County-Level Trends and Potential Disparities in the Suicide Rates in Virginia

Presenters:
  Sharon Olowoyo, Glodi Bokanya, Coralie Mugenga, Gideon Olowoyo, Nikito Gurung

Faculty Sponsor:
  Dr. Linnaya Graf

Outline

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  - Background
  - Research Question
  - Aim of the study
- Methods
- Results and Interpretation
- Recommendations
- Conclusion
  - Future goals and research
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INTRODUCTION

Background

- Suicide is one of the leading causes of death in the United States and a significant public health problem in Virginia.

- According to the Centers for Disease Control and Prevention (CDC), Virginia had a suicide rate of 13.44 per 100,000 in 2020, which is close to the national average of 13.48 per 100,000.[1]

Fig. 1 Suicide Data: Virginia from: American Foundation for Suicide Prevention. "Pictured is a factsheet on Virginia Suicide Data.", n.d., https://afsp.org/facts/virginia Accessed March 20, 2023, Creative Commons BY-SA 2.o.

Research Question

- What social determinants of health contribute to suicide rate disparities among Virginia counties?

Aim of the Study

- To identify potential factors associated with the observed disparities in suicide rates across different counties in Virginia

METHODS

Methods

- Secondary Data Analysis
  - Data were collected from County Health Rankings and the CDC databases
  - Databases only contained data from 2020 - 2022
- Variables:
  - Suicide Rate (Age-Adjusted)
  - Social determinants of health: race, median household income, high school graduation rate, mental health provider rate, and geolocation (rural, suburban, and urban)
- Data were analyzed using IBM® SPSS® Statistics v.29
  - Multiple regression
- Data were visualized using Tableau

RESULTS

Suicide Deaths 2020

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.414[a]	.172	.131	5.55687

a. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, %Rural, Median Household Income

b. Dependent Variable: Suicide Rate (Age-Adjusted)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	646.964	5	129.393	4.190	.002[b]
	Residual	3118.756	101	30.879		
	Total	3765.720	106			

a. Dependent Variable: Suicide Rate (Age-Adjusted)

b. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, %Rural, Median Household Income

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	7.783	13.357		.583	.561	-18.713	34.279					
	%Rural	.037	.019	.240	1.905	.060	-.002	.075	.294	.186	.172	.518	1.930
	Mental Health Provider Rate	.002	.004	.068	.595	.553	-.005	.010	-.128	.059	.054	.619	1.615
	Median Household Income	-6.329E-5	.000	-.236	-1.808	.074	.000	.000	-.343	-.177	-.164	.480	2.085
	High School Graduation Rate	.093	.137	.071	.677	.500	-.180	.365	.016	.067	.061	.739	1.353
	% Unemployed	.811	.952	.106	.853	.396	-1.076	2.699	.262	.085	.077	.527	1.898

a. Dependent Variable: Suicide Rate (Age-Adjusted)

Fig. 2 A multiple regression was run to predict the age-adjusted suicide rate by geolocation – labeled as %rural (rural, suburban, and urban), mental health provider rate, median household income, high school graduation, and unemployment rates. These variables significantly predicted the suicide age-adjusted rate, $F(5, 101) = 4.190$, $p = .002$, $R^2 = .172$ (17.2%). None of the predictors individually added a statistical significance to the prediction, $p < .05$
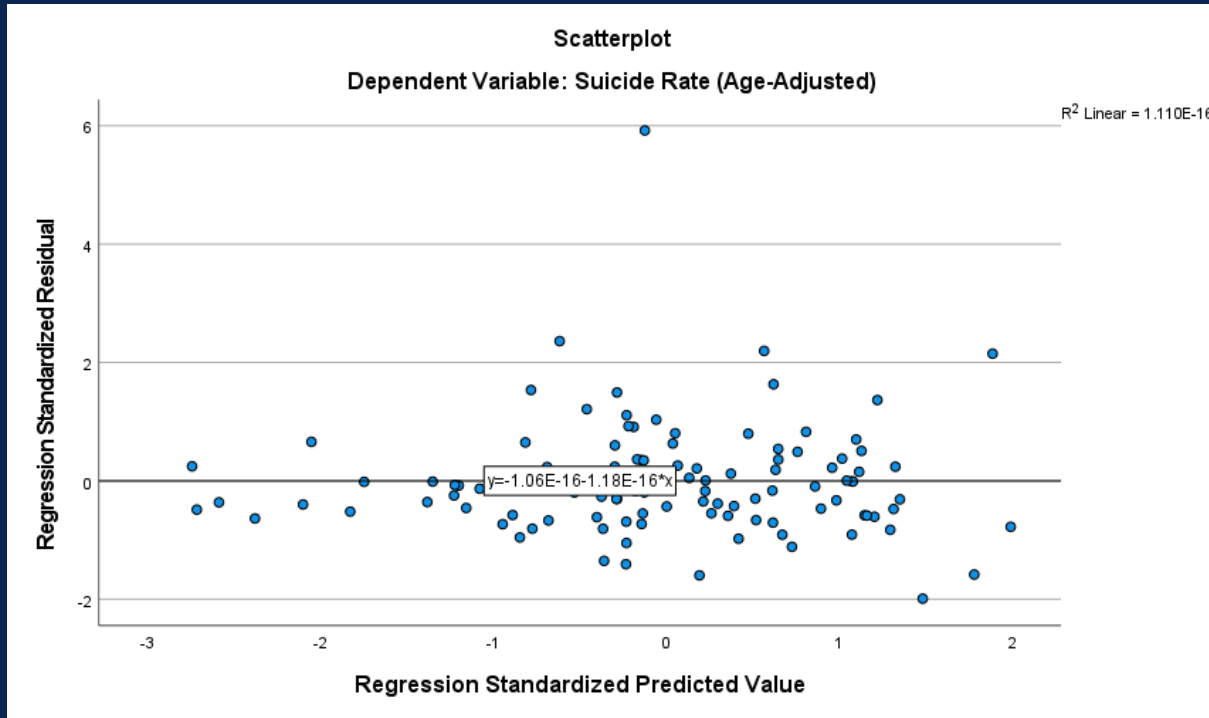
Fig. 3 A standardized residuals against predicted value shows the relationship between the response variable and predictor variables. The variables are randomly scattered around zero, and there is the presence of a few outliers

