Energy Imbalance: The End of the World as We Know It

CPCP Colloquium

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University of South Carolina

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Why Is Energy Imbalance the End of the World?

➢ It Causes Obesity
Do We Have an Obesity Epidemic?

- Absolutely, but I am not going to show you the obesity maps to prove it!
- 1/3rd of Americans are obese & 1/3rd are OW
  - If we used the correct classification for overweight (BMI >22.0 to 29.9) the rates would be even more astonishing!
- What are the health problems caused by obesity?
  - Everything—on Sept 10, 2012 NPR had a story on kidney stones and obesity!
  - Dec 24, 2012—early puberty caused by obesity!
  - The next major problem to be disclosed is: Terrorism
Causes of the Obesity Epidemic

Too Many People Being in Positive Caloric Balance on too Many Days
Confusion about Overweight, Obesity and Health
About two-thirds of adults in Mississippi and several other states will be obese by 2030 if obesity rates continue to climb as they are now, an analysis reports today.

The prediction says that 13 states will have adult obesity rates over 60%; all 50 states would have rates above 44%.

The words “physical activity” did appear once in the article.
Obesity and Diabetes

- We hear a great deal, in both the scientific literature and popular press, about the epidemics of obesity and diabetes
- In fact, some even use the term “diabesity”
Is nudge an effective public health strategy to tackle obesity?
Obesity and Diabetes

What is the rate of type 2 diabetes in U.S. individuals under 45 years of age?
U.S. Rates of Diagnosed Type 2 Diabetes in Persons under 45 Years of Age in 2010

- 1.4%
- Of course this is higher than it was in 1980
  - 0.6%
- Diagnosed diabetes in those under 20 years of age in the U.S.
  - 0.26%

Source: CDC website--
Causes of the Obesity Epidemic
World Health Organization
Collaborating Centre for Obesity Prevention

“Increased energy intake alone virtually explains all the increase in body weight in the United States from the 1970s to the 2000s.”

Swinburn B. European Congress on Obesity; May 6-9, 2009; Amsterdam, the Netherlands.
Unsupported Statements

"The main cause of the obesity epidemic in this country is the wide availability of high-caloric foods and the fact that we are eating way too many calories in the course of a day."

- Spokesperson for the American College of Cardiology M. Sorrentino, MD. University of Chicago.
Chicken Causes Obesity!

Slide courtesy of Dr. Tim Church
Comparison Shopping:
McDonald’s for Four

$27.89

- 2 Big Macs
- 1 cheeseburger
- 1 6-pc. Chicken McNuggets
- 2 medium fries
- 2 small fries
- 2 medium Cokes
- 2 small Cokes

Nutrition facts per person
Chicken, Potatoes and Salad for Four

$13.78

A savings of $14.11, or 51%, over the McDonald's meal.

Prices per item:

- Chicken: $5.96
- Milk: $1.49
- Lettuce: $1.50
- Potatoes: $2.98
- Bread: 75 cents
- Salt: 5 cents
- Pepper: 5 cents
- Oil: 55 cents
- Lemon: 50 cents

$13.78
Comparison Shopping: McDonald’s for Four

$27.89

- 2 Big Macs
- 1 cheeseburger
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Nutrition facts per person

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>900 (average)</td>
</tr>
<tr>
<td>Fat</td>
<td>37 grams</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>123 grams</td>
</tr>
<tr>
<td>Protein</td>
<td>23 grams</td>
</tr>
</tbody>
</table>
Chicken, Potatoes and Salad for Four

$13.78

A savings of $14.11, or 51%, over the McDonald's meal. Prices per item:

- $1.50
- $2.98
- $5.96
- 75 cents
- 50 cents
- 55 cents
- 5 cents
- 75 cents
- $1.49

Nutrition facts per person and difference from McDonald's meal:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CALORIES</td>
<td>934</td>
</tr>
<tr>
<td>FAT</td>
<td>39 grams</td>
</tr>
<tr>
<td>CARBOHYDRATES</td>
<td>80 grams</td>
</tr>
<tr>
<td>PROTEIN</td>
<td>67 grams</td>
</tr>
</tbody>
</table>

[Diagram showing a meal with ingredients and nutrition facts]
Trends in Energy Intake
NHANES 1971-2000

