

Nutrition Perspectives

University of California at Davis, Department of Nutrition, Cooperative Extension, and Center for Health and Nutrition Research

Blood Sugar Levels in Response to Foods Are Highly Individual

Which is more likely to raise blood sugar levels: sushi or ice cream? According to a Weizmann Institute study reported in the journal *Cell*, the answer varies from one person to another (1). The study, which continuously monitored blood sugar levels in 800 people for a week, revealed that the bodily response to all foods was highly individual.

The study, called the Personalized Nutrition Project, was conducted by the groups of Prof. Eran Segal of the Computer Science and Applied Mathematics Department and Dr. Eran Elinav of the Immunology Department. Segal said: “We chose to focus on blood sugar because elevated levels are a major risk factor for diabetes, obesity and metabolic syndrome. The huge differences that we found in the rise of blood sugar levels among different people who consumed identical meals highlights why personalized eating choices are more likely to help people stay healthy than universal dietary

advice.”

Indeed, the scientists found that different people responded very differently to both simple and to complex meals. For example, a large number of the participants’ blood sugar levels rose sharply after they consumed a standardized glucose meal, but in many others, blood glucose levels rose sharply after they ate white bread, but not after glucose. Elinav: “Our aim in this study was to find factors that underlie personalized blood glucose responses to food. We used that information to develop personal dietary recommendations that can help prevent and treat obesity and diabetes, which are among the most severe epidemics in human history.”

David Zeevi and Tal Korem, PhD students in Segal’s lab, led the study. They collaborated with Dr. Niv Zmora, a physician conducting PhD studies in Elinav’s lab, and with PhD student Daphna Rothschild

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Understanding differences in blood sugar level responses may help develop personalized dietary recommendations.

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and research associate Dr. Adina Weinberger from Segal's lab. The study was unique in its scale and in the inclusion of the analysis of gut microbes, collectively known as the microbiome, which had recently been shown to play an important role in human health and disease. Study participants were outfitted with small monitors that continuously measured their blood sugar levels. They were asked to record everything they ate, as well as such lifestyle factors as sleep and physical activity. Overall, the researchers assessed the response of different people to more than 46,000 meals.

Taking these multiple factors into account, the scientists generated an algorithm for predicting individualized response to food based on the person's lifestyle, medical background, and the composition and function of his or her microbiome. In a follow-up study of another 100 volunteers, the algorithm successfully predicted the rise in blood sugar in response to different foods, demonstrating that it could be applied to new participants. The scientists were able to show that lifestyle also mattered. The same food affected blood

sugar levels differently in the same person, depending, for example, on whether its consumption had been preceded by exercise or sleep.



Taking multiple factors into account, the scientists generated an algorithm for predicting individualized response to food and used this to design personalized diets.

In the final stage of the study, the scientists designed a dietary intervention based on their algorithm; this was a test of their ability to prescribe personal dietary recommendations for lowering blood glucose level responses to food. Volunteers were assigned a personalized "good" diet for one week, and a "bad" diet – also personalized – for another. Both good and bad diets were designed to have the same number of calories, but they differed between participants. Thus, certain foods in one person's "good" diet were part of another's "bad" diet. The "good" diets indeed helped to

keep blood sugar at steadily healthy levels, whereas the "bad" diets often induced spikes in glucose levels—all within just one week of intervention. Moreover, as a result of the "good" diets, the volunteers experienced consistent changes in the composition of their gut microbes, suggesting that the microbiome may be influenced by the personalized diets while also playing a role in participants' blood sugar responses.

Reference:

1. Zeevi D, Korem TI, Zmora N, et al. Personalized Nutrition by Prediction of Glycemic Responses. *Cell*. 2015 Nov 19;163(5):1079-94. doi: 10.1016/j.cell.2015.11.001.

Source: Weizmann Institute of Science; Nov. 19, 2015; <http://wis-wander.weizmann.ac.il/content/blood-sugar-levels-response-foods-are-highly-individual>

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Study Identifies Liver-Generated Hormone that Regulates 'Sweet Tooth'

We all love our sugar, especially during the holidays. Cookies, cake, and candy are simply irresistible.

While sugar cravings are common, the physiological mechanisms that trigger our “sweet tooth” are not well defined.

