Diabetes and Public Housing

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Clarence Spigner, Chair

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Abstract

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Chair of the Supervisory Committee: Clarence Spigner

Health Services

“Here is my abstract”

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Background and Significance

1.1 Public Housing

1.2 Diabetes

Diabetes is a chronic disease that is characterized by an inability of the body to maintain a healthy blood glucose level, this can cause a variety of symptoms that affect multiple systems in the body and can lead to potentially life-threatening complications. The key regulator hormone of glucose is insulin and it is produced in the pancreas. The absence or malfunction of insulin leads to elevated blood glucose levels called hyperglycemia. When insulin hormone is missing or ineffective the disease is called Diabetes Mellitus,

this condition has multiple types.

1.2.1 Diabetes Variants

The most common diabetes variants include type I diabetes mellitus, type II diabetes mellitus, and gestational diabetes. Type I diabetes is usually caused by genetic factors triggering an autoimmune reaction that results in the destruction of insulin producing cells in the pancreas. Also known as Juvenile Diabetes, the type I classification is typically diagnosed relatively early in life during childhood or early adulthood. Whereas, Type II diabetes develops when the body can still produce insulin however the amount is insuffient or when the body becomes resistant to the effects of insulin. Type II diabetes is largely attributed to lifestyle factors including obesity and physical activity levels. Gestational diabetes is the least common type and occurs during pregnancy.

Diabetes is a serious chronic disease condition without a medical cure. Medical treatment of Diabetes is centered around exogenous insulin replacement or use of medications that stimulate the pancreas to produce endogenous insulin. In the absence of adequate control, diabetes can lead to increased risk of vision loss, heart disease, stroke, kidney failure, nerve damage, amputation of toes, feet, or legs and even premature death; all of which have financial implications.

Many families have been left devastated by some of these complications and are financially indebted because of hospital bills, cost of medications, and time off work. For Type II Diabetics, a big part of their management is lifestyle modification which includes diet control and increased physical activity. This goal of this later method is to promote weight loss and reduce excess fat which in turn reduces insulin resistance and enhances disease control.(Ludwig et al., 2011)

For this reason, One avenure that public health researchers are beginging to explore is the relationship between

several studies have examined the

Few studies have examined th eassociation between

Finding an association between publich housing and diabetes stuatus.

1.3 Problem Definition

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Methods

2.1 Study Setting and Study Design

The current study investigates whether public housing is asociated with risk of diabetes status among King County, WA residents who were enrolled in Medicare and Medicaid. This study uses a descriptive cross-sectional design. The cross-sectional design is appropriate because it allows for an estimate of a dichotomous disease outcome at a particular point in time (???).

The analysis of this study was conducted on a dataset compiled from the King County *Data Across Sectors for Housing and Health (DASHH)* partnership. The findings from the original initial study have previously been reported (Public Health - Seattle & King County, 2018).

2.2 Data Sources

In an effort to reduce fragmented data siloes across different sectors, the DASHH partnership was formed in 2016 between Public Health - Seattle and King County (PHSKC), and two public housing authories, King County Housing Authority (KCHA) and Seattle Housing Authority (SHA). The primary objectives for DASHH were to join health and housing administrative data together to inform and measure future interventions, relating to policy, outreach, and program evaluation that would improve the health of King County residents, as well as to disseminate actionable data with key health and housing stakeholders.

The housing data provided by both KCHA and SHA originated from the US Department of Housing and Urban Development (HUD). This data source contained elements that included demographic information and period of enrollment for families and individuals. Claims and enrollment for Medicaid and Medicare data were from Washington Health Care Authority (HCA) which was provided to PHSKC. Enrollment data contained information on who was recieving Medicaid and Medicare benefits. Claims data provided elements such as diagnosis codes that were used to identify acute events and chronic conditions. All these data sources were linked together by a unique identifier ID.

2.3 Study Population

The study population were participants that were enrolled in either Medicare or Medicaid programs. Further eligibility for study participation included King County, Washington residency and at least 11 months of Medicare or Medicaid coverage in 2017. The overall number of participants derived from the DASHH dataset totaled 585,372.

