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Consulting Report – Municipality of Surco: Addressing the Social Problem of Iron Deficiency Anemia in School Children in the District of Surco, Perú

**TESIS PARA OBTENER EL GRADO DE MAESTRO EN
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PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ**

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Dedication

This paper is dedicated to all the women and children suffering from anemia, whose future and well-being have inspired this study.

To our parents, for their unconditional support in our personal and professional growth, you are and will always be our greatest inspiration.



Acknowledgement

This research paper would not have been possible without the hard work, dedication, and collaboration of each group member throughout the research and writing process of this thesis.

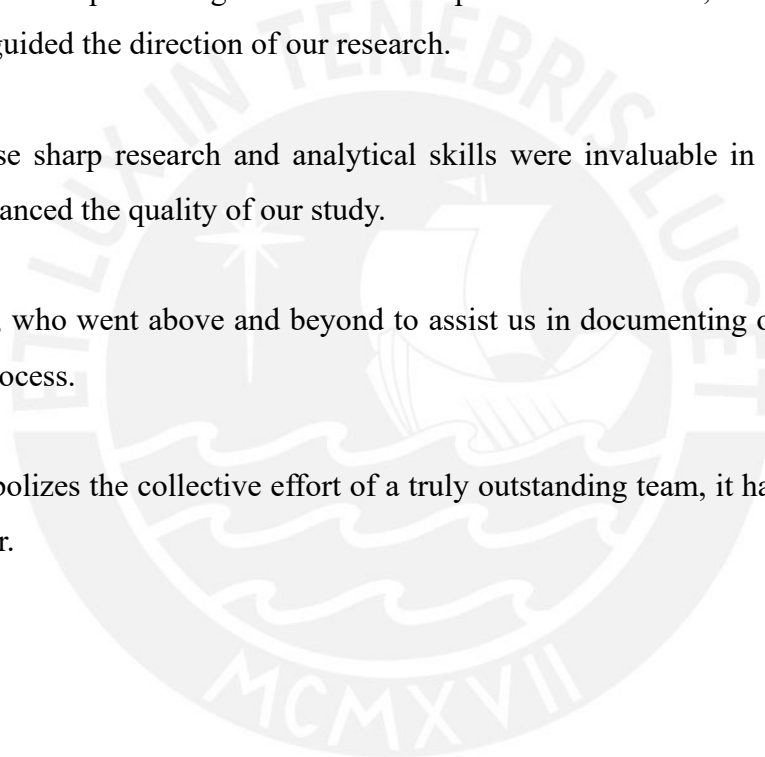
To Aldo, who served as our main point person in communicating with the municipality and other stakeholders, and who patiently helped us navigate the language and cultural barriers throughout this research.

To Moreen, whose exceptional organization skills kept the team on track, maintained our focus, and effectively guided the direction of our research.

To Simon, whose sharp research and analytical skills were invaluable in providing critical insights that enhanced the quality of our study.

To Lisa Hughes, who went above and beyond to assist us in documenting our data gathering and interview process.

This thesis symbolizes the collective effort of a truly outstanding team, it has been a pleasure working together.



Executive Summary

The study addresses the critical public health issue of childhood anemia in Surco, Lima. Anemia, among other reasons, is primarily caused by iron deficiency and impairs both physical and cognitive development, with long-term consequences for school performance and overall well-being. This research proposes an innovative yet easy to implement solution: an iron-fortified soup mix developed in collaboration with Ajinomoto, designed to tackle anemia through accessible and nutritious meals. The commissioner for this study is the Municipality of Surco, Lima.

The researchers came up with the solution by using agile methodologies, including user-centered design and multi-level prototyping to make sure that the final product meets the needs of local children and their families as well as the commissioner's expectations. Interviews with children and caregivers revealed key insights into dietary patterns and shed light about misconceptions about nutrition. Moreover, the economic challenges that exacerbate anemia were analyzed and taken into consideration during the ideation process. As a result, the fortified iron-rich soup mix offers a practical and culturally relevant intervention, aimed at improving iron intake without altering familiar dietary routines.

To ensure the project's sustainability and scalability and overall impact, the business model relies on partnerships with schools, local government units, and health institutions. Ajinomoto's expertise in food technology and nutrition enhances the product's effectiveness and market viability. The product is designed to be affordable, easy to prepare, and appealing to children in terms of taste and flavor to ensure broad acceptance within the community and optimal iron intake.

Abstract

La anemia ferropénica es la deficiencia nutricional más prevalente en todo el mundo, y afecta sobre todo a las poblaciones socioeconómicamente desfavorecidas de los países en desarrollo. Los grupos desproporcionadamente afectados por la anemia son los lactantes, los niños y las mujeres. En Perú, según las estimaciones, alrededor del 40% de los niños menores de 5 años son considerados anémicos, con consecuencias potencialmente graves para la salud. Por ello, la municipalidad de Surco ha encargado a un equipo de investigadores que realice un estudio sobre cómo resolver este problema social en la comunidad. Mediante cuestionarios y entrevistas con el usuario previsto, el equipo elaboró una solución innovadora a lo largo de múltiples rondas de comentarios, perfeccionamiento y creación de prototipos. Para abordar el problema de la anemia en Surco, se creó una base de sopa rica en hierro con el objetivo de que fuera fácil de usar, rentable y eficaz para ayudar con la ingesta de hierro. Además, la mezcla de sopa está diseñada para satisfacer el gusto de los niños y se desarrollará en colaboración con Ajinomoto.

Keywords: anemia, iron-rich food, Peru, iron deficiency, children health issues, dietary intervention

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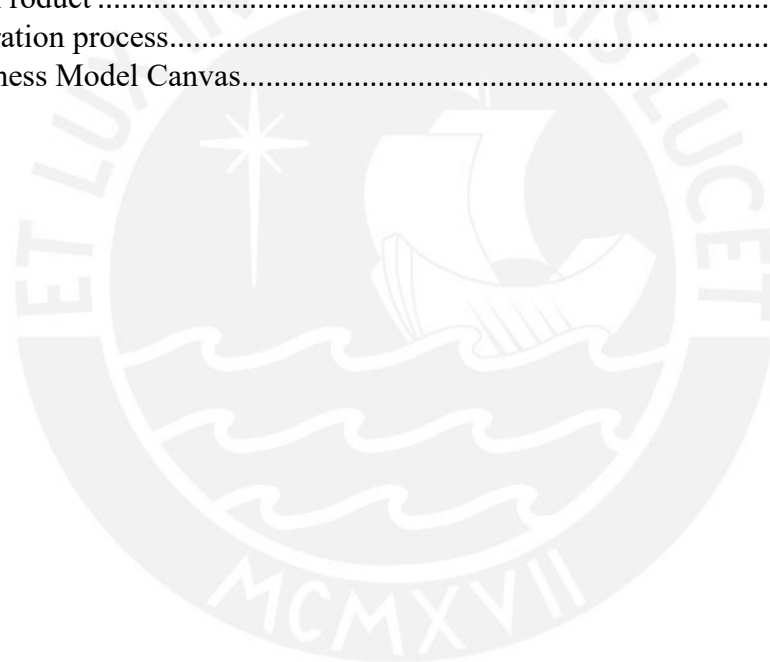
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Chapter I. Problem Statement

The social problem the research group is aiming to solve is centered around the high prevalence of anemia among primary school children, who are enrolled in public schools in the district of Surco, Lima, Peru. The word comes from ancient Greek and means “lack of blood” which is only partially true, as only a component of the blood is lacking (Badireddy & Baradhi, 2023).

Anemia is a common health condition in which the human body either has an insufficient amount or number of red blood cells or is unable to produce the required amount of hemoglobin in the red blood cells to supply the body with the required levels of oxygen (Sasmita et al., 2022). If hemoglobin levels are low and therefore body parts are undersupplied with oxygen, those affected body parts cannot function properly (*Low Red Blood Cell Count (Anemia)*, n.d.). As one of the most common health conditions on the planet, anemia is affecting billions of people (Sasmita et al., 2022). In fact, WHO estimates that “40% of all children aged 6–59 months, 37% of pregnant women and 30% of women 15–49 years of age are affected by anemia”, making this a very real, tangible problem for a substantial proportion of the world’s population (World Health Organization, 2023). In other words, children aged five and below are most affected by anemia, particularly babies and infants under two years old. On the other hand, females are disproportionately vulnerable to anemia, as more than half a billion women worldwide are considered anemic. The groups within that demographics are menstruating adolescent girls and women, and pregnant and postpartum women (World Health Organization, 2023). On top of that, the situation is worse in underdeveloped and developing countries with children and pregnant women being more affected than their counterparts in more developed regions of the world (Aminul Islam Apu et al., 2024).

On a global level, the areas that are most affected by anemic people are regions in Africa and South-East-Asia “with an estimated 106 million women and 103 million children affected by anemia in Africa and 244 million women and 83 million children affected in South-East Asia” (World Health Organization, 2023).

The impact of anemia can be far-reaching and may even have detrimental outcomes. In children, it may negatively impact school performance by contributing to developmental delays and behavioral challenges, such as decreased motor skills, reduced social engagement, and difficulty maintaining attention. In adults, anemia can lower productivity and diminish overall quality of life. During pregnancy, it has been connected to unfavorable outcomes like premature birth, low birth weight, and increased risk of maternal death. Besides its health implications, anemia also carries significant financial burdens for individuals, families, communities, and entire countries. It is estimated that investing US\$ 1 in anemia reduction for women could generate up to US\$ 12 in economic benefits (World Health Organization, 2023).

