

Konialian's Kitchen: Sustainable Meals for your Wallet and the Planet



By

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Department of Environmental Science and Sustainability

Allegheny College

Meadville, Pennsylvania

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Department of Environmental Science at Allegheny College
and approved by the senior thesis committee.**

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The website I created as a part of this project is in loving memory of my medzmama (grandmother) Margo Konialian, her sister Hasmig Berberian, and all of my Armenian relatives. Through their desire to keep Armenian traditions alive, recipes and cooking skills were passed down from generation to generation. This is my effort to keep passing on our recipes, for no one can take our culture away from us no matter how hard they try.

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Many individuals of Generation Z are currently graduating from university. These young adults are now faced with making their own decisions about food consumption without the influence of parental figures. Gen Zers are aware of the impacts of climate change and the need to be environmentally friendly. Providing this population with ecologically friendly recipes can help them make better food choices for the environment. This generation is plagued with student debt, which impacts their consumption behavior. As “digital natives”, Gen Zers often acquire recipes via the internet. A website with ecological and affordable recipes is a favorable medium for these individuals to have access to a resource which helps them make environmentally friendly food decisions. This [website](#) includes multiple Mediterranean recipes since they are cost effective and ecologically sound due to a focus on plant-based food items rather than those sourced from animals (<https://konialianskitchen.wixsite.com/website>). These recipes list price per serving, carbon footprint, and water footprint calculated to demonstrate how they have a significantly smaller environmental impact and monetary cost in comparison to other foods such as a Big Mac. Providing this analysis will allow for new graduates to recognize the impact of their food choices and make decisions that adhere to their financial constraints and their desire to address climate change with their consumption behaviors. With more people eating Mediterranean food, some of the harmful effects of agriculture production that contribute to climate change may diminish as this diet requires less water and emits fewer carbon dioxide equivalents.

INTRODUCTION:

Climate, Environment, and Food:

Climate change is long-term regional or global change in climate measures, such as temperatures, humidity, precipitation, and wind patterns (Climate Change: Basic Information, 2017; NASA Global Climate Change Vital Signs of the Planet, 2020). As our climate has been altered, many places have experienced atypical occurrences of floods and droughts, unprecedented heat waves, more severe hurricanes, and a severe uptick in wildfires (Climate Change: Basic Information, 2017; Daccache et al., 2014; IPCC, 2019 NASA Global Climate Change Vital Signs of the Planet, 2020). Climate change has increased the frequency, intensity, and complexity of extreme weather events (Busby, 2018; Daccache et al., 2014; Hayes et al., 2018). On a more global scale, glaciers and ice caps are melting, worlds' oceans are warming, and subsequently the sea levels are rising (Climate Change: Basic Information, 2017; IPCC, 2019; NASA Global Climate Change Vital Signs of the Planet, 2020). These changes can shift natural landscapes, disrupt water resources, change agricultural conditions and food supply, and shift land use and habitation (Busby, 2018; Hayes et al., 2018). Agriculture is directly impacted by altered weather conditions resulting from climate change, such as irregular rains resulting in harvest failure (Busby, 2018; Wiebe et al., 2018).

While agriculture is affected by climate change the opposite is also true, for much of climate change is caused by agriculture. There is debate as to whether animal agriculture is a leading cause or *the* leading cause of climate change. Calculations vary, but it is still evident that agriculture, specifically animal agriculture, results in a significant amount of emissions. According to The Food and Agriculture Organization (FAO), livestock are responsible for approximately 7,516 million metric tons of CO₂e emissions per year (Safran Foer, 2019). The Worldwatch Institute believes this value is actually larger at 32,564 million metric tons of CO₂e or 51% of annual global emissions (Safran Foer, 2019). Even though there may not be consensus on the exact percentage of emissions that are produced, it has been recognized that raising livestock through the process of animal agriculture is the main cause of deforestation and the prime source of methane and nitrous oxide emissions (Safran Foer, 2019).

Food and agriculture are some of the largest consumers of water, utilizing roughly 70-90% of the United States' consumptive water (Aleksandrowicz et al., 2016; Baroni et al., 2018; Carlsson-Kanyama & Martin Arrieta, 2019; Daccache et al., 2014; Garnett, 2014; Harris et al., 2019; Hrozencik, 2019; Ritchie & Roser, 2018; Rojas-Downing et al., 2017; Use of water in food and agriculture, n.d.). Water that is used to grow fresh produce and sustain livestock is categorized as agricultural water (Agricultural Water, 2016). Only about 40% of water withdrawn from rivers, lakes and aquifers for agriculture successfully contribute to crop production while the remainder is lost through evaporation and/or deep infiltration (Use of water in food and agriculture, n.d.). Rates of water withdrawals must be below that of freshwater replenishment in order to maintain sustainable levels of water supplies (Ritchie & Roser, 2018). Current global water

demands are facing additional competition as a result of scarcity and depletion of this source and increased agricultural demand (Mekonnen & Hoekstra, 2020; Rojas-Downing et al., 2017).

Footprint:

Ecological footprint associated with dietary behavior, or a foodprint, refers to the resource and environmental impact correlated with one's eating habits and choices (Birney, 2017). Foodprints vary from person to person as factors such as diet composition, shopping venue, type of food purchased, quantity of food consumed, caloric needs, quantity of food wasted, food availability, and food access require different amounts of resources (Birney, 2017). An individual's efforts to diminish their total footprint, or even just their foodprint, can lessen the pressure on global resources that are already under extreme stress due to climate change.

Carbon Footprint:

Carbon footprint (CFP) is one of the most frequently used environmental indicators for evaluating environmental performance and climate change since it summarizes all the greenhouse gas (GHG) emissions and removals resulting from production (Peter et al., 2017; Borsato et al., 2018). This quantity is typically conveyed in CO₂e equivalents (Peter et al., 2017). Globally, the agriculture sector can account for upwards of 30% of total anthropogenic GHG emissions (Aleksandrowicz et al., 2016; Alexander et al., 2016; Carlsson-Kanyama & Martin Arrieta, 2019; Garnett, 2014; Hallström et al., 2015; Heller & Keoleian, 2015).

Water Footprint:

Total water footprint of growing a crop is determined by adding up the quantities of green, blue, and grey water which were utilized (Aldaya et al., 2011; Borsato et al., 2018). Blue water consists of surface and groundwater which were removed from their original source and not returned (Aldaya et al., 2011; Birney, 2017; Borsato et al., 2018; Mekonnen & Hoekstra, 2012; Mekonnen & Hoekstra, 2020). Blue water footprint is the volume consumed for producing the product or crop (Mekonnen & Hoekstra, 2012). Agriculture utilizes this water source through infrastructure including irrigation canals, center pivot spray systems, and groundwater pumps (Marston et al., 2018). Blue water sources are becoming increasingly scarce (Aldaya et al., 2011). As of 2010, the average American diet consumed 162,000 liters of blue water per person each year. At this rate, blue water sources may not be able to keep up with current dietary demands.

While blue water is a large portion of agricultural water, green water is also required for agricultural production (Birney, 2017). Green water is the amount of rainwater/precipitation consumed or stored in the

soil and does not lead to run-off or replenish groundwater sources (Aldaya et al., 2011; Birney, 2017; Borsato et al., 2018; Mekonnen & Hoekstra, 2012). Oftentimes green water is substituted or supplemented with blue water (Aldaya et al., 2011). Unlike blue and green, grey water is a theoretical quantity (Birney, 2017). It is the amount of freshwater needed to dilute pollutants based on existing ambient water quality standards (Aldaya et al., 2011; Birney, 2017; Borsato et al., 2018; Mekonnen & Hoekstra, 2012). Agriculture is one of the most water intensive industries which puts severe stress on global water supplies (Mekonnen & Hoekstra, 2020). To decrease the water component of one's foodprint, it is advisable to eat food products that require less blue water or have a smaller overall water footprint. If consumers have accurate information about the water used to produce the goods they intake, then they may develop a more sustainable attitude towards water (Gómez-Llanos et al., 2020). Younger consumers are more likely to quickly understand this connection than older individuals (Gómez-Llanos et al., 2020).

Diets and Footprints:

Animal products provide a relatively low amount of energy to human diets with respect to how many resources are required to produce such goods (Alexander et al., 2016). Accounting for more than half of the average American's output, items in the meat, poultry, and egg categories are known to be some of the largest contributors of diet related GHGs (Birney, 2017). In addition to being GHG intensive, agricultural food production utilizes nearly 40% of the globe's arable land (Aleksandrowicz et al., 2016; Carlsson-Kanyama & Martin Arrieta, 2019; Garnett, 2014; Hallström et al., 2015). Reducing meat consumption can decrease GHG emissions and land demands (Alexander et al., 2019). Deciding upon meat replacements can be difficult for some plants may have greater GHG emissions (Baroni et al., 2018). Despite this fact, an entirely plant-based diet typically has the least impact with 1/8-1/5th of the carbon dioxide production as an omnivorous diet (Baroni et al., 2018). Pescatarian and vegetarian diets may reduce GHG emissions by 45% and 55% respectively (Donati et al., 2016). A Mediterranean diet is a compromise as it still contains animal products while having the potential to reduce emissions by 30% (Donati et al., 2016). Altering diets and opting for less resource intensive foods can reduce the amount of water and land required for production while decreasing carbon emissions. Everyone eats, so being cognizant about what we ingest can be a way to actively minimize impacts on climate change.

Target Audience:

There is a lack of consensus as to which birth years fall under the definition of Generation Z (Puthenpurakal, n.d.). In general, Gen Z individuals were born between 1995-2010 give or take five years (Ching-Hui, 2019; Puthenpurakal, n.d.; Uhlman, 2018; Walker, 2020). Since numerous Gen Zers grew up during the Great Recessions, they learned how to be practical about money (Uhlman, 2018). With over 80%

of the generation concerned about college costs and student loans, many of them are cognizant about the impact their educational choices have on their financial future and lifestyle (Puthenpurakal, n.d.; Uhlman, 2018). A large portion of individuals from this generation are now college/university students or new graduates who finally have the freedom to choose their consumptive behavior without the influence of their parents' choices (Kamenidou et al., 2019). Gen Zers are typically highly educated, tech-savvy, community oriented, and have a strong sense of social responsibility (Ching-Hui, 2019). In comparison to previous generations, these young people tend to be concerned about the environment and prioritize health when making food choices (Ching-Hui, 2019). A large portion of this generation prefers food ingredients that are sustainably sourced, reduce disease risk, and promote good health (Puthenpurakal, n.d.). This is partially due to climate anxiety, which is a defining feature of Generation Z, as roughly 41% of this cohort recognizes climate change as their largest concern for the future (Walker, 2020). As a result, many young people are choosing new ways to oppose the economic, social, and environmental policies that contribute to climate change (Walker, 2020).

