

4 Places, 4 Projects in Guatemala

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World Food Prize Foundation

CeSSIAM: The Center for Studies of Sensory Impairment,
Aging, and Metabolism

Hormel Foods Corporation

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of thousands of children. On behalf of past and future interns, thank you for your support in the World Food Prize Foundation. I extend many thanks to Dan Hernandez and Gary Weaver, who smoothly executed an impactful Employee Engagement Trip. Thank you to Melissa Bonorden and Lori Marco for your tremendous support in my research experience. I appreciate all of the Hormel Employee Engagement Trip attendees who helped make the week worthwhile.

To my host families: I owe endless thanks to Liza, Oscar, America, Samuel, and Josue Diaz, Monica, Rafael, and Brianna Orozco, and Rolando, Vanessa, Daniella, Marcos, and Ivanna Montenegro. Not only did you go above and beyond to ensure my security and comfort, but you welcomed me into the family with unbelievable hospitality. You taught me Spanish, dinner etiquette, card games, cooking skills, how to bargain in the market, and salsa skills (to the best of my ability). I felt like a true “chapina” with you all. Most importantly, you taught me that it does not matter where I am as much as who I am with. I miss you and will always cherish our many laughs and memories.

To my teachers at Western Dubuque High School, especially Mr. Wilson and Mrs. Lukes: as the original motivators in my World Food Prize involvement, you have influenced my life in ways I cannot describe. Thank you for encouraging me and Western Dubuque students to think outside our small town and investigate worldly issues. Your local determination is making a difference globally. I would not be where I am today without your guidance and passionate hearts.

To my parents: A special thank you goes to my parents, Ron and Julie Dougherty. I know sending your 19-year-old daughter to a foreign country for two months stirred a few fears, but thank you for believing in me and supporting my dreams. I cannot say thank you enough times for your eager help whenever I needed it, from packing my medical kit, to picking me up at the airport, and everything in between. Most of all, thank you for being my role models and teaching me how to be a global citizen.

To the rest of my family and friends: an immeasurable thank you goes to you all. As the saying goes, “surround yourself by those who bring you higher,” I am forever thankful for you all that push me to my full potential.

Humble Beginnings

When I was a freshman in high school, my teacher, Mr. Wilson, asked me if I wanted to write a solution for world hunger. Who, me? Propose a solution for world hunger? The daunting task seemed impossible for a mere freshman in high school from Epworth, Iowa. Little did I know that this challenge would extend beyond my high school years and change my educational, career, and life goals.

Mr. Wilson approached me because he saw potential. I grew up in the small town of Epworth, Iowa; although I did not grow up on a farm, I was surrounded by a world of agriculture. Every summer I can remember was spent exploring my grandparents' farm. My early excitement quickly turned into a passion for the agricultural industry; I started competing in national dairy bowl, judging contests, and taking on leadership positions in the 4-H, FFA, and Iowa Holstein Association. Through these experiences, I came to understand the impact of agriculture and the role of my generation in feeding the world. In addition to my agricultural experiences, Mr. Wilson approached me because of my interest in health science. Science was always my favorite school subject, especially in the areas of biology, anatomy, and nutrition. Learning about global health and human diseases in my classes fueled my curiosity and ambition to address these issues.

I accepted Mr. Wilson's invitation to participate in the Iowa Youth Institute because of my interest in agriculture and science, but I was also inspired by Dr. Norman Borlaug. The man known for saving a billion lives from starvation grew up just two hours away from me; yet, I had never heard of his name before. As I learned more about him, I was inspired by his humble nature and motivation to feed the world through research. The topic of my Iowa Youth Institute paper was water and sanitation services in Ethiopia. For a freshman with lack of research skills, writing experiences, and global perspective, this was no easy task. However, I enjoyed the challenge and investigating worldly issues.

The 2013 Iowa Youth Institute opened my eyes in a way that no other experience had. I nervously presented my research along with seven other young, enthusiastic students. The three international experts leading the discussion provided thought-provoking questions and feedback. My favorite part about this day was realizing that even though the eleven people in the room came from all over Iowa and the world, we were united by our passion in ending food insecurity. In just one day, I transformed from a curious freshman into a passionate student with a budding global perspective.

Without a doubt, I fell in love with the World Food Prize Foundation and its youth events. I participated in the 2014 Iowa Youth Institute; this time, I found my niche by researching malnutrition in Ethiopia. I still remember opening the manila envelope revealing my qualification for the 2014 Global Youth Institute and the rush of joy that followed. That cold October, my view of life changed as I interacted with inspiring students, scientists, and leaders from around the world. I could not resist participating in the Iowa Youth Institute during my junior and senior years, so the latter topics of my paper were obesity in Mexico and malnutrition in Haiti. The diverse field of nutrition as well as the detrimental effects of food insecurity encouraged me to pursue a dietetic major at Iowa State University. The 2016 Iowa Youth

Institute marked my final event as a participant, but my love for the World Food Prize encouraged me to volunteer at the 2016 Global Youth Institute and 2017 Iowa Youth Institute.

At the 2016 Global Youth Institute, I listened to several presentations from former Borlaug-Ruan International Interns. I looked up to them as they were intelligent, dedicated students with profound perspectives. One of the presentations significantly stood out to me; it was Alana Platte's experience with CeSSIAM and Hormel Foods in Guatemala. My jaw dropped as I realized how perfectly the nutrition-based internship aligned with my educational and career interests. I applied for the internship in December, open-minded and ready to put forth my best effort at any placement. I still remember exactly where I was and what I was doing when I received the life-changing emails: one about advancing to the interview stage, one accepting me as a Borlaug-Ruan intern, and one revealing my placement in Guatemala. I cried tears of joy with each email.

When Mr. Wilson first asked me if I wanted to write a solution for world hunger, I laughed at him. Now, I laugh at myself for my response. Through my World Food Prize experiences, I have learned to embrace the challenge of fighting food insecurity, just as Norman Borlaug exemplified throughout his entire life. With every inspiring student or expert I meet, I am more confident that a small town, Iowa girl plays an important role in finding a solution for world hunger.

Cultural Immersion in Four Places

I still feel butterflies as I remember reading the email from Lisa Fleming stating, "I am writing to inform you that you have "officially been accepted" as a 2017 Borlaug-Ruan Summer Intern by Hormel Foods and their partner CeSSIAM in Sololá & Antigua, Guatemala!" Not only was I excited to immerse myself in my first country abroad, but I was intrigued to visit various parts of the country during my rotation. My internship was divided into four segments: a weekend in Guatemala City, two weeks in Panajachel, one week in Guatemala City, and five weeks in Antigua. Each placement offered a new perspective in the diverse and exciting country of Guatemala.

When I arrived at the airport in the land of the "eternal spring," I was ready to embark on an adventure unlike anything I could ever imagine. A CeSSIAM employee, Claudia Arriaga Godoy, met me at the airport and brought me to my host family for the weekend. As I stared out the car window, I was mesmerized by the endless array of colorful buildings and surprised by the number of armed guards and stray dogs. The chaotic yet observant driving style of Guatemalans caught me off guard, but I quickly grew accustomed to it. Instead of experiencing culture shock, I was surprised by the plethora of American franchises and English billboards engulfing the bustling city. For the weekend, I stayed with a CeSSIAM employee, Liza Diaz-Jereda, and her family, Oscar, America, Samuel, and Josue. On my first night, they asked me what I wanted to do, to which I replied whatever they would like to do. Oddly, we did something I never would have expected for my first night in Guatemala: we went to the movies to see *Wonder Woman*. Still, my weekend with the Diaz family was full of Guatemalan traditions: eating fried plantains and beans for breakfast, bargaining in the market, and spending time with extended family.

After presenting my upcoming research projects at the CeSSIAM headquarters the following Monday, I went to live with the Orozco family in Panajachel, a quaint town on the edge of the famous Lake Atitlán. A picture cannot capture the beauty of this blue-green lake formed in a volcanic caldera. Three dormant volcanos stand around the lake, adding to the breathtaking view. Here in Panajachel, I felt more immersed in authentic, Guatemalan culture over the capital, especially while walking through the markets and seeing the intricate, traditional clothing adorning the people. I lived with a CeSSIAM employee, Monica Orozco, and her two children, Brianna and Rafael. Our laugh-filled memories smoothed my transition into the foreign country.

