Diet & Lifestyle for Wellness and Prevention of Disease

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Dr. Nigel Crawford
Emeritus Professor
"I don’t approve of low-carb, high-carb, fat-free, organic, macrobiotic, vegetarian or vegan. Frankly, I don’t approve of food."

Most comprehensive, systematic study of mortality/morbidity ever undertaken >500 researchers from > 300 institutions in 50 countries
The State of US Health, 1990-2010
Burden of Diseases, Injuries, and Risk Factors

Risk Factors
- Dietary risks
- Tobacco smoking
- High blood pressure
- High body mass index
- Physical inactivity and low physical activity
- High fasting plasma glucose
- High total cholesterol
- Ambient particulate matter pollution
- Alcohol use
- Drug use
- Lead exposure
- Occupational risks
- Low bone mineral density
- Residential radon
- Ambient ozone pollution
- Intimate partner violence
- Childhood sexual abuse

Deaths
Association between diet and mortality (CVD/T2D)

Proportional cardiometabolic mortality attributable to dietary habits in the United States in 2012

- High sodium: >2000 mg/d
- Low nuts/seed: <20.2 g/d
- High processed meats: >0 g/d
- Low seafood omega-3 fats: <250 mg/d
- Low vegetables: <400 g/d
- Low fruits: <300 g/d
- High sugar-sweetened beverages: >0 g/d
- Low whole grains: <125 g/d
- Low PUFAs replacing carbohydrates or saturated fats: <11% energy/d
- High red meats, unprocessed: >14.3 g/d

Deaths per y, %

2012: 709K deaths from CVD & T2D
Association between diet and mortality (CVD/T2D)

The most important dietary risks:

diets high in:
    sodium     processed meats     soda

diets low in:
    nuts/seeds, seafood omega-3 fats, vegetables, fruits, whole grains.
Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems
Lancet (2019)

19 Commissioners and 18 coauthors from 16 counties, fields of human health, agriculture, political sciences, and environmental sustainability
Charge: develop global scientific targets based on the best evidence available for healthy diets and sustainable food production.

- Food systems have the potential to nurture human health and support environmental sustainability; however, they are currently threatening both.

- >820 million people have insufficient food and many more consume low-quality diets that cause micronutrient deficiencies and contribute to a substantial rise in incidence of diet-related: obesity, coronary heart disease, stroke, diabetes.

- Unhealthy diets pose a greater risk to morbidity and mortality than does unsafe sex, and alcohol, drug, and tobacco use combined.
Healthy diets have an appropriate caloric intake and consist of:
- diversity of plant-based foods
- low amounts of animal source foods
- unsaturated rather than saturated fats
- small amounts of refined grains, highly processed foods, and added sugars.

Transformation to healthy diets by 2050 will require:
> 50% reduction in global consumption of unhealthy foods, such as red meat and sugar,
> 100% increase in consumption of healthy foods, such as nuts, fruits, vegetables, and legumes

-> avert about 11 million deaths per year, a reduction of ~20%.
Standard American Diet

- Vegetables, Fruit, Whole Grains, Legumes: 12%
- Red, Meat, Fish, Poultry, Eggs, Milk, Cheese: 25%
- Oils, Fats, Fast Food, Processed and Refined foods, Sweets: 63%

Colors:
- Animal-based foods
- Processed Foods
- Plant-based Foods
# Standard American Diet

% of individuals getting below minimum recommended levels

<table>
<thead>
<tr>
<th>19-30 yr</th>
<th>Whole Fruits</th>
<th>Total Veggies</th>
<th>Dark Greens</th>
<th>Orange Veggies</th>
<th>Legumes</th>
<th>Whole Grains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>90%</td>
<td>94%</td>
<td>99%</td>
<td>99.9%</td>
<td>99%</td>
<td>99.8%</td>
</tr>
<tr>
<td>Males</td>
<td>90%</td>
<td>93%</td>
<td>99%</td>
<td>99%</td>
<td>95%</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

% of individuals exceeding recommended levels

<table>
<thead>
<tr>
<th>19-30 yr</th>
<th>Fat, sugar, alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>98%</td>
</tr>
<tr>
<td>Males</td>
<td>98%</td>
</tr>
</tbody>
</table>

>16K people in 2001-2004 NHANES Study

Typical US Food Pyramid
Top ten countries with the highest % of obese adults:

1. United States 33.8
2. Mexico 30.0
3. New Zealand 26.5
4. Chile 25.1
5. Australia 24.6
6. Canada 24.2
7. United Kingdom 23.0
8. Ireland 23.0
9. Luxembourg 22.1
10. Finland 20.2
Obesity Trends* Among U.S. Adults

BRFSS, 1990

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

No state >15%

No Data          <10%           10% – 14%           15% – 19%          20% – 24%          25% – 29%          ≥30%
No state <20%
Diabetes Rate by State, 1990

Select years with the slider to see historical data. Hover over states for more information. Click a state to lock the selection. Click again to unlock.