Climate Change and Generation Z:

Climate change has been identified as one of the largest global threats of the century (Gasparrini et al., 2017). Individuals may not know what they can do and whether their actions will make a difference because climate change is unclear to them because of its abstractness and vast scale (Bouman, 2020). A large portion of Gen Zers understand why it is important to be ecologically friendly; however, they struggle with knowing how to get involved (Ching-Hui, 2019). Changes in human behavior will be necessary to address effects of climate change (van der Linden et al., 2017). Food consumption is a portion of our lives that is deeply intertwined with environmental impact and financial resources since food choices drive agricultural production while income and affordability shape such choices (Ching-Hui, 2019; Donati et al., 2016; Kamenidou et al., 2019). In comparison to other changes people may make to help the environment, altering one's diet can be simple, fast, and inexpensive if approached properly (Baroni et al., 2018). With regards to water conservation, opting for protein derived from plants such as legumes, grains, and vegetables may be the most beneficial choice for the environment (Baroni et al., 2018). Mediterranean diets align with this dietary pattern as cultures from the Mediterranean Basin have historically consumed plant-based foods and limited amounts of animal products due to resource scarcity (Baroni et al., 2018; Pairotti et al., 2015; Walker, 2020). The Mediterranean diet, which was developed over millennia by people of the Mediterranean Basin region, is a consumption pattern that is primarily centered around food derived from plants rather than animals (Baroni et al., 2018; Pairotti et al., 2015). As this diet suggests, it is possible to increase diet sustainability without eliminating food categories, including meat (Baroni et al., 2018). To do

so, individuals may require some guidance as to which choices will result in the greatest environmental benefit while remaining affordable.

Technology and Generation Z:

Individuals of Generation Z are often considered to be “digital natives” since a substantial proportion of them were exposed to technological devices at a young age (Ching-Hui, 2019; Puthenpurakal, n.d.; Uhlman, 2018; *Food for thought– What Sets Gen Z Apart When It Comes to Food Prep and Consumption*, n.d.). Technology has impacted how this generation finds recipe ideas and shifted them from utilizing physical cookbooks to virtual sources (*Food for thought– What Sets Gen Z Apart When It Comes to Food Prep and Consumption*, n.d.). Young adults have noted that social media is their top source for acquiring recipes (*Food for thought– What Sets Gen Z Apart When It Comes to Food Prep and Consumption*, n.d.). A website could be an effective medium for distributing recipes to new college graduates who may be making their own decisions about food for the first time without parental influence (Kamenidou et al., 2019). This generation has also recognized that food holds more value than just nourishment, as different foods and meals are representative of various cultures (*Food for thought– What Sets Gen Z Apart When It Comes to Food Prep and Consumption*, n.d.). With the desire to eat more sustainably and appreciate other cultures while living on a small budget, the recent graduates of Gen Z could benefit from a website with a virtual cookbook of ecological and affordable Mediterranean recipes.

I made a website, primarily for new graduates, with a selection of Mediterranean dishes. Each recipe will have a general price range to allow for individuals to effectively budget. While price may be a driving factor in consumer choice, elements of each recipe such as carbon and water footprints can allow for an individual to learn about the environmental impact of their diet. Such footprints are provided for each recipe to allow for a basic understanding of one’s environmental impact of their diet.

METHODS:

Before ecological and affordable Mediterranean recipes could be identified, the terms ecological and affordable were defined in the context of this project. To do so, recipes were compared to a McDonald’s Big Mac. Due to its low price and popularity, I thought a Big Mac would be a great means of comparison. A majority of people are aware of what a Big Mac is, even if they have not had one. Big Macs are one of McDonald’s staple food items and quite possibly the most well known fast food burger that exists. Not everyone eats Big Macs, but they are so iconic that nearly everyone knows them.

Using various sources, the price and a rough range of the water and carbon footprints for a Big Mac were determined (Cascio, n.d.; Hallock, 2014; McDonald’s Prices in McLean, VA 22101, n.d.; The 900 gallon diet: Meat, portion size and water footprints, 2020; The Carbon Footprint of a Cheeseburger, 2017;

Walmart, n.d.). For the carbon footprints, I decided that a serving of a chosen recipe could not exceed 25% of that of a Big Mac. In other words, a Big Mac's carbon footprint would be at least four times (4x) more than a single serving of each recipe. Among the values I found for a Big Mac's carbon footprint the lowest was 7.50 lbs CO₂e while the highest was 11.42 lbs CO₂e; therefore, the 25% benchmark that each recipe must fall under is approximately 1.875 lbs CO₂e (Cascio, n.d.; Hallock, 2014; The 900 gallon diet: Meat, portion size and water footprints, 2020; The Carbon Footprint of a Cheeseburger, 2017). A similar approach was taken for the water footprint criteria; however, the benchmark for this element was 35% of a Big Mac's water footprint. With a Big Mac's water footprint ranging from 202.5-369.06 gallons, one serving of each recipe must come below 35% of this value at roughly 70.875 gallons (Cascio, n.d.; Hallock, 2014; The 900 gallon diet: Meat, portion size and water footprints, 2020; The Carbon Footprint of a Cheeseburger, 2017). The price criteria was much more exact since there was no range for the price of a Big Mac. I wanted a serving of each recipe to cost less than 15% of the price of a Big Mac. Since a single Big Mac costs \$3.99, a recipe's serving could not exceed \$0.798 prior to tax.

Quantity and types of recipes were decided upon before proceeding. I primarily focused on main dishes. I originally planned on having 5-6 recipes as my starting goal, but I ended up with five main dishes and two sides. Chosen dishes were a combination of my own family recipes and published recipes. After a recipe was identified, a rough estimate of the price and water and carbon footprints were calculated to guarantee that it fit the defined criteria. Using Walmart's website, the total price of the ingredients needed to cook a recipe were added up (Walmart, n.d.). The cost per recipe was estimated by determining roughly how much of each ingredient would be used and computing the price of this fraction. The footprints were roughly estimated by using a calculator from The Vegan Society and data published in the Value of Water Research Report Series for carbon and water respectively (Carbon Food Calculator, n.d.; Mekonnen & Hoekstra, 2010a, Mekonnen & Hoekstra, 2010b).

The process of obtaining ingredients and cooking occurred in my hometown of McLean, Virginia from December 14th, 2020 through January 16th, 2021. Nearly all ingredients had to be available at one grocery store to limit transportation related carbon emissions. A store location was determined by searching for the necessary ingredients on the store's online inventory to guarantee availability. The Walmart located 1.5 miles away from my home was chosen as my desired grocery store due to its proximity and availability of ingredients. One ingredient, parsley, was not available at Walmart so I purchased this ingredient at a Giant supermarket. To reduce the cost of conducting this project, spices were not purchased since only small quantities will be utilized.

All of the cooking was conducted at my home by myself with the guidance of my mother, Arda-Konialian-Beck. Prior to cooking, I discussed the process of each recipe with my mom and made sure to take note of any tips she could provide. Preparation and cooking time was recorded using a timer to produce

a general timeframe necessary for each recipe. Ingredients included in each recipe were measured in grams using an electronic kitchen scale. The number of servings each recipe yields was estimated based on how much of the food my family members typically eat in a single helping. For example, when eating soup or salad, a full bowl was considered to be a serving. The number of servings the recipe yielded could be determined by counting up how many bowls were filled. For other dishes, the serving size was ballparked. After serving the meal and placing the amount of food I would typically eat on my plate, then I would use a measuring cup to quantify how much the serving was. Once I knew that my servings were roughly half a cup, for example, then I could measure the remainder of the dish and discern how many servings it produced.

Each recipe has three prices listed: the price for buying all necessary ingredients from scratch, the cost of the recipe, and the cost per serving. Only the ticket price was used to determine a meal's cost. Tax was not included in the price calculation due its variability. With the assumption that someone may not already have some of the ingredients needed, the total cost of purchasing all of the necessary ingredients was calculated based on prices from Walmart's website. Since each ingredient may not be used in its entirety, I made a rough calculation of how much it would cost to use the amount of the product that was used. For instance, an entire bag of lentils may not be needed for a recipe. If only a cup was used, I measured the weight of one cup of lentils and compared that quantity to the total weight and price of the bag. Following this process allowed me to derive the cost necessary just for the proportion of the ingredients needed in the recipe. I broke down this value further and divided it by the number of servings a recipe yielded so that the cost per serving could be approximated.

Calculating the carbon footprints of the recipes was performed using an online calculator by The Vegan Society (Carbon Food Calculator, n.d.). Water footprints of each ingredient were determined by values published by UNESCO-IHE Institute for Water Education (Mekonnen & Hoekstra, 2010a; Mekonnen & Hoekstra, 2010b). The footprints only depict the agricultural production of each ingredient. Factors such as transportation and packaging were not included. The footprint of each ingredient was identified and summed to determine the overall footprint of a recipe. Some ingredients for the recipes were not listed in the sources being used, so a closely related ingredient was used in the calculation as a substitute. Once the total carbon and water footprints were computed for each recipe, the footprints were divided by the number of servings in order to get an approximate value of the footprint of an individual serving.

Once all the information was compiled, I built a website using Wix as a generator. The goal of the website was to create a virtual source where new graduates can find recipes that are ecological and affordable. Once it was completed and published, the website was dispersed primarily amongst new/soon-to-be graduates through word of mouth and multiple social media platforms such as LinkedIn, Snapchat, Instagram, and Facebook.

RESULTS:

Using Wix, I prepared a website to display my recipes in the form of a blog and provide a space for viewers to read supplemental information about the Big Mac Comparison and water and carbon footprints. My website, Konialian's Kitchen: Sustainable Meals for Your Wallet and the Planet, can be visited using the following web address <https://konialianskitchen.wixsite.com/website>

Calculations of the price, carbon footprint and water footprint for a Big Mac were derived and displayed as a range (see table 1). The price, prior to tax, is the only definite value. Most research on burgers only centers around the beef. Knowing that a Big Mac has 3.2oz of beef, or 20% of a pound, I could calculate a range for its footprint. These values do not include the footprints of a bun and other toppings that come along with a Big Mac since such information is limited and hard to come by. If those items were added in, then the footprints would be larger.

Table 1: Price, carbon footprint, and water footprint per Big Mac/burger*

<u>Item</u>	<u>Price</u>	<u>Carbon Footprint (CO2e)</u>	<u>Water Footprint (gallons)</u>
Big Mac	\$3.99	7.50 - 11.42 lbs	202.5 - 369.06

*The carbon and water footprints are only for the beef component of a Big Mac.

