

# MechaChef

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# Abstract

The process of making food is tiring and time-consuming, especially during COVID-19, which causes several people to resort to eating out at fast food chains. However, as Dr. Ananya Mandal, MD says in her report at News Medical *“Studies have shown... consumption of food eaten away from home has also risen alarmingly... [and has resulted in] excess calorie intake and increases the risk of obesity”* While some people do cook at home, they present themselves to numerous hazards, such as the chance of a fire and explosion when cooking due to high pressure and hot items. In an article by the National Fire Protection Association, “US fire departments responded to an estimated average of 172,900 home structure fires per year started by cooking activities in 2014-2018.” To combat these disturbing issues, I developed a research question: How can I make the process of assembling a meal more efficient, easier, safer, and healthier for people across the world? I decided to answer this questions by making an all-in-one kitchen appliance that can chop and cook your food within less time and with only ingredients that you trust. Introducing MechaChef!

# Problems

- Time Consumption
  - Chopping and cooking food may take up several hours of a day.
- Safety Concerns
  - Burns
  - Knife Injury
- Health
  - Not being able to make food forces you to eat outside.
  - Fast-food leads to obesity, fatal heart diseases, and more
  - Fast-food is made to entice taste buds, and uses preservatives and other chemicals to accomplish this.

# My Solution

**I want to create a kitchen appliance that can:**

- Chop meats and vegetables and cook it with spices.
- Support different blade sizes to be able to cut vegetables in different sizes.
- Cook food with little to none human interaction, saving time for other important activities.
- Easy to use and easy to clean

**Constraints:**

- Should be small enough to be placed on kitchen countertop
- Be safe to use
- Moderately inexpensive

# Research Question/Hypothesis

My research question is how can I make the process of assembling a meal more efficient and easier for people across the world?

I hypothesize that an all-in-one chopping and cooking machine can drastically reduce the amount of time spent preparing a meal, and can reduce chances of fatal diseases and obesity.

This topic is very important because obesity is an extremely huge problem in the U.S. and has affected 42.4% nationwide, according to the CDC. By eating homemade and healthy food, these people are taking the first steps forward to living a more healthy life.

# Background Information for Research

I decided to start researching this topic due to the COVID-19 pandemic, in which the process of making homemade food became necessary, but tedious. My research first started by trying to save time, but I then found other problems cooking food presented.

The main scientific studies that I referenced a lot when researching about this issue are the following:

Inc, Gallup. “Americans’ Dining-out Frequency Little Changed from 2008.” Gallup.com, 11 Jan. 2017, [news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx](https://news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx).

Sphynx\_Admin. “Are Americans Still Serving up Family Dinners?” *The Harris Poll*, 13 Nov. 2013, [theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/](https://theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/).

# Research Methods (Data Sources – where you got the data)

When researching in-depth about obesity and fast-food effects on kids and adults, I came across several reports and research papers, most of which are cited in my bibliography. However, the following studies were the *most* helpful in my research.

1. Byrd-Bredbenner, Carol, et al. “HomeStyles: Shaping Home Environments and Lifestyle Practices to Prevent Childhood Obesity: A Randomized Controlled Trial.” *Journal of Nutrition Education and Behavior*, vol. 47, no. 4, July 2015, p. S99, 10.1016/j.jneb.2015.04.267.
2. Martin-Biggers, Jennifer, et al. “Come and Get It! A Discussion of Family Mealtime Literature and Factors Affecting Obesity Risk1–3.” *Advances in Nutrition*, vol. 5, no. 3, 1 May 2014, pp. 235–247, [www.ncbi.nlm.nih.gov/pmc/articles/PMC4013176/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4013176/), 10.3945/an.113.005116.
3. McIntosh, William Alex, et al. “Mothers and Meals. The Effects of Mothers’ Meal Planning and Shopping Motivations on Children’s Participation in Family Meals.” *Appetite*, vol. 55, no. 3, 1 Dec. 2010, pp. 623–628, [www.sciencedirect.com/science/article/abs/pii/S0195666310005143](http://www.sciencedirect.com/science/article/abs/pii/S0195666310005143), 10.1016/j.appet.2010.09.016.
4. Inc, Gallup. “Americans’ Dining-out Frequency Little Changed from 2008.” [Gallup.com](http://Gallup.com), 11 Jan. 2017, [news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx](http://news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx).
5. Sphynx\_Admin. “Are Americans Still Serving up Family Dinners?” *The Harris Poll*, 13 Nov. 2013, [theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/](http://theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/).

