

Developing a healthy, sustainable pizza for Yale events

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Background

Healthy eating can positively impact not only individual wellness, but also that of the environment. A burgeoning food movement has centered around an environmentally sustainable diet, which the Food and Agriculture Organization defines as “diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations...;[which] are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” [1]. An example of such a diet is one that consists primarily of vegetables, which uses less land and water resources [2]. Additionally, vegetable-based diets produce fewer greenhouse gas emissions than animal-based diets, which are associated with up to 20% of all greenhouse gas emissions [3].

Objective: to develop a pizza that is healthier and better for the environment than the average pie - without sacrificing taste or driving up consumer cost

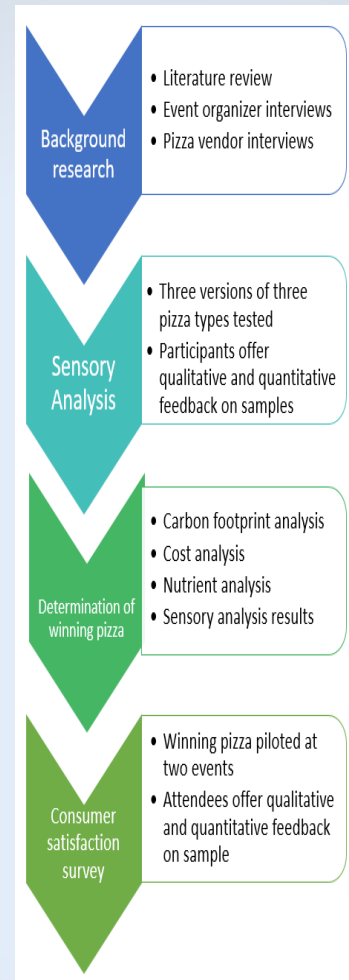
→Why pizza?

Pizza is a popular choice among Yale students due to convenience, relatively low cost, and New Haven’s pizza culture. For the same reasons, pizza is often served at Yale events such as lunchtime meetings or seminars. However, pizza tends to be high in calories, saturated fat, and sodium, which are risk factors for weight gain and obesity, cardiovascular disease, and hypertension, respectively. Pizza also tends to be low in fiber, which has multiple health benefits. Pizza has a high carbon footprint due to meat toppings and cheese.

	Pizza slice (100g)	% of USDA dietary guidelines*	USDA dietary guidelines*
Calories	266	13	2000
Saturated Fat (g)	4.5	20	<22.2
Sodium (mg)	598	26	<2300
Fiber (g)	2.3	8	>28

*based on 2000 calories/day

Methods



Results



Event organizer interviews (n=46)
 When ordering food, event organizers, including student leaders and administrative assistants, tend to prioritize low cost, convenience, and tastiness.

Pizza vendor interviews (n=5)

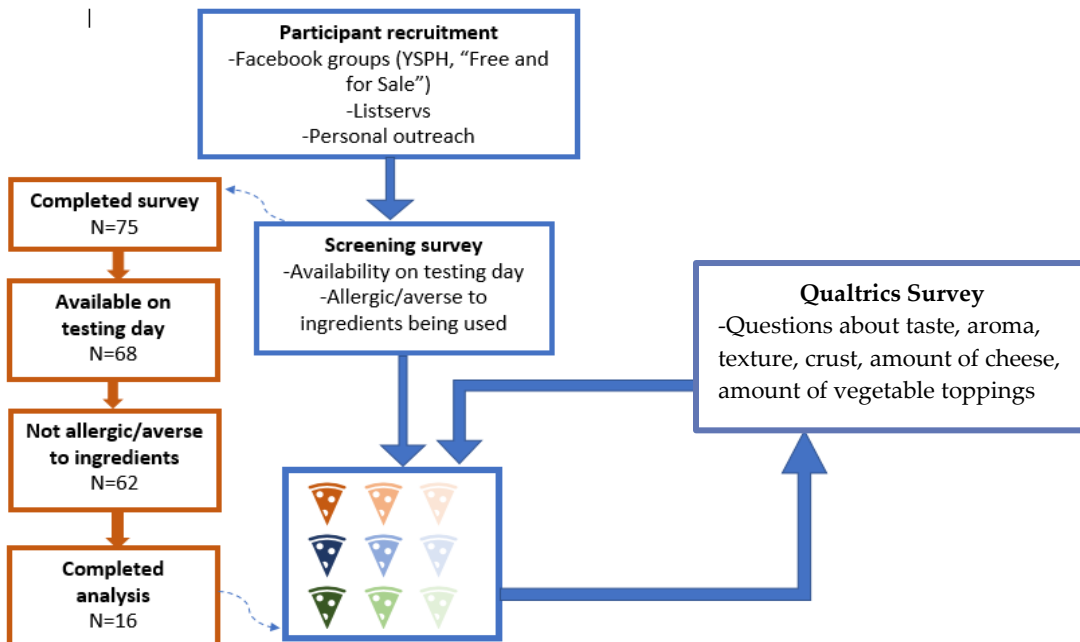
- Plain cheese pizzas and single-item meat pizzas are the most popular orders in New Haven.
- Success with current recipes made vendors reluctant to making their pizzas healthier and more sustainable.
- Vendors will accommodate individual requests for healthier and more sustainable options.