After my time in Panajachel, I paused my CeSSIAM projects to attend the Hormel Employee Engagement Trip, an experience that was both emotional and impactful. I loved getting to know the twenty-five, kindhearted attendees and watching them contribute their own unique skills to the community service projects. Witnessing the positive impact of Project Spammy and student sponsorships was uplifting, especially as we interacted with the mothers and children of the struggling, rural communities. However, these positive memories also came with discomfort and a strong sense of culture shock. The group and I stayed in a secure hotel surrounded by extravagant restaurants and malls; yet, a short bus trip away revealed the poorest communities I have ever seen. I felt utterly helpless in the communities that lacked clean water, stable roads, and a secure, nutritious food supply. The extreme parallels of wealth within a small area reminded me of a similar issue in the United States, where, oftentimes, poverty and hunger are present but hidden from sight. Overall, the Hormel Employee Engagement Trip helped me discover the difference between what I need in life and what I want in life.

I spent most of my internship in the city of Antigua, Guatemala. The town filled with adventure seekers, service volunteers, church missionaries, and international students learning Spanish was a blend of foreign and authentic, Guatemalan culture. Antigua preserves its historical beauty with cobblestone streets, pastel-colored buildings, and antique architecture. I admired my bedroom balcony views of the three surrounding volcanos; Volcán Fuego lit up the night with lava streaming down its side. My host family, Rolando, Vanessa, Daniella, Marcos, and Ivana Montenegro, welcomed me into their family for an amazing experience. They went above and beyond to provide safety, comfort, and once-in-a-lifetime adventures. The research team and I collected data from the elementary school of San Phillipe, the non-profit organization of *Nuestros Ahijados*, and several markets. At these places, I was able to share my dietetic knowledge by explaining body mass index and healthy eating choices to our participants. Without a CeSSIAM office in Antigua, our meeting places and data analysis took place in various coffee shops of the city. In addition to research, I was able to expand my horizons by volunteering at the *Nuestros Ahijados* elementary school, Casa Jackson Hospital for malnourished infants and children, and Caoba farm.

Each one of my places added breadth and depth to my cultural immersion. With everyone I met, I was eager to engage in conversations about language, health, customs, music, art, religion, politics, and local and global history. There were times that I saw people staring at my blond hair and pale skin, but I never quite felt out of place. The people I lived and worked with made Guatemala feel like home, and my eight-week mission drove me with a sense of purpose.

Host Institution; CeSSIAM

The Center for Studies of Sensory Impairment, Aging and Metabolism (CeSSIAM) was founded by Dr. Noel W. Solomons, MD, in 1985. For the last 32 years, this non-governmental, non-profit organization has conducted cutting-edge nutritional research in Latin America. CeSSIAM is continuously expanding its international connections by collaborating with elite universities in the Austria, Canada, Colombia, England, Germany, Ireland, Netherlands, and the United States. CeSSIAM is composed of thirteen part-time and full-time employees as well as international interns. My interest in nutritional research and education as well as my field of study, dietetics, seamlessly aligned with the summer research projects of CeSSIAM. The CeSSIAM headquarters is located in Guatemala City with a side office in Xela. I did not work in a specific office because my research was conducted in the cities of Panajachel and Antigua.

The Mission of Balancing Quality with Quantity

Food insecurity is defined as “The state of being without reliable access to a sufficient quantity of affordable, nutritious food” by the Oxford Dictionary (“Food Insecurity...”). While a popular belief on food insecurity is centered around the availability, it is equally important to focus on the quality of food. Guatemala’s plentiful fields of nutrient-rich fruits and vegetables hide reality; Guatemala is the fourth most malnourished country in the world and ranks first in Western Hemisphere (Thurow, 2016). Recent CeSSIAM studies have analyzed chronic malnutrition and stunting in numerous regions of Guatemala, where a reported 49.8% of children are malnourished (Solomons, 2015). It is of utmost importance to help this population by studying and addressing the root causes.

The mission of the CeSSIAM is to improve human health and well-being in underprivileged societies through better nutrition. Projects executed by CeSSIAM are created and assigned by the director, Dr. Solomons. The arm length project and arm span project aimed to develop non-invasive, diagnostic techniques for field application. The results of these projects can be used to better analyze the origins of linear growth failure. The goal of the protein study was to understand the cultural suitability of protein powder in cream-based soups which can later be used to address macronutrient deficiencies and dehydration in pregnant and lactating women.

A Well-Rounded, Diverse Team

Dr. Noel W. Solomons, MD, a graduate of Harvard Medical School and the Executive and Scientific Director of CeSSIAM, served as the overall project creator and supervisor. CeSSIAM employees, Claudia Arriaga Godoy and Dr. Marieke Vossenaar, guided projects and advised the team while Dr. Solomons traveled. The summer of 2017 marked the first year for a research team in Antigua which composed of two other international students, CeSSIAM employees from Guatemala, and myself. The international interns were Kelly Siverhus, a senior majoring in dietetics at University of Wisconsin-Madison, and Maaïke Visser, a graduate student pursuing a Master’s Degree in nutritional physiology and health status at Wageningen University in the Netherlands. The CeSSIAM junior-staff collaborators of Alejandra Zamora, Liza Diaz-Jereda, and Teresa Palala also assisted the research team in executing the projects.

My Responsibilities

Project 1: Project Spammy with Hormel Foods

My duties for the Hormel Employee Engagement Trip consisted of assisting in food distribution, leading games and learning activities for local kids, and translating Spanish and English between the kids and Hormel Foods employees.

Project 2: Soup Study

The idea and assignment of this project came from Dr. Solomons. For phase 1, my duties consisted of finalizing the survey questions, creating a Google Form for group data entry, translating surveys and results to English, and tabulating and analyzing survey results. In phase 2, my duties consisted of standardizing a method of cooking three types of soup, calculating the soup-to-protein ratio, and finding the ideal temperature and volume for surveying. In phase 3, my duties consisted of preparing the soup supplies, randomizing the placement, cooking and distributing soup during the taste-testing, translating surveys and results to English, and tabulating and analyzing results. My final duties included writing the ending report and presenting my findings to CeSSIAM employees and interns. I did not partake in interviewing the women because the open-ended questions were more efficiently and accurately documented by the Spanish-fluent investigators: Alejandra Zamora, Teresa Palala, Liza Diaz-Jereda, and Marieke Vossenaar.

Project 3 & Project 4: Arm Length and Arm Span Projects

The base of this project stemmed from the director of CeSSIAM, Dr. Noel Solomons. I alone investigated arm measurement procedures and conducted the intra-observer phase at the Robert Mueller Life School in Panajachel. The inter-observer phase was an equal distribution between myself and another intern, Maaïke Vissener. Alejandra Zamora, Kelly Siverus, Liza Diaz-Jereda, and Teresa Palala assisted in the manual process of the inter-observer phase. The data analysis, concluding report, and ending presentation were my final, individual duties.

Other Responsibilities

In addition to these projects, I helped the interns and employees of CeSSIAM with three other projects that were not finished at the time of my departure. For two of these projects, the other interns built research off of the results of the arm length measurement project. In one, the finalized anthropometric procedure was compared to photo-imaging methods; in the other, the procedure was used to compare arm, leg, and trunk ratios amongst middle-income children of Guatemala. I also assisted in a CeSSIAM project that compared trunk-to-leg ratios, sitting height-to-hip height ratios, and traditional measurements-to-photographic imaging in Guatemalan and foreign adults.

Project 1: Project Spammy with Hormel Foods

For my third week in Guatemala, I attended the Hormel Foods Employee Engagement Trip and saw the impact of Project Spammy. Employees and their families from across the United States apply for this engagement trip and are selected via a lottery process. I was invited on this week-long event because Hormel Foods sponsors the World Food Prize and Borlaug-Ruan program. Also, CeSSIAM collaborated with Hormel Foods to analyze the nutritional effects of *Spammy*.

In efforts to relieve childhood malnutrition in underprivileged communities of Guatemala, Hormel Foods developed Project Spammy. Named after *Spam*, *Spammy* is a turkey-based product fortified with, among others, Vitamins D and B₁₂, two nutrients that are uncommon in the Guatemalan diet. *Spammy* provides a shelf-stable, high-quality protein that is essential for proper development in the early years of life. The texture of *Spammy* allows it to be easily added to a variety of Guatemalan meals, including pancakes, beans, and burritos. Studies reveal that children who consistently consume the product show increased micronutrient levels, improvement in cognitive scores, and a reduction in the number of school days missed (“Hormel Foods and USDA,” 2014). Project Spammy has positively impacted thousands of children; in 2017, 2.5 million cans were donated and distributed throughout the country, bringing the collective total to sixteen million cans since 2008.

