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The Cost of a Healthy Diet:  
Accounting for Nutrition and Food Spending  
Goals and Constraints

Session:

USDA Modernizes the Thrifty Food Plan  
USDA Agricultural Outlook Forum  
February 24-25, 2022

Parke Wilde

The New York Times

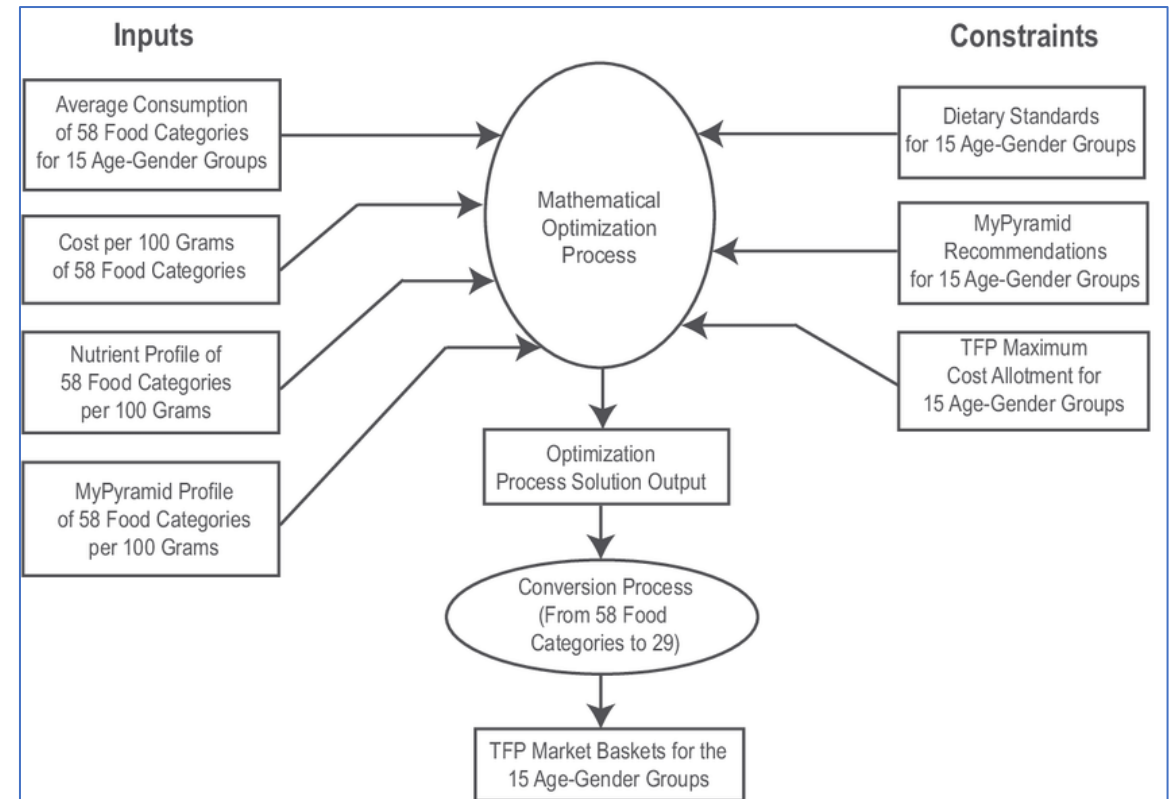
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# *Biden Administration Prompts Largest Permanent Increase in Food Stamps*

The jump in benefits, the biggest in the program's history, comes after a revision of the initiative's nutrition standards that supporters say will reduce hunger and better reflect how Americans eat.

