The Impact of Diabetes Mellitus in the United States

Epidemiology, Costs, and Future Projections
Epidemiology of Diabetes

- 29.1 million Americans, 9.3% of the population, have diabetes
  - Diagnosed: 21.0 million
  - Undiagnosed: 8.1 million
- 1.25 million have type 1 diabetes
- Leading cause of kidney failure, nontraumatic lower-limb amputation, new cases of blindness among adults
- Major cause of heart disease and stroke
- Seventh leading cause of death

# Racial/Ethnic Differences in Diagnosed Diabetes

2010-1012 data for people ages ≥20 Years or Older

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hispanic whites</td>
<td>7.6</td>
</tr>
<tr>
<td>Asian Americans</td>
<td>9.0</td>
</tr>
<tr>
<td>Hispanics/Latinos</td>
<td>12.8</td>
</tr>
<tr>
<td>Cuban Americans</td>
<td>9.3</td>
</tr>
<tr>
<td>Central and South Americans</td>
<td>8.5</td>
</tr>
<tr>
<td>Mexican Americans</td>
<td>13.9</td>
</tr>
<tr>
<td>Puerto Ricans</td>
<td>14.8</td>
</tr>
<tr>
<td>Non-Hispanic whites</td>
<td>7.6</td>
</tr>
<tr>
<td>American Indians/Alaska Natives</td>
<td>15.9</td>
</tr>
</tbody>
</table>

Diagnosed and Undiagnosed Diabetes

Estimated percentage of people ages ≥20 years with diagnosed and undiagnosed diabetes, by age group, United States, 2012

Source: 2005-2008 National Health and Nutrition Examination Survey

Number of Americans with Diagnosed Diabetes, 1980-2011

Centers for Disease Control and Prevention www.cdc.gov/diabetes/statistics
Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

1994

Obesity (BMI≥30 kg/m²)

- Missing Data
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- ≥26.0%

Diabetes

- Missing data
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- ≥9.0%

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2013

Obesity (BMI≥30 kg/m²)

- Missing Data
- 14.0%–17.9%
- 18.0%–21.9%
- 22.0%–25.9%
- ≥26.0%

Diabetes

- Missing data
- 4.5%–5.9%
- 6.0%–7.4%
- 7.5%–8.9%
- ≥9.0%

Prevalence of Overweight and Obesity Among Adults with Diabetes

- CDC analysis of prevalence of overweight and obesity among U.S. adults ≥20 years with previously diagnosed diabetes
  - Overweight or obesity: 85.2%
  - Obesity: 54.8%
- Women aged 20-64 years had a significantly higher prevalence of obesity than women ≥65 years of age (64.7% vs 47.4%; \( P<0.05 \)) during 1999-2002
- Among men, prevalence of overweight or obesity was 86.3% and obesity, 53.0%
Incidence and Prevalence of Diabetes in Youth, 2012

- About 208,000 people younger than 20 have been diagnosed with diabetes (type 1 and type 2), about 0.25% of American youth
- In 2008-2009, 18,436 people younger than 20 years in the U.S. newly diagnosed with type 1 diabetes annually, and 5,089 diagnosed with type 2 diabetes

Prediabetes

In 2009-2012, based on fasting glucose or A1C levels, prediabetes was detected in

- 37% of adults ages 20 years and older
- 51% of adults ages 65 years and older
- An estimated 86 million adults ages 20 years and older

People with prediabetes have an increased risk of developing type 2 diabetes, heart disease, and stroke

Complications of Diabetes

- Hypertension
- Hyperlipidemia
- Heart disease and stroke
- Blindness, eye problems
- Renal disease
- Amputations
- Other complications

Complications of Diabetes
Heart Disease, Stroke, Hypertension

- In 2009–2012, of adults aged $\geq 18$ years with diagnosed diabetes, 71% had blood pressure $\geq 140/90$ mmHg or used blood pressure medications.

- In 2003–2006 cardiovascular disease death rates were about 1.7 times higher among adults aged $\geq 18$ with diagnosed diabetes than among adults without diagnosed diabetes.