Every Hormel Employee Engagement Trip establishes a new *CHISPA* center, a central, community building with a variety of purposes, including the distribution of *Spammy*. Each caregiver receives twenty-four cans for his or her children once a month. Before receiving a new box of *Spammy*, families are required to return all twenty-four empty cans for the purpose of recycling and ensuring the product is not being sold. In addition, mothers attend monthly educational programs covering topics such as pregnancy, breastfeeding, hygiene, disease prevention, and nutrition. Sometimes, the mothers will bring in dishes that include *Spammy* for others to taste. Children younger than six years old are also measured monthly to analyze growth rates. Hormel’s non-profit, faith-based partners, Food for the Poor and *Caritas Arquidiocesana*, assist in the distribution and continuation of Project Spammy.

The trip was an eventful, impactful week. The trip coordinators, Dan Hernandez and Gary Weaver, led the group and I in establishing the twenty-first *CHISPA* center at a school in a rural village. When children from the community came to the center, and we led them in a rotation of games and learning activities. Upon arrival, they were shy, but they soon became an energetic bunch. We asked them about their dreams, encouraged them to set goals, and gave them ribbons that said, “Sí se puede!” or in English, “Yes, you can!” Books, school supplies, computers, and games were donated to the center. Throughout the week, we visited four already-established *CHISPA* centers. The mothers there were extremely thankful for the *Spammy* that boosted their children’s energy and growth. At a few of the centers, the children welcomed us by performing dances and thanked us with cards. In addition to the *CHISPA* centers, we had some eye-opening experiences while visiting rural community homes, a hospital, and two schools with students for whom Hormel Foods provides tuition scholarships. With each visit, the group and I soaked in everything we could learn. Our eyes were opened to see a world of need and our hearts opened to the possibility of being the part of the solution. All in all, I am immensely thankful for the positive impact of Project Spammy and the lessons I learned during the Hormel Employee Engagement Trip.

Project 2: Exploring Liquid-Dishes and Testing the Acceptability of a Whey-Protein Powder in Cream-Based Soups among Guatemalan Women

I. Introduction

Proper nutrition in the first 1,000 days of life, from conception to two years of age, is critical in optimizing physical and cognitive growth. Failure to receive adequate nutrients during this period has irreversible affects, including immune complications, inadequate brain development, greater risks for chronic diseases during future life stages, and physical stunting and wasting (Thurow, 2016). The mother serves as the main energy and nutrient source for an infant during pregnancy and lactation. As these are physically demanding tasks, increasing the consumption of energy and various nutrients is vital for the wellbeing of the mother and child, particularly in regard to the macronutrient protein. Essential for fetal development, maternal tissue maintenance, and the production of enzymes and hormones, the recommended daily intake of protein reaches 26 grams per day in the third trimester and 21 grams per day in the first semester of breastfeeding (Marangoni, 2016). Reaching these quantities can be a challenge, particularly for women in Guatemala, the most malnourished county in the western hemisphere (Thurow, 2016). In addition, a recent study conducted by CeSSIAM found dehydration in a proportion of pregnant and lactating Guatemalan mothers, leading to further complications in this vulnerable stage of life (Diaz-Jereda, 2017). In efforts to combat the under-consumption of protein and fluid intake, previous CeSSIAM studies stimulated the idea of using creamy soups as a food-vehicle for a high-quality, protein supplement. This proposal was created in response to a tradition of soup consumption as well as the availability of a six gram, whey protein powder called Beneprotein® created by Nestlé Health Science. Before declaring the supplement and soup combination a theoretical solution, this study aimed to analyze qualitative distinctions and frequencies of various liquid dishes in addition to the palatability of the protein powder in cream-based soups.

Objectives:

1. Study qualitative distinctions among types of soup by women of Antigua, Guatemala
2. Analyze frequencies of consumption of liquid-dishes in households
3. Determine the acceptability of Beneprotein® of Nestlé Health Science when added to a daily portion of three commonly consumed, cream-based soups.

II. Methodology

Subjects:

Figure 1: Demographics of Project 2. All subjects were female, native Guatemalans and members of the ‘*Nuestros Ahijados*’ project of Antigua, Guatemala.

	Age in years			
	N	Mean ± SD	Median	Min-Max
Phase 1	70	44.0 ± 14.3	44.5	21-71
Phase 2	54	44.7 ± 14.8	44.5	21-71

Phase 1: Soup Questionnaire

A face-to-face, paper and pen interview with structured questionnaire included open-ended questions and multiple-choice questions (Appendix A). Double entry of the questionnaire was used to confirm data input accuracy.

Questions gathered:

- a. Perceptions of the definition of four kinds of liquid dishes, namely:
 - i. bouillon or '*consome*'
 - ii. soup or '*sopa*'
 - iii. broth or '*caldo*'
 - iv. stew or '*recado*'
- b. Household frequency of consumption of
 - i. '*consome*', '*sopa*', '*caldo*' and '*recado*'
 - ii. cold soups
 - iii. creamy soups
- c. The most common variety of creamy soups consumed
- d. Preferred cooking method of creamy soups; from scratch or from a packet.

Phase 2: Establish Cooking Methods

Following, a procedure was established for cooking the three different kinds of cream-based soups based on the results of the survey. A thermometer and heating plate were used to ensure temperature consistency. Each of the six soups had its own pot, ladle, whisk, and thermometer to avoid cross-contamination. Each woman received a total of six, 100-mL cups of soup. This practice identified the ideal:

- Preparation procedures according to the instructions on the soup packet
- Time to dissolve protein packets: after the soup comes to a simmer and is removed from heat
- Soup to protein ratio according to the average consumption volume: 3 packets of protein powder per soup packet
- Taste-test sample volume: 100 mL
- Temperature to serve: 65-70 degrees C

Phase 3: Tasting Session

On the day of the sampling, the three most frequently consumed, packet-based types of creamy soups, as reported in the phase 1 survey, were made. The six sampled soups included

1. Asparagus without protein powder
2. Asparagus with protein powder
3. Mushroom without protein powder
4. Mushroom with protein powder
5. Chicken without protein powder
6. Chicken with protein powder

In this double-blind tasting session, the subjects and the interviewers were unaware of which soup had protein powder. The interviewers instructed subjects with a script (Appendix B). The placement of each tray was randomized. Soups were positioned on a tray in two rows and three

columns. Each flavor of soup (asparagus, mushroom, chicken) was lined up in the same column. Subjects were permitted to choose the order of their testing, but each chosen flavor was followed by its partner flavor (with or without protein of the same flavor). Women were instructed to take three sips of a soup, drink water, and taste the other. First, subjects were asked if they can taste a difference. If not, their result was categorized as “equal.” Responses and notes were recorded (Appendix C). If they could taste a difference, they were asked which they preferred. Women were permitted to retry both flavors before making a final decision. Each woman was compensated for their participation with a health kit consisting of a toothbrush, toothpaste, soap, and shampoo.