1.1 Definition

To assess whether a person is in fact anemic, hemoglobin levels are used (Milman, 2011). However, these thresholds vary between age, sex, altitude, smoking and pregnancy status, meaning that not the same hemoglobin concentration chart is used universally, but have to be adjusted for the aforementioned factors. Upon considering those factors, the WHO proposed four different tables for men, women, young children and people during pregnancy to measure the hemoglobin levels in a person to determine their anemia status. However, there is criticism about how the data sample was collected and hence the normal and insufficient hemoglobin concentration in humans was determined. The study that determined the thresholds failed to consider variances across different ethnicities, geographic locations and different

stages of pregnancy. The sample used to develop the thresholds is not universally representative of the global population, as predominantly white, Caucasian adults from Europe and North America were used (Garcia-Casal et al., 2019). Table 1 provides information on how the WHO classifies normal and anemic levels of hemoglobin concentration in the blood, according to different demographics. Moreover, the organization differentiates between different levels of magnitude of anemia, ranging from mild to severe (World Health Organization, 2011).

Population	Non-Anemia	Anemia		
		Mild	Moderate	Severe
Children 6 - 59 months of age	110 or higher	100-109	70-99	lower than 70
Children 5 - 11 years of age	115 or higher	110-114	80-109	lower than 80
Children 12 - 14 years of age	120 or higher	110-119	80-109	lower than 80
Non-pregnant women (15 years of age and above)	120 or higher	110-119	80-109	lower than 80
Pregnant women	110 or higher	100-109	70-99	lower than 70
Men (15 years of age and above)	130 or higher	110-129	80-109	lower than 80

Table 1: Hemoglobin Levels at Sea Level

The values in the table describe the hemoglobin levels in grams per liter of blood. Moreover, a disclaimer is added stating, that despite a category is named “mild”, iron deficiency is still prevalent and shall not be treated lightly as there may be consequences (World Health Organization, 2011).

As described, this table and the associated values are not reflective of all populations, as primarily Caucasians from Europe and North America were sampled. The WHO has suggested adjustments for more accurate measurements for instance for every thousand meters of altitude and people who are smoking.

1.2 Causes

Anemia can either stem from a singular issue or may be caused by a multitude of underlying reasons. Among the most common ones are nutrient deficiencies, malnutrition (or the inadequate absorption of nutrients), low levels of iron, vitamin B12 or folic acid, infections, inflammation, chronic diseases such as kidney disease, gynecological and obstetric conditions, and inherited red blood cell disorders (Aminul Islam Apu et al., 2024; *Low Red Blood Cell Count (Anemia)*, n.d.; World Health Organization, 2023). On occasions, a combination of the above-mentioned factors leads to a person being anemic, rather than an isolated factor. It may however also be related to injuries and the resulting blood loss due to too much bleeding. In that case, the original meaning of the ancient Greek word, lack of blood, is very much accurate. Also, other illnesses such as cancer, or the treatment thereof, may affect the red blood cell count and hence the production of hemoglobin (*Low Red Blood Cell Count (Anemia)*, n.d.).

One of the most prevalent causes of anemia across all demographic groups is iron deficiency, often resulting from malnutrition or inadequate dietary intake. Iron deficiency is widely recognized as a significant form of malnutrition globally. However, there is still a lack of agreement on the exact nature and severity of the health impacts caused by iron deficiency within communities (Aminul Islam Apu et al., 2024). Despite this, most experts agree that current public health and nutrition strategies are “ineffective at controlling iron deficiency in impoverished populations” (Aminul Islam Apu et al., 2024, p. 59). This issue is particularly concerning in children and infants, who are at a higher risk of life-threatening consequences due to iron deficiency. Additionally, children with iron deficiency are much more likely to develop behavioral problems and suffer from developmental delays.

Research has shown that in Europe for instance, lower socioeconomic status increases the likelihood of iron deficiency and hence the prevalence of anemia. Conversely, in Denmark, only 4% of women of reproductive age, one of the most vulnerable groups to anemia, are

affected by the condition. This can be linked to the high welfare, quality of life and nutrition in a highly developed country (Milman, 2011). On the other hand, 26% of 10-month-old French infants from socioeconomically disadvantaged families were found to be iron deficient, compared to 10% of infants from more affluent households. Additionally, the type of milk consumed by infants also influenced the prevalence of iron deficiency. Among Turkish infants aged six months, those who were fed human milk or formula had an iron deficiency rate of 3-4%, while 25% of infants who consumed cow's milk were iron deficient (Aminul Islam Apu et al., 2024).

Closely associated with iron deficiency are deficiencies in vitamin A, folate, vitamin B12, and riboflavin, as these essential nutrients are also obtained through diet (World Health Organization, 2023).

1.3 Symptoms

Anemia manifests through a range of symptoms, including fatigue, reduced physical work capacity, and shortness of breath, and is typically an indicator for poor nutrition and underlying health issues. Common, non-specific symptoms associated with anemia include chronic tiredness, dizziness or light-headedness, cold extremities, headaches, and shortness of breath, particularly during physical exercise. In more severe cases, anemia can lead to more pronounced symptoms such as pale mucous membranes (including those in the mouth and nose), pallor of the skin and under the fingernails, rapid breathing and heart rate, dizziness upon standing, and an increased tendency to bruise easily (World Health Organization, 2023).

1.4 Treatment and Prevention

The treatment and prevention of anemia are closely tied to addressing its underlying causes, with several effective strategies available. Dietary modifications can play a crucial role in reducing anemia, particularly by incorporating foods rich in iron, folate, vitamin B12, vitamin A, and other essential nutrients. Maintaining a healthy, balanced diet with a variety of

foods is also beneficial. In some cases, taking supplements, as recommended by a qualified healthcare provider, can further aid in the treatment and prevention of anemia (World Health Organization, 2023).

In the Western world, there has been a significant focus on preventing iron deficiency through public awareness efforts and dietary modifications that enhance children's access to iron. These initiatives aim to reduce the prevalence of anemia by ensuring that children receive adequate nutrition and the necessary supplements to support their overall health (Aminul Islam Apu et al., 2024).

1.5 Situation in Peru

Childhood anemia remains a significant public health issue in Peru, as reflected in both the current situation and historical trends. According to recent data, 40.1% of children aged 6 to 35 months suffer from anemia, impacting nearly 700,000 children under three years old out of a total of 1.6 million nationwide (Ministerio de Salud, 2020). A particularly high prevalence of anemia can be found in the Andean region, where 38.6% of children under three years are affected. Chronic malnutrition, especially in rural areas, makes this issue worse. Iron deficiency is the most common cause, but other factors, such as deficiencies in folic acid, vitamin B12, and inflammatory conditions, also contribute. This statistic has prompted the Peruvian government to set a goal of reducing the anemia rate to 19% by 2021 (Tokumura et al., 2023).

Current situation of anemia
prevalence of anemia in children under 6 to 35
months by regions

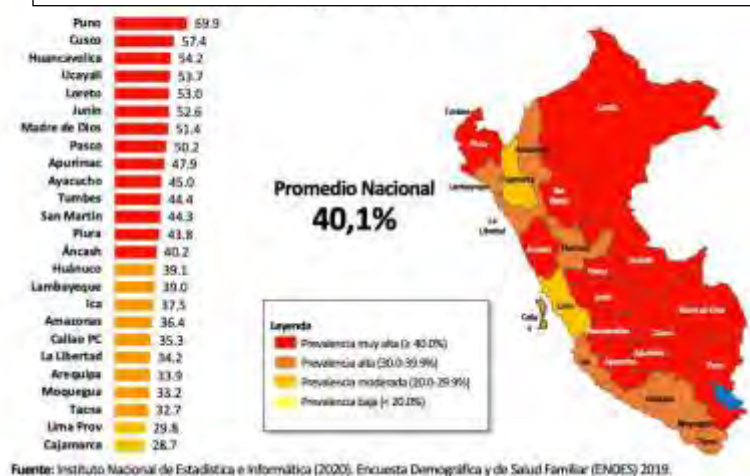


Figure 1: Anemia in Peru by Regions

This chapter outlined the issue of childhood anemia in Surco, Lima, with a specific focus on primary school children. Anemia, primarily caused by insufficient red blood cells or hemoglobin, hinders oxygen delivery to the body and disproportionately affects young children, particularly in developing nations like Peru. Key contributing factors such as nutrient deficiencies, malnutrition, and chronic diseases were examined. The chapter also discussed the widespread impact of anemia on children's school performance, overall health, and future economic productivity. Various prevention and treatment strategies, including dietary changes and supplementation, were explored. Ultimately, these insights underscore the need for targeted interventions to combat childhood anemia and improve long-term outcomes in affected communities.

Chapter II. User and Customer

2.1 User Profile

Gustavo represents the meta user for this study, which focuses on primary school children in Surco, Peru, who may be affected by anemia. He is a child between the ages of 6 and 12, enrolled in a public school, and comes from a low to middle-income family. Gustavo lives with his parents and siblings in the municipality of Surco. His socio-economic background influences his dietary habits, which lack sufficient iron and essential nutrients due to economic constraints, lack of other resources and his family's limited access to healthcare.



Figure 2: Meta User Canvas

2.2 Demographics

Gustavo is part of a demographic that is particularly vulnerable to nutritional deficiencies, including anemia. His age group (6-12 years old) is critical for physical and cognitive development. He represents children of all genders from low to middle-income families, where economic limitations often lead to dietary patterns that are insufficient in iron and other vital nutrients. Additionally, the family's limited access to healthcare exacerbates the challenges of addressing anemia effectively.

2.3 Social Circles and Family Influence

Gustavo's social environment includes his peers at school and in the playground, as well as his immediate and extended family. His parents are the primary source of information and decision-making regarding food and nutrition; however, their choices are sometimes constrained by their overworked schedules and the need for convenient, readily available food options. Hence, Gustavo's diet lacks important micro and macro nutrients. Gustavo's parents, like many others in his community, may resort to inexpensive, easily accessible food, which often lacks the nutritional quality necessary to prevent anemia.

