating habits and physical activity in the housewives, in addition to anthropometric (weight and height). With the initial diagnosis, an intervention was developed according to the needs detected. The intervention program consisted of sessions of 2.5 hours on average, with different topics in nutrition and physical activity, this was carried out for 14 weeks in housewives, at the end of the intervention the instrument and measurements of weight and height were reapplied, to analyze the changes that occurred in housewives, before and after the nutritional intervention program. The results obtained from the program intervention: a significant increase from 24.6% to 71.2% in the physical or women, a weight loss of 1.3 Kg at the end of the program, this result directly impacts the decrease in BMI before it was 29.04 and after 28.49, in eating habits knowledge about nutrition and healthy lifestyles increased by 34.41% (mean of 11.7), so that these values are significant at a confidence interval of a student t test was performed in 95%, where a p value of less than 0.05 was obtained physical activity, weight (kg), BMI and eating habits, thus having statistically significant results. There is a need to make changes in eating behavior, which is why this research demonstrates that conducting comprehensive interventions in nutritional education will generate benefits can be generated changes in people, especially as a measure of prevention of comorbidities of metabolic diseases and sedentary lifestyle, thus managing to avoid future health complications.

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### Resumen

El objetivo fue: analizar los cambios derivados de la intervención nutricional en las amas de casa que asisten a la Casa de la Cultura de Jeráhuaro, Michoacán. La metodología es de corte cuantitativo, longitudinal. Se diseñó un instrumento de medición para evaluar el estado nutricional individualmente de cada ama de casa, dicho instrumento se validó con un alfa Cronbach de 0.9, se aplicó para obtener un diagnóstico inicial y conocer los hábitos alimenticios y de actividad física en las amas de casa, además de las mediciones antropométricas (peso y talla). Con el diagnóstico inicial se desarrolló una intervención acorde a las necesidades detectadas. El programa de intervención constó de sesiones de 2.25 h promedio, con diferentes temáticas en nutrición y actividad física, este se realizó durante 14 semanas en las amas de casa, al finalizar la intervención se volvió a aplicar el instrumento y las mediciones de peso y talla, con la finalidad de analizar los cambios en las amas de casa, antes y después del programa de intervención nutricional. Los resultados obtenidos del programa de intervención arrojan: un incremento significativo de 24.6 a 71.2 % en la actividad física de las mujeres, una disminución de peso de 1.3 kg en promedio al finalizar el programa, este resultado impacta directamente en la disminución del IMC de 29.04 a 28.49, en los hábitos alimentarios se incrementó en un 34.41 % (media de 11.7) el conocimiento en materia de nutrición y estilos de vida saludable, para que estos valores sean significativos a un intervalo de confianza del 95 % se realizó una t de Student, se obtuvo un p < 0.05 en actividad física, peso (kg), IMC y hábitos alimenticios, teniendo así resultados estadísticamente significativos. Existe una necesidad de realizar cambios en la conducta de la alimentación, por lo que queda expuesto, con esta investigación que el llevar a cabo intervenciones integrales en educación nutricional,



se generaran cambios benéficos en las personas, sobre todo como medida de prevención de comorbilidades de las enfermedades metabólicas y del sedentarismo, logrando así evitar futuras complicaciones en la salud.

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## Introduction

Mexico has a long history and important environmental, economic, and political crises, which had an impact on food orientation (FO), Mexicans in the last four decades have modified their diet, therefore, consumer support programs were implemented to improve their nutrition, educate the population, especially the most vulnerable<sup>1,2</sup>.

Projects such as those implemented in 1975 to 1980, by the Mexican Food System (SFM), whose objective was to stimulate the production of basic foods, with the creation of the (DIF) Integral Development of the Family, educating the population in eating habits and distribution of dietary supplements, the child population, and pregnant mothers, through school breakfasts, manufacture of milk for infants and creation of popular kitchens<sup>3-5</sup>.

However, in the last fifty years, most of these programs, and nutritional problems related to food, have not presented favorable changes, poverty, ignorance and inadequate consumption of food, are part of the factors that continue to favor malnutrition, according to data from the Food and Agriculture Organization of the United Nations (FAO), point out that approximately one in five people in the world have chronic non-communicable diseases (NCDs) related to diet, such as obesity, diabetes, hypertension, cancer, among others, in Cuba for the year 2018 they mentioned as a priority to reduce NCDs, so Mexico in its

National Action Plan 2019-2024 mentions it as a priority<sup>6-8</sup>.

