



Capstone: ACEs

Eboni Lee

Outline



Problem
Statements



Background Info



Results & Best
Models



Website Demo



Conclusions &
Recommendations

- ▶ Can Adverse Childhood Experiences (ACEs) be used to predict future behavior and outcomes?
 - ▶ How well can it predict someone's use of smokeless tobacco products?
 - ▶ How well can it predict someone's activity limitations due to health problems?
 - ▶ How well can it be used to predict whether someone is in good or poor health?
 - ▶ How well can it be used to predict someone's smoker status?
 - ▶ Can factors other than ACE influence the precision of the models?

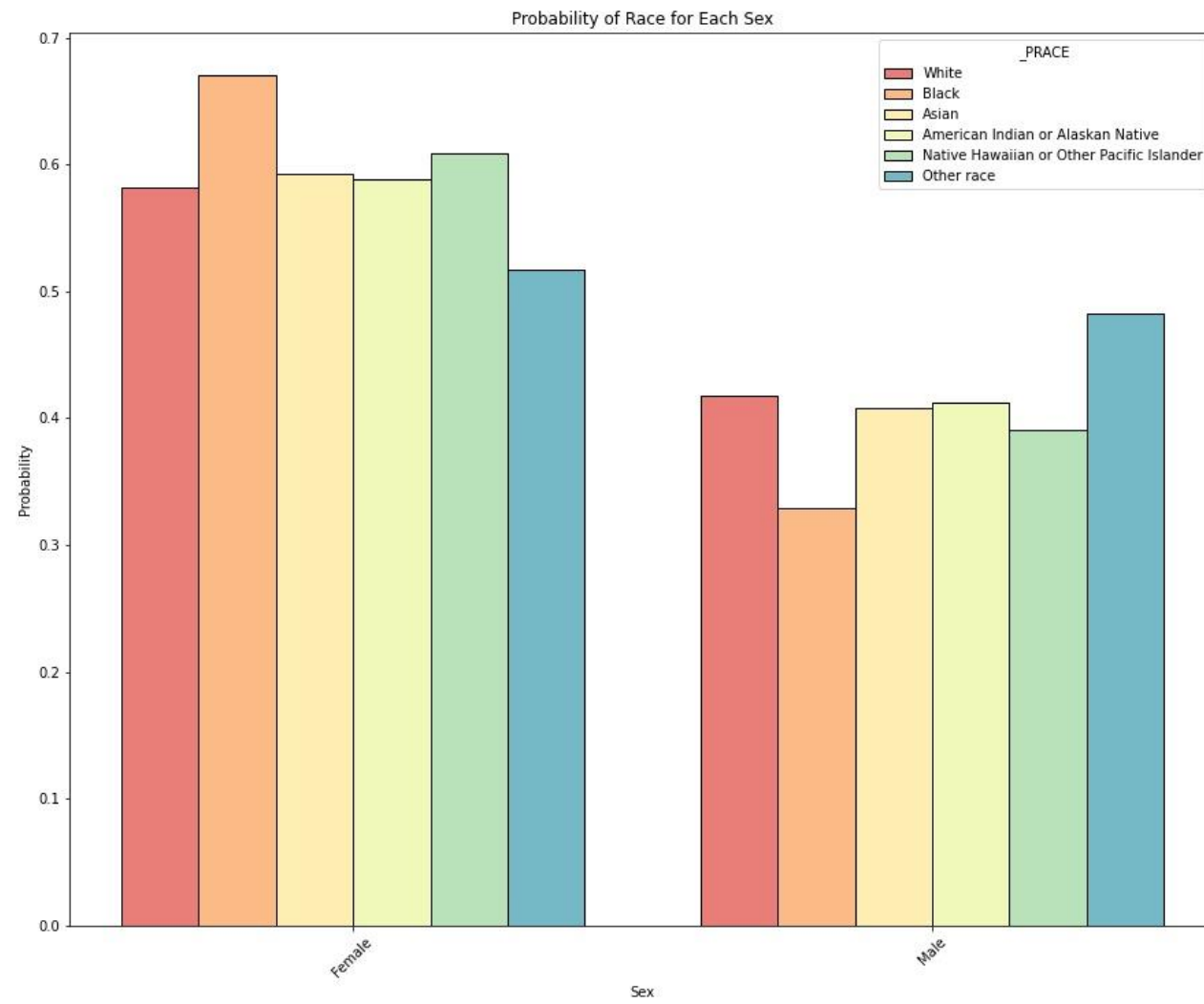
Problems Statements

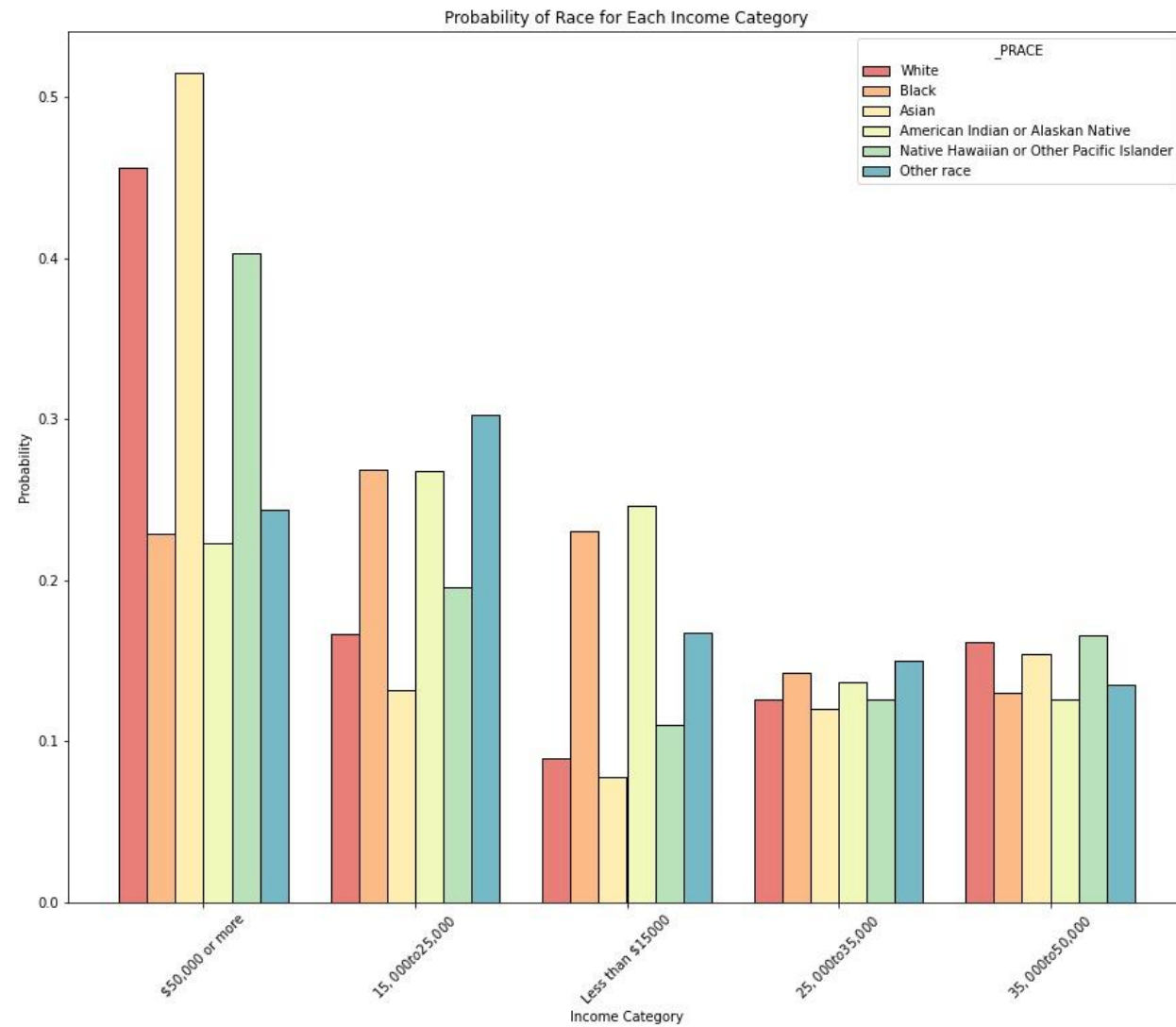
What are ACEs?