2.4 Activities and Beliefs

Gustavo is active throughout the day, enjoying playtime, especially in the afternoons. He attends school regularly, where he spends time with friends and engages in recreational activities, with the playground being a favored spot. Food is viewed primarily as a source of energy; Gustavo has a preference for snacks and sugary foods, with less developed taste for vegetables and other nutrient-dense, healthy options. His beliefs about food are shaped and reinforced by his family members, which can occasionally lead to misconceptions about the nutritional value of various foods. Given his young age, Gustavo himself has limited knowledge about health and nutrition, which contributes to a distaste for healthy food options.

2.5 Problems and Challenges

Not only is Gustavo too young to know about health and nutrition, but the decision-making power regarding his diet also lies outside of his control, heavily influenced by his parents' choices and economic limitations. The accessibility of healthy food is a significant issue, as is the general distaste for such foods. Gustavo's family may lack the knowledge or resources to provide a diet rich in iron and other essential nutrients, resulting in a higher risk of anemia. Furthermore, the common misconceptions about food and its nutritional value within the family may hinder efforts to improve his diet and health outcomes.

2.6 User Experience Map

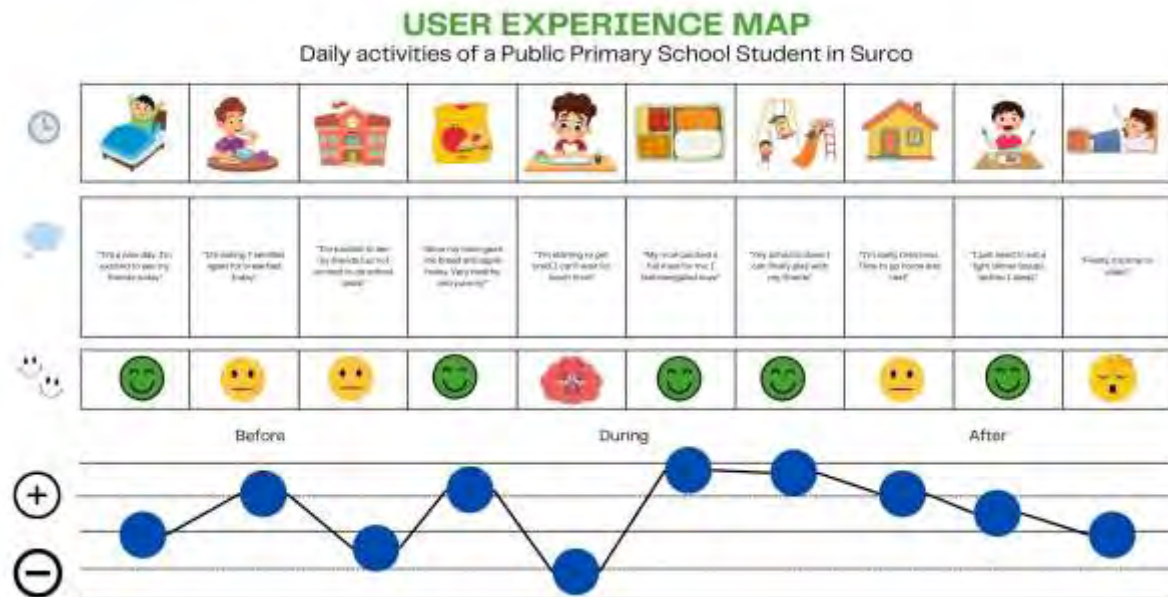


Figure 3: User Experience Map

The User Experience Map in figure 3 outlines the daily activities of a public primary school student in Surco, who is the primary user. The map captures both positive and negative experiences throughout the day.

2.7 Positive Moments in a Student's Day

The student's day begins positively, with an expressed excitement about seeing friends at school. This initial joy and enthusiasm highlight the importance of social connections which are fostered at school and are crucial for a child's development. Upon arriving at school, the student continues to feel happy, further emphasizing that social interactions significantly contribute to their satisfaction with the school environment. Another positive experience can be observed during the lunch period when the student is pleased with the meal provided by their caregiver, describing it as healthy and satisfying. This moment highlights the role of proper nutrition in enhancing mood and energy levels. Noted, this is an ideal scenario in which the student's caregiver have the resources to provide a nutritious lunch. Additionally, the completion of the school day and subsequent playtime with friends provide another source of

joy. Recreational activities are essential for the student's well-being and balances out the stress a student might experience in an academic setting. In the evening, the student seems happy with the light dinner option before bedtime. This suggests that a simple and comforting meal can contribute to a sense of satisfaction at the end of the day without being overly hard on the body. The day concludes positively, with the student looking forward to sleep, indicating a sense of relaxation and fulfillment of daily routines.

2.8 Negative Moments in a Student's Day

On the other hand, the student also experiences several negative moments throughout the day. One such moment is during breakfast, where the student expresses dissatisfaction with the monotony of having the same meal again. A monotonous breakfast is not only boring for the child in question but may also contribute to malnutrition. This lack of variety may also reduce enthusiasm at the start of the day. A noticeable decline in the student's mood occurs when thinking of school assignments. The student begins to feel fatigued before lunch and raises concerns about their energy levels during the school day. This fatigue may result from the student's overwhelming schedule or that they are not getting sufficient resting periods. Furthermore, in the afternoon upon returning home the student reports feeling very tired which suggests that the day was physically and mentally straining.

The analysis of these experiences reveals significant fluctuations in the student's mood and energy levels throughout the day. Social interactions and meal satisfaction emerge as key positive factors contributing to the student's overall well-being. However, negative experiences related to meal monotony, academic engagement, and fatigue suggest that there are areas requiring targeted interventions. To improve the student's daily experience, strategies such as diversifying meal options, introducing more engaging and interactive school tasks, and ensuring adequate opportunities for rest and relaxation should be considered. These changes

could contribute to enhanced well-being and academic performance, leading to a more balanced and fulfilling daily routine for the student.

2.9 Users' Needs

As identified in the analysis of the meta user canvas and user experience journey above, the primary need for the user, the primary school students in Surco, is the sufficient intake and absorption of iron through dietary choices. This is supported by not only the high prevalence of anemia in the community, but also by the daily activities and challenges and problems of the user. One key theme that stands out is the distaste for healthy, iron rich food options paired with the economic and time constraints of the user's caregivers. This is exacerbated by misconceptions and wrong assumptions about nutrition. Consequently, those needs and challenges were put at the center during the product development process.

In this chapter, the analysis of the meta user, shows the significant challenges faced by primary school children in Surco, Peru, regarding anemia and malnutrition. The chapter highlights the important role that socio-economic constraints, limited healthcare access, and misconceptions about nutrition play in leading to unhealthy dietary habits. The user experience map provided insights into the positive and negative moments in a child's daily routine, with a particular focus on the need for improved iron intake. These findings underscore the importance of addressing both the nutritional deficiencies and the broader socio-economic factors affecting children's health. The solution, therefore, must prioritize accessible, nutritious food options while addressing gaps in nutritional education for both children and their caregivers.

Children's food preferences are essential in shaping their eating habits, with studies showing that repeated exposure to specific foods increases the likelihood of their acceptance. Preferences often align with cultural norms, yet there's significant variability within the same culture. Family influence, particularly from parents, plays a role, although research indicates

that the correlation between parent and child preferences is often modest. Exposure to flavors begins in the uterus already and continues through breastfeeding, and repeated exposure to a variety of foods, especially during early infancy, enhances acceptance (Skinner et al., 2002). Children may not immediately like the taste of some vegetables due to their natural preference for sweet flavors and dislike for bitter or sour tastes. This can be overcome by introducing a variety of healthy foods early, around 7 to 8 months, to further develop a baby's taste preferences. Persistence is here key, as children may need multiple attempts before accepting new foods. In fact, it has been reported that it may take up to 15-20 attempts before a child accepts a new food (Healthy Eating Research, 2021).

A way to overcome this behaviour is by pairing vegetables with familiar tastes or setting a good example by the caregivers when eating vegetables themselves. Picky eating is common, but caregivers should remain patient, offering a variety of foods without pressuring children to eat. According to Healthy Eating Research (2021), this way, children become more accepting towards new tastes and flavor profiles.

Food neophobia, which is the correct expression for the reluctance to try new foods, is common in young children, but it decreases with age and repeated exposure. Studies have shown that pairing new foods with familiar ones can improve acceptance (Skinner et al., 2002). Parental modeling and environmental factors, such as school meal programs and peer influence, also impact children's food preferences. Additionally, temperament traits like emotionality and impulsiveness can affect food neophobia and preferences, with children exhibiting neophobic tendencies being less willing to try new foods.

Chapter III. Product Design – Solution

Product design is defined as the process of imagining and creating products that solve user problems in a given market (Baxter, 2018). In this case, the group is addressing childhood anemia in the district of Surco, which requires a strategic and iterative approach where agile methodologies and user needs are reflected. In this chapter, the solution formulation process will be developed using agile methodologies, with an approach that covers from the initial stages of the product to the final iteration that will result in the minimum viable product (MVP).

3.1 Conception of the Product

The process of product conception began by identifying the social problem that needs to be addressed, in this case, anemia among public primary school children in Surco. This group consists of children from 6 to 12 years of age who attend public schools and who, due to economic constraints, have a diet deficient in iron and other essential nutrients (Martínez-Salgado et al., 2008). Thus, this was the focus of our ideation. Furthermore, according to the World Health Organization, it is important to highlight that this public health problem has a significant impact on school performance and quality of life of children, which underlines the urgency of an effective intervention (World Health Organization, 2023).

As a result, it was proposed to interview parents and students to better understand the reality in which they find themselves. For this reason, it was decided to visit the district of Surco, which was identified as a key point to address this situation. Likewise, 20 surveys were carried out, both with children and parents to know their needs and knowledge about anemia.