# Research Methods (Data Use-what data did you use)

The data sources provided me with the data that was collected from various polls and surveys about how people's behavioural pattern has changed over time related to eating outside food. Some data showed that for some people due to the lack of time, it was more important to eat with the family rather than where the food came from. On the other side, there have been increase in the number of people living a lone life rather than getting married and having children. Because they're living alone, cooking food becomes more boring without a family to enjoy it with, making them turn to fast food. The amount of money the people earned also played an important role in people's decision to eat outside.

After my research, when trying to solve this problem, I surveyed 68 people to see if a machine like Mechachef would help them decide to eat a homemade meal rather than eat food from outside.

# Gallup Poll Data

Eating Dinner at a Restaurant in the Past Week, by Age

|                       | 18 to 34 | 35 to 54 | 55+ |
|-----------------------|----------|----------|-----|
|                       | %        | %        | %   |
| Zero times            | 28       | 35       | 50  |
| One time              | 31       | 26       | 22  |
| Two times             | 21       | 20       | 17  |
| Three or more times   | 20       | 19       | 11  |
| At least once (total) | 72       | 65       | 50  |

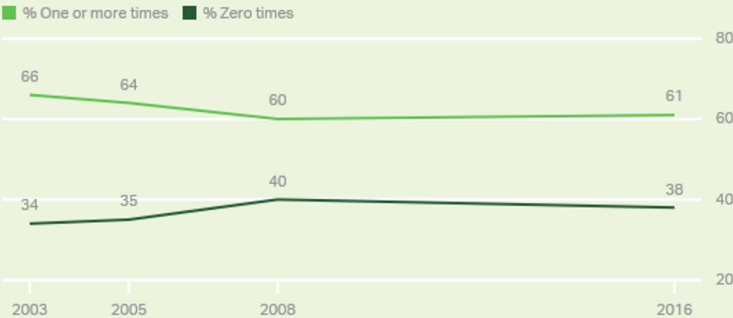
GALLUP, DEC. 7-11, 2016

Frequency of Eating Dinner at a Restaurant in the Past Week

|                     | Dec 11-14, 2003 | Dec 5-8, 2005 | Dec 4-7, 2008 | Dec 7-11, 2016 |
|---------------------|-----------------|---------------|---------------|----------------|
|                     | %               | %             | %             | %              |
| Zero times          | 34              | 35            | 40            | 38             |
| One time            | 29              | 29            | 28            | 26             |
| Two times           | 20              | 20            | 14            | 19             |
| Three or more times | 17              | 15            | 18            | 16             |

GALLUP

Thinking about last week, how many nights did you eat dinner out at a restaurant of any kind?