- ▶ “traumatic events occurring before the age of 18”
 - ▶ Abuse
 - ▶ Household Challenges
 - ▶ Neglect
- ▶ CDC-Kaiser ACE Study
- ▶ What are the impacts of ACEs?
- ▶ Is it preventable?

Demographics

- ▶ 117, 555 respondents
- ▶ 2009 - 2012
- ▶ 60% female
- ▶ 84% White
- ▶ 14 states

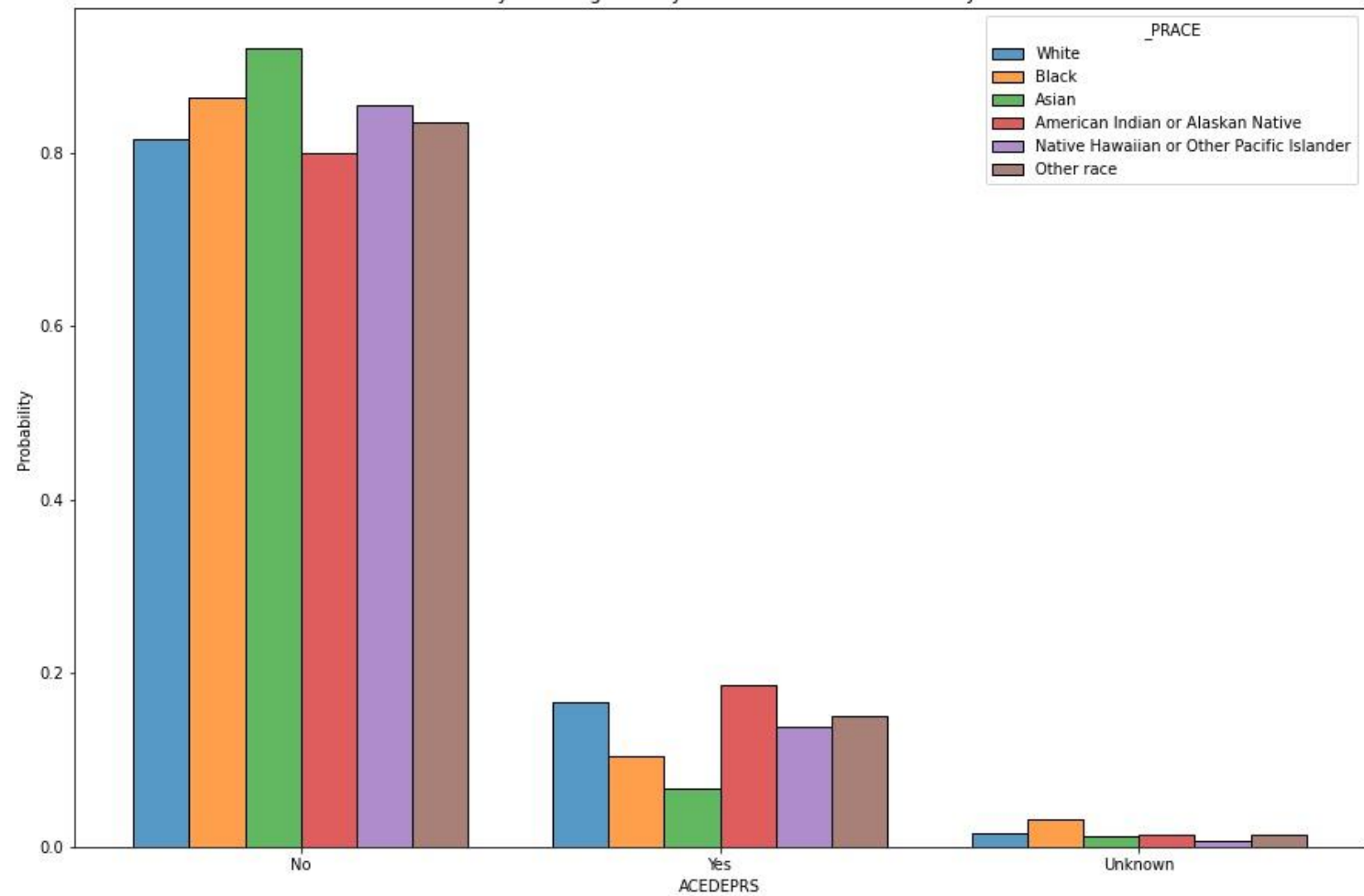


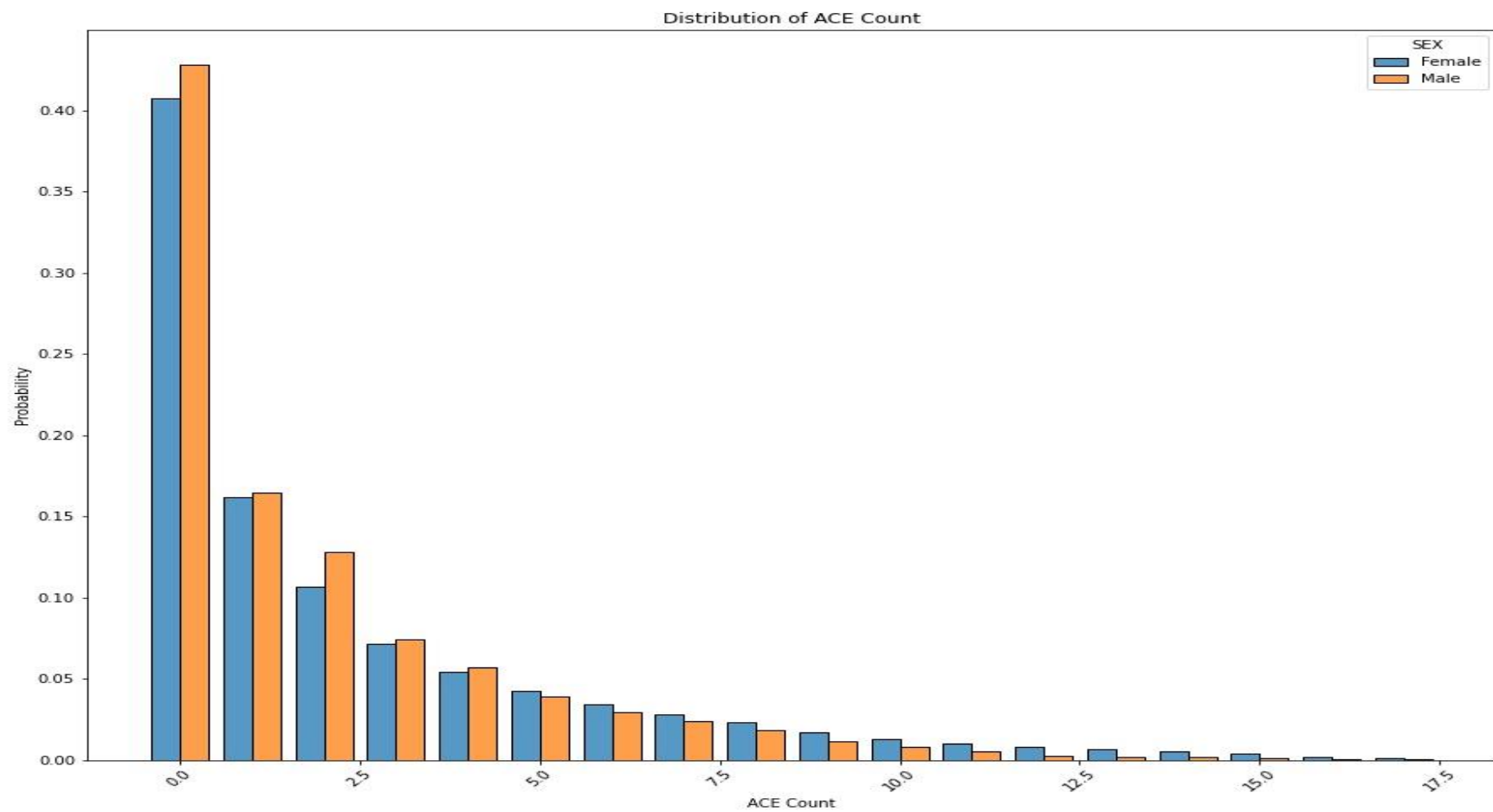


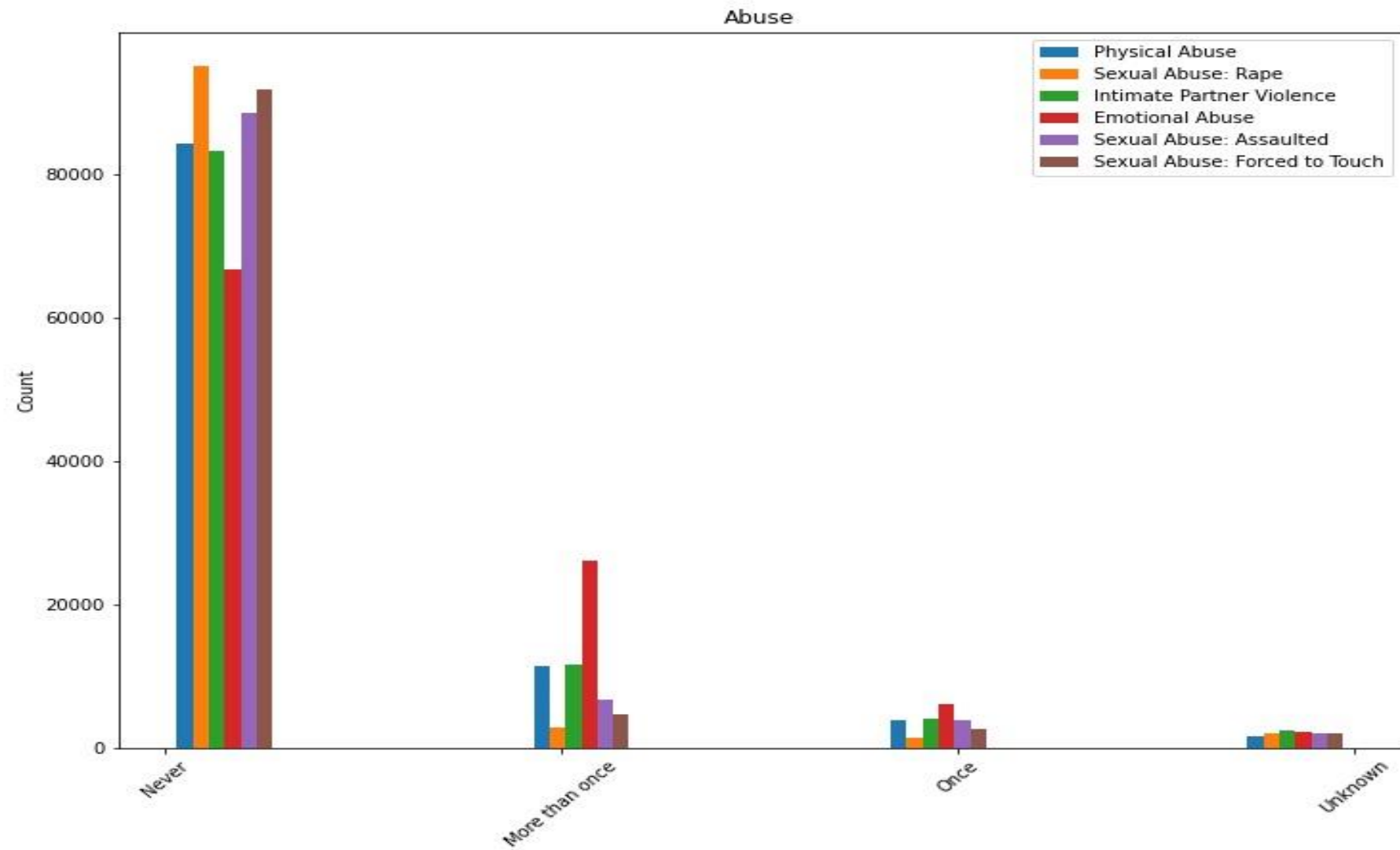
