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 2,3,

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. Adults having elevated glucose levels are recommended to receive glycated hemoglobin (HbA1c) testing to determine the average blood sugar concentrations. Deficiencies in insurance coverage has significant impact on recommended screenings. The study analyzed secondary data from 2011 to 2013 of three different health plans being Medicaid, Blue Care Network (BCN) and Blue Cross Blue Shield (BCBS) of Michigan. Statistical methods were used to ascertain the best regression 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 producing count event data. Also, urban-rural interface and type of insurance plan are key in understanding patterns 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 indicates 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

Population

▪ 17.7 million people are newly diagnosed with diabetes each year in U.S.5

▪ Based on current projections, one in three adults will be diagnosed with diabetes by 2050.6

▪ Diabetes was the seventh leading cause of death in the U.S in 2010 4,5

▪ Uncontrolled diabetes could lead to several related issues including blindness, heart disease, stroke, and premature death 5

▪ People with diabetes need more medical costs estimated to be 2-3 times higher than those without diabetes 1

▪ More than 1 in 5 healthcare dollars is spent on care for people diagnosed with diabetes 1

▪ In the U.S the total medical cost associated with diabetes management for 2012 is estimated to be 235.8 billion dollars with an indirect cost of 94.8 billion dollars 1

▪ Health insurance has been associated with the quality of care and management of diabetes, including incorporating recommended A1C testing and the type of health insurance (public vs. private) plays a key role in determining the level of care and management due to the cost burden of diabetes 1

Diabetes in Michigan

▪ 7.5 percent of the population in Michigan are diagnosed with diabetes each year 7

▪ Cost: 5.7 billion dollars in direct cost and 2.43 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 7

▪ Death due to diabetes was 2.2 times higher in MI than in the U.S consistently from 1999 to 2012 7

Objectives

▪ Identify the best model for predicting count secondary health data

▪ The association between screening rates and socioeconomic health 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


▪ Caused were analyzed Medicaid, BCN and BCBS was nx=42,337

▪ Eligibility:

- 18 years or older and diabetes
- 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

- Poisson regression

- Negative binomial regression

- Model selection using AIC, Young test and Residual Deviance

- Residual Analysis

▪ Age/sex 10-n rule for mapping

▪ Individual cases were aggregated into county of residence

▪ County HbA1c screening rates compared by insurance type

Results

Screening Rates for all three plans

▪ Less people within each country get the HbA1c testing as education increases

▪ Counts with higher physical inactivity record higher screening rates (more people taking the test)

▪ Socioeconomic and health factors have similar associations for both BCN and BCBS through 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.

Table 1 showing diabetes death rates per 10,000 populations between Michigan and U.S from 1999 to 2013

Comparing All Three Plans

▪ Spatial pattern vary across plans and plan data.

▪ 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

Discussion and Conclusions

▪ Noticeable variations across the counties of 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 selection criteria was available for entire state

▪ Multiple years were examined

▪ No missing data was identified

Limitations

▪ Could not examine county

▪ Secondary data

▪ Differences in population across plans was not examined

References


Acknowledgements

▪ Pending from Michigan Department of Health and Human Services

▪ Blue Cross Blue Shield of Michigan

▪ Health Data Research and Analysis Mapping Center (HDREAM)

▪ Department of Geography, Western Michigan University