

A stylized landscape illustration featuring rolling green hills in various shades of green and brown. On the left, there is a green tree, a purple flower, and some orange foliage. A small red bird is flying in the sky. The background consists of wavy blue and white lines representing the sky.

Healthy Vending and Concession Initiative

Kansas State Research and Extension
&
Manhattan City Hall

Scott Hoffman

K-State Research and Extension

- 110 Courthouse Plaza b220, Manhattan, KS 66502, is the exact location of the K-State Research and Extension Agency for Riley County.
- The Kansas State Research and Extension Agency is part of the Cooperative Extension established in 1914.
- The Cooperative Extension was designed to better communities in numerous ways by positively influencing residents:
 - ✓ Farms, businesses, homes, families, education, and more.
- The K-State Research and Extension Mission:
 - "We are dedicated to a safe, sustainable, competitive food and fiber system and to strong, healthy communities, families and youth through integrated research, analysis and education."

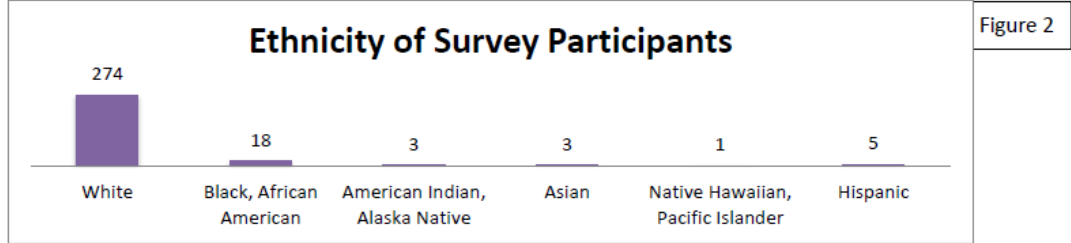
Healthy Little Apple Coalition Perception Survey

- The Healthy Little Apple Coalition (HLAC) was founded in April of 2011.
- The HLAC was renamed the Flint Hills Wellness Coalition (FHWC) early 2013.
- The perception survey took place right before I began my field experience with K-State Research and Extension, but I was still involved with its results.
- I was responsible for constructing most of the graphical interpretations.

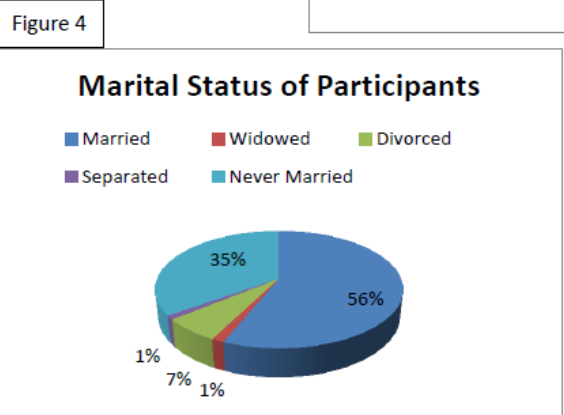
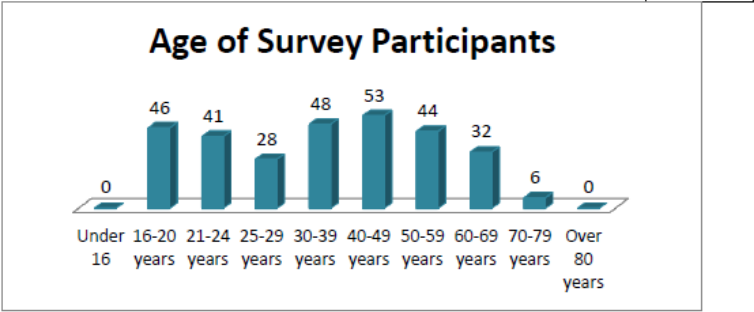
Demographic Data (survey questions 9-14)

There were 298 people who completed the survey, 235 female respondents (79%), and 63 male respondents (21%), as referenced in Figure 1.

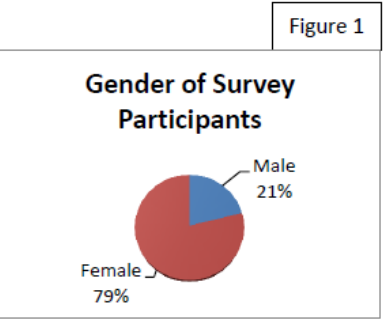
The majority of survey respondents were White (274, 91%), followed by Black/African American (18, 6%), American Indian/Alaska Native (3, 1%), Asian (3, 1%), Native Hawaiian/Pacific Islander (1, .03%), and Hispanic (5, 1.6%), see Figure 2.



There was a generally even distribution of survey respondents' age categories, which ranged from 16-20 to 70-79. The age category with the highest number of respondents was 40-49, with 53 respondents. See Figure 3.