III. Results

Results of Phase 1: Soup Questionnaire

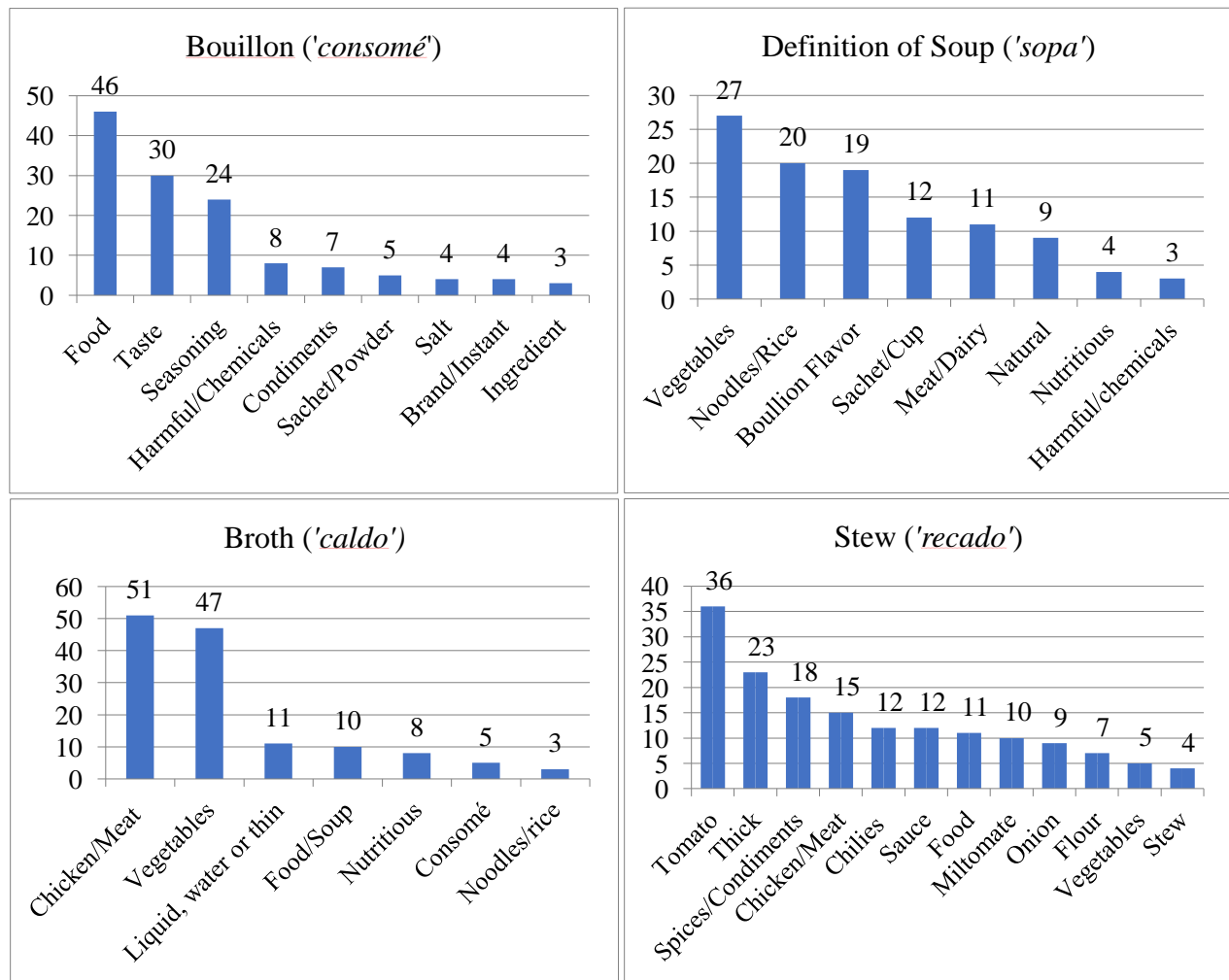


Figure 2: Qualitative Definitions of Liquid Dishes. These graphs correspond with the most popular key words in the responses when the subjects were asked about the definition of ‘consume’, ‘sopa’, ‘caldo’, and ‘recardo.’

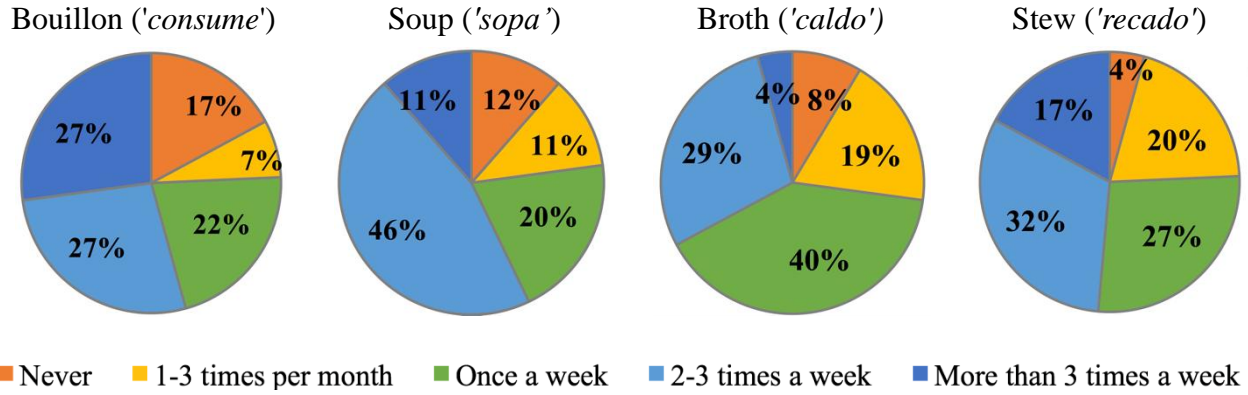


Figure 3: Reported Household Frequency Consumption of Liquid Dishes. Following the open-ended questions concerning the definition of a bouillon, soup, broth, and stew, women were asked about the frequency consumption of these dishes.

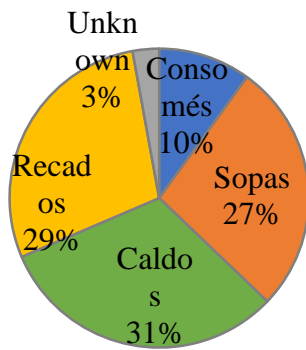


Figure 4: Reported Most Frequently Served Liquid Dishes. This pie graph represents the responses when women were asked which dish they consume the most on a weekly basis.

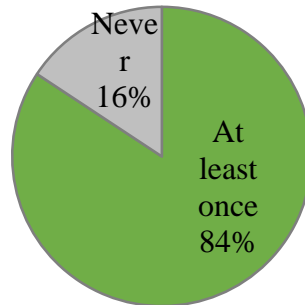


Figure 5: Consumption of Creamy Soup. A definition of a creamy soup was given and women were asked if they had ever consumed one.

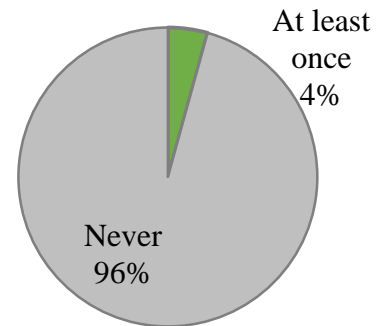
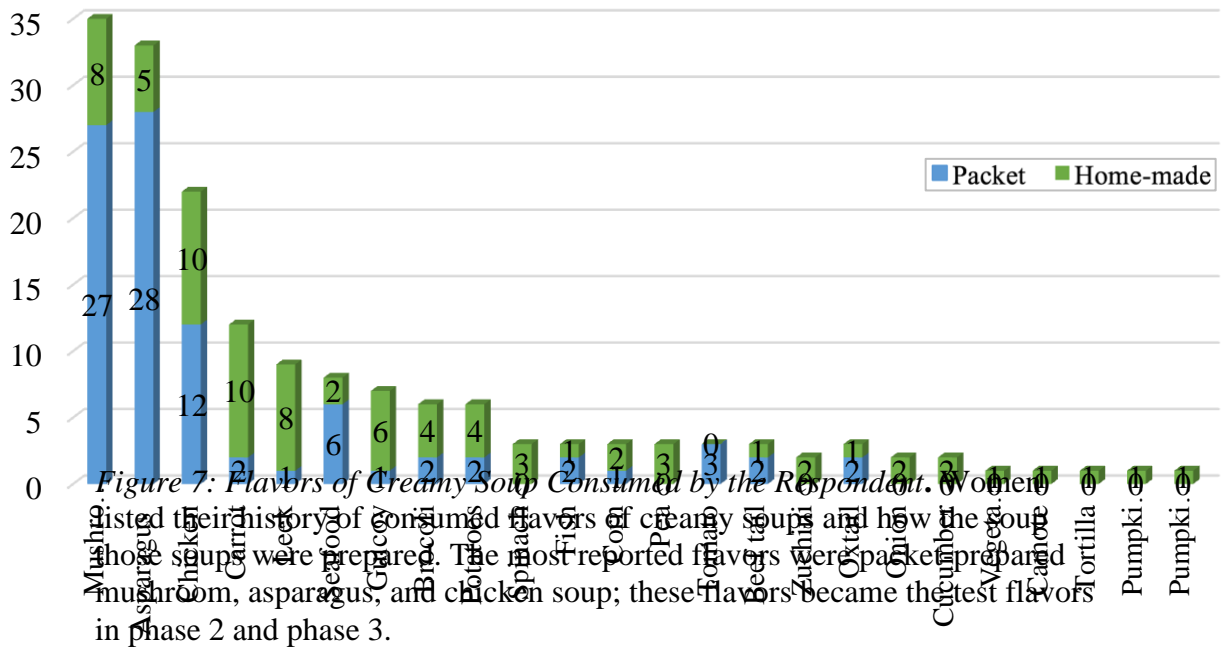


Figure 6: Consumption of a "Cold" Soup. Due to the rising popularity in Spain and other Hispanic countries, women were asked if they had ever consumed a "cold" soup. A description was provided.



