



INTRODUCTION

Eat the Rainbow! workbook is designed to support USC faculty and staff to incorporate more produce and nutrient-dense foods into your daily fruit and vegetable intake. This workbook aims to help you identify and fill gaps in your daily fruit and vegetable intake. Eating nutritious foods supports a healthier lifestyle and longer lifespan.^{1, 2} You will begin with determining your personal needs and serving sizes to track your current consumption. Following the self-assessment are tips, recipes, and options for integrating more fruits and vegetables into your diet, including cooking and preparation methods.



BACKGROUND

According to recent data from the Centers for Disease Control and Prevention (CDC), only 12.3% of adults in the U.S. consumed the recommended servings of fruit, and only 10% consumed the recommended servings of vegetables.³ Based on the standard 2000-calorie diet, the U.S. Department of Agriculture (U.S.D.A.) recommends 2 ½ servings of vegetables and 2 servings of fruit per day.⁴ (A serving is 1 cup for these food groups.)

Fruits and vegetables are filled with fiber, minerals, vitamins, and phytonutrients, which are naturally occurring molecules in plants that are associated with health benefits when consumed.⁵ Some examples of commonly mentioned phytonutrient families are carotenoids and polyphenols. The way to get the most benefit from these molecules Is to eat a variety of fruits and vegetables, focusing particularly on consuming a range of colors. Many phytonutrients are in fact pigments that give fruits and vegetables their colors.

A single fruit or vegetable can contain many different kinds of phytonutrients and increasing daily consumption even by only a serving or two has a positive impact on health.⁶ Please see the following image to find out which foods are high in phytonutrients.



FOOD SOURCES OF PHYTONUTRIENTS BY CLASS 5,7

ANTHOCYANINS

Cherries, berries, plums, beets, red radishes, eggplant, red cabbage

PHENOLIC ACIDS

Cherries, pears grapefruit, oranges, white potatoes, strawberries, artichokes, onions, kiwis, apples, coffee

GLUCOSINOLATES

Broccoli, cabbage,

mustard greens,

cauliflower, Brussel

sprouts, turnip

greens

LUTEIN & ZEAXANTHIN

Spinach, collard greens, kale, parsley, basil, leeks, peas, bell peppers (any color), carrots, broccoli

CAROTENOIDS

Pumpkins, carrots, watermelon, tomatoes, papayas, sweet potatoes, butternut squash, spinach, arugula, oranges, limes



ANTHOCYANINS

Anthocyanins are found in many purple, red, and blue fruits and vegetables, such as red cabbage, plums, red radishes, beets, strawberries, berries, and cherries.

Anthocyanins have anti-inflammatory properties and can slow or reverse the course of certain metabolic diseases and cardiovascular diseases.⁸



GLUCOSINOLATES

Glucosinolates are sulphur-containing phytonutrients found most abundantly in vegetables like cabbage and its relations, such as collard greens, broccoli, cabbage, mustard greens, cauliflower, Brussels sprouts, and turnip greens.

This class of phytonutrients is known to help in the prevention of many cancers as well as to act as antimicrobials and antioxidants.⁹

PHENOLIC ACIDS

Phenolic acids is a big group of phytonutrients that don't necessarily correlate to a specific color or range of colors like most of the previous groups have.

They can be found in large quantities in cherries, pears, grapefruit, oranges, white potatoes, strawberries, artichokes, onions, kiwis, apples, and even coffee. Many common kitchen herbs contain phenolic acids as well.

This class of phytonutrients is known for its anti-cancer and anti-microbial properties, and has beneficial effects on blood pressure and cholesterol levels.¹⁰



CAROTENOIDS

Carotenoids are powerful antioxidants found in many of our orange- or red-colored fruits and vegetables, such as pumpkins, carrots, watermelon, tomatoes, papaya, sweet potatoes, butternut squash, spinach, arugula, oranges, and limes.

