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Obesity in Thailand and its economic cost estimation

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ADB Working Paper Series

**OBESITY IN THAILAND AND ITS
ECONOMIC COST ESTIMATION**

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and Alia Luz

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Abstract

Obesity is becoming a global concern because many non-communicable diseases are attributable to obesity. Though it is highly prevalent in developed countries, obesity is quickly growing to be of concern in low- and middle-income countries such as Thailand, primarily due to the potential strain on its limited resources. Given the potential effect of obesity on the Thai health system, this paper discusses the trends, causes, and impact of obesity in Thailand. It is particularly geared for similar settings that will be dealing with this issue in coming decades. Based on a review of existing and grey literature, this paper addresses the following topics. The epidemiology of obesity in Thailand is described to provide an understanding of the overall trends of its prevalence in terms of sex, age, and geographical location. The etiology of obesity explores its causes and risk factors for children, adults, and the elderly. Obesity's impact is outlined in terms of the health and non-health impacts of obesity, including the health problems resulting from this condition, the cost to the healthcare system of obesity-related illnesses, and the social impact of obesity. The general framework for economic cost estimation of obesity is also illustrated for readers without economic background to better understand the approach. This paper concludes with the policy responses of the government and provides an idea of the various ways that the country has tackled this issue.

JEL Classification: I12, I18

Contents

1.	INTRODUCTION	1
2.	EPIDEMIOLOGY OF OBESITY	3
2.1	Overall Trends	3
2.2	Age Variation	4
2.3	Rural vs Urban Areas and Regional Variations	4
3.	ETIOLOGY AND RISK FACTORS.....	5
3.1	Child Obesity	5
3.2	Adult Obesity	7
3.3	Elderly Obesity.....	7
4.	IMPACT.....	8
4.1	Health Impact.....	8
4.2	Economic Impact	10
4.3	Social Impact	13
5.	POLICY RESPONSES	14
6.	FINAL REMARKS.....	17
	REFERENCES	18

1. INTRODUCTION

An upper-middle income country with 68 million people—the Kingdom of Thailand is the 51st largest country in the world in terms of total land area and 21st in terms of population. The country is facing an aging society, with 11% of its population aged 65 years and above in 2016 (doubling more than twice from 5% in 2005) (Ariyapruchya 2016), compounded by a low fertility rate (1.5 births per woman) (Health Nutrition and Population Characteristics for Thailand 2012–2015). Data from the National Statistical Office indicate that, between 2005 and 2014, the Thai population aged lower than 15 years decreased by 12% whereas the population aged 65 years and above increased by 38% (Older Persons in Thailand Survey 2015; Survey of Population Change Project 2006).

Since the 1980s, the Thai economy has shifted its concentration from the agriculture sector to manufacturing and service industries. However, half of its labor force are still working in agriculture and half of the population are living in rural areas. Prior to the economic crisis in 1997, the average annual economic growth rate from 1985 to 1995 was around 9% per year, which was the world's highest growth rate at the time. The gross domestic product (GDP) per capita increased by as much as 28 times, resulting to a decline in the poverty incidence from 57% in 1962 to 17% in 1996 (Office of the National Economic and Social Development Board, Poverty and Income Distribution). Nevertheless, Thailand experienced a serious economic crisis in 1997, causing a sharp drop in the annual economic growth rate from 7% in 1996 to –1.7% in 1997 and –10.8% in 1998. Poverty incidence increased from 17.0% in 1996 to 21.3% in 2000. In 2002, an economic recovery began and the proportion of people living under the poverty line decreased steadily to 10.5% in 2014 (Poverty and Equity Database 1990–2015). In 2015, the overall GDP in Thailand was \$395 billion and the Thai GDP per capita was \$5,620 (Thailand: World Bank Indicators 2016).

In the Thai health sector, the Ministry of Public Health (MOPH) is the principal agency responsible for promoting, supporting, controlling, and coordinating all health service activities for the wellbeing of the Thai people. Thailand is regarded as one of the leading countries in global health (Thaiprayoon and Smith 2014). The Thai healthcare system demonstrated its unique capacity in handling the major health issues and challenges of the country through careful planning, improvement, and investment in the system, resulting to the initiation of a successful family planning program in the 1970s (Case Study – Family Planning in Thailand: A Success Story 2014; Hemachidha and Rosenfield 1975), control of human immunodeficiency virus (HIV) epidemics by the 1990s (Ainsworth et al 2003), and the introduction of a tax-financed universal health coverage scheme (UHC) in the 2000s (Limwattananon et al 2007; 2009). The introduction of UHC in Thailand led to the establishment of the National Health Security Office (NHSO), an autonomous public health agency responsible for financing the UHC scheme. Three types of coverage are in place under the UHC scheme. The Civil Servant Medical Benefit Scheme (CSMBS) of the government officers and their dependents covers approximately 7% of the Thai population. The Social Security Scheme of the formal private sector employees covers around 13% of the total population. Finally, about 80% of the total population that are not eligible for the CSMBS are covered under a separate scheme – the UHC (Hughes and Leethongdee 2007).

The private sector, dominated by profit-making hospitals, has been expanding rapidly in Bangkok and other major provinces in the past three decades; they now represent 21% of the total hospital beds in Thailand (*Thailand Health Profile 2008–2010*). The MOPH, however, owns majority of hospitals throughout the country with 25 regional hospitals, 69 provincial hospitals, 734 district hospitals and 9,768 health promotion hospitals (at sub-district level) – thus maintaining 67% of all hospital beds in the country. The MOPH's regional and provincial hospitals focus on secondary and tertiary care services. District hospitals, which are staffed with physicians, nurses, and other paramedics, offer both primary and secondary care services. Health promotion hospitals, staffed by nurse practitioners and public health officers, provide only primary care, community services (including health promotion), and disease prevention.

Overall resources devoted to health care have increased markedly, especially after the establishment of UHC. The total health expenditure has grown at a faster rate than that of national GDP, from 3.5% to 4.6% of the GDP in 2003 and 2013 respectively (Global Health Expenditure Database 2003, 2013). In 2013, the Thai government spent 17% of its annual budget on the health sector. Government commitment on health investment is remarkably strong, even prioritizing it over investment for all others except the educational sector, which accounted for more than 6% of GDP in 2013 (Thailand's Education Spending above 6% of GDP 2015). As a consequence, majority of total spending (80%) on health is channeled through public expenditure as compared to private spending (20%).

The UHC scheme puts a strong emphasis on primary health care as the gatekeeper to service delivery and requests its beneficiaries in the catchment areas to register at the contracting unit for primary care (CUP). In general, a CUP includes one district hospital and several health promotion hospitals. The NHSO allocates budget for ambulatory services on a prepaid capitation basis, i.e. fixed rate per population registered to each CUP, which is equivalent to 90 USD per capita in 2015. The UHC's benefits package comprises not only treatment and rehabilitation but also disease prevention, such as vaccination, and health screening, including diabetes and hypertension screening.