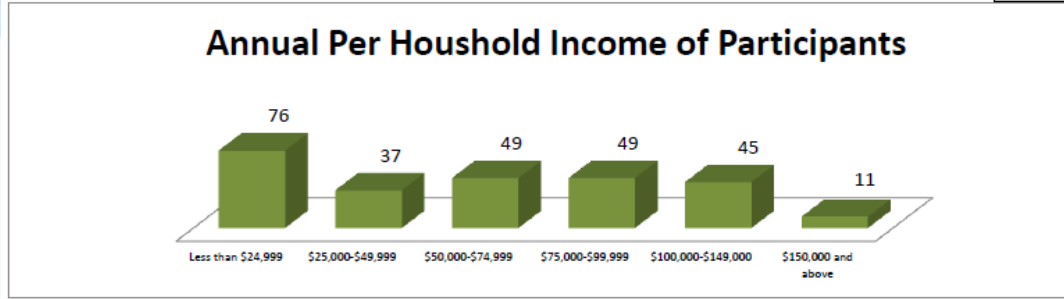


Over half of the survey respondents were married (56%). "Never married" was the next largest respondent category, containing 35% of survey respondents. See Figure 4 for a complete breakdown of marital status of all survey respondents.

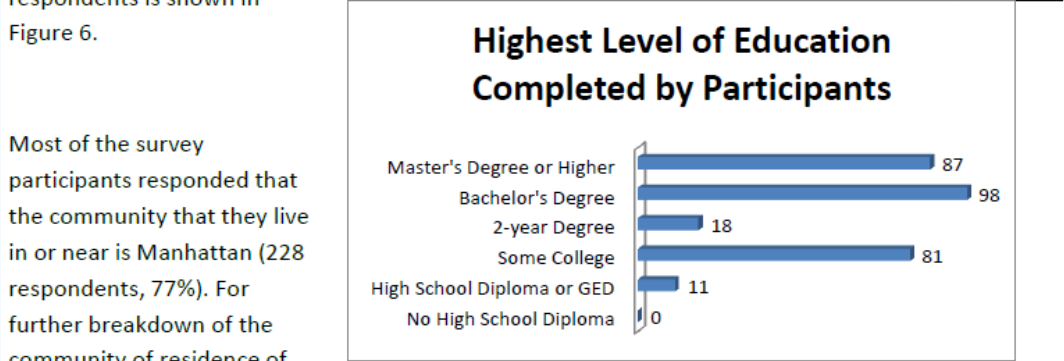


The Purpose of this Survey was to assess the perceptions of the Riley County residents with respect to nutrition.

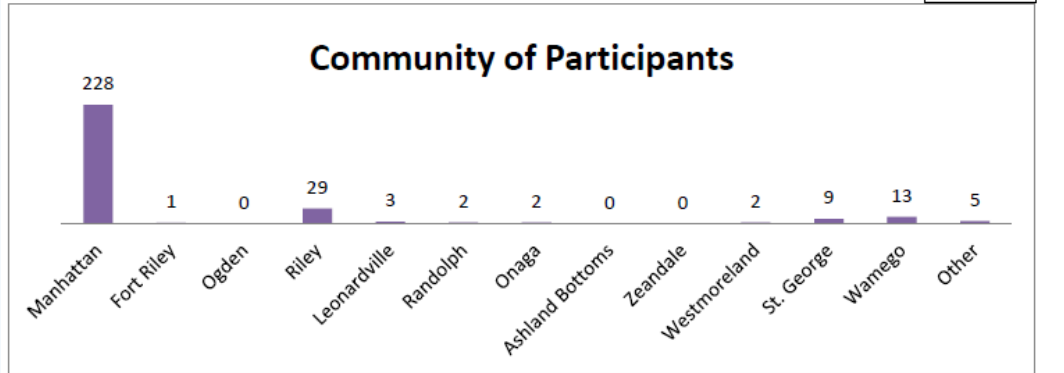
The majority of survey participants fell into the annual household income category of "less than \$24,999." Survey respondents were mostly evenly distributed amongst the remaining income categories, as shown in Figure 5.



The majority of survey respondents had a bachelor's degree (98) or master's degree (or higher, 87; total of 185 of the participants). The breakdown of educational attainment of survey respondents is shown in Figure 6.



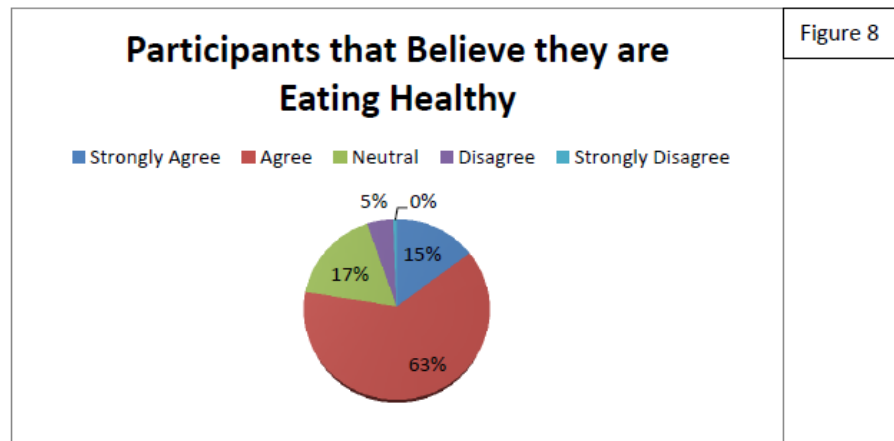
Most of the survey participants responded that the community that they live in or near is Manhattan (228 respondents, 77%). For further breakdown of the community of residence of survey participants see Figure 7.