Figure 1: Cost per serving of each recipe and Big Mac/burger

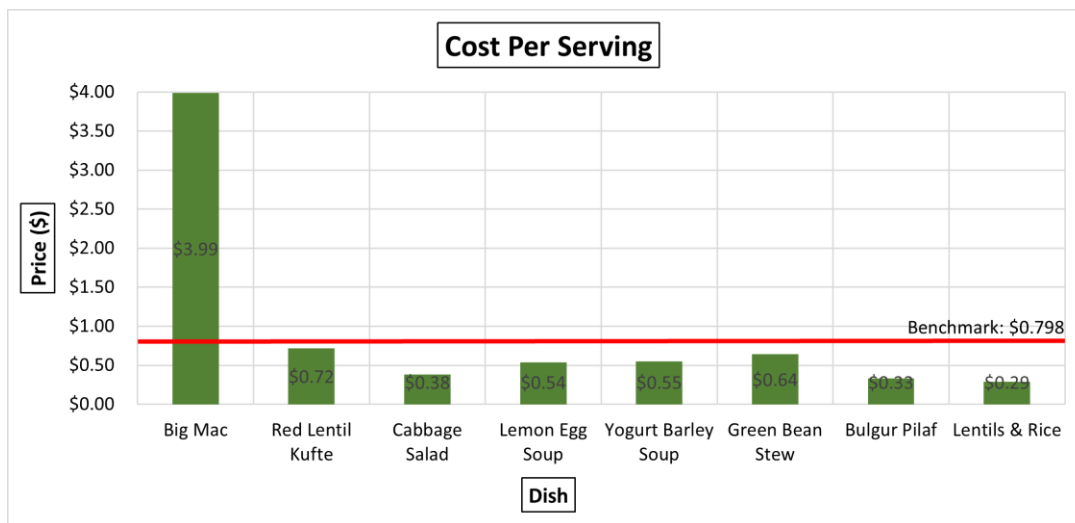


Figure 2: Carbon footprint per serving of each recipe and Big Mac/burger

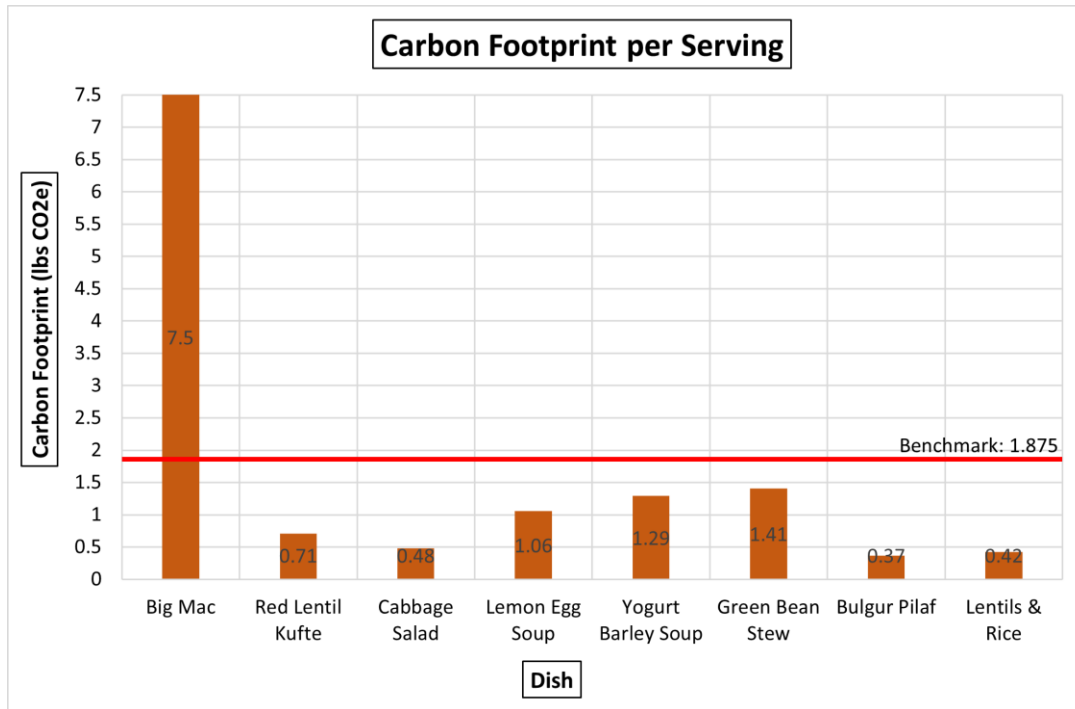
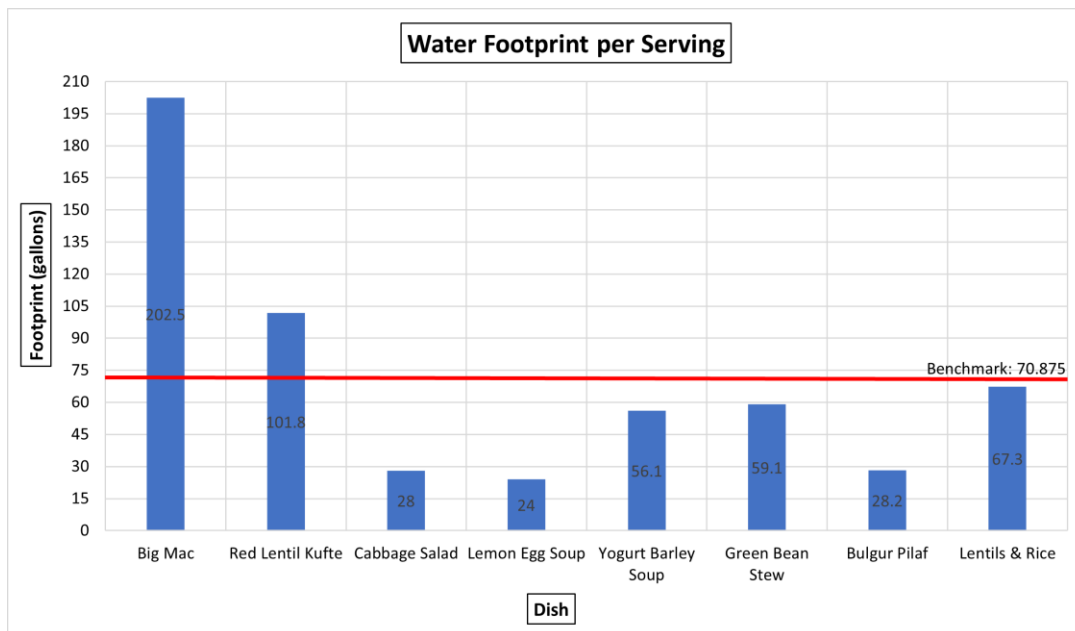


Figure 3: Water footprint per serving of each recipe and Big Mac/burger



As stated in my methods, I set a benchmark for each of my recipes to adhere to. Values for a serving of each one of my recipes had to fall below certain percentages of a Big Mac: price (15%), carbon footprint (25%), water footprint (35%). Under this criteria, one serving of a recipe would not cost more than \$0.798. With regards to footprints, the carbon footprint of a single serving could not go above 1.875 lbs CO₂e and the water footprint could not exceed 70.875 gallons.

By looking at figure 2 and figure 3, one can see that every recipe is significantly below their benchmark values except for the water footprint of Red Lentil Kufte. Red Lentil Kufte's water footprint per serving is 101.8 gallons, putting it above the 35% benchmark of a Big Mac's lower range water footprint of 202.5 gallons. This recipe comes in at roughly 50% of a Big Mac's water footprint.

RECIPES:

Red Lentil Kufte / Vospov Kufte



Servings: roughly 6

Serving Size: 2-3 kufte

Prep Time: 25 minutes

Cook Time: 55 minutes

Total Time: 1 hour 35 minutes. This includes some wait time

Ingredients:

- Roughly half a bunch of scallions (typically 3 scallions)
- Half a bunch of fresh flat leafed parsley
- 1 cup of #1 bulgur (cracked wheat)
- 1 cup of red lentils
- 1 large yellow onion
- 8 tablespoons (1 stick) of unsalted butter. For a slightly healthier alternative, use half a stick of butter and a few tablespoons of olive oil
- 3 cups of water
- Spices: salt, Aleppo pepper, paprika, cumin

Price for buying ingredients from scratch: \$12.10

Cost of recipe: \$4.32

Cost per serving: \$0.72

Instructions:

Cooking Lentils

- Rinse off the lentils in a strainer with cold water.
- Fill a medium sized pot with three cups of water.
- Put the lentils in the pot and add a pinch of salt.
- Turn on high heat and bring to a boil.
- Once boiling, lower the heat and bring to a simmer.
- Put on a lid and cook for 25 minutes. Stir periodically.
- Take off the lid and cook for an additional 5 minutes.

Preparing & Cooking Add-ins

It is advisable to do this while the lentils are cooking.

- Thinly slice the scallions. Try to keep the white and green parts separated. The white slices will be kneaded into the lentils while the green slices will be used as garnish.
- Finely dice/mince a medium yellow onion.
- Melt the butter (or butter and oil combination) in a small pan.
- Sauté the onions in the pan with two pinches of salt and cook until they are translucent. You do not want them to brown.
- Add a few dashes of Aleppo pepper and one dash of paprika.
- While the onion is cooking, pick the parsley off the stems.
- Ensure that the parsley is dry and finely chop the leaves. Set aside some of the parsley for garnish. The remainder will be kneaded into the lentils.

Putting It All Together

You will need a large pan or tray with edges for the kneading process. A large bowl can also be used, but this may be slightly more difficult.

- Dump the bulgur in the pan.
- Add the cooked onions on top and mix together with a spoon.
- Pour the cooked lentils into the pan and mix all of the contents. At this time it should look soupy. If it looks far too liquidy, add a small handful of bulgur.
- Set aside at room temperature for 15-20 minutes to allow for the mixture to cool and the bulgur to soften. You need the contents to be cool enough for you to touch and handle. This may take less

than 15 minutes or more than 20 minutes based on your tolerance. If the pan you are using has a lid, put it on during this time. If you do not have a lid, you can leave it out open or cover with foil.

- Before you begin kneading, fill a bowl with warm or room temperature water and set it next to you. Wet your hands before kneading and periodically dip them in the bowl during the kneading process.
- Knead the contents of the pan by flipping it over and squishing it into the palms of your hands repeatedly.
- Once the mixture is thoroughly incorporated, mix and knead in spices:
- ½ teaspoon of Aleppo pepper, cumin, and paprika.
- A dash of salt.
- White slivers of scallions.
- A few handfuls of chopped parsley.
- Taste a small amount and add additional spices as desired.
- Shape the kufte: Take a small handful, roll it between your palms, then gently squeeze it under your fingers while making a fist. This will result in a shape that resembles a kebob. Alternatively, you can make small balls or flat patties.
- Before serving, garnish with the remaining green slivers of scallions and chopped parsley.

Notes:

- This dish can be eaten at room temperature or cold straight out of the refrigerator.
- Parsley often goes limp quickly. To revitalize it, place the parsley in a bowl of cold water and let it sit. This will allow turgor pressure to crisp up the parsley. If you do this, make sure to dry the leaves completely before using them in your cooking.
- Red lentil kufte / vosp ov kufte pairs well with cabbage / lahana salad.
- Spicy Hungarian paprika or cayenne pepper can be used in lieu of Aleppo pepper.
- The number associated with bulgur corresponds with the coarseness of the grain. #1 Bulgur is the finest type.