Furthermore, in 2001, the ThaiHealth, another autonomous state agency under the supervision of the Prime Minister, was established under the Royal Decree on Establishing Health Promotion Fund (Buasai et al 2007). The fund acquires 2% of excise taxes collected from the sale of tobacco and alcohol beverage in the country. With an estimated annual budget of \$100 million, the responsibilities of the ThaiHealth are to advocate, stimulate, support, and provide funding to various organizations in society for health promotion activities that have no framework limitations. The ThaiHealth deploys four channels in promoting health, i.e. health promotion through "issues" e.g. alcohol, tobacco, unhealthy foods, etc., "organizations" such as educational institutions, workplaces, etc., "communities or areas," and "target groups" such as children, vulnerable populations, elderly etc. The ThaiHealth supports epidemiological and policy research related to obesity in Thailand, promotes public awareness, and advocates national and local policy on healthy diet and physical activity.

Given the potential effect of obesity on the Thai health system, this chapter will be a case study on obesity in a low- and middle-income country, exploring its trends, causes, and impact in Thailand. It will be particularly geared for similar settings that will be dealing with this issue in coming decades. The epidemiology of obesity in Thailand will be described in Section 2. This will serve to provide an understanding of the overall trends of its prevalence in terms sex, age, and geographical location. The etiology of obesity is discussed in Section 3, which will tackle its causes and risk factors for children, adults, and the elderly. Obesity's impact will be explored in Section 4,

outlining the health and non-health impacts of obesity, including the health problems resulting from this condition, the cost to the healthcare system of obesity-related illnesses, and the social impact of obesity. Finally, with all this in mind, this chapter concludes with the policy responses of the government in Section 5 and gives an idea of the various ways that the country has tackled this issue.

2. EPIDEMIOLOGY OF OBESITY

The measures on whether the body is fat or fit has long been subject to debate. The Body Mass Index (BMI) is one of several methods and can be regarded as the most common measurement. This is because BMI is easily calculated from the height and weight of an individual. In general, obesity is defined as having a BMI equal to or greater than 30 kilograms (kg)/meter (m)². Nevertheless, with the same BMI, women have, on average, more body fat than men (Stolk et al 2005), and Asians have more body fat than Caucasians (Janghorbani and Amini 2010). Due to these differences and in addition to the differences in BMI cut-offs for men and women, the WHO recommended the use of a BMI cut-off of 25 kg/m² for Asian populations (Chavasit et al 2013; Cheong 2014).

Though the BMI is helpful in predicting potential body fat percentages (Yang et al. 2006), the measurement fails to reflect body fat distribution. Abdominal obesity is now recognized to be associated with cardiovascular risk factors, including hypertension, hyperinsulinemia, type 2 diabetes, dyslipidemia, and other health problems (Cheng et al 2010; Janghorbani and Amini 2010). Aekplakorn et al (2007) prove that waist-to-height ratio is the best predictor for cardiovascular disease among Thai men. However, because BMI is inexpensive and easy to measure, it is widely used in community surveys around the world – including Thailand. This section, therefore, refers to obesity using BMI measures and the Asian cut point aforementioned.

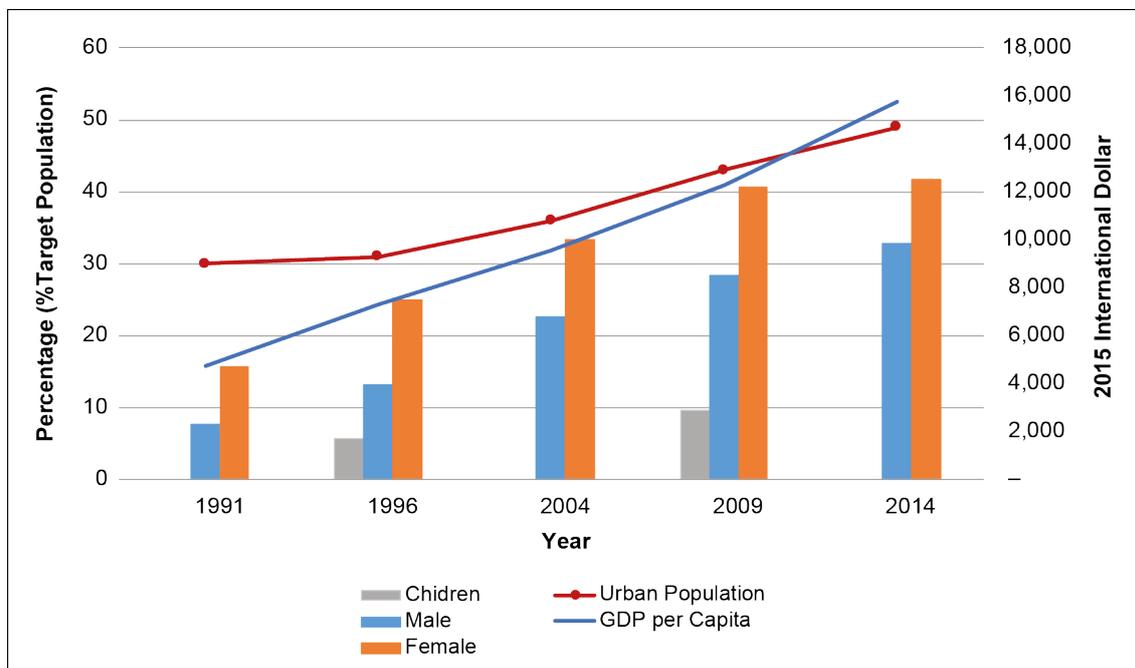
The National Health Examination Survey (NHES) is a nationally representative community survey that combines interviews and physical examinations. So far, it has been conducted five times – in 1991, 1996, 2004, 2009, and 2014 – in order to assess the health and nutritional status of adults and children (though the latter was included only in 1996, 2009, and 2014) in Thailand (Aekplakorn 2011; Aekplakorn et al 2014). The fifth survey is under analysis and the results (for the adult part only) of the fifth survey shown in this chapter are the preliminary findings. The NHES surveys are frequently used in Thailand when assessing epidemiological information about under- or over-nutrition as well as key health problems focusing on non-communicable diseases or metabolic syndrome that are related to nutritional status.

2.1 Overall Trends

Over a 23 year period from the first to the fourth NHES, obesity prevalence in Thailand increased more than 2.5 times (Aekplakorn, et al. 2014). Obesity prevalence seems to have grown at the same rate as the per capita GDP of the Thai population (see Figure 1). This trend is also comparable with the growing number of the Thai population living in urban areas. In 2009, 41% of females, 28% of males, and almost 10% of Thai children are obese. Results of the 2014 survey showed that the prevalence of obesity in males reflects the trend from previous years and rose to 33%, while the prevalence in females increased only slightly to 43%. Thailand has now become one of the countries with the highest prevalence of obesity in Asia (second only to Malaysia), ahead of richer countries such as the Republic of Korea, Japan, and Singapore (Cheong 2014). However, the obesity epidemic in Thailand is still far behind

the obesity problems of countries in Europe, the Americas, and Australia (Prevalence of Obesity, Ages 18+ [Age Standard Estimate] for Both Sexes 2014).