Healthy Foods Data (survey questions 1-7)

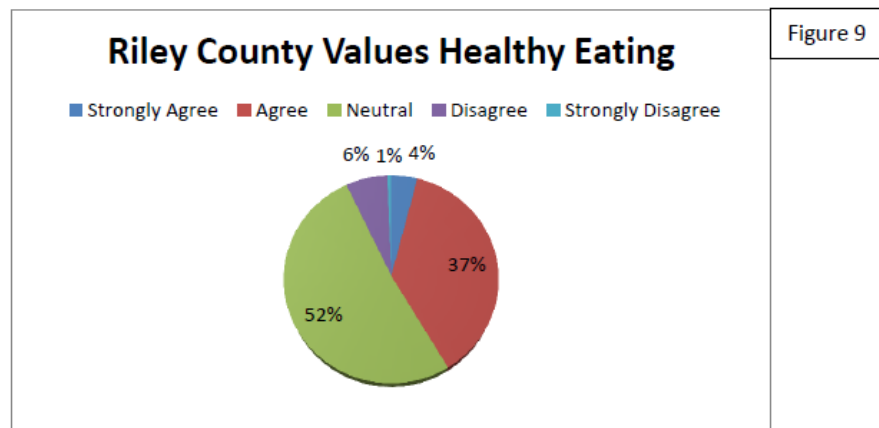
Question 1: Overall, I eat healthy foods. (answers ranged from “Strongly Agree – Strongly Disagree”)

The majority of participants responded that they “agree” that they eat healthy foods overall (63%). (See Figure 8.)



Question 2: Compared to other communities that I know, Riley County values healthy eating. (answers ranged from “Strongly Agree – Strongly Disagree”)

Over half of survey participants responded that they felt “neutral” that Riley County values healthy eating. Further, 41% of respondents “agree” or “strongly agree” that Riley County values healthy eating, see Figure 9.



- The executive summary of the HLAC Perception Survey indicates that the mission of the coalition is “to create a healthier community for our residents through policy, system, environmental, and person change.”
- Despite the name change, the Flint Hills Wellness Coalition still maintains the same ideals.

Flint Hills Wellness Coalition



<https://www.facebook.com/FlintHillsWellnessCoalition>

Agencies in partnership:

Riley County Health Department

Riley County Extension

Greater Manhattan Community Foundation

City of Manhattan

Fort Riley Public Health

Kansas State University Master of Public Health Program

Via Christi Health Center

USD 383

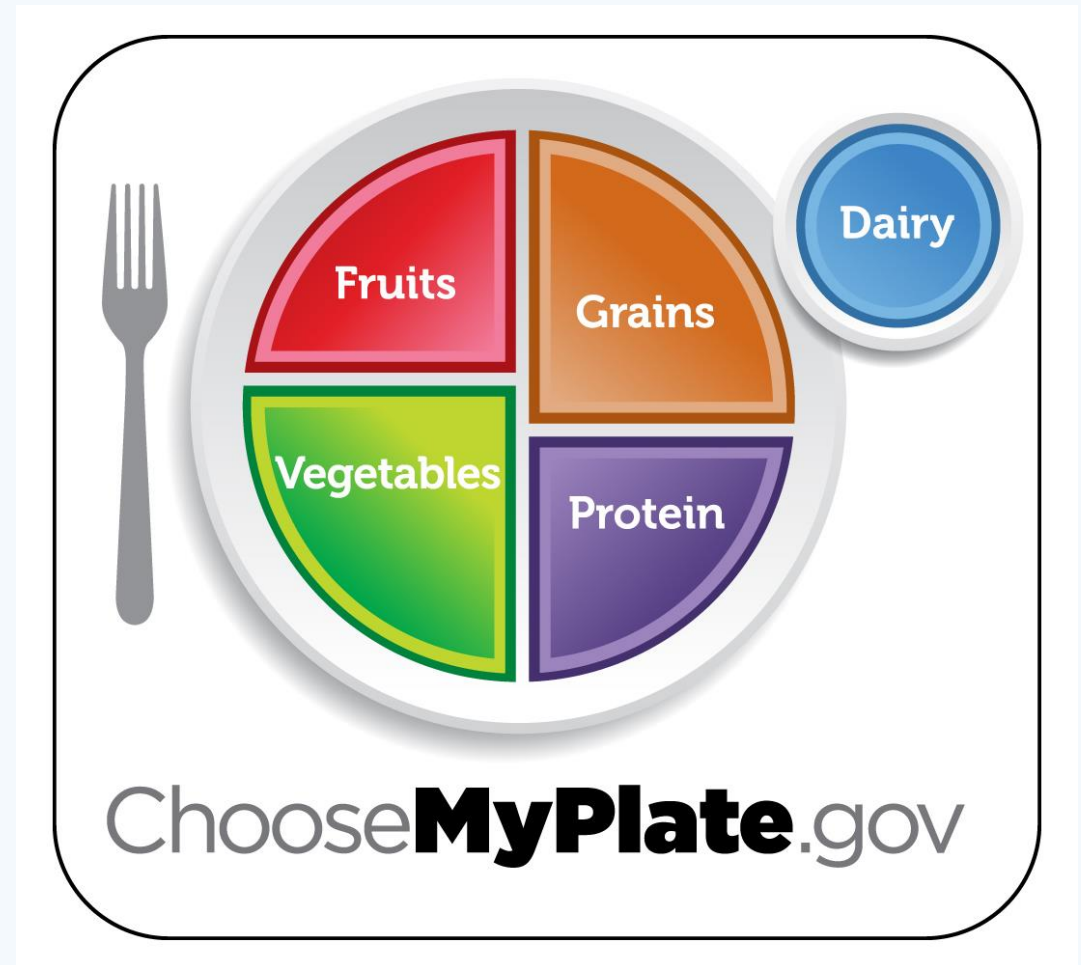
Manhattan Broadcasting Company



<https://www.facebook.com/FlintHillsWellnessCoalition>

Elementary Nutritional Education

- Ginny Barnard and I taught nutrition lessons to several different grades and classes of elementary students.
- The lessons were made to be as interactive as possible to maintain the interest of the children.
- The use of MyPlate was a common theme used at the beginning of each session.





The popcorn lab was a common one. It is low cost and provides numerous health benefits.



The elementary students enjoyed their popcorn while wearing their chef hats and working on interactive assignments.

Junior Master Gardener

- The Junior Master Gardener program involves many 4th grade elementary classes around the Riley County area.
- The program serves to educate the children in the areas of horticulture and nutrition.
- Gregg Eyestone, Ginny Barnard, and I plowed the small gardens and then allowed the children to plant the seeds.
- The seeds planted were lettuce, spinach, radishes, and onion sets.



<http://www.riley.ksu.edu/p.aspx?tabid=203>



The fourth graders
planting the seeds



Helping guide the
fourth grade
planters with a
plant marker



Observing the
diligence of some of
the Junior Master
Gardeners

National Alliance for Nutrition & Activity(NANA)



- These standards ensure efficient nutrition from the calories consumed by placing guidelines on the foods and beverages sold in vending machines.
- Added sugars and the chemical composition of fats in the vending products are of critical concern.
- Guidelines are also given for other ingredients, such as the content of: sodium, fruit juice, vegetable juice, milk, nuts, grains, and more.

- The NANA designed nutritional standards that several counties in the Kansas area are using.
- These standards may also be employed in other states, considering the standards were finalized in Washington, DC.

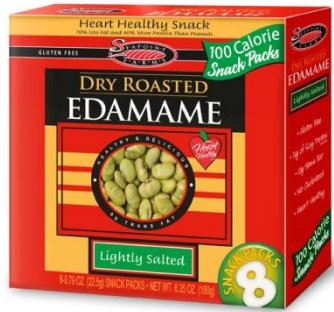
Potential Benefits of Healthy Vending

- Lower cholesterol
 - Better cholesterol level balance (HDL>LDL)
- Physiologically significant phytochemicals
- Weight loss/maintenance
- Healthier fats:
 - Avoidance of trace *trans* fats
 - Increase in polyunsaturated and monounsaturated fats
- And more.

Compare and Contrast

Dry Roasted Edamame

(New Addition)



www.seapointfarms.com

- Serving Size: 1/4 cup (30g) — 130 calories
- **Total Fat** 4g (6%)
 - Saturated Fat 0.5g (4%)
 - Trans Fat 0g
- **Cholesterol** 0mg (0%)
- **Sodium** 150mg (6%)
- **Total Carbohydrates** 10g (3%)
 - Dietary Fiber 8g (34%)
 - Sugars 1g
- **Protein** 14g

<http://www.seapointfarms.com/images/SPF%20Dry%20Roasted%20Edamame%20Lightly%20Salted%20711575102005%20back.jpg>

Snickers

(Old Product)

www.snickers.com/Nutritional-Info



- Serving Size: 1 Bar (52.7g) — 250 calories
- **Total Fat** 12g (18%)
 - Saturated Fat 4.5g (23%)
 - Trans Fat "0g"
- **Cholesterol** 5mg (2%)
- **Sodium** 120mg (5%)
- **Total Carbohydrates** 33g (11%)
 - Dietary Fiber 1g (4%)
 - Sugars 27g
- **Protein** 4g

<https://www.snickers.com/Nutritional-Inf>

Compare and Contrast

Dry Roasted Edamame

(New Addition)

- **Ingredients:** SOYBEANS, SEA SALT
- Many health websites and nutritionists recommend items with a short ingredient list.

Snickers

(Old Product)

- **Ingredients:** MILK CHOCOLATE (SUGAR, COCOA BUTTER, CHOCOLATE, SKIM MILK, LACTOSE, MILKFAT, SOY LECITHIN, ARTIFICIAL FLAVOR), PEANUTS, CORN SYRUP, SUGAR, MILKFAT, SKIM MILK, **PARTIALLY HYDROGENATED SOYBEAN OIL**, LACTOSE, SALT, EGG WHITES, CHOCOLATE, ARTIFICIAL FLAVOR. MAY CONTAIN ALMONDS
- The snickers bar claims 0g of *trans* fat, but the partially hydrogenated oils it contains actually contribute approximately 0.1g of *trans* fat per bar.