The FO, a dietary guide, whose objective is to help the population, achieve an optimal state of nutrition, leading to good health or improving it, through promoters who provide basic information on nutrition, which are useful, to promote feeding practices in the family and community<sup>3,9</sup>, which would be transformed into habits, and influenced by the geographical area (climate, vegetation, etc.), since everyone has their preferences, beliefs and rejections, with regard to their food, most of them, preserved from generation to generation, thus, in recent years, globalization has changed these preferences, as a result of this eating behavior, the rates of obesity and overweight increase on in all age groups, as in gender at the same time, with the risks of morbidity and mortality by NCD<sup>10,11</sup>. Nutritional habits, health habits and diseases are related since the origins of society. Currently, NCDs are related to incorrect eating habits, due to the consumption of foods with high fat content, hypocaloric diets, with low consumption of fruits and vegetables<sup>12</sup>. According to what was reported by the National Survey on Health and Nutrition<sup>13</sup>, they mention that the percentages of consumption of recommended foods in the population of 20 years or older are: dairy 47 %, fruits 49.7 %, legumes 54.1 %, meats 64.6 %, egg 29.9 % and vegetables 44.9 %, however, in the percentages of consumption

of non-recommended foods there are: sweetened non-dairy beverages 85.8 %, snacks, sweets and deserts 35.4 %, sweet cereals 33.9 %, sweetened dairy drinks 16.8 %, fast food and Mexican snacks 20.3 % and processed meats 7.4 %, if these results are analyzed, it is observed that there is no good diet on the part of the Mexican population, reflecting an increase in the prevalence of overweight and obesity of 75.2 % in 2018, and increasing 3.9 % compared to 2012<sup>13</sup>. All of the above translates into an increase in cases of obesity, overweight, derived from these increases, relating it to the increase in body mass index (BMI). Obesity is not an exclusive disease of some kind, but it is more prevalent in women<sup>13,14</sup>, it is estimated that the attention of these diseases annually 82 and 98 billion pesos, figures that can be estimated between 73 and 87 % for health expenses<sup>15</sup>.

In addition to these high health expenditures, WHO reports that around 41 million deaths occur each year from NCDs<sup>16</sup>. In our country, the strategy to control overweight and obesity is described in the National Agreement for Food Health (NAFH) that establishes ten priority objectives<sup>17</sup>, such as: promoting physical activity in community settings and improving the ability to make decisions about a correct diet, guiding the population on the control of recommended portion sizes in home food preparation<sup>16,17</sup>.

On the other hand, in a document issued by FAO<sup>18</sup>, nutrition education is recognized as a preferred strategy due to the repercussions it has in different areas such as food security, food nutrition and health intervention, since by itself it has the capacity to improve dietary behavior and nutritional status<sup>18</sup>. Mothers, being the ones who traditionally take care of the preparation of food, are the main objective of nutritional

education campaigns<sup>19,20</sup>, being the ones who mainly watch over the mental and physical development of their children. Even so, education should not only be limited only to housewives, but also to other family members<sup>20</sup>.

However, there are several factors that directly influence nutritional education, a study conducted in Mexico<sup>21</sup> analyzed the advertising of beverages and foods in a period from December 2012 to April 2013, of a total of 12311 ads, of these 23.3 % were directed to food and beverages, sweet snacks have 34.4 % sugary drinks 21.3 %, in addition, most of this advertising was aimed at children, which is logical, since they are the most vulnerable population, Pérez et al.<sup>22</sup> evidence reported in Mexico from July to October 2007 only 18.1 % of all commercials had nutritional value content or health benefits.

In 2010, the World Health Organization (WHO) proposed recommendations to governments to protect children from this type of junk food advertising, also creating appropriate guidelines for its presentation, as well as the creation of public policies regarding empowerment for health in nutrition<sup>23,24</sup>.