Suicide Deaths 2021

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.498[a]	.248	.210	5.06652

a. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, %Rural, Median Household Income

b. Dependent Variable: Suicide Rate (Age-Adjusted)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	838.557	5	167.711	6.533	<.001[b]
	Residual	2541.291	99	25.670		
	Total	3379.848	104			

a. Dependent Variable: Suicide Rate (Age-Adjusted)

b. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, %Rural, Median Household Income

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	15.550	9.673		1.608	.111	-3.643	34.744					
	%Rural	.034	.017	.238	1.957	.053	.000	.069	.349	.193	.171	.515	1.943
	Mental Health Provider Rate	.001	.003	.020	.184	.854	-.006	.007	-.179	.019	.016	.621	1.611
	Median Household Income	-9.788E-5	.000	-.397	-3.090	.003	.000	.000	-.426	-.297	-.269	.460	2.173
	High School Graduation Rate	.077	.101	.077	.759	.450	-.124	.278	.035	.076	.066	.746	1.340
	% Unemployed	-.079	.920	-.010	-.086	.932	-1.903	1.746	.275	-.009	-.007	.511	1.957

a. Dependent Variable: Suicide Rate (Age-Adjusted)

Fig. 4 A multiple regression was run to predict the age-adjusted suicide rate by geolocation – labeled as %rural (rural, suburban, and urban), mental health provider rate, median household income, high school graduation, and unemployment rates. These variables significantly predicted the suicide age-adjusted rate, $F(5, 99) = 6.533$, $p < .001$, $R^2 = .248(24.8\%)$. Only median household income was statistically significant to the prediction, $p < .05$
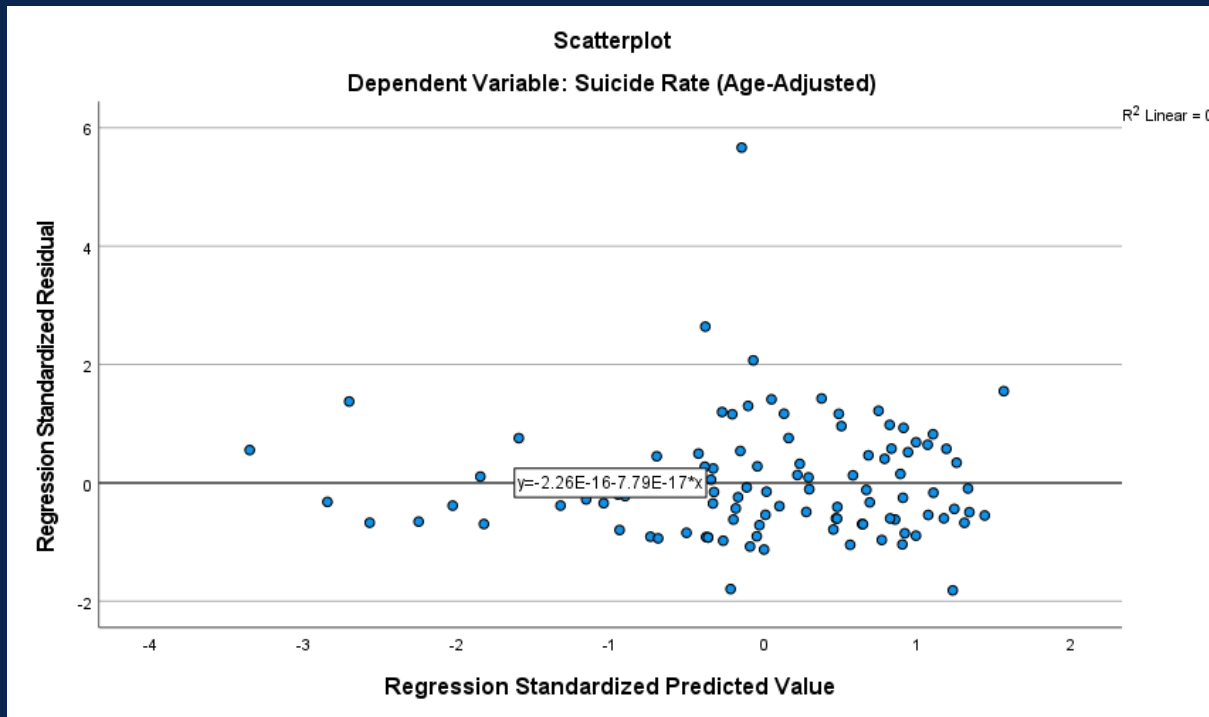
Fig. 5 A standardized residuals versus predicted value shows the relationship between the response variable and predictor variables. The variables are randomly scattered around zero, and there is the presence of a few outliers