Footprinting:

Carbon Footprint of Recipe: 1.93kg (4.25 lb) CO₂e

Carbon Footprint Per Serving: 321.67g (0.71 lb) CO₂e

Water Footprint of Recipe: 610.7 gallons

Water Footprint Per Serving: 101.8 gallons

Cabbage Salad / Lahana



Servings: 5

Serving Size: 1 full 8oz bowl

Prep Time: 10-15 minutes

Cook Time: 0 minutes.

There is no physical cooking required for this recipe, just prep.

Ingredients:

- 1/2 cabbage
- 3 cloves of garlic
- 1 lemon
- 1.5-2 tablespoons of olive oil
- Spices: salt, fresh black pepper, Aleppo pepper, dried mint

Price for buying ingredients from scratch: \$11.50

Cost of recipe: \$1.91

Cost per serving: \$0.38

Note: The high initial cost of this recipe results from purchasing a new bottle of olive oil. Dried mint was not included in the price calculation due to the extremely small amount that was used. A typical 3oz bag of dried mint often costs roughly \$9.00. Take note that a bag this size will last you a long time even if used frequently.

Instructions:

Cabbage

- Cut the cabbage in half vertically. Make sure to keep the root intact.
- Take one half of the cabbage and place it face down on a cutting board.

- With a large knife held at an angle, slice the cabbage into long thin shreds. Work your way down horizontally beginning at the top of the cabbage and work your way down until you get close to the root/core.
- Pull apart the shreds to separate the layers of cabbage and place in a large bowl.
- Sprinkle a pinch of dried mint, Aleppo pepper, salt, ground black pepper over the cabbage.
- Toss in desired amount of dressing.

Dressing

- Juice one lemon into a small bowl.
- Pour one and a half tablespoons of olive oil into the bowl.
- Crush garlic into the dressing.
- Add several pinches of salt and a dash of Aleppo pepper.
- Stir the dressing vigorously until all of the ingredients are combined.
- Taste a little bit of the dressing on your finger to determine if there needs to be any adjustments.
- You want the dressing to taste more lemony than oily. If the lemon taste is too strong, add about half a tablespoon of olive oil. If it is too oily, add juice from half a lemon. If you do so and the dressing still does not taste right, add more salt-- this tends to bring out a lot of the lemon flavor.

Notes:

- If you do not have Aleppo pepper, substitute with a dash of cayenne pepper.
- When working with dried mint, you want to pulverize it by rubbing it between your thumb and index finger. This will allow it to be a lot finer, almost like a powder.
- This salad pairs extremely well with red lentil kufte / vosp ov kufte.
- You can make a larger batch of dressing and store it in the refrigerator for later use with your other half of cabbage or romaine lettuce.

Footprinting:

Carbon Footprint of Recipe: 1.08kg (2.38 lb) CO₂e

Carbon Footprint Per Serving: 216g (0.48 lb) CO₂e

Water Footprint of Recipe: 140 gallons

Water Footprint Per Serving: 28 gallons

Lemon-Egg Soup / Soupa Avgolemono



Servings: 7

Serving Size: 8-10 oz

Prep Time: 15 minutes

Cook Time: 20 minutes

Cooking time will vary depending on how long it takes for your pasta to cook.

Ingredients:

- 1 cup of orzo or small pasta of your choice
- 64 oz of chicken broth
- 3-4 large carrots
- 1 lemon
- 1 egg yolk
- Spices: salt and fresh black pepper

Price for buying ingredients from scratch: \$6.07

Cost of recipe: \$3.79

Cost per serving: \$0.54

Instructions:

- Peel and chop carrots into bite sized pieces.
- Pour the broth into a large pot, add the carrots, and bring to a boil.
- Juice one lemon into a bowl.
- Separate an egg-- discard the whites and keep just the yolk.
- Beat the egg yolk in the bowl with the lemon juice.
- Add a pinch of salt and a few grinds of pepper to the bowl.
- Once the broth has come to a boil, add orzo and cook until soft. Cooking time will depend on the specific brand of orzo that you are using.
- After the pasta is cooked, temper the lemon-egg mixture. Take a few spoonfuls of the hot broth and beat it into the mixture.
- Stir the tempered lemon-egg mixture into the pot and bring the contents back to a boil.

Notes:

- This is not how traditional Soupa Avgolemono is made. Oftentimes you will not see this soup with carrots; however, my family recipe includes carrots for added color, texture, and nutrition. Add as many or as few carrots as you desire.
- You can substitute the chicken broth with the broth of your choice. For instance, you can use vegetable broth if you please.
- The more egg yolk you use, the creamier the soup will be. One yolk is usually enough, but sometimes it is nice to add a second yolk.
- After refrigerating, the soup will get much thicker. Do not worry, it will thin out once you heat it back up.

Footprinting:

Carbon Footprint of Recipe: 3.36kg (7.41 lb) CO₂e

Carbon Footprint Per Serving: 480g (1.06 lb) CO₂e

Water Footprint of Recipe: 167.9 gallons

Water Footprint Per Serving: 24.0 gallons

Yogurt Barley Soup / Madzoon ov dez zedzav



Servings: 11

Serving Size: 8-10 oz

Prep Time: 5-7 minutes

Cook Time: roughly 45 minutes-1 hour

Ingredients:

- 2 cups pearly barley. Using pearly barley will allow for a smoother texture, but hulled barley can still be used
- 32oz or 2lb container of plain yogurt (do not use Greek yogurt)
- 1 egg yolk
- 2 quarts of chicken broth (64oz)
- 4 tablespoons (½ stick) of unsalted/sweet butter
- 2-3 teaspoons of pulverized dry mint
- A dash of salt

Price for buying ingredients from scratch: \$10.58

Cost of recipe: \$6.03

Cost per serving: \$0.55

Note: Dried mint was not included in the price calculation due to the extremely small amount that was used. A typical 3oz bag of dried mint often costs roughly \$9.00. Take note that a bag this size will last you a long time even if used frequently.

Instructions:

Barley:

- In a large pot, bring to a boil 10 cups of water, 2 cups of barley, and a pinch of salt. Using pearled barley will allow for a smoother texture.
- Cook until tender-- roughly 25 minutes.
- Drain and let it sit in a colander. It's important to do this immediately because the starch from the barley will create a film.

Note: Refrigerate it if you cook the barley the day before making the broth. If you cook it directly before making the broth, you will have to temper the yogurt since the barley will be hot. Tempering is the act of bringing two ingredients together that are extremely different temperatures and creating a similar temperature before combining all of the ingredients in their entirety. This is done to avoid curdling in dairy products.

Broth:

- Put one egg yolk into the container of yogurt. Mix thoroughly.
- Open up 2 quarts of chicken broth and pour some of it into the yogurt egg mixture to thin it out.
- In a very large pot, pour the remainder of the chicken broth and the yogurt mixture.
- Set the burner to a high/medium heat. Stir the broth constantly until it comes to a boil. It is very important to stir it the entire time in order to prevent curdling.
- Once it has come to a constant rolling boil, you can stop stirring and let it sit.
- Add the cooked barley to the broth. Stir. Heat content until the barley is warm all the way through.

Notes:

- This is how you make the broth if you are starting with all the ingredients cold/room temperature. If you start making the broth with warm/heated chicken broth, you will have to temper the yogurt egg mixture before putting it into the pot with the rest of the chicken broth.
- You can substitute the chicken broth with the broth of your choice. For instance, you can use vegetable broth if you please.

How to temper:

With the egg yolk mixed into the yogurt container, take a ladle and stir in one or two scoops of the warm/hot chicken broth and mix all of the contents. Once you have stirred the yogurt egg mixture with the broth and it is thoroughly combined, add the contents to the pot of chicken broth.

Topping:

- Cut butter into slivers and melt in a fry pan at a low heat.
- Sprinkle dried mint into the pan. To do so, rub the mint between your fingers in order to grind it up and make it finer.
- Add a dash of salt. If you are using salted butter, you do not need to add any salt.
- Raise to a medium heat to brown the butter and cook the mint. Let it froth and brown- this is what gives the soup the flavor! It is ok if the butter and mint look burnt. You do not want the mint to seem raw or else it will rehydrate in the broth.
- Once everything is thoroughly browned, dump it into the broth. You want to make sure it sizzles when you put it in the soup.
- Take a ladle of broth and pour it into the fry pan to rinse the remainder of the butter and mint into the pot of broth.
- Bring the broth back up to a boil with the mint.

Footprinting:

Carbon Footprint of Recipe: 6.43kg (14.18 lb) CO₂e

Carbon Footprint Per Serving: 584.55g (1.29 lb) CO₂e

Water Footprint of Recipe: 616.7 gallons

Water Footprint Per Serving: 56.1 gallons

Green Bean Stew / Fasolia



Servings: 6

Serving Size: ½ cup

Prep Time: 25-30 minutes

Cook Time (with pressure cooker): 25 minutes

Cook Time (without pressure cooker): roughly 50-60 minutes

Ingredients:

- 28 oz can of crushed tomatoes
- 1 pound of fresh green beans
- 1 medium yellow onion
- 3-4 cloves of garlic
- 3 tablespoons of olive oil
- 2 teaspoons of pepper paste or tomato paste
- Spices: salt, fresh ground pepper, Aleppo pepper, ground allspice

Price for buying ingredients from scratch: \$13.08

Cost of recipe: \$3.82

Cost per serving: \$0.64

Note: The high initial cost of this recipe results from purchasing a new bottle of olive oil.

Instructions:

Note that this was done using an old style pressure cooker, newer styles will have different instructions.

- Snip off the ends of the green beans and chop into pieces that are roughly one inch in length.
- Peel the garlic cloves and cut them in half or into chunky slivers.
- Heat up olive oil on the bottom of a pressure cooker.
- Chop the onions into small pieces and sauté them in olive oil with a few grinds of fresh pepper and a pinch of salt to make them sweat. Start with a high heat then bring it down.
- Once the onions are cooked a bit, add the garlic chunks.
- Place the chopped green beans in the pressure cooker and sauté them for a few minutes.

- Sprinkle two pinches of Aleppo pepper. If you do not have Aleppo pepper, substitute with a dash of spicy Hungarian paprika or cayenne pepper.
- Dump the crushed tomatoes into the pressure cooker. Rinse out the residual tomato residue from the can with some water and pour that into the pressure cooker as well.
- Spoon in the pepper paste or tomato paste.
- Add a dash of allspice.
- Stir the contents of the pressure cooker until they are combined.
- Lock the lid on the pressure cooker and bring to a high heat. Allow pressure to build.
- When there is enough pressure, place the safety valve on the nozzle and reduce to low/medium heat. Cook for 25 minutes. If you are using an average pot, cook until the green beans are tender.