A University of Iowa-led study in mice shows that a hormone produced by the liver, fibroblast growth factor 21 (FGF21), suppresses the consumption of simple sugars (1). The researchers report that FGF21 is produced in the liver in response to high carbohydrate levels. FGF21 then enters the bloodstream, where it sends a signal to the brain to suppress the preference for sweets.

“This is the first liver-derived hormone we know that regulates sugar intake specifically,” says Matthew Potthoff, assistant professor of pharmacology in the UI Carver College of Medicine. Potthoff is co-senior author on the paper, published online in the journal *Cell Metabolism*, with Matthew Gillum, professor at the University of Copenhagen (Denmark).

The research could improve diets and help patients who are diabetic or obese.

“We’ve known for a while that FGF21 can enhance insulin sensitivity,” says Lucas BonDurant, a doctoral student in the Interdisciplinary Graduate Program in Molecular and Cellular Biology and co-first author in the study. “Now, there’s this dimension where FGF21 can help people who might not be able to sense when they’ve had enough

sugar, which may contribute to diabetes.”

This work is based on human genome-wide studies where researchers found associations between certain DNA mutations and a person's intake of specific macronutrients. Two of these mutations were located near the FGF21 gene, prompting the UI-led team to identify the role of this hormone in regulating macronutrient preference.

BonDurant and colleagues used genetically-engineered mouse models and pharmacological approaches to examine the role of FGF21 in regulating sugar cravings. In normal mice, BonDurant injected FGF21 and gave the mice a choice between a normal diet and a sugar-enriched diet.

Researchers observed that the mice didn't completely stop eating sugar, but ate seven times less than usual.

The research team also studied genetically-modified mice that either didn't produce FGF21 at all or produced a lot of FGF21 (over 500 times more than normal mice). The genetically-modified mice had a choice between the same two diets as the normal mice. Researchers observed that the mice that didn't produce FGF21 at all ate more sugar, while the mice that produced a lot of FGF21 ate less sugar.

Based on these results, the team concluded that FGF21 decreases appetite and intake of sugar. However, FGF21 does not reduce intake of all



When injected into mice, the hormone FGF21 resulted in the mice consuming seven times less sugar than usual.

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sugars (sucrose, fructose, and glucose) equally. FGF21 also doesn't affect the intake of complex carbohydrates.

While BonDurant, a Dean's Graduate Research Fellow and a UI Sloan Scholar, found that FGF21 sends signals to the brain, additional work is necessary to identify the neural pathways that regulate FGF21's ability to manage macronutrient preference. UI researchers are focused on the hypothalamus—a section of the brain responsible

for regulating feeding behavior and energy homeostasis.

"In addition to identifying these neural pathways, we would like to see if additional hormones exist to regulate appetite for specific macronutrients like fat and protein, comparable to the effects of FGF21 on carbohydrate intake," Potthoff says. "If so, how do those signals intertwine to regulate the neural sensing of different macronutrients?"

Reference:

1. Liechty JM, Saltzman JA, Musaad SM; STRONG Kids Team. Health literacy and parent attitudes about weight control for children. *Appetite*. 2015 Aug;91:200-8. doi: 10.1016/j.appet.2015.04.010

Source: Sharita Forrest. University of Illinois News Bureau; Jul. 28, 2015; <https://news.illinois.edu/blog/view/6367/233052>

Moderate Coffee Drinking May Lower Risk of Premature Death

People who drink about three to five cups of coffee a day may be less likely to die prematurely from some illnesses than those who don't drink or drink less coffee, according to a new study by Harvard T.H. Chan School of Public Health researchers and colleagues (1). Drinkers of both caffeinated and decaffeinated coffee saw benefits, including a lower risk of death from cardiovascular disease, neurological diseases, type 2 diabetes, and suicide.

"Bioactive compounds in coffee reduce insulin resistance and systematic inflammation," said first author Ming Ding, a doctoral student in the Department of Nutrition. "That could explain some of our findings. However, more studies are needed to investigate the biological mechanisms producing these effects."

The study appeared in the journal *Circulation*.