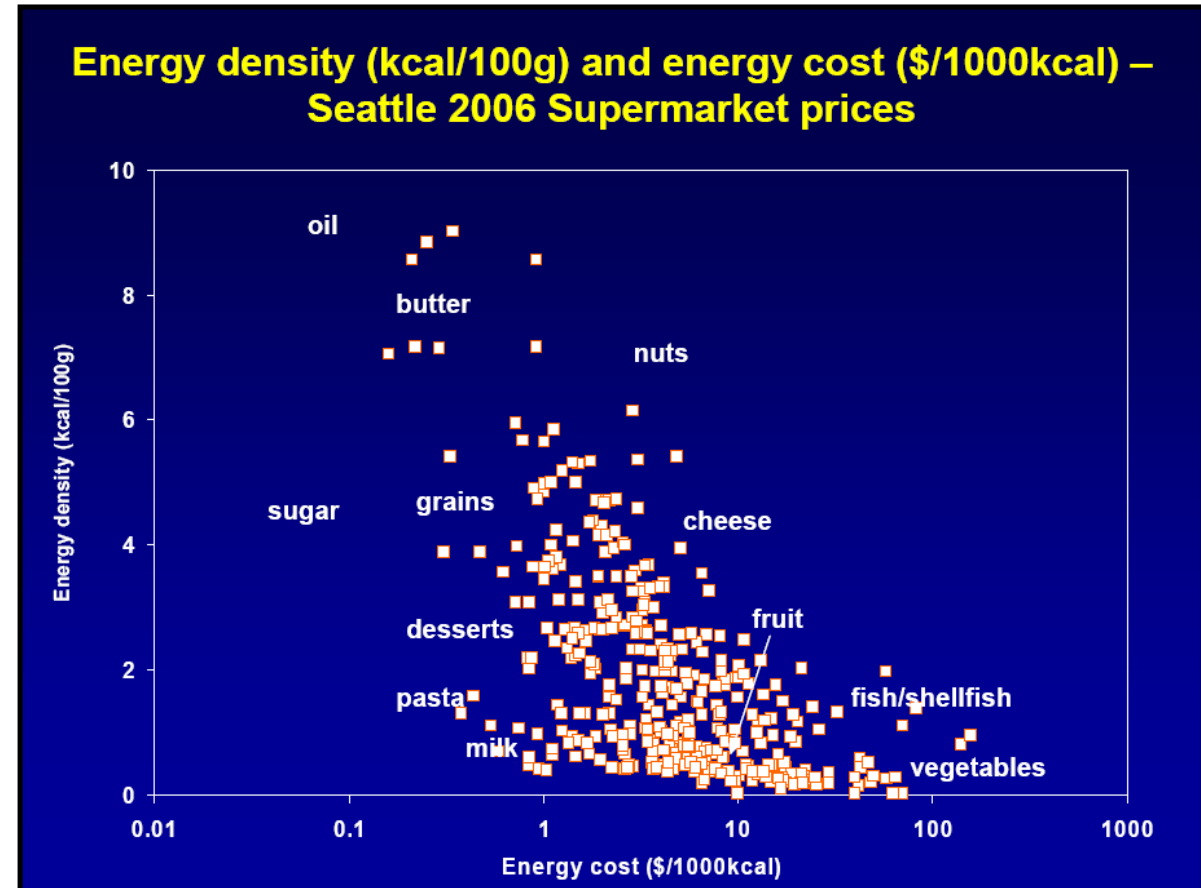
# What is the cost of a healthy diet?

- Carlson et al. (2006)
- Wilde and Llobrera (2009)