2.3.1 Exposure Variable

The exposure variable for this study was public housing assistance status. This was extracted from the HUD-50058 form which was provided by the PHAs. The HUD-50058 form provides information on

families that participate in public housing or Section 8 rental subsidy programs [Source]. Housing assitance is separated into 3 main types:

- Housing Choice Vouchers - vouchers provided to recipients to rent units on the private housing market
- Public housing properties and units - subisidized housing managed by PHAs
- Project-based vouchers - subsidized housing units not managed by PHAs

Responses on the HUD-50058 form were combined into a composite public housing binary variable. Study partipants that were not enrolled in any of the listed housing assistance programs were coded as 0 for PHA status. Whereas, those responses that contained any of the 3 types of housing housing assistance was given a 1 for PHA status.

2.3.2 Outcome Variable

The outcome variable for this study was diabetes status.This was defined using the Centers for Medicare and Medicaid Services (CMS) Chonic Conditions Warehouse (CCW) algorithm [Source]. According to the CCW, a participant meets the criteria if they have at least 1 inpatient, skilled nursing facility, home health agency visit or 2 hospital outpatient or carrier claims with diabetes diagnoses codes as outlined by the chronic conditions reference list within the last 2 years[Source]. This definition does not specify diabetes variant but instead accounts for any type diabetes diagnoses. The diabetes status outcome variable was dichotomous, given a 0 or 1. Those that did not meet the CCW alogrithm were coded a 0 and those that met the criteria were coded as 1 for diabetes status.

2.3.3 Potenetial Confounders

Potential confounders were identified based on literature review. This study considers age, race and ethnicity and gender as potential confounding variables. Each of these variables were selected due to the increased baseline risk for partipants to be either in public housing or have diabetes. It is known that

diabetes is an age-related disease, with a higher risk for older populations (Selvin & Parrinello, 2013). Age was presented as a discrete variable for the partipants age in 2017. Similarly, according to CDC data, racial minority groups may be differentially at risk for both type 1 and type 2 diabetes compared to their white counterparts (Divers et al., 2020 & CDC (2020)). Race and ethnicity variable was defined categorically and included: American Indians/Alaska Natives, Asian, Asian Pacific Islander, Black/African American, Latino, Multiple, Native Hawaiian and Pacific Islander, Other, Unknown, and White. Finally, gender was selected because both psychosocial and biological factors are responsible for sex and gender diabetes risk differences (Kautzky-Willer, Harreiter, & Pacini, 2016). Gender was grouped categorically and included: Female, Male, and Multiple.

2.4 Analyses

As is common in epidemiological and health services research, demographic characteristics were presented to describe the population distribition (???). Descriptive analyses were first used to list the count and percentages for each of the demographic categorical variables. (See table 1). The demographics table is arranged by PHA status, this included: KCHA, SHA, combined PHA and non-PHA. Although the discrete variable for age was used in the statistical analyses, age was reported categorically in the descriptive analyses for a simpler layout. Mean and median age were also shown for each category.

For the statistical analyses, logistic regression models were fitted to assess the risk of diabetes status in relation to public housing assistance status. This analysis is appropriate for this study because logistic reregression analyses allows for measuring the association of an effect towards a binomial response variable by combining multiple variables to avoid confounding (???). Two models were used to determine the odds ratios (OR) and corresponding 95% confidence intervals for the association between public housing assistance and diabetes status. These models were the unadjusted model, without any other variables included and the adjusted model including age, race and ethnicity and gender variables. Findings were statistical significant if the estimates did not cross the the confidence intervals and p-values were the <0.05 cutoff. Analyses were conducted using R version 3.6.0.

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Results

Among the study participants, the proportion of people in the PHA group were 10.4% and of that, 5.9% were with KCHA and 4.6% with SHA. The majority, 89.5% did not have any public housing assitance in 2017. Overall, 9.9% were considered to have diabetes and the rest, 90.1% were not considered to have diabetes.

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In the unadjusted model the odds ratio of having diabetes was 1.34 fold greater (95% CI: 1.31-1.38) for those with public housing assistance (table 2).