Results of Phase 3: Tasting Session

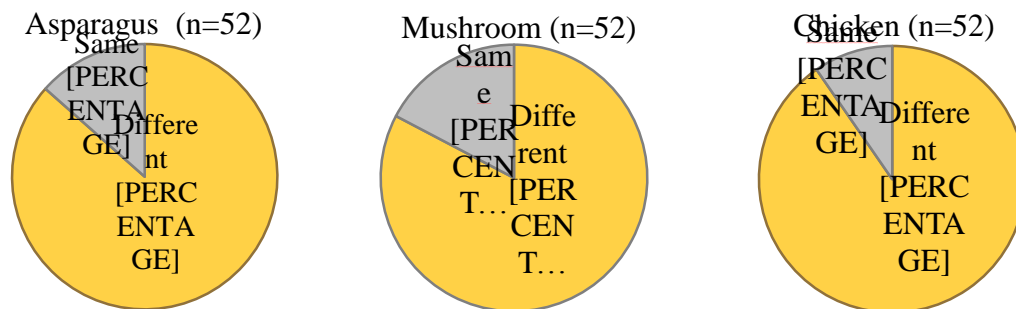


Figure 8: Difference Detection per Soup Flavor. The pie charts display the subject response to the question, “Are the soups the same or different?” for asparagus, mushroom, and chicken soup.

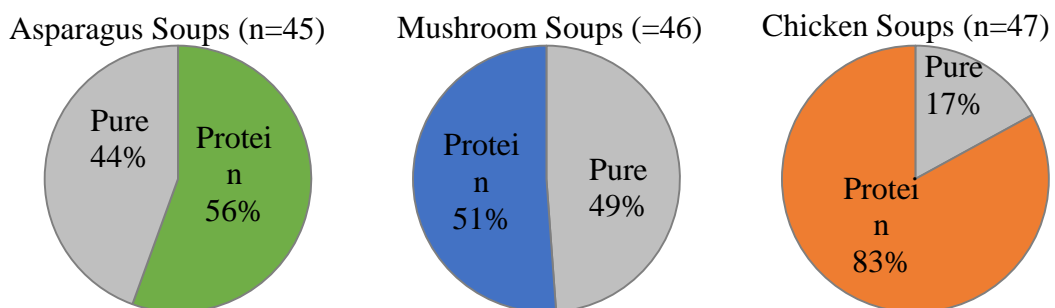


Figure 9: Preference Soup with or without Protein. Results from these graphs conclude whether the subjects preferred the soup with or without protein.

IV. Conclusion

Exploring the perceptions of the definition and frequency of four kinds of liquid dishes, namely a bouillon, broth, soup, and stew was not directly applicable to phase 2 and phase 3, but the results enhanced the study by outlining liquid-based meals of Guatemalan cuisine. The results were used to compare the four dishes to the prechosen food vehicle of the study, a cream-based soup. Defined in the survey (Appendix A) as “a soup with added milk or cream to give it a smooth consistency,” the cream-based soup most closely aligns with the liquid-dish of soup (*sopa*). In addition, the definitions of these liquid dishes can be used to provoke hypotheses for future Hormel Foods, CeSSIAM or outside investigations. The frequency results of phase 1 show that bouillon, soup, broth, and stew are commonly consumed by the average Guatemalan woman, indicating a possible food vehicle to address protein deficiencies and dehydration issues. Furthermore, the questionnaire reveals a currently low consumption of cold soups; therefore, cold soups are not recommended as an exploratory food vehicle for protein powder. Two primary aspects of the phase 1 were used for phase 2 and 3: the most popular three flavors of creamy soups (asparagus, mushroom, chicken) and the most popular preparation method of creamy soups (packet). Phase 3 confirmed that majority of women could taste a difference in the addition of a six gram, high-quality protein added to a daily portion of commonly consumed cream-based soups. In addition, the participants preferred the soup with protein for the asparagus, mushrooms, and chicken at 56, 51, and 83 percent, respectively. Due to the uncertainty of the mushroom preference, expansion of subject size as well as flavor options is advised for future studies. Overall, the acceptability of commonly consumed, cream-based soups is not negatively affected by the addition of 6 gram of high-quality protein and can be used as a food vehicle for supplementation. Further distribution of the protein powder product and education of the value of protein and adequate water intake is recommended to address protein deficiencies and dehydration in pregnant and lactating mothers of Guatemala.

Project 3: Development of Procedures for Assessing Upper-Extremity Length in Preschool-Aged Children

I. Introduction

Nutrition within the first 1,000 days of life, from conception to the second birthday, heavily impacts physical growth, cognitive development, and long-term health of a person's life. One of the outcomes of inadequate nutrition is stunting, which is a selective failure of the elongation of bones (Bender, 2014). Height, body-segment ratios, and growth patterns in infants and adolescents are essential in analyzing stunting; therefore, accurately measuring early stages of life assist in aiding populations that face childhood stunting (Reurings, Vossenaar, Doak, & Solomons, 2013). CeSSIAM uses photographic-imaging procedures and anthropometry, specifically height, weight, head circumference, trunk, and upper and lower extremity measurements, to assess body-segment ratios. Their recent investigations have seen an asymmetric correlation between trunk and leg length; although legs may fail to elongate, the length of trunk and size of head remain relatively conserved due to the body's prioritization of energy and growth distribution. These findings stimulate curiosity between the growth rates of the upper extremities in comparison to the lower extremities but cannot be answered due to the nonexistence of an official procedure of arm length measurement. The preliminary project aimed to establish and standardize a precise method of arm measurement procedure that can be implemented in future comparisons between upper and lower extremities.

	N	Girls	Boys
Sample Size and Gender	14	7	7
	Mean ± SD	Median	Min-Max
Age in years	6 ± 1	7	5-7
Height in cm (Day 2)	116.3 ± 8.9	116.8	102.0-132.5
Arm Span in cm (Day 2)	113.8 ± 9.4	114.5	100.0-130.5

II. Objectives:

1. Incorporate the best method(s) for arm length from the exploratory, intrapersonal phase into a complete evaluation protocol
2. Affirm repeatability with an interpersonal phase, further eliminating imprecise methods
3. Compare the stability and relative data output of an assortment of approaches to measuring the length of the upper limbs in preschool children to decide upon a standardized procedure to be used in anthropometry in studies of CeSSIAM

III. Methodology

Subjects:

Eligible subjects included children of Guatemalan nationality aged 4-7 from the cities of Panajachel and Antigua. Any individual with a physical impediment or problem in posture or balance conflicted with the measuring of height, arm span, and arm length was ineligible to participate.

	N	Girls	Boys
Sample Size and Gender	14	7	7
	Mean ± SD	Median	Min-Max
Age in years	5.6 ± .6	6	4-6
Height in cm (Alyssa)	113.4 ± 7.3	113.75	102-124
Arm Span in cm (Alyssa)	111.9 ± 7.6	111.75	101.5-126.5

observer, Exploratory Phase

Figure 10: Demographic statistics of Phase 1. Data was collected from Panajachel.

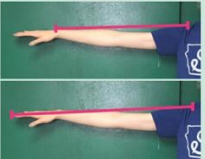
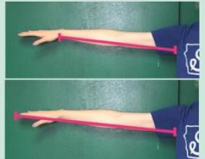


Figure 11: Demographic statistics of Phase 2. Data was collected from Antigua.

Phase 1: Intra-

Phase 1 was completed by a single examiner (Alyssa Dougherty) and fourteen children under the supervision of Monica Orozco. For the left and right arm, ten methods of measurement were used, varying in arm position and tool used (flexible measuring tape versus meter stick ruler). The lengths from the shoulder to the flexure of the wrist and from the shoulder to the end of the longest finger were recorded to the nearest 0.5 cm. Left and right were in accordance with the left and right of the subject, the opposite of the traditional anatomical position reference. For measurements with elevated arms, the subject was required to stand looking forward, head level, hands pronated, and arms elevated parallel to the ground with a 90-degree angle between the arm and chest body. To test repeatability, the experimenter measured the subjects with a day in between. The relationships of all methods of arm-length were compared and narrowed down to four methods per arm to further analyze repeatability in the next phase. Height, arm span, and dominant hand was recorded for reference.

Phase 2: Inter-observer Study of Methods

To assure precision and repeatability within the four arm length methods, two experimenters (Alyssa Dougherty and Maaïke Visser) measured the same 14 subjects with the same tools in a blind report. The experimenter who did not collect data in phase 1, Maaïke Visser, underwent training before collecting arm measurements. Kelly Siverhus assisted in recording the data.

Arm Measurement Methods (20 variations)							
Arm elevated, above the arm		Arm elevated, below the arm		Hand on hip		Arm hanging freely	
(from acromion process to distal ulna or fingers)		(from armpit to distal radius or fingers)		(from acromion process to olecranon process to distal ulna)		(from acromion process to distal radius)	
							
Variations:							
Arm	Left Right	Arm	Left Right	Arm	Left Right	Arm	Left Right
Shoulder to	Distal Ulna Fingers	Shoulder to	Distal Ulna Fingers	Shoulder to	To Elbow to Distal Ulna x	Shoulder to	To Distal Radius x
Tape	Flexible Tape Meter stick	Tape	Flexible Tape Meter stick	Tape	Flexible Tape x	Tape	Flexible Tape x

IV. Results

Figure 12. Arm Measurement Methods for Phase 1.