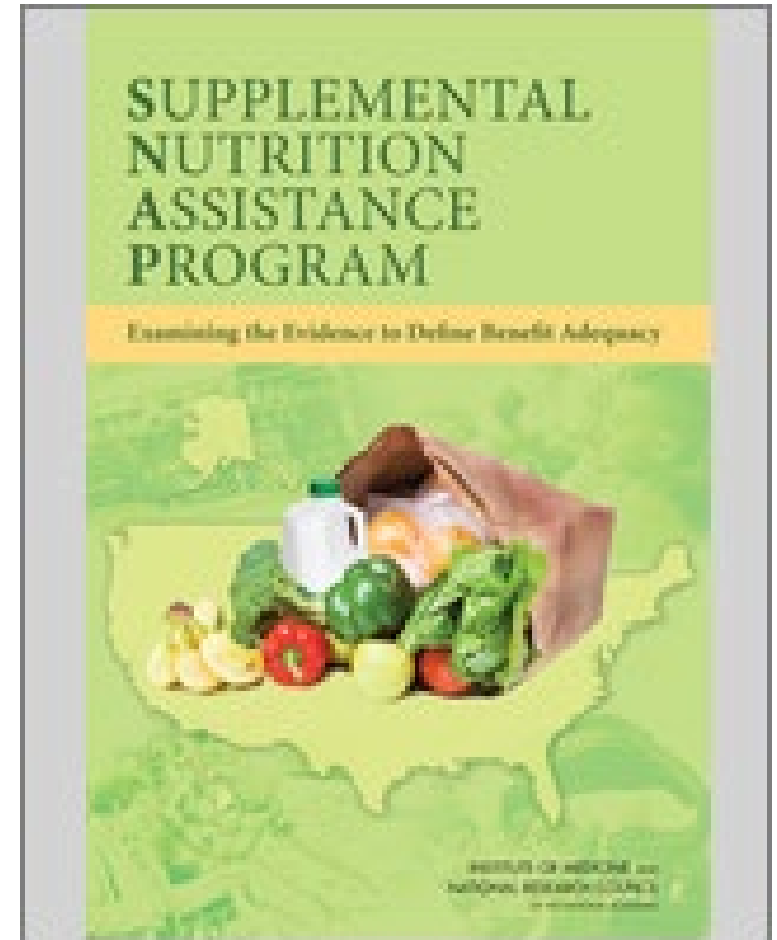
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- Carlson et al. (2006)
- Wilde and Llobrera (2009)
- Drewnowski (2007)
- Caswell and Yaktine (2013)
- Ziliak (2016)
- Fan, Baylis, Gundersen, Ver Ploeg (2018)
- Waxman, Gundersen, Thompson (2018)
- Carlson, Llobrera, Keith-Jennings (2021)
- USDA (August, 2021)



More healthy



More occasional

Less expensive



More expensive

More healthy



More occasional

Less expensive



More expensive



# From Scarcity to Prosperity: Nutrition and Food Spending Goals and Constraints for Low-Income Americans

Investigators: Parke Wilde, Linlin Fan, Norbert Wilson, Sara Folta

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Students: Yiwen Zhao, Elena Martinez, Aiden Gildea, and Angélica Valdés Valderrama

