Forecasting Cataract Prevalence in the United States Based on Race: A Data-driven Analysis for 2030, 2040, and 2050

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Abstract

The number of people diagnosed with cataracts in the United States is increasing each year. Utilizing data-driven analysis, the study will examine existing cataract statistics and demographic data from previous years to develop reliable projections. The research will employ advanced statistical modeling and forecasting techniques to provide insights into the potential burden of cataracts on specific races in the coming decades. This research seeks to provide valuable insights into the patterns of cataract prevalence in multiple races and identify potential risk factors.

1. Introduction

Cataracts, a common age-related ocular condition, have been on the rise in the United States, with the national prevalence rate increasing by over 2% from 2014 to 2019. In those 6 years, cataract prevalence in Asians has increased from 30.40% to 32.93% and from 23.50% to 25.91% in the non- Hispanic Black population. Similarly, the cataract prevalence increased by 1.49% in the Hispanic population in America. Following an identical trend, there was an increase from 33.70% cataract prevalence to 35.87% in the non-Hispanic White population.[1]

Cataracts are characterized by the clouding of the eye's lens which causes visual impairment and often leads to blindness if left untreated. Cataracts can significantly impact daily activities such as reading, driving, and recognizing faces. By removing cataracts, individuals can regain their ability to perform these activities and enhance their overall quality of life. One of the pioneering studies in this field was conducted by the Eye Diseases Prevalence Research Group in 2004. This study aimed to determine the prevalence of cataract in the United States and projected changes in prevalence figures up to the year 2020. By analyzing data from major population-based studies conducted in the United States, Australia, Barbados, and Western Europe, the researchers provided summary prevalence estimates for cataract, stratified by race/ethnicity, age, and gender.

The findings revealed an anticipated increase in cataract cases over the 20- year period. Cataracts were identified as the leading cause of vision loss in the United States, emphasizing the need for a better understanding of the prevalence rates among different racial groups. Notably, significant disparities in cataract prevalence were observed between various racial groups, with women exhibiting higher age-adjusted prevalence than men in the United States.

Looking ahead, the study projected a substantial rise in the total number of Americans affected by cataracts by the year 2020, signifying a 50% increase over two decades. This projection highlights the importance of continued research and interventions to address the growing burden of cataracts on public health.[2]

To further explore the prevalence of cataracts within specific racial and ethnic communities, subsequent studies have investigated their prevalence in targeted populations. For instance, the Los Angeles Latino Eye Study (LELAS) conducted in 2009 focused on the prevalence of cataracts within the Latino population residing in Los Angeles. The study revealed a cataract prevalence rate of 5.6% among participants of Hispanic descent aged 40 years and older. While this percentage may appear modest, given the estimated population size of elderly Latinos in the United States, the absolute number of individuals affected by cataracts remains substantial.

Additionally, research has been conducted to examine racial disparities in the prevalence of cataracts and access to necessary surgical interventions. A study conducted in Florida using data from the National Institute of Eye Health and the Healthcare Cost and Utilization Project revealed notable differences in cataract prevalence between white and African-American populations. White individuals exhibited a higher prevalence of cataracts, indicating potential disparities in the occurrence of this ocular condition among different racial groups.[3]

While previous studies have examined cataract prevalence and its associated risk factors, few have employed data science techniques to predict the cataract prevalence. Forecast predictions are essential because they provide estimates of future values based on historical data and patterns. From the data provided by Vision and Eye Health Surveillance System (VEHSS) from Centers for Disease Control and Prevention (CDC) which "represent[s] the primary surveillance measures of cumulative

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[1]CDC. "Vision and Eye Health Surveillance System (VEHSS)." Centers for Disease Control and Prevention, Centers for Disease Control and Prevention

[2]The Eye Diseases Prevalence Research Group*. "Prevalence of Cataract and Pseudophakia/Aphakia among Adults in the United States." Archives of Ophthalmology, JAMA Network

[3]Richter, Grace M, et al. "Prevalence of Visually Significant Cataract and Factors Associated with Unmet Need for Cataract Surgery: Los Angeles Latino Eye Study." Ophthalmology, U.S. National Library of Medicine