- In 2010 hospitalization rates for heart attack were 1.8 times higher and stroke were 1.5 times higher among adults with diagnosed diabetes $\geq 20$ compared to those without diagnosed diabetes.
Complications of Diabetes
Blindness, Eye Problems

- Diabetes is leading cause of new cases of blindness among adults ages 20–74 years

- Of people with diabetes aged ≥40 years, 4.2 million (28.5%) had diabetic retinopathy in 2005-2008

- 655,000 (4.4% of those with diabetes) had advanced diabetic retinopathy that could lead to severe vision loss
In 2011, diabetes was leading cause of kidney failure, accounting for 44% of all new cases of renal failure.

49,677 people with diabetes began treatment for end-stage renal disease (ESRD).

228,942 people with ESRD due to diabetes were living on chronic dialysis or with a kidney transplant.
Trends in age-standardized rates of diabetes-related complications among U.S. adults with diabetes, 1990-2010

Complications of Diabetes Nervous System Disease

• ~60%–70% of people with diabetes have mild to severe forms of nervous system damage
  – Impaired sensation or pain in feet or hands
  – Slowed digestion of food in the stomach
  – Carpal tunnel syndrome
  – Erectile dysfunction

• Severe forms are a major contributing cause of lower-extremity amputations: About 60% occur in people with diabetes ages ≥20
Deaths Among People with Diabetes

- In 2010, diabetes was the seventh leading cause of death based on death certificates
  - 69,071 underlying cause
  - 234,051 contributing cause
- Likely to be underreported as a cause of death
- Overall, risk for death among those with diabetes is about twice that of people with similar age but without diabetes

Total cost of diabetes: $245 billion

- $176 billion in direct medical costs, which includes costs for hospital and emergency care, office visits, and medications.
- $69 billion in indirect medical costs, which includes costs for absenteeism, reduced productivity, unemployment
Medical Expenditures Attributed to Diabetes, 2012

- Hospital inpatient care (43%)
- Retail prescriptions to treat complications of diabetes (18%)
- Diabetes medication and supplies (12%)
- Physician office visits (9%)
- Nursing/residential facility stays (8%)

- The absolute cost of hospital inpatient care for people with diabetes rose from $58 billion in 2007 to $76 billion in 2012. However, hospital inpatient care costs fell from 50 percent to 43 percent of total direct medical costs.
Costs Incurred by People with a Diagnosis of Diabetes in 2012

- Average annual expenditures: $13,700
  - $7,900 attributed to directly to diabetes
- Medical expenditures for people with diabetes are 2.3 times higher than for those without diabetes.
  - More than 1 in 5 health care dollars in the U.S. goes to the care of people with diagnosed diabetes
  - More than 1 in 10 health care dollars in the U.S. are spent directly on diabetes and its complications
## Health Care Expenditures in the U.S Attributed to Diabetes, 2012

<table>
<thead>
<tr>
<th>Health resource</th>
<th>Dollars ($ millions)</th>
<th>% of U.S. total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Institutional care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital inpatient</td>
<td>75,872</td>
<td>16%</td>
</tr>
<tr>
<td>Nursing/residential facility</td>
<td>14,748</td>
<td>17%</td>
</tr>
<tr>
<td>Hospice</td>
<td>32</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Outpatient care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office-based physician visits</td>
<td>15,221</td>
<td>8%</td>
</tr>
<tr>
<td>Emergency visits</td>
<td>6,654</td>
<td>6%</td>
</tr>
<tr>
<td>Ambulance services</td>
<td>218</td>
<td>11%</td>
</tr>
<tr>
<td>Hospital outpatient</td>
<td>5,027</td>
<td>6%</td>
</tr>
<tr>
<td>Home health</td>
<td>4,466</td>
<td>9%</td>
</tr>
<tr>
<td>Podiatry</td>
<td>212</td>
<td>12%</td>
</tr>
</tbody>
</table>
## Indirect Costs Attributed to Diabetes, 2012