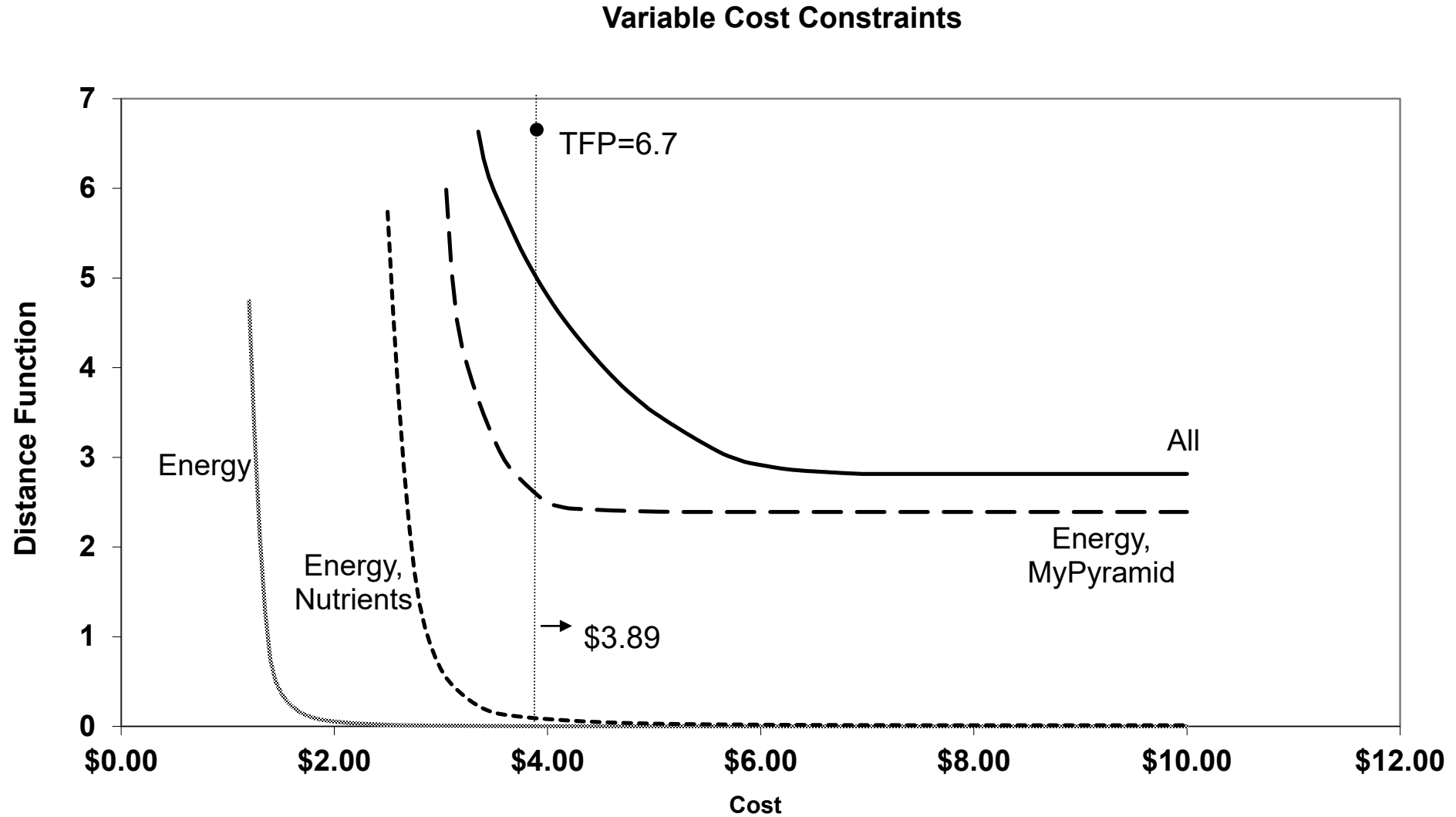
Advisors: Tatiana Andreyeva, Andrea Carlson, Will Masters, food bank/pantry partners

# Optimization framework in the spirit of the Thrifty Food Plan (TFP)

Choose a plan (123 category quantities in our case):

- Not too different from current intake (quadratic objective function)
- Meeting constraints:
  - Cost and food energy
  - Nutrients from the *Dietary Guidelines 2020-2025*
  - Broad food categories from *MyPlate*
  - *Practicality* constraints

# Choice of constraints $\rightarrow$ estimated cost.



Source: Wilde and Llobrera (2009).