To generate as many ideas as possible, brainstorming sessions were held, based on Design Thinking principles, which allowed for a diverse and enriched brainstorming. According to IDEO U (n.d.), brainstorming is effective in fostering creativity and exploring all possible perspectives in the team during the initial phase of product development. During these sessions, multiple approaches were considered, from educational programs to fortified food

products, all aimed at improving iron intake in affected children. The idea that was finally selected was the creation of an iron-fortified soup mix, due to the outcome of a cost-impact matrix analysis, which evaluated the feasibility, cost and potential impact of the different solutions. From this analysis, soup mix stood out as the most viable option due to its low cost and potential to improve iron intake in a broad population of children.

This approach also considered the cultural preference for soup in Peru, where this food plays an important role in the daily diet. According to studies and data from Ministerio de Salud and EsSalud, soup is a familiar food, widely consumed and valued for its ability to incorporate a variety of essential nutrients in an accessible and easy-to-prepare meal (EsSalud, 2020). This feature is ideal for supplying nutrients such as iron, especially in vulnerable populations such as children suffering from anemia.

During the ideation process, multiple potential solutions were explored to complement the core product idea (as seen in Table 2 below), ranging from the implementation of continuous monitoring of children's nutritional health by school nutritionists and the use of hemoglobin monitoring devices such as smart watches, to the creation of school talks that promoted nutrition by offering iron-rich foods in the cafeteria and the organization of interactive cooking classes. All these ideas served as the basis for developing the product and associated strategies.

	Cost			Impact		
	Low	Mid	High	Low	Mid	High
Iron-rich mixes/seasoning/powder		x				x
Sponsorship program where local businesses or individuals can "adopt" a child's healthcare needs (covering costs for personalized medical services)		x				x
micro lessons on nutrition sent to caregivers on Whatsapp in regular intervalls	x				x	
weekly comic in school newspaper where kids obtain knowledge about food e.g. supermarket detectives	x				x	
Health Champions Week as a school-wide initiative that promotes nutrition and well-being through themed daily activities, a Health Champions Challenge, expert-led workshops, and community involvement		x			x	
Health watches/fitness trackers that can measure hemoglobin levels (using sensors on the skin and light-based technology)			x			x

Table 2: Cost-impact Matrix

Subsequently, the chosen idea generated was subjected to a prioritization and refinement process through agile sprints. Each sprint, which was characterized by rapid development and feedback cycles, allowed for continuous iteration of the soup mix based on direct feedback from users, in this case, children and parents. In this iterative approach, as noted by Mehansho (2002), it is critical in user-centered product development, particularly in public health, where effectiveness and user acceptance are important. During prototype testing, interviews were conducted with both children and their parents to obtain valuable feedback on the product.



Figure 4: Initial product

From this, results revealed that the product was attractive but required some improvements such as instructions on its preparation, as well as the inclusion of recipe suggestions that would optimize the iron content through the addition of ingredients such as chicken and vegetables rich in Vitamin C. In addition to innovative ideas, proposals emerged such as incorporating interactive educational elements into the product's narrative, such as games and videos that would teach children the importance of a balanced diet. However, beyond these components, feedback was also received that emphasized that the product should be affordable and accessible to families. This consideration was integrated into the product feedback diagram, underscoring the importance of balancing innovation with the need for the product to be economically viable and readily available to the most vulnerable communities.

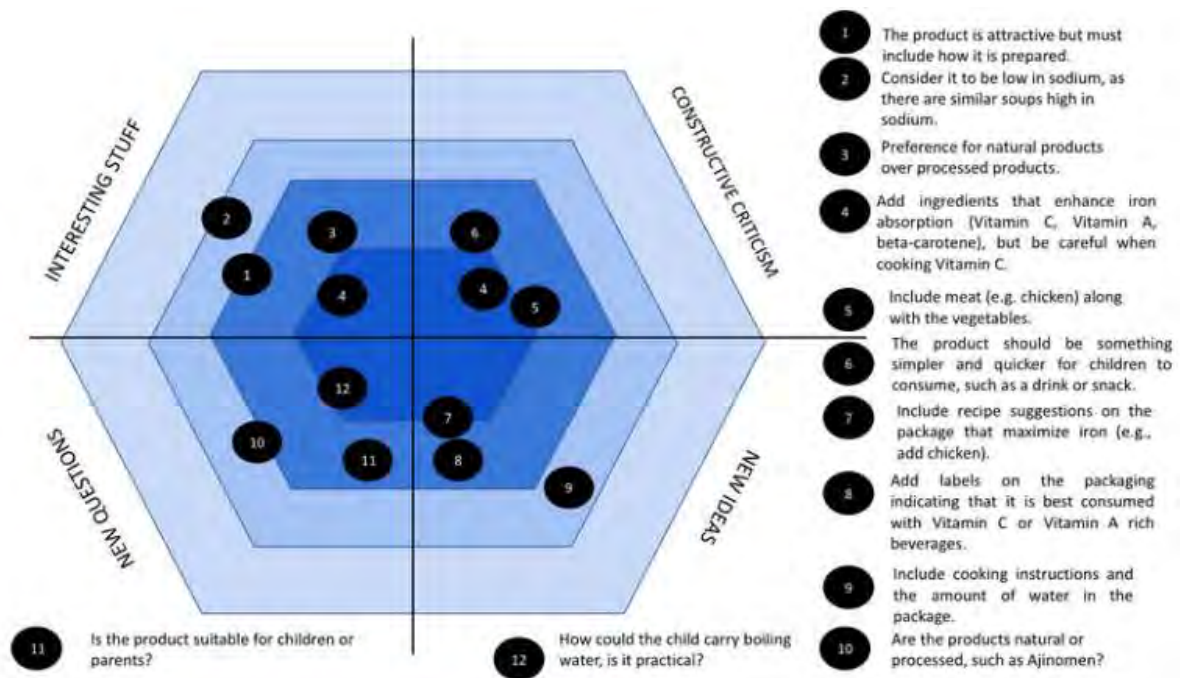


Figure 5: Product Feedback Diagram

3.2 Development of the Narrative

The product narrative, which encompasses both the value proposition and the story behind it, was developed using key tools such as the Value Proposition Canvas. This tool is fundamental to ensure that the solution was aligned with the needs and expectations of the users. It also began with the identification of the “day-to-day” needs of the users, in this case, the parents, who had to ensure adequate nutrition for their children and combat anemia. In addition, they identified the joys parents experience in seeing their children healthy, as well as the frustrations they face due to economic constraints, which prevent them from providing adequate nutrition. through the observations gathered during the interview and feedback process, parents highlighted the importance of having clear and accessible information about the preparation of the product, as well as understanding how it contributes to improving their children's health. Not only did they value this clarity, but they also highlighted the need for the product to be affordable and easily accessible, ensuring that it could be seamlessly integrated into their daily routines

These observations were important in developing support materials, such as suggested recipes and guidelines on how to maximize iron absorption, as seen in the following image.

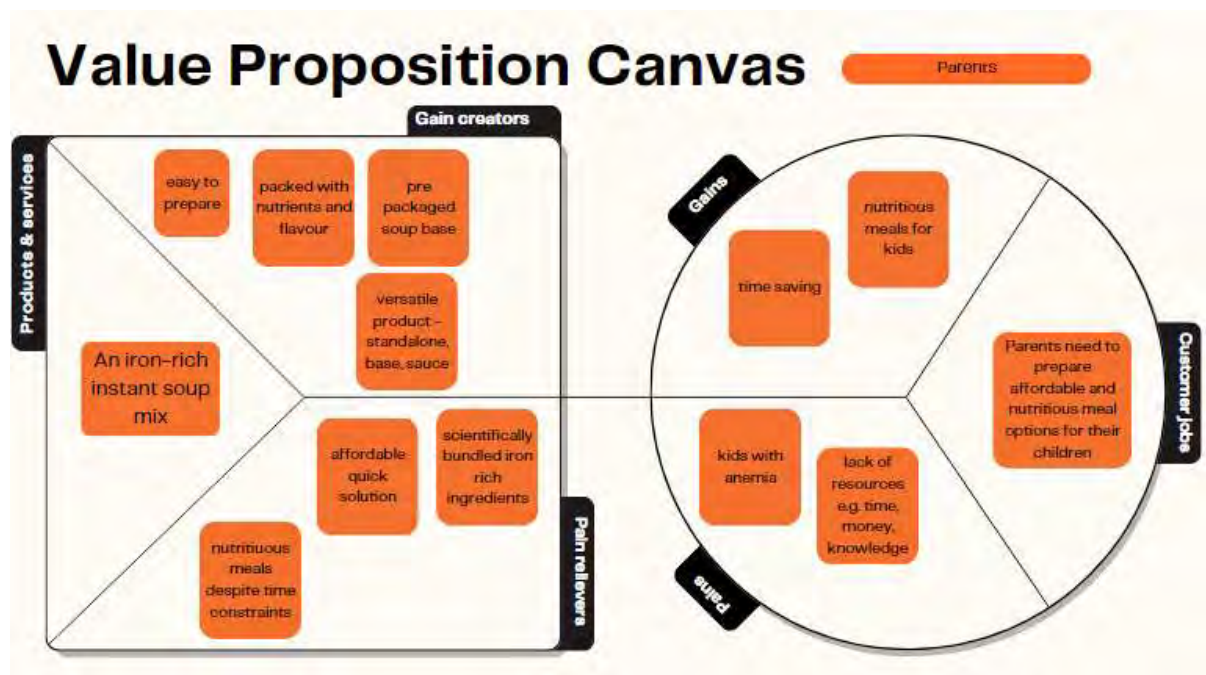


Figure 6: Value Proposition Canvas - Parents

3.3 Innovative and Disruptive Nature of the Product

The fortified soup mix is presented as an opportunity and effective solution to the problem of childhood anemia, positioning itself as a significant innovation in the field of child nutrition. To justify its innovative character, comments were collected through interviews with various stakeholders, such as the Municipality of Surco, children and their parents. First, the Municipality of Surco highlighted that, despite not having a budget for this type of initiative in the implementation of health programs, they welcomed the proposal of the fortified soup mix due to its low cost and potential positive impact on the community of Surco. In addition, during the interviews, some parents, who were also health professionals, expressed their support for the product, stressing the importance of an affordable and accessible solution for low-income families. They pointed out that, being fortified with iron, the soup mix would contribute significantly to combating childhood anemia in a practical way.

