

## Indicator 16: Ever had a stroke

Internal variable name: outc16\_stroke

Definition: (Ever told) you had a stroke.

### Predictive models

	Mixed, demos only	Logit, no area effects	Mixed with area covariates
	b/se	b/se	b/se
Outcome 16: Ever had a stroke			
NH Black vs. NH White	0.5795*** (0.1303)	0.4975** (0.1853)	0.4975*** (0.1399)
NH Asian vs. NH White	-0.2361 (0.5018)	-0.1219 (0.5846)	-0.1219 (0.5014)
NH Other vs. NH White	0.5436 (0.3516)	0.5120 (0.3483)	0.5120 (0.3565)
Hispanic vs. NH White	0.2585 (0.5546)	0.4132 (0.5364)	0.4132 (0.5927)
Female	0.1141 (0.1382)	0.1223 (0.1504)	0.1223 (0.1423)
Age 18-34 vs. 65+	-3.0224*** (0.6190)	-2.9954*** (0.5152)	-2.9954*** (0.6075)
Age 35-44 vs. 65+	-1.8421*** (0.3700)	-1.8016*** (0.4178)	-1.8016*** (0.3762)
Age 45-54 vs. 65+	-1.1649*** (0.2583)	-1.1379*** (0.2307)	-1.1379*** (0.2602)
Age 55-64 vs. 65+	-0.5096** (0.1527)	-0.5091** (0.1620)	-0.5091** (0.1562)
% Hispanic among adults 18 to 64		-0.0650** (0.0227)	-0.0650*** (0.0129)
Socio-economic factors z-score, County Rankings		1.6644** (0.5430)	1.6644*** (0.3928)
Kidney Male Rate		-0.0181* (0.0078)	-0.0181** (0.0057)
Crude mortality rate of malignant cancers per 10K		-0.0625*** (0.0183)	-0.0625*** (0.0123)
VA BRFSS 2014 SAE outc18_tobacco_user		-3.8063* (1.6928)	-3.8063* (1.4738)
% education below HS, population 25+ y/o		-0.1217* (0.0491)	-0.1217** (0.0427)
Crude mortality rate of accidents (unintentional injuries) per 10K		0.0595 (0.1335)	0.0595 (0.1108)
c.ACS_pct_educ_lt_HS#c.rate_cod_accidentsunintentionali		0.0042 (0.0076)	0.0042 (0.0069)

% education Bachelor+, population 25+ y/o		-0.0055 (0.0151)	-0.0055 (0.0106)
Crude mortality rate of nephritis, nephrotic syndrome & nephrosis per 10K		0.2981*	0.2981**
c.ACS_pct_educ_college#c.rate_cod_nephritisnephroticsyndr		(0.1249)	(0.1035)
		-0.0112 (0.0062)	-0.0112* (0.0044)
Intercept	-2.7089*** (0.1358)	1.5702 (1.2606)	1.5702 (1.1292)
Area effect variance	0.0000*** (0.0000)		0.0000*** (0.0000)

Number of alternative models used to estimate model error = 10.

## Results

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Augusta County	51015	3.0%	(1.8%, 9.2%)	3.3%	(2.7%, 4.1%)
Bath County	51017	21.9%	(5.0%, 60.0%)	7.9%	(3.4%, 17.4%)
Caroline County	51033	0.0%	(-0.0%, 27.1%)	3.2%	(2.3%, 4.3%)
Clarke County	51043	10.5%	(3.6%, 37.4%)	4.3%	(2.9%, 6.5%)
Culpeper County	51047	2.1%	(0.4%, 11.4%)	3.6%	(2.8%, 4.7%)
Fauquier County	51061	1.0%	(0.6%, 11.4%)	3.7%	(3.1%, 4.4%)
Frederick County	51069	1.5%	(0.9%, 10.1%)	2.8%	(2.3%, 3.4%)
Highland County	51091	0.0%	(0.0%, 47.5%)	3.3%	(1.9%, 5.7%)
King George County	51099	3.4%	(1.8%, 38.7%)	6.6%	(4.6%, 9.4%)
Madison County	51113	8.6%	(1.3%, 39.5%)	4.5%	(3.1%, 6.6%)
Orange County	51137	4.9%	(2.5%, 19.8%)	7.6%	(4.7%, 12.0%)
Page County	51139	2.8%	(1.2%, 23.8%)	3.4%	(2.3%, 4.9%)
Rappahannock County	51157	9.8%	(1.5%, 44.2%)	6.7%	(4.9%, 9.2%)
Rockbridge County	51163	3.7%	(1.6%, 18.0%)	3.6%	(2.6%, 5.0%)
Rockingham County	51165	2.6%	(1.6%, 9.0%)	2.3%	(1.6%, 3.3%)
Shenandoah County	51171	2.3%	(0.4%, 12.5%)	3.5%	(2.5%, 4.9%)
Spotsylvania County	51177	4.2%	(1.5%, 11.4%)	4.1%	(3.5%, 4.8%)
Stafford County	51179	1.5%	(0.9%, 6.3%)	3.6%	(2.6%, 5.1%)
Warren County	51187	0.0%	(0.0%, 14.9%)	3.0%	(2.4%, 3.9%)
Buena Vista City	51530	14.7%	(2.0%, 59.4%)	3.0%	(2.0%, 4.6%)
Fredericksburg City	51630	12.6%	(2.1%, 48.8%)	5.8%	(3.6%, 9.1%)
Harrisonburg City	51660	1.1%	(0.5%, 45.2%)	1.8%	(1.2%, 2.7%)
Lexington City	51678	0.0%	(0.0%, 96.3%)	0.6%	(0.2%, 2.1%)
Staunton City	51790	0.0%	(0.0%, 43.5%)	2.3%	(1.7%, 3.0%)
Waynesboro City	51820	4.1%	(1.6%, 45.3%)	3.4%	(2.8%, 4.2%)
Winchester City	51840	0.0%	(0.0%, 60.4%)	1.0%	(0.7%, 1.5%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Albemarle County	51003	5.2%	(2.2%, 11.5%)	4.9%	(4.0%, 6.0%)
Alleghany County	51005	10.7%	(2.8%, 33.3%)	11.4%	(8.9%, 14.4%)
Amherst County	51009	0.9%	(0.6%, 17.5%)	3.7%	(2.7%, 5.0%)
Appomattox County	51011	0.0%	(-0.0%, 18.6%)	2.5%	(1.6%, 3.9%)
Arlington City	51013	1.6%	(0.3%, 8.5%)	2.4%	(1.9%, 3.2%)
Bedford County	51019	2.5%	(1.5%, 8.0%)	4.0%	(3.3%, 4.8%)
Botetourt County	51023	3.8%	(1.8%, 20.2%)	6.6%	(5.1%, 8.6%)
Campbell County	51031	4.6%	(2.5%, 13.7%)	3.7%	(2.9%, 4.5%)
Craig County	51045	18.1%	(2.0%, 70.4%)	11.2%	(6.3%, 19.0%)
Fairfax County	51059	2.0%	(1.1%, 3.5%)	2.8%	(2.4%, 3.3%)
Fluvanna County	51065	3.4%	(0.6%, 18.2%)	5.8%	(4.4%, 7.5%)
Greene County	51079	3.2%	(1.4%, 37.6%)	2.4%	(1.7%, 3.5%)
Loudoun County	51107	2.2%	(0.9%, 5.3%)	3.0%	(2.4%, 3.9%)
Louisa County	51109	2.0%	(0.8%, 15.5%)	3.2%	(2.2%, 4.5%)
Nelson County	51125	1.0%	(0.6%, 29.4%)	1.6%	(1.0%, 2.5%)
Prince William County	51153	1.4%	(0.6%, 3.2%)	2.2%	(1.7%, 2.9%)
Roanoke County	51161	2.5%	(0.9%, 6.7%)	4.5%	(3.4%, 6.0%)
Alexandria City	51510	2.8%	(1.6%, 8.6%)	2.9%	(2.2%, 3.9%)
Charlottesville City	51540	1.1%	(0.7%, 19.5%)	1.5%	(0.8%, 2.6%)
Covington City	51580	0.0%	(0.0%, 87.4%)	23.0%	(8.2%, 50.1%)
Fairfax City	51600	1.3%	(0.2%, 7.0%)	2.8%	(2.0%, 3.9%)
Falls Church City	51610	0.0%	(0.0%, 25.6%)	2.4%	(1.5%, 4.0%)
Lynchburg City	51680	2.3%	(1.3%, 10.0%)	4.9%	(3.7%, 6.6%)
Manassas City	51683	1.4%	(0.8%, 34.2%)	0.8%	(0.4%, 1.5%)
Manassas Park City	51685	0.0%	(0.0%, 76.5%)	1.0%	(0.5%, 1.9%)
Salem City	51775	0.0%	(0.0%, 42.2%)	3.2%	(2.4%, 4.2%)