Results of Phase 1: Intra-observer

Phase 2		Lin Concordance Correlation										
		Arm elevated, above the arm	Arm elevated, below the arm	Hand on hip	Arm hanging freely							
Phase 1	LEFT ARM											
	Flexible Tape											
	- Distal ulna/ radius	-	-	0.891	0.924							
	LEFT ARM											
	Flexible Tape											
	- To fingers	-	-	-	-							
	Hard stick											
	- Distal ulna/radius	0.827	-	-	-							
	- To fingers	0.940	-	-	-							
	RIGHT ARM											
	Flexible Tape											
	-Distal ulna/elbow	-	-	0.857	0.927							
	-To fingers	-	-	-	-							
	Hard stick											
	-Distal ulna/radius	0.940	-	-	-							
-To fingers	0.941	-	-	-								
-To fingers	48.3	49.0	-0.8	46.3	45.5	0.8	-	-	-	-	-	-

Phase 1		Lin Concordance Correlation			
		Arm elevated, above the arm	Arm elevated, below the arm	Hand on hip	Arm hanging freely
LEFT ARM					
Flexible Tape					
- Distal ulna/ radius	0.854	0.600	0.886*	0.870*	
- To fingers	0.935	0.912	-	-	
Hard stick					
- Distal ulna/radius	0.952*	0.952	-	-	
- To fingers	0.973*	0.892	-	-	
RIGHT ARM					
Flexible Tape					
-Distal ulna/elbow	0.904	0.729	0.778*	0.844*	
-To fingers	0.964	0.845	-	-	
Hard stick					
-Distal ulna/radius	0.875*	0.823	-	-	
-To fingers	0.946*	0.898	-	-	

Figure 14: Lin's Concordance Coefficient. Correlation coefficients with an asterisk proceeded to phase 2. Correlation coefficients for arm hanging freely did not show significantly different values because of the substantial differences between phase 1 and phase 2.

Results of Phase 2: Inter-observer

Figure 15: Phase 2 Median Lengths. This chart represents the median and difference for the twenty variations of arm measurements between observer 1 and observer 2 during phase 2.

Phase 2		Median								
	Arm elevated, above the arm			Hand on hip			Arm hanging freely			
	Obs. 1	Obs. 2	Diff.	Obs. 1	Obs. 2	Diff.	Obs. 1	Obs. 2	Diff.	
LEFT ARM										
Flexible Tape										
- Distal ulna/ radius	-	-	-	39.8	39.5	0.25	37.3	37.5	-0.3	
- To fingers	-	-	-	-	-	-	-	-	-	
Hard stick										
- Distal ulna/radius	34.5	32.5	-1.5	-	-	-	-	-	-	
- To fingers	47	48.3	-1.3	-	-	-	-	-	-	
RIGHT ARM										
Flexible Tape										
-Distal ulna/elbow	-	-	-	40.3	39.8	0.5	37.8	38	-0.3	
-To fingers	-	-	-	-	-	-	-	-	-	
Hard stick										
-Distal ulna/radius	35.5	33	-0.8	-	-	-	-	-	-	
-To fingers	48	48	0	-	-	-	-	-	-	

Figure 16: Phase 2 Lin's Concordance Correlation. This chart represents the Lin's concordance correlation efficient between observer 1 and observer 2 in phase 2. Values between 0.90 and 0.95 signify moderate agreement.

Conclusion

Phase 1 narrowed the twenty methods of measurements by eliminating twelve imprecise methods. In comparison between above the arm position and below the arm position with the Lin's concordance correlation coefficient, the above the arm position proved to be more repeatable in seven out of the eight methods (with one method tied at 0.952) In comparison between the meter stick and flexible tape in Lin's concordance correlation coefficient, the meter stick method proved to be more repeatable in five out of the eight comparative positions (above the arm and below the arm). Therefore, the arm measurement methods below the arm or using a flexible tape measure were discontinued for phase 2.

Phase 2 affirmed precision with an inter-observer phase. In regard to arm position, the above the arm position resulted in greater precision than the hand on hip or arm hanging freely position with the exception of an outlier at 0.827 for the above the arm to the distal radius using a meter stick method. After comparing the stability and relative data output of an assortment of approaches to measuring the length of the upper limbs in preschool children, the recommended method for anthropometric studies is measuring from the acromion process to the distal radius or fingertips with a meter stick on the right arm.

Project 4: Preliminary Data on Arm Span-Height Ratio in Guatemalan Preschoolers

I. Introduction

Chronic malnutrition includes handful of classifications beneath it, including stunting, wasting, and obesity. Body mass index (BMI) is commonly used to classify overweight and obese patients, but can be misleading due to the undistinguished differentiation of adipose tissue and muscle weight. By contrast, BMI proves a useful and accurate tool for labeling chronic energy deficiency. The Quetelet BMI formula, $WT(kg)/HT(m^2)$, is simple and quick to calculate, but obstacles occur when a subject's height decreases in response to osteoporosis, kyphosis, compression of the vertebrae, and other physical disabilities (Rabe, 1996). Arm span-height ratios have been asserted to approach a value of 1:0 in early adulthood, but there is little information on the differential growth of upper and lower extremities in childhood contributing to the contours of this ratio value. Exploring the application of height and arm span in the juvenile population may prove beneficial in calculating body mass using arm span or analyzing other stunting measurements.

II. Objectives

1. Describe the association between arm span and height within the children aged 4-7 years old in Antigua, Guatemala
2. Confirm precise measurements with an intra-observer and inter-observer phases.

III. Methodology

Subjects

Children aged 4-7 from a diverse set of backgrounds in Antigua and Panajachel, Guatemala. Any individual with a physical impediment or problem in posture or balance that makes it impossible to collaborate with the measuring of height, weight, and arm span is ineligible. In addition, a wider range of ages were sampled to practice arm measurements prior to collecting official data.

	N	Girls	Boys	Age		
				Mean \pm SD	Median	Min-Max
Panajachel (Alyssa, Day 1 vs Day 2)	14	7	7	6.2 \pm 1.0	7	4-7
Antigua (Alyssa vs Maaike)	14	7	7	5.6 \pm 0.6	6	4-6
Panajachel and Antigua	28	14	14	5.9 \pm 0.9	6	4-7

Figure 17: Demographic Statistics of Phase 1 (Panajachel) and Phase 2 (Antigua).

Phase 1: Intra-observer in Panajachel

Phase 1 was an intra-observer phase conducted in Panajachel. The experimenter (Alyssa Dougherty) measured the height and arm span of 14 subjects with a day in between. To measure height: Meter stick is positioned against the wall, subject puts his/her heels as close to the wall as possible while standing up straight with his/her head level. Use the triangular measurement tool to ensure a 90-degree measurement between the top of the head and the wall. Arms remain at side with face forward. To measure entire arm span: Place the measuring stick horizontally against the wall and use a level to ensure parallelism with the ground. Subjects stand with arms abducted at 90 degrees, elbows and wrists extended, and palms ventral. Measure fingertip to fingertip.

Phase 2: Inter-observer in Antigua

Phase 2 was an inter-observer phase conducted in Antigua. Two experimenters measured the height and arm span of 14 subjects on the same day. To avoid intentional or unconscious recording bias, a third person recorded the measurements and the experimenters were out of earshot as the other measured the preschoolers. The measurement techniques for height and arm span from phase 1 carried into phase 2.

IV. Results:

	HEIGHT			ARM SPAN		
	P	A	P + A	P	A	P + A
Mean ± SD	165.3 ± 8.9	113.4 ± 7.3	114.8 ± 8.1	113.8 ± 9.4	111.9 ± 7.6	112.9 ± 8.4
Median	116.8	113.8	115.3	114.5	111.8	112.3
Min-Max	102-132.5	102-124	102-132.5	100-130.5	101.5-126.5	100-130.5

	Descriptive Statistics		Difference
	Day 1	Day 2	
Mean ± SD.	112.82 ± 10.11	113.79 ± 9.34	-0.96 ± 0.76
Median	112	114.5	-2.5
Min-Max	-32	-30.5	-1.5
	r² coefficient	r coefficient	
	0.982	.991	

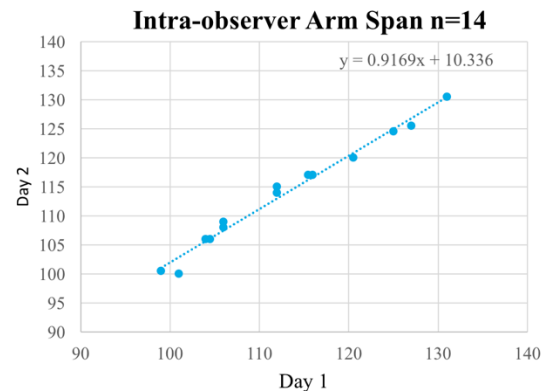


Figure 19: Intra-observer Results. Descriptive statistics of phase 1.

