

**Deloitte.**



**HealthPrism™**

**Dashboard Methodology**

Opioid Use Disorder



# HealthPrism™ reveals unique and compelling insights on your population.

## About

HealthPrism™ is one of the largest social drivers of health datasets with data on 335M people in the US, leveraging 1,700+ social drivers of health (SDoH) data variables on all adults and 8+ years of data history to identify populations at high-risk for pervasive health conditions and inequities.

HealthPrism supports longitudinal and point-in-time analyses that can inform optimal deployment of public health interventions.

HealthPrism's volume of data and breadth of predictive models enable the tool to automatically identify populations that are most susceptible to health inequities, at high risk for chronic conditions (e.g., diabetes, cardiovascular disease), or particularly vulnerable to infectious disease (e.g., COVID-19, influenza). HealthPrism is pre-loaded with a wealth of SDoH data including 20+ predictive models for the most pressing public health challenges.

## Our Difference

HealthPrism's SDoH data gives insight into the conditions where people live, learn, work, and play that affect a wide range of health risks and outcomes. Long-standing inequities influence many health and quality-of-life risks and outcomes. HealthPrism can examine these health and social inequities and can help us better understand how to promote health equity and improve health outcomes.

HealthPrism mobilizes one of the largest, multi-faceted SDoH datasets in the country to help our clients deploy strategies designed to improve outcomes and access to social services and resources in vulnerable populations. Through this data, HealthPrism identifies opportunities to achieve optimal outcomes that can be experienced by populations that have been disadvantaged by their social or economic status, geographic location, and environment.

## Predictive Modeling Methodology

The HealthPrism data solution comprises a collection of numerous individual- and household-level characteristics spread across socioeconomic, climate, environment, demographic, behavioral, and lifestyle attributes. These data points are used to train and build machine learning models that predict the probability of risk for a variety of vulnerabilities including chronic health conditions such as type 2 diabetes; behavioral health conditions such as opioid misuse; and economic vulnerabilities such as unemployment or food insecurity, etc.

Where traditional risk modeling techniques rely primarily on an individual's clinical or electronic health records and demographic data to model health risk, and financial or credit activity data to model economic risk, we take a comprehensive view of an individual across a variety of lenses including access to health care, language spoken, health literacy, food insecurity, transportation insecurity etc. Such an approach allows us to build models that capture the complex inter-relationship between the myriad factors correlated with adverse outcomes, especially for marginalized populations.

We leverage the power of semi-supervised machine learning (ML) methods to train explainable predictive models. Demographic, behavioral, economic, geographic, and other variables corresponding to each individual were used to build models to predict the probability of an individual to be at risk of a specific condition such as opioid misuse or uninsurance etc. Modeling datasets are generated that represent the US population with respect to protected groups, including age, race, and gender. We extend the bias checks further to include representation across income groups and the urban-rural continuum as defined by USDA[1]. Each feature input into the model is examined for its distribution with respect to age, race, gender, income, and the urban-rural continuum to ensure that they do not act as a proxy for any of those variables.

## Dashboard Indicators

### Filtered Adult Population

The HealthPrism opioid use disorder (also referred to as opioid misuse) dashboard displays the total US adult population above 18 years of age, which satisfies the selected risk indicators and social drivers. The dashboard visualizes the rate of the filtered adult population per 100,000 adults within a county or state. When the rate falls under 100, the data on the dashboard is obfuscated to protect the identity of certain groups.

### Dashboard Models

The HealthPrism opioid use disorder dashboard employs multiple advanced models to predict the risk of various health, behavioral, and economic conditions across the United States. These models are utilized in the dashboards to filter and analyze data to better understand opioid use disorder across different US population segments. This section briefly describes the HealthPrism models available within the dashboard.

## **Opioid Misuse Risk Model**

Opioid misuse or opioid use disorder is the chronic use of opioids that causes clinically significant distress or impairment. The HealthPrism opioid misuse model predicts the probability of an individual to have opioid misuse or opioid use disorder. Medical claims data containing individual level disease diagnosis for opioid misuse was used for model training.

## **Depression Risk Model**

Depression is part of a collection of mood affective disorders that affects nearly 1 in 5 adults in the USA[2]. The HealthPrism depression model predicts the probability of an individual to have the risk of having a depressive condition or mood disorder. Medical claims data containing individual level diagnosis for any mood affective disorder was used for model training.

## **Uninsurance Risk Model**

The HealthPrism uninsured model predicts the probability of being uninsured for individuals below retirement age (65+) using socio-economic, demographic, behavioral and other characteristics. Individuals labeled at being at high risk of being uninsured were used to train a model to predict the risk of being uninsured.

## **Unemployment Risk Model**

The HealthPrism unemployment model predicts the probability of being employed for individuals in HealthPrism using socio-economic, demographic, behavioral and other characteristics. Survey data of self-reported occupation at the individual level was used to train a model to predict the risk of being unemployed.

## **Race and Ethnicity Model**

HealthPrism contains self-reported race data for nearly 70 million adults in the US. For the remaining individuals whose race is unknown, a multi-class classification model that predicts a person's race is trained using the self-reported race and ethnicity data. The model is trained using first and last names, geographical information, household characteristics, and socioeconomic fields to predict a person's race.

## **Gross Income as % of 100% Federal Poverty Level**

Federal Poverty Level (FPL) is a measure of income used to determine eligibility for certain programs and benefits (e.g. Medicaid)[3]. HealthPrism contains estimates of household level income in the form of income bins which is converted into continuous income using a predictive model. The

household income is combined with household composition as specified by Federal Poverty guidelines[4] to calculate FPL for a given household.

## Contact

For more information, contact our support team at [HealthPrismContact@deloitte.com](mailto:HealthPrismContact@deloitte.com)

## References

[1] <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/>

[2] <https://www.nimh.nih.gov/health/statistics/any-mood-disorder>

[3] <https://www.healthcare.gov/glossary/federal-poverty-level-fpl/>

[4] <https://aspe.hhs.gov/topics/poverty-economic-mobility/poverty-guidelines>