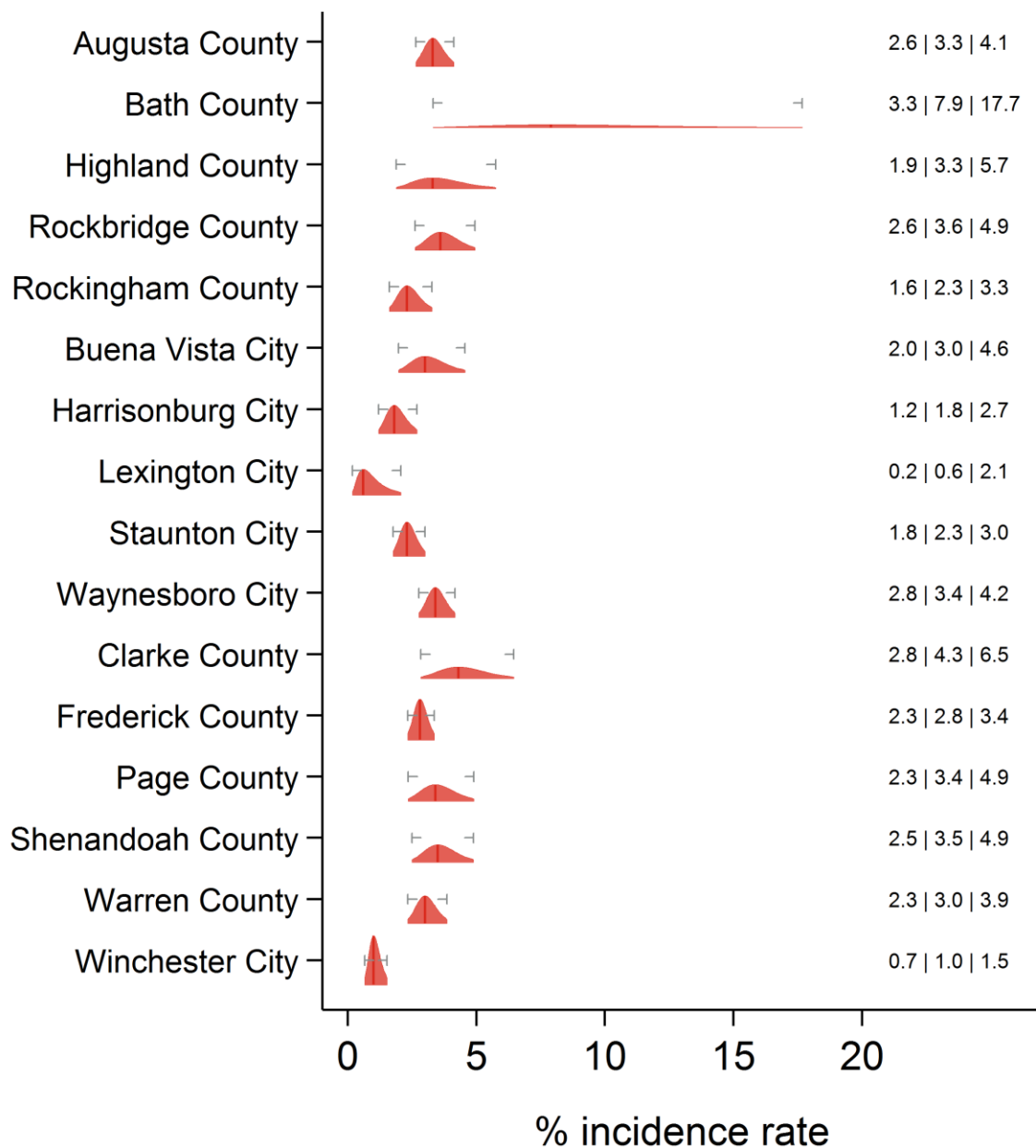
County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Bland County	51021	12.0%	(2.7%, 40.1%)	8.2%	(5.4%, 12.3%)
Buchanan County	51027	7.6%	(1.7%, 28.0%)	8.7%	(5.1%, 14.5%)
Carroll County	51035	12.7%	(2.9%, 41.8%)	6.8%	(4.6%, 9.8%)
Dickenson County	51051	0.0%	(0.0%, 19.3%)	5.5%	(2.3%, 12.5%)
Floyd County	51063	0.8%	(0.6%, 18.1%)	1.7%	(1.2%, 2.4%)
Franklin County	51067	4.3%	(0.9%, 18.1%)	5.2%	(4.5%, 6.2%)
Giles County	51071	2.4%	(0.8%, 15.6%)	4.0%	(2.3%, 6.6%)
Grayson County	51077	1.0%	(0.7%, 22.9%)	8.2%	(5.3%, 12.5%)
Henry County	51089	5.8%	(2.9%, 17.4%)	7.5%	(5.4%, 10.3%)
Lee County	51105	0.0%	(0.0%, 27.8%)	4.4%	(2.7%, 7.1%)
Montgomery County	51121	1.8%	(1.1%, 9.1%)	3.5%	(2.7%, 4.7%)
Patrick County	51141	2.8%	(1.3%, 32.1%)	4.9%	(3.3%, 7.2%)
Pittsylvania County	51143	1.5%	(1.0%, 6.5%)	4.5%	(3.4%, 6.0%)
Pulaski County	51155	7.7%	(2.3%, 22.6%)	8.4%	(5.8%, 12.0%)
Russell County	51167	0.0%	(0.0%, 12.7%)	3.3%	(2.0%, 5.3%)
Scott County	51169	2.7%	(1.4%, 20.3%)	3.8%	(2.7%, 5.4%)
Smyth County	51173	3.9%	(2.4%, 29.9%)	3.5%	(2.4%, 5.0%)
Tazewell County	51185	3.7%	(1.8%, 16.6%)	6.9%	(4.5%, 10.4%)
Washington County	51191	2.1%	(1.3%, 9.9%)	3.1%	(2.3%, 4.3%)
Wise County	51195	10.6%	(4.2%, 24.4%)	6.9%	(4.3%, 11.0%)
Wythe County	51197	14.9%	(6.5%, 30.6%)	5.0%	(3.4%, 7.3%)
Bristol City	51520	0.0%	(-0.0%, 67.4%)	3.9%	(2.5%, 6.0%)
Danville City	51590	1.0%	(0.7%, 19.7%)	6.1%	(4.9%, 7.7%)
Galax City	51640	0.0%	(0.0%, 76.1%)	1.4%	(0.8%, 2.6%)
Martinsville City	51690	3.7%	(1.4%, 53.6%)	9.8%	(5.1%, 18.0%)
Norton City	51720	4.8%	(1.4%, 62.9%)	4.3%	(2.9%, 6.4%)
Radford City	51750	0.0%	(0.0%, 41.9%)	2.6%	(0.9%, 6.9%)
Roanoke City	51770	1.7%	(1.1%, 8.2%)	3.1%	(2.4%, 3.9%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Amelia County	51007	8.8%	(3.1%, 22.4%)	4.5%	(2.8%, 7.1%)
Brunswick County	51025	2.6%	(1.2%, 25.2%)	2.2%	(1.1%, 4.4%)
Buckingham County	51029	1.6%	(0.9%, 19.9%)	2.6%	(1.6%, 4.3%)
Charles City County	51036	0.0%	(0.0%, 51.5%)	3.3%	(1.9%, 5.6%)
Charlotte County	51037	7.9%	(2.4%, 23.1%)	8.3%	(6.3%, 10.9%)
Chesterfield County	51041	2.8%	(1.4%, 5.8%)	3.4%	(2.9%, 4.1%)
Cumberland County	51049	8.9%	(1.7%, 35.4%)	10.9%	(7.7%, 15.1%)
Dinwiddie County	51053	9.5%	(2.3%, 31.7%)	6.0%	(4.9%, 7.2%)
Goochland County	51075	0.0%	(0.0%, 23.5%)	4.6%	(3.3%, 6.5%)
Greensville County	51081	0.0%	(0.0%, 37.1%)	7.5%	(3.6%, 15.3%)
Halifax County	51083	1.9%	(1.1%, 12.5%)	8.0%	(5.8%, 10.7%)
Hanover County	51085	2.1%	(0.6%, 6.8%)	3.1%	(2.2%, 4.4%)