	Descriptive Statistics		Difference
	Alyssa	Maaike	
Mean ± SD.	111.9 ± 7.6	112.1 ± 7.4	0.3 ± 0.3
Median	111.8	111.0	0.8
Min-Max	101.5-126.5	103-126	0.5-1.5
	r ² coefficient	r coefficient	
	0.988	0.994	

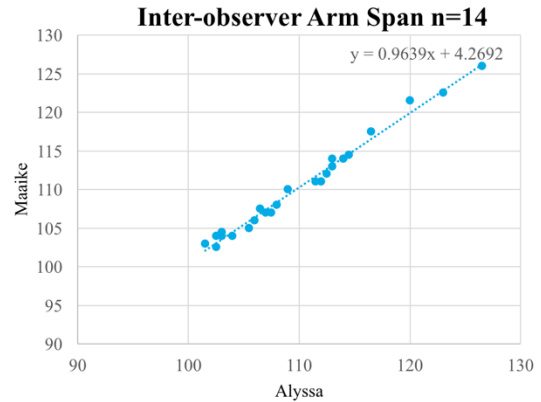


Figure 20: Inter-observer Results. Descriptive statistics of the phase 2.

	r ² coefficient	r coefficient
Correlation between arm span and body height	0.872	0.934

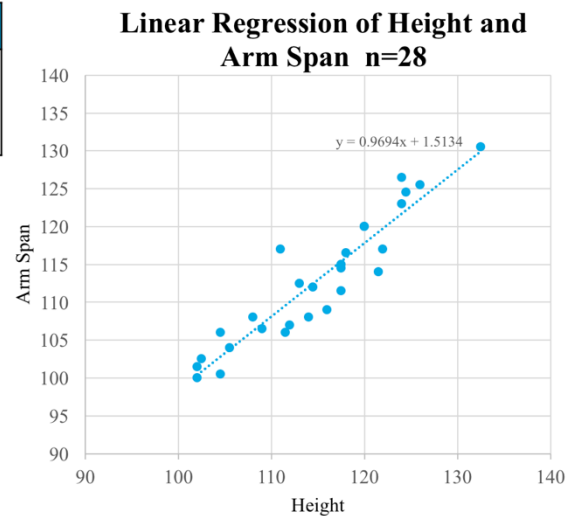


Figure 21: Combined Comparison of Height and Arm Span. This figure pairs with the linear regression of height and arm span chart on the right. The r coefficient proved a high correlation at 0.934. This figure includes all 28 subjects: 14 from Panajachel and 14 from Antigua.

V. Conclusion

The comparative studies proved moderate agreement with the precision of height to arm span ratio; the intra-observer phase calculated a 0.991 r value and the inter-observer calculated a 0.994. With an overall r coefficient of 0.934, arm span and height prove moderate agreement in correlation. The results of this study conclude a significant 1:1 ratio between height and arm span in a sample size of preschool-aged, Guatemalan children. Expansion of sample size and explorations amongst gender, economic status, and ethnicity is recommended for future studies.

A Change in Skills, Perspective, and Values

My research opportunities with CeSSIAM and Hormel Foods taught me valuable skills in the professional world of nutritional research. As an international intern, I creatively and strategically approached projects while executing the desires of my supervisors. I practiced essential research skills, including protocol procedures, ethical surveying, data analysis, and presentation of results. In addition to research skills, I gained knowledge applicable to my field of study, dietetics, at Iowa State University. My week with Hormel Foods taught me about the development, distribution, and impact of a product like *Spammy*. In the Casa Jackson Hospital, I learned about infant growth rates and recovery through observation and practice. My hands-on analysis of stunting and malnutrition with CeSSIAM helped me understand nutritional issues on deeper level. All of these experiences have paved a foundation for my future work in the field of global nutrition.

Being a part of CeSSIAM's first multiple-intern research team in Antigua strengthened my teamwork skills more than I had expected. As I worked with a research team of diverse nationalities, I learned how different cultures will approach problems; my teammates from Guatemala were gifted in graciousness and flexibility while my teammates from the Netherlands presented goal-oriented and strategic mindsets. Although this collaboration could be seen as a challenge, we used it as a strength; when a variety of talented, passionate people collaborate, the solution is better achieved. In addition, my team experience helped me practice when I should step up as a leader and when I should humble myself and let others use their expertise. For example, despite my interest in conducting interviews for the soup project, my fluent Spanish partners were more accurate and efficient in understanding the women and recording information. I stepped up as a leader during the intra-observer phases of the arm length and arm span projects because I conducted background research before training my partners in the various measurement methods. Lastly, the team research experience was very rewarding because my fellow teammates built onto my research work after my departure from Guatemala.

Researching food insecurity is completely different from seeing it in person. Simply thinking about a few of my experiences brings tears to my eyes, especially as I remember Juan Carlos, one of the malnourished infants I took care of at the Casa Jackson Hospital. Normally, children can walk by 15-16 months, but Juan Carlos could not crawl at 19 months old due to the lack of muscle and growth failure in the legs. His baby teeth were almost completely worn away from something he had been gnawing on. Research states that the effects of stunting and malnutrition are irreversible, and seeing it in person broke my heart. However, with my devastation also came hope. Juan Carlos was receiving treatment thanks to the generous efforts of many volunteers, donors, and employees of the Casa Jackson Hospital. I came across numerous inspiring organizations and people in Guatemala, each battling food insecurity from a new angle. CeSSIAM uses research to attack nutrition deficiencies at the source. Hormel Foods provides scholarships for students and nutritional support through Project Spammy. *Nuestros Ahijados* provides free education, health services, and meals for children from the lowest income communities. I cannot even count the number of volunteers and missionaries that I met in Guatemala. In everyone I met, I was inspired by the love and determination in their eyes. Our work is far from over, but I am encouraged by Juan Carlos and the people who embrace the challenge of ending world hunger.

When I think back to my Iowa Youth Institute and Global Youth Institute roundtable

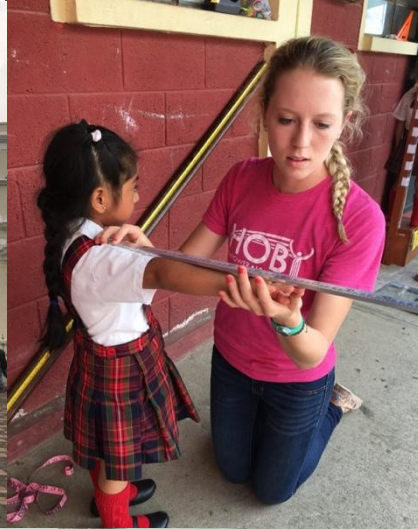
discussions, every issue seemed to be rooted in a solution: empowerment through education. The fundamental importance of education was reaffirmed through many experiences here in Guatemala. Hormel Foods and *Nuestros Ahijados* sponsor students so they can reach their full potential, achieve better careers, and provide a greater life for their families. I met a couple who adopted and educated ten girls in Guatemala; these girls became influential, successful professionals who strive to make a difference in the country. Nobody understands the living conditions and culture of third-world countries more than the people who live there, so engaging the community is an effective strategy in establishing sustainable communities. A popular saying offers, "Give a man a fish and you will feed him for a day. Teach a man to fish and you will feed him for a lifetime." Education creates a ripple effect that can lift families out of the cycle of poverty. On a closer base to home, youth programs, such as the Iowa Youth Institute and Global Youth Institute, open the eyes and hearts of young leaders by informing them about global issues. The opportunity of knowledge is key in helping any situation.

Traveling abroad put into perspective that although I am only person, my actions have a ripple effect and an enormous impact both locally and globally. Even in a world of seven billion people, everyone has power, and not by means of physical strength or wealth, but in the potential they have to change the world. In a poor, rural village, I met a mother with the biggest smile on her face that never faded. Even with limited resources and income, she worked diligently to provide food and security for her family. Her eager drive inspired me, making it clear to see that anyone can make a difference through a unique skill or mindset. I recently learned the phrase, "find your gift, give it away." My internship in Guatemala showed me how everyone has a gift that can play a role in the fight against food insecurity.