Pizzas tested for cost, health, sustainability, and sensory analysis

“Connie’s Special” - ricotta, spinach, red pepper	“Connie’s Special” with 25% increase in veggies, 25% decrease in ricotta	“Connie’s Special” with 50% increase in veggies, 50% decrease in ricotta
“Veggie Special” - mushroom, green pepper, onion, eggplant, mozzarella	“Veggie Special” - with 25% increase in veggies, 25% decrease in mozzarella	“Veggie Special” - with 50% increase in veggies, 50% decrease in mozzarella
“Margarita” - basil, fresh tomato, spinach, goat cheese	“Margarita” with chickpea crust	“Margarita” with cauliflower crust



Sensory Analysis Design



Determination of winning pizza

	Rank*								
	Veggie Orig	Veggie 25%	Veggie 50%	Marg Orig	Marg Cauliflower	Marg Chickpea	Connie's Orig	Connie's 25%	Connie's 50%
Sensory	4	2	6	5	8	9	1	3	7
Cost	3	2	1	6	9	8	7	5	4
Health	7	5	3	4	1	2	9	8	6
Carbon footprint	8	6	3	2	1	5	9	7	4
Average rank	5.50	3.75	3.25	4.25	4.75	6.00	6.50	5.75	5.25

*The nine pizzas were ranked from 1 (highest rank) to 9 (lowest rank) in each category.

"Too thin and no taste."
-Participant on Marg Cauliflower

"As someone who is more of a meat eater this would not be my first choice but I appreciate the taste." -Participant on Veggie 50%

"The taste of the crust was bland and felt like it was microwaved."
- Participant on Marg Chickpea

Consumer Satisfaction Survey Protocol

	Round 1	Round 2
Type of pizzas served	Veggie Special Original; Veggie Special with 50% reduced cheese and 50% increased vegetables	Veggie Special Original; Veggie Special with 50% reduced cheese and 50% increased vegetables
Pizza vendor	Abate's	School of Management Kitchen
Environment and demographics of consumer satisfaction survey	Pizza administered during a class at the School of Public Health; main participants were students in the class, along with people in the building who heard about the pizza from friends or a Facebook post	Pizza administered at the Yale School of Management's cafeteria; main participants were students and staff members at SOM who were in the cafeteria
Number of participants	31	10
Limitations	Abate's didn't measure out ingredients, so the 50% changes in cheese and vegetables were approximated by their chefs	Not randomized; small sample size

Consumer satisfaction survey

Consumer satisfaction survey results

- High level of satisfaction with both versions of pizza.
- When asked which pizza they preferred, participants divided about equally between the two pizzas.
- Most participants would change their mind if they had known that their "not preferred" pizza was healthier and better for the environment.
- Many participants could not tell the difference between the two pizzas.

"BOTH WERE DELICIOUS"
-Participant

Conclusion

- More “hidden” approaches to increasing health and sustainability, like reducing the cheese and increasing the vegetables, were more popular than more “radical” approaches, like the alternative crusts.
- Participants’ satisfaction level was not significantly affected by a 50% reduction in cheese and 50% increase in vegetables.

Limitations

- Inconsistent thickness of crusts and inconsistent proportions of vegetables in pizza slices for sensory analysis
- Small sample sizes
- Lack of randomization for Round 2 consumer satisfaction survey

Making your pizza healthier and more sustainable

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Looking to increase the health and sustainability of your pizza without sacrificing taste or emptying your wallet? Here are some ideas:

- Choose veggie toppings over meat toppings. In particular, mushrooms are a great topping - they’re healthy and have a low carbon footprint.
- Ask for half the amount of normal cheese, which is a main source of calories, saturated fat, sodium, and greenhouse gas emissions. You won’t notice the difference, we promise! (You can also ask for more vegetable toppings, but vendors may charge you extra.)
- Consider simpler pizzas. Our original margarita pizza had a high health rating and low carbon footprint even before we modified the crust. New Haven is an excellent place to try out “classic” pizzas with just crust and sauce.
- Choose less processed types of cheese, like mozzarella, to reduce your impact on the environment.

References:

1. Food and Agriculture Organization of the United Nations. [//www.fao.org/nutrition/education/food-dietary-guidelines/background/sustainable-dietary-guidelines/en/](http://www.fao.org/nutrition/education/food-dietary-guidelines/background/sustainable-dietary-guidelines/en/)
2. Pimentel, D., & Pimentel, M. (2003). Sustainability of meat-based and plant-based diets and the environment. *The American Journal of Clinical Nutrition*, 78(3), 660S-3S.
3. Springman, M., Godfray, H. C. J., Rayner, M., & Scarborough, P. (2016). Analysis and valuation of the health and climate change cobenefits of dietary change. *Proceedings of the National Academy of Sciences*, 113(15), 4146-51.