On the other hand, this feedback allowed us to identify the limitations of existing products and programs, such as Qaliwarma and Loncherita Surcana, implemented in previous years by the Ministry of Development and Social Inclusion and the Municipality of Surco, respectively. Despite the efforts made, both programs face challenges that have limited their long-term effectiveness. The Qaliwarma program, for example, faces logistical and budgetary constraints that affect both the continuity of food delivery and the quality of the products. In addition, the lack of exhaustive monitoring has been pointed out that would allow an accurate assessment of its impact on children's nutritional health in the long term. Dependence on external suppliers and the shortage of trained personnel in some regions have also complicated the program's sustainability. For its part, Loncherita Surcana has been more limited in scope and has depended on the allocation of variable annual budgets, which has led to a lack of continuity in its implementation. Although this initiative seeks to promote better nutrition among local children, its approach has been reactive rather than preventive, and has lacked a comprehensive strategy that incorporates both food provision and nutrition education. In addition, Loncherita Surcana has faced criticism for not adapting to cultural food preferences, and for offering products that, although nutritious, are not easily accepted by all families.

In the Peruvian market there are also products designed to combat childhood anemia, such as Nutri H, a powdered supplement distributed by the Ministry of Health, which, although effective, has faced acceptance barriers due to its format and taste. Another example is Quinoa and Kiwicha Bread, promoted in some localities as a source of iron, but which has not reached mass distribution. The 'sangrecita', a natural source of iron from cooked chicken blood, is another product promoted by the State, but its consumption has been limited due to cultural barriers. Likewise, the supplement Hierro Polvo faces similar challenges to Nutri H in terms of its continued use and acceptance by families.

These alternatives, while valuable, have failed to provide a comprehensive and sustainable long-term solution. In contrast, the fortified soup mix provides a highly nutritious and culturally accepted food, in turn encouraging long-term healthy eating habits. Its low cost and ease of preparation ensure that it can be accessible to the most vulnerable families, positioning it as a viable and disruptive solution in the fight against childhood anemia.

3.4 Value Proposal

The product's value proposition focuses on directly addressing the “frustrations”, “joys” and “jobs” of the users, while at the same time generating clear long-term benefits for the health of the students. Based on this, through ideation sessions and using the Value Proposition Canvas, it was identified that parents, facing childhood anemia, are looking for solutions that are accessible, effective and do not require drastic changes in their daily routines.

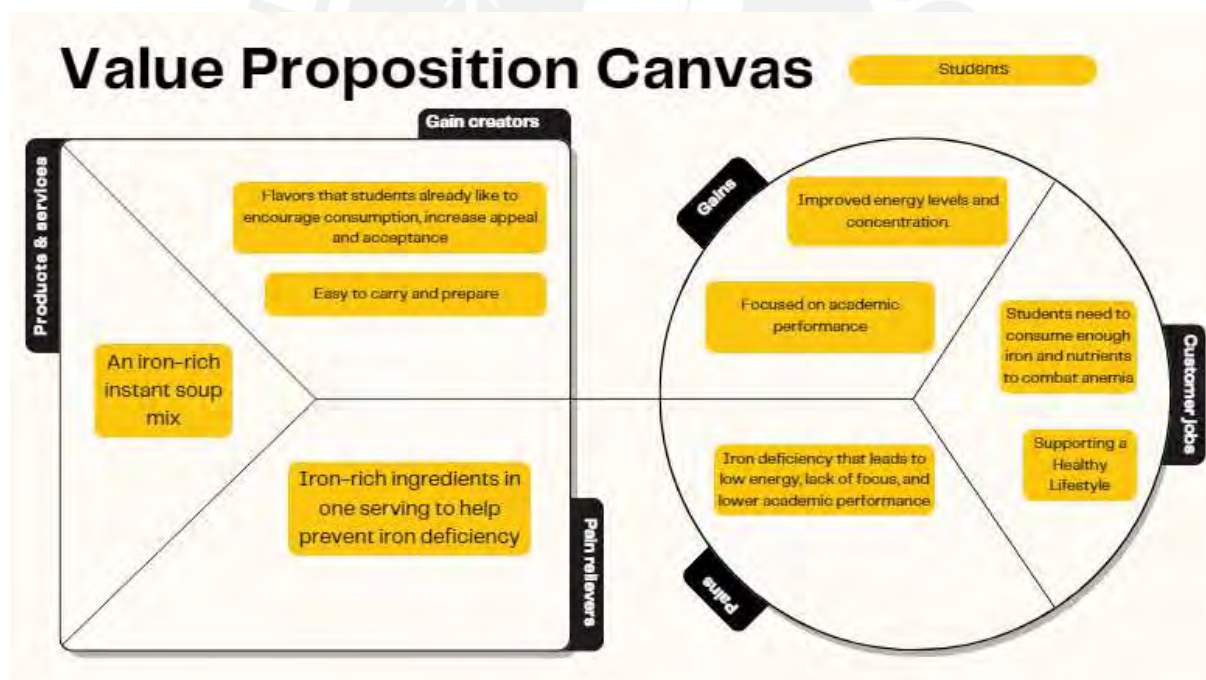


Figure 7: Value Proposition Canvas - Students

According to the interviews conducted, among the main frustrations of parents are the difficulty in accessing nutrient-rich foods due to economic constraints and concern for their children's health. On the other hand, “joys” emerge when parents observe improvements in their children's health and well-being, which gives them peace of mind and satisfaction. For

that reason, the soup mix alleviates these frustrations by being an affordable, easy to prepare and highly nutritious product, facilitating its integration into the daily lives of families, in addition, it generates tangible benefits by visibly improving the health of elementary school students. This fit between the solution and the needs of the users was key to ensuring the effectiveness and acceptance of the product.

3.5 Minimum Viable Product (MVP)

The development of the Minimum Viable Product (MVP) was the result of an iterative process involving several user tests. Each development cycle allowed adjustments to be made to the product based on the feedback received. In accordance with our objectives, the design must ensure that it meets the criteria of desirability, feasibility and viability. The PMV includes an easy-to-use nutritional solution targeted at primary school children suffering from anemia. This iron fortification is a key strategy to address iron deficiency, this product ensures that it is effective in terms of health and used for replication in the Peruvian community.

The product will be part of Ajinomoto's non-profit Corporate Social Responsibility (CSR) lines, with a focus on accessibility for low-income families. The main revenue stream will come from the sale of the iron-fortified soup mix, which will cost 1 sol per sachet. All income generated from sales of the product will be reinvested in production, ensuring the long-term sustainability of the project and benefiting not only the community of the Surco district, but also other vulnerable communities.

In addition, Ajinomoto, through its Open Innovation Initiative, will guarantee the production of a high quality and nutritious soup mix, taking advantage of Ajinomoto's years of experience and technology, ensuring that the product meets the highest quality standards. It is important to mention that, although the municipality of Surco will cover the costs of the initial trials, the families will have to assume the cost of the product once the pilot phase is completed,

for this reason, this model guarantees that the solution will be affordable, sustainable and scalable in other communities in the country. Our final product is seen below.



Figure 8: Final Product

The fortified soup's packaging design includes clear and accessible nutritional information, highlighting the iron content to combat anemia. In addition, the simple and attractive visual design reinforces the confidence of the Peruvian consumer and ensures that the product is perceived as nutritious and easy to prepare. It should be noted that the preparation process is simple as can be seen in figure 9:

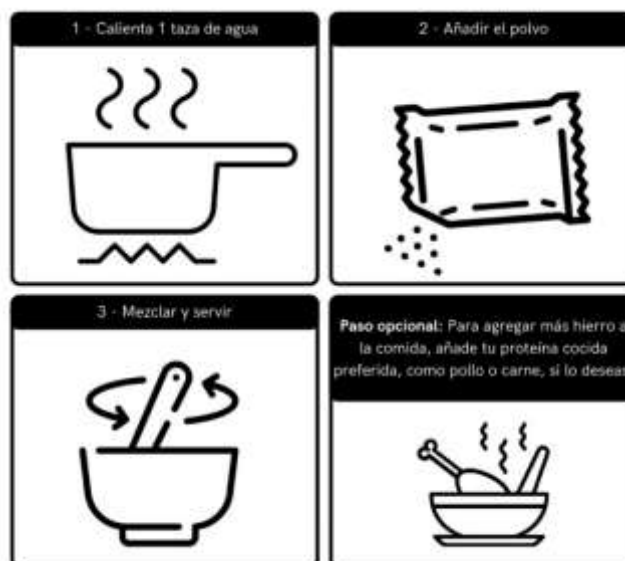


Figure 9: Preparation process

The image shows the simple steps to prepare the fortified soup, and it was designed so that families, regardless of their resources or cooking skills, can easily incorporate the product into their daily meals.

Finally, this iteration process identified and addressed potential economic barriers and will ensure that the product is efficient and well received by elementary school students and parents in the Surco district. This agile, user-centered approach has allowed us to adapt the product with potential for replication in other contexts where childhood anemia is prevalent.