Compare and Contrast

- The Snickers Bar (250 calories) contains nearly 2 times the calories of the Dry Roasted Edamame (130 calories).
- The protein content for one serving of the Dry Roasted Edamame (14g) is 3.5 times more than one serving of Snickers (4g), yet the Snickers weighs nearly twice as much as the edamame.
- The total fat of the Dry Roasted Edamame is one-third that of the Snickers.
 - Over 85% of the Dry Roasted Edamame fat comes from polyunsaturated or monounsaturated fats.
 - Less than 65% of the Snickers fat consists of polyunsaturated or monounsaturated fats (*trans* fats included).
 - There is **9 times** the amount of saturated fat in the Snickers compared to the edamame.
- 80% (8g) of the carbohydrates in the Dry Roasted Edamame consist of fiber, while **3%** (1g) of the carbohydrates in a snickers bar consist of fiber.

Contrast and Compare

GoGo Squeez Applesauce

(New Addition)



<http://www.gogosqueez.com/products/apple-apple/>

- Serving Size: 1 pouch (90g) — 60 calories
- **Total Fat** 0g (0%)
 - Saturated Fat 0g (0%)
 - Trans Fat 0g
- **Cholesterol** 0mg (0%)
- **Sodium** 0mg (0%)
- **Total Carbohydrates** 15g (5%)
 - Dietary Fiber 1g (4%)
 - Sugars 12g
- **Protein** 0g

Strawberry Pop-Tart

(Old Product)

- Serving Size: 1 Pastry (48g) — 190 calories
- **Total Fat** 4.5g (7%)
 - Saturated Fat 1.5g (8%)
 - Trans Fat 0g
- **Cholesterol** 0mg (0%)
- **Sodium** 160mg (7%)
- **Total Carbohydrates** 35g (12%)
 - Dietary Fiber less than 1g (2%)
 - Sugars 15g
- **Protein** 2g



<http://en.wikipedia.org/wiki/File:Strawberry-Pop-Tarts.jpg>

Contrast and Compare

GoGo Squeez Applesauce

(New Addition)

- **Ingredients:** organic apple, organic apple juice concentrate

Strawberry Pop-Tart

(Old Product)

- **Ingredients:** enriched flour (wheat flour, niacin, reduced iron, thiamin mononitrate [vitamin b1], riboflavin [vitamin b2], folic acid), corn syrup, high fructose corn syrup, dextrose, soybean and palm oil (with tbhq for freshness), sugar, cracker meal, contains two percent or less of wheat starch, salt, dried strawberries, dried pears, dried apples, leavening (baking soda, sodium acid pyrophosphate, monocalcium phosphate), citric acid, milled corn, gelatin, soybean oil, modified corn starch, caramel color, soy lecithin, xanthan gum, modified wheat starch, vitamin a palmitate, red 40, niacinamide, reduced iron, color added, turmeric extract, vitamin b6 (pyridoxine hydrochloride), yellow 6, vitamin b2 (riboflavin), vitamin b1 (thiamin hydrochloride), blue 1

Contrast and Compare

- The Pop-Tart weighs about half as much as the GoGo Squeez Applesauce, but contains over three times the calories—contributing to less satiation for more energy.
- Unlike the Pop-Tart, the GoGo Squeez Applesauce is void of fat and salt, but the Pop-Tart contains a small amount of protein.
- The GoGo Squeez Applesauce contains 15 grams of natural carbohydrates while the Pop-Tart contains 35 grams of mostly added sugars.
- Controversy surrounds some ingredients present in the Pop-Tart, such as:
 - added colors (red 40, yellow 6, blue 1, caramel color)
 - Tert-butylhydroquinone (tBHQ) preservative

Potential Adverse Effects

- tBHQ may induce carcinogenesis in humans (Gharavi et al., 2007).
- Added colors have been reported to cause hyperactivity in children and contribute (Arnold et al., 2012).
- Starting in 2010, Europe mandated a warning label for foods containing artificial dyes: cautioning consumers of the potential hyperactive effects on children (Potera, 2010).

Natural Versus Added Sugars

- The evidence behind whether natural sugars are better than added sugars seems inconclusive.
- Genetically modified sugars like high fructose corn syrup have not been documented to have a significantly different physiological impact on the human body compared to natural sugars.
- The main differences between the added sugars in the Pop-Tart and the natural sugars in the GoGo Squeez Applesauce, are the phytochemicals and antioxidants present in the applesauce.

Phytochemicals and Antioxidants

- The most common phytochemicals in fruits and vegetables are carotenoids, flavonoids, isoflavonoids, and phenolic acids.
- Apples are a very significant source of flavonoids.
- A Finnish study of 10,000 people indicated that flavonoid intake is positively associated with decreased mortality.
- The antioxidants present in apples help prevent chronic disease and slow aging (Boyer et al., 2004).
- It is important to note that the processing of the apples into applesauce may reduce the total amount of phytochemical and antioxidant components, but there has been no research to verify the potential reduction.

Taste Testing Survey

- The taste testing survey was an attempt to ascertain the majority preference of the City of Manhattan workers.
- Confounding variables may be present, primarily because the participants knew the food was healthier, therefore, they may possess a preconceived bias.
- The taste testing participants were all above the age of 18, so denoting the taste preference of adolescents and younger individuals is not necessarily applicable.



