

Understanding COPD Burden in Virginia: Patterns, Disparities, and Public Health Implications



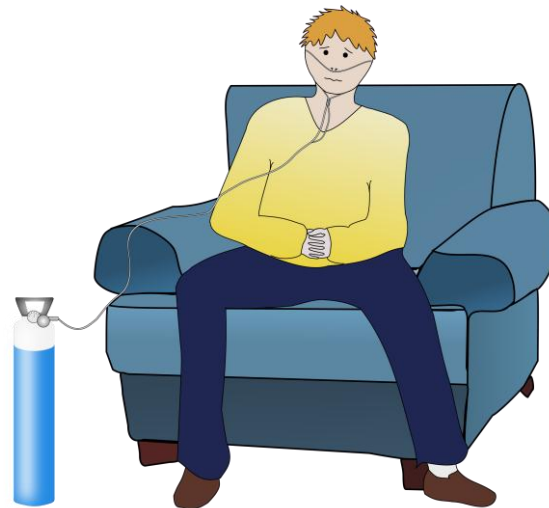
Francis Adams, MPH
Epidemiologist
Environmental Public Health Tracking
Division of Population Health Data
Office of Family Health Services

Conflict of Interest Disclosure Statement

I declare that I have no conflicts of interest regarding this presentation. I have not received financial support or benefits from any organization, nor do I have personal relationships or affiliations that could influence its content.

Overview

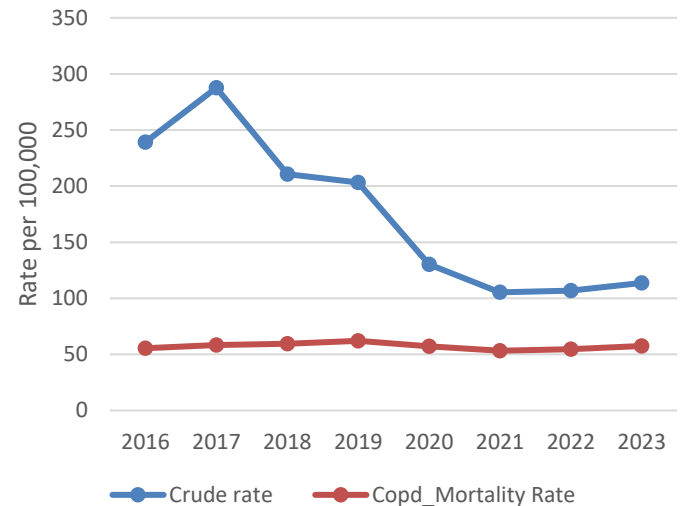
- Describe the burden of COPD morbidity and mortality
- Highlight disparities
- Discuss limitations
- Examine geographic trend
- Brief Discussion



Background and Disparities

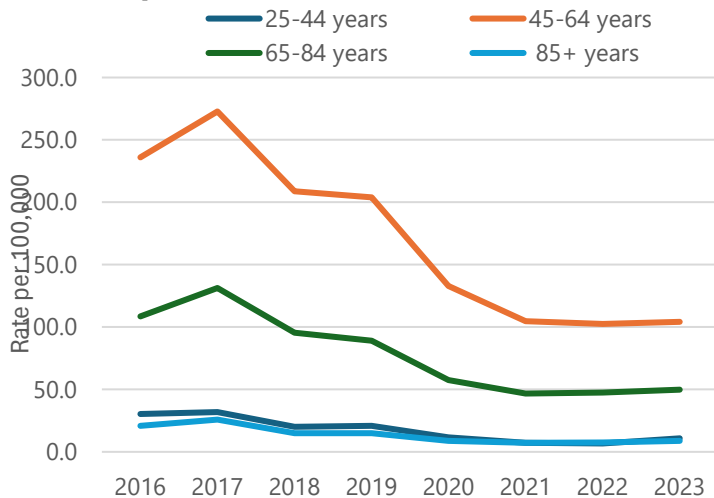
- COPD includes chronic bronchitis and emphysema
- Primarily caused by smoking (85–90% of cases)
- Air pollution
- Fourth leading cause of death in the U.S. (2019).
- COPD morbidity and mortality in Virginia (2016–2023)

