

**A Proposed Intervention Strategy to Reduce and Prevent the Increase of
Obesity in the Galápagos Islands-Ecuador**
by:

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INTRODUCTION

The Galápagos Islands is an archipelago located 1000 km from the continental coast (UNESCO, n.d.). The Islands are known for their unique flora and fauna, and humans inhabit only a few islands. Importing services from the continental territory covers most of their needs, such as food and healthcare. However, these activities have led to the creation of an unhealthy environment conducive of excess weight and chronic diseases.

The proposed intervention arises from the need to implement actions that counteract the burden of overweight and obesity that afflicts the Galápagos population. In order to develop an intervention appropriate to the population and its resources, specific information on food availability, level of physical activity, access to healthcare services, and the built environment. Data was collected by the use of a modified NEMS-CS questionnaire, key informant interviews and observation. The final intervention involves three components that are complementary to each other and try to improve both knowledge about the nutritional situation in the Islands, as well as promote environmental changes.

BACKGROUND

Overweight and obesity

Overweight and obesity are health conditions characterized by excessive accumulation of fat as a result of an imbalance between energy intake and expense. The World Health Organization (WHO) defines excess weight as standard deviations above the mean for weight for height in children less than 5 years of age and school children, and a body mass index over 25kg/m² for teenagers and adults (OMS, 2016).

Both obesity and overweight are influenced by a series of genetic, social, behavioral, political and environmental factors that will determine the prevalence of cases in the population. The National Health Institute (NIH) has identified specific behaviors as risk factors for obesity and overweight. These include: energy imbalance resulting from excess calorie intake and inadequate expenditure; physical inactivity; stress; lack of sleep; inadequate breast feeding; unhealthy environment (low socio-economical status, access to healthy foods and healthcare services, fast food and ultra-processed foods availability, built environment that is not conducive to the realization of physical activity, and exposure to obesogenic chemicals); family history; ethnicity; age and sex (NIH, 2017). The modification of many of these risk factors can guide the development of public health policies and programs.

These conditions affect individuals throughout the life cycle, having immediate and future health consequences and increasing morbidity and mortality rates. Excess weight is one of the main risk factors for the development of Non-Communicable Chronic Diseases such as cardiovascular disease, type 2 diabetes mellitus with renal and eye complications, non-alcoholic fatty liver, asthma, sleep apnea, metabolic syndrome, polycystic ovarian syndrome, infertility, orthopedic complications, psychiatric diseases and certain types of cancer (Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014). Childhood overweight and obesity are serious conditions because not only do they increase the probability of suffering from the

consequences of disease in adulthood, but they also increase the risk of early morbidity and mortality.

Nutritional Transition

The last few decades have seen demographic, economic and social changes brought on by urbanization and industrialization processes. These changes have led to a decrease in morbidity and mortality caused by infectious diseases related to under nutrition. Moreover, eating and physical activity habits have been transformed. The access to fast and ultra-processed foods has increased, and so has its consumption. Conversely, fruit vegetable and other natural food intake has decreased. These changes in eating patterns have caused the diet to have more energy, saturated fats, sugar, salt, and be poor in fiber, vitamins and minerals; additionally, modifications to the daily routine have caused less and less physical activity to be required. As a result, the balance has shifted towards overweight and obesity, and with it the increase of chronic non-communicable diseases (Carolina Population Center, n.d.).

Low birth weight and malnutrition during the first years of life can lead to stunting and have cognitive consequences later in life. While many public programs in low and middle income countries attempt to catch-up with weight and height for malnourished children, excessively fast weight gain can end up in overweight and obesity during adult age. This also results from changes in eating and exercising patterns, which cause malnourished children to intake large amounts of calories, leading to a fast weight gain (Adair et al., 2013).

“NOVA” Food Classification

Over the years, food has been classified into multiple groups based on its nutritional composition and contribution to daily energy intake. According to the US Department of Agriculture (USDA), foods are currently classified into 5 groups which include fruits, vegetables, proteins, grains and cereals, and dairy (USDA, 2017). All the foods within a group are interchangeable among them because they contribute with the same amount of nutrients and energy, nonetheless most of them have different nutrient profiles. This way of classifying foods does not consider the degree of food processing of the items in each group, nor does it take in account the effects processing has over the consumer’s health.

The University of São Paulo’s School of Public Health in Brazil, proposed an alternate classification which considers the degree of food processing as the main determinant for its recommendation and intake. The “NOVA” classification, nova meaning “new” in portuguese, is made up of four main food groups (Ministerio de Salud de Brasil, 2015), (Monteiro, Levy, Claro, De Castro, & Cannon, 2010):

1. *Natural and minimally processed foods:* Includes natural foods such as fruits, seeds, leaes, eggs, milk, meat. Minimally processed foods have undergone certain processes to increase their preservation time, availability and accessibility, and to make them safer and tastier. The foods in this group have the highest nutrient density and provide vitamins, minerals, fiber, protein, mono and poliunsaturated fats, and complex carbohydrates.

2. *Cooking ingredients and condiments:* The foods in this group are natural foods that have undergone physical and chemical processes to extract and purify substances that will be used as cooking ingredients and condiments. These are unedible on their own, and have the highest energy density and the lowest nutrient density as compared to the natural foods they come from. Examples include salt, sugar and oils.
3. *Processed foods:* This type of foods result from the combined use of cooking ingredients or condiments and natural foods. The nutrient composition in these foods is due to the high energy content of cooking ingredients. Some foods in this group are pickled preserves, fruits in syrup, salted meats, fermented milk, and culinary preparations.
4. *Ultra-processed foods:* Ready to eat and ready to heat foods, as well as artificial condiments (such as monosodium glutamate) are included in this group. These foods result from the combination and industrial processing of various foods in groups 1, 2 and 3, and are commonly known as “fast food”. The nutrient composition of these items has been modified in such a way that they have high amounts of sugar, salt, saturated fats and chemical additives.