Researchers analyzed health data gathered from participants in three large ongoing studies: 74,890 women in the Nurses' Health Study; 93,054 women in the Nurses' Health Study 2; and 40,557 men in the Health Professionals Follow-up Study. Coffee drinking was assessed using validated food questionnaires every four years over about 30 years. During the study period, 19,524 women and 12,432 men died from a range of causes.

In the whole study population, moderate coffee consumption was associated with reduced risk of death from cardiovascular disease, diabetes, neurological diseases such as Parkinson's disease, and suicide. Coffee consumption was not associated with cancer deaths. The analyses took into



More studies are needed to investigate the biological mechanisms producing these effects.

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consideration potential confounding factors such as smoking, body mass index, physical activity, alcohol consumption, and other dietary factors.

“This study provides further evidence that moderate consumption of coffee may confer health benefits in terms of reducing premature death due to several diseases,” said senior author Frank Hu, professor of nutrition and epidemiology. “These data support the 2015 Dietary Guidelines Advisory Report that concluded that ‘moderate coffee consumption can be incorporated into a healthy dietary pattern.’”

Reference:

1. Ding M, Satija A, Bhupathiraju SN, et al. Association of Coffee Consumption With Total and Cause-Specific Mortality in 3 Large Prospective Cohorts. *Circulation*. 2015 Dec 15;132(24):2305-15.

Source: Harvard T.H Chan School of Public Health; Nov. 16, 2015; <http://www.hsph.harvard.edu/news/press-releases/moderate-coffee-drinking-may-lower-risk-of-premature-death/>



Kitchen Utensils Can Spread Bacteria Between Foods

In a recent study funded by the U.S. Food and Drug Administration, University of Georgia researchers found that produce that contained bacteria would contaminate other produce items through the continued use of knives or graters—the bacteria would latch on to the utensils commonly found in consumers' homes and spread to the next item (1).

Unfortunately, many consumers are unaware that utensils and other surfaces at home can contribute to the spread of bacteria, said the study's lead author Marilyn Erickson, an associate professor in the College of Agricultural and Environmental Sciences' department of food science and technology.

"Just knowing that utensils may lead to cross-contamination is important," Erickson said. "With that

knowledge, consumers are then more likely to make sure they wash them in between uses."



Cutting and grating increased the number of contaminated produce items when that utensil had first been used to process a contaminated item.

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Erickson has been researching produce for the past 10 years. Her past work has mainly focused on the fate of bacteria on produce when it's introduced to plants in the field during farming.

In 2013, she was co-author on a study looking at the transfer of norovirus and hepatitis A between produce and common kitchen utensils—finding that cutting and grating increased the number of contaminated produce items when that

This study, published in *Food Microbiology*, is

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similar in that it considers the influence that knives and graters have on the transfer of pathogenic bacteria to and from produce items. She urges consumers to realize that these germs can spread in their kitchens as well.

Researchers have known that poor hygiene and improper food preparation practices in a consumer's home can lead to foodborne illnesses, but considering what practices in the kitchen are more likely to lead to contamination has not been examined extensively.

"The FDA was interested in getting more accurate numbers as to what level of cross-contamination could occur in the kitchen using standard practices," Erickson said.

In her recent study, Erickson contaminated many types of fruits and vegetables in her lab—adding certain pathogens that often can be found on these foods, such as salmonella and E. coli.

Using a knife, Erickson would cut into things like tomatoes or cantaloupe and other types of produce to see how easily the bacteria could spread when the knife was continuously used without being cleaned. Because they "were looking at what would be the worst-case scenario," she said, Erickson and study co-authors did not wash between cutting these different produce items.

Researchers also grated produce, like carrots, to see how easily the pathogens spread to graters. They found that both knives and graters can cause additional cross-contamination in the kitchen and that the pathogens were spread from produce to produce if they hadn't washed the utensils.

"A lot of the broken up material and particles from the contaminated produce remained on the graters," said Erickson, who conducts her research at

the UGA Center for Food Safety in Griffin. "Then if you were to shred another carrot or something else immediately after that, it gets contaminated, too."

The study also found that certain fruits and vegetables spread pathogens to knives to different degrees.



The study found that certain fruits and vegetables, such as tomatoes, spread pathogens more easily than other produce items, such as strawberries.

"For items like tomatoes, we tended to have a higher contamination of the knives than when we cut strawberries," Erickson said. "We don't have a specific answer as to why there are differences between the different produce groups. But we do know that once a pathogen gets on the food, it's difficult to remove."