Percent of adults with diabetes
- Green: 0 - 3.9%
- Yellow: 4 - 7.9%
- Orange: 8 - 11.9%
- Red: 12 - 15.9%
- Purple: 16%+

No state >8%
Most states >8%
Hypertension Rate by State, 1990

Select years with the slider to see historical data. Hover over states for more information. Click a state to lock the selection. Click again to unlock.

Percent of adults with hypertension

- 0 - 9.9%
- 10 - 14.9%
- 15 - 19.9%
- 20 - 24.9%
- 25 - 29.9%
- 30 - 34.9%
- 35%+

One state >25%
Hypertension Rate by State, 2017

Select years with the slider to see historical data. Hover over states for more information. Click a state to lock the selection. Click again to unlock.

Percent of adults with hypertension

- 0 - 9.9%
- 10 - 14.9%
- 15 - 19.9%
- 20 - 24.9%
- 25 - 29.9%
- 30 - 34.9%
- 35%+

One state <25%
Hypertension Risk & Age

Figure 1. Age-specific and age-adjusted prevalence of hypertension among adults aged 18 and over: United States, 2011–2012

- Overall: 29.1%
- Men: 29.7%
- Women: 28.5%
- Age (years)
  - 18–39: 7.3%
  - 40–59: 32.4%
  - 60 and over: 65.0%
What are the most beneficial foods?
Most Beneficial Foods
Plant-Based Whole Foods

Vegetables & Fruits (strong color & flavor)

Beans, nuts, whole grains
Benefits of Fruits & Vegetables

Fiber
Micronutrients: vitamins & minerals
Phytonutrients: plant-based secondary metabolites that are bioactive and beneficial
Chef's Banquet Macaroni & Cheese Storage Bucket 180 Servings

Rating: ★★★★★ 4.7 (7)
Item: 871376

Your Price: $89.99
Shipping & Handling Included*

Features:
- Up to 20 years shelf life
- 6 - 30 serving zip-sealed pouches of Cheddar Sauce
- 6 - 30 serving zip-sealed pouches of Elbow Macaroni Pasta
- Net Weight: 23 lb 6 oz
Average American consumes ~45 gal of soft drinks/year.

A Year of Soda: 44.7 Gallons

Here's what carbonated soft drink consumption — sugared and diet sodas — looked like in 2010. The average American chugged the equivalent of 48 two-liter bottles and 206 12-ounce cans of soft drinks (one of many possible container combinations that add up to about 44.7 gallons):
Components of a Healthy Lifestyle

eat healthy diet (high intake of fruits & vegetables, low intake of meat)

exercise > 3.5 hr/wk

maintain a healthy weight (<30 BMI; 208 lb 5’10”)

don't smoke tobacco
Disease Reduction from Healthy Lifestyles

Study of 23,000 people over 8 year period who did all 4 healthy activities versus those that did none had reduced risk of disease:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Reduced risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>All chronic diseases</td>
<td>78%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>93%</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>81%</td>
</tr>
<tr>
<td>Stroke</td>
<td>50%</td>
</tr>
</tbody>
</table>
Components of a Healthy Lifestyle

Compliance Rates

eat healthy diet (>= 5 fruits & veggies /day)

exercise >30 min/day

maintain a healthy weight (<25 BMI = 174 lb 5’10”)

don't smoke tobacco

How many of you do each of these?

Components of a Healthy Lifestyle
Compliance Rates

eat healthy diet (>5 fruits & veggies /day): 23%
exercise >30 min/day: 22%
maintain a healthy weight (<25 BMI): 40%
don't smoke tobacco: 76%

Components of a Healthy Lifestyle

Compliance Rates

- eat healthy diet (>5 fruits & veggies /day): 23%
- exercise >30 min/day: 22%
- maintain a healthy weight (<25 BMI): 40%
- don't smoke tobacco: 76%

Only 3% do all four!

Diet & Lifestyle for Wellness and Prevention of Disease

Yes
Disease Reduction from Healthy Lifestyles

70-90% drop in risk

Figure. Percentage of colon cancer, stroke, coronary heart disease, and type 2 diabetes that is potentially preventable by lifestyle modifications. For colon cancer (6), the low-risk definition includes body
Mortality vs Fruit/Veg Consumption

16 prospective cohort studies 4.6 - 26 years follow up  833,234 participants

know bottom line: 5-6 servings/day optimal  

BMJ 2014;349:g4490
GOLDEN NUGGET #1

eat healthy diet (plant-based, whole food, >5 servings/d)

exercise >30 min/day

maintain a healthy weight (<25 BMI = <175lbs for 5’10”)

don't smoke tobacco

Complete assessment at Harvard School of Public Health site: healthyheartscore.sph.harvard.edu
Figure 1.—Mean percentage diameter stenosis in treatment and control groups at baseline, 1 year, and 5 years. Error bars represent SEM; asterisk, $P=.02$ by between-group 2-tailed test; dagger, $P=.001$ by between-group 2-tailed test.

