

## Indicator 30: Tetanus Diphtheria (Tdap)

Internal variable name: outc30\_tdap\_vacc

Definition: Since 2005, have you had a tetanus shot? (If yes, ask: "Was this Tdap, the tetanus shot that also has pertussis or whooping cough vaccine?")

### Predictive models

	Mixed, demos only	Logit, no area effects	Mixed with area covariates
	b/se	b/se	b/se
Outcome 30: Tetanus Diphtheria (Tdap)			
NH Black vs. NH White	-0.3653*** (0.0889)	-0.3644*** (0.1096)	-0.3644*** (0.0918)
NH Asian vs. NH White	-0.3604 (0.2702)	-0.3529 (0.2418)	-0.3529 (0.2709)
NH Other vs. NH White	0.2272 (0.1714)	0.2125 (0.1784)	0.2125 (0.1719)
Hispanic vs. NH White	-0.4247* (0.1794)	-0.4378* (0.1833)	-0.4378* (0.1824)
Female	0.4937*** (0.0678)	0.4914*** (0.0786)	0.4914*** (0.0676)
Age 18-34 vs. 65+	1.0432*** (0.1113)	1.0305*** (0.1079)	1.0305*** (0.1122)
Age 35-44 vs. 65+	0.8445*** (0.1041)	0.8366*** (0.1158)	0.8366*** (0.1056)
Age 45-54 vs. 65+	0.3410** (0.1046)	0.3258** (0.1036)	0.3258** (0.1023)
Age 55-64 vs. 65+	0.2969** (0.0974)	0.2828** (0.0991)	0.2828** (0.0953)
Crude mortality rate of influenza & pneumonia per 10K		-0.1172** (0.0418)	-0.1172** (0.0428)
% group quarter population		0.1212*** (0.0236)	0.1212*** (0.0214)
Other female sites Female Rate		0.0775** (0.0262)	0.0775*** (0.0220)
% no phone service, ACS 2016 5yr		-0.1121* (0.0455)	-0.1121** (0.0386)
VA BRFSS 2014 SAE outc39_curr_smoker		-1.9675 (1.0526)	-1.9675* (0.9443)
Esophagus Female Rate		-0.0195 (0.0227)	-0.0195 (0.0177)
Esophagus Male Rate		-0.0092 (0.0083)	-0.0092 (0.0083)

c.EsophagusFemaleRate#c.EsophagusMaleRate		-0.0033 (0.0021)	-0.0033* (0.0014)
Average aggregated value (in dollars) per occupied housing unit in the ACS		-0.0017 (0.0009)	-0.0017 (0.0009)
Stomach Male Rate		0.0114 (0.0115)	0.0114 (0.0099)
c.PDB_avg_agg_house_value_ACS126#c.StomachMaleRate		0.0000 (0.0001)	0.0000 (0.0001)
Intercept	-1.5828*** (0.0790)	-0.8338* (0.3421)	-0.8338* (0.3556)
Area effect variance	0.0530 (0.0449)		0.0000 (0.0000)

Number of alternative models used to estimate model error = 15.

