# Assessing the Fiscal Burden of Obesity Disease in Japan through Application of a Public Economic Framework

Copeland, C[1], Kotsopoulos, N[1], Connolly, M[1], Ota, R[2,3], Igarashi A[4,5]

[1]Global Market Access Solutions; [2]Novo Nordisk Pharma Ltd., [3]Novo Nordisk A/S, [4]Yokohama City University, [5]University of Tokyo

EE230

## Conclusions

- ☑ This analysis utilizes a government perspective to demonstrate the impact that current rates of obesity in Japan have on public accounts. The total burden of disease (BoD), calculated as tax revenue losses and increases in social transfer spending, is ¥2.66 trillion or $18.56 billion.
- ☑ This analysis shows the broader benefits that can be realized through policies aimed at reducing rates of obesity, as these can lead to greater employment levels, which in turn leads to higher levels of tax revenue. Similarly, lower obesity levels can reduce the number of long-term disability support recipients and early retirement payments, thus reducing government expenditure.
- ☑ Given all of the noted health implications associated with obesity and its comorbidities, as expected, the largest component of the fiscal burden of disease is healthcare expenditure. However, the tax revenue burden is similar to healthcare costs, demonstrating that these additional components should be considered when evaluating new health policies.

## Objectives

***This analysis assesses the fiscal consequences of obesity disease (defined as BMI ≥ 25kg/m² in line with local guidelines[1]) in Japan through application of a government perspective to capture obesity-attributable lost tax revenues and increased government transfers.***

## Background & Methodology

- Obesity continues to represent a significant public health concern globally, with a broad impact from both a health and economic perspective.
- Obesity is associated with multiple comorbidities as well as elevated mortality,[2] with Asians shown to have higher mortality risk than Caucasian populations.[3]
- As well as the substantial medical costs associated with obesity, there is also a sizeable economic effect. The economic and labor market effects of obesity in Japan have been illustrated in several studies.[4,5]
- A prevalence-based fiscal BoD model was developed in Microsoft Excel®, which tracked the Japanese population across different BMI categories using national Japanese data.[6]
- A literature review was undertaken to identify data linking obesity with different fiscal effects, such as economic activity and healthcare costs.
- A hypothetical 'control' cohort was generated using population-level Japanese fiscal data and compared to an 'intervention' cohort where obesity was reduced by a specified level. The incremental effects between these two cohorts represents the fiscal BoD of obesity.
- The fiscal BoD model structure is outlined in **Figure 1**.

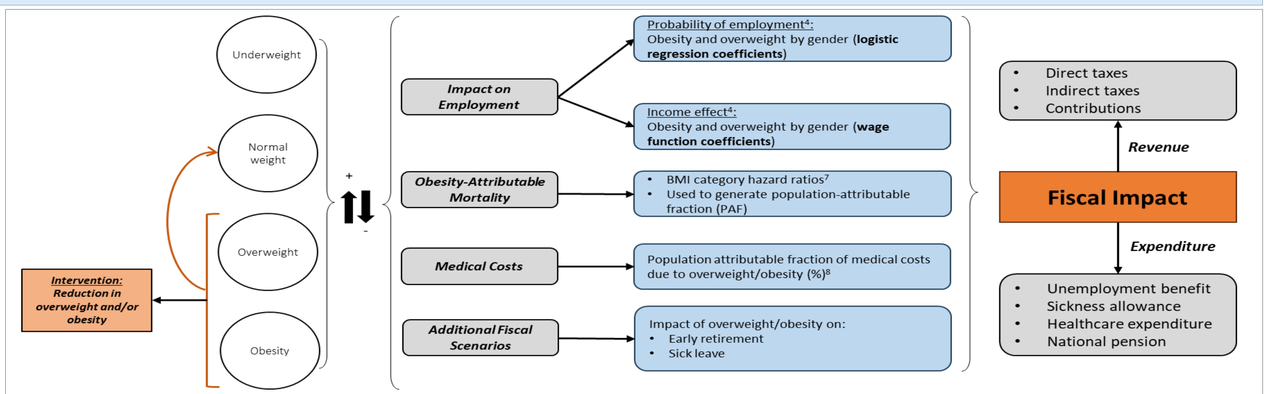


**Figure 1: Fiscal Model Structure**

## Results

- The total fiscal burden of obesity disease in Japan, defined as BMI≥25, is estimated at $18.56 billion (¥2.66 trillion), with a breakdown of results outlined in **Table 1**. This represents approximately 0.5% of the gross domestic product (GDP) of Japan.
- This consists of a loss of $6.58 billion (¥944 billion) and $1.18 billion (¥169 billion) in direct and indirect tax revenue, respectively. This reduction is caused by lower rates of employment and income combined with higher rates of sick leave among individuals with obesity disease.
- Excess obesity-attributable healthcare costs were $8.96 billion (¥1.29 trillion), while additional pension payment spending of $1.84 billion (¥264 billion) was estimated, due to higher levels of early retirement.
- The analysis demonstrates that, for every 1% reduction in obesity prevalence, the Japanese government will receive a net fiscal benefit of ¥26.63 billion comprising increased tax revenue and lower transfer spending.