Suicide Deaths 2022

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.475[a]	.225	.187	5.47126

a. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, Median Household Income, % Rural

b. Dependent Variable: Suicide Rate (Age-Adjusted)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	887.432	5	177.486	5.929	<.001[b]
	Residual	3053.336	102	29.935		
	Total	3940.769	107			

a. Dependent Variable: Suicide Rate (Age-Adjusted)

b. Predictors: (Constant), % Unemployed, Mental Health Provider Rate, High School Graduation Rate, Median Household Income, % Rural

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	5.328	11.543		.462	.645	-17.568	28.225					
	% Rural	.024	.020	.159	1.215	.227	-.015	.064	.256	.119	.106	.446	2.242
	Mental Health Provider Rate	.001	.003	.053	.487	.627	-.004	.007	-.126	.048	.042	.635	1.574
	Median Household Income	-9.927E-5	.000	-.393	-3.189	.002	.000	.000	-.423	-.301	-.278	.500	2.000
	High School Graduation Rate	.179	.108	.174	1.660	.100	-.035	.393	.071	.162	.145	.692	1.444
	% Unemployed	.301	.500	.080	.602	.548	-.691	1.293	.160	.060	.052	.431	2.321

a. Dependent Variable: Suicide Rate (Age-Adjusted)

Fig. 6 A multiple regression was run to predict the age-adjusted rate of suicide by geolocation – labeled as %rural (rural, suburban, and urban), mental health provider rate, median household income, high school graduation, and unemployment rates. These variables significantly predicted the suicide age-adjusted rate, $F(5, 102) = 5.929$, $p < .001$, $R^2 = .225(22.5\%)$. Only median household income was statistically significant to the prediction, $p < .05$
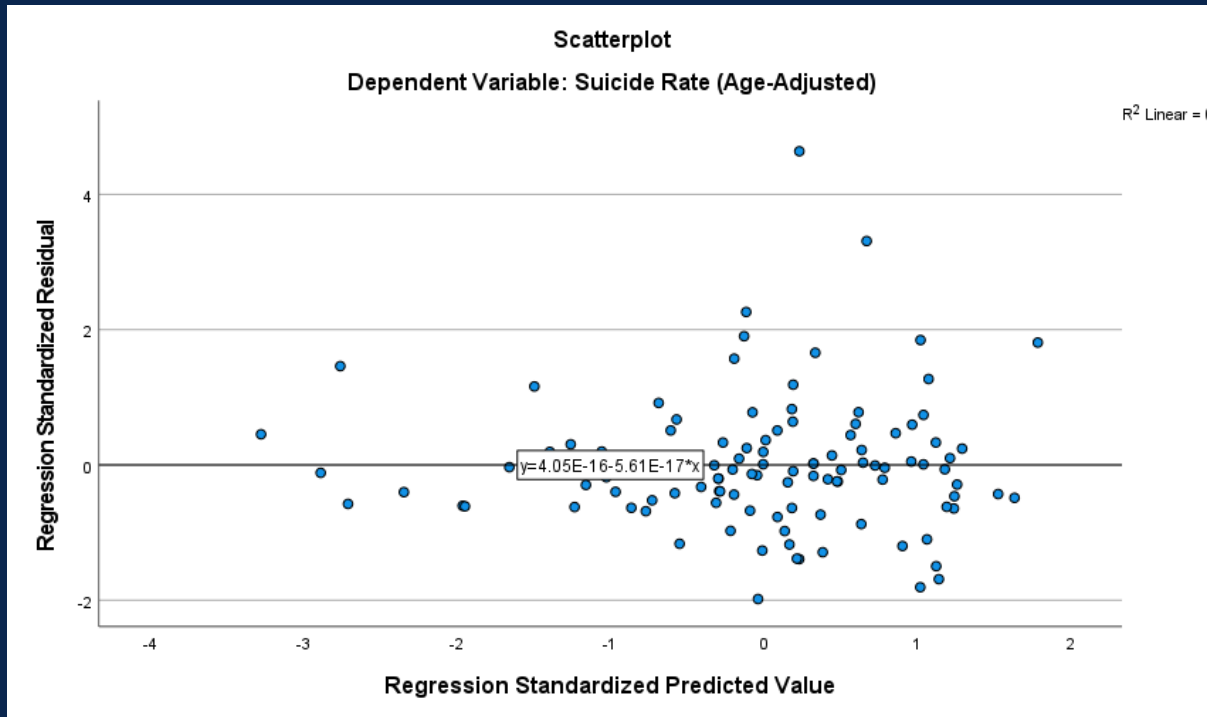
Fig. 7 A standardized residuals versus predicted value shows the relationship between the response variable and predictor variables. The variables are randomly scattered around zero, and there is the presence of a few outliers.
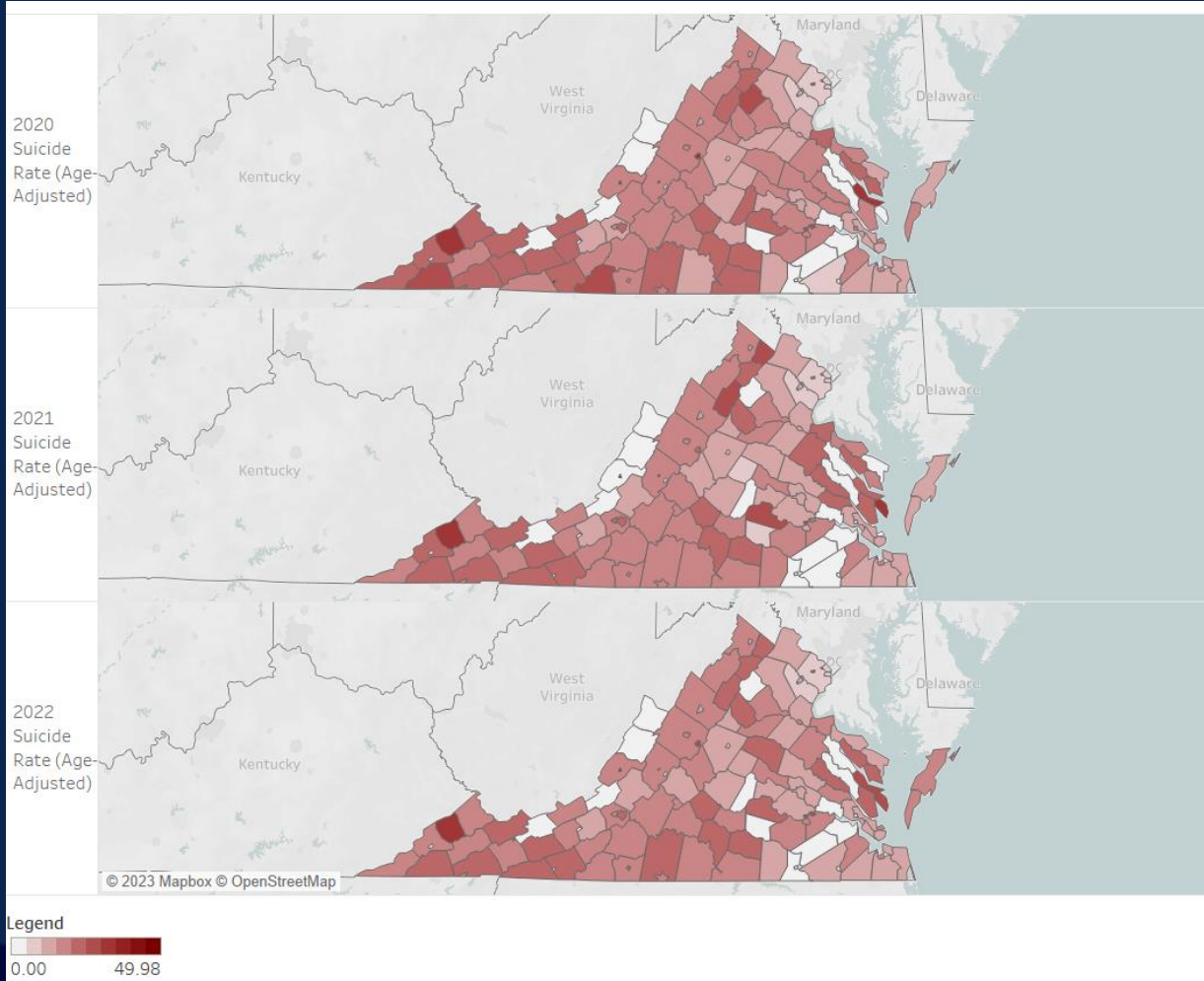
Fig. 8 A 2020 – 2022 map of Virginia showing the distribution of age-adjusted suicide rates per county.
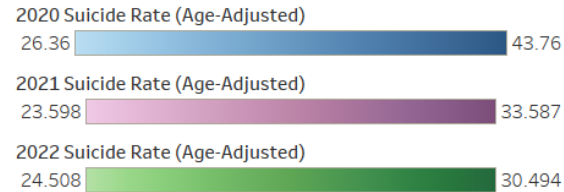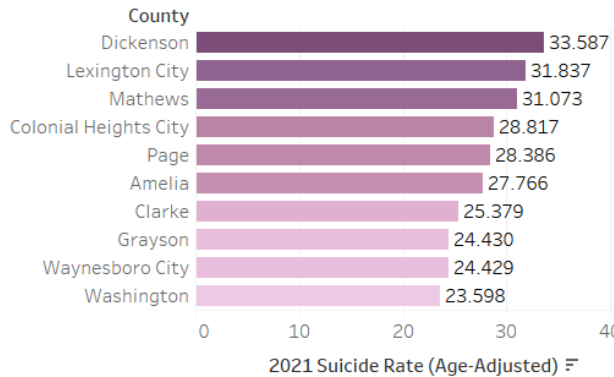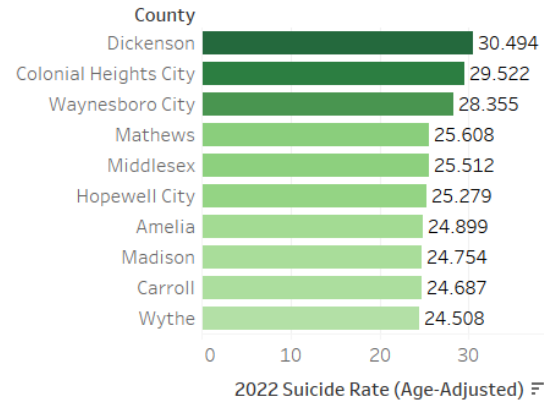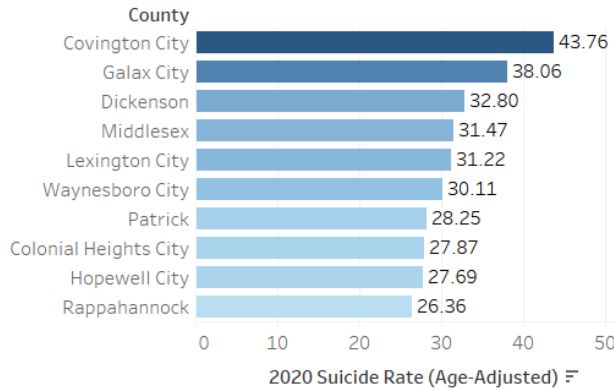
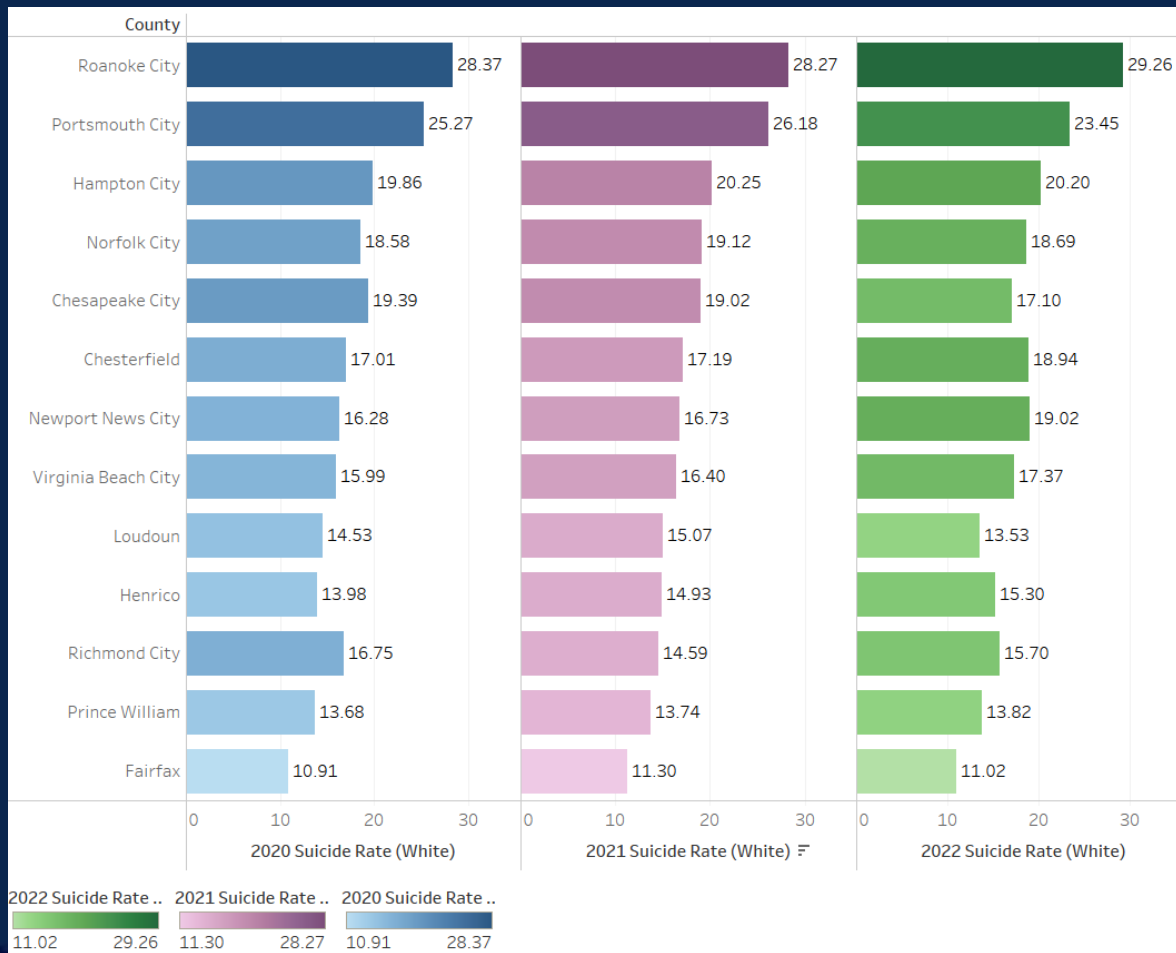**Fig. 9** Top ten counties based on the age-adjusted suicide rates (2020 – 2022)