Notes:

- It is best to serve this dish over rice, preferably bulgur pilaf, to absorb the sauce.
- This pairs well with bread, specifically pita or lavash.

Footprinting:

Carbon Footprint of Recipe: 3.84kg (8.57 lb) CO₂e

Carbon Footprint Per Serving: 640g (1.41 lb) CO₂e

Water Footprint of Recipe: 354.8 gallons

Water Footprint Per Serving: 59.1 gallons

Rice / Pilaf

There are two main types of pilaf/rice that we make in my household. One is bulgur pilaf and the other is white rice. Pilaf is meant to be a side that pairs with a main dish.

Bulgur Pilaf



Servings: roughly 8

Serving Size: ½ cup

Prep Time: 10 minutes

Cook Time: 25-30 minutes



Ingredients:

- 2 tablespoons of sweet/unsalted butter
- A handful of thin egg noodles
- 1 cup of #3 bulgur (cracked wheat)
- 2 cups of chicken broth
- ½ teaspoon of salt
- 3-4 grinds of fresh black pepper

Price for buying ingredients from scratch: \$11.85

Cost of recipe: \$2.65

Cost per serving: \$0.33

Instructions:

- Take a handful of thin egg noodles and place them in a pot.
- Cut the butter into slices and add them to the pot.
- Put on high heat-- melt the butter and brown the noodles until golden/light brown.
- Add about half a teaspoon of salt into the noodle and butter mixture.
- Once the noodles are browned, dump the bulgur into the pot and toss around to coat in butter.
- Pour two cups of chicken broth into the pot.
- Add 3-4 grinds of fresh black pepper.
- Bring to a small rolling boil.
- Cover with a lid and cook for 25-30 minutes. Do not open the lid during this time.
- After cooking is done, leave it to rest for a bit.
- Before serving, toss/stir the bulgur.

Notes:

- To make this vegetarian, substitute the chicken broth with vegetable broth. Any broth of your choice will be fine.
- This recipe has a 1:2 ratio of bulgur to broth. You can choose your favorite regular sized cup or coffee mug and use that as your measuring utensil.
- The number associated with bulgur corresponds with the coarseness of the grain. #3 bulgur is coarse, or medium coarse.
- Bulgur pilaf goes well with saucy dishes since it is absorbent.

White Rice / Pilaf

This uses the exact same instructions/method that bulgur pilaf does except for one substitution. Instead of using bulgur, use your favorite long-grain rice. My family prefers Uncle Ben's original long-grain rice.



Footprinting:

Note that this is specifically for bulgur pilaf.

Carbon Footprint of Recipe: 1.33kg (2.93 lb) CO₂e

Carbon Footprint Per Serving: 166.25g (0.37 lb) CO₂e

Water Footprint of Recipe: 225.5 gallons

Water Footprint Per Serving: 28.2 gallons

Lentils & Rice / Mujadarah



Servings: roughly 8

Serving Size: ½ cup

Prep Time: 10 minutes

Cook Time (with pressure cooker): 50 minutes

Cook Time (without pressure cooker): 65-80 minutes

Ingredients:

- 2 large yellow onions
- 1 cup of uncooked brown lentils
- ½ cup of Baldo rice. If you cannot find Baldo rice, try to get long-grain Carolina rice. Do not use really hard rice such as Uncle Ben's brand.
- 3 tablespoons of olive oil

- 4 tablespoons of canola/vegetable oil
- 5 cups of water
- Spices: Aleppo pepper, cumin, paprika, fresh black pepper, and salt (to taste--will use small amounts)

Total price for buying ingredients from scratch: \$14.22

Cost of recipe: \$2.28

Cost per serving: \$0.29

Note: The high initial cost of this recipe results from purchasing a new bottle of olive oil.

Instructions:

*This was done using an old style pressure cooker, newer styles will have different instructions.

- Dice 1 yellow onion into squares.
- On medium heat, sauté the onion on the bottom of a pressure cooker with olive oil, a pinch of salt, and a few grinds of fresh black pepper.
- Constantly toss the diced onion and cook until soft. You do not want the onions to brown.
- Add seasoning: Put about a teaspoon of Aleppo red pepper. If you do not have it, use cayenne or a hot Hungarian paprika-- do this to taste.
- Rinse 1 cup of uncooked brown lentils and toss them into the pressure cooker with the olive oil and onion mixture.
- Add about a teaspoon of cumin. Stir.
- Put 1/2 cup of uncooked rice into the pressure cooker with the rest of the mixture. Stir.
- Pour 5 cups of water into the pressure cooker.
- Stir and let it come to a light boil.
- Optional: at this point you could add a chicken bouillon cube for added flavor.
- Lock the lid on the pressure cooker and bring to a high heat. Allow pressure to build.
- When there is enough pressure, place the safety valve on the nozzle and reduce to low/medium heat. Cook for 25-30 minutes. (If using a regular pot, cook for 45 minutes)
- When time is up, take a bite to see if the rice and lentils are soft. If there is a lot of water left, boil it some more. This can be done with the lid off.
- Add more seasoning to taste.
- Loosely put the lid back on and allow the contents of the pressure cooker to cool slightly.

- Once it is cool enough for you to place your hand in the pressure cooker, whisk all of the content by hand until everything is homogeneous.

Topping Instructions

To conserve time, make the onion topping while your pressure cooker is building pressure.

- Slice one yellow onion into thin slivers and separate the layers.
- Heat vegetable oil on a skillet.
- Once the oil is hot, place the onion slivers in the pan. To ensure even cooking, try not to overlap the onions.
- Brown/pyrolyze the onions. Cook until they are almost burnt.
- Remove the onions and place them on a plate lined with paper towel to absorb excess oil.
- Spoon into a deep rimmed serving dish and place the fried onions on top. You must use something with edges to keep everything contained.

Notes:

- This dish is good at any temperature: hot, cold, room-temperature.
- The fried onions go on top when you are ready to serve. Do not put them on the dish and then stick it in the refrigerator--the onions will fall apart and lose their crunch.
- Refrigerate leftovers (with onions separate). Keep in mind that water will separate and come to the top. Just stir this in before eating again.

Footprinting:

Carbon Footprint of Recipe: 1.52kg (3.35 lb) CO₂e

Carbon Footprint Per Serving: 190g (0.42 lb) CO₂e

Water Footprint of Recipe: 538.5 gallons

Water Footprint Per Serving: 67.3 gallons

DISCUSSION:

There are multiple other diets, such as veganism and vegetarianism, that can be as good or better for the environment than a Mediterranean diet. The diet with the smallest environmental impact is a vegan diet which contains no foods of animal origins (Baroni et al., 2018). In contrast, an omnivorous diet, which has a much larger focus on meat, has the highest environmental impact (Baroni et al., 2018). Studies have

suggested that the sustainability of one's diet can increase without completely excluding food categories such as meat or animal products (Baroni et al., 2018). A Mediterranean diet consists primarily of unrefined cereals, legumes/pulses, nuts, vegetables, fruits, moderate quantities of fish and dairy products, and small amounts of meat and meat products (Baroni et al., 2018; Pairotti et al., 2015). The beneficial environmental elements of this diet are therefore related to the minimal consumption of animal products as well as a preference for unprocessed goods (Pairotti et al., 2015). Due to the proportion of animal products in a Mediterranean diet, the environmental impact of this food pattern falls between that of a typical Western omnivorous diet and a vegetarian diet (Baroni, L., Filippin, D., & Goggi, S., 2018).

I believed that my family recipes would prove to be a compromise since they are less harsh on the environment than the typical diet of an omnivore yet less restrictive than a vegan or vegetarian diet. Donati et al. confirmed my hunch by revealing that a Mediterranean diet has the potential to reduce per capita emissions from food production by 30% (Donati et al., 2016). As my analysis has revealed, Mediterranean dishes are better for the environment and your wallet because they have smaller ecological footprints and cost less per serving in comparison to other popular diets. The footprints of my recipes can be readily reduced further by using substitutes such as vegetable broth instead of chicken broth. These recipes are just a small sample, but it can be assumed that other Mediterranean recipes are going to have the same environmental and financial benefits.

A person's food choices have a noticeable impact on the environment (Baroni et al., 2018; Birney, 2017; Heller & Keoleian, 2015). Many people find affordability to be a limiting factor which prohibits them from buying ecologically sound food products; however, this is a common misconception since sustainable diets can be cost effective (Carlsson-Kanyama & Martin Arrieta, 2019; Donati et al., 2016). If the general public was to learn that it is possible to eat sustainably while on a small budget, then fewer people may disregard environmental considerations when purchasing food. By being introduced to my recipes, people may recognize that it is possible for environmentally friendly food to be low-cost. If more people were to cook these recipes and consistently eat a Mediterranean diet rather than fast food, then greenhouse emissions, specifically carbon dioxide, and water consumption associated with agriculture would decrease and lessen the contributors to climate change and resource depletion (Aleksandrowicz et al., 2016; Pairotti et al., 2015).

Limitations:

Only a handful of sources were utilized to determine the carbon and water footprints of a Big Mac and each recipe. There are very few sources that discuss the footprint of a Big Mac since this is such a niche item to conduct calculations for. It is much more common to find calculations for an average cheeseburger because it is a general item. For this reason, an average footprint of a Big Mac was estimated and a precise

number could not be calculated. If more sources existed with the necessary information, it could have been possible to derive a truer value. The same can be said about the calculations for each recipe. Despite this, I chose to use a Big Mac for my means of comparison because of its universal popularity and low price.

Due to the limited amount of data, the carbon and water footprint calculations are not precise. Many small decisions had to be made which impacted the accuracy of the calculations. For example, if an ingredient was not listed on the source being used, then a substitute had to be used in its place. Some ingredients, such as the spices, had to be left out of the calculations entirely because only an extremely small quantity was used and there was a lack of information about them.

The footprint of an item is impacted by its country of origin predominantly because of different production and processing methods as well as transportation. The sources used for footprinting in this project had options for choosing a specific country or region. Although this was provided, it was not possible to identify where the ingredients came from for each recipe. Without knowing exactly where they were from, an executive decision was made to use North America as the region of origin for the carbon footprints and the global average for water footprints. This caused the calculated values to differ from the true values for each ingredient.

Even if there was ample data for every ingredient, the calculations would still lack precision due to rounding. Each calculation included multiple steps which required unit conversions and rounding decimals. As a rounded number was carried onto a subsequent step, the margin of error increased. This is not entirely avoidable, but it could be slightly decreased by only rounding at the final step of the calculation.

As seen in figure 3, Red Lentil Kufte / Vosp ov Kufte is the only recipe that does not explicitly fall within my defined criteria. Current calculations put the water footprint per serving above the benchmark of 70.875 gallons. If I was able to include all ingredients rather than just beef in the Big Mac calculation, then it is guaranteed that both the carbon and water footprint values would be larger than what I have listed in table 1. As a result, I chose to keep this recipe in this analysis since I believe that it would certainly fall within 35% or less than the true water footprint of a Big Mac.