In this chapter, a comprehensive approach to address childhood anemia in Surco, Peru, has been developed through the design of an innovative product, which is an iron-fortified soup mix. In addition, the conception and development of the Minimum Viable Product (MVP) was detailed, highlighting agile methodologies to adjust the product based on user feedback. The analysis of the problem revealed the importance of a solution that was easy to incorporate into the daily routine of families, responding to the socioeconomic and educational constraints that hinder their health and well-being, furthermore, allowed us to identify the creation of a value proposition aligned with the expectations of parents and students.

Chapter IV. Business Model

4.1 Business Model Canvas

The business aims to address childhood anemia among public primary school students in Surco by developing an iron-rich instant soup mix. The product will be developed in collaboration with Ajinomoto—a Japanese multinational food and biotech company that produces seasonings, instant noodles, and soup mixes among other things—to leverage their expertise in nutrition and food technology. The soup mix is designed to be both nutritious, palatable to children, and easy to make to encourage consumption and to stray away from the mindset that healthy food is time-consuming and unappealing to kids. The primary customers of the product will be both parents and schools or cafeterias as they are responsible for the preparing and serving the meals of the target beneficiaries. The product's affordability and accessibility are key considerations, making it suitable for low-income households. In pursuing this project, the key activities that the municipality of Surco will undertake are product development and marketing in partnership with Ajinomoto, distribution management, and effectiveness testing to assess the soup's impact on anemia. Revenue generation for this business will primarily originate from the sales of the instant soup mix with each sachet costing around one sole, and costs will originate from product development and production, and other costs associated with the key activities of the enterprise. Since professional expertise, food technology, and machinery will be required to produce the soup mix, Ajinomoto would have to charge for the product at a very minimal price. However, this product could be part of Ajinomoto's not-for-profit line wherein the revenue they receive from product sales will only be reinvested into the production of the same product line. By combining the nutritional benefits of the product, its taste, affordability, and accessibility, the business aims to make a significant impact on the health and wellness of the public primary school students of Surco, and eventually of the children of Peru.

Key Partners	Key Activities	Identified Problem	Customer Relationships	Customer Segments
<p>Ajinomoto: Partners for product development and creation.</p> <p>Primary Schools: For distribution and raising awareness</p> <p>Government Units: For distribution and awareness</p> <p>Health Institutions: For impact testing</p>	<p>Product Development: In collaboration with Ajinomoto's Open Innovation Initiative for R&D and soup mix formulation</p> <p>Marketing and Awareness: Advertising and promoting the product</p> <p>Effectiveness Testing: Hemoglobin testing to see impact of soup mix in reducing anemia</p>	<p>Iron-deficiency anemia among public primary school students in Surco</p> <p>Purpose</p> <p>To combat iron-deficiency anemia among public primary school students in Surco through a nutritious, iron-rich instant soup mix</p>	<p>Educational Programs: Educating the community about the benefits of the soup mix through engaging programs, brochures, or lectures.</p>	<p>Primary Segment <i>Schools/Cafeterias:</i> Bulk purchasers to serve the soup mix to students <i>Parents:</i> Purchasers to prepare at home</p> <p>Secondary Segment <i>Local Government Units/Public Health Groups:</i> Bulk purchasers, to serve or to distribute to local schools or households</p> <p>End-Users <i>Public Primary School Students:</i> Ultimate consumers, main beneficiaries of the iron-rich soup mix.</p>
	Key Resources	Value Proposition	Channels	
	<p>Partnership with Ajinomoto: Provides access to company's knowledge, expertise, and facilities</p> <p>Supply Chain: Reliable suppliers</p>	<p>Nutritional Solution: Iron-rich</p> <p>Affordable and Accessible: Low-cost and available in local markets</p> <p>Easy to prepare</p> <p>Yummy for Kids: Designed to be appealing to children to encourage consumption</p>	<p>Retail Sales: Local stores and supermarkets</p> <p>Direct Distribution (i.e. Feeding Programs): Partnership with organizations focused on addressing iron-deficiency anemia</p>	
Cost Structure		Impact Metrics	Revenue Streams	
<p>Product Development/Production: Costs associated with creating, formulating, testing, and producing the product.</p> <p>Marketing: Promoting and advertising the product.</p> <p>Distribution: Logistics and delivery of the product.</p>		<p>Percentage of students with anemia: Analyzed through hemoglobin testing</p> <p>Product Adoption: Number of purchases</p>	<p>Sale of Product: The main source of revenue will originate from the sales of the iron-rich instant soup mix which costs around 1 soles per sachet. The product will be part of Ajinomoto's non-for-profit product lines and revenue from the sales of product will be reinvested in production.</p>	

Figure 10: Business Model Canvas

The marketing strategy will use a combination of digital and face-to-face channels, leveraging social networks and campaigns in public schools and health centers. The primary target audience will be low-income parents, who will be reached through educational workshops in schools, informational brochures and campaigns in collaboration with local municipalities. Marketing messages will focus on the product's nutritional benefits, ease of preparation, and affordability to change the perception that healthy foods are expensive or difficult to prepare. The marketing campaign will rely on a combination of social media ads (Facebook, Instagram, Whatsapp, Tiktok), educational workshops in schools, and success stories from families who have already used the product. Surveys will be conducted before and after campaigns to measure shifts in parents' perception of the importance of iron-rich nutrition and the accessibility of the product.

In addition, educational materials will be developed for parents and teachers, explaining the importance of iron in children's diets, along with testimonials from families and communities that have seen improvements in their children's health through consumption of the product.

In terms of distribution, the product will initially be distributed through public schools in the district of Surco, with the support of the municipality and the Ministry of Health. Alliances will also be established with local supermarkets and small distributors to ensure that the product is available in other districts and provinces. In the long term, direct sales through school feeding programs will be considered, allowing local governments to purchase the product in large volumes at a reduced cost. Ajinomoto's existing distribution network will be key to ensuring that the product reaches different markets in Peru, leveraging its established infrastructure and relationships with trusted retailers.

4.2 Financial Viability of the Business Model

Cognizant of the budgetary restrictions of the Municipality of Surco, the business will be implemented through a strategic partnership with Ajinomoto. Currently, Surco's funds are only sufficient for anemia testing, hence a partnership will be necessary. Ajinomoto's Open Innovation Initiative encourages collaborative efforts that leverage their Client Innovation Center. This collaboration will ensure the production of a high-quality, nutritious soup mix through leveraging the years of expertise and technology of Ajinomoto. With a population of approximately 4,500 elementary school students in Surco, distributed in 6 grades with 3 sections per grade and 25 students per section, the initial target market is clear. Assuming that each student would consume one serving of fortified soup per day, the projected demand for this group amounts to 4,500 units per day. Considering 180 school days per year, annual consumption would be 810,000 units in Surco alone. In an initial phase, it is expected to reach an adoption rate of 30%, which would represent 243,000 units per year, generating a potential income of 243,000 soles per year.

The production cost of each sachet of soup is estimated at 0.50 soles, and the selling price at 1 sol per sachet, which would give a gross margin of 0.50 soles per unit. With a projected initial production of 100,000 units per year, a gross income of 100,000 soles would be generated. As the project expands beyond Surco, sales are expected to grow by 10% annually, reaching 150,000 units by the third year, with projected revenue of 150,000 soles. Marketing and distribution costs are estimated at 20,000 soles per year, allowing the project to continue generating net income and contributing to its sustainability. The break-even analysis indicates that, considering the fixed costs associated with production and distribution, the project will reach profitability after the sale of approximately 60,000 units.

The partnership is expected to be structured in a way that Ajinomoto takes the lead in R&D, production, and marketing activities while the municipality of Surco will take charge of

effectiveness assessments among public primary school students. While this arrangement ensures the product's success, it is anticipated that Ajinomoto will retain a significant share, if not all, of the revenue given that they are covering the entirety of the associated costs. However, it will be proposed to Ajinomoto to include the product to their non-for-profit line to further minimize the price of the soup mix. Revenue from the sales of the products will be reinvested in the production of the instant soup mix, following a sustainable business model commonly practiced in the industry. This approach will ensure the financial viability of the business and its ability to deliver on its social impacts.

4.3 Scalability of the Business Model

The scalability of the business model is supported by Ajinomoto's scale and influence in Peru. The company already has an established relationship with trusted retailers across the country which will allow them to efficiently introduce the product to other cities and provinces, expanding its reach beyond Surco. Additionally, if the effectiveness assessments conducted by the municipality of Surco yield positive results, these findings can be shared with other municipalities. The favorable evidence can encourage other local governments to support and promote the product within their own localities, expanding the marketing presence and consumption of the iron-rich instant soup mix. The combination of Ajinomoto's extensive network and support from local government units will allow the business to scale and expand across the country, and potentially in other nations facing the same social challenges.

A potential risk in scaling the business is the reliance on local governments for distribution in new areas. To mitigate this, partnerships will be established with non-governmental organizations and private distributors already operating in rural and hard-to-reach areas. These partnerships will ensure consistent distribution and reduce dependence on public sector resources, providing a more resilient and adaptable distribution model across different regions.

4.4 Social Sustainability of the Business Model

The business model supports the improvement of current and future generations by promoting healthier lives. By focusing on addressing iron deficiency anemia among public primary school students, the business directly supports the United Nations Sustainable Development Goals (SDGs), particularly SDG 2: Zero Hunger and SDG 3: Good Health and Well-Being (United Nations, n.d.). Furthermore, the business model's key partner, the Ajinomoto Group, is also dedicated to working towards the same goal through their global initiatives aimed towards improving nutrition, ensuring sustainable food systems, and enhancing the quality of life for communities around the world (Ajinomoto Group, n.d.). The collaborative approach that involves local schools, government units, and health institutions ensures that the product and initiative are supported by community stakeholders, fostering social inclusion and shared responsibility. Additionally, by reinvesting profits into production and expanding the program to other municipalities, the business model not only sustains itself financially but also ensures a cycle of positive social impact, contributing to the achievement of SDGs 2 and 3, and making it a socially sustainable and globally responsible venture.