<table>
<thead>
<tr>
<th>Cost component</th>
<th>Productivity loss</th>
<th>Total cost attributable to diabetes ($ billions)</th>
<th>Proportion of indirect costs (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workdays absent</td>
<td>25 million days</td>
<td>5.0</td>
<td>7</td>
</tr>
<tr>
<td>Reduced performance at work</td>
<td>113 million days</td>
<td>20.8</td>
<td>30</td>
</tr>
<tr>
<td>Reduced productivity days for those not in labor force</td>
<td>20 million days</td>
<td>2.7</td>
<td>4</td>
</tr>
<tr>
<td>Reduced labor force participation due to disability</td>
<td>130 million days</td>
<td>21.6</td>
<td>31</td>
</tr>
<tr>
<td>Mortality</td>
<td>246,000 deaths</td>
<td>18.5</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>68.6</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
# Mortality Costs Attributed to Diabetes, 2012

<table>
<thead>
<tr>
<th>Primary cause of death</th>
<th>Total US deaths</th>
<th>Deaths attributed to diabetes</th>
<th>% of total of US deaths</th>
<th>Value of lost productivity ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>73,000</td>
<td>73,000</td>
<td>100.0</td>
<td>7,147</td>
</tr>
<tr>
<td>Renal disease</td>
<td>46,000</td>
<td>25,000</td>
<td>55.0</td>
<td>2,004</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>136,000</td>
<td>38,000</td>
<td>28.0</td>
<td>1,484</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>687,000</td>
<td>110,000</td>
<td>16.0</td>
<td>7,827</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>NA</strong>*</td>
<td><strong>246,000</strong></td>
<td><strong>NA</strong>*</td>
<td><strong>18,462</strong></td>
</tr>
</tbody>
</table>

*Total comprises mortality for reasons other than those listed here
Economic Costs of Prediabetes, GDM and Diabetes, 2012

- Total national cost: $322 billion
- Higher medical costs: $244 billion
- Productivity loss: $78 billion
  - $245 billion for diagnosed diabetes
  - $32.8 billion for undiagnosed diabetes
  - $43.9 billion for prediabetes
  - $1.3 billion for gestational diabetes

Section 3

FUTURE PROJECTIONS
## Estimated Number of People with Diabetes Worldwide, 2010 and 2030

<table>
<thead>
<tr>
<th>Country/Territory</th>
<th>2010 Millions</th>
<th>Country/Territory</th>
<th>2030 Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  India</td>
<td>50.8</td>
<td>1  India</td>
<td>87.0</td>
</tr>
<tr>
<td>2  China</td>
<td>43.2</td>
<td>2  China</td>
<td>62.6</td>
</tr>
<tr>
<td>3  USA</td>
<td>26.8</td>
<td>3  USA</td>
<td>36.0</td>
</tr>
<tr>
<td>4  Russian Federation</td>
<td>9.6</td>
<td>4  Pakistan</td>
<td>13.8</td>
</tr>
<tr>
<td>5  Brazil</td>
<td>7.6</td>
<td>5  Brazil</td>
<td>12.7</td>
</tr>
<tr>
<td>6  Germany</td>
<td>7.5</td>
<td>6  Indonesia</td>
<td>12.0</td>
</tr>
<tr>
<td>7  Pakistan</td>
<td>7.1</td>
<td>7  Mexico</td>
<td>11.9</td>
</tr>
<tr>
<td>8  Japan</td>
<td>7.1</td>
<td>8  Bangladesh</td>
<td>10.4</td>
</tr>
<tr>
<td>9  Indonesia</td>
<td>7.0</td>
<td>9  Russian Federation</td>
<td>10.3</td>
</tr>
<tr>
<td>10 Mexico</td>
<td>6.8</td>
<td>10 Egypt</td>
<td>8.6</td>
</tr>
</tbody>
</table>
Annual U.S. Diabetes Burden in 2050

- By 2050, prevalence of total diabetes (diagnosed and undiagnosed) is projected to increase from 1 in 10 adults to between 1 in 5 and 1 in 3 adults
- Incidence: from 8 in 1000 to 15 in 1000
- Largely attributed to three key factors
  - Aging of the U.S. population
  - Increasing size of higher-risk minority populations
  - Declining mortality among those with diabetes

Total U.S. Adult Population Diabetes Prevalence Projections

Year

Percent

2010 2015 2020 2025 2030 2035 2040 2045 2050

Middle: $r_1 = 1.77, r_2 = 2.11$

Middle: $r_1 = 1.00, r_2 = 4.08$

Low: $r_1 = 1.77, r_2 = 2.11$

Low: $r_1 = 1.00, r_2 = 4.08$