Table 3.1: Population Demographics

X1	KCHA	SHA	Combined PHA	Non-PHA
Characteristics	N=34,514 (5.9%)	N=27,044 (4.6%)	N=60,919 (10.4%)	N=523,814 (89.5%)
Age				
<5	6.6%	6.1%	6.4%	5.5%
5-9	12.0%	10.2%	11.2%	7.0%
10-17	19.5%	14.9%	17.5%	9.8%
18-29	12.5%	9.9%	11.3%	8.3%
30-49	21.0%	19.3%	20.3%	11.2%
50-64	15.3%	19.9%	17.4%	9.4%
65-74	6.8%	11.5%	8.9%	28.0%
75+	6.1%	7.9%	7.0%	20.6%
Median	39.1 years	29.0 years	34.0 years	62.0 years
Mean	33.3 years	38.7 years	35.7 years	50.0 years
Race and Ethnicity				
American Indian or Alaska Native	0.8%	1.4%	1.0%	0.8%
Asian	5.5%	11.7%	8.3%	6.9%
Asian Pacific Islander	0.1%	0.2%	0.2%	3.5%
Black/African American	36.9%	44.9%	40.2%	7.9%
Latino	3.8%	2.8%	3.4%	6.5%
Multiple	15.5%	10.2%	13.2%	8.0%
Native Hawaiian or Pacific Islander	2.3%	1.9%	2.1%	2.4%
Other	0.0%	0.0%	0.0%	0.8%
White	30.1%	22.3%	26.8%	56.1%
Unknown	5.0%	4.5%	4.8%	6.9%
Gender				
Female	58.6%	53.5%	56.3%	52.4%
Male	40.6%	45.7%	42.9%	47.2%
Multiple	0.8%	0.8%	0.8%	0.4%

Note:
Percentages may not add up to 100 because of missing data

4

By far the easiest way to present tables in your thesis is to store the contents of the table in a CSV or Excel file, then read that file in to your R Markdown document as a data frame. Then you can style the table with the `kable` function, or functions in the kableExtra pacakge.

In addition to the tables that can be automatically generated from a data frame in R that you saw in [R Markdown Basics] using the `kable` function, you can also create tables using *pandoc*. (More information is available at `http://pandoc.org/README.html#tables`.) This might be useful if you don't have values specifically stored in R, but you'd like to display them in table form. Below is an example. Pay careful attention to the alignment in the table and hyphens to create the rows and columns. Generally I don't recommend this approach of typing the table directly into your R Markdown document.

Table 4.1: Correlation of Inheritance Factors for Parents and Child

Factors	Correlation between Parents & Child	Inherited
Education	-0.49	Yes
Socio-Economic Status	0.28	Slight
Income	0.08	No
Family Size	0.18	Slight
Occupational Prestige	0.21	Slight

We can also create a link to the table by doing the following: Table 4.1. If you go back to [Loading and exploring data] and look at the `kable` table, we can create a reference to this max delays table too: Table ??. The addition of the `(\#tab:inher)` option to the end of the table caption allows us to then make a reference to Table `\@ref(tab:label)`. Note that this reference could appear anywhere throughout the document after the table has appeared.

Conclusion

If we don't want Conclusion to have a chapter number next to it, we can add the `{-}` attribute.

More info

And here's some other random info: the first paragraph after a chapter title or section head *shouldn't be* indented, because indents are to tell the reader that you're starting a new paragraph. Since that's obvious after a chapter or section title, proper typesetting doesn't add an indent there.

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```

A

Appendix

Table A.1: Population Demographics

X1	KCHA	SHA	Combined PHA	Non-PHA
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75+	6.1%	7.9%	7.0%	20.6%
Median	39.1 years	29.0 years	34.0 years	62.0 years
Mean	33.3 years	38.7 years	35.7 years	50.0 years
Race and Ethnicity				
American Indian or Alaska Native	0.8%	1.4%	1.0%	0.8%
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Note:
Percentages may not add up to 100 because of missing data

Colophon

This document is set in EB Garamond, Source Code Pro and Lato. The body text is set at 11pt with *EBGaramond*(3).

It was written in R Markdown and *LaTeX*, and rendered into PDF using huskydown and bookdown.

This document was typeset using the XeTeX typesetting system, and the University of Washington Thesis class class created by Jim Fox. Under the hood, the University of Washington Thesis LaTeX template is used to ensure that documents conform precisely to submission standards. Other elements of the document formatting source code have been taken from the Latex, Knitr, and RMarkdown templates for UC Berkeley's graduate thesis, and Dissertate: a LaTeX dissertation template to support the production and typesetting of a PhD dissertation at Harvard, Princeton, and NYU

The source files for this thesis, along with all the data files, have been organised into an R package, xxx, which is available at `https://github.com/xxx/xxx`. A hard copy of the thesis can be found in the University of Washington library.

This version of the thesis was generated on 2020-05-21 16:04:41. The repository is currently at this commit:

The computational environment that was used to generate this version is as follows:

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