Based on the recommendation of the WHO in 2010, the Ministry of Health in Mexico (SSA), involves the protection, improvement of the physical, mental and social well-being of citizens through community action, this also means acting to optimize levels of development, being part of the improvement and progress programs on nutrition and health education<sup>25</sup>, since these programs have a direct effect, because they work in promotion of well-being and food.

Knowledge of nutrition in the population is limited only to what is learned at home, with friends, schools

or empirically, thus being more vulnerable the acquisition of unhealthy eating styles, resulting in CNDs<sup>7</sup>. Michoacán is going through an important nutritional epidemiological transition, the lack of information in the area of nutrition is part of this problem, that is why according to the ENSANUT 2018<sup>26</sup> Michoacán stands out for registering a high prevalence in the population of 20 years or more with overweight and obesity (BMI  $\geq 25\text{kg/m}^2$ ) of 79.6 % in women and 65.5 % in men, it is important to mention that in order to classify the relationship with BMI<sup>4</sup> is established, given these conditions, it is necessary to implement nutritional education workshops that favor healthy lifestyles<sup>17</sup>.

According to these problems detected, FO programs focus their efforts on generating changes in behavior, attitudes, and good lifestyle habits, to recover or maintain health<sup>27</sup>. Thus, there are guidelines and standards on health promotion in the field of nutrition, specifically for Mexicans, which is very useful to carry out its implementation<sup>4,28</sup>. In such a way that it is definitively implemented in their daily lives, that is why this work takes as pillars the women housewives of the Mexican families of Jeráhuaro, Mich., since they can influence more directly to modify and implement a better diet<sup>19,27</sup>, in this way it is objective, to evaluate the changes derived from the nutritional intervention in physical activity, BMI, weight (kg) and eating habits in the target population.

**Materials and methods**

*Type of study.* Quantitative, longitudinal design. *sample type*, according to the type of research corresponds to a non-probabilistic sample, of volunteer

participants. *Study population.* Housewives who attend the House of Culture of Jeráhuaro Michoacán (CCJM).

*Characteristics of the community of Jeráhuaro, Michoacán.* It has a total population of 2822, 1370 men and 1452 women (INEGI 2010), predominating the latter gender, between the ages of 29 to 49 years<sup>29</sup>.

**Table 1** Data recorded by INEGI 2010, the community of Jeráhuaro presents an economic distribution and occupation

Class	Percentage
Poverty	29.2
Casualty	24.3
Medium-low	22.4
Media	21
Loud	3.1
Occupation	Percentage
Housewives	65%
Farmer	10%
Merchant	20%
Professional	5%

The composition of the community tends to be even more extensive composed of the father, mother, and an average of 4 children, approximately in 20 % of households live grandparents in the same house.

According to the latest data obtained from the health center of this community, the population reluctance to change established eating habits is due to the lack of education on dietary habits, a problem in the three social classes<sup>27</sup>.

*Inclusion criteria:* i) morehousewives attending CJM who are overweight or obese, ii) whoprepare and serve food to the family, iii)18-year-olds, iv)knowledge about nutrition.

*Exclusion criteria:* i) 18-year-olds, ii) attendanceat nutritional guidance workshops.

*Methodology.* Se carried out the following: i) andwork of the measuring instrument, ii) validation of the measuring instrument, iii) application and analysis of the community through a measurement

instrument (initial diagnosis), iv) design of the nutritional intervention program.

The *design of the measuring instrument* consisted of questions in the area of nutrition and eating habits, once elaborated its validation was carried out, it consisted of 19 questions, based on nutrition and physical activity, a Cronbach's alpha of 0.9 was obtained indicating that the instrument has an acceptable consistency and can be applied in the target population<sup>30</sup>. For the interpretation of this coefficient and be acceptable a minimum value of 0.70 is required, below it, the internal consistency of the scale is low. On the other hand, an expected maximum value of 0.90 indicating a good internal consistency<sup>30</sup>.

The initial *diagnostic stage (ID)*, allows to obtain reliable information of the aspects that need to be adapted, strengthened or created, through the creation of strategies according to the needs<sup>31</sup>, to identify the community, the CCJM house was visited, women were made aware of the importance of the application of this measurement instrument as well as inviting them to the nutritional intervention program (IN), the antropometric measurements were made: height and weight, to obtain the BMI that is obtained by dividing the weight in kg by the height in meters, elevated is last squared (weight (kg)/height (m)<sup>2</sup>), allows to classify in low weight, normal weight, overweight and obesity<sup>4</sup>, the instrument was applied to assess the state of physical activity and knowledge in terms of food, it is essential to know these results to have a starting point on the design of nutrition workshops to be implemented in the community.