Figure 1: Obesity Prevalence, Gross Domestic Product (GDP) per Capita and Percentage of Urban Population in Thailand between 1991 and 2014



GDP = Gross Domestic Product.

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

Although the obesity prevalence is higher in females than males, the prevalence of obesity in males is rising at an alarming rate. In the 1991 and 1996 survey, the obesity prevalence for females was approximately two times higher than that of their male counterparts. But the survey also found that the ratio of obese females to males has gone down, from 1.5, 1.4, and 1.3 in 2004, 2009, and 2014, respectively.

2.2 Age Variation

The fourth NHES illustrated that the prevalence of childhood obesity is highest for children at ages 12–14 years old (7.2%) followed by 1–5 years old (4.6%) and 6–11 years old (3.5%). For adults, the highest prevalence is observed in populations aged 45–59 years (42.4%), followed by 30–44 years (38.4%), 60–69 years (35.6%), 70–79 years (25.5%), 15–29 years (19.5%), and 80+ years (12.8%). This trend is similar for both genders (Aekplakorn, et al. 2014).

2.3 Rural vs Urban Areas and Regional Variations

For childhood obesity, Mohsuan et al (2011) reports that from 1991–2009, the prevalence of stunted and underweight Thai children aged between 6–14 years decreased from 6.6 % to 3.7% and 8.7% to 4.1%, respectively. For urban and rural children, the gap of the prevalence of these conditions has decreased over time. Meanwhile, the increase of childhood obesity prevalence has been observed at a

higher rate in rural areas as compared to urban areas, though the total prevalence remains higher in urban (13%) compared to rural (8%) areas.

For adults, the prevalence of obesity is higher in urban than in rural areas for both genders. The difference of prevalence between urban and rural is greater in males (36.1% vs 25.1%) than in females (44.9% vs 38.8%) (Aekplakorn et al 2014). Bangkok has the highest prevalence of obesity for both males (38.8%) and females (49.4%), followed by the central region (33.3% for males and 44.5% for females), the southern region (27.4% and 44.7%), the northern region (27.5% and 36.3%) and the north-eastern region (22.5% and 39.1%). This obesity trend reflects the differences in average income per capita across regions.

3. ETIOLOGY AND RISK FACTORS

Obesity does not develop overnight. It is a chronic condition -- the outcome of an energy imbalance over a long period of time. This involves having high caloric intake without the required energy expense from physical activities to counteract the body fat accumulation or maintain/increase muscle mass. Although the major cause for obesity seems obvious and simple, the cause of such an energy imbalance for each individual is often the result of a combination of several factors, including genetics and biology, individual behaviours, socio-economic factors, as well as environment. Understanding the complexity of the factors contributing to the obesity epidemic is essential to the development and implementation of effective prevention and treatment interventions. This section describes the etiology of overweight and obese individuals across population groups, namely, children and adolescents, adults, and elderly. The findings were derived from a narrative review of published and grey literature focusing on the overweight and obese in Thai populations.

3.1 Child Obesity

Similar to other countries, childhood obesity was given a higher priority in health research in Thailand than obesity in other population groups. This is evidenced by the fact that there was more research addressing etiology and impacts of childhood obesity than other population groups. This may be justifiable given that childhood and adolescent obesity both have immediate and long-term effects on health and well-being. Those who are overweight or obese as children are likely to be obese as adults and/or have more serious adverse consequences later in life.

Skelton et al (2011) describes that although both 'nature' and 'nurture' can contribute to childhood obesity, the rapid rise in the obesity epidemic around the globe almost certainly points to behavioral and environmental changes as having a greater impact than genetics or biological reasons. In the paper, they document a number of genetically linked causes, endocrinological disorders, infectious etiologies (e.g. adenovirus or AD36), gut microbiota, and even stress that can increase a child's risk of obesity. However, almost all literature on the subject in relation to Thailand focus on external factors.

Sakamoto et al (2001) illustrates a positive relationship between parents' education and household incomes with childhood obesity in Thailand, especially in rural areas. This evidence confirms the stronger factors of systemic mechanisms (or environmental effects) on childhood obesity than that of individuals' genetic make-up. Nevertheless, the positive relationship is in contrast with the results found in developed nations (Sobal and Stunkard 1989). Many studies in high-income countries suggest that more

deprived households often have unhealthy food environments than those in wealthy communities (French et al 2001). With fewer grocery stores and more convenience stores, neighborhood residents in poor communities in high-income countries find it difficult to purchase affordable, healthy foods. However, this situation is likely to be different in developing countries, where sources of energy dense foods, such as fast foods, are more likely to be located in wealthier communities. Children from households of higher socioeconomic status in Thailand are more likely to consume more total calories as well as a greater proportion of calories from fats and proteins.

The urban-rural obesity prevalence has been an area of focus in many countries, including Thailand. Using data from a demographic surveillance system, Firestone et al (2011) assess whether urban environments contribute to children's risks of obesity in Thailand. They found that urban residence persists as a risk factor for obesity after adjusting for child characteristics. They also indicate that community wealth concentration and television coverage were strongly associated with risk for obesity. This may be explained by the fact that fast foods are heavily marketed in Thai television. Children living in communities with greater media exposure and easily accessible fast food stores could have a greater consumption of food products with low nutritional value.

With urbanization, children worldwide have increasing access to electronic media, such as computer/video games, mobile phones, and the internet in everyday life. In Thailand, the number of internet cafes which provide online gaming services increased 1.8 times over two years from 2008 to 2010 (*Situational Analysis of Game Addiction in Thai Children* 2012). In addition, more and more Thai children and adolescents own mobile phones. Mo-suwan et al's (2014) study analyzing a nationally representative health examination survey data among 6–14 year old children and adolescents found that computer game use for more than an hour a day and TV viewing for more than two hours a day is significantly associated with being overweight among girls who spent ≤ 3 days per week in 60 minutes of moderate intensity physical activity. On the contrary, these sedentary behaviors do not exert significant risk for being overweight among Thai boys. Though there are differences in the effects on gender, these behaviors are detrimental to living an active lifestyle in general; time spent on electronic media use not only reduces time allocated to physical activity but also increases consumption of fast foods and sugary or overly sweetened beverages that are more convenient to access or eat than traditional Thai foods when using electronic media.

With the potential for Thai children to have access to unhealthy food at home, they also may be inundated with it in other spheres of life, namely the school. It is very common in Thailand that preschoolers and school students have lunch provided to them at their kindergarten or elementary schools (Yothasamut 2016). All schools receive 10 baht (30 cents) per day per student from the central government, though schools can secure extra budget from the local government and/or voluntary contribution from parents. Because few schools prepare food for students in the school kitchen, most schools procure their meals from external vendors. Nevertheless, the current food procurement system prevents schools from buying food products and meals with the best quality but through consideration of the lowest price in the bidding process. A study from Kai et al (2008) indicates dishes offered to children contain a high amount of fat, which are the preferred choice of food by preschoolers and students, and insufficient quantity of vegetables and fruits that are relatively expensive. School teachers hesitate to procure meals and dishes rich with vegetables and fruits and limit the students' intake of fatty foods out of caution in case students' are dissatisfied and parents take complaints to the school. In addition, many students can buy snacks, sweets and carbonated drinks

from food stalls at the entrance of the schools and sometimes within the school grounds (Yothasamut 2016).