Knives and graters aren't the only utensils in the kitchen consumers should be worried about. Erickson has also helped study the role brushes and peelers have on the transfer of dangerous kitchen bacteria.

In concurrent studies, Erickson found that scrubbing or peeling produce items—like melons, carrots and celery—did not eliminate contamination on the produce item but led to contamination of the brush or peeler. Even when placed under running water, the utensils still became contaminated; however, the ability to cross-contaminate later produce items depended on the brush type and the pathogenic agent.

These studies combined give researchers a better idea as to how common cross-contamination is in the kitchen—even when just using standard practices.

Erickson explained there is a small chance of buying fruits and vegetables contaminated with bacteria, but the problem can occur—whether the product is store-bought or locally grown.

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Reference:

- Erickson MC, Liao J, Cannon JL, and Ortega YR. Contamination of knives and graters by bacterial foodborne pathogens during slicing and grating of produce. *Food Microbiol.* 2015 Dec; 52:138-45. doi: 10.1016/j.fm.2015.07.008.

Source: Sydney Devine. UGA Today; Nov. 6, 2015; <http://news.uga.edu/releases/article/kitchen-utensils-can-spread-bacteria-between-foods-1115/>

Negative Body Image, Not Depression, Increases Adolescent Obesity Risk

Negative body image significantly increases the risk of obesity regardless of whether youth have depression, according to researchers at The University of Texas Health Science Center at Houston (UTHealth) School of Public Health (1).

“Our last study found that participants who were depressed were twice as likely to be obese six years later, implying a cause-and-effect relationship between depression and obesity. In this new study, when body image was introduced, we found no association between major depression and obesity, meaning that body image is the mediating factor,” said Robert E. Roberts, Ph.D., first author and professor of health promotion and behavioral sciences at UTHealth School of Public Health San Antonio Regional Campus.

In the paper published recently in the *Journal of Affective Disorders*, Roberts and his co-author examined data from a study called Teen Health 2000 (TH2K) which surveyed youth ages 11 to 17 in the Houston area. The youth were asked to describe themselves as skinny, somewhat skinny, average weight, somewhat overweight or overweight. They were also measured for height,

weight and whether they had a major depressive episode in the last year.



In this new study it was reported that when body image was introduced there was no association between major depression and obesity.

For the study's purposes, persons with a body mass index of 30 or more were considered obese.

Participants who perceived themselves to be overweight, regardless of how much they weighed, were twice as likely to be obese a year after they were surveyed. Young women in the group were three times more likely to be obese at the one-year mark.

According to the paper, previous research has indicated that negative body image is associated with greater psychological distress, more disordered eating, binge eating and fewer health-promoting behaviors such as physical activity and consumption of fruits and vegetables.

“Clinically, addressing body image in depressed patients who are obese may improve outcomes,” said Roberts, who is also part of the Michael & Susan Dell Center for Healthy Living at UTHealth School of Public Health Austin Regional

Reference:

- Roberts RE and Duong HT. Does major depression affect risk for adolescent obesity? *J Affect Disord.* 2015 Nov 1;186:162-7. doi: 10.1016/j.jad.2015.06.030. Epub 2015 Jul 26.

Source: UT Health Media Relations; Nov. 6, 2015; <https://www.uth.edu/media/story.htm?id=33056bb1-52f2-475d-83e0-fd3ab3dd7c7b>

New Review: What to Do to Prevent Food Allergies in Infants

With food allergies in children on the rise, parents often ask the question, How do I prevent food allergies in my baby? A new review published in the *Canadian Medical Association Journal*, based on the latest evidence, interprets new evidence to guide physicians and families regarding food introduction and allergy prevention (1).

"If parents ask how to prevent allergy in their children, our current advice is to introduce the allergenic foods at four to six months of age," write Drs. Elissa Abrams and Allan Becker, Department of Pediatric Allergy and Clinical Immunology, University of Manitoba, Winnipeg, Manitoba. "Once highly allergenic foods are introduced, regular exposure is important for maintenance of tolerance — children should eat these foods on a regular basis."