The importance of the degree of food processing lies in the promotion of unhealthy eating habits, and the harmful effects it has on the consumer’s health due to the increased risk of developing overweight, obesity and non-communicable chronic diseases. Added to this is the reduction in the consumption of natural foods as a result of the predominant presence of ready-to-eat and ready-to-heat meals that have replaced natural foods.

Healthy Eating Recommendations in Brazil

As it was originally designed in Brazil by Monteiro, this method of food classification takes into account social, economic, cultural, public health and biological aspects, so it can be used as a guide to develop policies, programs and nutritional recommendations (Monteiro et al., 2010).

The Brazilian food guides are based on this new food classification, upon which they establish four main recommendations to promote a healthy lifestyle through food (Ministerio de Salud de Brasil, 2015):

1. As a rule of thumb, consume a diet based on natural foods, preferably of vegetable origin, as well as culinary preparations that include these foods, to obtain the greatest possible amount of nutrients necessary for adequate body functioning, and health benefits.
2. Utilize processed condiments in moderate amounts to limit nutritional modification of natural foods.
3. Limit the consumption of processed foods whose nutritional composition may have been noxiously modified.
4. Finally, avoid ultra-processed foods to prevent an excessive intake of saturated fats, salt, sugar and additives; and to favor nutritious eating habits and a healthy weight.

Other recommendations include: prefer water or milk over sodas or other sugary drinks, prefer fruit as a dessert instead of cookies or baked goods, select home-cooked dishes instead of ready-to-eat or ready-to-heat foods.

NUTRITIONAL SITUATION IN ECUADOR

The current health and nutrition situation in Ecuador reflects the epidemiologic and nutritional transition characteristic of middle income countries, which consists on a rapid increase in the incidence of overweight and obesity, while cases of under nutrition still exist (Popkin & Gordon-Larsen, 2004). Additionally, it is the upper quintiles of socioeconomic level that have more access to ultra-processed foods, therefore it is this group that has higher prevalence of excess weight. A marked feature of the national epidemiological profile resulting from this transition is the existence of a double burden of malnutrition at the national, household and individual levels (ENSANUT-ECU, 2014). At the national level the double burden is observed as the prevalence of malnutrition, defined by stunting, zinc or iron deficiency, along with rapid increase in cases of overweight and obesity in the population. A similar situation is seen at the household level, where malnourished children live with obese adults. In the individual, the double burden is characterized by micronutrient deficiency in an overweight or obese adult (WFP y CEPAL, 2017), (Freire, Silva-jaramillo, Ramirez-Luzuriaga, Belmont, & Waters, 2014).

The National Food and Nutrition Survey (ENSANUT) found that 13.1% of Ecuadorian households are made up of overweight mothers and stunted children less than 5 years of age. Likewise, 12.6% of excess weight women live with a child that has zinc or iron deficiency. At the individual level, the survey showed that 2.8%, 0.7% and 8.8% of overweight and obese school-aged children suffer from stunting, iron deficiency anemia and zinc deficiency respectively. Finally, 8.9% of adult women (aged 12 to 49) suffer from iron deficiency anemia, and 32.6% are zinc deficient; both groups also have excess weight (Freire et al., 2014).

When looking at malnutrition measures for each region of the country individually, it is the rural Andes that have the highest prevalence of stunting and iron deficiency anemia in children aged 0 to 60 months; the region of urban coast has the highest number of adult women with iron deficiency anemia; finally, it is the rural Amazon the region that presents the higher prevalence of zinc deficiency in children younger than 5 years, and the urban Coast region that has higher number of zinc deficiency in adult women. In terms of excess weight, the island region (Galápagos) has the highest prevalence of obesity and overweight in school age children (5 to 11 y), adolescents (12 to 19 y), and adults (>19 to 59 y). The values are shown in table 1.

Table 1. Excess Weight and Malnutrition Indicators by Region

Measure	Age Group	Region	%
Stunting	Children 0 to 60 m	Rural Andes	38.4
Iron Deficiency Anemia	Children 0 to 60 m	Rural Andes	30.7
	Adult women 19 to 59 y	Urban Coast	18.1
Zinc deficiency	Children 0 to 60 m	Rural Amazon	34.3
	Adult Women 19 to 59y	Urban Coast	62.9
Overweight and obesity	School age children 5 to 11 y	Island Region	44.1
	Adolescents 12 to 19 y	Island Region	34.5
	Adult women 19 to 59 y	Island Region	75.9

Adapted from (ENSANUT-ECU)

Overweight and Obesity

Many of the risk factors established by the NIH are prevalent in the Ecuadorian population. The Ecuadorian diet is unbalanced, made up mostly of simple carbohydrates, saturated fats, fast and ultra-processed foods, and sugary drinks; at the same time it lacks fruits and vegetables. In terms of physical activity levels, the ENSANUT survey showed that around 4% of children younger than 5 years of age watch more than 4 hours of TV or videogames every day, 34% of teenagers aged 10 to 18 do not perform physical activity regularly, and almost 15% of adults aged 19 to 60 are not physically active in their free time or as transportation (ENSANUT-ECU, 2014). Although the availability of food in the country should be sufficient to cover the nutritional needs of the entire population, 8.7% of Ecuadorian families do not have access to the basic food basket (Ministerio de Coordinación de Desarrollo Social, 2010). At the same time, there is a broad offer of ultra-processed and fast foods, which is easily accessible by the population, especially by those in the top economic quintiles.