In brief, two key factors relevant to childhood and adolescent obesity are the biological factors and social environment surrounding kids and teens. Although there is a dearth of literature addressing the former in Thailand, a number of national and international studies reveal the importance of the social environment on childhood and adolescent obesity. These include parents' socioeconomic status, geographical location (rural vs urban), children's exposure to media promoting unhealthy food and behaviours, marketing and availability of unhealthy foods and beverages, as well as sedentary behaviours.

3.2 Adult Obesity

It has long been recognized that childhood or adolescent obesity can lead to adult obesity. Similar to childhood obesity, this may be explained by biological or genetic reasons as well as individual behaviours and environmental factors. Unlike childhood obesity, however, there are a number of social variables that affect adult obesity. Education, income and occupation cause variations in behaviour, thereby changing energy consumption, energy expenditure, and metabolism. These social variables are directly related to adults, not children. Jitnarin et al (2010) report from a nationally representative household survey that Thai male adults who are older, lived in urban areas, have higher annual household income, and who are a non- or former smoker are identified to be at increased risk for being overweight and obesity. In addition, Thai female adults who are older, have higher education, are not in a marriage-like relationships, and are in semi-professional occupations are at greater risk for being overweight and obesity. The study also shows that Thais aged between 46–55 years old have the highest risk of being overweight and/or obese. These findings may be explained by many reasons. First, urbanization can have adverse effects for eating a healthy diet since urban populations tend to consume more energy dense yet low nutritional value foodstuffs. Urbanites may also be more reliant on markets to supply food as opposed to home-based cooking in rural populations. Urban populations are likely to have less physical activity due to better transportation systems and limited public spaces for exercise. Secondly, Thais aged between 46–55 years are at the peak of their career and usually have an economic disincentive to focus on food and diet. They tend to place a lower priority on the quality of their products and curbing spending habits, including on food and beverages. At the same time, they have less leisure time due to more responsibility in their jobs, leading to a sedentary lifestyle. Lastly, social norms in Thailand and other Asian communities believe that having heavier weights represents access to more resources, thus equating to health and wealth. There is less social stigma in being fat than in other regions, though this may not apply to women.

3.3 Elderly Obesity

A nationally representative community survey conducted by the Ministry of Public Health in 2013 found that elderly Thai females are more likely to be obese than their male counterparts (*Elderly Health Survey 2013*). Higher household incomes, higher education levels achieved, and living in urban areas are also risk factors for elderly obesity in Thailand. Although there is strong association between chronic diseases, i.e. hypertension and diabetes, and obesity, the precise mechanisms linking the two conditions remain unclear. Further, there is no clear explanation of inter-individual differences i.e. the reasons why not all obese elderly individuals develop type 2 diabetes (Eckel et al 2011). This survey also demonstrates that elderly with less than

20 natural teeth or less than 4 posterior occluding pairs are unlikely to eat enough vegetables and fruits and therefore be more prone to being obese. In addition, results from the National Health Examination Survey also reveal that Thai elderly are less active as they age. Only 21%, 36%, and 60% of Thai people aged 60–69 years, 70–79 years, and 80 years or more, respectively, reported that they have enough physical activity (i.e. moderate intensity exercise for 30 minutes or more for at least 5 days/week, or high intensity exercise for 20 or more for at least 3 days/week).

4. IMPACT

Obesity is not a disease. It is a health risk that occurs and affects populations in every age group. It is regarded as one of the major public health issues in all resource-rich and resource-limited settings. Nevertheless, it is not easy to measure the health impact of obesity due to its long term effects by nature and the involvement of multiple factors in the impact evaluation. Ideally, it requires a well-defined cohort study with a very large sample size that is monitored over a significant number of years, perhaps even decades. Using cross sectional data always poses challenges in interpretation and control of bias. For example, Vapattanawong et al (2010) assess the relationship between body mass index and mortality among Thai elderly using two large databases i.e. the Vital Registry and the National Health Examination Survey (NHES). They found that there are higher mortality rates in people who are underweight, compared to persons with normal weight, and observed a higher magnitude in males compared to females. Being overweight or obese appears to have different effects by gender as a lower risk of mortality was observed in females but not in males. The findings are consistent with several studies in other countries, explaining a lower mortality among those with higher BMI measures in very old population groups as opposed to an intuitively expected higher mortality. This is called the ‘survival effect,’ which posits that obese persons may have already died from complications and conditions resulting from obesity, leaving only those who are genetically disposed or able to tolerate the higher body fat accumulation. In addition, some members of the elderly population with low BMI may have unrecognized illnesses or health problems unrelated to obesity that lead to their higher mortality rates. Some degree of difference in the magnitude of association by gender was found. This may reflect the paradox that obesity is more pronounced in the older Thai females than in males. This example highlights the importance of establishing a longitudinal cohort study with a significant sample size in Thailand. This is not only to have better understanding of the biological, behavioral, and environmental factors to obesity among the Thai population but also to ensure that intervention effectiveness related to obesity is well measured and the results can be used to inform future policy development in tackling the increased epidemic of obesity in the country.

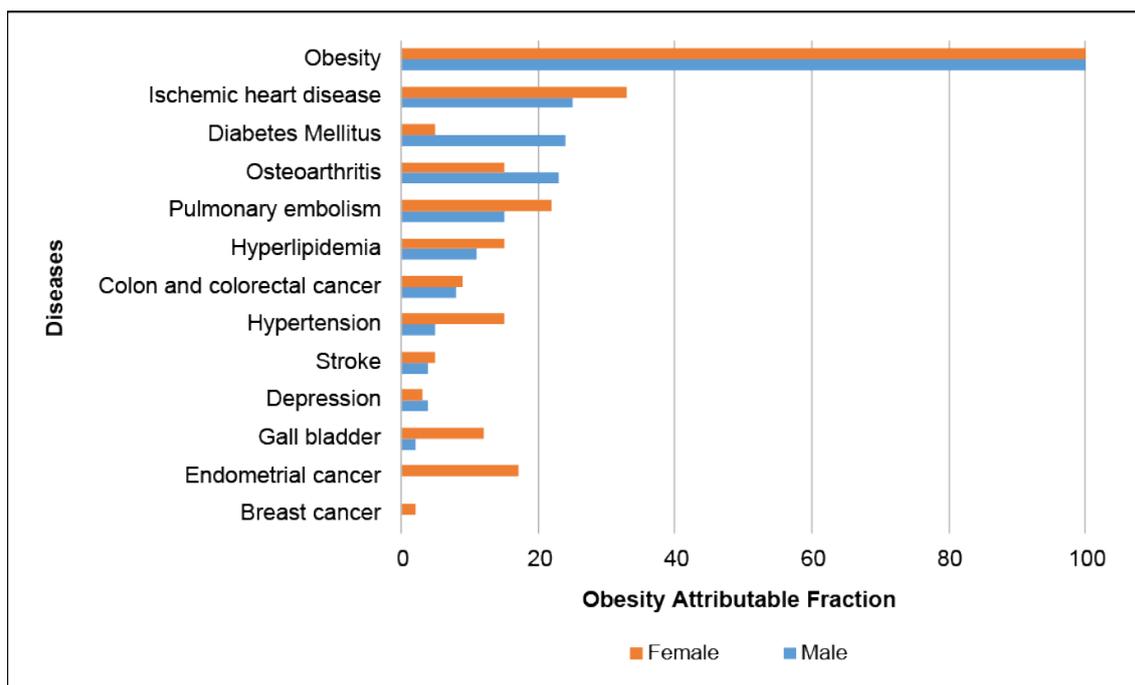
Despite the challenges above, based on case-control studies and epidemiological modelling, this section describes why obesity is so important and what are the health, economic, as well as social implications and impact of the epidemic in Thailand.