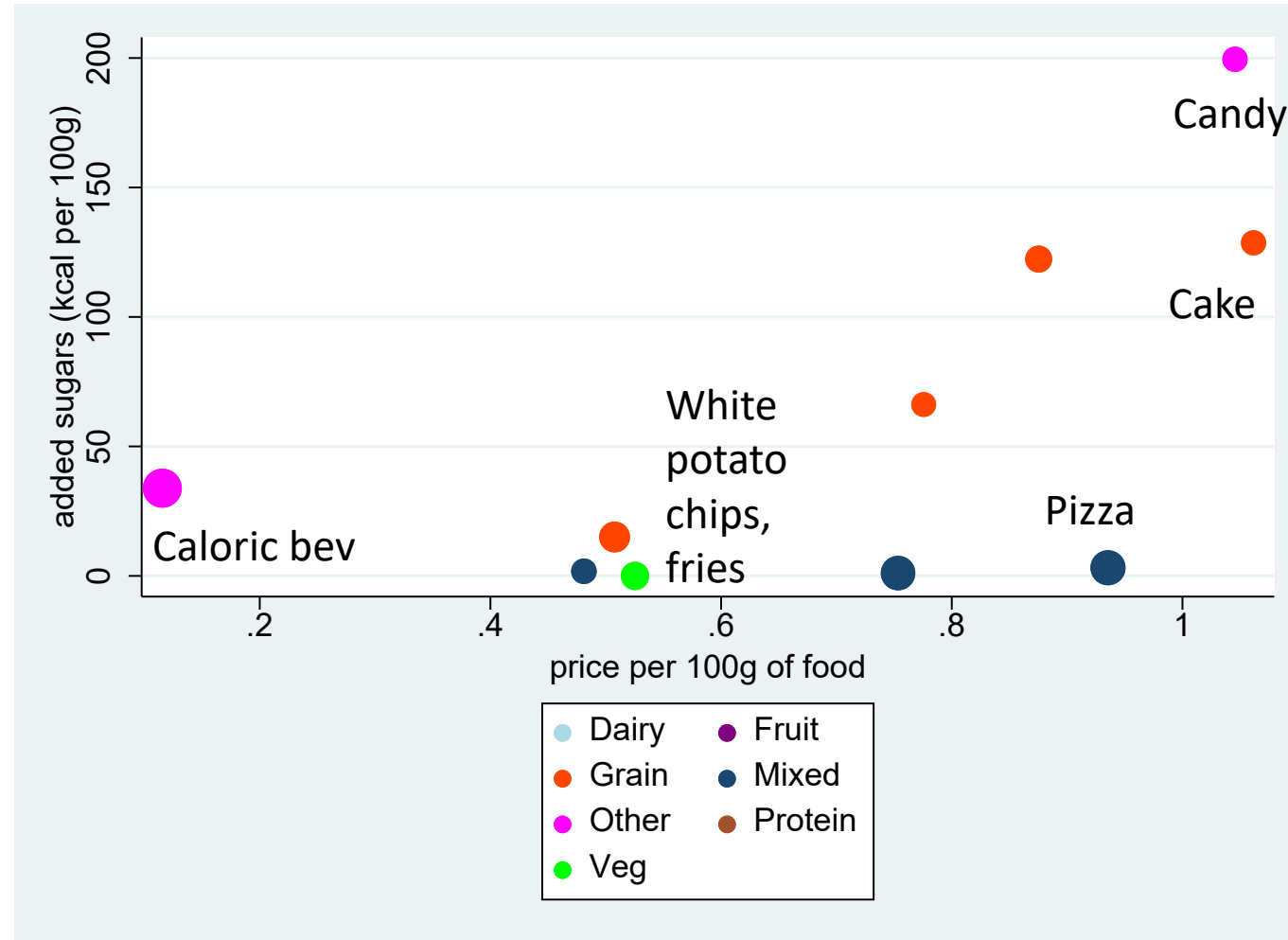
# Insights

- Easier to meet nutrient constraints than food group constraints
- Expectations for fruits, vegetables, and protein foods matter
- Strict or more feasible sodium constraint
- Interaction of constraints and aspirations

# Preliminary: 10 most-consumed categories

categ	category	current		output	
		rank	calories	rank	calories
122	Caloric beverages, non-alcoholic	1	117.41	15	51.42
72	Pizza	2	93.46	26	1.17
71	Mixed dishes, Mexican	3	90.25	27	1.13
49	Bread and rolls, not whole wheat or whole grain	4	69.94	28	0.88
35	White potato chips, french fries and other fried white potatoes	5	57.9	10	101.16
56	Cookies	6	52.14	29	0.65
76	Pasta dishes, including macaroni	7	45.78	30	0.57
116	Candy	8	44.79	31	0.56
55	Cake	9	44.24	32	0.56
58	Doughnuts, strudel, pastries, muffins, biscuits, scones, and other bakery products	10	42.87	33	0.54

