

Projected Savings in Direct and Indirect Costs Due To Reduced Diabetes Prevalence With Vegetarian Diets

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INTRODUCTION

- Diabetes is among the most prevalent and costly conditions worldwide.
 - 7.2% of the United States (US) population (23.1 million people) was diagnosed with diabetes in 2015.¹
 - The estimated total economic cost of diagnosed diabetes in 2012 was \$245 billion in the US.²
 - Diabetes is one of the major risk factors for cardiovascular disease (CVD), which has been the leading cause of death of Americans for decades.³
- Plant-based, or vegetarian, diets, have been shown to be associated with reduced risk of diabetes, CVD, and cancer.⁴⁻⁸
 - As a result of improvement in health outcomes, the direct and indirect costs associated with these diseases can be avoided with appropriate nutritional modifications.

OBJECTIVES

- The aim of the study was to evaluate the economic impact of switching to vegetarian diets among patients with type 2 diabetes from the US societal perspective.

METHODS

Overview

- The annual direct and indirect costs due to type 2 diabetes are initially calculated based on the following:
 - US population size
 - Type 2 diabetes prevalence
 - Annual per-patient costs associated with diabetes
- Based on diabetes rate reductions reported in the literature, and assuming that 50% of patients follow a vegetarian diet, the number of patients with diabetes is reported with and without vegetarian diet uptake, and costs are recalculated.
- Calculations were carried out Microsoft Excel 2013.

Inputs

- Model inputs are shown in **Table 1**.
- The percentage of diabetics among the vegetarians and non-vegetarians is calculated as 5.21% and 6.89%, respectively, assuming that overall type 2 diabetes prevalence (7.2% x 95%) is a weighted average based on the percentage of vegetarians and the odds ratio for the association between a vegetarian diet and diabetes.
- Annual per-patient costs were calculated based on the reported number of diabetics in the US in 2012 (22.3 million), the overall direct and indirect costs (\$176 billion and \$69 billion, respectively), and the consumer price index to inflate the estimates to 2017 US dollars.^{2,9}

Table 1. Model Inputs

Parameter	Value	Reference
US population size	326,098,770	10
Percent vegetarian	3.2%	11
Diabetes prevalence	7.2%	2
Percent of diabetics with type 2 diabetes	95%	2
Odds ratio for the association between a vegetarian diet and diabetes	0.756	5
Annual per-patient direct cost associated with diabetes	\$8,946	2,9
Annual per-patient indirect cost associated with diabetes	\$3,507	2,9

Outcomes and Analyses

- Total direct, indirect, and overall costs are reported in 2017 US dollars.
- Sensitivity analyses are conducted for diabetes rate reductions reflecting different diet types and by varying diet uptake rates.

RESULTS

- A 12% reduction (~2.7 million patients) in the number of patients with diabetes was estimated with the adoption of a vegetarian diet (**Figure 1**).
- This led to \$23.8 billion and \$9.3 billion in savings of direct and indirect costs, respectively, summing to an overall \$33.1 billion in savings (**Figure 2**).
- In sensitivity analyses, the savings doubled with 100% adoption and varied between \$3.9 billion and \$66.1 billion when different risk reduction figures and vegetarian diet types were considered (**Table 2**).

Figure 1. Number of Patients With Diabetes, With and Without Vegetarianism Uptake

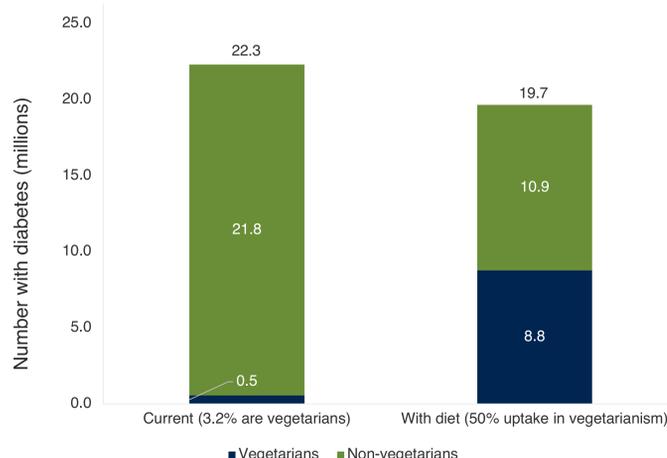


Figure 2. Costs Associated With Diabetes With and Without Vegetarianism Uptake

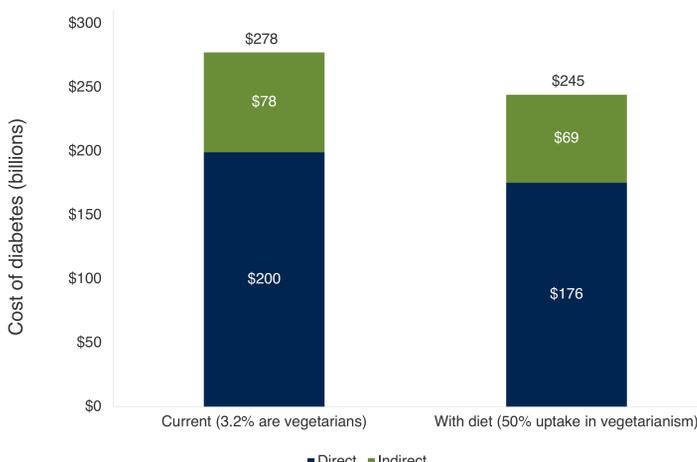


Table 2. Sensitivity Analyses Results

Scenario	Net Economic Impact (Billions)
25% vegetarianism uptake	-\$16.5
100% vegetarianism uptake	-\$66.1
OR ^a : 0.589 (lower CI)	-\$56.0
OR ^a : 0.971 (upper CI)	-\$3.9
OR ^a : 0.593 (vegan diet)	-\$55.4
OR ^a : 0.867 (pesco-vegetarian diet)	-\$18.0

^a Odds ratio for the association between a vegetarian diet and diabetes. Key: CI – confidence interval, OR – odds ratio.

CONCLUSION

- The results from this economic assessment suggest that the adoption of a vegetarian diet will result in considerable savings in direct and indirect costs in the US.
- The type of vegetarian diet chosen may have a significant role in the amount of savings predicted.

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