4.1 Health Impact

Obesity is strongly associated with non-communicable diseases because it increases the risks of type 2 diabetes, cardiovascular diseases, as well as some cancers. These risks have been shown to be reversed with weight loss (Zomer et al 2016). In Thailand, Pitayatiennanan et al (2014) estimated the health impact of obesity among Thai population in terms of obesity attributable fraction, which reflects the proportion of the

incidence of a co-morbidity in the Thai population due to obesity. The results are shown in Figure 2. Obesity contributes to 25% and 52% of diabetes cases in males and females, respectively. Ischemic heart disease is the second to diabetes in terms of obesity attributable fraction, indicating that 25% and 33% of ischemic heart disease cases are attributable to obesity. Osteoarthritis and pulmonary embolism are the third and fourth. Obesity contributes to a higher proportion of osteoarthritis cases in males (23%) than in females (15%) while it contributes to a higher proportion of pulmonary embolism cases in females (22%) than in males (15%).

Figure 2: Estimated Obesity Attributable Fraction in Selected Diseases in Thailand



Source: Modified from Pitayatiennanan et al (2014).

Hyperlipidemia is the fifth with 11% of cases in males and 15% of cases in females attributed to obesity. The sixth is hypertension with 5% of cases in males and 15% of cases in females attributed to obesity. There were three cancers included in this study. Two of them are cancers related to the female reproductive organs, namely breast cancer (2%) and endometrial cancer (17%). Colon and colorectal cancer affects both males (with obesity attributable fraction of 8%) and females (with obesity attributable fraction of 9%). There is only one mental health problem included in the analysis. It is estimated that 4% of depression in males and 3% of cases in females are attributable to obesity. While obesity is not a disease, some experts may consider it as such for cases of extreme obesity that significantly hampers daily living and reduces quality of life, prompting the need for surgery.

The data above clearly shows that obesity has a significant impact on quality of life and life expectancy amongst the Thai population. The Burden of Disease team of the International Health Policy Program in Thailand report that non-communicable diseases are the most relevant and attributable factor for disability-adjusted life years (DALYs) lost in Thailand. It contributes to 75% or 7.95 million DALYs lost in 2013

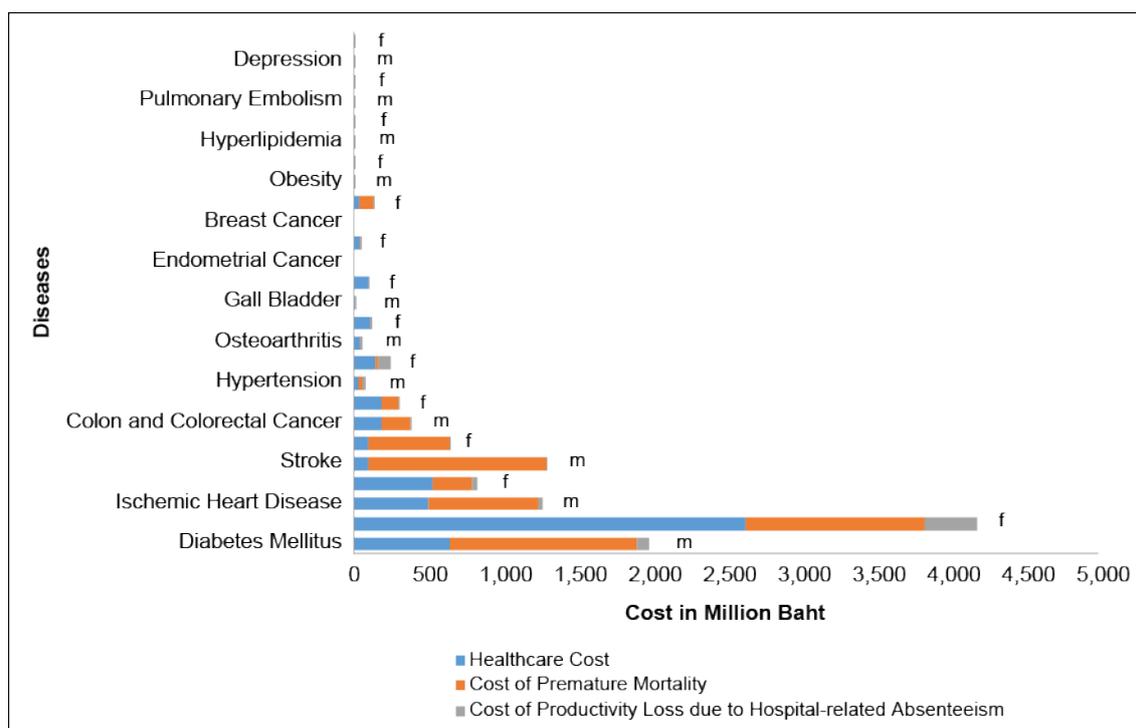
(Bundhamcharoen 2016). It is by far more significant than infectious diseases, maternal and child health problems, and injuries combined.

4.2 Economic Impact

From the aforementioned information, it can be estimated that obesity requires significant resources in the health sector for treatment and caring for patients with obesity-induced health problems. For each co-morbidity, the inpatient and outpatient healthcare costs attributable to obesity can be calculated by multiplying the number of patients in a single year with the given co-morbidity by the corresponding obesity attributable fraction, and the average cost of each comorbidity per person per year. The total healthcare cost for obesity can be estimated from the sum of all the co-morbidities' total cost. The costs associated with productivity loss due to premature death can be calculated for each co-morbidity using, for example, the human capital approach. This approach suggests that the number of deaths attributed to obesity in a given year, disaggregated by age and gender, are multiplied by the average lifetime earning each person would receive if he or she lived through his or her lifespan.

A collaborative research led by the Health Intervention and Technology Assessment Program (HITAP) of the Ministry of Public Health and the Mahidol University revealed that obesity generates a considerable cost to the Thai society, estimated to be about \$404 million or 12 billion baht annually (Pitayatiennanan et al 2014). Among these, 46% or \$186 million is due to direct health care cost for both out-patient and in-patient care. The remaining (54% or \$218 million) comes from indirect costs including opportunity cost related to premature mortality (\$195 million or 5,864 million baht) and hospital-related absenteeism (\$23 million or 694 million baht).

