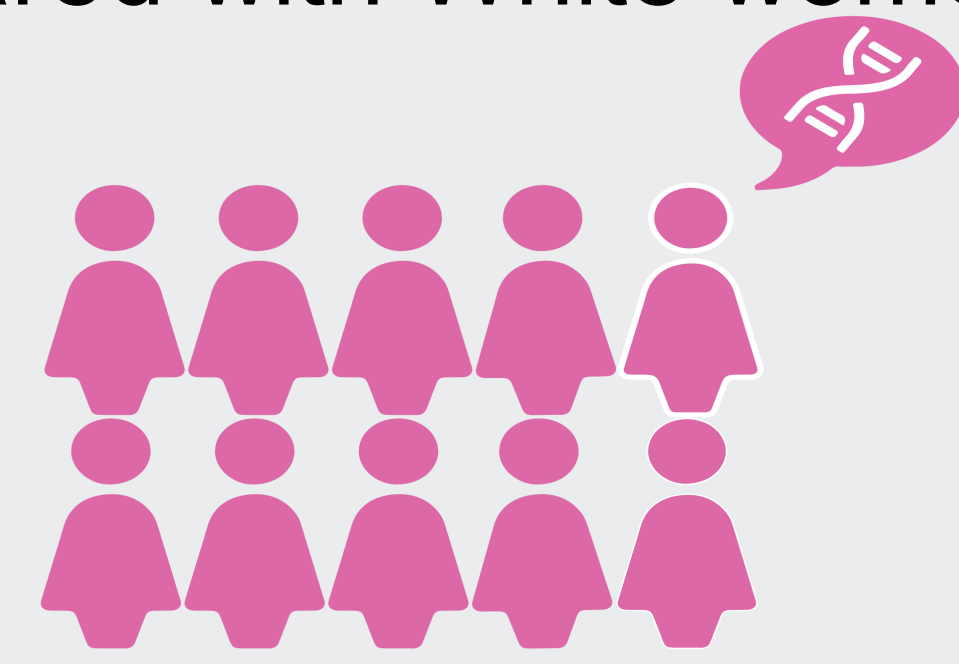


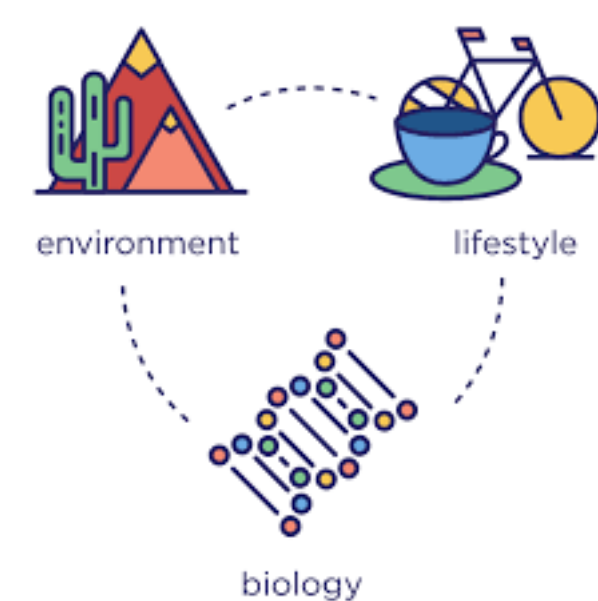
Background

- Breast cancer is the **second** leading cause of death among U.S. women.
- Approximately **1 out of 8** women will get it during their lifetime.
- Black women had a **30% to 60%** higher likelihood of being diagnosed with advanced-stage breast cancer compared with White women.