## Results

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Augusta County	51015	27.7%	(17.2%, 41.5%)	26.1%	(23.3%, 29.0%)
Bath County	51017	41.9%	(12.1%, 79.0%)	44.3%	(36.1%, 52.9%)
Caroline County	51033	42.2%	(17.8%, 71.2%)	26.9%	(19.2%, 36.4%)
Clarke County	51043	15.3%	(3.4%, 48.1%)	20.0%	(13.8%, 28.1%)
Culpeper County	51047	23.0%	(11.9%, 39.8%)	21.9%	(18.9%, 25.3%)
Fauquier County	51061	10.2%	(5.3%, 24.8%)	22.0%	(17.6%, 27.1%)
Frederick County	51069	31.1%	(18.3%, 47.6%)	23.1%	(19.6%, 27.0%)
Highland County	51091	31.4%	(6.1%, 76.4%)	27.1%	(22.1%, 32.7%)
King George County	51099	61.2%	(29.4%, 85.7%)	43.2%	(34.5%, 52.3%)
Madison County	51113	7.7%	(3.1%, 35.6%)	26.7%	(19.5%, 35.4%)
Orange County	51137	21.8%	(8.6%, 45.2%)	24.6%	(21.5%, 28.0%)
Page County	51139	43.4%	(22.5%, 66.9%)	20.3%	(16.2%, 25.0%)
Rappahannock County	51157	30.5%	(8.9%, 66.5%)	32.2%	(17.7%, 51.1%)
Rockbridge County	51163	25.2%	(12.3%, 44.8%)	27.5%	(23.4%, 32.0%)
Rockingham County	51165	21.7%	(12.7%, 34.6%)	30.9%	(27.3%, 34.6%)
Shenandoah County	51171	22.8%	(10.8%, 41.8%)	22.3%	(18.8%, 26.2%)
Spotsylvania County	51177	18.5%	(10.4%, 30.7%)	25.4%	(20.8%, 30.5%)
Stafford County	51179	31.0%	(20.9%, 43.2%)	32.1%	(28.9%, 35.5%)
Warren County	51187	25.4%	(11.0%, 48.4%)	25.6%	(22.8%, 28.7%)
Buena Vista City	51530	33.3%	(6.0%, 79.6%)	24.8%	(16.5%, 35.6%)
Fredericksburg City	51630	35.0%	(15.2%, 61.8%)	28.6%	(23.4%, 34.5%)
Harrisonburg City	51660	83.4%	(41.8%, 97.2%)	49.9%	(41.8%, 58.1%)
Lexington City	51678	79.9%	(2.7%, 99.5%)	65.5%	(48.5%, 79.2%)
Staunton City	51790	61.5%	(22.0%, 90.1%)	29.4%	(25.1%, 34.1%)
Waynesboro City	51820	38.2%	(9.8%, 77.8%)	40.7%	(29.4%, 53.1%)
Winchester City	51840	10.1%	(2.8%, 69.7%)	29.1%	(22.7%, 36.4%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Albemarle County	51003	32.5%	(22.8%, 43.8%)	35.3%	(32.8%, 38.0%)
Alleghany County	51005	23.4%	(8.8%, 49.1%)	22.7%	(18.3%, 27.8%)
Amherst County	51009	19.4%	(6.7%, 44.7%)	19.6%	(15.9%, 24.0%)
Appomattox County	51011	17.8%	(6.8%, 42.7%)	25.1%	(20.1%, 30.8%)
Arlington City	51013	40.7%	(29.9%, 52.5%)	31.7%	(28.3%, 35.4%)
Bedford County	51019	34.8%	(22.8%, 49.2%)	29.0%	(25.6%, 32.6%)
Botetourt County	51023	37.8%	(19.3%, 60.8%)	27.9%	(24.0%, 32.3%)
Campbell County	51031	29.7%	(18.7%, 43.8%)	28.6%	(25.0%, 32.5%)
Craig County	51045	43.2%	(5.4%, 91.0%)	17.6%	(12.5%, 24.2%)
Fairfax County	51059	30.3%	(25.2%, 36.0%)	26.5%	(24.6%, 28.6%)
Fluvanna County	51065	35.4%	(16.7%, 60.1%)	22.3%	(18.7%, 26.3%)
Greene County	51079	45.5%	(11.7%, 84.0%)	44.7%	(36.9%, 52.7%)
Loudoun County	51107	25.9%	(18.9%, 34.3%)	25.2%	(21.9%, 28.9%)
Louisa County	51109	28.6%	(14.3%, 49.0%)	19.0%	(16.3%, 21.9%)
Nelson County	51125	16.9%	(4.3%, 48.1%)	19.6%	(17.0%, 22.5%)
Prince William County	51153	28.5%	(22.1%, 35.9%)	24.5%	(21.9%, 27.4%)
Roanoke County	51161	35.8%	(24.8%, 48.5%)	35.3%	(31.2%, 39.6%)
Alexandria City	51510	34.4%	(24.2%, 46.3%)	25.6%	(22.0%, 29.6%)
Charlottesville City	51540	31.7%	(15.0%, 55.0%)	31.7%	(25.8%, 38.3%)
Covington City	51580	0.0%	(0.0%, 96.4%)	30.8%	(21.0%, 42.9%)
Fairfax City	51600	56.8%	(41.9%, 70.5%)	49.8%	(39.7%, 59.9%)
Falls Church City	51610	9.4%	(1.7%, 38.6%)	17.7%	(11.5%, 26.2%)
Lynchburg City	51680	9.8%	(5.7%, 20.8%)	22.8%	(16.8%, 30.2%)
Manassas City	51683	30.6%	(10.4%, 62.6%)	19.1%	(15.7%, 23.1%)
Manassas Park City	51685	7.9%	(0.9%, 87.0%)	27.2%	(21.6%, 33.6%)
Salem City	51775	42.2%	(11.1%, 81.0%)	31.6%	(23.7%, 40.8%)

