Diet Compositions and Obesity

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Introduction

A staggering number of 37.3% of the US population is obese,

The USDA Center for Nutrition Policy and Promotion recommends a very simple daily diet intake guideline: 30% grains, 40% vegetables, 10% fruits, and 20% protein. [1] [2]
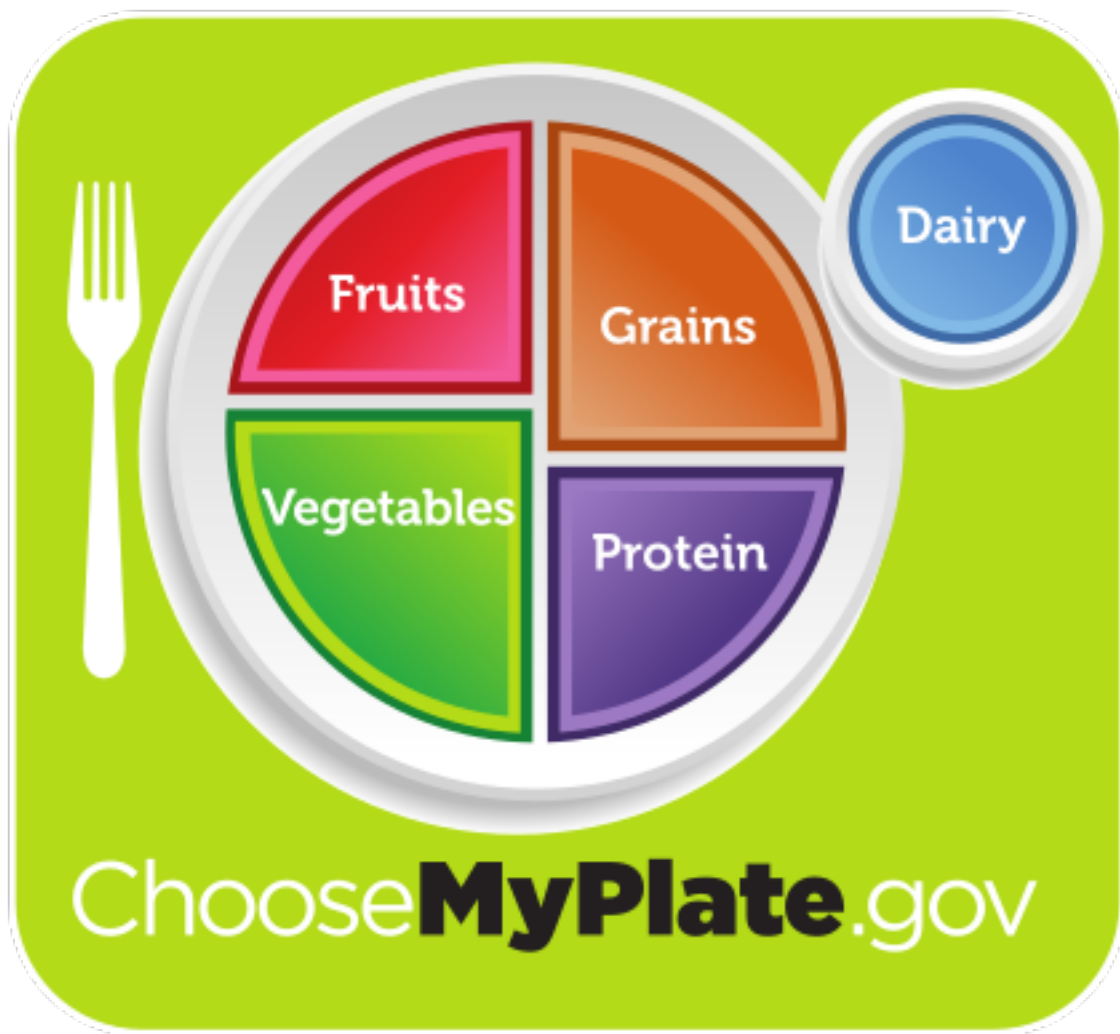
Figure 1: MyPlate Guildlines