Henrico County	51087	3.0%	(1.3%, 6.9%)	3.8%	(3.1%, 4.8%)
Lunenburg County	51111	2.4%	(1.2%, 29.9%)	6.0%	(4.2%, 8.6%)
Mecklenburg County	51117	4.6%	(1.5%, 13.5%)	5.1%	(4.1%, 6.4%)
New Kent County	51127	9.8%	(1.5%, 43.5%)	4.2%	(2.8%, 6.4%)
Nottoway County	51135	1.7%	(0.9%, 35.4%)	1.8%	(1.0%, 3.0%)
Powhatan County	51145	10.3%	(1.6%, 44.9%)	9.0%	(6.3%, 12.8%)
Prince Edward County	51147	3.3%	(2.0%, 16.0%)	9.1%	(6.2%, 13.0%)
Prince George County	51149	4.0%	(2.6%, 16.8%)	4.2%	(2.9%, 6.2%)
Surry County	51181	0.0%	(-0.0%, 33.3%)	2.3%	(1.5%, 3.5%)
Sussex County	51183	5.8%	(3.2%, 21.6%)	5.7%	(4.0%, 8.1%)
Colonial Heights City	51570	1.5%	(0.9%, 20.7%)	5.2%	(3.6%, 7.5%)
Emporia City	51595	0.0%	(0.0%, 91.8%)	1.2%	(0.4%, 3.8%)
Hopewell City	51670	4.0%	(1.9%, 24.4%)	2.6%	(1.8%, 3.9%)
Petersburg City	51730	1.7%	(0.3%, 9.1%)	3.6%	(2.0%, 6.4%)
Richmond City	51760	2.4%	(1.0%, 5.8%)	5.2%	(3.6%, 7.5%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Accomack County	51001	4.4%	(1.6%, 11.6%)	3.8%	(2.4%, 5.9%)
Essex County	51057	1.0%	(0.6%, 26.7%)	2.2%	(1.5%, 3.4%)
Gloucester County	51073	3.3%	(0.8%, 12.2%)	5.5%	(4.5%, 6.7%)
Isle of Wight County	51093	4.8%	(1.9%, 21.7%)	5.4%	(4.1%, 7.2%)
James City County	51095	1.7%	(0.9%, 8.5%)	3.5%	(2.5%, 5.0%)
King and Queen County	51097	11.5%	(1.7%, 49.4%)	8.3%	(5.8%, 11.8%)
King William County	51101	2.3%	(1.2%, 29.8%)	4.2%	(3.2%, 5.4%)
Lancaster County	51103	1.0%	(0.6%, 39.9%)	4.2%	(2.1%, 8.4%)
Mathews County	51115	15.2%	(4.2%, 42.7%)	21.4%	(14.3%, 30.7%)
Middlesex County	51119	6.7%	(1.1%, 32.1%)	3.3%	(2.0%, 5.4%)
Northampton County	51131	4.5%	(1.0%, 17.5%)	4.5%	(2.6%, 7.6%)
Northumberland County	51133	7.8%	(2.0%, 25.7%)	6.2%	(3.2%, 11.5%)
Richmond County	51159	7.5%	(1.4%, 32.1%)	15.4%	(10.6%, 21.8%)
Southampton County	51175	0.0%	(0.0%, 31.1%)	4.0%	(2.8%, 5.5%)
Westmoreland County	51193	0.0%	(0.0%, 31.3%)	3.6%	(2.5%, 5.0%)
York County	51199	7.5%	(2.7%, 19.2%)	6.3%	(4.6%, 8.5%)
Chesapeake City	51550	1.5%	(1.0%, 5.2%)	5.3%	(4.1%, 6.7%)
Franklin City	51620	2.5%	(1.4%, 25.1%)	6.6%	(4.6%, 9.6%)
Hampton City	51650	5.9%	(2.4%, 13.6%)	5.6%	(4.0%, 7.8%)
Newport News City	51700	4.6%	(1.8%, 11.0%)	5.4%	(4.3%, 6.7%)
Norfolk City	51710	5.9%	(3.1%, 10.9%)	6.3%	(4.8%, 8.2%)
Poquoson City	51735	5.9%	(1.5%, 66.6%)	6.1%	(3.0%, 11.9%)
Portsmouth City	51740	3.8%	(2.4%, 10.0%)	5.9%	(4.6%, 7.4%)
Suffolk City	51800	8.0%	(3.9%, 15.6%)	6.6%	(5.3%, 8.2%)
Virginia Beach City	51810	2.8%	(1.4%, 5.6%)	4.7%	(3.6%, 6.1%)
Williamsburg City	51830	2.5%	(0.8%, 65.5%)	1.9%	(0.4%, 7.9%)