Food allergies have increased over time, with an 18% increase between 1997 and 2007 in the United States. A recent survey of Canadian households found that 8 percent reported at least one food allergy. The most common allergens are cow's milk, soy, peanut, tree nuts, eggs, wheat, fish, shellfish and sesame.

Babies with parents or siblings who have allergies, especially to peanut, are at higher risk of atopy.

A recent randomized controlled trial — the Learning Early About Peanut (LEAP) study — found that introducing peanut early, rather than late, in high-risk children reduced the risk of food allergy by

as much as 80 percent. However, children at high risk of peanut allergy may benefit from an allergist's evaluation before peanut introduction.

As a result of the LEAP study, groups such as the American Academy of Allergy, Asthma and Immunology, the American Academy of Pediatrics and the Canadian Society of Allergy and Clinical Immunology, now state that for infants at high risk, there is strong evidence to support the introduction of peanut between 4 and 11 months.

Previous guidelines recommended avoiding potentially allergenic foods until 12 to 36 months of age in babies at high risk. As a consequence, some women avoid potentially allergenic foods during pregnancy and breastfeeding to try to prevent the development of allergies in their babies. However, current guidelines do not support avoidance diets.

To introduce new foods, the American Academy of Allergy, Asthma and Immunology recommends:

- Introduce a new food every 3 to 5 days in an age-appropriate manner (to avoid choking).
- Start with grains, yellow and orange vegetables and fruit.
- Introduce one of the potentially allergenic foods, if well tolerated, in small amounts (e.g., cow's milk, soy, eggs)



"If parents ask how to prevent allergy in their children, our current advice is to introduce the allergenic foods at four to six months of age," write Drs. Elissa Abrams and Allan Becker."

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- Introduce highly allergenic foods at home.
- Increase the quantity of food over several days.

"It has been well documented that avoidance of allergenic foods is not preventive of food allergy," write the authors. "In the newly released LEAP study, there is strong evidence that early introduction of peanut is in fact preventive. How this will change current guidelines on food introduction remains to be seen."



Reference:

1. Abrams EM and Becker AB. Food introduction and allergy prevention in infants. *CMAJ*. 2015 Nov 17; 187(17):1297-301. doi: 10.1503/cmaj.150364. Epub 2015 Oct 19.

Source: *CMAJ*; Oct. 19, 2015; http://www.cmaj.ca/site/misc/pr/19oct15_pr.xhtml

New AAP Report Targets Lack of Adequate Food as Ongoing Health Risk to U.S. Children



The AAP recommends screening all children for food insecurity. More than 15 million children live in households struggling with hunger.

For the first time, the American Academy of Pediatrics (AAP) is recommending that pediatricians screen all children for food insecurity (1). In a new policy statement identifying the short and long-term adverse health impacts of food insecurity, the AAP also recommends that pediatricians become familiar with and refer families to needed community resources, and advocate for federal and local policies that support access to adequate, nutritious food.

The new policy statement, "Promoting Food Security for all Children," was published in *Pediatrics*.

Despite improvements over the past few years, the latest data show that more than 15 million U.S. children live in households still struggling with hunger. The policy statement identifies the immediate and potentially lifelong health effects of this pervasive problem.

USDA data released in September show that the number of children regularly getting enough food to stay healthy and active last

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year was its highest since 2007. The slight but significant rise to pre-recession food security levels underscores the effectiveness and ongoing importance of federal nutrition programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the Supplemental Nutrition Assistance Program (SNAP) and school lunch and breakfast programs, according to the AAP. In fact, nearly half of all SNAP recipients are children.

"The health effects of hunger on children are pervasive and long-lasting, which is why our new policy urges pediatricians to take action in and outside of the clinic to conquer food insecurity and promote child health," said Sarah Jane Schwarzenberg, MD, FAAP, a lead author of the policy statement and director of pediatric gastroenterology, hepatology and nutrition at the University of Minnesota Masonic Children's Hospital. Health problems linked to hunger described in the AAP policy statement include:

Children who live in households that are food insecure, even at the lowest levels, get sick more often, recover more slowly from illness, have poorer overall health and are hospitalized more frequently.

Children and adolescents affected by food insecurity are more likely to be iron deficient, and preadolescent boys dealing with hunger issues have lower bone density. Early childhood malnutrition also is tied to conditions such as diabetes and cardiovascular disease later in life.

