# Estimating Prostate Cancer Care Cost in the US: Findings from the Medical Expenditure Panel Survey 2008-2011

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# Presenter Disclosures

**Mohammad Rifat Haider**

**The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:**

No relationships to disclose

# Prevalence of Prostate Cancer

- Cancer is the second leading cause of death in the US.

- Prostate cancer is one of the most prevalent (second only to skin cancer) and deadly (second only to lung cancer) among US males (28% of total cancer incidence).

- The American Cancer Society estimates that there will be nearly 233,000 new cases of prostate cancer in 2014 nationwide, with approximately 30,000 deaths being attributed to the same (ACS, Cancer Facts and Figures 2014).

# Costs of Prostate Cancer Care

- Aging of population leads to longer survival and aggressive treatment at the end of life (Meropol et al., 2009).

- Dubious cost-effectiveness of newer therapies and treatments also increases the cost burden (Leonhardt D, 2009).

# Objectives

- To estimate the changes in prostate cancer-attributable costs for the prostate cancer patients over time.

- To estimate the total prostate cancer-attributable cost to the US economy over the period 2008- 2011.

# **Data**

- This study used the Medicare Expenditure Panel Survey (MEPS) household component datasets from 2008 through 2011 .

- Medical Components of MEPS were used to estimate the Charlson comorbidity index.

- MEPS is a nationally representative database with the distinct feature of cross-validated cost data obtained from the respondents and the payers.

# Method

- Propensity score matching technique was used to match non-cancer controls with the cancer patients using selected covariates, age, sex, education, poverty level (poor, near poor, low middle, and high income), race (White, Black, Asian, Others), insurance status (private, public and uninsured), and marital status (married and other).

- As propensity score matching requires completeness in information, variables with missing values were imputed.

- Doubly Robust (DR) estimation was used to calculate inverse probability treatment weights (iptw).

# Method (Cont.)

- Generalized Linear Model with Log Link and Gamma Family were fit to estimate the cancer care cost.

- Propensity score (iptw) was multiplied with the person weight (MEPS) to form the new weight and used in the weighted analysis (DuGoff et al., 2014).

- Besides the matching variables, cancer remission status, years of suffering and cancer diagnosis (yes/no), Charlson comorbidity index, and any limitation were included in the model .

# Results: Propensity Score Matching
## (MEPS 2008)

| Independent Variables | Mean in Treated (Prostate Cancer) | Mean in Untreated (Non-Cancer ) | Standardized Difference |
|---|---|---|---|
| **Age** | | | |
| 40-49 | 26.4% | 33.7% | -0.159 |
| 50-64 | 46.2% | 42.2% | 0.082 |
| 65-74 | 15.7% | 13.9% | 0.050 |
| 75+ | 11.6% | 10.2% | 0.047 |
| **Race** | | | |
| White | 66.9% | 71.29 | -0.152 |
| African American | 14.4% | 19.04 | -0.067 |
| Asian | 2.1% | 6.61 | -0.221 |
| Others | 16.6% | 3.07 | 0.480 |
| **Insurance Coverage** | | | |
| Public | 73.0% | 65.2% | 0.170 |
| Private | 19.8% | 19.1% | 0.018 |
| Uninsured | 7.1% | 15.7% | -0.272 |
| **Marital** | | | |
| Other | 33.7% | 28.7% | 0.109 |
| Married | 66.3% | 71.3% | -0.109 |
| **Poverty Category** | | | |
| Poor | 6.9% | 11.8% | -0.169 |
| Near Poor | 3.5% | 4.9% | -0.070 |
| Low Income | 9.4% | 13.8% | -0.138 |
| Middle Income | 23.3% | 30.7% | -0.168 |
| High Income | 30.37 | 30.7% | 0.370 |
| **Region** | | | |
| Northeast | 26.9% | 15.7% | 0.277 |
| Midwest | 11.7% | 19.5% | -0.216 |
| South | 42.4% | 38.8% | 0.073 |
| West | 19.0% | 26.0% | -0.168 |