Figure 3: Economic Cost of Obesity in Thailand by Gender, Disease Category and Cost Component

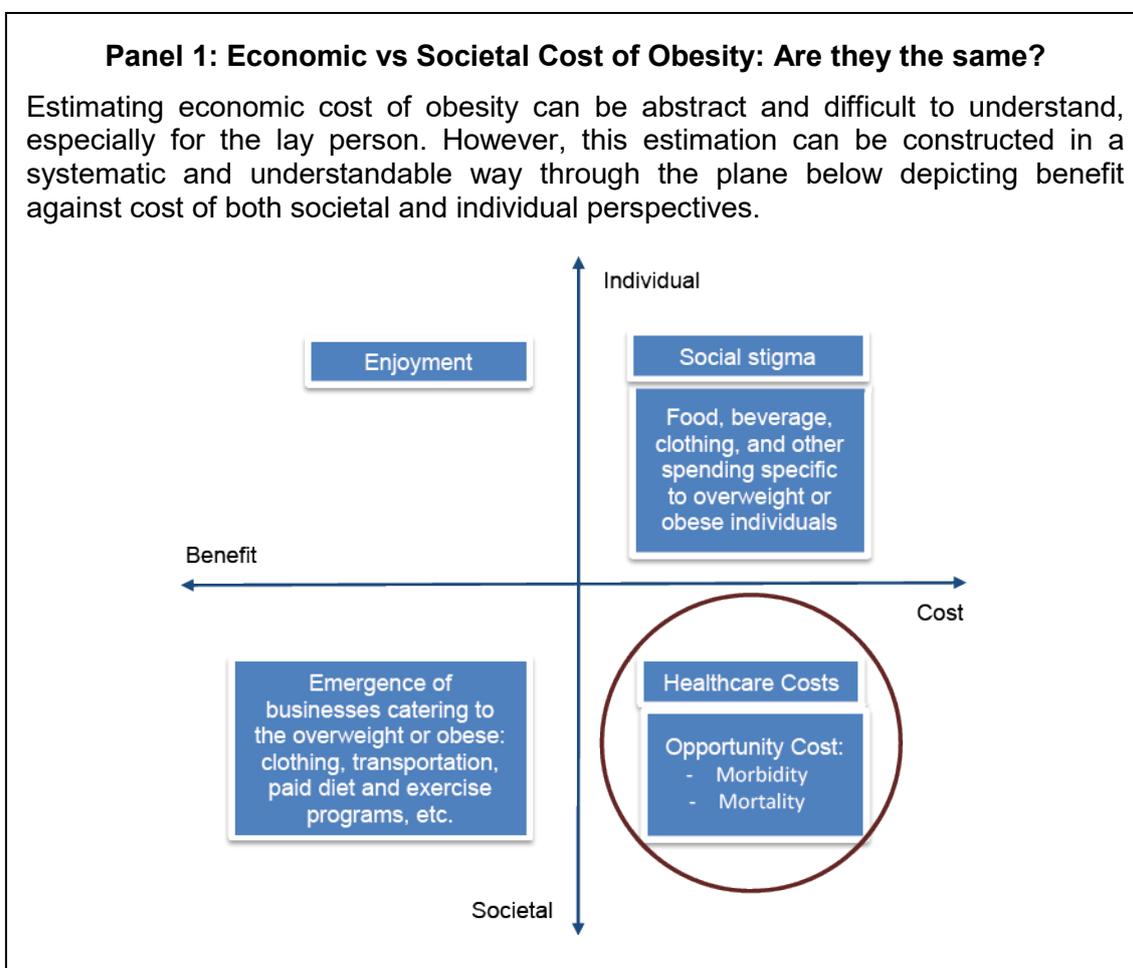


m = male, f = female.

Source: Modified from Pitayatiennanan et al (2014).

Figure 3 illustrates the economic costs of obesity in Thailand by the type of costs, gender, and co-morbidity. Diabetes, ischemic heart disease, stroke, colon and colorectal cancer, and hypertension as a result of obesity are the top five diseases consuming resources from the health care system as well as households in Thailand. Although obese Thai females have higher health care costs than obese males (\$134 million vs \$52 million), the cost of premature mortality is higher for obese males than his female counterparts. This may be explained by the fact that obese Thai males usually died at a younger age than obese females and the earning income of Thai males is higher than females.

In comparing the economic costs of obesity in Thailand with the results from other countries, the findings from Thailand are in line with other studies. Withrow and Alter (2011) conducted an economic study based on a systematic review of the direct costs of obesity in 32 studies from Australia, Brazil, Canada, the People’s Republic of China (PRC), France, Ireland, Italy, Japan, New Zealand, Sweden, Switzerland, and the United States. They conclude that obese individuals have approximately 30% more in terms of health care expenditures than those with normal weight. They also indicate that obesity accounts for 0.7% to 2.8% of a country’s total health expenditure, which is comparable to the Thai study. The Thai study results show that obesity accounts for 1.5% of the national health spending.



If choice of lifestyle is assumed as the primary cause of obesity – i.e. eating unhealthy food and beverages, inadequate physical activity – then its enjoyment can be taken as a personal gain. However, this comes at a cost, especially given spending on food, drinks, products and/or services that may be specific to obese individuals. There is also an opportunity cost to physical inactivity because the time spent on sedentary activities could take away from income generating activities. In addition, obese and overweight individuals may need to account for their size in terms of housing, transportation, clothing, and logistical concerns that in general may cater to the normal sized population.

In terms of the wider, societal impact, obesity could generate businesses to cater to this segment of the population, and examples include: fast-food chains, sugar dense beverages, and high caloric foodstuffs; clothing stores catering to oversized individuals; and, diet, fitness, and care paid programs. The societal cost of obesity includes healthcare costs of treating obesity and obesity-related complications. Opportunity cost of morbidity and premature mortality, including employee presentism (present at work but not fully productive) and absenteeism (short or long-term absence from work). This entire framework can also be adapted to other health risks such as alcohol and tobacco consumption.

The review of literature illustrates that only the last component, namely societal cost, is counted in the economic cost of obesity including the Thai study. This may be due to the individual's costs offsetting the individual gain. On the other hand, the social gains are negligible due to the fact that businesses cater to demands in different markets, such that if there is no demand for obesity-specific products, businesses will turn to other areas. Thus, there is no opportunity lost from the shift from obesity-related business to other markets.

This framework relies on the assumption of a perfect market and free choice for consumers. However, in case consumers have limited choices in terms of their consumption of unhealthy food (i.e. unable to afford appropriate food) or their living or work conditions force them to have sedentary lifestyles, then the individual cost may not be offset by the individual gain. Theoretically, in this case, the individual cost should also be included in the economic cost. However, this can be very challenging in practice to justify whose individual cost should be included and how to proportionally include them.

Another criticism on estimating social cost of obesity, especially on opportunity cost lost from premature mortality, is that if the study applies the human capital approach, the impact can be overestimated. This is because the human capital approach assumes that the economic loss from a person who dies prematurely is equivalent to the loss of their lifetime productivity, which is usually calculated through the estimated income loss from age of death until retirement. Realistically, there is unemployment of some degree in each country, in which case there is a potential for that person's productivity loss to be filled in by an unemployed individual. In this case, the opportunity cost lost is much shorter than the lifetime loss of income, and translates to the training and learning/transition phase of the new employee. This approach is also known as the 'friction cost approach'.