1 in 10 breast cancer case is caused by genetic variation

Objectives

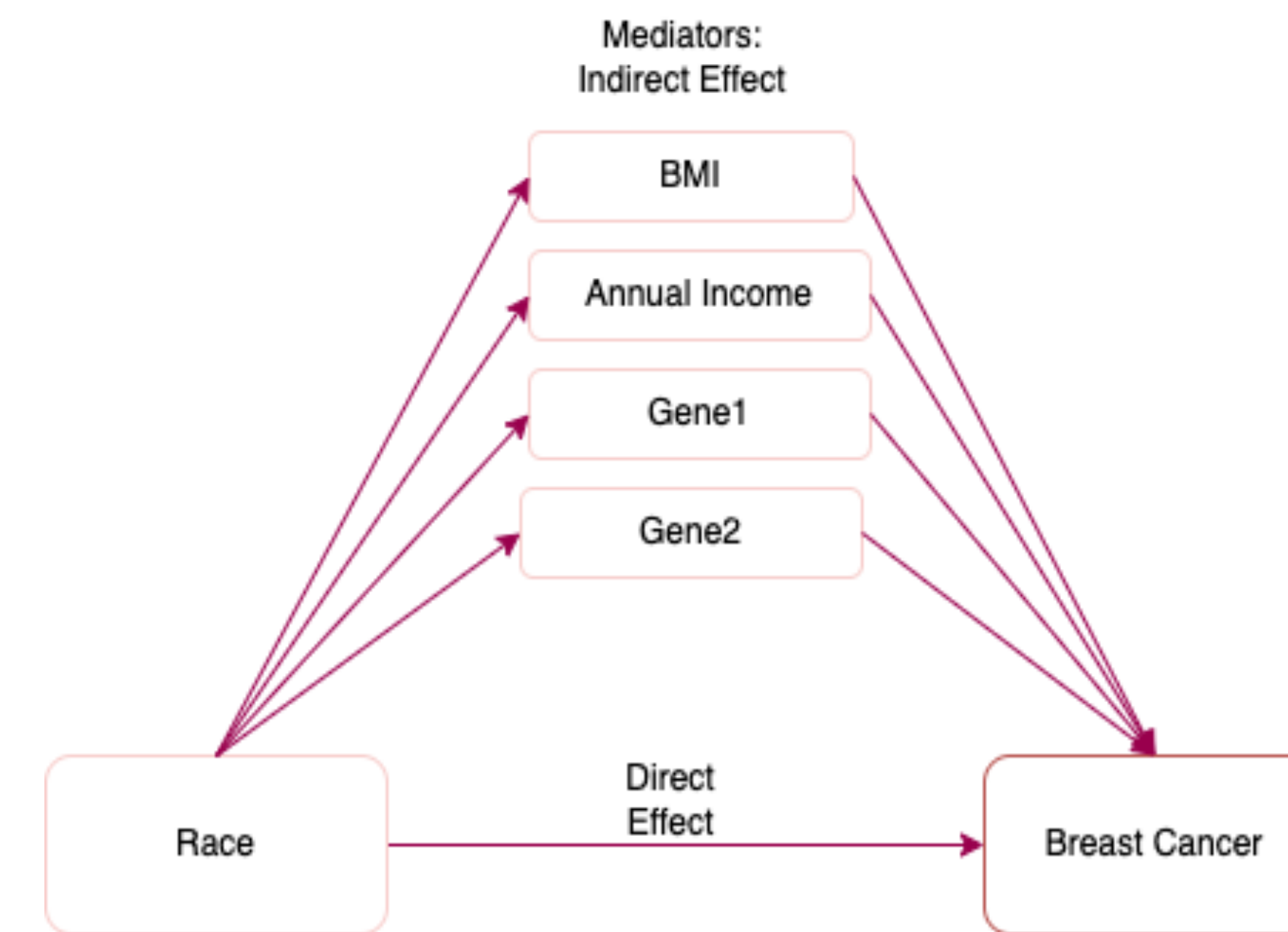


- Identify mechanisms that underlie racial disparities in cancer progression among breast cancer patients, considering both environmental and individual risk factors.
- Identify genes that work as mediators to explain racial disparities among breast cancer patients.

Methodology

- The **All of US (AoU)** database which combines electronic health records (EHR), survey, social economic environmental and genomic data is used.
- A total of **7385** adult female breast cancer patients were included in the dataset.
- Variables: BMI, Annual Income, Homeowner, 100_Cigs_in_lifetime, Employment Status, Education level, General health, General Quality, Mental Health, Marital Status, drug use, Social Satisfaction.
- The **multiple mediation analysis** is used to find the mediators and effect size.