In the *creation of the ON workshops*, the dish of good eating was taken into account, since it places particular emphasis on choosing the food options of each of the groups, as well as the portions, the plate of good eating is a Mexican food scheme designed

for the promotion and education of health in food matters<sup>4</sup>.

*Implementation of nutritional workshops.* Con DI of the target population, the educational sessions to be taught were designed, there were 14 sessions one each week, with an approximate duration between 2 and 2.5 h, for the creation of these sessions supported by the NOM-043-SSA2-2012 that deals with basic health services. *Promotion and education* for health in food matters. Criteria to provide OA, carrying out a set of actions with simple information, scientifically analyzed, with the purpose of generating skills and attitudes to favor the adoption of an adequate diet, in addition to taking into account the geographical, economic, social and cultural location<sup>4</sup>.

*Analysis of results.* The data obtained were analyzed in the paquete estadístico para the Social Sciences 22 (SPSS 22)<sup>32</sup>, of this program the t Student test of paired samples with a confidence interval (CI) of 95 % was used, the Student's t test serves to compare means of small samples<sup>33</sup>, all this in order to analyze if the results of the intervention are statistically significant.

## Results

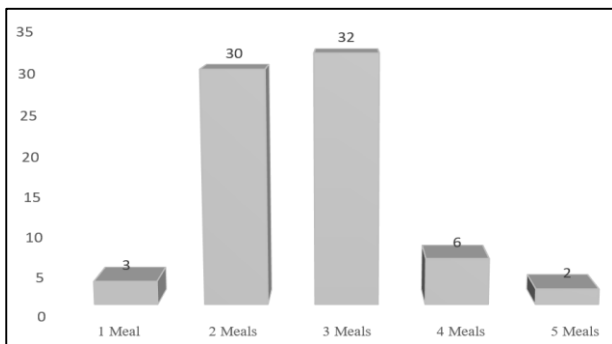
In the initial ID, results were obtained from knowledge in the area of nutrition and physical activity, as well as BMI, from the weight and height of each housewife. This step is essential for the creation of the nutritional intervention program, since it is according to the needs of the housewives of Jeráhuaro, with the results of the ID a nutritional intervention program taught by the nutritionist was created and developed, each session was weekly with a duration between 2 and 2.5 hours, was theoretical and practical with different topics such as: i)Healthy eating, ii)Plate of good eating, iii)Physical activity, iv)Types

of physical activity v)ECNT, vi)Food for patients suffering from CNCD, vii)Food economy, viii)Food safety, ix)Reading labels, x)Jug of good drinking, xi) Nutritional guidance focused on children, xii)The importance of breakfast, xiii)Healthy menus, xiv)Feedback from the sessions.

Having the following changes in housewives.

To achieve a change in their diet in the number of meals made during the day, they were given the workshop on healthy eating and the plate of good eating, because they indicate in the ID, that most of them make between 2 and 3 meals a day Figure 1, after to IN they changed the way of eating Figure 2, now most perform between 4 and 5.