Panel 2: The Social Stigma on Obesity in Thailand

Generally, weight is considered to be a natural part of social conversations or interactions in many Asian cultures, including Thailand. While children are considered cute when chubby, there is an opposite and negative reaction to older individuals who are overweight and/or obese, though there is now pushback on these perceptions. One such example is when a Thai government official posted a photo of an overweight/obese woman working in a gas station on social media with the tagline “News Highlight: I came across a strange and rare creature because it works in shifts. #What an ugly human being? #How dare it be born?” Internet responders condemned his post, prompting the governor of his region to open an investigation and for the woman to file charges against him. The official eventually apologized to the woman and the charges were dropped. This anecdote highlights opposing views on what is socially acceptable or not in terms of body size.

Source: Coconuts Bangkok August 2016.

4.3 Social Impact

The social determinants of health, including gender, education, occupation, geographical household location, income, and others, have been described above as part of the etiology of obesity. This section describes the other direction -- how obesity in turn affects or compounds these social factors. The previous section showed how obese individuals are more likely to have obesity-related diseases and poor health, therefore more likely to have higher spending on healthcare and health-related issues, such as travel costs for seeking care. They also take more leave days from work (as shown in the paragraph describing absenteeism) and have shorter active lives or less productive working years. Nevertheless, from the authors' review of literature, there are no studies aiming to quantify the impact of obesity on these social and economic outcomes. One potential study would be comparing between education spending in households with obese older family members and those without obese family members. Another would be to explore the differences in income, controlling for other factors, of obese and non-obese individuals, especially for those who are self-employed. This type of research should be areas for future exploration to understand further the full impacts of obesity.

The other level of social impact from obesity are the psychosocial consequences. Although, in general, the Thai population has a relatively good attitude towards obesity, especially for children and adult men (Laung-Ubon 2010), many studies informed that the attitudes towards obesity are negative (i.e. several survey participants view it as disgusting) for certain groups, particularly women and teenagers, often through or due to the influence of international celebrities and beauty standards (Tangpaibulsaph 2010). According to many surveys, majority of high school and university female students view obesity as tremendously undesirable (Chiraponseth 2008; S 2012; Tinkajec 2012). Those who are obese believe that they are inferior to others and feel that (as well as often are) the subject of other people's judgmental or damaging discussions. More than half of the samples in a survey try to be thinner (Penprom 2010). Though exercise and fasting are the most prevalent means to lose weight, many believe that the most effective way is medication and treatment in private health facilities, which is now greatly popular and has become a booming industry in major cities throughout the country. In this survey, 12% of the samples used medical intervention. The survey also found that medicines used are often dangerous ones,

including amphetamine, diuretic drugs, laxatives, sedative medicines, etc. Marketing of products such as coffee, tea, and nutritional supplements geared towards weight loss is widespread; many of these products haven't been approved by the Thai Food and Drug Administration. As a result, there are often reports of adverse events on these types of products that are being sold through word-of-mouth or online (Kitchanapaibul 2012).

Other studies related obesity with religious beliefs, such as a study on Muslim women in the south of Thailand where most military living in the area are Muslims (Nima 2014). They found that the women have a strong conviction that being a good Muslim is reflected in daily living. In their belief, good Muslim practitioners control their diet and desire to eat as well as their physical activity; in this case, obese individuals are considered bad practitioners and face social stigma. This is another area that warrants further exploration.

5. POLICY RESPONSES

At present, all developed countries have implemented a number of policies for prevention and control of obesity (Popkin et al 2013). Nevertheless, although there are more obese people living in developing countries than those living in developed countries, only few developing countries have seriously responded to the obesity epidemic with concrete policies and programs. Thailand is one of the developing countries that gradually improved policy support for obesity control. Chavasit et al (2013) reviewed the historical development of obesity control policies in Thailand during the past two decades. This review focused only on activities and policies at the national level and excluded pilot studies and community as well as industry initiatives. Further, the author provided policy updates from 2011, shown in Figure 4. It can be seen that most policies developed in the first decades were initiated by the Thai Ministry of Public Health (MOPH). Other government authorities, professional communities, and civil societies have also been active in recent years when the obesity problem became more evident and the impact of the work of the Thai Health Promotion Foundation (primarily focusing on non-state actors) became more prominent. There are few national policies and activities related to physical activity, save the recent national campaign in 2015 led by the Crown Prince to promote bicycle use called "Ride for Mom and Dad" that attracted the world record of most number of people riding a bicycle in a public event (Nanuam 2015; Online Reporters 2015).

Zhang et al (2014) classified five types of food policies to prevent obesity at the national level. These include: i) school focused policy; ii) labelling, packaging and restaurant focused policy; iii) marketing policy; iv) pricing policy; and, v) nutrition education and national dietary guidelines. Each of these five policies are essential in preventing obesity, with advantages and disadvantages depending on the context and country situation. Countries must find an appropriate and synergic combination of these policies to ensure overall effectiveness. While there are now programs in place in Thailand for policy types i, ii, iii, and v (for which, in particular, already have many policies enacted), pricing policies have not been touched upon, even though they may have immediate impact.

Food prices are a contentious issue, especially in the context of Thailand, which is one of the major food exporters. Aside from the obvious need for daily living, food affects all levels of Thai society. Given that 50% of the labor force is concentrated on the agricultural sector, food prices are subject to push and pull not only from the market but from laborers and consumers as well. The impact of changing food prices on a national