Our bodies can covert certain carotenoids into vitamin A, which is essential for proper vision and immunity.¹¹



LUTEIN & ZEAXANTHIN

Lutein and Zeaxanthin are two specific carotenoids that are known to be particularly protective against age-related vision problems by absorbing blue light as well as acting as antioxidants to stop free radical damage in the eye from UV light.

Once damage has occurred to the eye, lutein and zeaxanthin are less effective, so it's best to consume them in good amounts as soon as you start incorporating more fruits and vegetables into your diet.

They can be found in many of the other carotenoid plants but are especially abundant in spinach, parsley, kale, collard greens, basil, leeks, peas, bell peppers, carrots, and broccoli.¹²



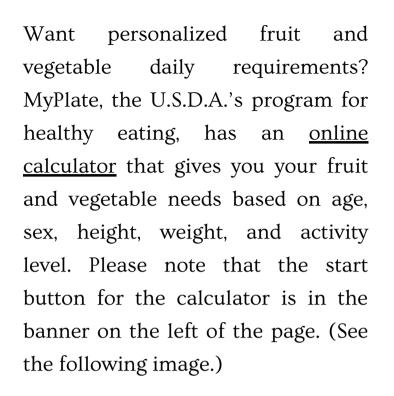
DAILY REQUIREMENTS

Daily calorie needs can vary widely based on age, sex, and activity level, See the table ⁴ for more specific guidelines based on your calorie needs per day. Please note the vegetable section is broken down by category, and these categories provide cups/servings needed per week, not day.

Healthy U.S.-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN	1.000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3.000	3,200
FOOD GROUP OR SUBGROUP			(Ve	Di getable a			ood From ubgroup			veek.)		
Vegetables (cup eq/day)	1	1%	1 %	2	2 %	2 %	3	3	3 %	3 %	4	- 4
				V	egetable	Subgroup	s in Wee	kly Amou	ints			
Dark-Green Vegetables (cup eq/wk)	30	1	1	1 1/2	1 %	1 %	2	2	2 %	2 %	2 %	2 %
Red and Orange Vegetables (cup eq/wk)	2 %	3	3	4	5%	514	6	6	7	7	7%	75
Beans, Peas, Lentils (cup eq/wk)	36	36	16	1	116	16	2	2	2 %	2 %	3	3
Starchy Vegetables (cup eq/wk)	2	3 %	3 %	4	5	5	6	6	7.	7	8	8
Other Vegetables (cup eq/wk)	1 %	2 %	2 %	3 %	4	4	5	5	5%	5%	7	7
Fruits (cup eq/day)	1	1	1%	1.%	1%	2	2	2	2	2 %	2 %	2 %

If tracking your consumption at this level does not fit your lifestyle, it's not a problem. Simply consuming more fruits and vegetables up until you hit those requirements is all you need to do; But note that more benefits come when you vary which ones you eat or have a regular rotation.





Your food plan is personalized, based on your:

- · Age
- · Sex
- · Height
- Weight
- · Physical activity level

To get started, click on the "Start" button. You can also find out your MyPlate Plan in Spanish.

Get the MyPlate Plan widget to post or share on your blog or website!

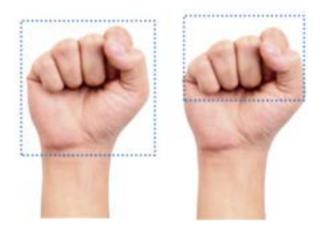
Get the Widget



SERVING SIZES

If you have access to measuring cups and the time to cook, the given fruit and vegetable cup measurements are really useful. However, if you're quickly throwing together a meal or trying to figure out serving sizes while eating out, you may find these quick visual references to be more helpful.

Please use the following image to determine what a serving size of fruit or vegetables is based on type.



The average fist is the size of 1 cup. Use this for fruit, raw vegetables, and cooked vegetables that retain most of their shape after cooking. Raw, leafy greens have a serving size of 2 fists.

Half of an average fist is the size of ½ cup. Use this for dried fruits and vegetables.

