The US Obesity Epidemic: Time Trends and Health Care Costs ("Where Are we Headed & What Will it Cost?")

Youfa Wang, MD, PhD
Associate Professor
Center for Human Nutrition
Department of International Health
Department of Epidemiology
ywang@jhsph.edu

Outline

I. Introduction
   ➢ The global obesity epidemic

II. The US obesity epidemic
   ➢ Observed trends in adults
   ➢ Observed trends in children
   ➢ Projections of future trend in obesity
   ➢ Projection of financial costs

Selected key references


Why do we care about obesity?

Medical Complications of Obesity

- Pulmonary disease
  - abnormal function
  - obstructive sleep apnea
  - hypoventilation syndrome

- Nonalcoholic fatty liver disease
  - steatosis
  - steatohepatitis
  - cirrhosis

- Gall bladder disease

- Gynecologic abnormalities
  - abnormal menses
  - infertility
  - polycystic ovarian syndrome

- Osteoarthritis

- Skin

- Gout

- Idiopathic intracranial hypertension

- Idiopathic intracranial hypertension

- Stroke

- Cataracts

- Coronary heart disease

- Diabetes

- Dyslipidemia

- Hypertension

- Cancer
  - breast, uterus, cervix
  - colon, esophagus, pancreas
  - kidney, prostate

- Severe pancreatitis

- Osteoarthritis

- Gout

- Pulmonary disease

- Idiopathic intracranial hypertension

- Idiopathic intracranial hypertension

- Stroke

- Cataracts

- Coronary heart disease

- Diabetes

- Dyslipidemia

- Hypertension

- Cancer

- Osteoarthritis

- Gout

With examples of the top 5 Countries in each Region

International Obesity Taskforce (IOTF), Jan 2007

Global Prevalence of Obesity (BMI > 30) in Adult Males

- North America
  - USA 31%
  - Mexico 19%
  - Canada (self report) 17%
  - Guyana 14%
  - Bahamas 14%

- South Central America
  - Panama 28%
  - Paraguay 23%
  - Argentina (urban) 20%
  - Uruguay (self report) 17%
  - Dominican Republic 16%

- Africa
  - South Africa 18%
  - Gabon 16%
  - Democratic Republic 13%
  - Colombia 12%
  - Egypt 11%

- South East Asia & Pacific Region
  - Nauru 80%
  - Tonga 47%
  - Cook Island 41%
  - French Polynesia 36%
  - Samoa 33%

- European Region
  - Croatia 31%
  - Cyprus 27%
  - Czech Republic 25%
  - Albania (urban) 23%
  - England 23%

- Eastern Mediterranean
  - Lebanon 36%
  - Qatar 35%
  - Jordan 33%
  - Kuwait 28%
  - Saudi Arabia 26%

- Middle East
  - Iran 26%
  - Iraq 24%

- South East Asia & Pacific Region
  - Nauru 80%
  - Tonga 47%
  - Cook Island 41%
  - French Polynesia 36%
  - Samoa 33%
II. The US obesity epidemic

1. Time trends


(Wang and Baydound, Epid Rev 2007)
What's even worse:

Heavy Americans have become heavier!


Have heavy Americans become heavier over time?
Yearly average increase in BMI (kg/m²) and waist circumference (WC, cm) across their distributions

Between group differences:
Yearly average change in BMI (kg/m²) and waist circumference (WC, cm) across their distributions, by gender and race/ethnicity

3a) NH White men
3c) NH black men

Girls, 12-19 y
Boys, 12-19 y

Have high BMI or WC Have high BMI or WC

Years change

Cumulative proportion/Percentile

Cumulative proportion/Percentile

* OLS estimate of average yearly shift within percentile groups based on NHANES III and 1999-2004 data.

The future trends?