Lack of adequate healthy food can impair a child's ability to concentrate and perform well in school and is linked to higher levels of behavioral and emotional problems from preschool through adolescence.

"As is the case with many childhood health conditions, being malnourished or not getting enough healthy food early in life has effects that can last well into adulthood," Dr. Schwarzenberg said.



These food security data underscore the importance of federal nutrition programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the Supplemental Nutrition Assistance Program (SNAP) and school lunch and breakfast programs.

Struggles to keep food on the table can affect children in any community, and households with children have substantially higher rates of food insecurity than those without. Low-income working families and families headed by a single parent are at particular risk.

Women who experience food insecurity during pregnancy are at increased risk for poorer birth outcomes, including low birth weight babies and toxic stress, which can have lifelong effects on the health and well-being of a child.

"The demographic of food-insecure Americans extends beyond the areas of concentrated urban poverty and into suburbs and rural America, areas often mistakenly thought to be immune to this problem," the authors write. "Like poverty, food insecurity is a dynamic, intensely complex issue," they write, and levels remain near historic highs despite the current economic recovery.

For many families, seemingly small changes to income, expenses, or access to federal or state

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assistance programs can instantly reduce the ability to buy enough nutritious food, according to the AAP policy statement. In addition, statistics show that more than 30 percent of families who reported food insecurity said they had to choose between paying for food or paying for medicine or medical care.

Every child needs optimal nutrition to grow and stay healthy. "We are in the midst of a nutritional crisis in our country, and when you're in a

crisis, you can't keep doing what you've always done," said AAP President Sandra Hassink, MD, FAAP. "That's why pediatricians are taking a comprehensive approach, connecting families to resources and advocating to keep federal nutrition programs like WIC and SNAP strong. It will take all of us—pediatricians, parents, government leaders, educators—partnering together, to do our best to ensure that no child goes hungry in this country."

References:

1. Council on Community Pediatrics; Committee on Nutrition. Promoting Food Security for All Children. *Pediatrics*. 2015 Nov;136(5):e1431-8.
2. Coleman-Jensen A, Rabbitt MP, Gregory C, and Singh A. Household Food Security in the United States in 2014, ERR-194, U.S. Department of Agriculture, Economic Research Service, September 2015.

Source: American Academy of Pediatrics News; Oct. 23; 2015; <https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/Lack-of-Adequate-Food.aspx>

Rebates a Cost-Effective Way to Boost Healthy Eating Among Low-Income People, Study Finds

Providing low-income households that receive federal food assistance benefits with financial incentives to buy fruits and vegetables would encourage them to purchase and consume more healthy food, and slightly increase their longevity, a new study suggests (1).

Despite some critics' concerns, these incentives, in the form of rebates for purchasing healthy foods, are unlikely to prompt consumers to increase their spending on junk food as well, according to University of Illinois kinesiology and community health professor Ruopeng An.

An evaluated the cost effectiveness of the Healthy Incentives Pilot, an experimental initiative that offered a 30 percent rebate to participants in the Supplemental Nutrition Assistance Program when they bought targeted fruits and vegetables at participating retailers. SNAP, formerly known as Food Stamps, provides food assistance benefits to more than 46 million Americans – or more than one in five people – nationwide. The program is administered by the U.S. Department of Agriculture.

In response to a mandate in the 2008 Farm Bill, the USDA implemented HIP in one Massachusetts county from November 2011 to December 2012 to assess whether making targeted fruits and vegetables



Financial incentives encouraged those in the study to purchase more fruits and vegetables.

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more affordable for SNAP households would impact consumers' purchase and consumption of healthy foods.

For every dollar of SNAP benefits that the 7,500 participating households spent on targeted fruits and vegetables – including fresh, frozen, dried or canned fruits and vegetables without added sugars, fats, oils or salt – they received a rebate of 30 cents.

In a paper published in the journal *Social Science and Medicine*, An evaluated the feasibility of rolling out HIP to SNAP households nationwide. An calculated the expected monetary costs to society, the projected gains in participants' life expectancy, and the cost-effectiveness ratio of HIP compared with competing healthy-diet policies.

According to the USDA's final report, the HIP trial run increased SNAP participants' fruit and vegetable consumption by 0.48 servings per person per day.