ACE Prevalence

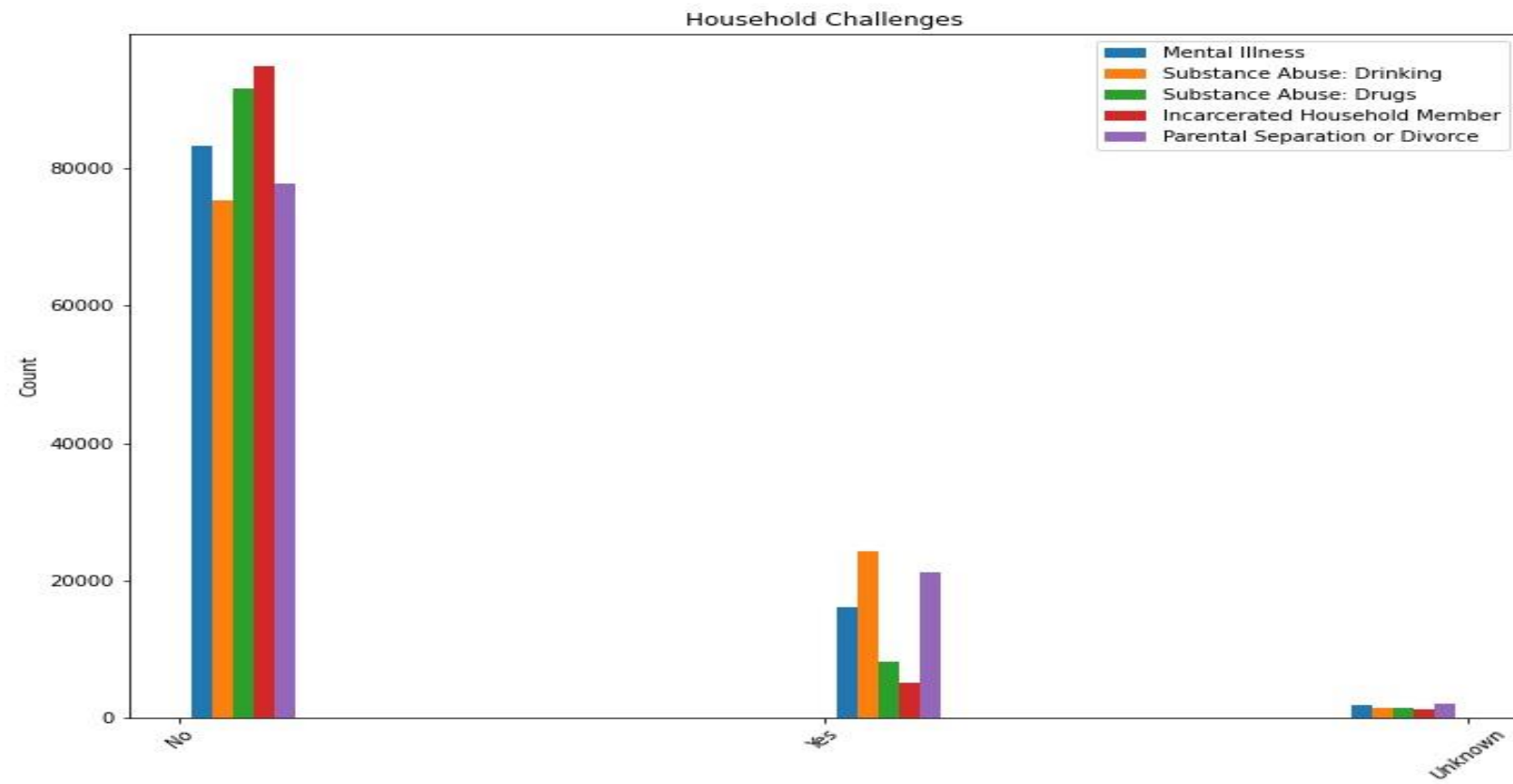
ACE	STATE	RACE	SEX	Education	Income
Mental Illness	Washington	Native American	F	Graduated college or tech school	Less than \$15000
Substance Abuse: Alcohol	Nevada	Native American	F	Didn't graduate high school	Less than \$15000
Substance Abuse: Drugs	Nevada	Native Hawaiian/ Pacific Islander	M	Didn't graduate high school	Less than \$15000
Incarcerated Family Member	North Carolina	Native American	M	Didn't graduate high school	Less than \$15000
Parental Separation or Divorce	Nevada	Black	F	Didn't graduate high school	Less than \$15000
Intimate Partner Violence	Nevada	Native American	F	Didn't graduate high school	Less than \$15000
Physical Abuse	Nevada	Native American	M	Didn't graduate high school	Less than \$15000
Emotional Abuse	Nevada	Native American	M	Attended college or tech school	Less than \$15000
Sexual Abuse: Touched sexually	Washington	Native American	F	Attended college or tech school	Less than \$15000
Sexual Abuse: Forced to touch someone sexually	Washington	Native American	F	Attended college or tech school	Less than \$15000
Sexual Abuse: Forced to have sex	Nevada	Native American	F	Didn't graduate high school	Less than \$15000