Virginia COPD Hospitalization and mortality crude rates per 100,000 persons aged 25 years and older 2016-2023

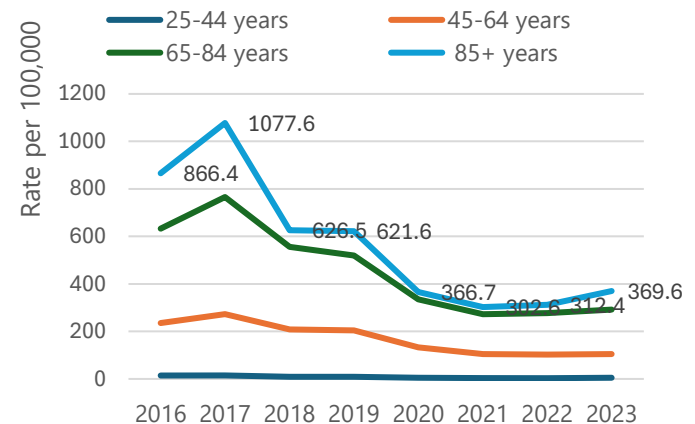


COPD Disparities

Virginia Age Adjusted COPD Hospitalization Rate 2016-2023



Virginia COPD Hospitalization Rate by Age grouping 2016-2023

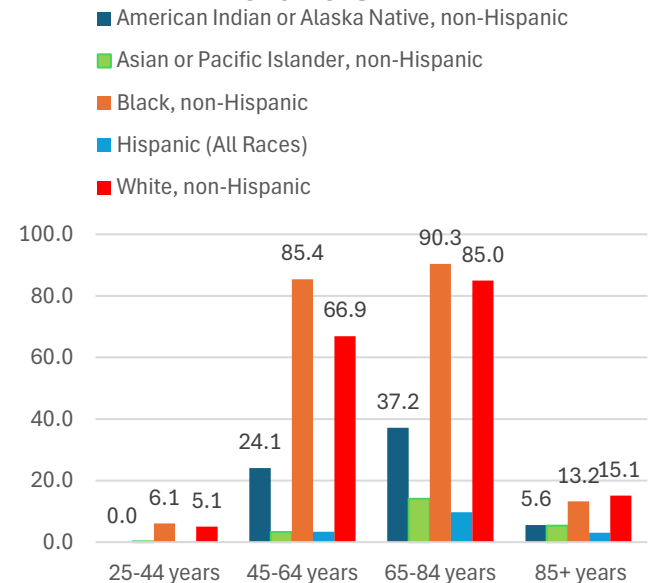


- By age grouping, the hospitalization burden is higher among 45-64 and 65-84.

CON'T COPD Disparities

- The races that are highly affected are blacks and whites
- Black, non-Hispanic individuals experience a disproportionately high burden of hospitalizations compared with other racial and ethnic groups
- The pattern is consistent with the national trend (Goto et al., 2017)
- Low rate in Asian and Hispanic adults (Weeks & Elgaddal, 2025)

Virginia COPD Hospitalization Age Adjust Rate by Race /Ethnicity 2016-2023



Methods

- Obtained data from Virginia Health Information & CDC Environmental Public Health Tracking Network
- Counted hospitalizations with primary diagnosis of ICD-10-CM J40–J44 for ages ≥ 25
- Counted deaths with underlying cause of death ICD-10-CM J40–J44
- Used age adjusted rates to 2000 U.S. standard population