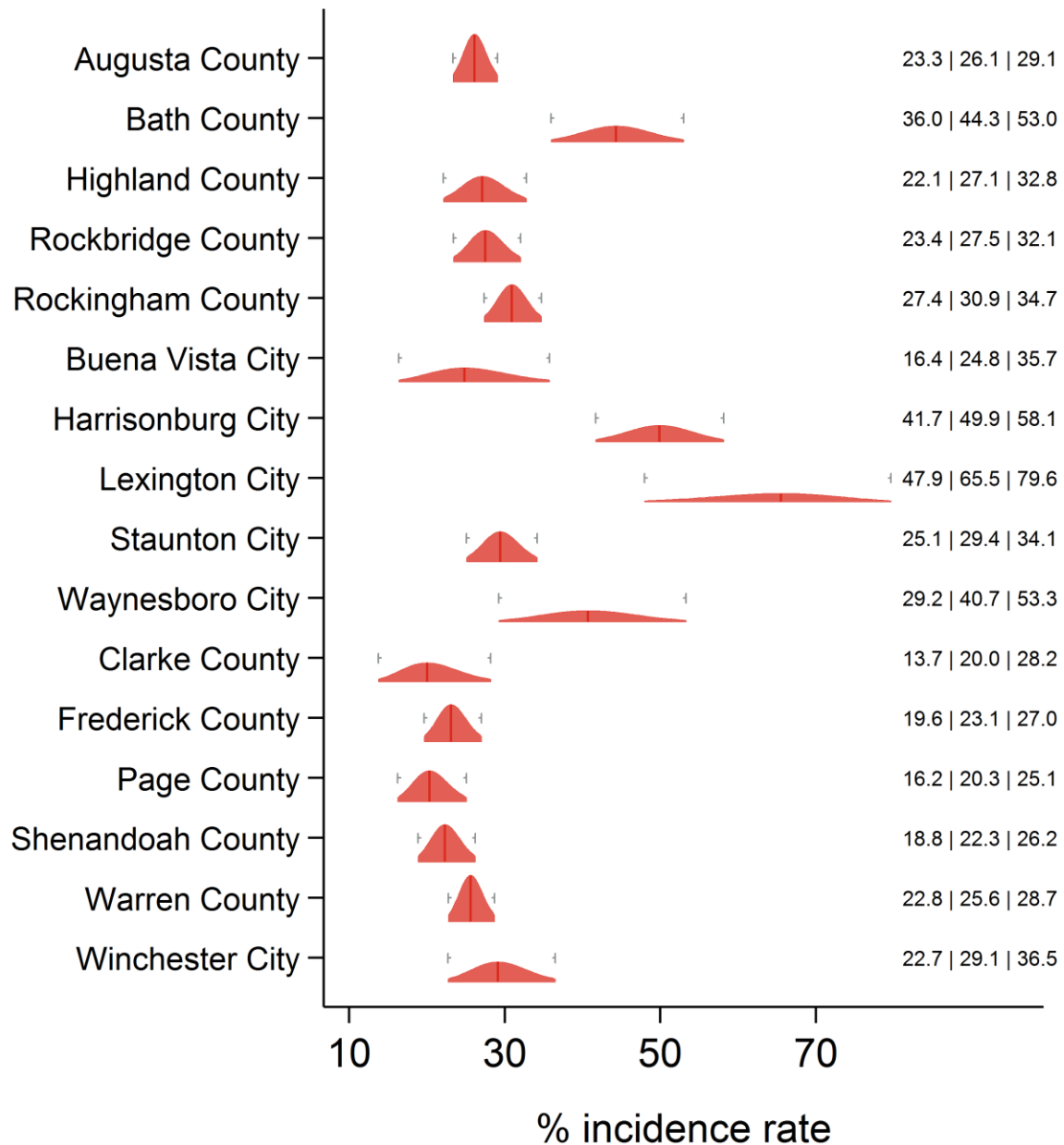
County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Bland County	51021	26.7%	(8.3%, 59.3%)	20.2%	(15.2%, 26.3%)
Buchanan County	51027	27.2%	(9.9%, 56.0%)	18.1%	(14.2%, 22.9%)
Carroll County	51035	26.8%	(12.9%, 47.4%)	20.0%	(16.9%, 23.6%)
Dickenson County	51051	10.7%	(2.1%, 40.6%)	26.1%	(21.9%, 30.8%)
Floyd County	51063	29.7%	(13.3%, 53.7%)	32.9%	(27.3%, 38.9%)
Franklin County	51067	28.3%	(13.7%, 49.5%)	27.9%	(24.6%, 31.4%)
Giles County	51071	24.5%	(10.4%, 47.5%)	34.1%	(29.5%, 39.0%)
Grayson County	51077	35.1%	(13.1%, 65.8%)	23.8%	(20.3%, 27.7%)
Henry County	51089	24.1%	(12.9%, 40.5%)	27.1%	(23.3%, 31.2%)
Lee County	51105	29.0%	(6.7%, 70.0%)	24.8%	(20.7%, 29.5%)
Montgomery County	51121	25.8%	(16.3%, 38.2%)	28.1%	(24.3%, 32.2%)
Patrick County	51141	54.6%	(25.1%, 81.2%)	29.5%	(24.9%, 34.5%)
Pittsylvania County	51143	11.5%	(6.6%, 19.3%)	16.9%	(13.5%, 21.0%)
Pulaski County	51155	23.1%	(11.1%, 42.1%)	33.0%	(26.4%, 40.4%)
Russell County	51167	6.5%	(1.7%, 22.1%)	12.1%	(8.2%, 17.5%)
Scott County	51169	21.2%	(9.8%, 40.1%)	23.2%	(19.4%, 27.5%)
Smyth County	51173	44.0%	(17.1%, 74.9%)	27.3%	(21.9%, 33.5%)
Tazewell County	51185	25.6%	(11.4%, 47.8%)	18.9%	(15.2%, 23.2%)
Washington County	51191	34.4%	(21.1%, 50.7%)	23.1%	(19.5%, 27.2%)
Wise County	51195	37.6%	(22.3%, 56.0%)	34.0%	(29.7%, 38.6%)
Wythe County	51197	21.1%	(8.6%, 43.2%)	22.9%	(19.0%, 27.2%)
Bristol City	51520	48.2%	(5.0%, 94.2%)	4.7%	(1.9%, 11.4%)
Danville City	51590	18.8%	(6.7%, 42.8%)	24.4%	(19.1%, 30.8%)
Galax City	51640	29.3%	(3.1%, 84.4%)	49.6%	(33.1%, 66.1%)
Martinsville City	51690	22.5%	(3.4%, 70.2%)	26.3%	(21.1%, 32.2%)
Norton City	51720	37.3%	(6.3%, 84.0%)	26.4%	(11.9%, 48.8%)
Radford City	51750	2.2%	(1.0%, 46.1%)	17.2%	(9.9%, 28.1%)