**Figure 1 Initial diagnosis results, number of meals performed during the day**



**Figure 2 Results after nutritional intervention, number of meals made during the day**

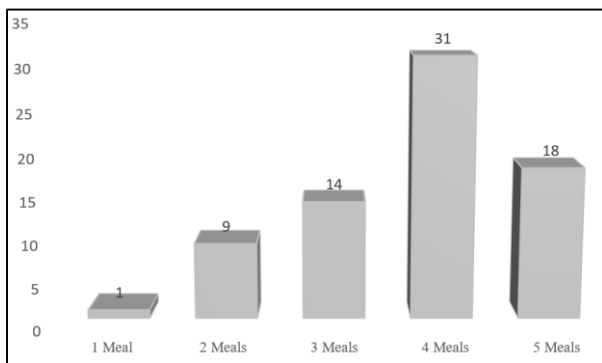
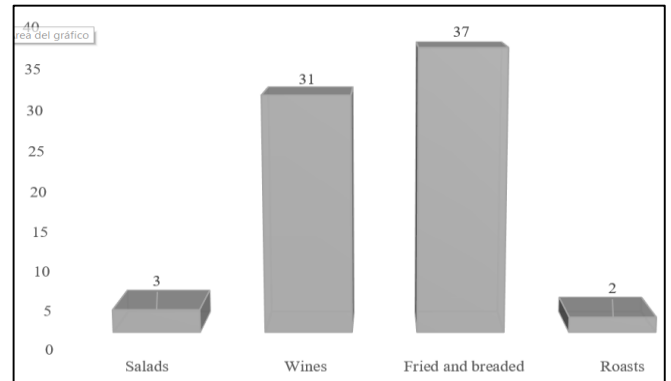


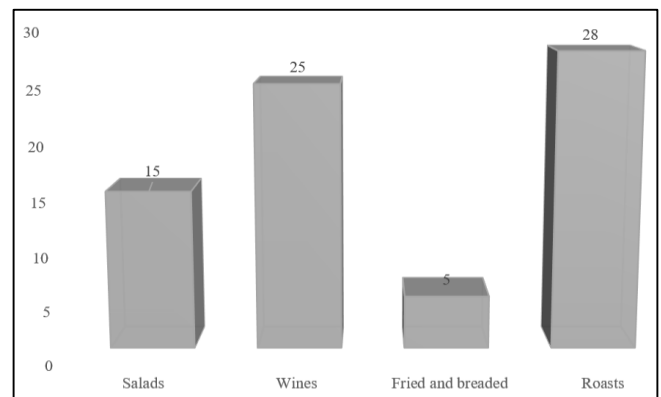
Figure 3, in the DI the main preference is observed are fried and breaded, followed by the broths, now

Figure 4, there were changes after the IN program, the preference is most often roasted and broths in second place, in addition the preference for salads and a decrease in fried and breaded was increased.

**Figure 3 Results of the initial diagnosis in the preparation of food before the nutritional intervention program**



**Figure 4 Results after nutritional intervention, Preference for food preparation**

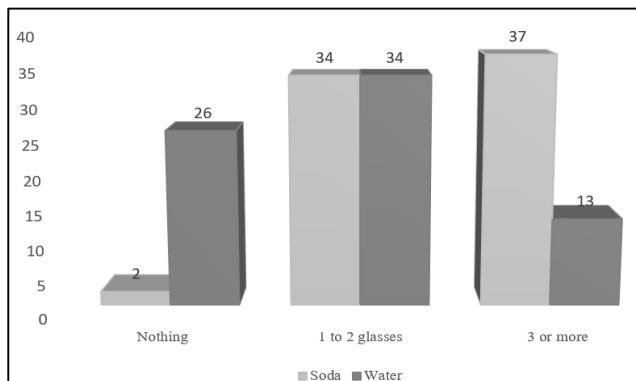


In the stage of DI, they were asked about the consumption of soda and water per day, 37 refer to having a consumption of soda more than 3 glasses per day, 34 of 1 to 2 glasses per day and only 2 people do not consume, Figure 5 the consumption of water 34 consume 1 to 2 glasses, 26 indicate that they do not consume and only 13 consume more than three glasses per day, after the IN program, and the session of the jug of good drinking Figure 6, 39 no longer consume any soda, 23 consume 1 to 2 glasses and 11

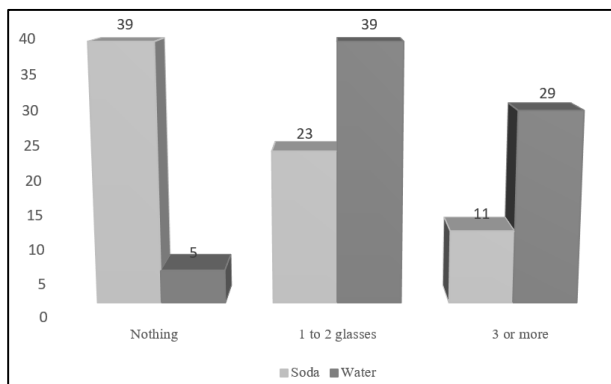


consume more than 3 glasses, the change in water consumption, 29 decided to increase to more than 3 glasses a day, 39 from 1 to 2 glasses and only 5 still do not consume water.