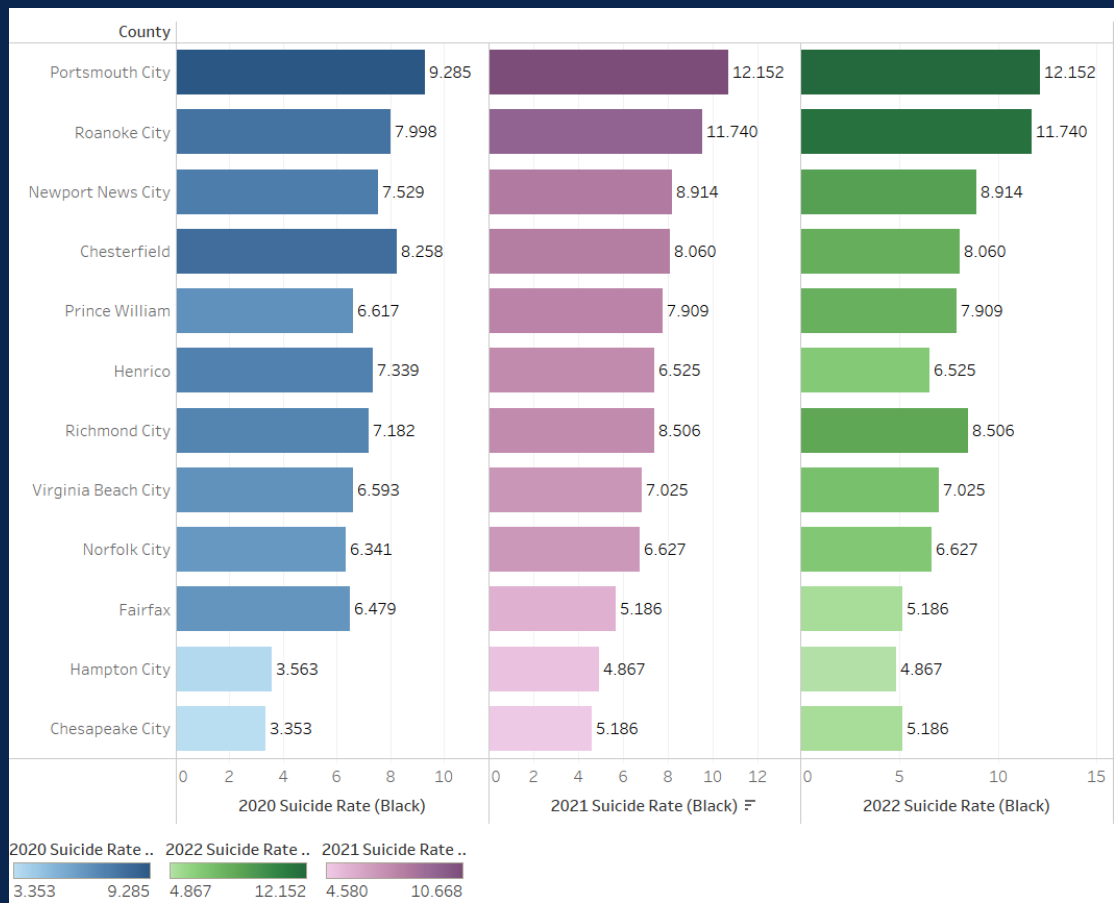**Fig. 10** Suicide rates among Non-Hispanic White per county (2020 – 2022)