Roanoke City	51770	35.7%	(23.9%, 49.6%)	28.3%	(24.5%, 32.4%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Amelia County	51007	36.4%	(9.3%, 76.1%)	34.9%	(30.3%, 39.8%)
Brunswick County	51025	6.4%	(2.7%, 30.7%)	14.9%	(10.4%, 20.8%)
Buckingham County	51029	18.9%	(8.3%, 37.3%)	30.6%	(24.0%, 38.1%)
Charles City County	51036	38.3%	(7.2%, 83.2%)	20.7%	(16.0%, 26.4%)
Charlotte County	51037	20.1%	(8.3%, 41.2%)	20.2%	(16.3%, 24.6%)
Chesterfield County	51041	37.4%	(28.9%, 46.7%)	28.1%	(25.4%, 30.9%)
Cumberland County	51049	15.1%	(5.0%, 37.7%)	24.5%	(16.2%, 35.3%)
Dinwiddie County	51053	12.8%	(4.5%, 31.4%)	20.0%	(15.3%, 25.7%)
Goochland County	51075	30.8%	(12.4%, 58.5%)	19.8%	(15.2%, 25.3%)
Greensville County	51081	9.4%	(3.2%, 49.8%)	33.0%	(26.7%, 40.1%)
Halifax County	51083	18.7%	(7.7%, 38.7%)	29.2%	(26.0%, 32.8%)
Hanover County	51085	33.2%	(21.2%, 47.8%)	31.4%	(28.2%, 34.9%)
Henrico County	51087	33.9%	(24.7%, 44.5%)	31.1%	(28.4%, 34.0%)
Lunenburg County	51111	43.6%	(15.4%, 76.6%)	26.0%	(21.5%, 31.0%)
Mecklenburg County	51117	35.4%	(21.2%, 52.8%)	21.4%	(16.7%, 27.0%)
New Kent County	51127	17.1%	(6.7%, 46.0%)	23.9%	(20.3%, 28.0%)
Nottoway County	51135	23.3%	(7.9%, 51.6%)	28.2%	(20.3%, 37.8%)
Powhatan County	51145	40.8%	(18.4%, 67.9%)	28.1%	(23.5%, 33.3%)
Prince Edward County	51147	32.6%	(15.3%, 56.4%)	20.8%	(14.6%, 28.8%)
Prince George County	51149	13.1%	(5.7%, 27.4%)	19.6%	(16.4%, 23.2%)
Surry County	51181	32.3%	(10.6%, 65.7%)	12.9%	(8.6%, 18.8%)
Sussex County	51183	39.0%	(19.3%, 63.1%)	27.4%	(20.8%, 35.2%)
Colonial Heights City	51570	27.3%	(10.6%, 54.3%)	24.2%	(18.6%, 30.8%)
Emporia City	51595	0.0%	(0.0%, 91.8%)	47.4%	(27.0%, 68.7%)
Hopewell City	51670	27.6%	(7.8%, 63.2%)	26.1%	(20.0%, 33.3%)
Petersburg City	51730	29.1%	(13.5%, 51.8%)	26.5%	(20.1%, 34.1%)