Obesity is, therefore, a public health problem in the country. According to the National Institute of Statistics and Census (INEC), in the year 2014, five out of the ten main causes of death in adults were associated to non-communicable diseases related to excess weight. The results at the national level according to ENSANUT show excess weight throughout the life cycle, as presented in table 1. There is a higher proportion of overweight than of obesity in all age groups, especially in the adult group, where overweight goes as high as 40%. Regarding obesity, it is the adults who present the highest rates with 22%, followed by children from 5 to 11 years old with almost 11%.

Table 2. National prevalence of overweight and obesity in Ecuador

Age Group	Overweight (%)	Obesity (%)
Children < 5 y	6.2	2.8
Children 5 to 11 y	19	10.9
Adolescents (12 to 19 y)	18.8	7.1
Adults (20 to 59 y)	40.6	22.2
Adults (20 to 29 y)	33	13.4
Adults (30 to 39 y)	45.6	22.7
Adults (40 to 49 y)	45.4	28.4
Adults (50 to 59 y)	42.4	32.7

Adapted from (ENSANUT-ECU, 2014).

Eating pattern

The Ecuadorian diet is unbalanced. Rice predominates as a staple food and acts as the main source of calories, proteins and carbohydrates. Fruit and vegetable intake is low and it does not meet the 400 grams per day recommended by the World Health Organization as part of a healthy diet to prevent chronic diseases and improve overall health (this equals to 5 servings of fruits and vegetables) (WHO, 2017). Animal source foods commonly consumed are beef, chicken, whole milk and cheese, being chicken the one that most contributes to daily protein intake after rice. The main source of fat is palm oil, which has a high content of saturated fats. The consumption of sugary drinks is widespread in the population, and it is evident from an early age, with a higher consumption in the age group of 19 to 30 year olds. The high consumption of sugary drinks contributes with a large amount of sugar to the diet. This eating pattern in which the consumption of refined carbohydrates, saturated fats and sugar prevails, and in which fruits, vegetables, animal source foods and fiber are not given enough importance, creates the perfect conditions to develop overweight or obesity and the associated chronic diseases (ENSANUT-ECU, 2014).

NUTRITIONAL SITUATION IN THE GALÁPAGOS ISLANDS

The past few decades have witnessed a massive population growth in the islands (around 300%), which has put tremendous pressure on the ecosystem. Along with other risk factors, population growth and forced urbanization has led to a decreased availability of natural foods, increased offer and consumption of non-perishable foods, and decreased physical activity, which as previously described, cause an increase in weight (Page, Bentley, & Waldrop, 2013).

The situation in the Galapagos Islands reflects what happens in the nation as a whole. Nonetheless, because of specific characteristics of this territory, the prevalence of obesity and overweight is higher than in any other region of the country. The islands have a set of particular geographic and demographic specificities that will determine their nutritional and health situation, and will guide the development of public health programs and policies.

Overweight and Obesity

When analyzing the nutritional situation of the country at the provincial level, Galápagos appears in the first place in overweight and obesity statistics in all age groups. Approximately 2 out of 4 school age children, 1 out of 3 teenagers and 3 out of 4 adults are overweight or obese. On the contrary, it is the province with the lowest rates of stunting in children and adolescents (as a malnutrition indicator) (ENSANUT-ECU, 2014). Table 3 presents the prevalence of overweight, obesity and stunting for each age group.

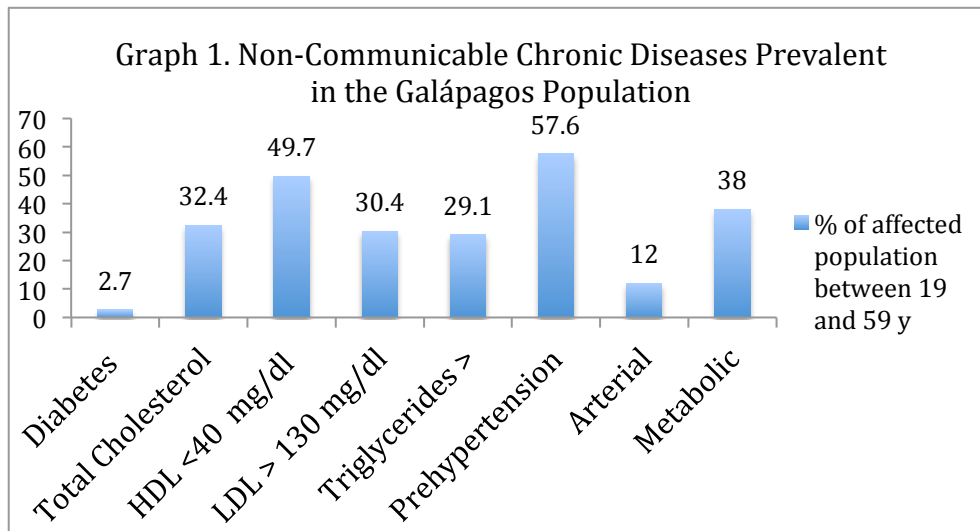
The Galápagos population also encounters a series of risk factors that predisposes it to a higher prevalence of overweight and obesity. The diet, as it will be described in more detail later on, is based on refined carbohydrates, accompanied by a high intake of saturated fats and ultra-processed foods. Although Galápagos has enough local agricultural production, the perceived high price of produce forces them to opt for less healthy and more accessible options. Physical activity levels are low in the Galápagos population, especially among adolescents and adults: 31.8% of teenagers aged 12 to 19 years, and more than half of adults (57%) are not physically active (ENSANUT-ECU, 2014). Poor dietary practices and little physical activity eventually lead to an increase in weight and greater risk of developing non-communicable chronic diseases.