"There is evidence that a nationwide expansion of HIP is likely to nudge SNAP households to eat more fruits and vegetables," An said, but added that changes in consumer behavior are always proportional to changes in prices. "Even a large incentive like HIP, which provides a 30 percent rebate, closes only a very small fraction – less than 18 percent – of the gap between the number of servings of fruits and vegetables that consumers eat and the targeted amount set by federal officials in the Healthy People 2020 campaign."

In the Healthy People 2020 initiative, federal officials sought to increase American adults' intake of fruits and vegetables to five or more servings per

day.

An, who recommends that HIP be implemented for SNAP recipients nationwide, found that HIP's cost-effectiveness ratio is very high, compared with other dietary initiatives such as the federal nutrition labeling law.

An said alternative policies aimed at improving Americans' diets have either not been passed into law; were struck down on appeal, as were taxes on junk food and sugar-sweetened beverages; or were found to have limited impact on consumer behavior, as were regulations banning new fast-food restaurants in South Los Angeles and a menu labeling law for chain restaurants.

The average household participating in HIP earned about \$3.65 in incentives monthly. Although some scholars speculate that the additional income provided by healthy eating rebates such as HIP might prompt recipients to buy more junk food as well, An said the monetary gains for most households are rather small, making that outcome "very unlikely."

An's estimates included a one-time implementation cost of \$5 and an annual cost of \$44 in HIP incentives, per SNAP household, based on 2012 U.S. dollars. If all SNAP participants nationwide received the HIP incentive at the age of 30 and stayed in the program throughout their lifetime, the federal government's discounted costs would increase by an average of \$1,323 per capita, by An's calculations.

Examining the incentive's impact on health-adjusted longevity, An estimated that HIP participants would gain 20.083 quality-adjusted life



"There is evidence that a nationwide expansion of HIP is likely to nudge SNAP households to eat more fruits and vegetables," An said.

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years, compared with 20.001 QALYs gained by SNAP recipients not receiving the incentive.

A quality-adjusted life year is an estimate of the societal value and cost effectiveness of a medical intervention that considers the impact on both longevity and quality of life. Scientists allocate one QALY for one year of life in perfect health, and zero QALYs for death. For U.S. populations, researchers estimate a willingness-to-pay threshold of \$50,000 to \$100,000 per QALY gained. The lower the cost of each QALY gained, the more cost effective an intervention is deemed to be.

An estimated the HIP incentive, if expanded to all SNAP households nationwide, would have a cost effectiveness ratio of \$16,172 per QALY gained – significantly below the \$50,000 to \$100,000 threshold.

Reference:

1. An R. Nationwide expansion of a financial incentive program on fruit and vegetable purchases among Supplemental Nutrition Assistance Program participants: A cost-effectiveness analysis. *Soc Sci Med.* 2015 Dec;147:80-8. doi: 10.1016/j.socscimed.2015.09.032. Epub 2015 Sep 30.

Source: Sharita Forrest. University of Illinois News Bureau; Oct. 6, 2015; <https://news.illinois.edu/blog/view/6367/258664>



“It is possible that treatment beyond one year would result in better outcomes, but these data provide no support for use of higher-dose cholecalciferol replacement

Food Policy: Cutting Waste, Broadening Systems

In two separate articles, researchers detail strategies aimed at cutting food waste and broadening approaches to food policy, moves that the researchers say would ultimately improve public health and food security (1,2).

The two articles appeared in the November issue of *Health Affairs*, its first ever devoted to food and health.

Previous studies indicate that Americans waste as much as 40 per cent, or 133 billion pounds, of the food that is produced or purchased. Globally, the figure is about 30 per cent of the food supply. This past fall, the United States and United Nations pledged to reduce by half the amount of food wasted in the U.S and abroad by 2030. If this goal is met, it’s likely that future food production would not have to be increased as much to address hunger and meet the

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demands of a growing global population. Today, one in nine people around the world lack sufficient food, while 14 percent of Americans experience food insecurity, living without reliable access to a sufficient quantity of affordable, nutritious food.