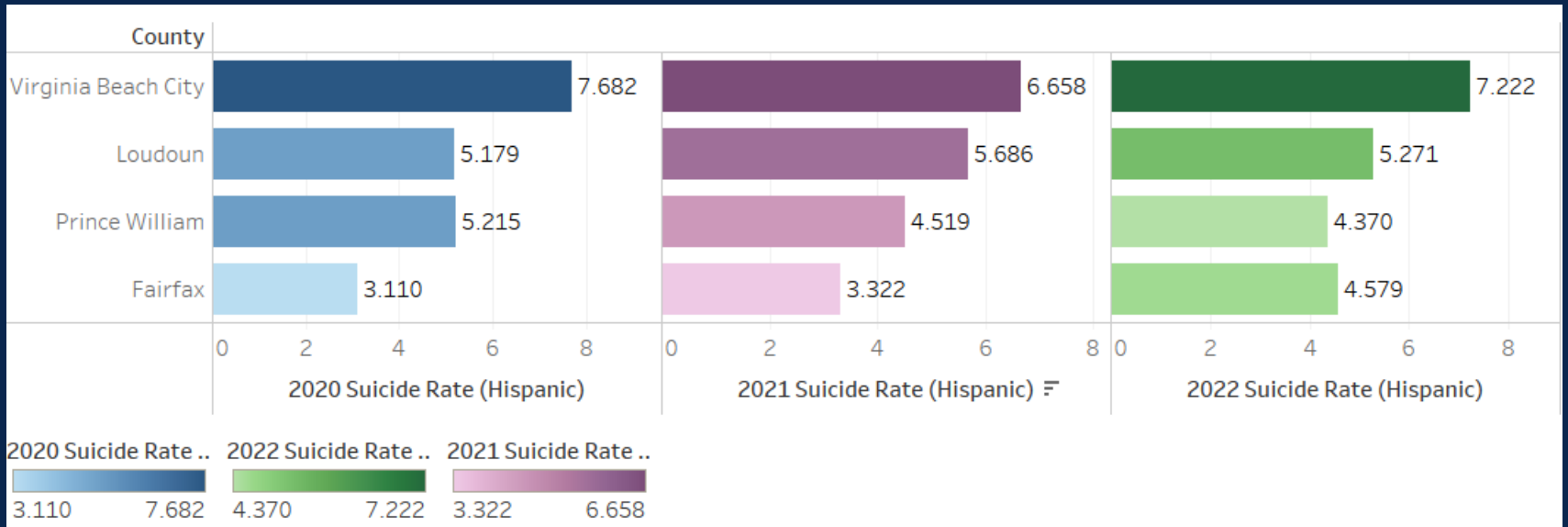**Fig. 11** Suicide rates among African American per county (2020 – 2022)