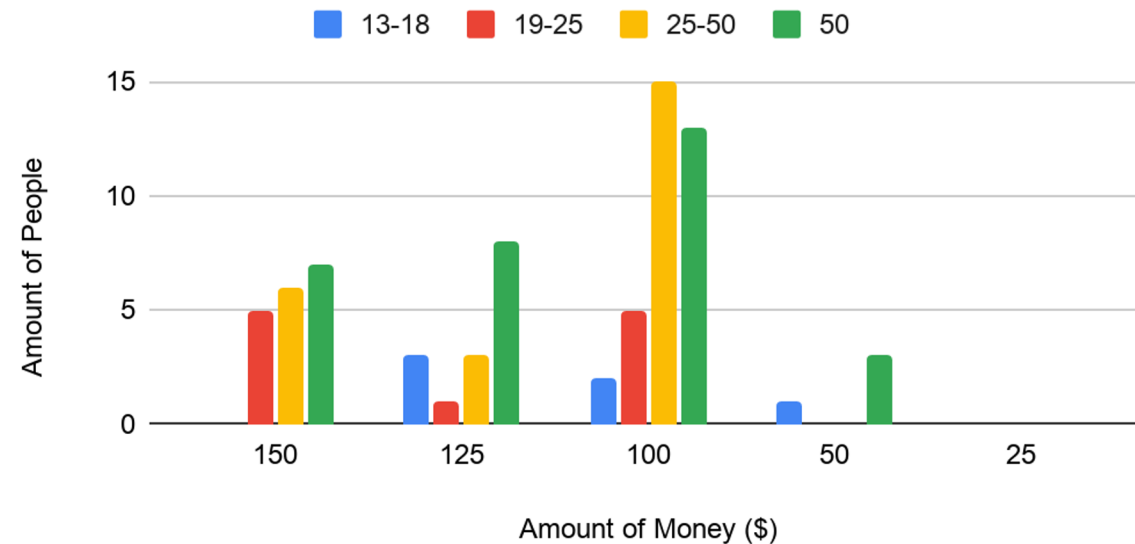


Trend based on polls conducted each December  
GALLUP

# Data Visualizations

## Ages vs. Prices to buy MechaChef

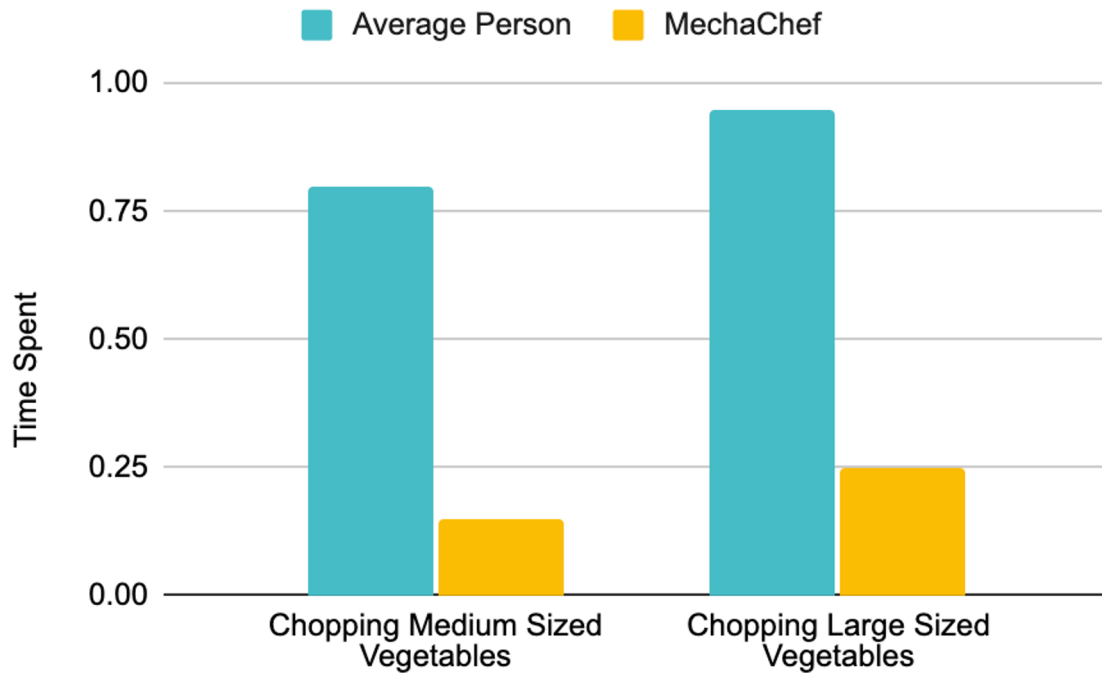
Price and willingness of different ages to buy MechaChef.