# Results: GLM estimation
## (MEPS 2008)

| Parameter | Parameter Estimate | SE | 95% Confidence interval | P value |
|---|---|---|---|---|
| Prostate cancer | 0.815 | 0.618 | -0.404-2.034 | 0.189 |
| No cancer | 1.000 | | | |
| Other Cancer | 0.533 | 0.131 | 0.274-0.792 | 0.000*** |
| No Cancer | 1.000 | | | |
| Age | | | | |
| 40-49 | 1.000 | | | |
| 50-64 | 0.505 | 0.193 | 0.125-0.886 | 0.010* |
| 65-74 | 0.457 | 0.147 | 0.167-0.748 | 0.002** |
| 75+ | 0.917 | 0.311 | 0.302-1.532 | 0.004** |
| Race | | | | |
| White | 1.000 | | | |
| Black | -0.124 | 0.165 | -0.450-0.202 | 0.454 |
| Asian | -0.241 | 0.171 | -0.579-0.095 | 0.160 |
| Other | 2.304 | 0.378 | 1.557-3.050 | 0.000*** |
| Marital Status | | | | |
| Other | 1.000 | | | |
| Married | 0.111 | 0.095 | -0.769-0.297 | 0.246 |
| Insurance Status | | | | |
| Private | 1.000 | | | |
| Public | 0.345 | 0.154 | 0.398-0.651 | 0.027* |
| Uninsured | -0.744 | 0.402 | -1.538-0.017 | 0.066 |
| Cancer Remission | | | | |
| No | 1.000 | | | |
| Yes | -0.046 | 0.495 | -1.021-0.929 | 0.226 |
| Years of Suffering | -0.097 | 0.058 | -0.211-0.016 | 0.094 |
| Charlson Comorbidity Index | | | | |
| 0 | 1.000 | | | |
| 1 | 0.906 | 0.255 | 0.402-1.411 | 0.000*** |
| 2 | 0.571 | 0.195 | 0.185-0.957 | 0.004** |
| Any Limitation | | | | |
| No | 1.000 | | | |
| Yes | 0.627 | 0.101 | 0.428-0.826 | 0.000*** |
| Constant | 7.513 | 0.185 | 7.147-7.880 | 0.000*** |