Data

Categories	Items
Alcoholic Beverages	Alcohol, Non-Food; Beer; Beverages, Alcoholic; Beverages, Fermented; Wine
Animal fats	Butter, Ghee; Cream; Fats, Animals, Raw; Fish, Body Oil; Fish, Liver Oil
Animal Products	Aquatic Animals, Others; Aquatic Plants; Bovine Meat; Butter, Ghee; Cephalopods; Cream; Crustaceans; Demersal Fish; Eggs; Fats, Animals, Raw; Fish, Body Oil; Fish, Liver Oil; Freshwater Fish; Marine Fish, Other; Meat, Aquatic Mammals; Meat, Other; Milk - Excluding Butter; Molluscs, Other; Mutton & Goat Meat; Offals, Edible; Pelagic Fish; Pigmeat; Poultry Meat
Aquatic Products, Other	Aquatic Animals, Others; Aquatic Plants; Meat, Aquatic Mammals
Cereals - Excluding Beer	Barley and products; Cereals, Other; Maize and products; Millet and products; Oats; Rice (Milled Equivalent); Rye and products; Sorghum and products; Wheat and products
Eggs	Eggs
Fish, Seafood	Cephalopods; Crustaceans; Demersal Fish; Freshwater Fish; Marine Fish, Other; Molluscs, Other; Pelagic Fish
Fruits - Excluding Wine	Apples and products; Bananas; Citrus, Other; Dates; Fruits, Other; Grapefruit and products; Grapes and products (excl wine); Lemons, Limes and products; Oranges, Mandarines; Pineapples and products; Plantains
Meat	Bovine Meat; Meat, Other; Mutton & Goat Meat; Pigmeat; Poultry Meat
Milk - Excluding Butter	Milk - Excluding Butter
Miscellaneous	Infant food; Miscellaneous
Offals	Offals, Edible
Oilcrops	Coconuts - Incl Copra; Cottonseed; Groundnuts (Shelled Eq); Oilcrops, Other; Olives (including preserved); Palm kernels; Rape and Mustardseed; Sesame seed; Soyabeans; Sunflower seed
Pulses	Beans; Peas; Pulses, Other and products
Spices	Cloves; Pepper; Pimento; Spices, Other
Starchy Roots	Cassava and products; Potatoes and products; Roots, Other; Sweet potatoes; Yams
Stimulants	Cocoa Beans and products; Coffee and products; Tea (including mate)
Sugar & Sweeteners	Honey; Sugar (Raw Equivalent); Sugar non-centrifugal; Sweeteners, Other
Sugar Crops	Sugar beet; Sugar cane
Treenuts	Nuts and products
Vegetable Oils	Coconut Oil; Cottonseed Oil; Groundnut Oil; Maize Germ Oil; Oilcrops Oil, Other; Olive Oil; Palm Oil; Palmkernel Oil; Rape and Mustard Oil; Ricebran Oil; Sesameseed Oil; Soyabean Oil; Sunflowerseed Oil
Vegetables	Onions; Tomatoes and products; Vegetables, Other
Vegetal Products	Alcohol, Non-Food; Apples and products; Bananas; Barley and products; Beans; Beer; Beverages, Alcoholic; Beverages, Fermented; Cassava and products; Cereals, Other; Citrus, Other; Cloves; Cocoa Beans and products; Coconut Oil; Coconuts - Incl Copra; Coffee and products; Cottonseed; Cottonseed Oil; Dates; Fruits, Other; Grapefruit and products; Grapes and products (excl wine); Groundnut Oil; Groundnuts (Shelled Eq); Honey; Infant food; Lemons, Limes and products; Maize and products; Maize Germ Oil; Millet and products; Miscellaneous; Nuts and products; Oats; Oilcrops Oil, Other; Oilcrops, Other; Olive Oil; Olives (including preserved); Onions; Oranges, Mandarines; Palm kernels; Palm Oil; Palmkernel Oil; Peas; Pepper; Pimento; Pineapples and products; Plantains; Potatoes and products; Pulses, Other and products; Rape and Mustard Oil; Rape and Mustardseed; Rice (Milled Equivalent); Ricebran Oil; Roots, Other; Rye and products; Sesame seed; Sesameseed Oil; Sorghum and products; Soyabean Oil; Soyabeans; Spices, Other; Sugar (Raw Equivalent); Sugar beet; Sugar cane; Sugar non-centrifugal; Sunflower seed; Sunflowerseed Oil; Sweet potatoes; Sweeteners, Other; Tea (including mate); Tomatoes and products; Vegetables, Other; Wheat and products; Wine; Yams

Food Groups Re-categorization

Categories	Items
Grains	Cereals - Excluding Beer
Vegetables	Spices
	Starchy Roots
	Vegetables
	Pulses*
Fruits	Fruits - Excluding Wine
Protein	Aquatic Products, Other
	Eggs
	Fish, Seafood
	Meat
	Offals
	Pulses*
	Treenuts
Dairy	Milk - Excluding Butter
Sugar	Sugar & Sweeteners
Alcohol	Alcoholic Beverages
Stimulants	Stimulants
Fats	Animal fats
	Vegetable Oils
Others	Animal Products
	Miscellaneous
	Oilcrops
	Sugar Crops
	Vegetal Products

*Pulses: Considered both Vegetables and Protein by USDA.