Not only will Guatemala hold a special place in my heart, but the World Food Prize Foundation and its youth programs will forevermore as well. My first Iowa Youth Institute was hosted in the Memorial Union of Iowa State University; thanks to the hard work of the World Food Prize staff and volunteers, the event must now be held in Hilton Coliseum to accommodate for over two hundred participants. I have attended the five previous Iowa Youth Institutes, and I plan on contributing my time and efforts at future Iowa Youth Institutes and Global Youth Institutes to ensure students have the most life-changing experience possible, just as I did. For I am sure that the next generation of hunger fighters hold the potential to eliminate hunger once and for all.

At the Borlaug-Ruan International Internship orientation day, Ambassador Kenneth Quinn told the twenty-three interns and I that we would not return from our internships as the same person. Thankfully, he was 100 percent accurate. I am beyond blessed for my experience in Guatemala. Every emotion was felt, from complete hopelessness, to fierce determination, to genuine joy. My appreciation for my secure, American life has grown tremendously, but now, I cannot return to taking advantage of my safe society while others are suffering. I am fueled to use my skills, knowledge, and willpower to fight for human rights and healthy, happy lives for all. My internship in Guatemala may be over, but this is only the beginning of an impactful, life journey.

Photos





References

Bender, D. (2014). Stunting. *A Dictionary of Food and Nutrition, A Dictionary of Food and Nutrition*.

CeSSIAM – Center for Studies of Sensory Impairment, Aging and Metabolism. (2017, May 31). Retrieved August 2, 2017, from <http://www.inffoundation.org/cessiam/>

Diaz-Jereda, L. A., Montenegro-Bethancourt, G., Vossenaar, M., & Solomons, N. W. (2017a). Adequacy and sources of total daily water and liquid drinks by low-income, urban and rural, pregnant and lactating women in the Western Highlands of Guatemala. *The FASEB Journal*, 31(1 Supplement), 650.651-650.651.

Food insecurity | Definition of food insecurity in English by Oxford Dictionaries. (n.d.). Retrieved August 2, 2017, from https://en.oxforddictionaries.com/definition/food_insecurity

Hormel Foods and USDA Collaborate to Help Improve Physical and Cognitive Development in Malnourished Children. (2014, July 15). Retrieved September 25, 2017, from <https://www.hormelfoods.com/newsroom/press-releases/hormel-foods-and-usda-collaborate-to-help-improve-physical-and-cognitive-development-in-malnourished-children/>

Marangoni, F., Cetin, I., Verduci, E., Canzone, G., Giovannini, M., Scollo, P., ... Poli, A. (2016). Maternal Diet and Nutrient Requirements in Pregnancy and Breastfeeding. An Italian Consensus Document. *Nutrients*, 8(10), 629. <http://doi.org/10.3390/nu8100629>

Rabe, B., Thamrin, M., Gross, R., Solomons, N., & Schultink, W. (1996). Body mass index of the elderly derived from height and from armspan. *Asia Pacific Journal of Clinical Nutrition*, 5(2), 79-83.

Reurings, Vossenaar, Doak, & Solomons. (2013). Stunting rates in infants and toddlers born in metropolitan Quetzaltenango, Guatemala. *Nutrition* (Burbank, Los Angeles County, Calif.), 29(4), 655-60.

Solomons, N. W., Vossenaar, M., Chomat, A. M., Doak, C. M., Koski, K. G., & Scott, M. E. (2015). Stunting at birth: recognition of early-life linear growth failure in the western highlands of Guatemala. *Public Health Nutr*, 18(10), 1737-1745. doi:10.1017/s136898001400264x

Thurow, R. (2016). *The First 1,000 Days*. New York, NY: PublicAffairs.

Appendix A

Fecha entrevista: _____ Fecha cita: _____ _____

CUESTIONARIO

Nombre: _____ Edad: _____ Celular: _____
--

PREAMBULO: Estamos interesados en el consumo de consomés, sopas, caldos y recados ya que estos alimentos pueden proveer a usted y a su familia agua y una serie de nutrientes.

1. ¿Le vamos a preguntar qué entiende por 4 alimentos: consomé, sopa, caldo y recado?:

CONSOMÉ: _____

SOPA: _____

CALDO: _____

RECADO: _____

2. ¿Qué tan seguido consume en su casa?

a. Consomé

- Nunca, o menos de una vez al mes
- 1 a 3 veces por mes
- 1 vez por semana
- 2 a 3 veces por semana
- Más de 3 veces por semana

b. Sopa

- Nunca, o menos de una vez al mes
- 1 a 3 veces por mes
- 1 vez por semana
- 2 a 3 veces por semana
- Más de 3 veces por semana

c. Caldo

- Nunca, o menos de una vez al mes
- 1 a 3 veces por mes
- 1 vez por semana
- 2 a 3 veces por semana
- Más de 3 veces por semana

d. Recado

- Nunca, o menos de una vez al mes
- 1 a 3 veces por mes
- 1 vez por semana
- 2 a 3 veces por semana
- Más de 3 veces por semana

3. ¿Qué tipo de (las variedades indicadas) prepara con mayor frecuencia (indique solo una)

- Consomés
- Sopas
- Caldos

Recados

No puede decir (no leer esta opción)

4. **¿Alguna vez ha servido una sopa de lata o de sobre (paquete) en su casa?**

Sí No

5. **En los países europeos de Francia o España, la gente disfruta de "sopas frías".**

¿Alguna vez ha consumido una "sopa fría"?

Sí No

Si la respuesta es sí

a. ¿Qué tipos de sopas frías ha consumido o podría consumir?

_____	_____
_____	_____
_____	_____

6. **Una "sopa cremosa" es una sopa con leche o crema añadida para darle una consistencia suave. ¿Alguna vez ha consumido una "sopa cremosa"?**

Sí No elaborado

a. ¿Qué tipos de sopas cremosas ha consumido y podría consumir? Indicar con una "S" si es de sobre o una "N" si es natural.

Ha consumido	Podría consumir

Appendix B

PROYECTO DE SOPAS CREMOSAS

INSTRUCCIONES	LECTURA
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Dígale a la participante que tome asiento frente a usted. Preséntele las 6 muestras de 3 tipos de sopas cremosas: Espárragos, Hongos y Pollo.	Buenas tardes señora, gracias por aceptar la invitación, puede sentarse. Se le presentan 3 tipos de sopas cremosas, las cuales son espárragos, hongos y pollo. Le vamos a pedir que pruebe todas.
PRIMERA SOPA Dele de probar el otro vaso de la sopa que ella selecciono. Si encontró alguna diferencia pregunte	Empiece probando la sopa que quiera. Pruebe 3 cucharadas. No hay necesidad de terminar la sopa. Luego tome un trago de agua Y luego pruebe 3 cucharadas de esta sopa. ¿Le parecen iguales o diferentes las sopas? Si desea, puede volver a probar las dos ¿Cuál le gustó más?
SEGUNDA SOPA Dele de probar el otro vaso de la sopa que ella selecciono. Si encontró alguna diferencia pregunte	Seleccione otra sopa. Pruebe 3 cucharadas. No hay necesidad de terminar la sopa. Luego tome un trago de agua Y luego pruebe 3 cucharadas de esta sopa. ¿Le parecen iguales o diferentes las sopas? Si desea, puede volver a probar las dos ¿Cuál le gustó más?
TERCERA SOPA Dele de probar el otro vaso de la sopa que ella selecciono. Si encontró alguna diferencia pregunte	Pruebe la última sopa. Pruebe 3 cucharadas. No hay necesidad de terminar la sopa. Luego tome un trago de agua Y luego pruebe 3 cucharadas de esta sopa. ¿Le parecen iguales o diferentes las sopas? Si desea, puede volver a probar las dos ¿Cuál le gustó más?
Agradezca al final de la Degustación:	Gracias por su participación!!

Appendix C

PROYECTO SOPAS CREMOSAS
Antigua, Nuestros Ahijados
10/07/2017

Entrevistadora:
Código:
Nombre participante:
Edad:

Tere, Liza, Claudia, Ale & Marieke
 NA _____

 _____ años

Sopa cremosa	Código	Orden en que se probaron las sopas (de 1 a 6)	Preferencia de sopas		¿Cual sopa le gusto más?	La señora termino toda la sopa (100 ml)
			Igual	Diferente		
Espárragos	267					
	246					
Hongos	458					
	496					
Pollo	674					
	621					

OBSERVACIONES: _____