# Results: Estimated Prostate Cancer Attributable Costs (USD)

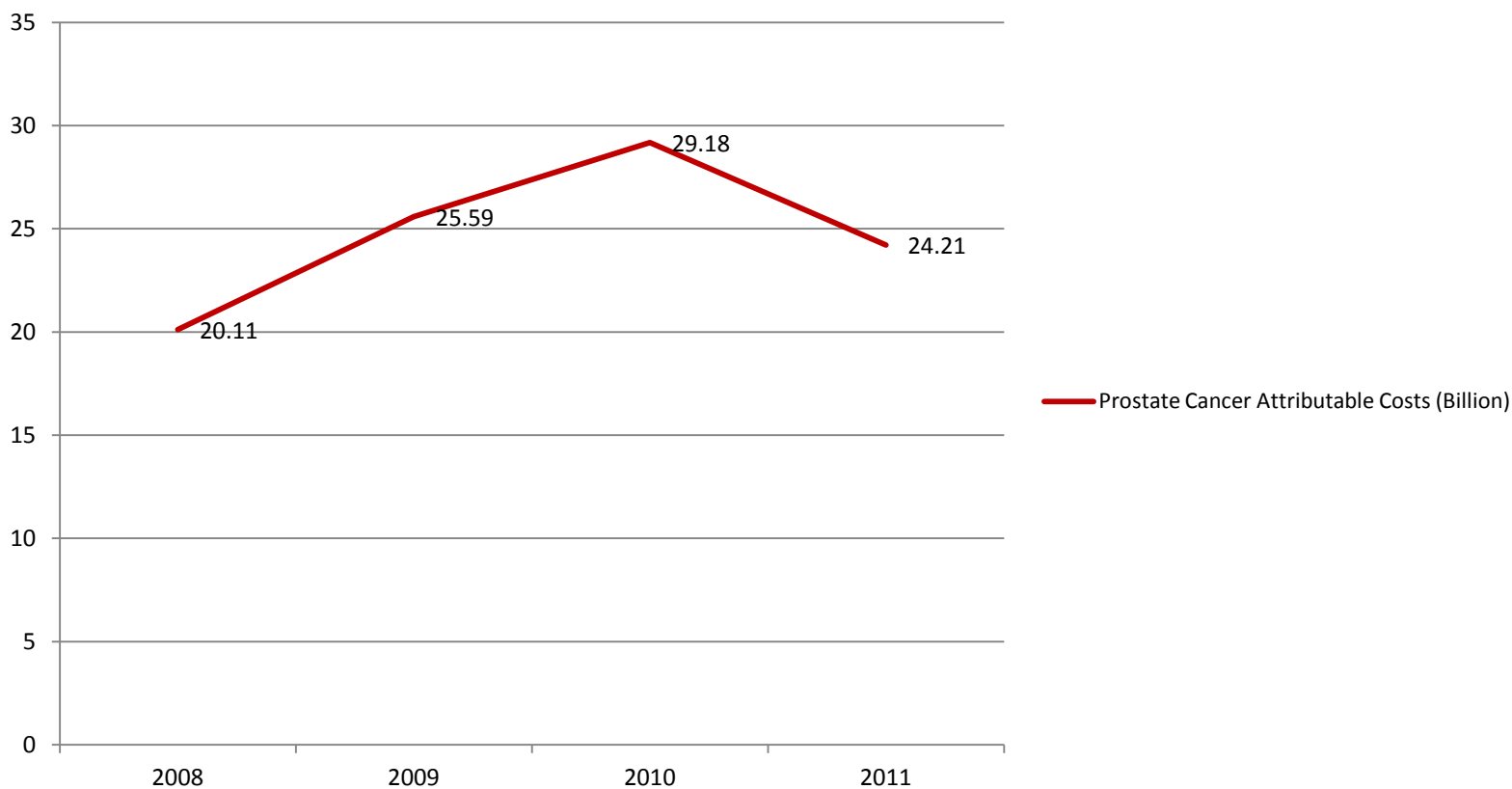| Costs | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| Prostate Cancer Total Cost | 14332.99 | 16421.7 | 16276.44 | 15070.56 |
| Non-Cancer Total Cost | 6465.8 | 5803.93 | 6156.7 | 6675.24 |
| Cancer Attributable Costs | 7867.19 | 10617.77 | 10119.74 | 8395.32 |
| Cancer Attributable Costs on Economy | 20.11 Billion | 25.59 Billion | 29.18 Billion | 24.21 Billion |

# Trend of Prostate Cancer Care Per Capita Costs in the US (2008-2011)



Chart legend:
- Cancer Total Cost
- Non-Cancer Total Cost
- Linear (Cancer Total Cost)
- Linear (Non-Cancer Total Cost)

Cancer Total Cost data points:
- 2008: 14332.99
- 2009: 16421.7
- 2010: 16276.44
- 2011: 15070.56

Non-Cancer Total Cost data points:
- 2008: 6465.8
- 2009: 5803.93
- 2010: 6156.7
- 2011: 6675.24