INTAKE TRACKING

Most of us are unaware of how many servings we consume in a day, so this handbook includes a printable tracking sheet, see below. By noting down the types and serving sizes of our food, we get clarity on our consumption. Other tracking methods include creating a page in your smart phone notes app or In an Excel-like program. To get a precise measurement, we recommend tracking for 2 to 3 days, recording size/amount every time a fruit or vegetable is consumed. Noting down these portions immediately after eating is best, because it prevents having to rely on memory.

The table has extra rows in case they're needed, so don't feel obligated ito fill them in, but rather use this table to establish a baseline and use only when needed. Keeping a strict record of food intake very frequently or everyday can lead some people to become obsessive. We want eating to be not just a way to provide nutrients to our bodies, but also a way to have fun and have new experiences with food.

DAY 1	DAY 2	DAY 3

EASY MEAL AND SNACK IDEAS

Are you ready to begin adding more produce into your diet? Here are some suggestions for each meal of the day as well as snacks. Using fresh or frozen ingredients has minimal impact in terms of nutrition, however monitor the sodium content. Dried fruit is also a good option if fresh or frozen fruits aren't available. It's best to pick dried fruit that is unsulfured and unsweetened.

Remember: the ultimate goal is to eat a wide variety of types and colors. Try some new fruits and vegetables every once in a while and see if you like them enough to add into your rotation.

BREAKFAST

- Make or buy smoothies that include a combination of fruits and vegetables. Leafy greens like spinach and kale provide a nutrient boost with little added flavor. Add protein and a healthy fat, either incorporated or on the side
- Make quick vegetable hash with frozen or fresh bell peppers, onions, and potatoes
- Try a plant-based protein like tofu or soy chorizo as a replacement for, or in addition to, scrambled eggs
- Mix fresh, frozen, or dried fruits into cooked oatmeal
- Cut up half a banana or sprinkle berries onto cereal or granola
- Make a quick frittata or quiche with your favorite vegetables: the most common are mushrooms, spinach, bell peppers, asparagus, tomatoes, and onions
- Grab a whole seasonal fruit or cut fruit as a side to a favorite breakfast protein
- Make a homemade yogurt parfait with low- or nonfat yogurt, oats or granola, and add chopped fruit or frozen berries
- Add in shredded zucchini or carrots to pancake or waffle batter and add fruit on top
- Throw together melon pieces with cottage cheese and crackers

LUNCH

- Throw chopped broccoli or cauliflower and a teaspoon of water into a microwave-safe container to steam at work and eat alongside leftovers from last night's main dish
- Make a bibimbap-style bowl with rice on the bottom and small portions of a variety of cooked vegetables (often spinach, bean sprouts, carrot, zucchini, cucumber, onion, and kimchi) with protein and preferred sauce
- Add variety to sandwiches and wraps with different kinds of leafy greens, tomatoes, cucumbers, and pickled peppers
- Build a sweet salad with any type of dark greens plus halved grapes, chopped apples, strawberry slices, walnut pieces, and a light vinaigrette. Make it a complete meal by adding chickpeas or shredded chicken.
- Slice avocado and add as a great alternative to more saturated fats like butter or full-fat cheese
- Boil lentils and split peas, then blend or mash together with aromatics (ex: garlic, onion, celery, black pepper, leeks) and some of the water they were cooked in to make a soup without missing out on those water-soluble vitamins
- Use half the normal amount of jams or fruit jellies in a PB&J, replacing the rest with sliced strawberries or bananas





DINNER

- Roast kabocha or butternut squash and beets for a sweet, colorful side dish
- Add vegetables into stir-fries: asparagus, snow peas, bell peppers, carrots, summer squash, enoki mushrooms, cabbage, bok choy, hot peppers, bean sprouts, and others
- Mix together a simple tomato sauce with vegetables to pour over pasta or zucchini spirals
- Grill or roast vegetable skewers alone or with protein. Common vegetables used are mushrooms, eggplant, bell peppers, red onions, tomatoes, leeks, and artichokes
- Use a crock pot or Instapot to make stew with potatoes, turnips, carrots, green peas, vegetable broth, and a protein. Another option is bean chili with tomatoes, onions, cilantro, and chipotle chilis
- Core out and roast Italian eggplants, then smother in tomato sauce or meat sauce, bread crumbs, and fresh herbs
- Add sliced okra and chunks of tomato and onions to a yellow curry base or combine with a masala mix to make bhindi masala
- Chop up asparagus spears and coat lightly with salt and a high-smokepoint oil, then cook them in an air fryer until just crispy

