Economic Impact of Obesity: the Thai Case

Alia Luz, HITAP International Unit (HIU)
Outline

• Health system context
• Epidemiology of Obesity
• Etiology and Risk Factors
• Economic Impact
  • Methodology
  • Economic cost by gender, disease category, cost component
  • Discussion and Limitations
  • Recommendations
Health System Context

- Population: 68 million (2016)
- In 2013, Health expenditure: 3.9% of GDP (Public 80%)
- Universal health insurance coverage (UHC) established in 2002
- Ministry of Public Health (MOPH) and National Health Security Office (NHSO) principal agencies
- Increased demand for covering high-cost health interventions
Thailand’s three public health insurance schemes

<table>
<thead>
<tr>
<th></th>
<th>Civil Servants Medical Benefit Scheme (CSMBS)</th>
<th>Social Security Scheme (SSS)</th>
<th>Universal Coverage Scheme (UC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>1963</td>
<td>1990</td>
<td>2002</td>
</tr>
<tr>
<td>Eligible</td>
<td>Government employees, pensioners and their dependents</td>
<td>Formal-sector private employees</td>
<td>The rest of population who are not covered by SSS and CSMBS</td>
</tr>
<tr>
<td>Coverage</td>
<td>7%</td>
<td>13%</td>
<td>80%</td>
</tr>
<tr>
<td>Source of finance</td>
<td>General tax</td>
<td>Tripartite from employer, employee, government</td>
<td>-General tax - Managed by National Health Security Office (NHSO)</td>
</tr>
</tbody>
</table>
Epidemiology of Obesity

• Obesity measures based on BMI cut-off 25 kg/m$^2$ for Asian populations

• 41% of females, 28% of males, and almost 10% of Thai children are obese (2009)

• Obesity prevalence for females was 2x higher than their male counterparts (1991, 1996); but ratio of obese females to males has gone down
Epidemiology of Obesity

Rural and Urban areas

• Childhood obesity prevalence increased at a higher rate in rural areas, though total prevalence is higher in urban (13%) compared to rural (8%) areas

• Males (36.1% vs. 25.1%) and females (44.9% vs. 38.8%) obesity prevalence in urban and rural areas, respectively

(Aekplakorn et al)
Obesity prevalence, Gross Domestic Product (GDP) per capita and percentage of urban population in Thailand between 1991 and 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>chidren</th>
<th>Male</th>
<th>Female</th>
<th>urban population</th>
<th>GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>35</td>
<td>2,000</td>
</tr>
<tr>
<td>1996</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>45</td>
<td>4,000</td>
</tr>
<tr>
<td>2004</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>55</td>
<td>6,000</td>
</tr>
<tr>
<td>2009</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>65</td>
<td>8,000</td>
</tr>
<tr>
<td>2014</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>75</td>
<td>10,000</td>
</tr>
</tbody>
</table>

Sources: The 1st, 2nd, 3rd, 4th and 5th National Health Examination Survey in Thailand (on obesity prevalence) and the World Bank (on % urban population and GDP)
Etiology and Risk Factors

Obesity is a condition that results from an energy imbalance in food consumption and energy expenditure; this may be affected by biological or environmental/social factors.

Childhood Obesity

- Parents’ socioeconomic status (Sakamoto et al, 2001)
- Urban residence is a risk factor for obesity after adjusting for child characteristics (Firestone et al, 2011)
- Media exposure (computer, television, mobile phones) (Situational Analysis of Game Addiction in Thai Children, 2012)
- Lack of an active lifestyle
- Access to unhealthy food at home, in schools, and on the streets (Yothasamut 2016)
Etiology and Risk Factors

Adult Obesity
• Education, income and occupation
• Increased risk for adult obesity (Jitnarin et al, 2010):
  • Male adults who are older, lived in urban areas, have higher annual household income, and who are a non- or former smoker
  • Female adults who are older, have higher education, are not in a marriage-like relationships, and are in semiprofessional occupations

Elderly Obesity (Elderly Health Survey, 2013)
• Thai elderly females more at risk of being obese
• Risk factors: higher household incomes, higher education levels achieved, and living in urban areas, elderly with less than 20 natural teeth or less than 4 posterior occluding pairs
• Thai elderly are less active as they age
Social and non-economic impacts