Table 3. Prevalence of overweight, obesity and stunting at the provincial level in Galápagos

Age group	Overweight (%)	Obesity (%)	Stunting (%)
Children < 5 y	8.9	3.8	10.6
Children 5 to 11 y	25.8	18.3	7.8
Teenagers (12 to 19 y)	20.7	13.8	9.9
Adults (20 to 59 y)	45.8	26.7	NA
Adults (20 to 29 y)	38.2	17.9	NA
Adults (30 to 39 y)	50.8	27.2	NA
Adults (40 to 49 y)	50.6	32.9	NA
Adults (50 to 59 y)	47.6	37.2	NA

(ENSANUT-ECU, 2014)

As previously mentioned, excess weight is an important risk factor for the development of non-communicable chronic diseases, which are present in all age groups in the Galápagos population (more specifically in individuals between 10 and 59 years of age), as it is presented in graph 1. The high prevalence of chronic diseases is evident when looking at the main causes of death among the Galápagos population. According to INEC, in the year 2014, six out of the fifteen main causes of death in the province were associated to chronic diseases resulting from an unhealthy lifestyle. These included: stomach and pancreatic cancer, diabetes mellitus, hypertension, ischemic heart disease, cerebrovascular accidents (INEC, 2014).



Adapted from (ENSANUT-ECU, 2014)

Food Availability

Because of its status as islands, Galápagos receives a large amount of its food from continental Ecuador. As a result of the transportation process and expiration time, corner stores which act as the main food distributors in the Islands, have little availability of fresh products and a greater offer of processed and ultra-processed foods. However, the islands have approximately two thousand hectares of arable land, of which 1517 are covered by permanent crops and 220 hectares are covered by seasonal crops. Banana, plantain, orange, pineapple, tomato and watermelon excel in production in both groups; agricultural production is accompanied by local fishing. Most of these products are intended for sale to the final consumer, whether in general markets or weekly farmers market. The price variability between locally produced and processed foods becomes one of the main determinants of food purchase and consumption. The inhabitants of the islands prefer to consume processed foods brought from the continent over local produce, since many times the price of the latter is perceived as greater (Espinoza Pacheco, 2015).

Public daycare services (managed by the Ministry of Economic and Social Inclusion), also known as CIBV for its acronym in Spanish (Centros Infantiles del Buen Vivir), provide early education and stimulation for children aged between 1 to 3 years and daily meals to cover nutritional needs. The lack of availability of natural foods also affects the public daycare in San Cristóbal, and makes compliance with the norms of healthy eating difficult. As with the rest of the population, the food provider has difficulty accessing fresh and local foods. This is due to the limited availability of specific good quality fruits and vegetables in stores.

As a result, there is evidence of low daily consumption of fruits and vegetables (half the amount recommended by the WHO of 400g), and an excessive intake of refined carbohydrates, saturated fats and calories from food processing. Additionally, the islanders have the habit of eating out of home due to lack of time to

cook (approximately 40% of adults eat out), which increases the intake of saturated fats and refined carbohydrates (Espinoza Pacheco, 2015), (Waters et al., 2017).

Galapagos Action Plan

The Galapagos Action Plan, developed by the Ministry of Public Health in collaboration with the Ministry of Economic and Social Inclusion and the Ministry of Agriculture in May 2017, arises as a response to the increase in the prevalence of overweight and obesity in the Islands. It is a multisectoral model that involves activities at the level of health, agriculture, education and social inclusion in order to create an environment that promotes healthy habits. More specifically, the plan seeks to: promote food security and sovereignty for residents of the islands, generate environments that favor and promote health, identify early cases of overweight and obese and provide adequate care, promote and protect breastfeeding, and use mass media to promote healthy habits (Ministerio de Salud Pública del Ecuador, 2017).

METHODOLOGY

The following activities were carried out:

Literature review

In order to determine the best possible intervention, a literature review was carried out to collect updated information on: the local state of health and nutrition; actions that are currently being carried out to reduce and prevent overweight and obesity; food practices; availability and access to healthy foods vs. processed foods; and on other factors that increase the risk of obesity and non-communicable chronic diseases. The reviewed literature was provided by local researchers based on their findings of barriers affecting access and availability of healthy foods through focus groups. Other resources were selected from search engines such as Google scholar with the use of specific words that would focus the search, for example “NOVA food classification”, “nutritional transition”, “obesity and overweight”. Additional resources included the national ENSANUT survey and national data collected by the institute of census and statistics (INEC).

Visit to the Galápagos Islands

A four-day visit (from October 12 to 16) to the islands was needed to better analyze the situation and identify determinants of excess weight. During the visit to the island of San Cristóbal, the food environment, access to foods, feeding practices, access to health services, presence of social action programs, and other determining factors for the development of overweight and obesity were analyzed. The information was collected through meetings with key informants in the community, specifically with the director of the Oskar Jandl Public Hospital, Ministry of Economic and Social Inclusion representatives, director of the public daycare center CIBV Chiquitines, vendors of neighborhood stores and local farmers from the weekly market. Each interview was made up of a series of questions developed to get information that would guide the development of a proposal for a public health

program to control overweight and obesity. Interviews were also carried out during the visit to the weekly farmers market.