Figure 2.—Changes in percentage diameter stenosis by 5-year adherence tertiles for the experimental group.
Obesity Rate, Youth Ages 10-17, 2016-2017

Select years with the slider to see historical data. Hover over states for more information. Click a state to lock the selection. Click again to unlock.

Obesity rates, children ages 10 to 17

- 0 - 9.9%
- 10 - 14.9%
- 15 - 19.9%
- 20 - 24.9%
- 25 - 29.9%
- 30 - 34.9%
- 35%+

Map showing obesity rates for youth ages 10-17 across the United States from 2016-2017.
What are the most beneficial foods?

2013 research paper (72K Swedes, 13 yr study)
one class of foods can reduce your risk of death by 1/3 over a 13 yr period.
Phytonutrients

Purple Peruvian 171

French fingerling 58.1
Ozette fingerling 34.8
Yukon Gold 5.45
White potato 1.03

Total phytonutrients, milligrams per 100 grams freeze-dried powder.

http://www.nytimes.com/interactive/2013/05/26/sunday-review/26corn-ch.html?ref=sunday
Phytonutrients

Dandelions 6.89

Spinach 0.89
Red leaf 0.23
Romaine 0.21
Iceberg lettuce 0.17

Amount of antioxidants measured per 100 grams of fresh weight.

http://www.nytimes.com/interactive/2013/05/26/sunday-review/26corn-ch.html?ref=sunday
The total antioxidant content of more than 3100 foods, beverages, spices, herbs and supplements used worldwide


Table 4 Excerpt of the berries, fruit and vegetable analyses in the Antioxidant Food Table (10^3 µmol/100g)

<table>
<thead>
<tr>
<th>Fruit/vegetable</th>
<th>Anti-ox Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana</td>
<td>27</td>
</tr>
<tr>
<td>Apple</td>
<td>56</td>
</tr>
<tr>
<td>Mango</td>
<td>108</td>
</tr>
<tr>
<td>Strawberry</td>
<td>315</td>
</tr>
<tr>
<td>Blueberry</td>
<td>367</td>
</tr>
<tr>
<td>Raspberry</td>
<td>426</td>
</tr>
<tr>
<td>Cranberry</td>
<td>497</td>
</tr>
<tr>
<td>Blackberry</td>
<td>680</td>
</tr>
</tbody>
</table>
Bacon Cheese Burger (Quad Stack)

4 hamburger patties
4 slices of cheese
8 strips of bacon and a bun

1,000 Cal
30 g Saturated Fat (1.5X daily limit)
Dazzler Ice Cream Sunday

3 scoops of ice cream, hot fudge, Oreos, and whipped cream.

1270 Cal
38 g saturated fat (=10 oz prime rib steak), 1.9X daily limit
Worst Food in America 2012

Bistro Shrimp Pasta

2730 Cal, 78 g sat fat, 919 mg Na
~ 1.25 sticks of butter

Men’s Health Magazine
Obesity Trends* Among U.S. Adults
(BMI ≥30)

1985: No Data, <10%, 10%–14%, 15%–19%, 20%–24%, 25%–29%, ≥30%
1996: No Data, <10%, 10%–14%, 15%–19%, 20%–24%, 25%–29%, ≥30%
2010: No Data, <10%, 10%–14%, 15%–19%, 20%–24%, 25%–29%, ≥30%
Figure 2. Average Daily Sodium Consumption in the United States, 1999–2010. Data are from the National Health and Nutrition Examination Survey. Current recommendations of the U.S. Department of Health and Human Services for the general population and various subgroups are shown.
Know bottom line: 5 servings/d of fruits & veggies decreases risk of all-cause mortality by 1/3 and associated with an increased life span of 3yr on average!

<table>
<thead>
<tr>
<th>Daily consumption of fruit and vegetables</th>
<th>10th PD</th>
<th>95% CI</th>
<th>HR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>mo</td>
<td>-37</td>
<td>-58, -16</td>
<td>1.53</td>
<td>1.19, 1.99</td>
</tr>
<tr>
<td>0</td>
<td>-25</td>
<td>-36, -15</td>
<td>1.37</td>
<td>1.20, 1.56</td>
</tr>
<tr>
<td>0.5</td>
<td>-17</td>
<td>-23, -11</td>
<td>1.26</td>
<td>1.17, 1.37</td>
</tr>
<tr>
<td>1</td>
<td>-7</td>
<td>-11, -2</td>
<td>1.16</td>
<td>1.09, 1.24</td>
</tr>
<tr>
<td>2</td>
<td>-3</td>
<td>-6, -1</td>
<td>1.11</td>
<td>1.05, 1.17</td>
</tr>
<tr>
<td>3</td>
<td>-1</td>
<td>-3, 1</td>
<td>1.05</td>
<td>1.02, 1.09</td>
</tr>
<tr>
<td>4</td>
<td></td>
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<td>Reference</td>
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<tr>
<td>5</td>
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<td>Reference</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>-4, 7</td>
<td>0.97</td>
<td>0.93, 1.01</td>
</tr>
</tbody>
</table>

72K Swedes (45-83 yrs), 13 yr follow up