Richmond City	51760	26.9%	(17.9%, 38.3%)	29.4%	(26.4%, 32.7%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Accomack County	51001	28.5%	(17.1%, 43.5%)	26.6%	(21.7%, 32.1%)
Essex County	51057	29.0%	(11.7%, 55.7%)	25.8%	(21.9%, 30.2%)
Gloucester County	51073	44.4%	(27.6%, 62.5%)	29.6%	(27.0%, 32.3%)
Isle of Wight County	51093	16.2%	(8.4%, 36.4%)	37.0%	(29.7%, 45.0%)
James City County	51095	37.0%	(23.2%, 53.4%)	28.2%	(25.1%, 31.5%)
King and Queen County	51097	60.6%	(25.6%, 87.3%)	46.1%	(31.2%, 61.8%)
King William County	51101	29.0%	(9.6%, 61.0%)	26.8%	(22.9%, 31.1%)
Lancaster County	51103	15.8%	(6.2%, 34.9%)	22.4%	(16.1%, 30.2%)
Mathews County	51115	33.2%	(12.6%, 63.1%)	32.9%	(26.4%, 40.0%)
Middlesex County	51119	20.1%	(7.6%, 43.7%)	22.6%	(18.5%, 27.4%)
Northampton County	51131	47.8%	(24.5%, 72.0%)	32.3%	(24.6%, 41.1%)
Northumberland County	51133	13.0%	(4.4%, 32.5%)	10.7%	(6.0%, 18.5%)
Richmond County	51159	33.1%	(11.5%, 65.4%)	39.1%	(31.6%, 47.1%)
Southampton County	51175	60.4%	(27.8%, 85.8%)	38.9%	(31.7%, 46.6%)
Westmoreland County	51193	3.5%	(1.9%, 41.4%)	10.6%	(7.3%, 15.2%)
York County	51199	24.2%	(12.9%, 40.9%)	27.5%	(23.4%, 32.2%)
Chesapeake City	51550	30.5%	(22.0%, 40.5%)	28.7%	(26.2%, 31.3%)
Franklin City	51620	28.5%	(8.8%, 62.1%)	40.3%	(28.5%, 53.4%)
Hampton City	51650	31.2%	(22.3%, 41.7%)	22.8%	(19.6%, 26.4%)
Newport News City	51700	30.6%	(21.0%, 42.3%)	28.7%	(25.5%, 32.2%)
Norfolk City	51710	40.5%	(30.8%, 51.1%)	27.9%	(24.2%, 31.9%)
Poquoson City	51735	23.4%	(3.2%, 82.7%)	23.1%	(18.7%, 28.2%)
Portsmouth City	51740	35.9%	(24.4%, 49.3%)	30.0%	(26.4%, 34.0%)
Suffolk City	51800	37.7%	(22.5%, 55.8%)	26.6%	(24.1%, 29.3%)
Virginia Beach City	51810	28.1%	(22.0%, 35.1%)	25.6%	(23.1%, 28.2%)
Williamsburg City	51830	9.3%	(1.1%, 48.1%)	9.8%	(3.5%, 24.6%)