• Gender, education, occupation, geographical household location, income and others

• How obesity affects these factors – e.g. potential for less spending on education from parents dealing with obesity due to more healthcare costs, or impact on income due to obesity

• Psychosocial consequences – negative attitudes and resulting behavior, such as alienation from society and using unsafe drugs or treatment (Laung-Ubon 2010, Tangpaibulsapth 2010, Chiraponseth 2008, S 2012, Tinkajec 2012, Kitchanapaibul 2012)

• Religious beliefs regarding obesity (Nima 2014)
Economic Costs of Obesity: The Thai Story
Introduction

• Prevalence-based, cost-of-illness study
• Obesity Attributable Function (OAF) – estimate the extent to which co-morbidities are attributable to obesity

Costs included:
• health care
• productivity loss due to premature mortality
• productivity loss due to hospital-related absenteeism
Co-morbidities

Based on the degree of association with obesity, the availability of existing information and its importance in the Thai context, the following co-morbidities were included:

| • Colon and colorectal cancer | • Hypertension |
| • Breast cancer | • Ischemic heart disease |
| • Endometrial cancer | • Pulmonary embolism |
| • Hyperlipidaemia | • Stroke |
| • Diabetes mellitus | • Gall bladder disease |
| • Depression | • Osteoarthritis |
Obesity Attributable Fraction (OAF)

\[ OAF_j = \frac{\sum_{i=1}^{2} P_i (RR_{ij} - 1)}{\sum_{i=0}^{2} P_i (RR_{ij} - 1) + 1} \]

OAF = proportion of the incidence of a co-morbidity in the population that is due to obesity

- \( i \) = Body Mass Index (BMI) level (i = 1 means BMI ≥ 25.0 - 29.9 kg/m2 and i = 2 means BMI ≥ 30 kg/m2)
- \( j \) = Co-morbidity related to obesity (j = 1 - 12)
- \( P_i \) = Prevalence of obesity at BMI level i
- \( RR_{ij} \) = Relative Risk of co-morbidity j associated with obesity level i compared with the non-obese population
Table 1: Relative risks for selected co-morbidities in obese subjects and Obesity Attributable Fraction (OAF)

<table>
<thead>
<tr>
<th>Diseases/conditions</th>
<th>Relative risk of developing diseases</th>
<th>Obesity attributable fraction (OAF) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male 1* 2**</td>
<td>Female 1* 2**</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Breast cancer [32]</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Colon and colorectal cancer [32]</td>
<td>1.51</td>
<td>1.95</td>
</tr>
<tr>
<td>Depression [32]</td>
<td>1.30</td>
<td>1.31</td>
</tr>
<tr>
<td>Diabetes mellitus [32]</td>
<td>2.40</td>
<td>6.47</td>
</tr>
<tr>
<td>Endometrial cancer [32]</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gall bladder [32]</td>
<td>1.09</td>
<td>1.43</td>
</tr>
<tr>
<td>Hyperlipidemia [26]</td>
<td>1.95</td>
<td>1.76</td>
</tr>
<tr>
<td>Hypertension [32]</td>
<td>1.28</td>
<td>1.84</td>
</tr>
<tr>
<td>Ischemic heart disease [35]</td>
<td>3.02</td>
<td>4.37</td>
</tr>
<tr>
<td>Obesity</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Osteoarthritis [32]</td>
<td>2.76</td>
<td>4.20</td>
</tr>
<tr>
<td>Pulmonary embolism [32]</td>
<td>1.91</td>
<td>3.51</td>
</tr>
<tr>
<td>Stroke [32]</td>
<td>1.23</td>
<td>1.51</td>
</tr>
</tbody>
</table>

*1 = BMI 25.0-29.9 kg/m², **2 = BMI ≥ 30 kg/m².
Estimated Obesity Attributable Fraction for Selected Diseases (adapted from Pitayatienanan et al)
Healthcare Costs

• Estimated for both inpatient and outpatient services

Healthcare costs attributable to obesity = Total number of patients with co-morbidity × OAF × Average cost of each co-morbidity in Thailand
Productivity Loss due to Premature Mortality