“In a world of limited resources and growing populations, it’s past time to stop dumping our good food in the landfill,” says Roni Neff, PhD, lead author of the article on food waste, director of the Food System Sustainability & Public Health Program at the Center for a Livable Future and an assistant professor at the Johns Hopkins Bloomberg School of Public Health. “Cutting food waste in half is doable, and public health is part of the solution.”

To curtail food waste in higher income countries, measures like clarifying food date labels could go a long way. Consumers are often confused by “use by,” “best by” and “sell by” dates on food packaging and thus toss out perfectly good food. Improving date labeling policy can also improve food safety. In addition, creating markets for so-called “ugly” produce – bruised peaches, nicked potatoes – could minimize food waste while increasing fruit and vegetable consumption.

In lower- and middle-income countries, the priority is to improve infrastructure so food doesn’t begin to spoil while being shipped from farms to its

final destinations.

The authors note that while most food waste reduction approaches benefit the public’s health, some strategies can be damaging. Recovering food that would otherwise be wasted is generally a win-win for food security and waste prevention. But donated food should meet recipient needs, not only those of donors to get rid of it; food banks are increasingly working to seek out healthier donations.

In a second article, researchers recommend taking a broader “systems” approach to food policy in order to tackle public health issues as far-ranging as climate change and antibiotic use in food animal production.

“Working with those in other fields gives us tools to address some of the most critical public health threats we face,” says Neff, who is also lead author of the food systems article. “Collaboration is not optional anymore.”

The authors describe three examples of a food systems approach to food policy: farm-to-school programs, incorporating sustainability into the Dietary Guidelines for Americans and antibiotic use in food animal production.

Farm-to-school programs bring fresh, healthy food to children, while building their interest in



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eating fruits and vegetables and also benefiting local farmers. The growth of these programs demonstrates the potential influence that health and agricultural policy leaders can have when they advocate around their shared interests.

Earlier this year, the USDA and HHS rejected recommendations to make food's environmental impact part of the 2015 Dietary Guidelines for Americans. The public debate over how food habits affect the planet's health illustrates ways in which public health voices can shift understanding of federal food policy, and perhaps build momentum toward future change.

In 2013 the FDA issued voluntary guidelines



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on antibiotic use in food animal production. The guidelines asked drug companies to voluntarily withdraw approvals to use antibiotics in food animals for “growth promotion,” while keeping approvals to use these drugs for “disease prevention.” From a public health perspective, this is problematic. In both cases, antibiotics are fed to animals at low doses, making bacteria resistant to drugs used to treat human infections. The authors describe the experience from Denmark and the Netherlands, suggesting that “coordinated action across sectors can be successful in reducing antibiotic use in animal agriculture, while imposing little or no negative impact on consumers, producers, or the meat industries.”

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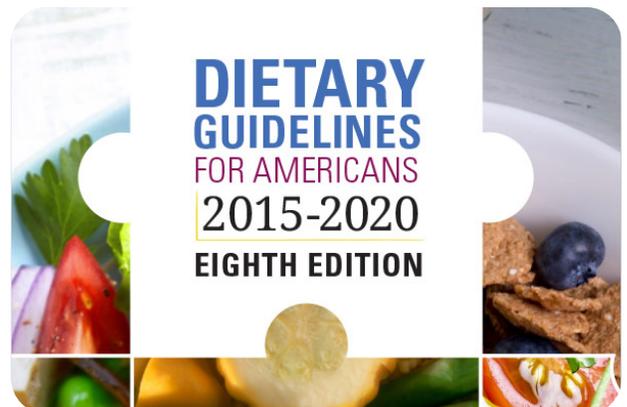
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Source: John Hopkins Bloomberg School of Public Health; Nov. 5, 2015; <http://www.jhsph.edu/news/news-releases/2015/food-policy-cutting-waste-broadening-systems.html>

2015–2020 Dietary Guidelines for Americans Now Available

The latest edition of the *Dietary Guidelines for Americans* has been released by the Department of Health and Human Services and the US Department of Agriculture. The *Dietary Guidelines* provides evidence-based nutrition advice to encourage Americans to eat a healthful diet and reduce risk of chronic disease. The new edition of the *Dietary Guidelines* focuses on encouraging and supporting healthy eating patterns for all. To access the *Dietary Guidelines*, visit:

<http://health.gov/dietaryguidelines/2015/guidelines/>



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