Our taste testing session was held in the City Commission Room. There were a total of 31 participants.

Taste Testing Food Ranking

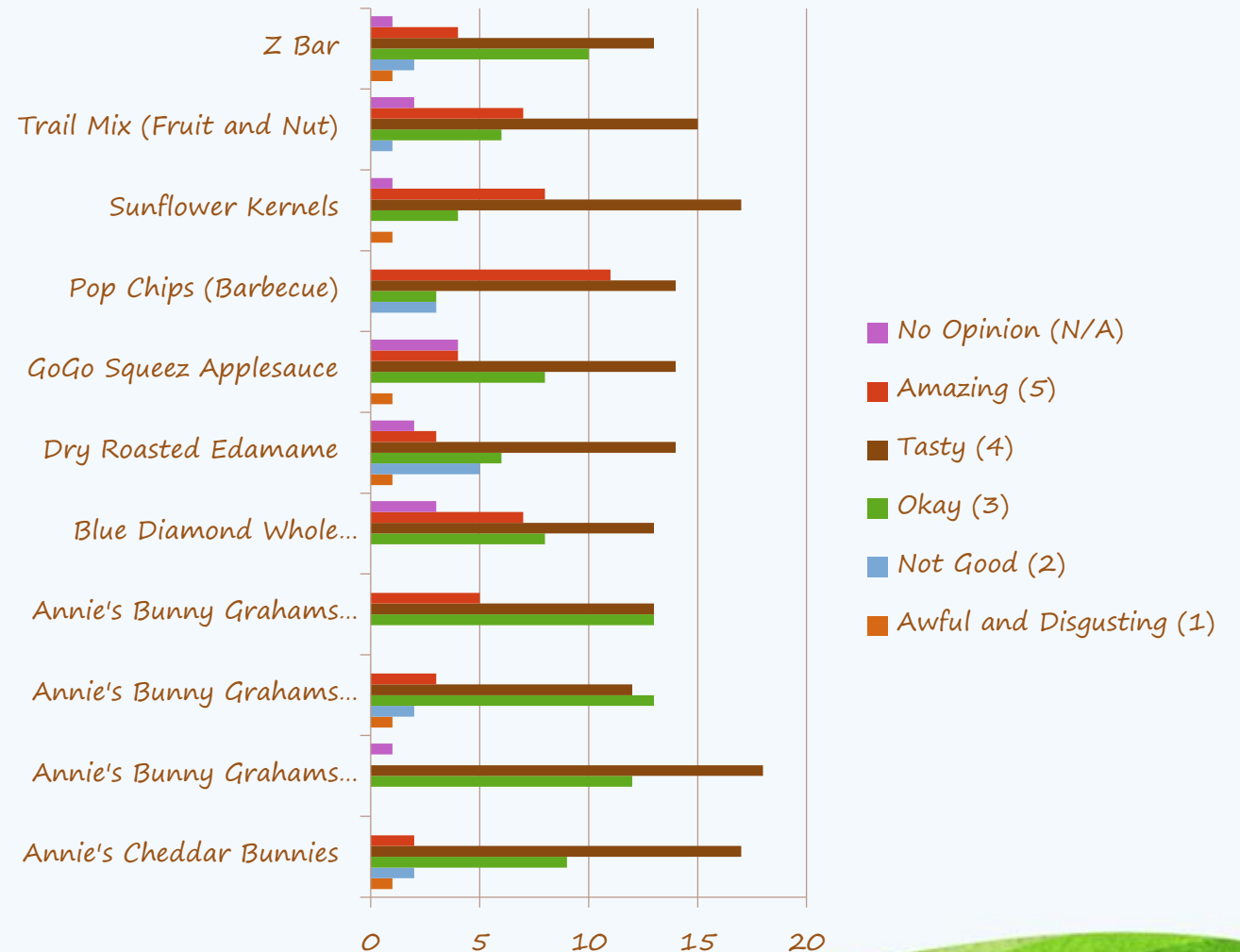
Healthier Vending Machine Options	Awful and Disgusting	Not Good	Okay	Tasty	Amazing	No Opinion
Annie's Cheddar Bunnies	1	2	3	4	5	N/A
Annie's Bunny Grahams (Honey)	1	2	3	4	5	N/A
Annie's Bunny Grahams (Chocolate)	1	2	3	4	5	N/A
Annie's Bunny Grahams (Chocolate Chip)	1	2	3	4	5	N/A
Blue Diamond Whole Natural Almonds	1	2	3	4	5	N/A
Dry Roasted Edamame	1	2	3	4	5	N/A
GoGo Squeez Applesauce	1	2	3	4	5	N/A
Pop Chips (Barbecue)	1	2	3	4	5	N/A
Sunflower Kernels.	1	2	3	4	5	N/A
Trail Mix (Fruit and Nut)	1	2	3	4	5	N/A
Z Bar	1	2	3	4	5	N/A

- The ranking system was from 1-5 in ascending order of taste, and most of the participants abided by the system.
- A few individuals took an intermediate stance between two numbers.
- To maintain greater validity I took the greater of the two numbers if this was the case.
- Two of the items listed in the taste testing survey were not included in our first set of vending machine additions (Pop Chips & Blue Diamond Whole Natural Almonds).

