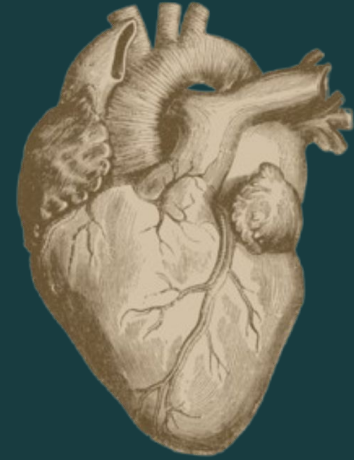


Team CardioPALS



9 Out of 10 Cases Preventable:

AI-Driven Solutions for **Rhode Island's Number One Killer**

Prepared by: Hrishikesh (Rishi) and Rushil

Why does it Matter?

- According to RI Health Department there were **217 deaths per 100,000 in 2022**

Literature shows that Cardiovascular Diseases affect **underserved communities disproportionately**

Median income:
~\$43K-\$47K

Poverty rate:
~11-12%

White (non-Hispanic): ~66-68%
Hispanic / Latino: ~18-19%
Black / African American: ~5-6%
Asian: ~3-4%
Multiracial / other: ~4-5%



WE DUG DEEPER

WE EXPLORED RISK FACTORS of CVDs

High cholesterol
Obesity/BMI
Hypertension
Diabetes
Smoking
Alcohol
Stress
Age, gender, race,
ethnicity, income,
county

Tobacco smoking and risk of 36 cardiovascular disease subtypes: fatal and non-fatal outcomes in a large prospective Australian study

[Emily Banks](#)^{1,2,8}, [Grace Joshy](#)¹, [Rosemary J Korda](#)¹, [Bill Stavreski](#)³, [Kay Soga](#)¹, [Sam Egger](#)⁴, [Cathy Day](#)¹, [Naomi E Clarke](#)¹, [Sarah Lewington](#)^{5,6}, [Alan D Lopez](#)⁷

The association between BMI and mortality: implications for obesity prevention

[Deirdre K Tobias](#)^{a,c} · [Frank B Hu](#)^{b,c,d} 

Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19·1 million participants

[NCD Risk Factor Collaboration \(NCD-RisC\)](#)[†]

Elevated stress hormones linked to higher risk of high blood pressure and heart events

Elevated LDL cholesterol and increased risk of myocardial infarction and atherosclerotic cardiovascular disease in individuals aged 70–100 years: a contemporary primary prevention cohort

[Martin Bødtker Mortensen](#), PhD^{a,b,c} · [Prof Børge Grønne Nordestgaard](#), MD ^{b,c} 

[Affiliations & Notes](#)  [Article Info](#)  [Linked Articles \(1\)](#) 

Clinical (7)

1. Systolic BP
2. Diastolic BP
3. Total Cholesterol
4. HDL Cholesterol
5. BMI
6. Blood Glucose
7. HbA1c

Next: Data

Behavioral (3)

8. Smoking Status
9. Alcohol Use
10. Stress Level

We extracted **features** supported by the Literature

Demographic (5)

11. Age
12. Gender
13. Race
14. Ethnicity
15. Income

Geographic (1)

16. County

16 Features (Risk Factors)

CardioPALS: A Three-Layer AI Framework

PREDICT

- **We answered “Who is at risk before CVD develops?”**
- XGBoost and Logistic Regression model trained on 16 features
- We compared both and selected the best performing model

PREVENT

- **We answered “What interventions does each high-risk patient need?”**
- SHAP values identify personal top risk drivers
- Personalized recommendations mapped to evidence-based interventions

WHAT WE FOUND

Model Performance:

- Logistic Regression AUC: 0.90
- XGBoost AUC: 0.95
- Accuracy: 88%

Risk Identification:

- 19,201 high-risk patients flagged out of 69,624
- Top risk drivers: **Age, Diastolic BP, HbA1c, BMI (from SHAP)**

Racial Disparities:

- Black patients: 38.9% CVD prevalence (highest of all groups)
- Black patients flagged High Risk: 31.2% vs 27.4% white patients

County Disparities:

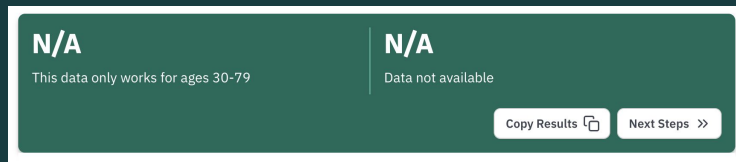
- Bristol County: 37% CVD prevalence (highest in RI)
- Providence County: 32.2% (Lowest RI)

Here
Is
Our
Demo!

https://drive.google.com/file/d/19C-110UPp3wR8TuPhnXszR/tVBWhElny/view?usp=drive_link

Gold standards

Framingham Risk Score

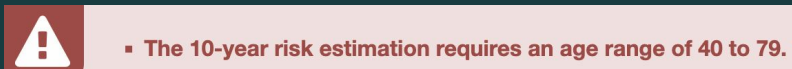


N/A
This data only works for ages 30-79

N/A
Data not available

Copy Results  Next Steps >>

Pooled Cohort Equation



- Age, sex, total cholesterol, HDL cholesterol, systolic BP, BP treatment status, smoking status, diabetes
- Pooled Cohort Equation considers race but limited to black vs white
- Uses Traditional Regression (linearity) and misses the complexities of risk factors
- No Behavioral factor/limited behavioral factor

Why CardioPALS?

- 16 Variables
- Machine Learning Model such as XGBoost looks at the complexities in the data
- Multiracial and Uses Large dataset (278,000 patients and validated on 69,000)
- Attains both internal and and has potential for external validity
- Our findings are clinically coherent and relevant

Marketability, Sustainability & Access

9

- **Providers:** Primary care physicians, cardiologists screenings, nurse practitioners during routine screenings
- **Community health centers:** Clínica Esperanza, Rhode Island Free Clinic (mediated by spanish interpreters), Progreso Latino, the 12 community health centers to serve uninsured population
- **Insurance Companies:** Identify high risk members, prevent Reactive/Curative care by focusing on preventive care. They could encourage users to enroll in rewards program such as wellness reimbursement
- **Federal/State:** American Heart Association and HHS committed 121 Million dollars nationally to fight cardiovascular disparities, RIDOH state funding, CDC Prevention Grants, Possibility* of CDC WiseWoman grant/NIH Health Equity grants

"We meet users where they are"

Community Relevance



- Culture of Biometrics Tracking (Apple watches, Oura ring, FitBit)
- We are Brown University and our mission is Social Transformation, and we can expand this tool across Rhode Island to tackle health disparities
- We plan to collaborate with Promotores de salud (the trusted bilingual community members), and work in communities.
- We can use this tool minimally without clinicians as well
- We plan on building ethical business model, so we will run community intervention without any cost, go to schools and mobilize students in this change



Thank You