In order to find out how many people would actually be interested in a machine like this, I surveyed 68 people from different ages, ethnicities, gender, and more. The age was the biggest factor in the willingness to buy MechaChef, which is why I decided to base my visual representation off of it.

# Data Visualizations

Average Person vs. MechaChef (Chopping)



This data shows the estimated times of a normal person chopping medium-sized vegetables (e.g. tomato) and large-sized vegetables (e.g. ) versus the time it would take MechaChef to do the same task.

# Data Visualizations

Average Person vs. MechaChef (Cooking)



This chart compares the estimated times, based on research, that it takes for an average person to cook a small, 3-vegetable dish and a large, 8-vegetable dish versus how long it would take for MechaChef to do the same task.

# Data Analysis – what is the story

My results shows that there is truly a need for a an automatic meal maker in the market. I wanted MechaChef to be a fast and simple kitchen appliance that could prepare food with less efforts and save time. Based on my evidence, we can see that the chopping time and cooking time is greatly reduced from what we can do manually, and the best part is, MechaChef handles all the hard work. In conclusion, MechaChef can be a reliable kitchen-appliance that can help save time and serve fresh, healthy food everyday!

# Interpretation of Data Conclusion (Next Steps)

The MechaChef will be solving one of our biggest problems: making healthy, homemade food. For several centuries, we have made food on our own at home, and ever since restaurants and fast-foods were introduced, homemade food is barely remembered (except during the pandemic 😊). MechaChef will help bring back healthy food into our diet and will be made fresh with the trusted ingredients. There's nothing better than that!

I would like to improve my model by adding a few more features, such adding an app with preset recipes for making the job more easier. Also, if I were to make a real working prototype of MechaChef, I would most likely encase the whole machine in a box, with access to the different parts for cleaning only when the machine is turned off.

# References/Bibliography

- Byrd-Bredbenner, Carol, et al. "HomeStyles: Shaping Home Environments and Lifestyle Practices to Prevent Childhood Obesity: A Randomized Controlled Trial." *Journal of Nutrition Education and Behavior*, vol. 47, no. 4, July 2015, p. S99, 10.1016/j.jneb.2015.04.267..
- Clancy-Hepburn, Katherine, et al. "Children's Behavior Responses to TV Food Advertisements." *Journal of Nutrition Education*, vol. 6, no. 3, July 1974, pp. 93–96, 10.1016/s0022-3182(74)80118-4.
- Coon, K. A., et al. "Relationships between Use of Television during Meals and Children's Food Consumption Patterns." *PEDIATRICS*, vol. 107, no. 1, 1 Jan. 2001, pp. e7–e7, 10.1542/peds.107.1.e7.
- "GLOBE Home Page - GLOBE.gov." *Globe.gov*, [www.globe.gov/](http://www.globe.gov/).
- Hammons, A. J., and B. H. Fiese. "Is Frequency of Shared Family Meals Related to the Nutritional Health of Children and Adolescents?" *PEDIATRICS*, vol. 127, no. 6, 2 May 2011, pp. e1565–e1574, 10.1542/peds.2010-1440.
- Hamrick, Karen. "USDA ERS - Americans Spend an Average of 37 Minutes a Day Preparing and Serving Food and Cleaning Up." *Www.ers.usda.gov*, 7 Nov. 2016, [www.ers.usda.gov/amber-waves/2016/november/americans-spend-an-average-of-37-minutes-a-day-preparing-and-serving-food-and-cleaning-up](http://www.ers.usda.gov/amber-waves/2016/november/americans-spend-an-average-of-37-minutes-a-day-preparing-and-serving-food-and-cleaning-up).
- Inc, Gallup. "Americans' Dining-out Frequency Little Changed from 2008." [Gallup.com](http://Gallup.com), 11 Jan. 2017, [news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx](http://news.gallup.com/poll/201710/americans-dining-frequency-little-changed-2008.aspx).
- Kennedy, Madeline. "Home-Cooked Meals, Hold the TV, Linked to Less Obesity." *U.S.*, Reuters, 2 Mar. 2017, [www.reuters.com/article/us-health-obesity-meals-tv/home-cooked-meals-hold-the-tv-linked-to-less-obesity-idUSKBN16928E](http://www.reuters.com/article/us-health-obesity-meals-tv/home-cooked-meals-hold-the-tv-linked-to-less-obesity-idUSKBN16928E).