Probability of having a family member with mental illness by Race









Tobacco Products	Limited Activities	Overall Health	Smoker Status
25%	33%	33%	20%

Baseline Accuracy

Features	y	Best Model Type	Testing Accuracy	Precision	Overfit or Underfit?
ACEs only	Tobacco products	RFC	61%	62%	Neither
	Limited Activities	ETC	58%	59%	Neither
	Overall Health	ETC	53%	55%	Neither
	Smoker Status	RFC	39%	41%	Neither
ACEs count only	Tobacco products	Logistic Regression	37%	37%	Neither
	Limited Activities	Logistic Regression	40%	40%	Neither
	Overall Health	Logistic Regression	36%	37%	Neither
	Smoker Status	Logistic Regression	26%	26%	Neither

ACEs Best Models

Logistic Regression Coefficient Interpretation

- ▶ Smokeless Tobacco Products
 - ▶ Some days, every day, not at all
- ▶ Activity Limitations
 - ▶ Yes
- ▶ Self-reported health
 - ▶ Fair or poor
- ▶ Smoker Status
 - ▶ Every day, some days, former

Feature Importance

- ▶ No family members in prison
 - ▶ 3 out of 4
- ▶ Never touched inappropriately
- ▶ No intimate partner violence
 - ▶ 3 out of 4

Features	y	Best Model Type	Testing Accuracy	Precision	Overfit or Underfit?
All features (incl. ACEs)	Tobacco products	RFC	99%	99%	Neither
	Limited Activities	XG Boost	87%	88%	Neither
	Overall Health	ETC	93%	96%	Neither
	Smoker Status	RFC	73%	82%	Overfitting
All features (incl. ACEs count only)	Tobacco products	RFC	99%	99%	Neither
	Limited Activities	ETC	88%	92%	Neither
	Overall Health	RFC	93%	95%	Neither
	Smoker Status	RFC	71%	80%	Overfitting

All Features Best Models

Feature Importance w/ no ACE count

- ▶ Being female
 - ▶ 3 out of 4
- ▶ Tennessee
 - ▶ 3 out of 4
- ▶ Employed for Wages
 - ▶ 3 out of 4
- ▶ Smokeless Tobacco Usage
 - ▶ Not having/ never experiencing 8 ACEs

Features Importance w/ an ACE count

- ▶ ACE count
- ▶ Being female
- ▶ Tennessee
 - ▶ 3 out of 4
- ▶ # of days physical and mental health not good
 - ▶ 3 out of 4
- ▶ Being a homeowner



Website Demo

Conclusions/ Recommendations

- ▶ Women are not being protected
- ▶ Location matters
- ▶ # of ACEs is important
- ▶ Awareness is KEY!