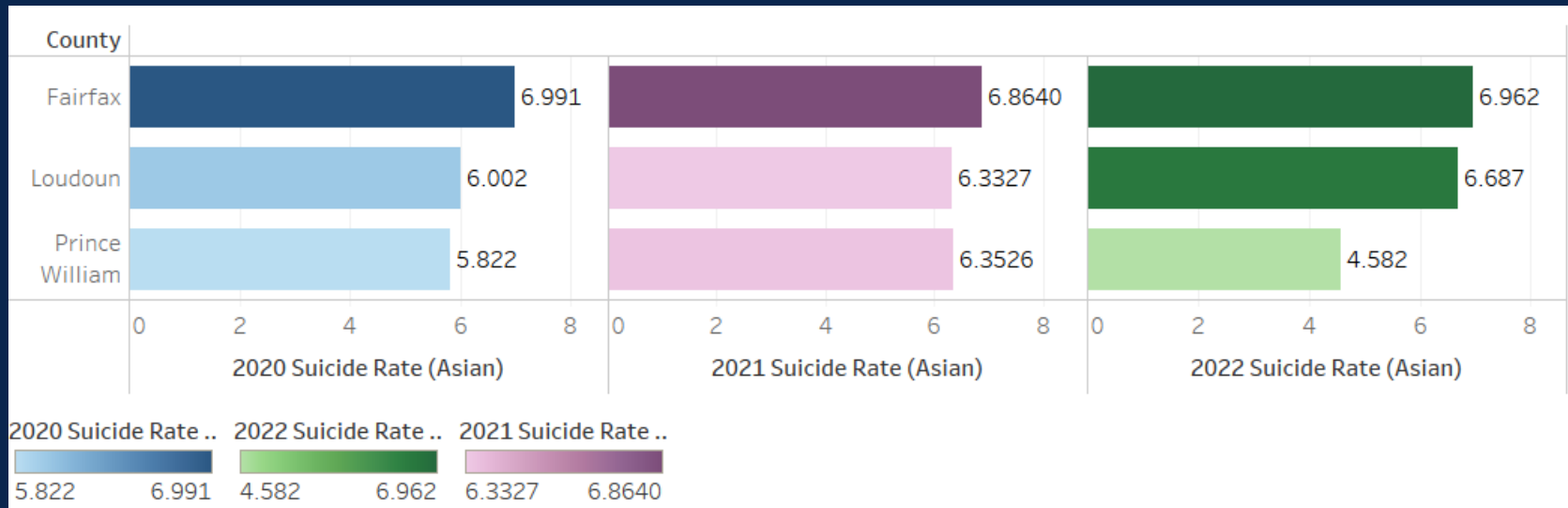**Fig. 12** Suicide rates among Hispanic per county (2020 – 2022)