For each corner store visit, the NEMS-CS (Nutrition Environment Measures Survey-Corner Store) questionnaire, developed by the University of Pennsylvania, was applied in order to rate establishments based on the availability of healthy and unhealthy food options. The questionnaire's scoring system assigns positive points for healthy foods and negative points for unhealthy foods available. Price and quality of each food option is also rated. Each store is assigned a score over 58 points, the closer the score gets to this value, the better the food environment is in that specific site.

To better qualify the food supply in San Cristóbal, the NEMS-CS questionnaire was adapted to include the foods most commonly consumed by the local population. A NOVA classification item was also included to determine the level of processing of each food available at the store. The scoring system was also adapted to provide positive points for the presence of natural foods, cooking ingredients and processed foods, and negative points for the availability of ultra-processed foods. Each store could receive a maximum score of 83 points, being the stores with a score closest to this value the ones with the best food supply. The adaptation of the questionnaire and the scoring system was based on a Brazilian version used to analyze the nutritional environment of stores in the urban area of the country (Martins et al., 2013).

The purpose of this adaptation was not only to reflect the available food supply, but also to qualify the proportion of processed and unprocessed foods sold in stores. In addition to the NEMS-CS survey, a short interview was conducted with business owners to learn their perception about the availability of foods and purchase patterns.

The level of community readiness to accept, implement and maintain a public health intervention was assessed through a pilot application of the questionnaire developed by the Tri-Ethnic Center for Prevention Research designed for this purpose (Plested, Edwards, & Jumper-Thurman, 2006). The questionnaire is based on the responses provided by community leaders on issues (categories) of community efforts, community knowledge about these efforts, leadership, community climate, community knowledge about the health problem, and available resources. A score is assigned to each category, and it is averaged to get a final score that qualifies the community on a scale of "not ready" to "ready". Recommendations for successful interventions based on the conditions of the community are included for each level on the scale. In this case, interviews conducted with the director of the Oskar Jandl Public Hospital and Ministry of Economic and Social Inclusion representatives were used as the basis for qualifying the readiness level of the San Cristóbal community.

RESULTS

Corner Stores

The food supply of 3 corner stores in different locations in the Island was analyzed. Each store was selected based on its location relative to the main street

(on the main street, on a more residential neighborhood, and in one of the smaller streets close to the main one) and its supply. The selected stores either had a varied supply of foods (closer to what a grocery store would have), or were more “corner store-like” with fewer food options. The results obtained from the adapted version of the NEMS-CS questionnaire showed that the availability of processed foods is superior to that of natural foods, as it is shown in table 4. The stores had an average score of 9/83, which means that the most available foods belong to groups 3 and 4 from the NOVA classification. Fruits, vegetables, whole grains and meat are scarce and in bad condition (old, wrinkles, crushed, with roots and holes). The price of produce available in stores (imported from the continent) is higher than that produced locally. For example, one apple in a store costs \$0.50, while a locally produced case of corn or a head of lettuce sold at the weekly farmer’s market costs \$1.00.

Table 4. Corner Store Food Availability Scores According to NEMS-CS

Corner Store	Score /83
Minimarket “Mijo”	18
Tienda “Matí”	9
Minimarket “2000”	1

Weekly Farmers Market

Weekly, on Saturdays between 7:00am and 12:00pm, farmers from the upper part of the Island offer their products in a fair. They generally sell beans, oranges, cabbage, broccoli, chard, cauliflower, carrot, pumpkin, corn, chicken, meat, honey and guava candy. The variety of products offered is greater than that available in stores. It is often not enough, and buyers are not able to buy all the products they need.

An important barrier people have regarding the purchase of fruits and vegetables is the high cost of these products; however, most of the products sold by local farmers have a price between \$0.50 and \$1.00. According to what a producer explains, consumers perceive this price as “high”, since they consider that locally produced foods should be cheaper, but at the same time they prefer to spend \$2.00 for a store-bought item of less quality. This portrays a preference towards imported foods, rather than locally produced. Another barrier that stops people from attending the farmers market is the schedule, which turns out to be inconvenient. Many times, people choose to buy products later in the day at a neighborhood store, even though the offer and quality of foods is poor.

At the end of the day, what is not sold directly to the consumer is supplied to corner stores. It is done this way since local farmers want to avoid acting as “brokers or intermediaries” and prevent overpricing of products. By establishing controlled sales price, this practice could be important to provide fresh, healthy and local products for corner stores.

Ministry of Economic and Social Inclusion/Community Nurseries “CIBV Chiquitines”

The Ministry of Economic and Social Inclusion (MIES) carries out a series of child care programs to ensure optimal growth and development. The management of community nurseries known as “Good Living Community Childcare Centers” (CIBV) is the program most relevant to this study. These centers deliver early stimulation and education to children between 1 and 3 years of age, while providing daily food that meet’s the child’s nutritional needs to aid in growth.

Both in nurseries around the country and in the one visited (CIBV Chiquitines), each child receives 4 meals: breakfast, mid-morning snack, lunch and mid-afternoon snack. Members of MIES, the center’s director and the person in charge of food preparation plan the menu on a weekly basis. According to national guidelines, the menu should include fruits, vegetables, protein, dairy products, carbohydrates and water. The food is prepared outside of the center by an independent contractor who sends food to the center, in the right portions, before each meal.