Further Research:

There will always be room for further research of any topic for as long as humans inhabit this planet and continue to produce and consume items. As seen in the research by Mekonnen and Hoekstra (2010a, 2010b, 2012, 2020), not every food product has been researched when it comes to calculating its water footprint. The Vegan Society's Carbon Calculator also revealed that we do not know the carbon footprint of many food items. While it is not possible to perform these calculations for every product known to man, it could be helpful to expand this field of research to encompass more foods, especially those that are considered to be commonly used.

When it comes to investigating the impact of food choices on the environment, this analysis only touched upon a few elements. Carbon and water footprints are important aspects to look at, but there are other factors that could be researched. Carbon dioxide is one of the most well known greenhouse gases; however, it would also be beneficial to research the agricultural output of other greenhouse gases such as methane and nitrous oxide that is associated with food production. This could help provide a better picture of how people's diets impact climate change by quantifying the earth warming gases.

In addition to further research on greenhouse gas emissions, it would be advantageous to investigate other environmental elements that are affected by agriculture. These could include, but are not limited to, deforestation, soil degradation, biodiversity, and water pollution. While increased study of these environmental components is important, the results would vary depending on location and agricultural practices. For this reason, it would be wise to expand the realm of study on the agricultural impacts of climate change. Examining such aspects in multiple countries across the globe that employ varying production techniques would provide a deeper understanding of how differing practices impact the environment.

APPENDIX:

Red Lentil Kufte / Vospov Kufte Calculations

Prices Using Walmart Website: <https://www.walmart.com/>

- Roughly half a bunch of scallions (typically 3 scallions) (64g)
 - Green Onions, Bunch (\$0.78)
 - \$0.39 for half a bunch
- Half a bunch of fresh flat leafed parsley (43g)
 - Italian Parsley Bunch (\$1.29)
 - \$0.65 for half a bunch
- 1 cup of #1 bulgur (cracked wheat) (170g)
 - Yara Bulgur Wheat - Fine #1 (24oz→ 680g) (\$3.99)
 - \$1.00 for 1 cup
- 1 cup of red lentils (185g)
 - Goya Red Lentils, 16 oz→ 454g (\$1.58)
 - \$0.64 for 1 cup
- 1 large yellow onion (162g)
 - Yellow Onion (\$0.70 each)
- 8 tablespoons (1 stick) of unsalted butter (111g)

- Land O Lakes Unsalted Butter, 1 lb (453.6g) (\$3.76)
 - \$0.94 for one stick
- 3 cups of water (1 cup= 240g → 3 cups = 720g)
 - Not included in calculation
- Spices: salt, Aleppo pepper, paprika, cumin
 - Not included in calculation

Price for buying ingredients from scratch: \$12.10

Cost of recipe: \$4.32

Cost per serving: \$0.72

Carbon Footprint Calculations:

Ingredient	Amount (kg)	Greenhouse Gases
Salad Onions	0.06	0.02kg CO ₂ e (0.35kg CO ₂ e/kg)
Coriander (fresh)	0.04	0.05kg CO ₂ e (1.35kg CO ₂ e/kg)
Buckwheat	0.17	0.15kg CO ₂ e (0.88kg CO ₂ e/kg)
Lentils	0.19	0.27kg CO ₂ e (1.42kg CO ₂ e/kg)
Onions	0.16	0.17kg CO ₂ e (1.09kg CO ₂ e/kg)
Butter (dairy)	0.11	1.08kg CO ₂ e (9.86kg CO ₂ e/kg)
Water	0.72	0.19kg CO ₂ e (0.27kg CO ₂ e/kg)

Total per serving: 321.67g CO₂e → 0.71 lb CO₂e

Total overall: 1.93kg CO₂e → 4.25 lb CO₂e

Cabbage Salad / Lahana Calculations

Prices Using Walmart Website: <https://www.walmart.com/>

- ½ a cabbage (444g)

- Cabbage Green \$0.78/lb [4.9 cents per oz] (2lb 9.4oz → 720g → \$2.03)
 - \$1.02 for half a cabbage
- 3 cloves of garlic (16g)
 - Garlic, each (1 bulb → ~44g) (\$0.45)
 - \$0.16 for 3 cloves of garlic
- 1 lemon (152g)
 - Lemons, each (\$0.56)
- 1.5-2 tablespoons (1oz) of olive oil (22g)
 - Great Value 100% Extra Virgin Olive Oil 51 fl oz (\$8.46) [roughly \$0.17 per oz]
 - \$0.17 for 2 tablespoons
- Spices: salt, fresh black pepper, Aleppo pepper, dried mint
 - Not included in price

Price for buying ingredients from scratch: \$11.50

Cost of recipe: \$1.91

Cost per serving: \$0.38

Water Calculations:

- ½ a cabbage (444g → 0.000444 metric ton)
 - Cabbage lettuce (head lettuce) fresh or chilled. Water m³/ton
 - Global Average: Green: 133 Blue: 28 Grey: 77 **Total: 238**
 - US Average: Green: 30 Blue: 42 Grey: 41 Total: 113
 - **238 x 0.000444 = 0.105672**
 - **444g (0.00444 metric tons) of cabbage is 0.105672 m³ of water**
 - **0.105672 m³ of water → 27.9155891168 gallons = 27.9 gallons**
- 3 cloves of garlic (16g → 1.6e-5 metric ton)
 - Garlic, fresh or chilled. Water m³/ton
 - Global Average: Green: 337 Blue: 81 Grey: 170 **Total: 558**
 - US Average: Green: 116 Blue: 186 Grey: 77 Total: 379
 - **558 x 1.6e-5 = 0.008928**
 - **16g of garlic is 0.008928 m³ water**
 - **0.008928 m³ water → 2.3585280835 gallons = 2.4 gallons**
- 1 lemon (152g → 0.000152 metric ton)
 - Lemons and limes, fresh or dried. Water m³/ton

- Global Average: Green: 432 Blue: 152 Grey: 58 **Total: 642**
- US Average: Green: 251 Blue: 52 Grey: 45 Total: 348
- **$642 \times 0.000152 = 0.097584$**
 - **156g of lemon is 0.097584 m^3 water**
 - **0.097584 m^3 water $\rightarrow$ 25.778965557 gallons = 25.8 gallons**
- 1.5-2 tablespoons (1oz) of olive oil (22g $\rightarrow$ 2.2e-5 metric ton)
 - Olive oil, virgin. Water m^3/ton
 - Global Average: Green: 11826 Blue: 2388 Grey: 217 Total: **14,431**
 - US Average: Green: 2175 Blue: 2607 Grey: 360 Total: 5,142
 - **$14431 \times 2.2\text{e-}5 = 0.031746 \text{ m}^3$ water**
 - **22g of olive oil is 0.31746 m^3 water**
 - **0.31746 m^3 water $\rightarrow$ 83.86405974 gallons = 83.9 gallons**
- Spices: salt, fresh black pepper, Aleppo pepper, dried mint
 - Not included in calculation

Total water footprint of recipe: 140 gallons

Water footprint per serving: 28 gallons

Carbon Footprint Calculations:

Ingredient	Amount (kg)	Greenhouse Gases
Cabbage	0.44	0.81kg CO ₂ e (1.84kg CO ₂ e/kg)
Garlic	0.02	0.02kg CO ₂ e (1.09kg CO ₂ e/kg)
Citrus	0.15	0.18kg CO ₂ e (1.22kg CO ₂ e/kg)
Fats and oils: other	0.02	0.07kg CO ₂ e (3.74kg CO ₂ e/kg)

Total per serving: 216g CO₂e $\rightarrow$ 0.48 lb CO₂e

Total overall: 1.08kg CO₂e $\rightarrow$ 2.38 lb CO₂e

Lemon-Egg Soup/ Soupa Avgolemono Calculations

Prices Using Walmart Website: <https://www.walmart.com>

- 1 cup of orzo or small pasta of your choice (184g)
 - Barilla® Classic Blue Box Soup Pasta Orzo 16 oz→ 454g (\$1.28)
 - \$0.52 for a cup
- 64 oz of chicken broth (1,814g)
 - Great Value Unsalted Chicken Broth, 32 oz→ 907g (\$1.22)
 - \$2.44 for two containers
- 3-4 large carrots (120g)
 - Whole Carrots, 1lb bag (454g) (\$0.67)
 - \$0.18 for 120g
- 1 lemon (115g)
 - Lemons, each (\$0.56)
- 1 egg yolk (60g)
 - Great Value Large White Eggs, 12 Count (\$1.12)
 - \$0.09 for 1 whole egg
- Spices: salt and fresh black pepper
 - Not included in calculation

Price for buying ingredients from scratch: \$6.07

Cost of recipe: \$3.79

Cost per serving: \$0.54

Water Calculations:

- 1 cup of orzo or small pasta of your choice (184g→ 0.000184 metric ton)
 - Dry pasta. Water m³/ton
 - Global Average: Green: 1292 Blue: 347 Grey: 210 **Total: 1,849**
 - US Average: Green: 1892 Blue: 93 Grey: 232 Total: 2,217
 - **1,849 x 0.000184 = 0.340216 m³ of water**
 - **184g of pasta is 0.340216 m³ of water**
 - **0.340216 m³ of water→ 89.875558965 gallons = 89.9 gallons**
- 64 oz of chicken broth (1,814g→ 0.001814 metric ton)
 - Not on source. Will count this as just water
 - **64 fl oz = 0.5 gallons**

- 3-4 large carrots (120g→ 0.00012 metric ton)
 - Carrots and turnips, fresh or chilled. Water m³/ton
 - Global Average: Green: 106 Blue: 28 Grey: 61 **Total: 195**
 - US Average: Green: 65 Blue: 20 Grey: 39 Total: 124
 - **195 x 0.00012 = 0.0234 m³ of water**
 - **120g of carrots is 0.0234 m³ of water**
 - **0.0234 m³ of water→ 6.18162603 gallons = 6.2 gallons**
- 1 lemon (115g→ 0.000115 metric ton)
 - Lemons and limes, fresh or dried. Water m³/ton
 - Global Average: Green: 432 Blue: 152 Grey: 58 **Total: 642**
 - US Average: Green: 251 Blue: 52 Grey: 45 Total: 348
 - **642 x 0.000115 = 0.07383 m³ of water**
 - **115g of lemon is 0.07383 m³ of water**
 - **0.07383 m³ of water→ 19.50382263 gallons = 19.5 gallons**
- 1 egg yolk (60g→ 6e-5 metric ton)
 - Eggs. Water m³/ton
 - USA- Industrial: Green: 1218 Blue: 132 Grey: 232 Total: 1,582
 - USA- Weighted Average: Green: 1206 Blue: 130 Grey: 230 Total: 1,566
 - Global Average- Industrial: Green: 2298 Blue: 205 Grey: 360 Total: 2,863
 - Global Average- Weighted Average: Green: 2592 Blue: 244 Grey: 429 **Total: 3,265**
 - **3,265 x 6e-5 = 0.1959 m³ of water**
 - **61 egg is 0.1959 m³ of water**
 - **0.1959 m³ of water→ 51.7513051 gallons = 51.8 gallons**
- Spices: salt and fresh black pepper
 - Not included in calculation