# Preliminary: 10 most-consumed categories



# The Works Pizza

Entrées, Serves 8, 1 slice per serving

Prep time: 30 minutes • Cook time: 25 minutes



Whole Wheat  
Pizza Dough  
= \$1.49

+



8-ounce can of  
Tomato Sauce,  
No Salt Added  
= \$0.49

+



¼ teaspoon  
Dried Basil  
= \$0.03

+



¼ teaspoon  
Dried Oregano  
= \$0.03

+



6-ounce block of  
Mozzarella Cheese  
= \$2.17

+



1 tablespoon  
Canola Oil  
= \$0.06

+



Large Onion  
= \$0.99

+



Medium Red  
Bell Pepper  
= \$0.89

+



Medium Green  
Bell Pepper  
= \$0.69

+



2 medium  
Tomatoes  
= \$2.58

+



8 ounces of Button  
Mushrooms  
= \$1.79

+



Light coat of Non-  
stick Cooking Spray  
= \$0.04

=



\$11.25

Total grocery cost \$23.57  
Cost per serving: \$1.41

## The Works Pizza

Prep time: 30 minutes

Cook time: 25 minutes

### Nutrition Facts

Serving Size 1/8 of pizza (190g)  
Servings per Recipe 8 slices

Amount Per Serving

**Calories** 210      **Calories from Fat** 80

% Daily Value\*

**Total Fat** 9g      14%

Saturated Fat 3g      15%

Trans Fat 0g

**Cholesterol** 10mg      3%

**Sodium** 240mg      10%

**Total Carbohydrate** 26g      9%

Dietary Fiber 3g      12%

Sugars 5g

**Protein** 10g

Vitamin A 20%      •      Vitamin C 70%

Calcium 15%      •      Iron 8%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

**Ingredients:** Whole Wheat Pizza Dough, Bell Peppers, Onion, Tomatoes, Button Mushrooms, Tomato Sauce (No Salt Added), Mozzarella Cheese, Canola Oil, Dried Basil, Dried Oregano, Non-Stick Cooking Spray.

# Tomato Egg Drop Soup

Entrée. Serves 4

1 cup per serving

Prep time = 5 minutes Cook time = 10 minutes



Vegetable oil  
2 TBS = \$0.06

+



Tomatoes  
2 small = \$1.18

+



Chicken broth  
1 cup = \$0.33

+



Water  
2 cups = free

+



Sesame oil  
1 tsp = \$0.10

+



White pepper  
¼ tsp = \$0.16

+



Egg  
1 egg = \$0.11

+



Cornstarch  
1 ½ tsp = approx. \$0.07

+



Scallions  
1 scallion = \$0.15

+



Cilantro  
2 TBS = \$0.11

=



## Nutrition Facts

4 servings per container

Serving size **1 cup (234g)**

Amount Per Serving

**Calories 110**

	% Daily Value*
<b>Total Fat</b> 1g	<b>1%</b>
Saturated Fat 1g	<b>5%</b>
Trans Fat 0g	
<b>Cholesterol</b> 40mg	<b>13%</b>
<b>Sodium</b> 360mg	<b>16%</b>
<b>Total Carbohydrate</b> 5g	<b>2%</b>
Dietary Fiber 1g	<b>4%</b>
Total Sugars 2g	
Includes 0g Added Sugars	<b>0%</b>
<b>Protein</b> 4g	<b>8%</b>

Not a significant source of vitamin D, calcium, iron, and potassium

\*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Ingredients: Tomatoes, egg, water, chicken broth, vegetable oil, scallions, sesame oil, white pepper, cornstarch, cilantro

Total for recipe = \$2.20  
Cost per serving = \$0.55

\*Prices from Walmart website January 2022



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