However, there are some barriers in terms of food provision that the center must deal with. First, the lack of availability of natural foods hinders compliance with national guidelines and rules of healthy eating. As with the rest of the population, the food provider has difficulty accessing fresh and local foods. This is due to the limited availability of specific products in corner stores, and because products ran out fast in the farmer’s market. Additionally, the perceived high price of fruits and vegetables replaces their consumption with processed foods of lower price. While providing daily meals ensures that children who attend the community nursery have access to healthy and safe food during the week, there is a lack of co-responsibility from parents in the food supplied at home and during the weekend. Furthermore, publicity for processed food is abundant and leads mothers to select these foods because of a lack of time to cook. Finally, there is no nutritional technical support for the development of weekly menus.

As part of the national plan, a nutritional assessment is carried out for all children in community nurseries is carried out with the objective of monitoring their growth and identify early cases of malnutrition. In the case of CIBV Chiquitines, weight and height measurements are taken by nursing staff at the public hospital. Educators, who are in charge of taking anthropometric measures, follow children that presented below-average weight for height monthly. Children identified to be malnourished are recommended to consume at home the government-provided fortified milk and the micronutrient supplement “Chispaz”; they receive the same food as other children in the daycare center. The lack of nutritional technical support is also evidenced by the fact that the children’s center does not deliver the necessary nutrients to replenish nutritional status of those children with deficiencies.

Oskar Jandl Public Hospital

Part of the health culture of Galápagos is based on the idea that being overweight is equivalent of good health (especially in the case of children), and in seeking health services only when advanced symptoms of disease appear. It is based

on these practices and beliefs that Dr. Byron Tobar, director of the hospital, believes in the need to develop a strategy that will create awareness about the importance of making adequate nutritional diagnoses, timely access to health services, and propose individualized nutritional interventions with the available resources.

Built Environment

The built environment of San Cristóbal is conducive to physical activity. There is a long boardwalk with an attached bike path, which allows enough space to walk or run; as well as parks with gym type machines (“biohealthy machines for adults”). Additionally there is promotion of physical activity to engage in active transport, such as the message “bike, for your health and the planet” outside the MIES offices. While the existing infrastructure facilitates access to places to be physically active, and it would ideally increase the performance of such activities, most parks, boardwalks and bike paths remain unused. The main reported reason for not exercising is lack of time, accompanied by a culture that loses the habit as it enters adulthood. Finally, the ease of transportation by taxi or car discourages people from walking, even short distances.

Community Readiness

Based on the results obtained from the community readiness pilot analysis, San Cristóbal is at a pre-planning stage (as shown in table 5). At this level, the problem is recognized, as well as the need to generate solutions, however there are no concrete results.

Table 5. Community Readiness Analysis Results	Interview		Partial Score
	#1	#2	
Dimensions of Preparedness			
Existing Community Efforts	5.5	6	5.75
Knowledge about those efforts	2.5	2.5	2.5
Leadership	4.0	6.0	5.0
Community Climate	3.5	3.5	3.5
Knowledge about the problem	4.0	4.0	4.0
Available resources	3.5	4.0	3.75
Total Score			24.5
Average between dimensions			4

Adapted from: Tri-Ethnic Center for Prevention Research

INTERVENTION

Target Population

As described above, the Galápagos population is presented with a series of barriers that prevent them from maintaining a healthy lifestyle, and an adequate nutritional and health status. Whether due to risk factors such as the availability of natural vs. processed foods, their cost, lack of time to cook at home or exercise, or the habit of eating out, there is a greater risk of this population having excessive

weight and chronic diseases. Although all the age groups are affected by obesity, it is adults that have the higher rates of excess weight, and within this group, it is women (aged 19 to 60 years) who have the highest prevalence: 34.5% of adult women in the Islands are obese, as compared to 25% of adult men (Espinoza Pacheco, 2015). Moreover, women are responsible for food preparation and feeding the household, being an important piece in maintaining the nutritional status.

An individual's eating habits develop during childhood, influenced by family practices. During this time the mother is responsible for the transmission of healthy dietary guidelines to the child, which will go on to affect future health. The availability of food in the home and the pattern of family eating behaviors play a substantial role in the child's own eating behavior (Dominguez-Vazquez, Olivares, & JI, 2008). Taking the example of the Galápagos, families that eat away from home (because of lack of time to cook or due to few healthy options available), may develop in the child the habit of preferring fast and ultra-processed over natural foods. These eventually lead to overweight and obese children, and adolescents that already show early signs of chronic diseases (ENSANUT-ECU, 2014). The degree of maternal education is also an important risk factor for malnutrition in children. Mothers with low schooling tend to have less knowledge in health and nutrition, as well as lower purchasing power that leads to low availability of food or greater access to ultra-processed foods (Fondo de las naciones unidas para la infancia UNICEF, 2015).

Hence the importance of providing the women of Galápagos with the necessary tools to prevent the increase of overweight and obesity rates through knowledge about the health situation of the Islands; nutrition to develop healthy eating habits; improvement in the availability of natural foods and the ability of the population to access and use them; and through the improvement of nutritional health services.

The intervention will be implemented in San Cristóbal initially, and then in other populated islands of the archipelago.

Intervention Strategy

The selected strategy is based on the predicted community's readiness and knowledge of the health problem and its capacity to implement and maintain an intervention. The available resources in terms of food availability, built environment and access to healthcare services also guided the development of the intervention components. Based on the level of community readiness, the Tri-Ethnic Center for Prevention Research recommends the development of a strategy that creates awareness about the health situation, and at the same time proposes specific activities to combat the problem.