The social impact of the project will be measured through regular hemoglobin tests in students consuming the product. The results will be compared to a control group to assess the effectiveness of the fortified soup in reducing childhood anemia. Additionally, periodic surveys will be conducted with parents to measure product acceptance and long-term behavior changes, ensuring that the project not only improves health outcomes but also fosters lasting improvements in nutrition and dietary habits.

This chapter analyzed the financial viability, and social sustainability of a business proposal aimed towards addressing childhood iron deficiency anemia in the municipality of Surco through an iron-rich soup mix developed in partnership with Ajinomoto. The chapter emphasizes the importance of collaboration with Ajinomoto to ensure high-quality, low-cost

production, and scalability of the business proposal. In addition to this, the chapter enumerates the key roles, activities and responsibilities of each collaborator. Lastly, the chapter highlights the contributions of this enterprise to the community and its social sustainability as it fosters shared responsibility and advocates for SDGs 2 and 3.



Chapter V. Conclusion

This business research addresses the critical health issue of childhood anemia with a particular focus on public primary school students in Surco in Lima, Peru. Iron deficiency anemia is a crucial global problem that affects about 40% of young children in Peru who are prone to significant long-term consequences such as developmental delays, behavioral challenges, and decreased motor skills. Anemia is caused by a variety of reasons with the most common cause across demographic groups being iron deficiency which is widely recognized as a significant form of malnutrition globally. The treatment and prevention of anemia is closely tied to addressing the underlying causes and is currently being addressed around the world through dietary modifications, particularly by incorporating foods rich in iron, and other nutrients in daily meals or through supplements recommended by qualified healthcare providers. Although the prevalence of anemia in the province of Lima is lower compared to its more rural counterparts, addressing the issue in the capital of Lima is still crucial, as the positive spillover effects can favorably impact its neighboring provinces.

In addressing this pressing healthcare challenge, the researchers took a more user-centered approach, engaging in interviews and surveys with students, their caregivers, local government units, and healthcare professionals. This revealed crucial information about the end-users of the product and their preferences. Although there is high enthusiasm when it comes to addressing childhood anemia, engaging with the parents and caregivers of children highlighted some hurdles in doing so such as gaps of knowledge about nutrition, economic constraints, and dietary habits. By utilizing agile methodologies and incorporating feedback in every step of the development process, the researchers were able to achieve a solution that is not only effective in addressing the underlying causes of anemia but are also desirable and feasible for the target end-users.

Through this agile process, the researchers developed an iron-rich instant soup mix as a desirable, feasible, viable, scalable solution to address the problem.

- **Desirable:** The iron-rich soup mix addresses the market's key needs in addressing childhood anemia. It is affordable, accessible, easy to prepare, palatable for children, and most especially, offers high nutritional value. These characteristics makes it easier to incorporate into their daily routines and encourages widespread consumption.
- **Feasible:** The partnership with Ajinomoto Group and their Open Innovation Initiative, feasibility challenges such as the municipality's budgetary constraint, lack of technology and nutritional expertise in the production process are addressed. This ensures the development of a high-quality, iron-rich soup mix.
- **Viable:** The business model ensures a financial viability through charging an attainable price for each unit which will be reinvested in the production of the iron-rich soup mix. Furthermore, the business model encourages the involvement of other stakeholders such as schools, families, and healthcare groups, therefore promoting shared responsibility.
- **Scalable:** The combination of Ajinomoto's extensive network and support from local government units will give way for expansion across other provinces and localities in Peru.

Ultimately, this proposal contributes to the broader goal of improving public health in Peru through a tangible and scalable solution that is the iron-rich soup mix which aligns well with SDG 2: Zero Hunger, and SDG 3: Good Health and Well-Being. The product stands as a significant advancement in addressing childhood anemia and enhancing the well-being of Children in Surco with the potential to make a wider impact across the country.

Appendices

Appendix A: Consent Form



¡Hola!

Somos estudiantes de Centrum PUCP y estamos realizando entrevistas con estudiantes de primaria para recopilar información sobre la anemia, su impacto y posibles soluciones. **Esta investigación nos ayudará a diseñar intervenciones efectivas para abordar la anemia en los estudiantes de escuelas públicas.**

Su hijo/a completará un breve cuestionario sobre su salud y dieta. Adicionalmente, le haremos algunas preguntas de entrevista a usted sobre la salud y dieta de su hijo/a. Cada una tomará aproximadamente 15-20 minutos.

Toda la información recopilada se mantendrá confidencial y se utilizará únicamente con fines de investigación. Las respuestas de usted y su hijo/a serán anonimizadas, garantizando que sus identidades estén protegidas.

Al firmar a continuación, usted acepta permitir que su hijo/a complete el cuestionario y participe en la entrevista sobre anemia. Además, acepta participar en las preguntas de la entrevista.

Si tienes preguntas, puedes hablar con nosotros o pedirle a tus padres que nos envíen un correo a aldo.arellano@pucp.edu.pe

Aldo Arellano: _____

Fecha: JULIO 23, 2024

	Nombre del Padre/Madre	Nombre del Niño/a	Firma
1			
2			
3			
4			
5			
6			
7			
8			
9			

Appendix B: Signed Consent Form (Preliminary Interviews)



¡Hola!

Somos estudiantes de Centrum PUCP y estamos realizando entrevistas con estudiantes de primaria para recopilar información sobre la anemia, su impacto y posibles soluciones. Esta investigación nos ayudará a diseñar intervenciones efectivas para abordar la anemia en los estudiantes de escuelas públicas.

Su hijo/a completará un breve cuestionario sobre su salud y dieta. Adicionalmente, le haremos algunas preguntas de entrevista a usted sobre la salud y dieta de su hijo/a. Cada una tomará aproximadamente 15-20 minutos.

Toda la información recopilada se mantendrá confidencial y se utilizará únicamente con fines de investigación. Las respuestas de usted y su hijo/a serán anonimizadas, garantizando que sus identidades estén protegidas.

Al firmar a continuación, usted acepta permitir que su hijo/a complete el cuestionario y participe en la entrevista sobre anemia. Además, acepta participar en las preguntas de la entrevista.

Si tienes preguntas, puedes hablar con nosotros o pedirle a tus padres que nos envíen un correo a aldo.arellano@pucp.edu.pe

Aldo Arellano: _____

Fecha: JULIO 23, 2024

	Nombre del Padre/Madre	Nombre del Niño/a	Firma
1	Margala Elina Chaponin	Camela Perach	<i>[Signature]</i>
2	Juan Gutierrez Sanchez	Johan Zarale	<i>[Signature]</i>
3	Peruvia Songoma Pios	ALEJANDRO	<i>[Signature]</i>
4	Julia Morales Cande.	Gustavo	<i>[Signature]</i>
5	Leonarda Jose Perumano	Auroora	<i>[Signature]</i>
6	Narda Yuste Carlos M.	Krionna, Sonny, Asi	<i>[Signature]</i>
7	Keila Chugnas Viscaino	Colegio Alfonso Ugarte	<i>[Signature]</i>
8			
9			

Appendix C: Interview Question

date

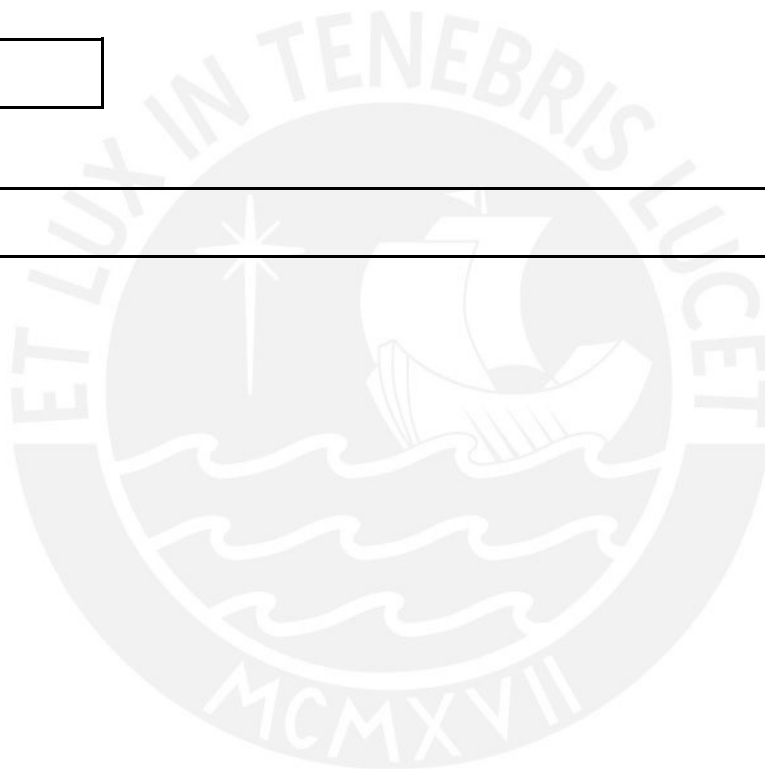
Personal information

First Name

Participant Nr.

Age

Name of school



Daily Routine

Describe a regular day, from waking up to going to bed? Please include everything you do, like waking up, going to school, playing, and especially when you eat your meals like breakfast, lunch, and dinner.