Projections based on NHANES data 1976 - 2004


Observed
High R²
Projected

* The projected prevalence presented here are those based on our linear regression models.
Method 2: Observed and projected shifts in BMI distribution among American adults

a) Observed shift between 1976 and 2004

b) Projected BMI distribution for 2010, 2020, and 2030

(Wang et al, 2008)

Average annual increase in the combined prevalence and future projection: among US adults >20 y

<table>
<thead>
<tr>
<th>Gender</th>
<th>Ethnicity</th>
<th>Ann. Inc.</th>
<th>Year when prev will reach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>80%</td>
</tr>
<tr>
<td>All</td>
<td>All</td>
<td>0.77</td>
<td>2022</td>
</tr>
<tr>
<td>Men</td>
<td>All</td>
<td>0.65</td>
<td>2020</td>
</tr>
<tr>
<td>Women</td>
<td>All</td>
<td>0.91</td>
<td>2022</td>
</tr>
<tr>
<td>Men</td>
<td>NH White</td>
<td>0.65</td>
<td>2018</td>
</tr>
<tr>
<td></td>
<td>NH Black</td>
<td>0.42</td>
<td>2047</td>
</tr>
<tr>
<td></td>
<td>Mex Am</td>
<td>0.60</td>
<td>2011</td>
</tr>
<tr>
<td>Women</td>
<td>NH White</td>
<td>0.86</td>
<td>2027</td>
</tr>
<tr>
<td></td>
<td>NH Black</td>
<td>0.69</td>
<td>2006</td>
</tr>
<tr>
<td></td>
<td>Mex Am</td>
<td>0.48</td>
<td>2016</td>
</tr>
</tbody>
</table>


Average annual increase in prevalence of obesity and future projection: US children 6-11 y

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Ann. Inc.</th>
<th>Year when prev will reach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>All</td>
<td>0.46</td>
<td>2031</td>
</tr>
<tr>
<td>Boys</td>
<td>0.49</td>
<td>2029</td>
</tr>
<tr>
<td>Girls</td>
<td>0.41</td>
<td>2035</td>
</tr>
<tr>
<td>Boys</td>
<td>NH White</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>NH Black</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Mex Am</td>
<td>0.55</td>
</tr>
<tr>
<td>Girls</td>
<td>NH White</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>NH Black</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>Mex Am</td>
<td>0.31</td>
</tr>
</tbody>
</table>


Projected Direct Health Care Costs Attributable to Overweight and Obesity for US Adults: 2000 to 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Overweight, BMI&gt;25</th>
<th>Obesity, BMI&gt;30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in 2000 $</td>
<td>% of total HCC*</td>
</tr>
<tr>
<td>2000</td>
<td>$81.5</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>$104.3</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>$437.6</td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>$956.9</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>$60.9</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>$151.3</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>$351.1</td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>$784.8</td>
<td></td>
</tr>
</tbody>
</table>

* Projections are based on per capita excess health care costs attributable to obesity and overweight estimated by Thorpe et al. 2004, and the Medical Expenditure Panel Survey (MEPS) data.

**Total HCC, total health care cost, estimated based on MEPS

The financial consequences?

Health care costs attributable to obesity / overweight

- Thorpe et al (2004): in 2001, the average health care costs for the obese group was $1,069 higher than for the normal weight group; and for the overweight (25≤BMI<30) group, by $340.

- Finkenstein et al (2003): in 1998, the annual excess health care costs attributable to obesity were $732 per person; and $247 for overweight.

Exaggeration or underestimation?
**Likely, underestimated!**
- Assumed obesity-related per capita health care costs grow at the same rate as the per capita total health care costs
- Heavy Americans become heavier
- Earlier onset of obesity and complications
- More advanced and expensive health care services

**What do we hope regarding our projections for the U.S.?**

**Conclusions**
- The prevalence of overweight and obesity has reached a high level both in adults and children in the U.S.
- We are far away from achieving the 2010 Healthy People goals
- Multiple factors have contributed to the growing obesity epidemic in the U.S. and worldwide
- Vigorous, effective, sustainable national and regional policies and programs are needed

**Do we want our children to live shorter lives than us?**

What should be done?

*Should obesity be considered in health care reform?*

**Acknowledgement**

Key collaborators:
- Dr May A. Beydoun, Hopkins (now with NIA)
- Dr Lan Liang, Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality
- Dr Benjamin Caballero, Hopkins
- Dr Shiriki K. Kumanyika, University of Pennsylvania

Funding: NIH, USDA and other research grants