Trends and Model Findings

Generalized Linear Model Regression Results

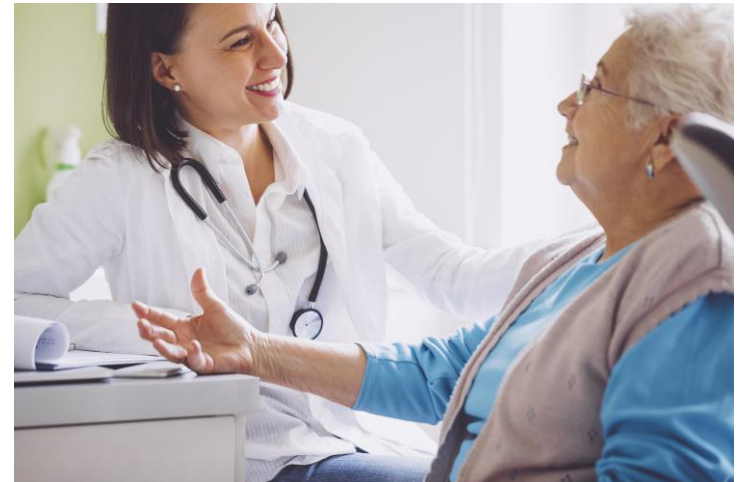
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Dep. Variable:      deaths      No. Observations:      5622
Model:              GLM        Df Residuals:          5601
Model Family:      NegativeBinomial  Df Model:              20
Link Function:     Log         Scale:                 1.0000
Method:            IRLS        Log-Likelihood:        -30393.8
Date:              Wed, 11 Feb 2026  Deviance:              3422.4
Time:              16:22:47      Pearson chi2:          3.03e+03
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	coef	std err	z	P> z	[0.025	0.975]	IRR	IRR 0.025	IRR 0.975
Intercept	-84.5235	36.8479	-2.294	0.022	-156.744	-12.303			
C(SEX)[T.Male]	0.1192	0.0294	4.053	0.000	0.062	0.177	1.127	1.063	1.193
C(Income, Treatment(reference='\$50k+'))[T.less than \$15k]	0.8278	0.0579	14.303	0.000	0.714	0.941	2.288	2.043	2.563
C(Income, Treatment(reference='\$50k+'))[T.\$15-25k]	0.6358	0.0511	12.448	0.000	0.536	0.736	1.889	1.709	2.087
C(Income, Treatment(reference='\$50k+'))[T.\$25-35k]	0.5479	0.0486	11.266	0.000	0.453	0.643	1.730	1.572	1.903
C(Income, Treatment(reference='\$50k+'))[T.\$35-50k]	0.4027	0.0492	8.185	0.000	0.306	0.499	1.496	1.358	1.647
C(Income, Treatment(reference='\$50k+'))[T.Missing]	0.2338	0.0417	5.604	0.000	0.152	0.316	1.263	1.164	1.371
C(Smoker, Treatment(reference='Yes'))[T.No]	-0.2164	0.0332	-6.515	0.000	-0.281	-0.151	0.805	0.755	0.860
C(Smoker, Treatment(reference='Yes'))[T.unknown]	0.7369	0.0816	9.033	0.000	0.577	0.897	2.089	1.781	2.452
C(Smoker, Treatment(reference='Yes'))[T.Missing]	0.3743	0.0464	8.067	0.000	0.283	0.465	1.454	1.328	1.592
C(RACE, Treatment(reference='White'))[T..]	0.8472	0.0574	14.762	0.000	0.735	0.960	2.333	2.085	2.611
C(RACE, Treatment(reference='White'))[T.Black]	0.5000	0.0363	13.782	0.000	0.429	0.571	1.649	1.536	1.770
C(RACE, Treatment(reference='White'))[T.Hispanic]	0.8198	0.0502	16.329	0.000	0.721	0.918	2.270	2.057	2.505
C(RACE, Treatment(reference='White'))[T.Other]	0.7480	0.0491	15.236	0.000	0.652	0.844	2.113	1.919	2.326
C(Age_Group_C, Treatment(reference="55-64"))[T.25-34]	-6.2400	0.0533	-117.105	0.000	-6.344	-6.136	0.002	0.002	0.002
C(Age_Group_C, Treatment(reference="55-64"))[T.35-44]	-3.6977	0.0526	-70.296	0.000	-3.801	-3.595	0.025	0.022	0.027
C(Age_Group_C, Treatment(reference="55-64"))[T.45-54]	-1.7046	0.0511	-33.366	0.000	-1.805	-1.604	0.182	0.165	0.201
C(Age_Group_C, Treatment(reference="55-64"))[T.65-74]	0.7927	0.0483	16.402	0.000	0.698	0.887	2.209	2.010	2.429
C(Age_Group_C, Treatment(reference="55-64"))[T.75+]	1.1285	0.0461	24.500	0.000	1.038	1.219	3.091	2.824	3.383
prevalence_pct	-0.0146	0.0012	-12.689	0.000	-0.017	-0.012	0.985	0.983	0.988
year	0.0441	0.0182	2.419	0.016	0.008	0.080	1.045	1.008	1.083