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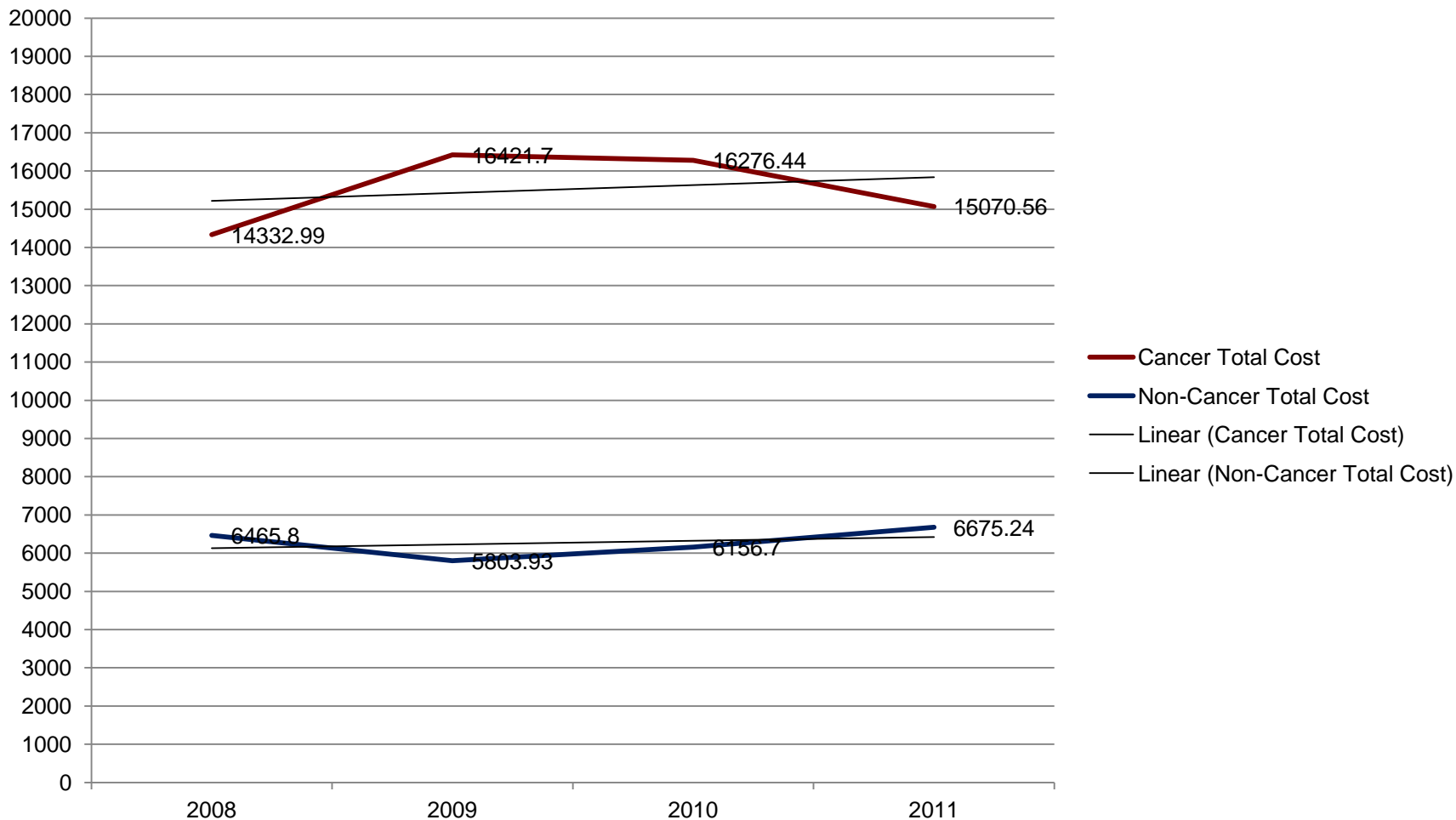
# Trend of Prostate Cancer Care Total Costs in the US



Prostate Cancer Attributable Costs (Billion)

# Discussion

- Prostate cancer cost experienced a dip in recent years.
- Total attributable costs on the economy increased up to $ 29 Billion in 2010 but decreased to $ 24 Billion in 2011.

# Policy Implications

- Prostate Cancer is a growing concern in terms of health care expenditure as well as prescribed methods of screening and treatment.

- More research should be done to estimate the direct costs as well as the indirect costs of prostate cancer.

- More informed policy making regarding prostate cancer thus can be ensured.

# Thank You