Graphical representation

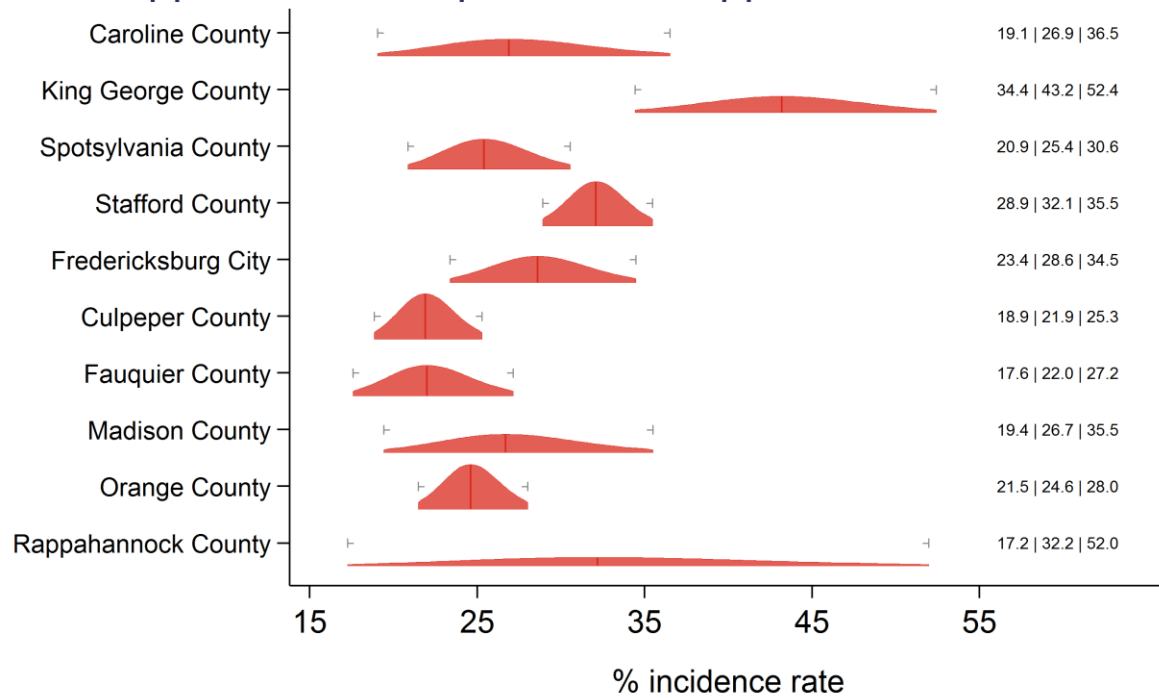
## Tetanus Diphtheria (Tdap) Central Shenandoah and Lord Fairfax HDs