Total water footprint of recipe: 167.9 gallons

Water Footprint per serving: 24.0 gallons

Carbon Footprint Calculations:

Ingredient	Amount (kg)	Greenhouse Gases
Pasta	0.18	0.22kg CO ₂ e (1.23kg CO ₂ e/kg)

Stock	1.81	2.57kg CO ₂ e (1.42kg CO ₂ e/kg)
Carrot	0.12	0.13kg CO ₂ e (1.09kg CO ₂ e/kg)
Citrus	0.12	0.15kg CO ₂ e (1.22kg CO ₂ e/kg)
Egg	0.06	0.29kg CO ₂ e (4.84kg CO ₂ e/kg)

Total per serving: 480g CO₂e→ 1.06 lb CO₂e

Total overall: 3.36kg CO₂e→ 7.41 lb CO₂e

Yogurt Barley Soup / Madzoon ov dez zedzav Calculations

Prices Using Walmart Website: <https://www.walmart.com/>

- 2 cups barley (or wheat) (13.5 oz→ 382g)
 - Goya Barley, 16 oz (454g) (\$1.42)
 - \$1.19 for 382g
- 32oz or 2lb (907g) container of plain yogurt (do not use Greek yogurt)
 - Great Value Plain Nonfat Yogurt, 32 oz (\$1.84)
- 1 egg yolk (60g for whole egg)
 - Great Value Large White Eggs, 12 Count (\$1.12)
 - \$0.09 for 1 egg
- 2 quarts of chicken broth (64oz→ 1,814g)
 - Great Value Unsalted Chicken Broth, 32 oz→ 907g (\$1.22)
 - \$2.44 for two containers
- 4 tablespoons (half a stick) of unsalted/sweet butter (55g)
 - Land O Lakes Unsalted Butter, 1 lb (453.6g) (\$3.76)
 - \$0.47 for half a stick of butter
- 2-3 teaspoons of pulverized dry mint
 - Too insignificant of a weight to calculate, so it will not be included in the calculation
- A dash of salt
 - Not included in calculation

Price for buying ingredients from scratch: \$10.58

Cost of recipe: \$6.03

Cost per serving: \$0.55

Water Calculation:

2 cups barley (or wheat) (13.5 oz→ 382g→ 0.000382 metric ton)

- Barley, hulled, pearled, sliced or kibbled. Water m³/ton
 - Global Average: Green: 1685 Blue: 110 Grey: 182 **Total: 1,977**
 - US Average: Green: 1287 Blue: 307 Grey: 214 Total: 1,808
 - **1,977 x 0.000382 = 0.755214 m³ of water**
 - **2 cups of barley is 0.755214 m³ of water**
 - **0.755214 m³ of water→ 199.50643235 gallons = 199.5 gallons**
- 32oz or 2lb (907g→ 0.000907 metric ton) container of plain yogurt
 - Yogurt. Water m³/ton
 - No USA value
 - World Average- Industrial: Green: 1194 Blue: 114 Grey: 96 Total: 1,404
 - Weighted Average: Green: 1003 Blue: 99 Grey: 84 **Total: 1,186**
 - **1,186 x 0.000907 = 1.075702 m³ of water**
 - **32oz of yogurt is 1.075702 m³ of water**
 - **1.075702 m³ of water→ 284.17040507 gallons = 284.2 gallons**
- 1 egg yolk (60g for whole egg→ 6e-5 metric ton)
 - Eggs. Water m³/ton
 - USA- Industrial: Green: 1218 Blue: 132 Grey: 232 Total: 1,582
 - USA- Weighted Average: Green: 1206 Blue: 130 Grey: 230 Total: 1,566
 - Global Average- Industrial: Green: 2298 Blue: 205 Grey: 360 Total: 2,863
 - Global Average- Weighted Average: Green: 2592 Blue: 244 Grey: 429 **Total: 3,265**
 - **3,265 x 6e-5 = 0.1959 m³ of water**
 - **1 egg is 0.1959 m³ of water**
 - **0.1959 m³ of water→ 51.7513051 gallons = 51.8 gallons**
- 2 quarts of chicken broth (64oz→ 1,814g)
 - **Not on source. Will count this as just water.**
 - 64 fl oz → **0.5 gallon**
- 4 tablespoons (half a stick) of unsalted/sweet butter (55g→ 5.5e-5 metric tons)

- Butter. Water m³/ton
 - USA- Industrial: Green: 2417 Blue: 330 Grey: 543 Total: 3,290
 - USA- Weighted Average: Green: 3519 Blue: 324 Grey: 483 Total: 4,326
 - Global Average- Industrial: Green: 5591 Blue: 532 Grey: 448 Total: 6,571
 - Global Average- Weighted Average: Green: 4695 Blue: 465 Grey: 393 **Total:**
5,554
 - $5,554 \times 5.5\text{e-}5 = 0.30547 \text{ m}^3 \text{ of water}$
 - $\frac{1}{2}$ stick of butter is $0.30547 \text{ m}^3 \text{ of water}$
 - $0.30547 \text{ m}^3 \text{ of water} \rightarrow 80.69663683 \text{ gallons} = \mathbf{80.7 \text{ gallons}}$
- 2-3 teaspoons of pulverized dry mint
 - Too insignificant of a weight to calculate, so it will not be included in the calculation
- A dash of salt
 - Not included in calculation

Total water footprint of recipe: 616.7 gallons

Water Footprint per serving: 56.1 gallons

Carbon Footprint Calculations:

Ingredient	Amount (kg)	Greenhouse Gases
Barley	0.38	0.32kg CO ₂ e (0.85kg CO ₂ e/kg)
Yogurt and Fromage Frais (dairy)	0.91	2.66kg CO ₂ e (2.92kg CO ₂ e/kg)
Egg	0.06	0.29kg CO ₂ e (4.84kg CO ₂ e/kg)
Stock	1.81	2.57kg CO ₂ e (1.42kg CO ₂ e/kg)
Butter (dairy)	0.06	0.59kg CO ₂ e (9.86kg CO ₂ e/kg)

Total per serving: 584.55gCO₂e → 1.29 lb CO₂e

Total overall: 6.43kg CO₂e → 14.18 lb CO₂e

Green Bean Stew / Fasolia Calculations

Prices Using Walmart Website: <https://www.walmart.com>

- 28 oz can of crushed tomatoes (794g)
 - Great Value Crushed Tomatoes with Tomato Puree, 28 oz (\$0.87)
- 1 pound of green beans (454g)
 - Green beans, loose produce 1lb (\$1.68)
- 1 medium yellow onion (162g)
 - Yellow Onion (\$0.70 each)
- 3-4 cloves of garlic (23g)
 - Garlic, each (1 bulb→ ~44g) (\$0.45)
 - \$.23 for 4 cloves
- 3 tablespoons of olive oil (31g)
 - Great Value 100% Extra Virgin Olive Oil 51 fl oz (\$8.46) [roughly \$0.17 per oz]
 - \$0.26 for 3 tablespoons
- 2 teaspoons of pepper paste or tomato paste (28g)
 - Great Value Tomato Paste, 12 oz→ 340g (\$0.92)
 - \$0.08 for two teaspoons
- Spices: salt, fresh ground pepper, Aleppo pepper, ground allspice
 - Not included in calculation

Price for buying ingredients from scratch: \$13.08

Cost of recipe: \$3.82

Cost per serving: \$0.64

Water Calculations:

- 28 oz can of crushed tomatoes (794g→ 0.000794 metric ton)
 - Tomato puree. Water m³/ton
 - Global Average: Green: 360 Blue: 211 Grey: 142 Total: **713**
 - US Average: Green: 103 Blue: 248 Grey: 72 Total: 423
 - **713 x 0.000794 = 0.566122 m³ of water**
 - **794g of crushed tomatoes is 0.566122 m³ of water**
 - **0.566122 m³ of water→ 149.55361063 gallons = 149.6 gallons**
- 1 pound of green beans (454g→ 0.000454 metric ton)
 - String beans. Water m³/ton
 - Global Average: Green: 301 Blue: 104 Grey: 143 **Total: 548**
 - US Average: Green: 329 Blue: 111 Grey: 187 Total: 627

- $548 \times 0.000454 = 0.248792 \text{ m}^3 \text{ of water}$
 - 454g of green beans is $0.248792 \text{ m}^3 \text{ of water}$
 - $0.248792 \text{ m}^3 \text{ of water} \rightarrow 65.72389325 \text{ gallons} = 65.7 \text{ gallons}$
- 1 medium yellow onion (162g $\rightarrow$ 0.000162 metric ton)
 - Onions and shallots, fresh or chilled. Water m^3/ton
 - No US average
 - Global average: Green: 176 Blue: 44 Grey: 51 **Total: 271**
 - $271 \times 0.000162 = 0.043902 \text{ m}^3 \text{ of water}$
 - 162g of onion is $0.043902 \text{ m}^3 \text{ of water}$
 - $0.043902 \text{ m}^3 \text{ of water} \rightarrow 11.597681443 \text{ gallons} = 11.6 \text{ gallons}$
- 3-4 cloves of garlic (23g $\rightarrow$ 2.3×10^{-5} metric ton)
 - Garlic, fresh or chilled. Water m^3/ton
 - Global Average: Green: 337 Blue: 81 Grey: 170 **Total: 558**
 - US Average: Green: 116 Blue: 186 Grey: 77 Total: 379
 - $558 \times 2.3 \times 10^{-5} = 0.012834 \text{ m}^3 \text{ of water}$
 - 23g of garlic is $0.012834 \text{ m}^3 \text{ of water}$
 - $0.012834 \text{ m}^3 \text{ of water} \rightarrow 3.39038412 \text{ gallons} = 3.4 \text{ gallons}$
- 3 tablespoons of olive oil (31g $\rightarrow$ 3.1×10^{-5} metric ton)
 - Olive oil, virgin. Water m^3/ton
 - Global Average: Green: 11826 Blue: 2388 Grey: 217 **Total: 14,431**
 - US Average: Green: 2175 Blue: 2607 Grey: 360 Total: 5,142
 - $14,431 \times 3.1 \times 10^{-5} = 0.447361 \text{ m}^3 \text{ of water}$
 - 31g of olive oil is $0.447361 \text{ m}^3 \text{ of water}$
 - $0.447361 \text{ m}^3 \text{ of water} \rightarrow 118.18027351 \text{ gallons} = 118.2 \text{ gallons}$
- 2 teaspoons of pepper paste or tomato paste (28g $\rightarrow$ 2.8×10^{-5} metric ton)
 - Tomato paste. Water m^3/ton
 - Global Average: Green: 431 Blue: 253 Grey: 171 **Total: 855**
 - US Average: Green: 124 Blue: 297 Grey: 87 Total: 508
 - $855 \times 2.8 \times 10^{-5} = 0.02394 \text{ m}^3 \text{ of water}$
 - 28g of tomato paste is $0.02394 \text{ m}^3 \text{ of water}$
 - $0.02394 \text{ m}^3 \text{ of water} \rightarrow 6.324278933 \text{ gallons} = 6.3 \text{ gallons}$
- Spices: salt, fresh ground pepper, Aleppo pepper, ground allspice
 - Not included in calculation