Taste Testing Survey Results

Taste Testing Food Ranking

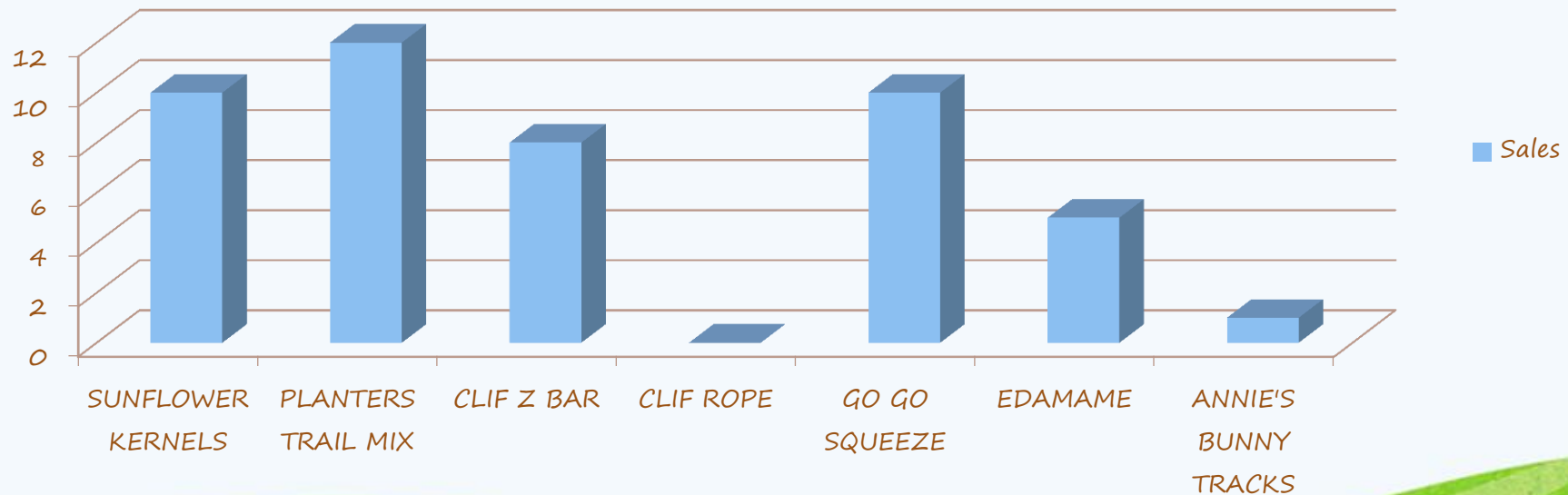
Healthier Vending Machine Options	Awful and Disgusting	Not Good	Okay	Tasty	Amazing	No Opinion
Annie's Cheddar Bunnies [71%]	1	2	9	17	2	
Annie's Bunny Grahams (Honey) [72%]			12	18		1
Annie's Bunny Grahams (Chocolate) [69%]	1	2	13	12	3	
Annie's Bunny Grahams (Chocolate Chip) [75%]			13	13	5	
Blue Diamond Whole Natural Almonds [79%]			8	13	7	3
Dry Roasted Edamame [69%]	1	5	6	14	3	2
GoGo Squeez Applesauce [75%]	1		8	14	4	4
Pop Chips (Barbecue) [81%]		3	3	14	11	
Sunflower Kernels [81%]	1		4	17	8	1
Trail Mix (Fruit and Nut) [79%]		1	6	15	7	2
Z Bar [71%]	1	2	10	13	4	1



First Month Sales




- The new item best sellers after the first month of implementation were different than Ginny Barnard, Katy Oesterman, Cathy Harmes, Terry Francis, and I expected.
- The seeds and nuts were expected, but the success of the GoGo Squeez Applesauce was a surprise.

Items Sold (April 1st to March 10th)




Little Apple Core Newsletter

- To provide some publicity for the new additions, we sent in an article for the Manhattan Newsletter.
- The article was featured on the first page of the newsletter, which was a pleasant surprise.

INSIDE:
 **PASSWORD TIPS, 4**
 **HEALTH IDEAS, 5**
 **ICE BOWL, 6**

MARCH/APRIL 2014


 **THE LITTLE APPLE CORE**

Snow removal crews log 100s of hours

Manhattan's snow removal crews logged 1,982.5 call-back, on-call and bad-weather hours during and following February snowstorms.

The crews plowed a foot of snow from City streets on Feb. 4 and 5 and moved additional snowfall on Feb. 9.

In appreciation for the City's efforts, the Becoming Girls group of Boys and Girls Club of Manhattan stopped by the Street Department to deliver valentines to members of the department following the early February snowstorms. The girls group was one of many to offer their appreciation to the crews following the storm.