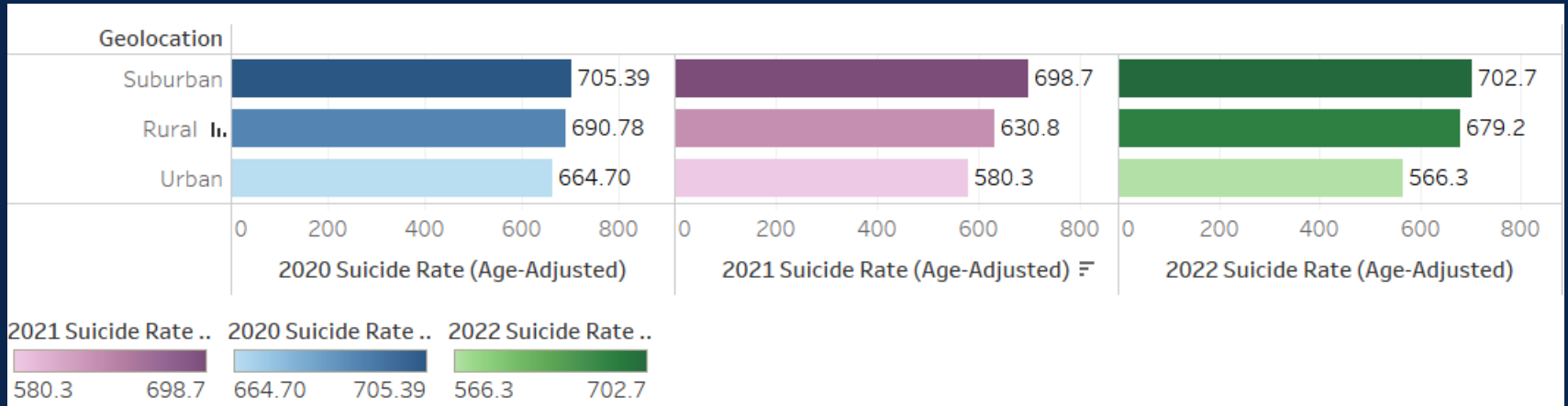**Fig. 13** Suicide rates among Asian per counties (2020 – 2022)

Fig. 14 Sum of suicide rates (Age-adjusted) by geolocation in Virginia. (2020 – 2022)

RECOMMENDATIIONS

Recommendations

- Expand access to crisis intervention services
  - Hotlines, mobile crisis teams for immediate support to individuals experiencing suicidal thoughts or behaviors
- Reduce access to lethal means
  - Firearms, medications, etc.
- Implement suicide prevention training
  - Focuses on identifying warning signs of suicide, providing support, and connecting individuals to resources

Recommendations

- Improving access to mental health resources, particularly in underserved communities
  - Therapy and counseling
  - Increase funding for Mental health services
- Implementing policies to reduce the stigma around seeking mental health treatment.

  - Policies could include public awareness campaigns
    - Education and training program
    - Employee assistance programs
    - Mental health insurance coverage while focusing on diversity, equity, and inclusion.

□

CONCLUSION

Future Goals and Research

- Improve data collection and analysis
  - Intersectionality: race, ethnicity, gender, sexuality, etc.
- Improve historical trends
- Cultural factors
  - Attitudes and beliefs

Biblical View

- From a Christian worldview, suicide is regarded as a severe and tragic issue that has significant implications for the individual who takes their own life and the loved ones who are left behind

- In Psalm 55:22," Cast your cares on the Lord and He will sustain you; He will never let the righteous be shaken"

- 1 Peter 5:7," Cast all your anxiety on him because he cares for you"

Biblical View

- Role of Christians in this research:
  - Love and serve
  - Advocate for policies
  - Implement programs in churches
  - Offer counseling services

References

1. Suicides in Virginia. County Health Rankings & Roadmaps. https://www.countyhealthrankings.org/explore-health-rankings/county-health-rankings-model/health-factors/social-economic-factors/community-safety/suicides?year=2022&state=51&tab=1. Accessed March 20, 2023.