- Calculated using the human capital approach
- Discount rate of 3% used

Productivity loss due to premature mortality = No. of deaths attributed to obesity (2009, age and gender) × Average wage each person would receive if he or she lived through his or her lifespan
Productivity Loss due to Absenteeism

- Hospital-related absences from work
- Human capital approach
- Assumption that the average outpatient visit took 0.5 days

\[
\text{Productivity loss due to absenteeism} = \text{No. of days inpatients and outpatients with obesity-related conditions absent from work (2009)} \times \text{Average daily wage} = \frac{\text{GDP/capita (2009)}}{\text{no. of working days in the year}}
\]
<table>
<thead>
<tr>
<th>Type of Data</th>
<th>Source</th>
<th>Date</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of deaths from each co-morbidity</td>
<td>Thai Burden of Disease (BOD) project</td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>Relative Risks</td>
<td>Meta-analysis and studies conducted in Asia</td>
<td></td>
<td>Guh et al (2009)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Luppino et al (2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prospective Studies Collaboration (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jee et al (2006)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fu et al (2008)</td>
</tr>
<tr>
<td>Average earnings</td>
<td>National Economic and Social Survey</td>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>Outpatient data on the total number of patients</td>
<td>Center for Health Equity Monitoring (CHEM), Faculty</td>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>and the data on the cost of outpatient visit(s)</td>
<td>of Medicine, Naresuan University</td>
<td></td>
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<tr>
<td>for each comorbidity per person per year</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Outpatient absentee data</td>
<td>CHEM database</td>
<td>2009</td>
<td></td>
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<tr>
<td>Inpatient data on the total number of patients</td>
<td>Central Office for Health care Information (COHI)</td>
<td>2009</td>
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<tr>
<td>and the data on the cost of inpatient visit(s)</td>
<td>database</td>
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<tr>
<td>for each comorbidity per person per year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient absentee data</td>
<td>COHI database</td>
<td>2009</td>
<td></td>
</tr>
</tbody>
</table>
Assumptions

CHEM: outpatient information covered by the two major public health insurance schemes (UCS and CSMBS) from 675 out of 843 public hospitals (80%) across all 76 provinces throughout the country.

- Approximately 80% of the total Thai population (approximately 67 million); 20% covered by the Social Security Scheme for formal private sector employees.
- Assumed that 64% of total outpatient covered by CHEM database (in 2009)

COHI: hospital admission data from all public hospitals for patients covered by UCS and CSMBS (but not SSS)
- Assumed that the COHI data represent 80% of total inpatients
Results

Attributable to obesity
- 24% to 52% of all cases of diabetes mellitus
- 25% to 33% of all cases of ischemic heart disease
- 15% to 23% of all cases of osteoarthritis

- Total estimated economic cost is **12,142 million baht** (725.3 million US$PPP, 16.74 baht =1 US$PPP or **0.13% of GDP**)
- Health care costs account for 46% of the total cost or about **1.5% of the national health care expenditure**
- Productivity loss costs account for 56% of the total cost

- Table 2 for cost results
Estimated costs of obesity, disaggregated by gender (adapted from Pitayatienanan et al)
<table>
<thead>
<tr>
<th>Cost</th>
<th>Million baht</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct cost (health care cost)</td>
<td>5,584</td>
<td>46</td>
</tr>
<tr>
<td>OPD</td>
<td>850</td>
<td></td>
</tr>
<tr>
<td>IPD</td>
<td>4,734</td>
<td></td>
</tr>
<tr>
<td>Indirect cost (productivity loss)</td>
<td>6,558</td>
<td>54</td>
</tr>
<tr>
<td>Premature mortality</td>
<td>5,864</td>
<td></td>
</tr>
<tr>
<td>Hospital-related absenteeism</td>
<td>694</td>
<td></td>
</tr>
<tr>
<td>Total cost</td>
<td>12,142</td>
<td>100</td>
</tr>
<tr>
<td>% of total cost in term of GDP</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>% of Health care cost in term of National health care expenditure [37]</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>
Discussion and Limitations