It is with this guide that a multicomponent intervention was developed. Each one of the components complements each other, and together seek to increase knowledge about the nutritional situation in the Islands and empower the community through provision of the tools necessary to combat excessive weight. Likewise, the proposed intervention covers various levels of the socio ecological model, more specifically, the individual, organizational and community levels. The individual level is targeted by providing education, cues to action through healthy

fairs and corner store advertising, and eventually reducing perceived barriers to food and healthcare access. Actions within the organizational level will include organizational changes within corner stores and healthcare services to accommodate the intervention. Finally, the importance of developing a community level intervention arises from the need to modify health determinants that will lead to changes in lifestyle.

Main Objective

The main objective of this intervention is to limit the increase of obesity in adults from San Cristóbal, Galápagos, through changes in knowledge about the nutritional situation of the population, changes in the food environment, and improvements in the provision of health services.

Goals

1. Train health personnel (doctors, nurses, nutritionists) in the strategies to be implemented and the role each professional will perform.
2. Generate a level of awareness in the population about the health situation, and motivate them to take action voluntarily.
3. After the first year of intervention, at least 3 seminars and 3 healthy fairs will have been held.
4. After the first year of intervention, the number of “healthy stores” will increase from 0 to a minimum of 3.
5. In this same period of time, participating (healthy) stores will offer a minimum of 8 new products.
6. Increase the number of counseling sessions carried out by district nutritionists to once every 4-6 weeks.
7. After the first year of implementation, the participating nutritionists will have given at least 8 counseling sessions through telemedicine, directed to patients recruited by the San Cristóbal health network.
8. Similarly, nutritionists will have participated in at least 3 seminars and 3 healthy fairs.

Intervention Components

1. Campaign implementation: Implement a three-month-long campaign to raise awareness about the nutritional situation in the Islands. The campaign will consist of monthly seminars for mothers on issues such as obesity in the Islands, risk factors, future consequences of excess weight and benefits of healthy eating and physical activity. Each seminar will be held in San Cristóbal’s schools after class, and facilitated by district dietitians. These seminars will be complemented with healthy fairs (family day/sports day) held in parks/sport fields/neighborhoods. During each fair physical activity, cooking demonstrations with local products will be carried out and district dietitians will distribute information about obesity in different age groups. Furthermore, a mass media campaign will be carried out to increase the dissemination of health information.

2. “Neighborhood Store Initiative”: Along with the campaign, a neighborhood store will be implemented to improve access to fruits and vegetables. The initiative consists in increasing the supply of fresh and local produce in neighborhood stores by generating a link between stores and local farmers. This link will also include the public daycare center CIBV Chiquitines to ensure their access to natural foods. Each participating store must include at least four new products, either fruits or vegetables.

Additionally, each store will receive educational material to display and delivered to customers. The material will be aimed at women, and it will include nutritional information on the benefits of fruit and vegetable consumption, as well as ideas of healthy preparation with each product. Participating stores will be visited every three months to evaluate their progress and provide the necessary support. Eventually, as the supply of natural products increases and new pricing and promotion methods are introduced, stores will get certified as “healthy”. An initial event, which will include cooking demonstrations and nutrition education stands carried out by district dietitians, will be held to promote the program among the population.

3. Increase supply of nutrition professionals: The need to have active nutrition professionals who provide counseling and support will be covered through periodic visits and telemedicine. The district dietitians will be responsible for providing training to members of the public daycare on issues of healthy eating and support in developing weekly menus, as well as in training educators to correctly perform nutritional assessment for monthly checks of stunted children. Moreover, every six months, district dietitians will provide support in nutritional assessment of children in the public day care center.

As part of the Galápagos Action Plan, nutritional counseling will be provided to individuals who are identified as obese at the primary care level. District dietitians will provide tips on weight loss and maintenance, healthy eating for specific conditions with available resources, and physical activity through videoconference counseling sessions. Follow-up consultations will be held every 4 to 6 weeks through the same means. Finally, dietitians will participate in the initial awareness campaigns, during which they will provide education through seminars and fairs, as well as provide training to shopkeepers and local farmers on the subject of natural products and healthy eating.

Reach: The intervention seeks to reach women and mothers who are responsible for food preparation in the household. The project is expected to reach around 3,500 women through its awareness campaigns, promotion of healthy stores and access to nutrition services.

Adoption: At least two schools in the area are expected to adopt monthly seminars, at least three corner stores will adopt the neighborhood stores initiative, finally telemedicine will be included as a mean to provide health care in the public hospital.

The full adoption of the three intervention components will allow for the desired impact to be achieved.

Implementation: Several conditions are necessary for the intervention to be implemented as planned:

- Identification of participating schools and stores.
- Disseminate information on training sessions and healthy store initiative.
- Contact local farmers and create a link with storeowners and public daycare.
- Provide training to farmers and storeowners in the subject of natural foods.
- Acquire telemedicine equipment for the hospital, health professionals and district dietitians.
- Train dietitians and other health professionals in telemedicine.
- Train primary care providers to direct patients with chronic diseases to dietitians.

Maintenance: The first component of the intervention must be maintained for a period of three months. To maintain both the healthy neighborhood store initiative and the use of telemedicine constant training needs to be provided to all the involved parties. Likewise, a monitoring system must be implemented to ensure that the components are being carried out according to plan, and to allow any improvement to be made.

Evidence Base for the Proposed Intervention

Similar interventions have been implemented internationally, and have shown to be successful in creating knowledge about obesity in the population, as well as improving healthy food availability.