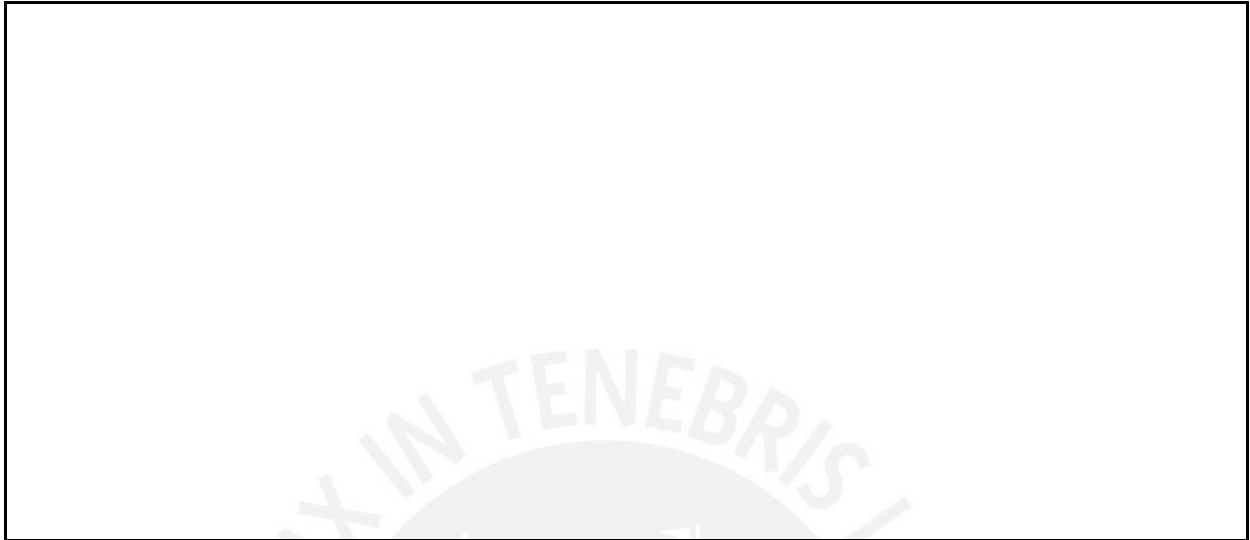


What time of the day do you start to feel tired?



Eating Habits

Can you draw how eating makes you feel? How does your body react to food?



How many times do you eat in a day?

What do you usually eat and drink for:

Breakfast

Snacks

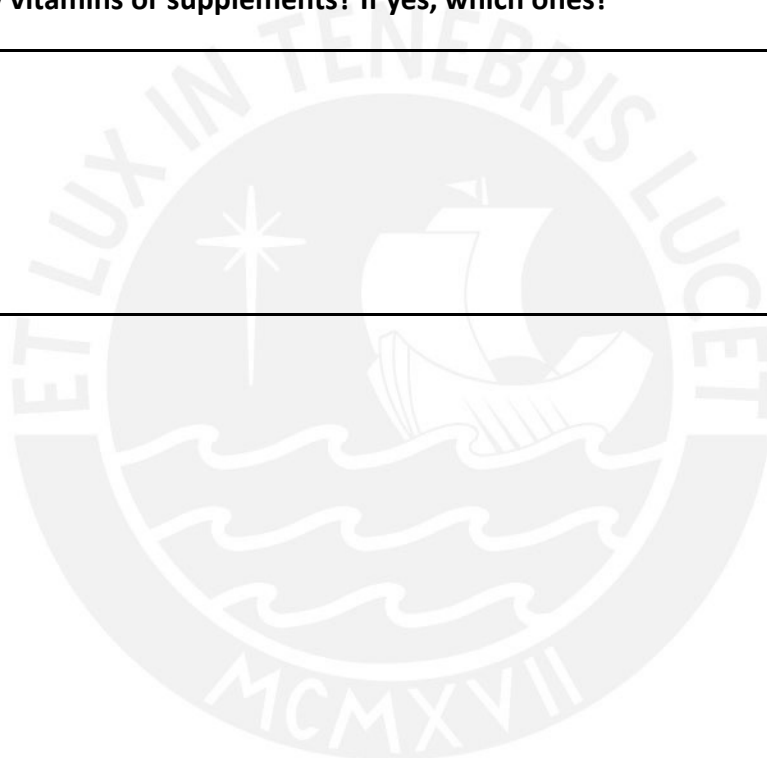
Lunch**Dinner****Where do you get your meals:**

- **From the house (cooked by mom/dad/siblings/grandparents)**
(De la casa (cocinadas por mamá/papá/hermanos/abuelos))
- **Outside (buy from stores, from the school, etc)**
(Fuera (compradas en tiendas, en la escuela, etc.))

Do you eat vegetables and fruits every day? If yes, which ones do you like the most?**Do you drink milk or eat dairy products like cheese and yogurt? How often?**

Do you eat meat, fish, or eggs? How often do you have these foods?

Do you take any vitamins or supplements? If yes, which ones?



Level of knowledge about healthy food

Do you know that some food is healthier and better for your body than other food?

What do you think is healthy food?

Where did you learn about the importance of healthy food?

- School
- Home
- From peers
- Online sources
- Others

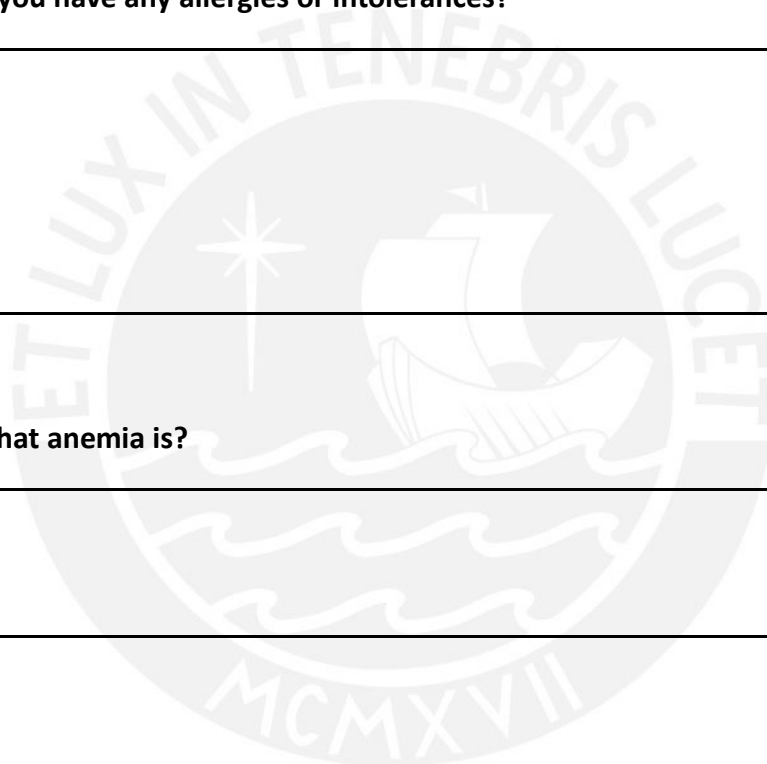
What did you learn?

Level of knowledge about health concerns

Do you know if you have any kind of chronic illness or disease?

Do you know if you have any allergies or intolerances?

Do you know what anemia is?



Appendix D: Sample Filled in Survey Form

fecha

Información personal

nombre

edad

Participant Nr.

Nombre de la escuela

12

Abraham roldan poma

Rutina diaria

Describe un día normal, desde que te despiertas hasta que te acuestas. Incluye todo lo que haces, como despertarte, ir a la escuela, jugar y, especialmente, cuándo comes tus comidas como el desayuno, el almuerzo y la cena.

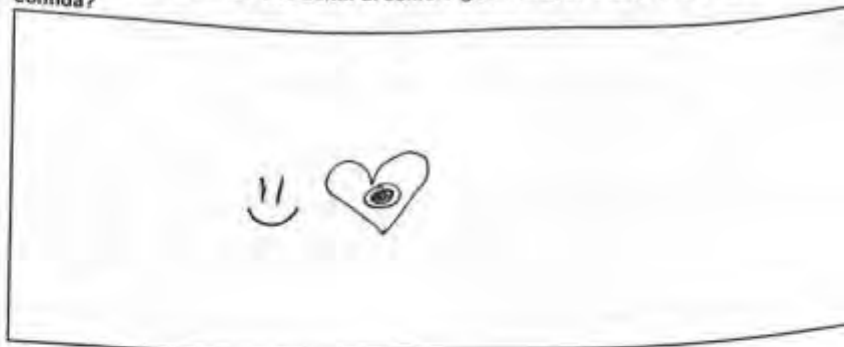
voy a la escuela llevo y hago mis
tareas y voy al parque y luego
almuerzo y duermo.

¿A qué hora del día empiezas a sentirte cansado?

a las 07:00

Hábitos alimenticios

¿Puedes dibujar cómo te hace sentir al comer? ¿Cómo reacciona tu cuerpo a la comida?



¿Cuántas veces comes al día?

4 veces

¿Qué sueles comer y beber para:

el desayuno

pan y jugo

La media mañana (Recreo)

Galletas y Jugo

el almuerzo

Arroz con pollo y jugo de manzana

La cena

pan con avena

¿Dónde obtienes tus comidas?

- De la casa (cocinadas por mamá/papá/hermanos/abuelos)
 Fuera (compradas en tiendas, restaurantes, en la escuela, etc)

¿Comes verduras y frutas todos los días? Si es así, ¿cuáles te gustan más?

manzanas, bananas y durazno
tomate, pepino y cebolla

¿Bebes leche o consumes productos lácteos como queso y yogur? ¿Con qué frecuencia?

solo una vez al dia

¿Comes carne, pescado o huevos? ¿Con qué frecuencia consumes estos alimentos?

a veces los consumo

¿Tomas vitaminas o suplementos? Si es así, ¿cuáles?

Appendix E: Images from Data Collection Process

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