• Heath care provision and costs associated with productivity loss were broadly similar
• Minimum estimate (other related costs not included in the analysis: cost of absenteeism not related to hospitalization, cost of presentism, and unemployment costs); other healthcare issues not included due to lack of data
• Proportions of illness similar with global estimates (e.g. obesity and overweight account for 23% of coronary heart disease cases, similar to 25-33% of cases in Thailand); however, cardiovascular disease not the main cause of economic burden unlike other studies
• Diabetes mellitus leading cause of obesity cost, similar to studies in Asia
Discussion and Limitations

• Obesity has a health impact equal to or exceeding that of smoking and drinking (similar to alcohol consumption related issues, estimated to cost at 5,591 million baht in 2006)
• Few public health interventions aimed at decreasing obesity prevalence
• Limitations:
  • Induction time of chronic diseases not included
  • Reliance on estimated cost (CHEM and COHI databases)
  • Obesity prevalence among UCS and CSMBS schemes (public sector) are similar to the SSS scheme (private sector)
  • No Thai-specific relative risk, data obtained from international literature
Conclusion and Recommendations

• The study provides a starting point on understanding the costs of obesity and for the government to take action

• Interventions aimed at obesity control should be given more attention (exploring all types)

• Public health campaign targeting obesity epidemic

• Social responsibility without stigmatising those who are obese

• More research on limitations mentioned (e.g. relative risk of co-morbidities in Thailand, induction times of chronic diseases, and obesity prevalence in all sectors)

• Need an update on the study (conducted between 2009-2010)
Economic Cost of Obesity in Thailand Study Link:


Economic costs of obesity in Thailand: a retrospective cost-of-illness study

Paiboon Pitayatienanan, Rukmanee Butchon, Jomkwan Yothisamut, Wichai Aekplakorn, Yot Teerawattananon, Naeti Suksomboon and Montarat Thavorncharoensap

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Abstract

Background

Over the last decade, the prevalence of obesity (BMI ≥ 25 kg/m²) in Thailand has been rising rapidly and consistently. Estimating the cost of obesity to society is an essential step in setting priorities for research and resource use and helping improve public awareness of the negative economic impacts of obesity. This prevalence-based, cost-of-illness study aims to estimate the economic costs of obesity in Thailand.
Thai Policies on Obesity Prevention and Control
1996
• The MOPH endorsed the food-based dietary guidelines and nutrition flag to inform the proper portions of cereals and other complex carbohydrates, fruits, vegetables, animal foods, legumes and pulses, sugar, salt, and fat that should be consumed by Thais daily.

1998
• The MOPH issued 'nutrition labeling' recommendations on a voluntary basis except for milk and their related products as well as food products that have nutrient claims.

2005
• The MOPH launched a public campaign on meals with ‘half fruits and vegetables and half others' for daily consumption.

2007
• The Thai FDA and Public Relations Department have regulated commercialization of “Foods for Children” by limiting food advertising to children on prime-time television.

2009
• Thai public health authorities and local government have conducted various national campaigns that promote regular exercise or physical activity including making the world record on 2012 and 2013.
• The Thai National Health Assembly issued a resolution on being overweight and obesity resulting in the development of the national action plan to fihealth workers to endorse regulations to reduce added sugar in food products, campaign against the sale of sugary beverages at schools, and succeeded in issuing a national law prohibiting added sugar in follow-up infant formulas.
2010
• The modified food-based dietary guidelines were issued.
• 'Sweet Enough Network' was established by a group of dentists, pediatricians and public health workers to endorse regulations to reduce added sugar in food products, campaign against the sale of sugary beverages at schools, and succeeded in issuing a national law prohibiting added sugar in follow-up infant formulas.

2011
• The Thai FDA have implemented the guidelines for daily amounts for saturated fatty acids, sugar and sodium on a voluntary basis except for snacks. The interpretation is based on package, not one serving, regardless of package size.

2015
• A public campaign led by the Crown Prince to encourage bicycle use called "Bike for Mom and Dad" on national mother and father's days (12th August and 5th December, 2015) was initiated.
• An educational reform: "Moderate Class, More Knowledge" has been implemented in state schools to cut class hours and increase extra-curricular activities including sports.

Modified from Chavasit et al (2013)
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