SNACKS

- Make banana or pumpkin bread and consider adding shredded zucchinithe extra flavor and texture is almost impossible to detect
- Slice an apple and dip the pieces into a couple tablespoons of nut butter
- Dip cucumbers, carrots, celery, or pita in hummus or tzatziki
- Buy a package of non-candied trail mix or create your own homemade version with preferred unsweetened dried fruits and nuts (a serving is 1/2 cup or a cupped hand)
- Replace butter with an olive or avocado oil spray when making popcorn; toss with salt or spices to taste
- Have leftover rice with store-bought or homemade furikake (often slivers of dried seaweed, sesame seeds, dried egg, salt) and a side of Japanese pickles
- Chop mango or watermelon into chunks and sprinkle with Tajin or add chili powder, lime juice, and a touch of salt to taste
- Have a serving of 100% fruit and/or vegetable juice



COOKING METHODS AND RECIPES FOR MAXIMUM FLAVOR AND NUTRITION



How we prepare and cook fruits and vegetables has significant impact on how much nutrition is in the final product. Boiling can lead to the loss of water-soluble vitamins like the B vitamins and Vitamin C, as well as loss of pigment that contains beneficial phytonutrients. Cooking in fat for too long can drain out the fatsoluble vitamins A, D, E, and K. Peeling the skins from fruits and vegetables decreases the amount of important pigments and other phytochemicals, vitamins, and minerals that are not present or not as abundant in the flesh.

In addition to being mindful of potential nutritional loss based on cooking method, flavor and texture might also be affected. If we have to force ourselves to eat overcooked vegetables, we're not likely to want to keep up with our serving goals.

Here are some cooking methods to use to retain maximum nutrition and flavor. Eating raw is also a healthy and tasty option for some vegetables and fruit.

ROASTING/BAKING/BROILING:

Cooking in an oven, often at a high heat

These methods create vegetables that are a little crispy with a softer interior without the use of much oil or direct contact with a flame.

ROASTED EGGPLANT

- i. Cut an eggplant into ½-inch thick rounds, then cut each round in half.
- ii. Put the pieces into a bowl with 2 tablespoons of a high smoke point oil and your preferred seasonings, and use your hands to gently toss the pieces so they are evenly coated.
- iii. Place on a pan lined with aluminum foil and cook in a preheated oven at 400°F for about 30 minutes. (Time may vary based on thickness of the pieces, so check every 5 minutes starting around 20 minutes for a caramelized, golden color.)

Pairs well with a plain tomato sauce with fresh basil or Bolognese sauce.



SAUTÉING/STIR FRYING:

Cooking in a pan at medium or high heat with a small amount of oil

These methods use a little bit of oil or sauce over high heat to quickly cook vegetables through. Some stores sell packages of stir-fry vegetables that are pre-cut, but you can make your own with whatever suits your taste buds. Put thicker, more fibrous vegetables in first and leafy or softer vegetables in last.



- i. Thinly chop or slice a handful of snow peas, bok choy, red bell peppers, carrots, garlic, mushrooms, and onions and put aside. (If you have time, separate the bok choy leaves from the stems and keep the leaves and mushrooms apart from the rest.)
- ii. Heat your sauté pan or wok on high, then pour in 2-3 tablespoons of canola oil.
- iii. Let that heat up, then add all thick or fibrous vegetables, frequently stirring to not burn and cooking for 2 minutes, then add in mushrooms, bok choy leaves and 2tsp of soy sauce, cooking for another 1-2 minutes with frequent stirring.