Obesity is a public health problem in the United Arab Emirates (UAE). With the aim of combating this condition, in 2009, the ministries of health and education, along with UNICEF and private sector collaborators, implemented the initiative “The Fat Truth Campaign”. The campaign lasted for three months, and consisted of a series of community and school events complemented by a display of information in mass media. The objective of the information presented was not only to show the future risks of childhood obesity and the benefits of a healthy lifestyle, but also to raise awareness about the health situation, encourage behavior change and make it a priority issue in the national agenda. While the impact of this campaign has not been documented, the Ministry of Health of the UAE and UNICEF continue to implement campaigns that aim to reduce the burden of childhood obesity (Gupta, Shah, Nayyar, & Misra, 2013). The Fat Truth Campaign is applicable to the Galápagos Islands’ population because the level of knowledge of health situation, and perceptions about weight is similar to those of the UAE. Similarly, determinants of obesity are comparable between both populations. High prevalence of obesity results from increased consumption of ultra-processed foods and physical inactivity. In addition, the UAE is going through the same phase of nutrition transition as Ecuador (Al Junaibi, Abdulle, Sabri, Hag-Ali, & Nagelkerke, 2013).

The Corner Store Initiative has been previously implemented in the United States, and has proven to be successful in increasing the supply of natural, fresh and local foods in neighborhood stores, and in promoting the purchase of such products. By linking corner stores with farmers and other community partners, and through the provision of education, corner stores in the city of Minneapolis, Minnesota subjected to the intervention, showed an increase in availability of fruits and vegetables of 39% (11 varieties on average). Likewise, sales of these products increased from 0-2.97% before the intervention to 0-5.94% after the intervention (Minneapolis Department of Health and Family Support, 2012). Similarly, a healthy corner store intervention implemented in Baltimore, Maryland showed an availability of 86% of natural and healthy products during the intervention phase as compared to stock before the intervention (Gittelsohn et al., 2010). Individuals of Latino origin managed most of the neighborhood stores in which the initiative was carried out, so cultural aspects are, in part, applicable to the population of San Cristóbal (Sandoval & Aquilante, 2014).

The lack of nutrition professionals in Galápagos can be mended through the use of technology. Telemedicine is a technique based on the use of telecommunications to provide healthcare services at a distance. It allows health professionals to come close to patients who have difficulties accessing specific services, like the case of the Galápagos population and nutrition health care. The IDEATel Project (Informatics for Diabetes and Education Telemedicine Project) evaluated the effect of nutritional counseling through videoconference in the elderly population in the state of New York. Technology was used to promote behavioral changes through nutrition education, display of food models, and lab values monitoring. After the course of two years, a reduction of 1.2cm in waist circumference was seen in women who participated in the intervention (Izquierdo et al., 2010). A key piece necessary for the use of telemedicine is access to internet. Wireless internet is universal in Galápagos thanks to RedGal, which provides a connection to all inhabited islands since 2009 (Mena-Erazo, 2009), (Consejo de Gobierno de Galápagos, n.d.).

EVALUATION

The evaluation component seeks to assess the reach of the intervention in the community; the effect of the three components on obesity rates in the target population; and the degree to which the intervention was adopted and implemented by community members, neighborhood stores, local farmers and healthcare services. The evaluation will be done pre and post intervention without a comparison group. The level of awareness about the health situation will be followed up after the intervention has been implemented. The NEMS-CS questionnaire will be applied after the intervention to evaluate the amount of natural foods offered by each participating stores. Finally, the number of nutrition counseling sessions will also be evaluated. All these measures will be compared to the information collected prior to the implementation of the intervention.

Awareness Campaign

- *Evaluation Questions:* How many seminars and fairs were held? How many women/mothers attended? Has the level of community readiness improved?
- *Measures:* # of seminars and fairs held, # of women who attended the events, score in community readiness scale.
- *Data:* seminar and fair records, records of attendance, community readiness score.

Healthy Neighborhood Stores

- *Evaluation Questions:* How many stores participate? How many healthy products do participating stores offer?
- *Measures:* # of participating stores, # healthy options being offered
- *Data:* Participation agreement documents, proportion of healthy vs. unhealthy foods based on NEMS-CS questionnaire.

Use of Telemedicine for Nutritional Counseling

- *Evaluation Question:* How many counseling sessions through telemedicine were held?
- *Measure:* # of counseling sessions held through videoconference.
- *Data:* counseling sessions record.

ISSUES THAT AFFECT THE SUCCESS OF THE INTERVENTION

Although the components of the intervention have been selected based on their cultural and practical fit to the Galápagos community, certain issues may jeopardize the success of the intervention. In the first place, it is essential to have a commitment between all the interested parties to ensure that the intervention will be carried out according to plan. The link between local farmers and shopkeepers, is of vital importance, however this relationship can be hindered as local farmers seek to sell their products directly to the consumers and at prices they consider to be fair; avoiding the presence of a third party that might cause overpricing of products. Lastly, there is a great difficulty when wanting to change previously established behaviors, especially in adults.

LIMITATIONS OF THE PROPOSED INTERVENTION

The main limitation for this proposal is the length of the visit to the Islands, and the small sample interviews to collect information. Although important information on food availability and accessibility, eating habits, physical activity levels, access to healthcare services, and presence of social action programs was gathered, it would still be necessary to go back and collect more information from other sources to make sure the proposed intervention will be successful. On the same lines, a bigger sample of key informant interviews will allow a more precise analysis of the level of community readiness and predict their ability to accept, implement and maintain the current intervention.

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