Total water footprint of recipe: 354.8 gallons

Water Footprint per serving: 59.1 gallons

Carbon Footprint Calculations:

Ingredients	Amount (kg)	Greenhouse Gases
Vegetable: other	0.45	0.83kg CO ₂ e (1.84kg CO ₂ e/kg)
Tinned tomatoes	0.79	2.61kg CO ₂ e (3.3kg CO ₂ e/kg)
Tinned tomatoes	0.03	0.1kg CO ₂ e (3.3kg CO ₂ e/kg)
Onions	0.16	0.17kg CO ₂ e (1.09kg CO ₂ e/kg)
Garlic	0.02	0.02kg CO ₂ e (1.09kg CO ₂ e/kg)
Fats and oils: other	0.03	0.11kg CO ₂ e (3.74kg CO ₂ e/kg)

Total per serving: 640g CO₂e → 1.41 lb CO₂e

Total overall: 3.84kg CO₂e → 8.57 lb CO₂e

Wheat Rice / Bulgur Pilaf Calculations

Prices Using Walmart Website: <https://www.walmart.com>

- 2 tablespoons of sweet/unsalted butter (30g)
 - Land O Lakes Unsalted Butter, 1 lb (453.6g) (\$3.76)
 - \$0.25 for 2 tablespoons
- A handful of thin egg noodles (40g)
 - Pennsylvania Dutch Enriched Fine Egg Noodles, 12 oz → 340g (\$1.88)
 - \$0.22 for 40g
- 1 cup of #3 bulgur (cracked wheat) (195g)
 - Yara Bulgur Wheat - Coarse #3 (680g) (\$4.99)
 - \$1.43 for 1 cup
- 2 cups of chicken broth (558g)
 - Great Value Unsalted Chicken Broth, 32 oz → 907g (\$1.22)

- \$0.75 for 2 cups
- ½ teaspoon of salt
 - Not included in calculation
- 3-4 grinds of fresh black pepper
 - Not included in calculation

Price for buying ingredients from scratch: \$11.85

Cost of recipe: \$2.65

Cost per serving: \$0.33

Water Calculation:

- 2 tablespoons of sweet/unsalted butter (30g→3e-5 metric ton)
 - Butter. Water m³/ton
 - USA- Industrial: Green: 2417 Blue: 330 Grey: 543 Total: 3,290
 - USA- Weighted Average: Green: 3519 Blue: 324 Grey: 483 Total: 4,326
 - Global Average- Industrial: Green: 5591 Blue: 532 Grey: 448 Total: 6,571
 - Global Average- Weighted Average: Green: 4695 Blue: 465 Grey: 393 **Total: 5,554**
 - **5,554 x 3e-5 = 0.16662 m³ of water**
 - **30g of butter is 0.16662 m³ of water**
 - **0.16662 m³ of water→ 44.01634736 gallons = 44.0 gallons**
- A handful of thin egg noodles (40g→ 4e-5 metric ton)
 - Dry pasta. Water m³/ton
 - Global Average: Green: 1292 Blue: 347 Grey: 210 **Total: 1,849**
 - US Average: Green: 1892 Blue: 93 Grey: 232 Total: 2,217
 - **1,849 x 4e-5 = 0.07396 m³ of water**
 - **40g of pasta is 0.07396 m³ of water**
 - **0.07396 m³ of water→ 19.53816499 gallons = 19.5 gallons**
- 1 cup of #3 bulgur (cracked wheat) (195g→ 0.000195 metric ton)
 - Buckwheat. Water m³/ton
 - Global Average: Green: 2,769 Blue: 144 Grey: 229 **Total: 3,142**
 - US Average: Green: 2,743 Blue: 791 Grey: 469 Total: 4,003
 - **3,142 x 0.000195 = 0.61269 m³ of water**
 - **195g of buckwheat is 0.61269 m³ of water**

- 0.61269 m³ of water → 161.8555748 gallons = **161.9 gallons**
- 2 cups of chicken broth (558g → 0.000558 metric ton)
 - Not on source. Will count this as just water.
 - 2 cups = 0.125 gallons → **0.1 gallon**
- ½ teaspoon of salt
 - Not included in calculation
- 3-4 grinds of fresh black pepper
 - Not included in calculation

Total water footprint of recipe: 225.5 gallons

Water Footprint per serving: 28.2 gallons

Carbon Footprint Calculations:

Ingredient	Amount (kg)	Greenhouse Gases
Butter (dairy)	0.03	0.3kg CO ₂ e (9.86kg CO ₂ e/kg)
Noodles	0.04	0.05kg CO ₂ e (1.23kg CO ₂ e/kg)
Buckwheat	0.2	0.18kg CO ₂ e (0.88kg CO ₂ e/kg)
Stock	0.56	0.8kg CO ₂ e (1.42kg CO ₂ e/kg)

Total per serving: 166.25g CO₂e → 0.37 lb CO₂e

Total overall: 1.33kg CO₂e → 2.93 lb CO₂e

Lentils & Rice / Mujadarah Calculations

Prices Using Walmart Website: <https://www.walmart.com/>

- 2 large yellow onions (334g)
 - Yellow Onion (\$0.70 each)
 - \$1.40 for two onions
- 1 cup of uncooked brown lentils (180g)
 - Great Value Lentils, 1lb → 454g (\$0.98)
 - \$0.39 for 1 cup

- ½ cup of Baldo rice or long-grain Carolina (100g)
 - Reis Baldo Rice - 2.2lb→ 1kg (\$18.25)
 - Great Value Long Grain Enriched Rice, 32 oz→ 907g (\$1.46)
 - \$0.16 for ½ a cup
- 3 tablespoons of olive oil (1.5 fl oz→ 33g)
 - Great Value 100% Extra Virgin Olive Oil 51 fl oz (\$8.46) [roughly \$0.17 per oz]
 - \$0.25 for 3 tablespoons
- 4 tablespoons of canola/vegetable oil (2 fl oz→ 40g)
 - Great Value Canola Oil, 48 fl oz (\$1.92) [\$0.04 per oz]
 - \$0.08 for 4 tablespoons
- 5 cups of water (240g=1cup → 1,200g=5cups)
 - Not included in price
- Spices: Aleppo pepper, cumin, paprika, fresh black pepper, and salt (to taste--will use small amounts)
 - Not included in price

Price for buying ingredients from scratch: \$14.22

Cost of recipe: \$2.28

Cost per serving: \$0.29

Water Calculations:

- 2 large yellow onions (334g→ 0.000334 metric ton)
 - Onions and shallots, fresh or chilled. Water m³/ton
 - No US average
 - Global average: Green: 176 Blue: 44 Grey: 51 **Total: 271**
 - **271 x 0.000334 = 0.090514 m³ of water**
 - **334g of onion is 0.090514 m³ of water**
 - **0.090514 m³ of water → 23.911269147 gallons = 23.9 gallons**
- 1 cup of uncooked brown lentils (180g→ 0.00018 metric ton)
 - Lentils dried, shelled, whether or not skinned or split. Water in (m³/ton)
 - US average: Green: 1,782 Blue: N/A Grey: 7,736 Total: 9,518
 - Global average: Green: 4,324 Blue: 489 Grey: 1,060 **Total: 5,873**
 - **5,873 x 0.00018 = 1.05714 m³ of water**
 - **180g of lentils is 1.05714 m³ of water**

- **1.05714 m³ of water → 279.2668434 gallons = 279.3 gallons**
- ½ cup of Baldo rice or long-grain Carolina (100g→ 1e-4 metric ton)
 - Rice, semi-milled or wholly milled, whether or not polished or glazed. Water m³/ton
 - Global Average: Green: 1653 Blue: 492 Grey: 269 **Total: 2,414**
 - US Average: Green: 610 Blue: 1222 Grey: 268 Total: 2,100
 - **2,414 x 1e-4 = 0.2414 m³ of water**
 - **100g of rice is 0.2414 m³ of water**
 - **0.2414 m³ of water → 63.7711334 gallons = 63.8 gallons**
- 3 tablespoons of olive oil (1.5 fl oz→ 33g→ 3.3e-5 metric ton)
 - Olive oil, virgin. Water m³/ton
 - Global Average: Green: 11826 Blue: 2388 Grey: 217 **Total: 14,431**
 - US Average: Green: 2175 Blue: 2607 Grey: 360 Total: 5,142
 - **14,431 x 3.3e-5 = 0.476223 m³ of water**
 - **33g of olive oil is 0.476223 m³ of water**
 - **0.476223 m³ of water→ 125.80480729 gallons = 125.8 gallons**
- 4 tablespoons of canola/vegetable oil (2 fl oz→ 40g→ 4e-5 metric ton)
 - Rape,colza o mustard oil&their fract,refind but not chemically modifid. Water m³/ton
 - Global Average: Green: 3226 Blue: 438 Grey: 636 **Total: 4,300**
 - US Average: Green: 5319 Blue: 39 Grey: 712 Total: 6,070
 - **4,300 x 4e-5 = 0.172 m³ of water**
 - **40g of canola oil is 0.172 m³ of water**
 - **0.172 m³ of water→ 45.437593 gallons = 45.4 gallons**
- 5 cups of water (240g=1cup → 1,200g=5cups → 0.0012 metric ton)
 - **5 cups = 0.3125 gallons → 0.3 gallons**
- Spices: Aleppo pepper, cumin, paprika, fresh black pepper, and salt (to taste--will use small amounts)
 - Not included in calculation

Total Water Footprint of recipe: 538.5 gallons

Water Footprint per serving: 67.3 gallons

Carbon Footprint Calculations:

Ingredients	Amount (kg)	Greenhouse Gases
Onions	0.33	0.36kg CO ₂ e (1.09kg CO ₂ e/kg)
Lentils	0.18	0.26kg CO ₂ e (1.42kg CO ₂ e/kg)
Rice	0.1	0.32kg CO ₂ e (3.15g CO ₂ e/kg)
Fats and oils: other	0.03	0.11kg CO ₂ e (3.74kg CO ₂ e/kg)
Vegetable Oils	0.04	0.15kg CO ₂ e (3.74kg CO ₂ e/kg)
Water	1.2	0.32kg CO ₂ e (0.27kg CO ₂ e/kg)

Total per serving: 190g CO₂e → 0.42 lb CO₂e

Total overall: 1.52kg CO₂e → 3.35 lb CO₂e

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