**Figure 5 Initial diagnosis result, soda and water consumption**



**Figure 6 Result after nutritional intervention, consumption of soft drink and water**



Another of the key questions is about the physical activity that the housewives performed, 55 do not perform any physical activity, 13 perform about 30 min, 3 perform an hour and 2 more than an hour, after the IN program and the sessions of physical activity and types of activity that can perform the results were modified because now from 55 decreased to 21 who do not perform physical activity, that is, 34 people began to perform physical activity, from 13 increase to 30 those who perform about 30 min, from 3 increase to 18 those who perform an hour, in the case of those who perform more than an hour increase from 2 to 6. Figure 7.

**Figure 7 Physical activity results at initial diagnosis (before) and after the nutritional intervention program**

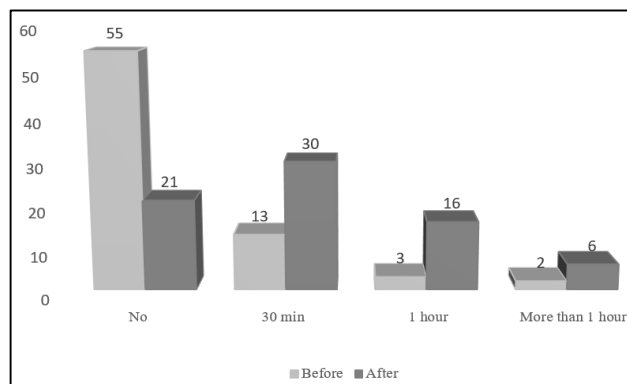


Table 3, for the analysis of BMI, resulted in a p value lower than <math><0.01</math>, reflecting that, if there is a significant difference in BMI, that is, if there was a favorable change in ID and after the application of the IN program.

**Table 2 Descriptive statistics of related samples for BMI**

Statistics of related samples		Media	N	Tip deviation.	Typ. error. of the average
By 1	IMC-Before DI	29.0411	73	4.22199	.49415
	IMC-After IN	28.4914	73	3.98572	.46649

DI Initial diagnosis, IN nutritional intervention, BMI body mass index

Tables 4 and 5, the people who participated in the IN program, related to the weight measures (kg) in the

ID and after applying the IN program, all this in order to see if there was any change in their weight

throughout the IN program and verify if the results are satisfactory.

Table 5, a p value lower than <0.01 was obtained, evidencing a statistically significant result. We can

say that the difference in weight (kg) is indeed significant and the delivery of IN programs benefits the population.

**Table 3 Results of the "t" test of related samples (measurement of BMI DI (before) and after IN)**

Statistics of related samples		Media	Tip deviation.	Typ. error. of the average	95% Confidence interval for difference		t	GI	Sig. (bilateral)
					Inferior	Superior			
By 1	BMI-Before DI/After IN	.54973	.74119	.08675	.37679	.72266	6.337	72	.000

DI Initial diagnosis, IN nutritional intervention, BMI body mass index

**Table 4 Descriptive statistics related to weight**

Statistics of related samples					
		Media	N	Typ deviation	Media typo error
By 1	Weight-to-Before- DI	74.5068	73	12.39051	1.45020
	Weight-After IN	73.1959	73	11.70575	1.37005

DI Initial diagnosis, IN nutritional intervention.

**Table 5 Results of the "t" test of related samples (DI weight measurement and then IN)**

Testing related samples		Related differences					t	GI	Sig. (bilateral)
		Media	Deviation typ.	Typ. error. of the average	95% Confidence interval for difference				
				Inferior		Superior			
By 1	Weight before DI- Weight after IN	1.3109	1.65425	.19362	.92499	1.69692	6.771	72	.000

DI Diagnóstico inicial, IN intervención nutricional

**Table 6 Shows the descriptive statistics of the samples related to be analyzed in the SPSS 22**

Statistics of related samples					
		Media	N	Deviation typ.	Typ. error. of the average
By 1	Survey 1DI	15.27	70	3.795	.454
	Survey 2 IN	26.97	70	2.525	.302

DI Initial diagnosis, IN nutritional intervention

**Table 7 Results of the "t" test of related samples obtained in SPSS 22 (DI and then IN surveys)**

Testing related samples		Related differences					t	GI	Sig. (bilateral)
		Media	Deviation typ.	Typ. error. of the average	95% Confidence interval for difference.				
				Inferior		Superior			
By 1	Survey 1 DI-Survey 2 IN	11.700	2.003	.239	11.223	12.177	48.883	69	.000

DI Initial diagnosis, IN nutritional intervention

Finally, eating habits, Table 6 shows the descriptive statistics in the ID and after the IN program.