Key Trends

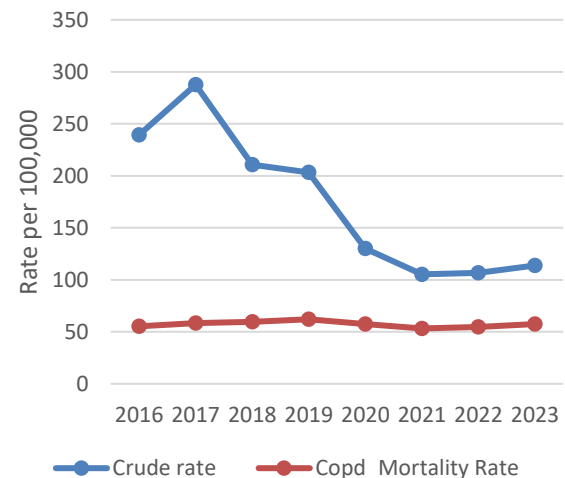
- Annual average: 10,238 individuals were hospitalized for COPD (2016-2023)
- Hospitalizations peaked in 2017 (>250 per 100,000), lowest in 2021 (~100 per 100,000)
- Mortality remained stable (~50 per 100,000) -2016-2023



Discussion

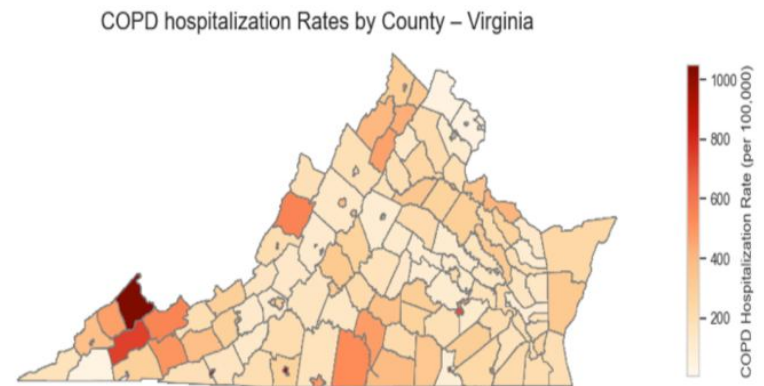
- Declines in hospitalization align with national improvements
- High prevalence linked to better disease management, not higher mortality
- Hospitalization \neq severity; mortality reflects systemic inequities

Virginia COPD Hospitalization and mortality crude rates per 100,000 persons aged 25 years and older 2016-2023



Geographic Variability

- Decrease in hospitalization rates from 2016–2023
- High variability in rural counties (e.g., Buchanan, Russell)
- Stable trends in urban areas (Arlington, Fairfax)
- COVID-19 (2020) likely influenced observed declines



Conclusion

COPD trends in Virginia appear to be:

- Strongly socially patterned
- Influenced by structural inequities
- Progressively higher with age
- Increasing modestly over time

These findings support the need for:

- Targeted interventions in low-income populations
- Structural health equity policies
- Improved access to respiratory care
- Continued tobacco control efforts

Thank You

References

- Anderson & Rosenberg (1998); Aryal et al. (2014); Berry & Wise (2010);
- CDC (2011, 2020); Ford et al. (2015); Hanson et al. (2020);
- Liu et al. (2023); Ni & Xu (2016); Mannino & Buist (2007);
- Williams & Jackson (2005); Wu et al. (2021).