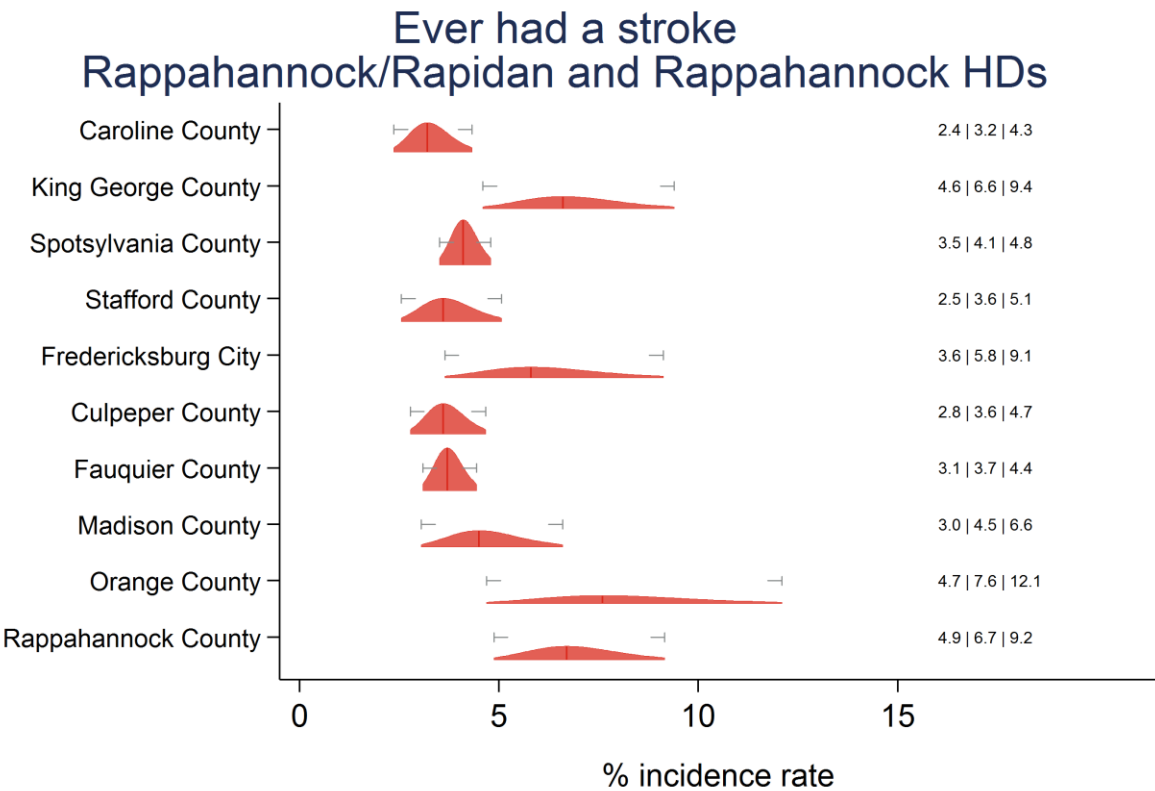
Graphical representation

## Ever had a stroke Central Shenandoah and Lord Fairfax HDs



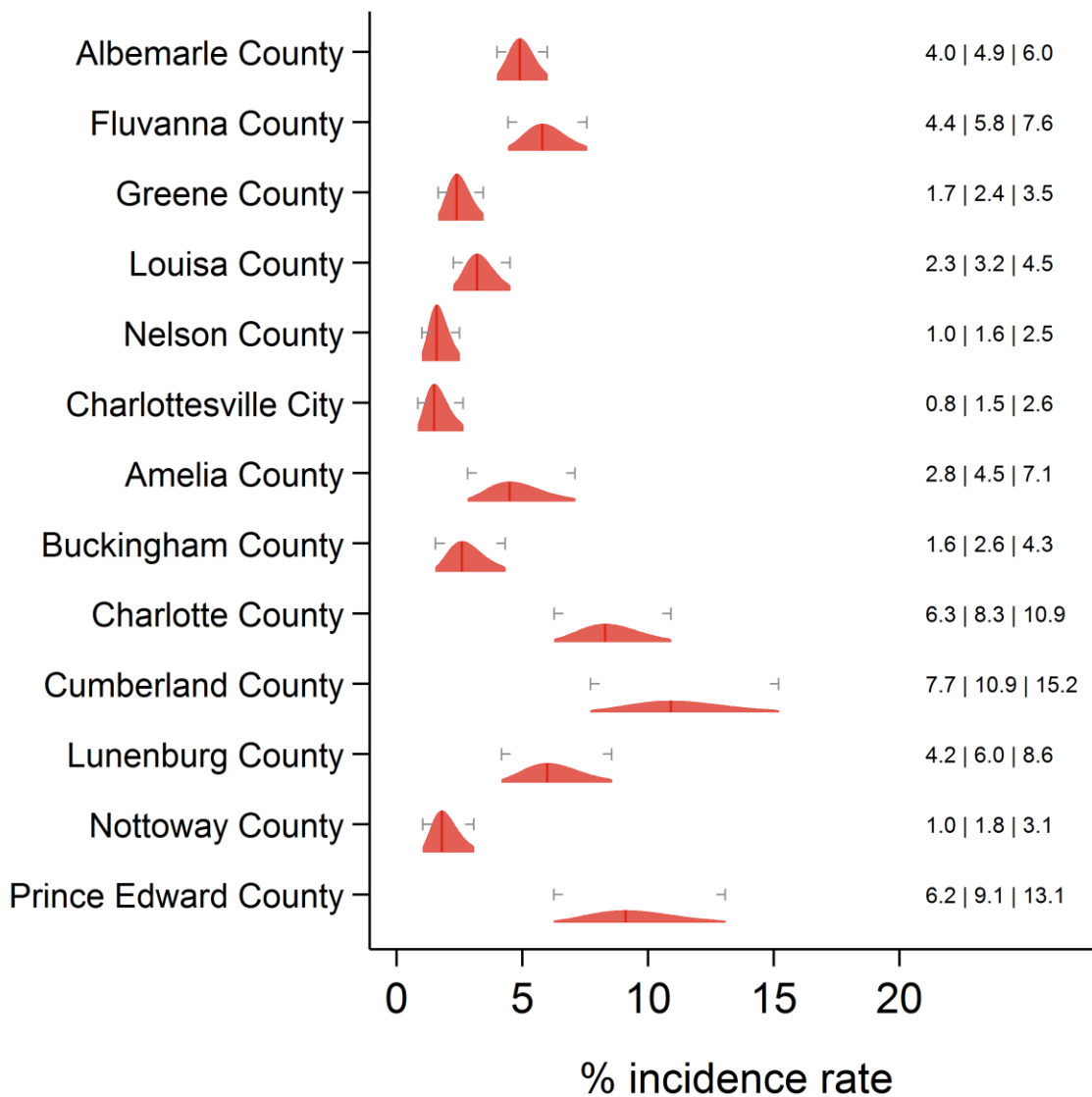
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval





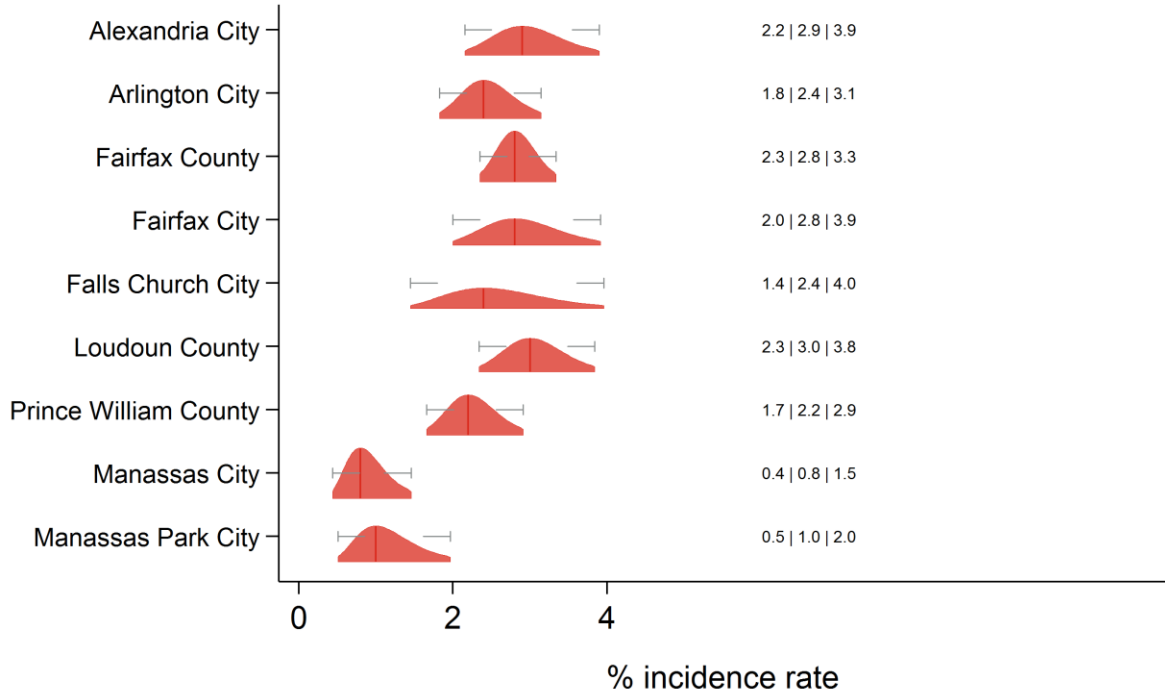
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

## Ever had a stroke Thomas Jefferson and Piedmont HDs



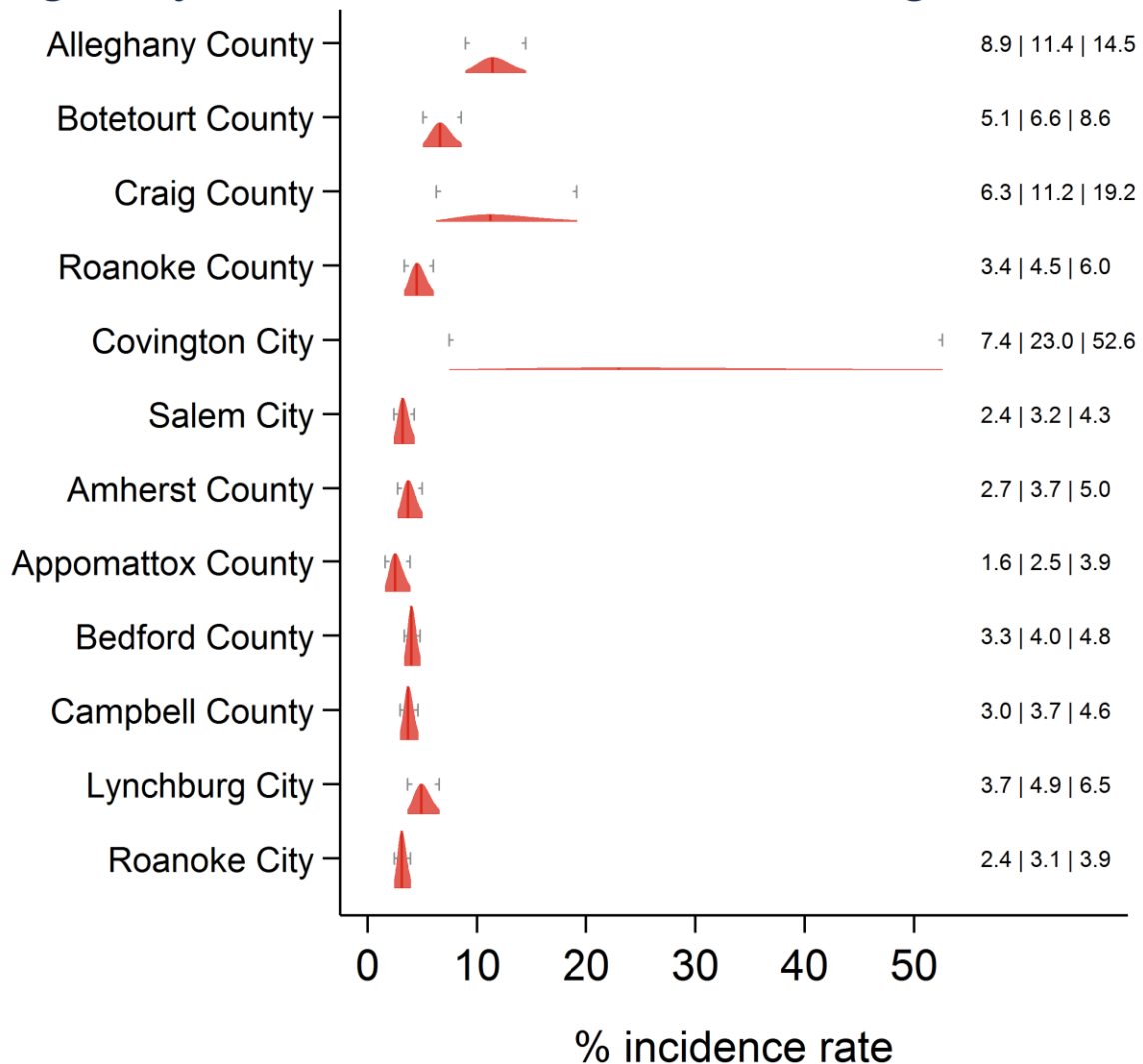
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

# Ever had a stroke Alexandria, Fairfax, Arlington, Loudon, Prince William HDs



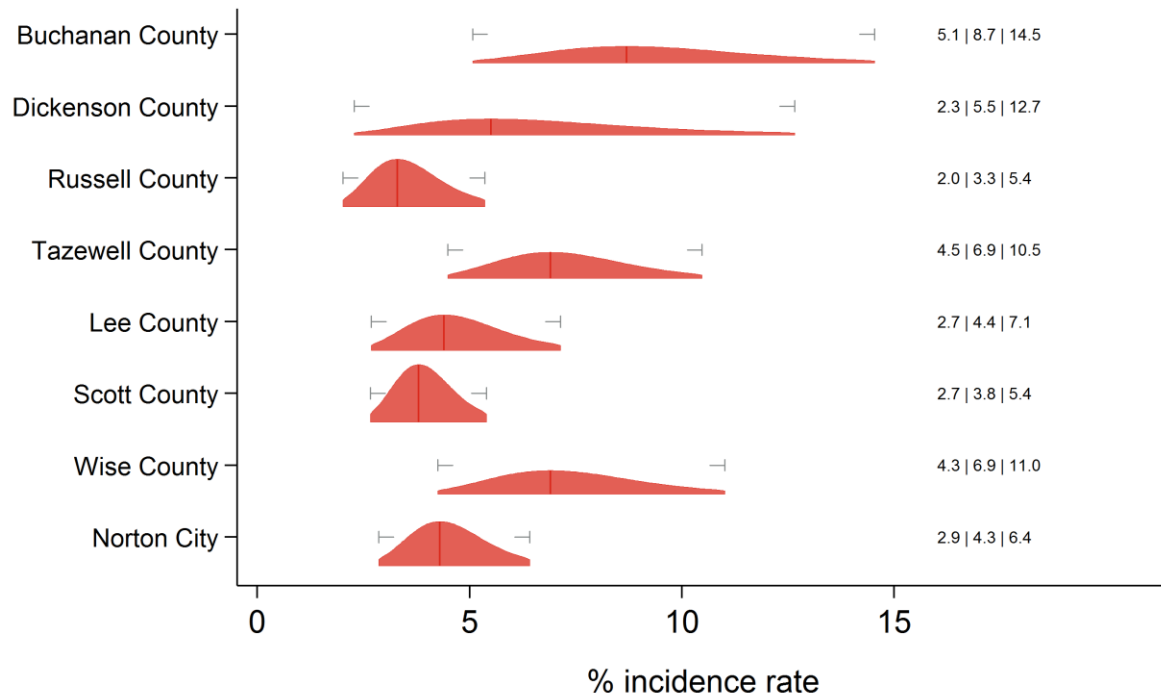
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Ever had a stroke Alleghany, Roanoke and Central Virginia HDs