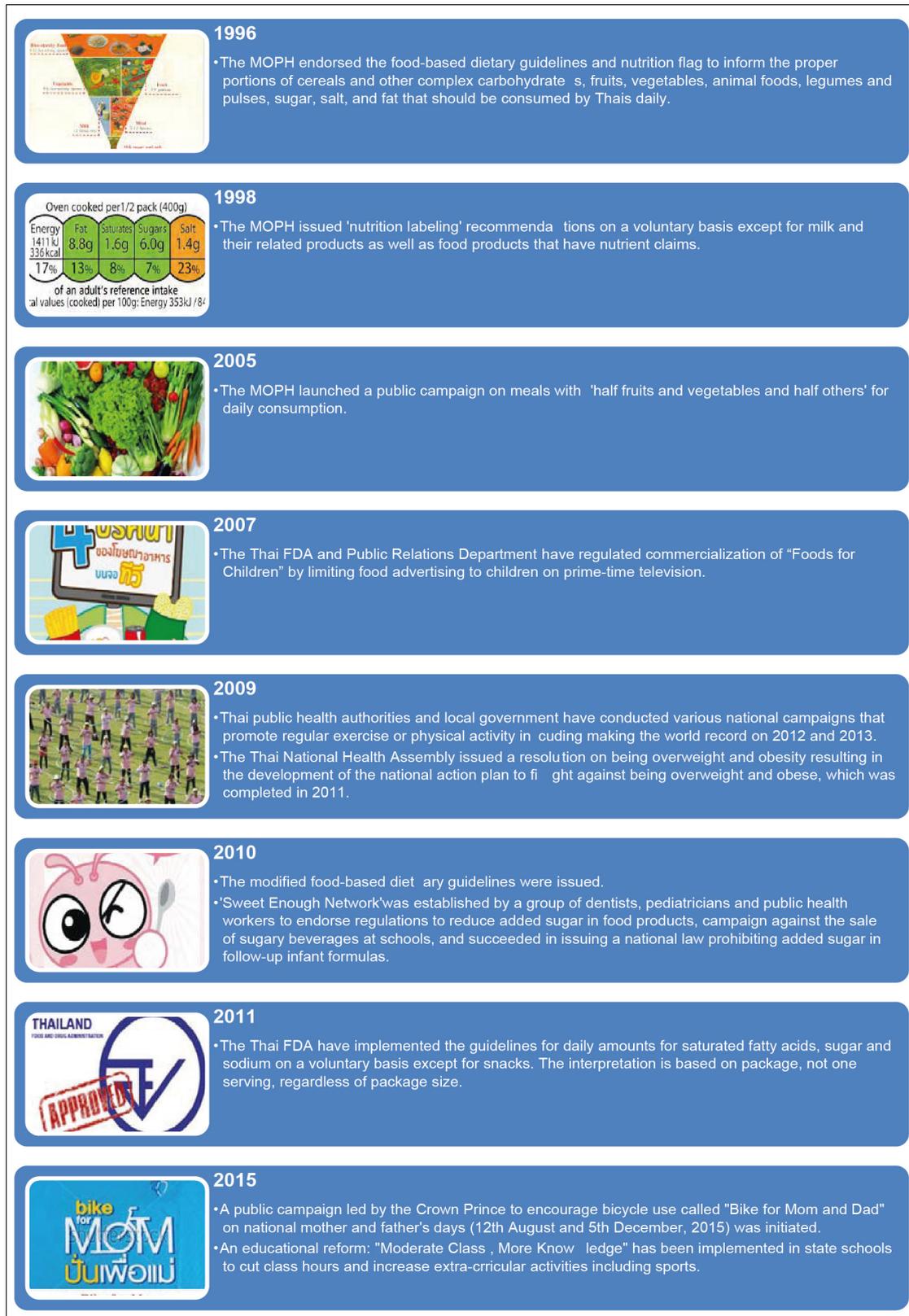
policy level is pervasive – from the small street sellers to the large scale producers of Thai products to the customers. The food industries for a long time have influenced and maintained close ties with policymakers. Given their profit-making drive, industry has a strong incentive to prevent any policies from controlling prices for certain products, e.g. higher prices for unhealthy food or subsidized cost of healthy ones such as fruits and vegetables.

As described above in the Etiology, obesity is not only related to biological factors but are highly affected by social determinants e.g. gender, occupation, education, urbanization, and socio-economic class. The current policies rarely address these determinants; for example, there is no particular policy focusing on ensuring the access of poor and/or urban areas to healthy food, communication strategies for healthy living targeted towards vulnerable groups, nor workplace policies on food and physical activity. Marketing and pricing policies which have been shown to be effective in other countries to address problems in these social groups are challenging or cannot be implemented properly due to the reasons stated above.

Although non-communicable diseases have become the major disease problems amongst the Thai population and incur substantial healthcare costs that are presently subsidized by the government's health insurance schemes, obesity treatments, including surgical treatments, are not part of the benefits package. These interventions are cost-effective and now included in benefits packages of many countries (Picot et al 2009). On the contrary, costly treatment interventions for obesity-related health consequences, such as acute coronary syndrome, diabetes, hypertension, osteoarthritis, obesity-related malignancy, or sleep apnea, are included in the health benefits package. This phenomenon reflects Thai attitudes about obesity. One is that obesity is the result of lifestyle choices and eating habits, i.e. preference for unhealthy foods or excessive eating. Another is that obese individuals without diseases are still healthy and therefore need no treatment. The perspective of wealth equating to more access to resources and food propagates the "fat is rich" ideal. In the private health sector, medical and surgical treatments are often offered at relatively high costs, targeting higher socio-economic classes, many of whom desire to look fit and adhere to prevailing standards of beauty. As a result, the Thai public and government officials may not readily accept the use of public resources and taxpayer monies for obesity treatments, unless the aforementioned attitudes change.

Lastly, there is lack of policy or program evaluation on obesity prevention and control interventions in Thailand. Decision makers may find it difficult to assess and modify existing policies in order to have greater health gains and allocate higher investment in obesity policies due to insufficient data on impact. Many question the effectiveness and value for investment in current policies, especially those with opposing views or incentives such as industry. Furthermore, the most useful nationally representative data sources are the National Health Examination Survey and the National Survey on Food and Nutrition. However, the survey is conducted only every five years and may not provide timely information for policy impact measures. Investment on surveillance, research, and program evaluation is a serious need in Thailand.

Figure 4: Historical Development of National Policies or Activities Addressing Obesity in Thailand



FDA = Food and Drug Administration, MOPH = Ministry of Public Health.

Source: Modified from Chavasit et al (2013).

6. FINAL REMARKS

Thailand, one of the global health leaders, is facing huge challenges in controlling the obesity epidemic and mitigate its impact in the country. This test is as onerous as controlling the HIV epidemic or establishment of the UHC program, if not more so. Obesity contributes to significant health problems as well as economic impact to the country. NCD is by far the major cause of death and disabilities in the Thai population. Its economic burden is \$404 million annually or equivalent to 0.13% of Thailand's gross domestic product.

The etiology of obesity is complex, involving multiple factors and are context specific. Genetics and biology are uncontrollable factors. Although individual behaviors, socio-economic and environmental factors are modifiable, there is no evidence on highly effective measures that can successfully control them. As a result, all developed and developing countries are dealing with the same challenges nowadays.

Developing countries are lagging behind developed countries in terms of their policy responses to obesity, despite the sharp increase of obesity prevalence observed in recent years. Like other countries, Thailand's obesity policies focus on nutrition and physical activity education, setting national standards, while food marketing or pricing policies are rarely introduced, perhaps, reflecting the strong influence of food industries that move to act against such interventions. In addition, it highlights the need for more investment in obesity research as well as monitoring and evaluation of obesity policy.

With robust civil society, strong public health authorities including the Thai Health Promotion Foundation that has both financial power and leadership in health promotion, and good health care infrastructure, Thailand has the potential to eradicate the obesity epidemic within its borders. The country needs to move faster in filling in the policy and research gap. It is highly encouraging that in 2016, the health minister himself takes leadership and focuses efforts on the issue by initiating a project called "Ministry of Public Health's Executives without a Big Belly," encouraging all top leaders of the Thai MOPH and other public health authorities to control their BMI below 25 kg/m (Ministry of Public Health's Executives without Big Belly Project 2016). However, obesity is not only controlled by the health sector. It remains to be seen how leadership in the health sector can influence overall government policy and support the public to have a better balance of their caloric intake and energy expenditures.

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