Mediation Diagram

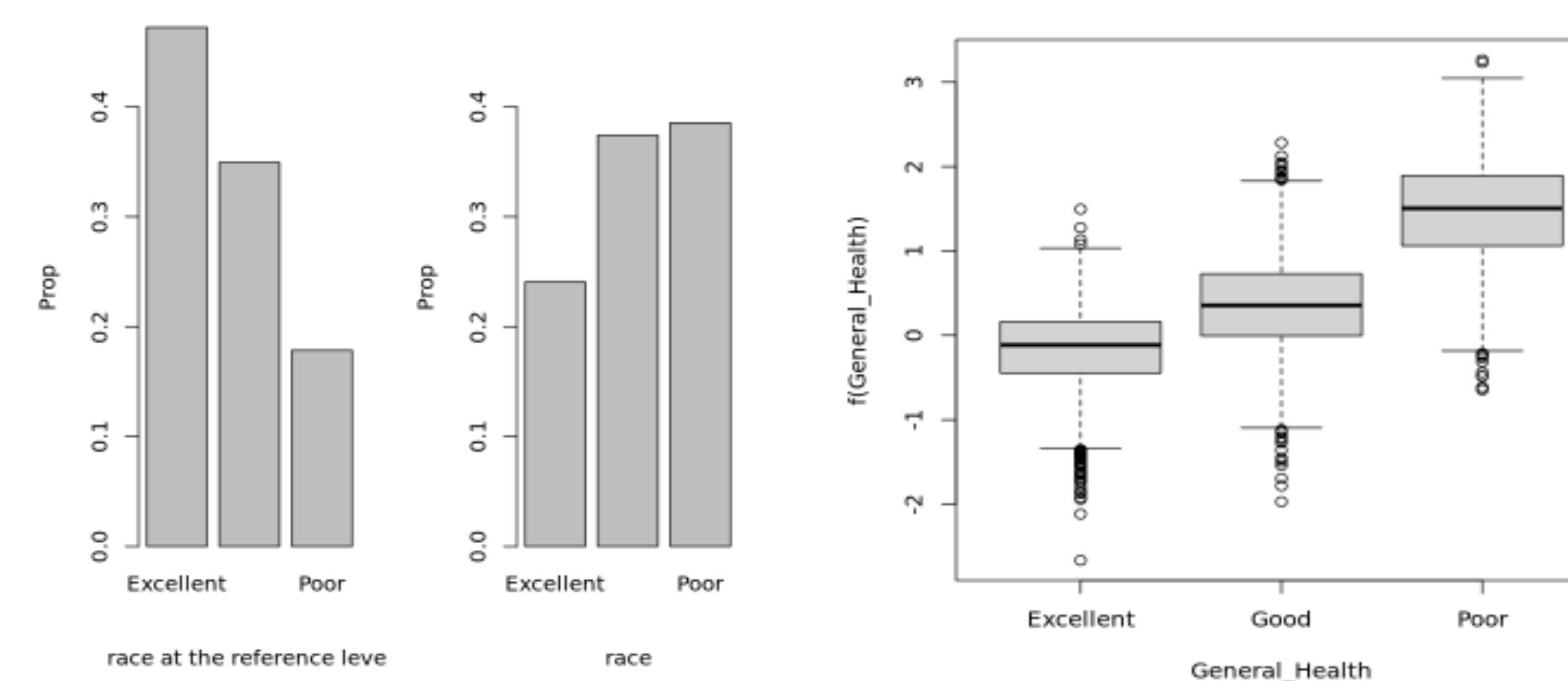


Results

	N	Chi-sq	P-value
Race	7385	4.3	0.04

* Log-Rank Test for Survival between White and Black patients with breast cancer

Factors	Indirect Effect	CI	P-value
General Health	0.894	(0.42, 2.05)	0.009



Conclusions

- This study shows that the underlying status of general health-related variables and specific gene mutations contribute towards the racial disparity in breast cancer outcomes.
- The significant genes can help in early detection, risk assessment, and prediction of disease outcomes.
- Targeted therapies aimed to selectively inhibit or modulate the activity of these specific genes or proteins involved in cancer growth and survival.

Genomic Results

Genes	Indirect Effect	CI	P-value
NFIA	0.057	(0.001 , 0.171)	0.049
PADI2	0.046	(0.007 , 0.188)	0.020
AC007620.2	0.091	(0.007 , 0.254)	0.038
SEMA5B	0.094	(0.000 , 0.181)	0.048
LFNG	0.136	(0.032 , 0.292)	0.008
IKBKB	-0.079	(-0.139 , -0.022)	0.002
AL136084.2	0.092	(0.013 , 0.289)	0.030

Recommendations

- Improving the general physical health, mental health, social satisfaction, general health among black women can help bridge the gap.
- Developing drugs that specifically target these molecular pathways, can lead to more effective and less toxic treatments.

References

- Q.Yu and B.Li. mma: An r package for multiple mediation analysis. Journal of Open Research Software, 5:11,2017.
- Q.Yu and B.Li. mmabig: Multiple Mediation Analysis for Big Data Sets. CRAN, 2018.