- NHANES I—1971-1974
- NHANES II—1976-1980
- NHANES III—1988-1994
- NHANES—1999-2000

Surveys were representative samples of noninstitutionalized U.S. women and men aged 20 to 74 years

Source: MMWR Feb 6, 2004
Trends in Energy Intake: 1971 to 2000, Men, NHANES

Kcal/day

Source: MMWR Feb 6, 2004
Trends in Energy Intake: 1971 to 2000, Women, NHANES

Source: MMWR Feb 6, 2004
NHANES Survey Methods 1971-2000

- NHANES I and NHANES II
  - 24-hour dietary recall, Monday-Friday
- NHANES III and NHANES
  - 24-hour dietary recall, Monday-Sunday
- Other changes in methodology included better probing techniques and better training of interviewers
- Other changes in dietary behavior included more meals eaten away from home and increasing portion sizes
Changes in RMR & TDEE
1960-2000: Women 20-74

Changes in RMR & TDEE
1960-2000: Men 20-74

RMR: Mifflin Equation
Archer et al., Obesity and the Disparity between Reported Energy Intake (EI) and Actual Food Energy Requirements (FERs). In Review.
True Cause of the Obesity Epidemic

Slide courtesy of Dr. I-Min Lee
Obesity Epidemic Caused by Eating too Much, Claims Academic

- Average caloric expenditure in 1980
  - Women=950 kcal/day
  - Men=1380 kcal/day

- Average caloric intake is now 3,500 kcal/day

- "Over the past 25 years...there has been no change in our levels of physical activity"
- "there has been no change in energy expenditure"

Article on British Science Festival in the September 16, 2010 Daily Telegraph
Self-Reported Leisure Time Physical Activity Is Not a Good Measure of Total Energy Expenditure
Jobs in U.S. Over Last 50 Years

Church TS et al. PLoS 2011
Daily Occupational Caloric Expenditure

Occupation Related Daily Energy Expenditure (calories)

Year


Men

-140 daily kcals

Women

-120 daily kcals

Church TS et al. PLoS 2011
Figure 3. Household Management Energy Expenditure per Week.

http://www.plosone.org/article/info:doi/10.1371/journal.pone.0056620
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0056620
Using BMI to Characterize the Obesity Epidemic
Definitions for adults

Body mass index (BMI) – weight/height

- Underweight: BMI < 18.5
- Normal weight: BMI 18.5-<25
- Overweight*: BMI 25-<30
- Obesity: BMI 30+

<table>
<thead>
<tr>
<th>Height</th>
<th>BMI 18.5</th>
<th>BMI 25</th>
<th>BMI 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>162 cm (64 in)</td>
<td>49 kg (107 lbs)</td>
<td>66 kg (145 lbs)</td>
<td>79 kg (174 lbs)</td>
</tr>
<tr>
<td>178 cm (70 in)</td>
<td>59 kg (129 lbs)</td>
<td>79 kg (174 lbs)</td>
<td>95 kg (209 lbs)</td>
</tr>
</tbody>
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* WHO defines overweight as BMI 25+

Courtesy of Katherine Flegal
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<th>Weight by Measured BMI</th>
<th>Underweight</th>
<th>Normal weight</th>
<th>Overweight</th>
<th>Class I Obesity</th>
<th>Class II Obesity</th>
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**Perception of Weight by Respondents**

- Underweight
- Normal weight
- Overweight
- Obese
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SOURCE: Harris 2008 Int J Obesity

Courtesy of Katherine Flegal
Final selection yielded 97 articles with data on the topic
- 2.88 million individuals
- >270,000 deaths

Sensitivity analyses were used to address possible over adjustment or under adjustment in the analyses

Hazard Ratio

- All ages >65 years

- Normal wt
- BMI 25-<30
- BMI 30-<35
- BMI >35
Can’t we have a more equal focus on physical inactivity and obesity?
Melbourne Collaborative Cohort Study of 7,142 women and men

After 14 year follow-up, participants “were asked about difficulties performing certain activities because of their health. Activities included bathing, dressing, eating, getting out of a chair or bed, going to our using the toilet at home, and walking about 200-300 meters”.

Physical activity or fitness was not assessed and taken into account in the analyses.
What Should We Do?

Learn the true causes of the obesity epidemic!
Then develop sound policies and strategies to deal with it.
The Energy Balance Study

Energy Balance

Diet

Activity
Thank you
Questions?