Pairs well with rice and baked tofu.



AIR FRYING:

Cooking in a smaller convection oven with air circulating at high speed

Almost anything that is cooked in an oven can be cooked in an air fryer, but an air fryer can only fit a few servings. Watch the time, because this cooks much faster than regular ovens.



AIR-FRIED GREEN BEANS

- i. Put 1 ½ cups of whole or 2- to 3-inch pieces of green beans into a bowl.
- ii. Add 2 teaspoons of vegetable oil and seasoning of your choice (a little Mrs. Dash works well), then toss to coat.
- iii. Take out the green beans by hand or with tongs and put them into the basket; it's best not to pour them in, otherwise you will also include any excess oil.
- iv. Set your air fryer to 375°F for 15 minutes, checking every 2 minutes starting at 10 minutes. They are done when they are crispy but not crunchy.

Pairs well with a lean cut of beef and mashed potatoes.

GRILLING:

Cooking on a preheated grill exposed directly to flames, or on a stovetop grill plate

There is some concern about the charring caused by grilling and its possible negative effects on health, but the emphasis has been on grilled meats, not fruits and vegetables. The harmful compounds form when fat drips into open flame, and this happens minimally with lightly oiled fruits and vegetables as they are naturally low fat.¹⁴

GRILLED PEACH SALAD

- i. Cut a fresh peach in half and remove the pit, then slice each side into 3 pieces and put in a bowl.
- ii. Add 1-2 teaspoons of canola oil, then place them on a well-oiled grill or grill plate to prevent sticking. (The latter can be used on a stove top.)
- iii. Cook for a couple minutes on each side, re-oiling the grill or grill plate if needed, then set aside to cool.
- iv. After cooling, add them to a bowl of arugula, light feta, blueberries, and chopped or whole pecans.

Pairs well with baked salmon and plain quinoa.

STEAMING:

Cooking over hot water in an enclosed container

Steaming is a very effective method of cooking that also keeps of the in most phytonutrients in vegetables, especially if done over rice or another grain; this way the grains absorb any drops from the vegetables and prevents almost all loss. Steaming can be done over a pot of boiling water or in a rice cooker, but make sure that the water doesn't come in contact with the steam basket.





Cut a butternut squash in half and take out the seeds and fibrous strands, then cut the rest into 1-inch thick cubes or triangles.

ii. Cut off or peel the rind/skin and discard. Place the squash pieces evenly in the steam basket, making sure to leave some space in between them so the steam can touch all sides, and place the basket over the pot of water or in the rice cooker. (If using a pot of water, try to cover as much of the basket as possible with the pot lid.)

iii. After 10 minutes, check every so often to see if they're done by taking out a piece and trying to slice it in the middle with the side of a fork; if done, it will cut through easily. The time they take to fully cook depends on how thin they are, so begin checking around 10 minutes. This can take up to 20 minutes.

iv. Put the hot pieces into a large bowl and sprinkle with 2 teaspoons of cinnamon and 1 tablespoon of brown sugar.

v. Toss very gently in the bowl, then serve.

Pairs well with roast turkey and stuffing.

MICROWAVING:

Cooking in microwave can include steaming, reheating, defrosting

Microwaving is a quick, effective way to heat frozen or fresh vegetables. To avoid contaminants entering your food from plastics, cook in a microwave-safe bowl or dish.

GARLICKY BROCCOLI AND CAULIFLOWER FLORETS

- i. Take a cupful of frozen cauliflower and broccoli and put into a bowl.
- ii. Add $\frac{1}{2}$ minced clove of garlic, then cover the bowl with a plate.
- iii. Cook in the microwave for around 2 to 3 minutes (the larger the pieces, the longer the time), then take out of the microwave and remove the lid.
- iv. These can be eaten as is or with a little extra-virgin olive oil and sprinkles of your favorite seasonings, like black pepper and thyme.

Pairs well with baked pork tenderloin and light mac and cheese.



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