Table 7, p value of <0.01, therefore, in this way we have a significant difference between the results of the eating habits obtained in the ID and after the IN program.

**Discussion**

The development of programs and projects aimed at improving health in Mexico are currently strategies created to reduce the incidence and development of comorbidities secondary to energy imbalance<sup>17</sup>, a



product of obesity, overweight and lack of IN<sup>3,12</sup>. In the present study, it was possible to show that actions aimed at nutritional education, physical activity, are tools against the development of non-communicable diseases, as they are modifiable factors<sup>16</sup>. Figure 1 and 2 shows the difference in the modification of the number of meals made, there is a change in this behavior, it is also expected that they implement it in their day to day, making these changes can be given compliance to their diet, which according to NOM 043, the set of daily foods, can constitute a good diet<sup>4</sup>, as proposed in the food and nutrition education program (EDANUL), whose objective is focused on housewives, as they are the fundamental pillars in Mexican households<sup>18,19</sup>, so based on their empowerment Figure 3 and 4 the modification in the preparation of food, before the fried and now the roasted, it was also observed that the Mexican woman continues to be the pillar in the preparation of food<sup>19</sup> and not only that, its influence on different tasks such as agriculture, transmitting custom among other<sup>34</sup>, of this same result, the broths continue present, since the community of Jeráhuaro is located in the mountains and has a cool climate so it remains one of the preferences<sup>35</sup>, despite this result, it was also observed the consumption of salads and roasts increased, according to NOM 043, a varied diet is the one that includes foods of each group and an adequate diet, that is, that it is in accordance with the tastes and culture of those who consume it, as well as adjusted to the economic and also, that it does not mean the sacrifice of other characteristics<sup>4</sup>. For the modification of habits towards the adoption of healthy habits, the preparation and choice of food is important<sup>4,19</sup>. The program managed to reduce the weight (kg) of the participants by an average of 1.300 kg, Table 4 the mean in the ID was 74.50 kg, after the IN 73.19 kg, which is related and reflected in the BMI with 29.04 and now

28.49, Table 2 it can be seen that, although they are still overweight, it is far from the obesity range<sup>4</sup>, the time of the IN comprised a period of 14 weeks, nutritional education and physical activity were provided, if this type of interventions would be applied for a longer time the results would be even better and therefore there is a decrease in associated diseases such as: hypertension, type 2 diabetes mellitus, cardiovascular diseases<sup>16</sup>, joint problems of knee and spine, this is related to what was reported in the ENSANUT 2018 the prevalence of obesity and overweight in women<sup>14</sup>, in a study conducted by Rodríguez Jimenez<sup>36</sup>, made a nutritional evaluation in older adults de albergues of the National Institute of older Adults of Mexico City (INAPAM), observed 22 % were overweight, 65 % were normal weight and 13 % were underweight<sup>36</sup>. For water consumption, in studies carried out it was mentioned that Mexico is the fourth country in the world with the highest consumption of carbonated beverages, these results were modified after the intervention program<sup>37</sup>, in Nuevo León in 2016 the water consumption was analyzed according to the jug of good drinking in students of the fifth and sixth grade of primary school, 37.3 % did not consume any water, 27.1 % consumed one or two glasses<sup>37</sup>, although it was a study in students, they reflect the consumption of what they see at home, since it was obtained 50.6 % consume soda of 3 or more glasses, 17.8 % 3 or more glasses Figure 5, likewise 35.6 % does not consume any water, after the IN program considerable changes were observed in the amounts consumed, now only 6.8 % do not consume any water and in the case of consumption of 3 glasses or more it has to be that 39.7 % do so and in the case of soft drink decreased to 15 % consumption of 3 glasses or more Figure 6. As for physical activity, in a study implemented in schoolchildren on