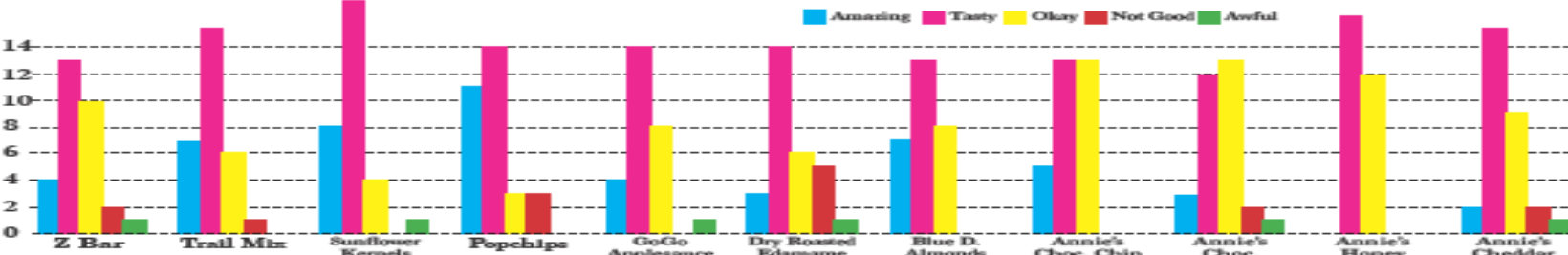
The Becoming Girls group from Boys and Girls Club of Manhattan delivered valentines to the Street Department in appreciation of the department's efforts to clear snow in February.

Healthy options make way to vending machines

New food items were recently implemented into the vending machine at City Hall. More than 30 people participated in a taste testing, and the foods received a high approval rating. If you are hungry and craving a snack, give the new foods a try.

Following is data rating the new food options implemented into the machine by participants of the survey. The Popchips and Blue Diamond Almonds were not added to the machine.

— Information provided by HR



Food Item	Amazing	Tasty	Okay	Not Good	Awful
Z Bar	4	13	10	2	1
Trail Mix	7	15	6	1	1
Sunflower Kernels	8	16	4	1	1
Popchips	11	14	3	3	1
GoGo Applesauce	4	14	8	1	1
Dry Roasted Edamame	3	14	6	5	1
Blue D. Almonds	7	13	8	1	1
Annie's Choc. Chip	5	13	13	1	1
Annie's Choc.	3	12	13	2	1
Annie's Honey	1	15	12	1	1
Annie's Cheddar	2	15	9	2	1

Concession Initiative

- Johnson County has not been as bold as we are here in Manhattan
 - They have only taken on one challenge at a time.
- We have been trying to influence both vending and concessions simultaneously.
- I have not had the chance to influence concession changes like I wish I could have.
- I mainly have just provided suggestions, and a lot of work is still to be done with the healthy vending and concession initiatives.



Core Competencies

- ✓ *Biostatistics*
- ✓ *Environmental Toxicology*
- ✓ *Epidemiology*
- ✓ *Health Services and Administration*
- ✓ *Social And behavioral Sciences*

Biostatistics

- A lot of statistical analysis were conducted over nutrition and diet preference.
- The biostatistical involvement of the healthy vending project was basic, but necessary for implementation of the new products and understanding the target audience.
- Examples:
 - Taste testing survey – analyzed participant palate preferential.
 - HLAC perception survey – collected nutritional preferences and access to healthy foods.
 - Worksite wellness survey – evaluated worksite access to healthy foods.

Environmental Toxicology

❖ Examples:

- Junior Master Gardener
 - Anthropologic toxicant introduction
 - Heavy metal contamination
 - Inadvertent toxin exposure
- Garden hoses are often rampant with BPA and dangerously high lead levels. If the kids were to drink from a garden hose, they are potentially consuming many unwanted chemicals. The hose could increase the heavy metal concentration of the garden soil as well.

Epidemiology

- No clinical research was conducted during my field experience, but obesity prevention was of the utmost concern.
- The World Health Organization defines epidemiology as “the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems.”
- Given this definition, the primary example of epidemiology in my field experience was monitoring and documenting the vending sales by time period and location.

Health Services and Administration

- The impact of health services and administration in my field experience is very minimal, but the accessibility and necessity for health services may potentially be reduced by the implementation of healthier food items into the vending machines.
 - However, this implication is directly dependent upon a successful shift in consumer trends towards the new food additions.

Social and Behavioral Sciences

- Social and behavioral sciences were heavily involved when considering the taste testing survey and the interactions with the elementary school students.
- The taste testing results may be confounded by the “healthy” stigma given to the items before testing.
- I believe the stigma of healthy food is also prevalent with the elementary children, however, harvesting the garden themselves seemed to reduce the stigma to some degree.

The Future of the Initiative and I

- The future of the healthy vending initiative has been left in great, capable hands. The FHWC will not falter in its constant endeavor to make Manhattan a healthier community.
- I am excited to see the progress of the healthy vending and concession initiatives in my absence.
- I will be working for the University of Kansas Medical Center with the Kansas Cancer Registry as a research associate.

References

Arnold, L. E., Lofthouse, N., & Hurt, E. (2012). Artificial food colors and attention-deficit/hyperactivity symptoms: Conclusions to dye for. *Neurotherapeutics : The Journal of the American Society for Experimental NeuroTherapeutics*, 9(3), 599-609. doi:10.1007/s13311-012-0133-x; 10.1007/s13311-012-0133-x

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- Additional references available upon request