# References/Bibliography cont.

- Martin-Biggers, J., et al. “Breakfast Behaviors and Cognitions among Parents of Preschoolers.” *Journal of the Academy of Nutrition and Dietetics*, vol. 113, no. 9, 1 Sept. 2013, p. A79, [jandonline.org/article/S2212-2672\(13\)00952-0/abstract](http://jandonline.org/article/S2212-2672(13)00952-0/abstract), 10.1016/j.jand.2013.06.274.
- Martin-Biggers, Jennifer, et al. “Come and Get It! A Discussion of Family Mealtime Literature and Factors Affecting Obesity Risk1–3.” *Advances in Nutrition*, vol. 5, no. 3, 1 May 2014, pp. 235–247, [www.ncbi.nlm.nih.gov/pmc/articles/PMC4013176/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4013176/), 10.3945/an.113.005116.
- McIntosh, William Alex, et al. “Mothers and Meals. The Effects of Mothers’ Meal Planning and Shopping Motivations on Children’s Participation in Family Meals.” *Appetite*, vol. 55, no. 3, 1 Dec. 2010, pp. 623–628, [www.sciencedirect.com/science/article/abs/pii/S0195666310005143](http://www.sciencedirect.com/science/article/abs/pii/S0195666310005143), 10.1016/j.appet.2010.09.016.
- Mull, Amanda. “Dinner in America: Who Has the Time to Cook?” *The Atlantic*, The Atlantic, 10 Oct. 2019, [www.theatlantic.com/health/archive/2019/10/work-its-whats-for-dinner/599770/](http://www.theatlantic.com/health/archive/2019/10/work-its-whats-for-dinner/599770/).
- Neumark-Sztainer, Dianne R., et al. “Shared Risk and Protective Factors for Overweight and Disordered Eating in Adolescents.” *American Journal of Preventive Medicine*, vol. 33, no. 5, 1 Nov. 2007, pp. 359–369, [pubmed.ncbi.nlm.nih.gov/17950400/](http://pubmed.ncbi.nlm.nih.gov/17950400/), 10.1016/j.amepre.2007.07.031.
- Quick, Brian L., et al. “A Formative Evaluation of Shared Family Mealtime for Parents of Toddlers and Young Children.” *Health Communication*, vol. 26, no. 7, Oct. 2011, pp. 656–666, 10.1080/10410236.2011.561920.

# References/Bibliography cont.

- Reiter, Amy. “Food Network UK.” *Foodnetwork.com*, 2018, [www.foodnetwork.com/fn-dish/news/2015/07/guess-how-much-time-you-spend-eating-on-an-average-day](http://www.foodnetwork.com/fn-dish/news/2015/07/guess-how-much-time-you-spend-eating-on-an-average-day).
- Sphynx\_Admin. “Are Americans Still Serving up Family Dinners?” The Harris Poll, 13 Nov. 2013, [theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/](http://theharrispoll.com/new-york-n-y-november-13-2013-with-americas-most-visible-family-meal-thanksgiving-just-around-the-corner-the-tradition-of-the-family-dinner-appears-alive-and-well-though-some-report-th/).
- Strasburger, Victor C., et al. “Children, Adolescents, Obesity, and the Media.” *PEDIATRICS*, vol. 128, no. 1, 27 June 2011, pp. 201–208, 10.1542/peds.2011-1066.
- Tumin, Rachel, and Sarah E. Anderson. “Television, Home-Cooked Meals, and Family Meal Frequency: Associations with Adult Obesity.” *Journal of the Academy of Nutrition and Dietetics*, vol. 117, no. 6, June 2017, pp. 937–945, 10.1016/j.jand.2017.01.009.