State Patterns In Diabetes Screening Service: Comparing 3 Medical Insurance Plans

Stephen Anim-Preko 1,3 , Kathleen Baker 1,3 , Amy Curtis 2,3 , Ben Ofori-Amoah 1 and Rajib Paul 3,4

WMU Department Of Geography1; WMU Interdisciplinary Health Sciences PhD Program2; HDREAM3; WMU Department of Statistics4

Abstract

In the U.S. diabetes has become one of the major health concerns. In like manner, health insurance coverage is vital to the health needs of individuals. Adult having elevated glucose levels are recommended to receive glycated hemoglobin (HbA1c) testing to determine the average blood sugar concentrations. Differences in insurance coverage has significant impact on recommended screenings. The study analyzes secondary data from 2011 to 2013 in three different health plans being Medicaid, Blue Care Network (BCN) and Blue Cross Blue Shield (BCBS) of Michigan. Statistical methods were used to scrutinize the best regressor model for count data and the association between county specific health and socioeconomic factors and insurance plans associated with the HbA1c testing. The study finds the negative Binomial model to be in predicting event count data. Also, urban-rural differences and type of insurance plans are key in understanding patients and frequency of diabetes service utilization. The BCBS plan has more people taking the required HbA1c test compared to the BCN and Medicaid. Across all plans, analysis indicate that interventions should be focused on the southern part of Michigan. Further, health and socioeconomic factors determine the rate and frequency of the HbA1c screening.

Introduction

• 11.7 million people are newly diagnosed with diabetes each year in U.S.5
• Based on current projections, one in three U.S adults will be diagnosed with diabetes by 2050.6
• Diabetes was the seventh leading cause of death in the U.S in 2010 4,6
• Mismatches diabetes could lead to several related issues including blindness, heart disease, stroke, and premature death 3
• People with diabetes have higher medical costs estimated to be 2.5-3 times higher than those without diabetes.1
• More than 1 in 7 healthcare dollars is spent on care for people diagnosed with diabetes.1
• In 2010 the total medical cost associated with diabetes and management for 2012 is estimated to be 235.8 billion dollars with an indirect cost of 46.8 billion dollars.1
• Health insurance has been associated with the quality of care and management of diabetes, including encouraging recommended A1C testing and the type of health insurance.3
• People with diabetes have higher medical costs estimated to be 2.5-3 times higher than those without diabetes.1
• Diabetes in Michigan
• 7.5 percent of the population in Michigan are diagnosed with diabetes each year.4
• Cost: 57.6 billion dollars in direct and 24.9 billion dollars indirect cost to manage diabetes.4
• Diabetes is a primary cause of new cases of adult blindness, kidney failure and non-traumatic lower-limb amputation.4
• Health insurance plans vary across plans and plan costs.6

Objectives

• Identify the best model for predicting secondary health data
• The association between screening rates and socioeconomic factors.
• HbA1c testing rates in Michigan on county level to identify areas with lower testing rates and geographic patterns
• Does HbA1c testing rates vary by insurance type (public vs private)

Methods

Study Design


Population

Cases were analyzed Medicaid, BCN and BCBS was n=427,337

Eligibility:

• 18 years old or older
• Had previous been screened with diabetes
• In the insurance plan for at least 12 consecutive months during the 3 year study period

Measures

• A1C testing at least once per year (yes/no)
• County of residence

Analysis

• Statistical analysis was conducted in R
• Pearson regression
• Negative binomial regression
• Poisson regression

Model selection (using AIC, Young test and Residual Deviance)

• An AIC 10 rule for mapping
• Individual cases were aggregated into county of residence
• Country HbA1c screening rates computed by insurance type

Results

Screening Rates for all three plans

Diabetes is a primary cause of new cases of adult blindness, kidney failure and non-traumatic lower-limb amputation.

Key Similarities Across Insurance Plans

• Less people within each county get the HbA1c testing as education increases.
• Counties with higher physical activity record higher screening rates (more people taking the test)
• Socioeconomic and health factors have similar associations for both BCN and BCBS though the parameter estimates

Residual Analysis

The red areas are locations where the actual values are larger than the model estimated.

The blue areas are locations where the actual values are smaller than the model estimated.

Comparing All Three Plans

• Spatial patterns vary across plans and plan timeframes.
• BCBS has higher number of people as well as recording the highest turnout rates
• Socioeconomic and health factors that influence similar through the parameter estimates vary for BCN and BCBS
• All plans have the southern counties and regions having relatively low turnout rates

Discussion and Conclusions

• Noticeable variations across the counties in Michigan (southern MI)
• Exercising and engaging in any physical activity does not influence a person’s decision to take the required HbA1c testing
• Socioeconomic and health factors are associated with screening rates and patterns
• The patterns for all the plans differ

Strengths

• Data for selected criteria was available for entire years
• Multiple years were examined
• No missing data was identified

Limitations

• Could not examine mortality
• Secondary data
• Differences in population across plans was not examined

References


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