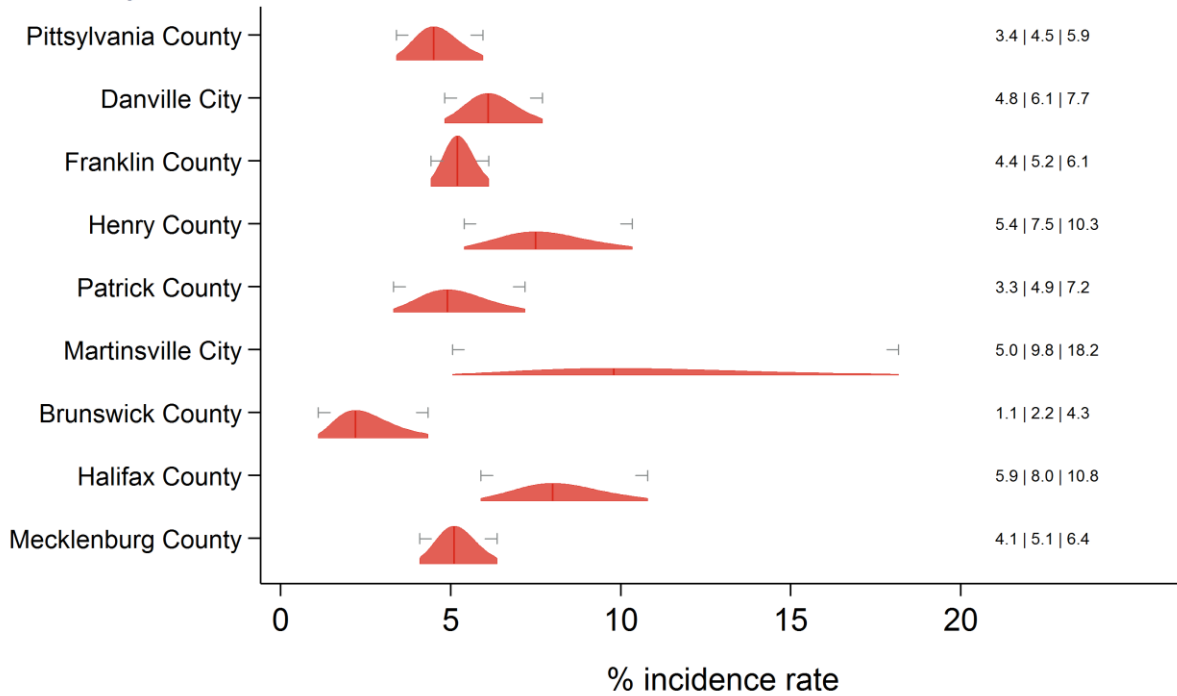
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Ever had a stroke Cumberland Plateau and Lenowisco HDs



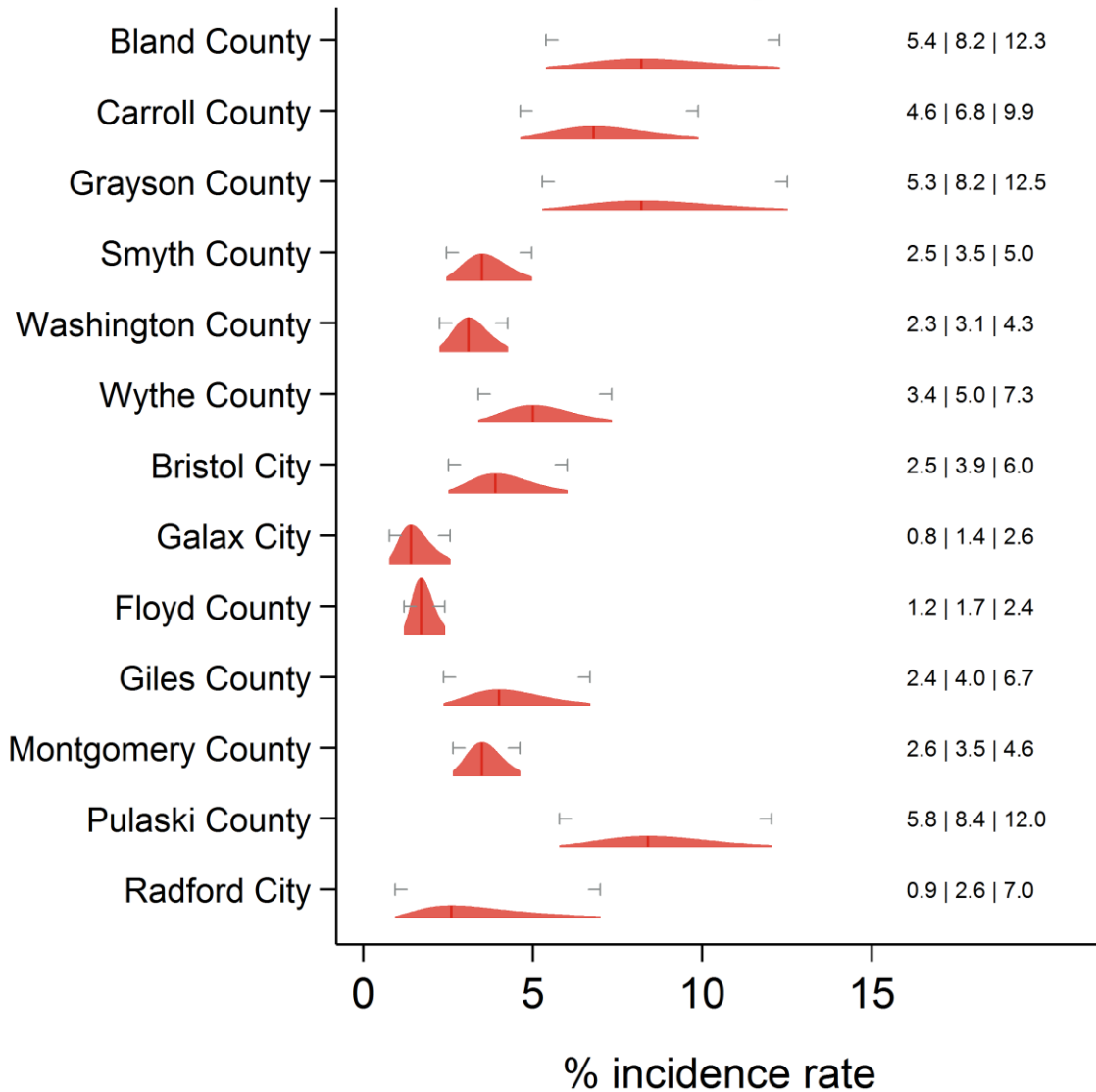
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Ever had a stroke Pittsylvania/Danville, Southside and West Piedmont HDs