**Table 1: Fiscal Burden of Disease in Japan (2023; Billion ¥)**

| | |
|---|---|
| **Income and tax revenue** | |
| Gross income loss from employment | ¥2,896.16 |
| Direct tax losses from employment | ¥944.15 |
| Indirect tax losses (from employment income and transfers) | ¥168.78 |
| **Transfers** | |
| Retirement payments | ¥264.20 |
| Healthcare costs | ¥1,286.37 |

- A one-way sensitivity analysis was conducted to explore the variables which have greatest impact on results. This showed that results are most sensitive to the employment and retirement modifiers applied to generate rates for the population with obesity disease **(Figure 2)**.
- Results of the model were initially generated for 2023, with an additional 10-year projection to illustrate the fiscal effects associated with increasing obesity prevalence rates **(Figure 3)**.

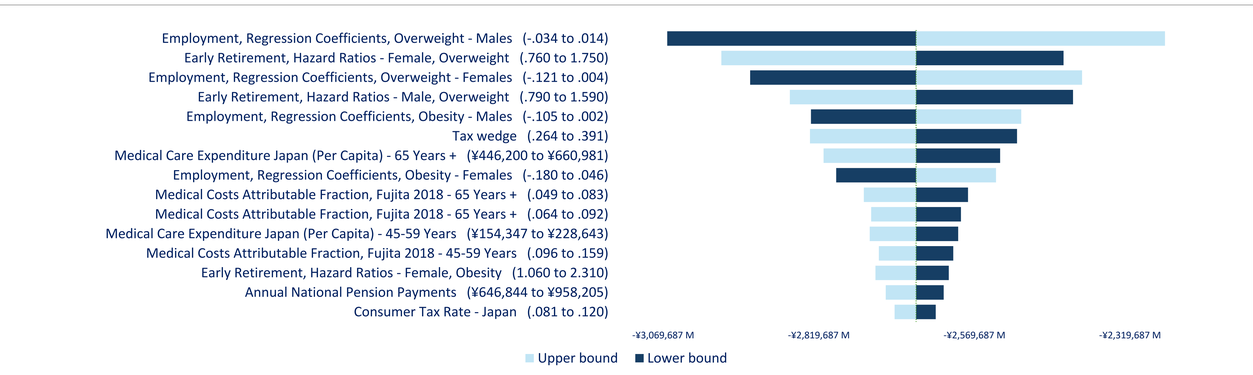


**Figure 2: Results of One-Way Sensitivity Analysis (Tornado Diagram)**

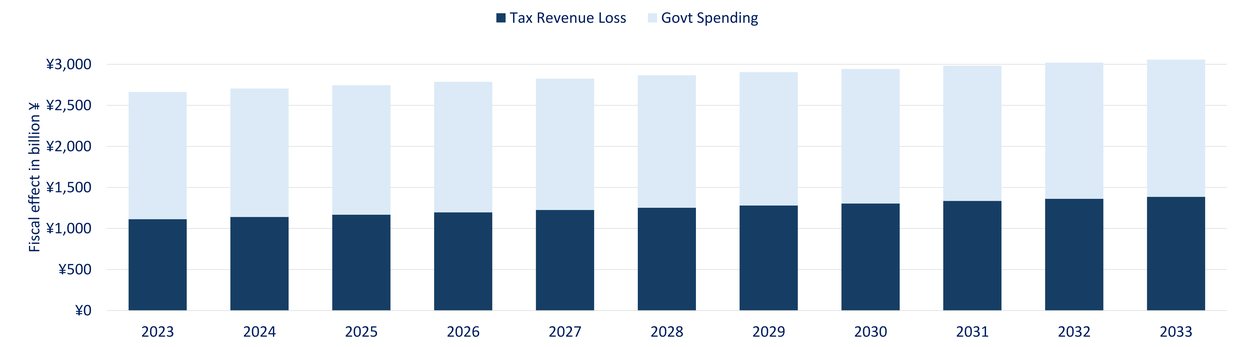


**Figure 3: Fiscal Projections in Billion ¥ (2023-2033)**

**Abbreviations:** BMI: Body mass index; BoD: Burden of disease; GDP: Gross domestic product

**References:** *1. Ogawa, W. and S. Miyazaki, Diagnosis criteria for obesity and obesity disease. Health Eval Promot, 2015. 42(2): p. 301-306. 2. Prospective Studies Collaboration, Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. The Lancet, 2009. 373(9669): p. 1083-1096; 3. Wen, C.P., et al., Are Asians at greater mortality risks for being overweight than Caucasians? Redefining obesity for Asians. Public health nutrition, 2009. 12(4): p. 497-506; 4. Morikawa, M., Smoking, Obesity, and Labor Market Outcomes: Evidence from Japan. 2018; 5. Okunogbe, A., et al., Economic impacts of overweight and obesity: current and future estimates for 161 countries. BMJ global health, 2022. 7(9): p. e009773; 6. e-Stat. National Health and Nutrition Survey 2016 Datasets. 2016 [cited 2023 October]; Available from: https://www.e-stat.go.jp/stat-search/files?page=1&layout=datalist&toukei=00450171&tstat=000001041744&cycle=7&tclass1=000001111535&cycle_facet=tclass1&tclass2val=0. 7. Sasazuki, S., et al., Body mass index and mortality from all causes and major causes in Japanese: results of a pooled analysis of 7 large-scale cohort studies. Journal of epidemiology, 2011. 21(6): p. 417-430; 8. Fujita, M., et al., Medical costs attributable to overweight and obesity in Japanese individuals. Obesity Research & Clinical Practice, 2018. 12(5): p. 479-484.*