physical activity the significant increase was observed, plus 85 % of schoolchildren performed physical activity<sup>38</sup>, which coincides with this work women housewives before the IN program most do not perform physical activity after the program changed increasing the number of mistresses who now perform physical activity Figure 7. Although there are no works that refer to the implementation of these programs in women, since children reflect what they learn at home<sup>38</sup>. Although nutrition is the set of complex interactions of genetics and eating habits, whether favorable or not, in addition to physical, emotional, biological, cultural aspects that are balanced, favorable results were achieved<sup>39</sup>. With this work we sought to evaluate the changes derived from the intervention in housewives, they play an important role in all sectors<sup>40</sup> the results obtained in the ID stage in the target population show the lack of knowledge in healthy lifestyles, the inadequate consumption of food and the sedentary lifestyle in the housewives of Jeráhuaro, Mich, reflecting a need and desire to be oriented in terms of nutrition and physical activity, with this intervention it is possible to point out that these changes are favorable, since they positively impact the IN programs, in addition a statistical analysis was made with the Student 't' test, and it was found that there are significant differences, with a value of  $<0.01$ , thus indicating that activities related to health promotion play a very important role in reducing the incidence of morbidity and mortality in today's society related to poor diet, at the end, changes in physical activity were obtained from 24.6 to 71.2 %, knowledge about nutrition from 44.9 % to 79.3 %, weight reduction 1.3 kg, decrease in BMI by 0.5 % on average, sedentary lifestyle from 46.4 % low to 16.8 %, beverage consumption from 43.75 to 38.85 %, water consumption increased from 33.7 to 48.5 %. It is also very important to emphasize that

the people who are responsible for carrying out this type of actions are widely trained<sup>4</sup>, that professionals in the area of nutrition can give OA, in order to promote the creation of healthy nutritional habits and that these are acquired for a lifetime, in order to achieve an appropriate decision when choosing the foods to consume<sup>41</sup>. With all the above it follows that this work aims to be a basis for future research, can be implemented in different groups of people such as: schools, companies, hospitals, geriatric centers, institutions and also that this type of community actions serve to reduce the rates of CNCD that are an important health problem for Mexico, this research is relevant in the community of Jeráhuaro is the first to be implemented, therefore, this work provides knowledge that must stimulate creativity and learning in the nutritional area. It stands out as a strength the active participation of housewives and the interest in improving their nutritional and health knowledge, as an area of opportunity to continue insisting on this type of activities and not only in the implemented population, but also that they take as a reference the work and professionals in the area of nutrition make nutritional community action, the threats detected are the bad habits that housewives have, the promotion of junk food and as a weakness the lack of knowledge in the nutritional area.

### **Source of funding**

Own resources were used to implement the programme.

### **Conflicts of interest**

The collaborators in this research work declare that there is no conflict of interest, related to the planning, implementation and results derived from this work

implemented, which the results obtained are for the purpose of generating knowledge that will serve as a basis for future research.

### Acknowledgements

To the Casa de la Cultura of the municipality of Jeráhuaro, Michoacán, Mexico for the facilities granted for the use of its facilities for the implementation of the nutritional orientation programme. To the Facultad de Químico Farmaco-biología de la Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, México.

### Ethical considerations

In accordance with the General Health Law in Mexico regarding health research, and with the aim of contributing to safeguarding the dignity, safety and well-being of all participants, and in accordance with the consideration that this research was prospective in nature, and in which the risks are minimal or null for the participants, informed consent was contemplated<sup>42</sup>.

### Research limitations

There were no limitations to the implementation of the programme.

### Authors' contribution to the article

*Elizabeth Sánchez Santana*, for supporting the research in the formulation and design, as well as the implementation of the nutritional guidance programme, anthropometric measurement, data capture, participation in the experimental phase, analysis of

results and discussion. *Judith Ayala García*, literature reviewer, background and results. *Rodrigo Díaz Balcazar*, for participation in the review of materials, statistical analysis and results. *Patricia Yazmín Figueroa Chávez*, design of the orientation programme, participation in the experimental phase, statistical analysis, results, discussion and final article.

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