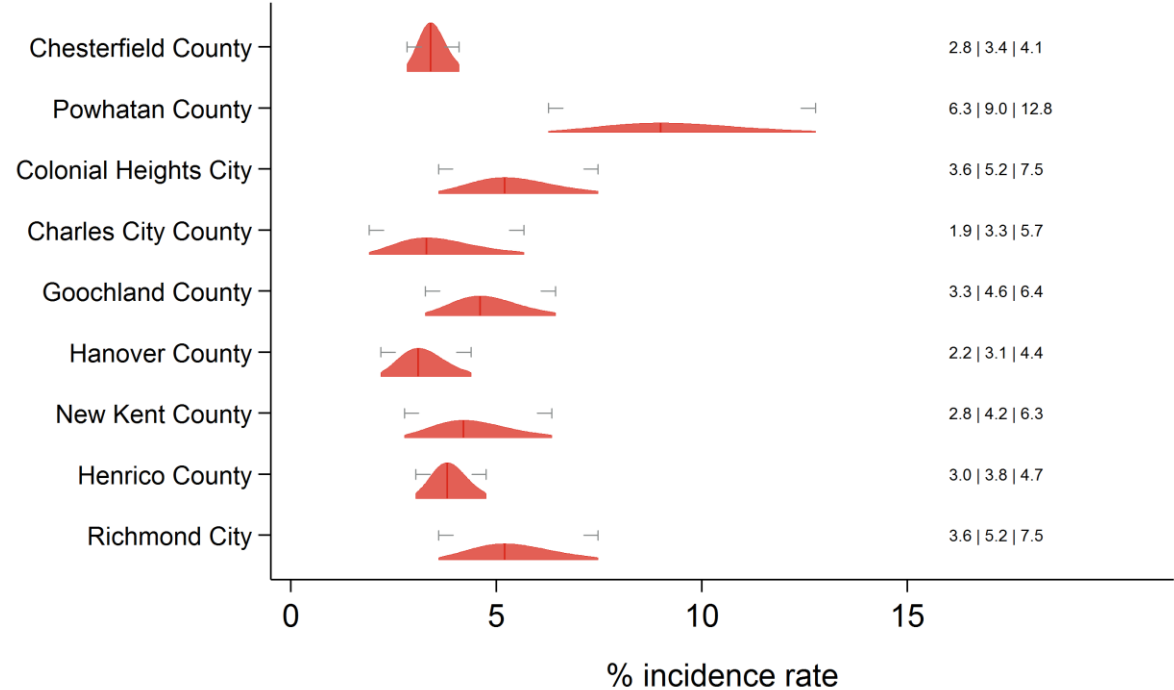
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Ever had a stroke New River and Mount Rogers HDs



Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

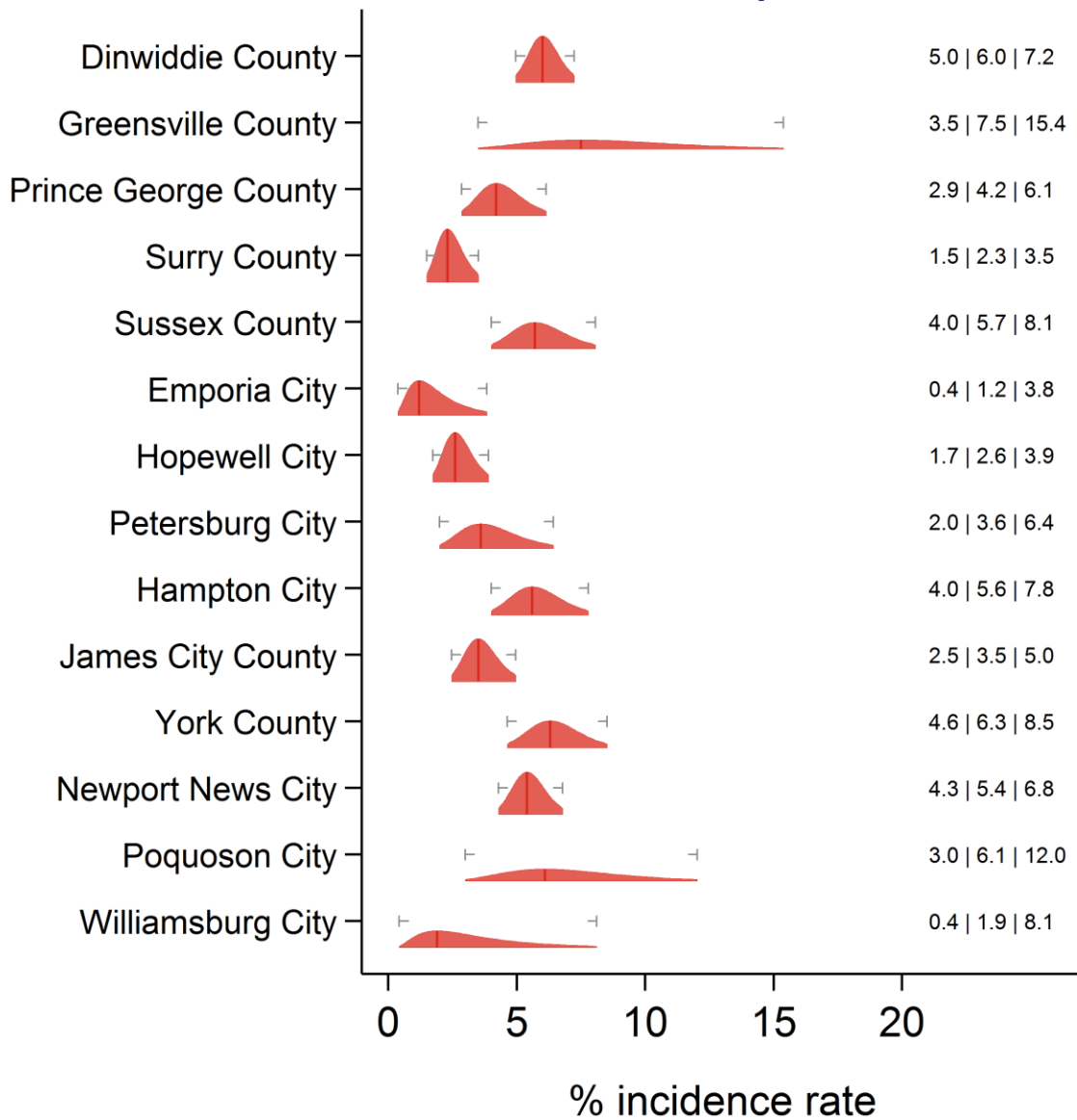
# Ever had a stroke Chesterfield, Chickahominy, Henrico and Richmond HDs



Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

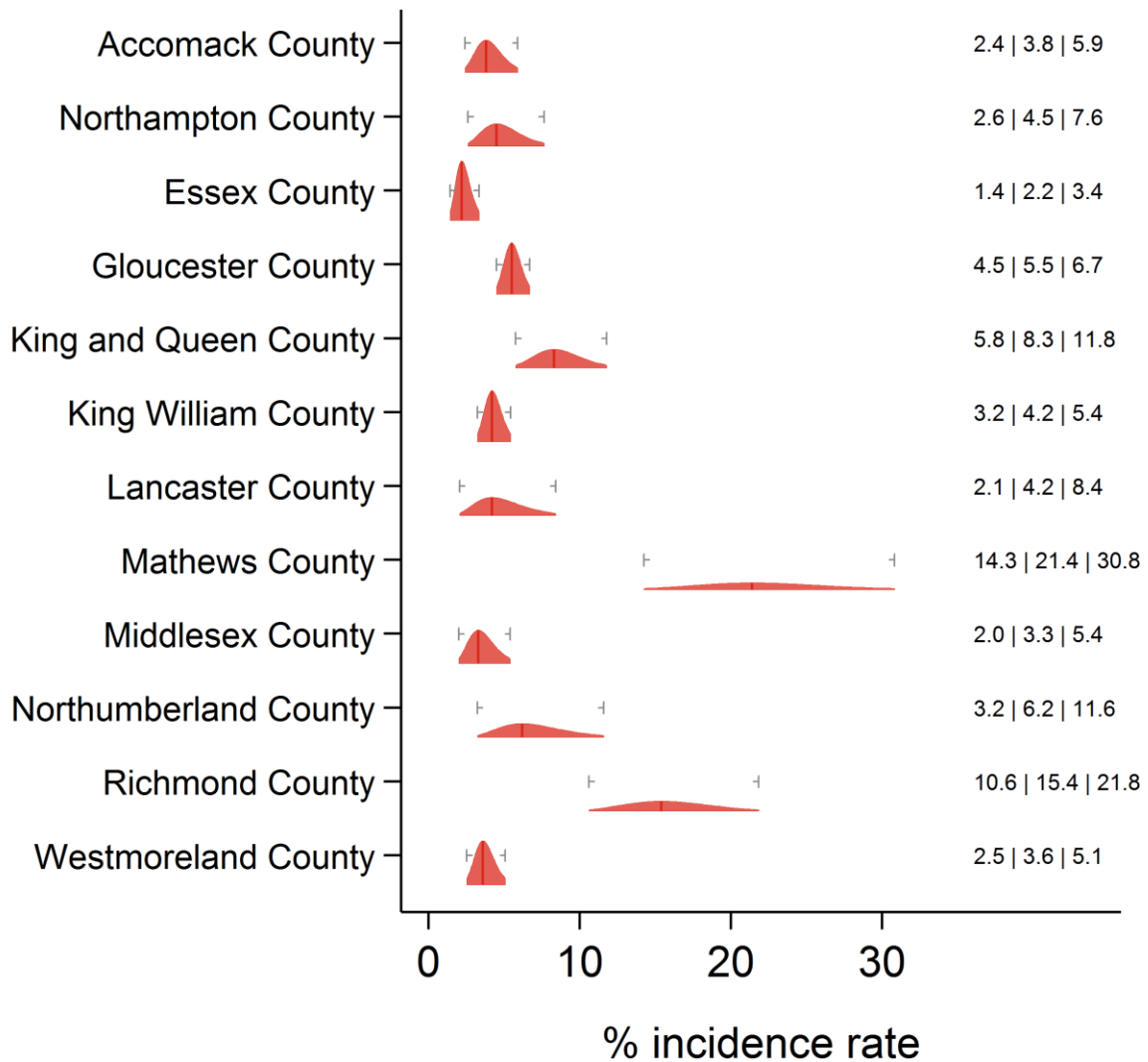


## Ever had a stroke Crater, Peninsula and Hampton HDs



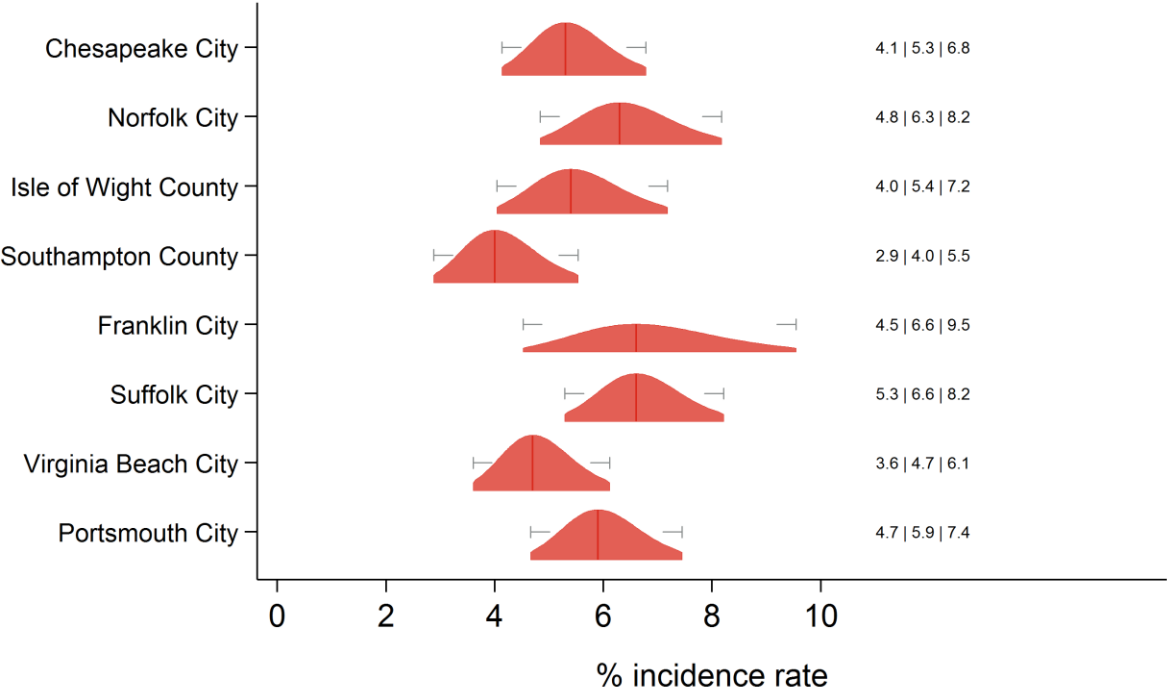
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Ever had a stroke Eastern Shore and Three Rivers HDs



Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

# Ever had a stroke Norfolk, Portsmouth, Chesapeake, VA Beach, W. Tidewater HDs



Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

## Additional diagnostics

Direct estimate is inside the 95% SAE Wilson CI: 46 areas.

Direct estimate is outside the 95% SAE Wilson CI: 87 areas.

SAE estimate is inside the 95% direct Wilson CI: 130 areas.

SAE estimate is outside the 95% direct Wilson CI: 3 areas.

SAE Wilson 95% CI is fully inside the 95% direct Wilson CI: 121 areas.

SAE Wilson 95% CI partially overlaps with the 95% direct Wilson CI: 12 areas.

SAE Wilson 95% CI and the 95% direct Wilson CI do not overlap: 0 areas.

SAE standard error is less than the direct standard error: 106 areas.

SAE standard error is greater than the (nonzero) direct standard error: 3 areas.

Direct standard error is zero: 24 areas.

Proportion of SAE variance due to ACS sampling error: min = 0.05%; med = 0.82%; max = 5.19%.

Proportion of SAE variance due to sampling error in regression coefficient estimates: min = 42.22%; med = 96.85%; max = 99.64%.

Proportion of SAE variance due to model selection: min = 0.05%; med = 1.79%; max = 57.72%.

Proportion of SAE variance due to area random effects: <identically zero>