Methodology

Beta Regression

```
##
## Call:
## betareg(formula = Obesity ~ Grains + Vegetables + Fruits + Protein +
##     Dairy + Sugar + Alcohol + Stimulants + Fats, data = supply_kg_data)
##
## Standardized weighted residuals 2:
##     Min      1Q  Median      3Q     Max
## -3.2917 -0.5625 -0.0061  0.7238  2.3335
##
## Coefficients (mean model with logit link):
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.195768   0.900756   0.217  0.82795
## Grains      -0.087609   0.018583  -4.715 2.42e-06 ***
## Vegetables  -0.045226   0.018775  -2.409  0.01600 *
## Fruits      -0.023341   0.022364  -1.044  0.29664
## Protein     -0.032188   0.026939  -1.195  0.23214
## Dairy       -0.004219   0.018652  -0.226  0.82104
## Sugar        0.086377   0.031942   2.704  0.00685 **
## Alcohol     -0.068276   0.023635  -2.889  0.00387 **
## Stimulants  -0.355029   0.210306  -1.688  0.09138 .
## Fats         0.215998   0.079589   2.714  0.00665 **
##
## Phi coefficients (precision model with identity link):
##       Estimate Std. Error z value Pr(>|z|)
## (phi)    29.92       3.26   9.177   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Type of estimator: ML (maximum likelihood)
## Log-likelihood: 223.6 on 11 Df
## Pseudo R-squared: 0.5844
## Number of iterations: 19 (BFGS) + 2 (Fisher scoring)
```

Variable	VIF
Grains	7.684232
Vegetables	7.648296
Fruits	4.270433
Protein	3.154515
Dairy	7.264360
Sugar	2.085934
Alcohol	2.316546
Stimulants	1.193987
Fats	1.234286

Country	Grains	Vegetables	Fruits	Protein	Dairy	Sugar	Alcohol	Stimulants	Fats	Others	Obesity
Japan	12.1692	10.3064	2.8618	10.3912	5.0630	2.2055	4.0440	0.3731	1.4196	51.2949	0.044
United States of America	5.5048	8.8022	4.5432	8.5674	12.8657	3.3200	4.8647	0.2458	1.1570	50.3185	0.373

Results

Compare Japan and US Diet Compositions

Predict Obesity Rate with USDA Guidelines

```
## Predicted Obesity Rate with USDA Guidelines: 0.00594812
```

Conclusion
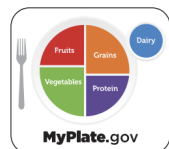
Start *simple* with **MyPlate** Plan

The benefits of healthy eating add up over time, bite by bite. Small changes matter. Start Simple with MyPlate.

A healthy eating routine is important at every stage of life and can have positive effects that add up over time. It's important to eat a variety of fruits, vegetables, grains, protein foods, and dairy or fortified soy alternatives. When deciding what to eat or drink, choose options that are full of nutrients. Make every bite count.

Food Group Amounts for 2,400 Calories a Day for Ages 14+ Years

Fruits	Vegetables	Grains	Protein	Dairy
2 cups	3 cups	8 ounces	6½ ounces	3 cups
Focus on whole fruits Focus on whole fruits that are fresh, frozen, canned, or dried.	**Vary your veggies** Choose a variety of colorful fresh, frozen, and canned vegetables—make sure to include dark green, red, and orange choices.	**Make half your grains whole grains** Find whole-grain foods by reading the Nutrition Facts label and ingredients list.	**Vary your protein routine** Mix up your protein foods to include seafood; beans, peas, and lentils; unsalted nuts and seeds; soy products; eggs; and lean meats and poultry.	**Move to low-fat or fat-free dairy milk or yogurt (or lactose-free dairy or fortified soy versions)** Look for ways to include dairy or fortified soy alternatives at meals and snacks throughout the day.

Limit

Choose foods and beverages with less added sugars, saturated fat, and sodium. Limit:
- Added sugars to **less than 60 grams** a day.
- Saturated fat to **less than 27 grams** a day.
- Sodium to **less than 2,300 milligrams** a day.

Activity

Be active your way:

Children 6 to 17 years old should move **60 minutes** every day. Adults should be physically active at least **2½ hours** per week.

Figure 2: MyPlate Plan

Limitations

1) Categorization not precise

Citations

[1] https://www.dietaryguidelines.gov/

[2] https://www.myplate.gov/