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

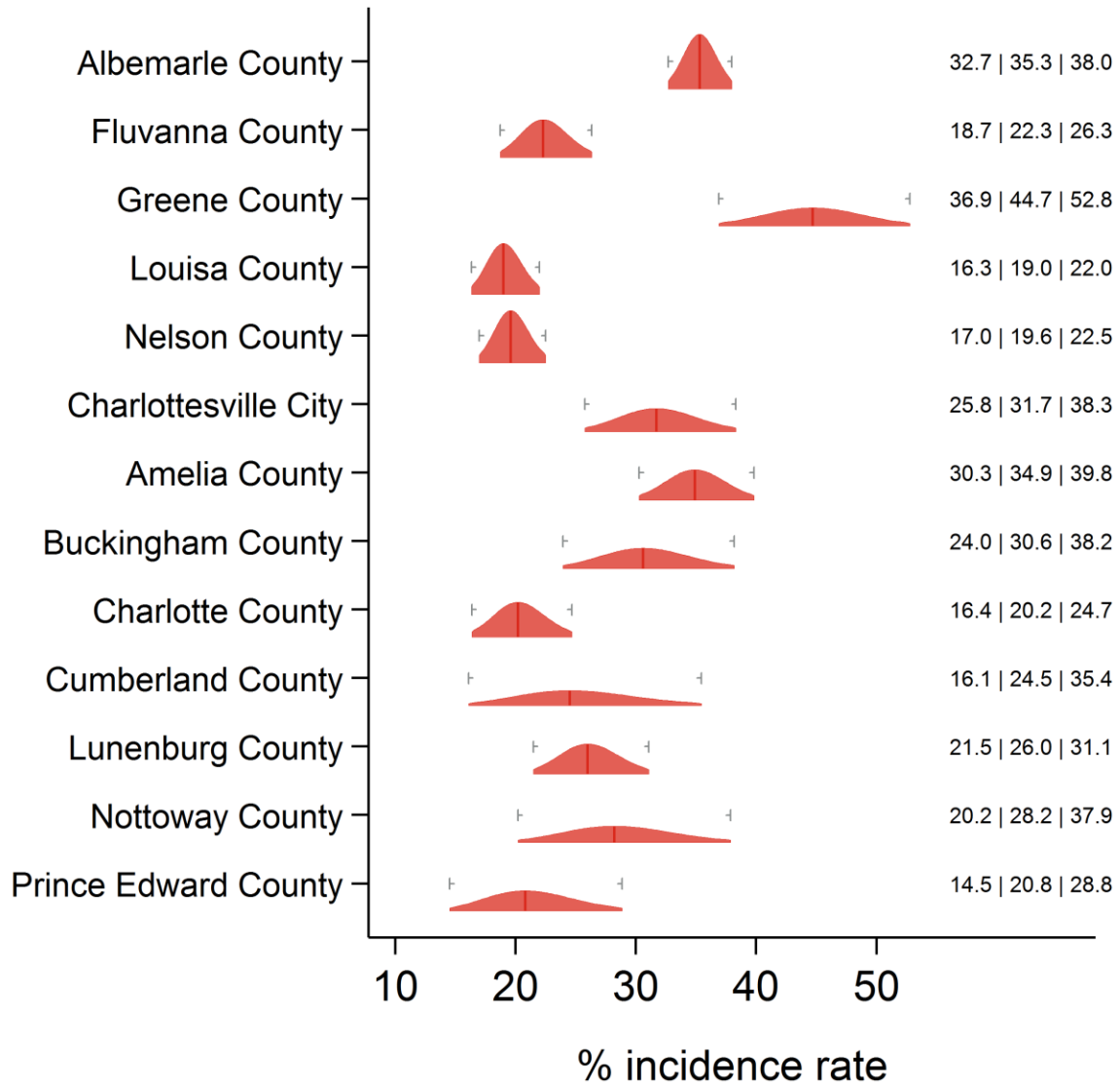


## Tetanus Diphtheria (Tdap) Rappahannock/Rapidan and Rappahannock HDs



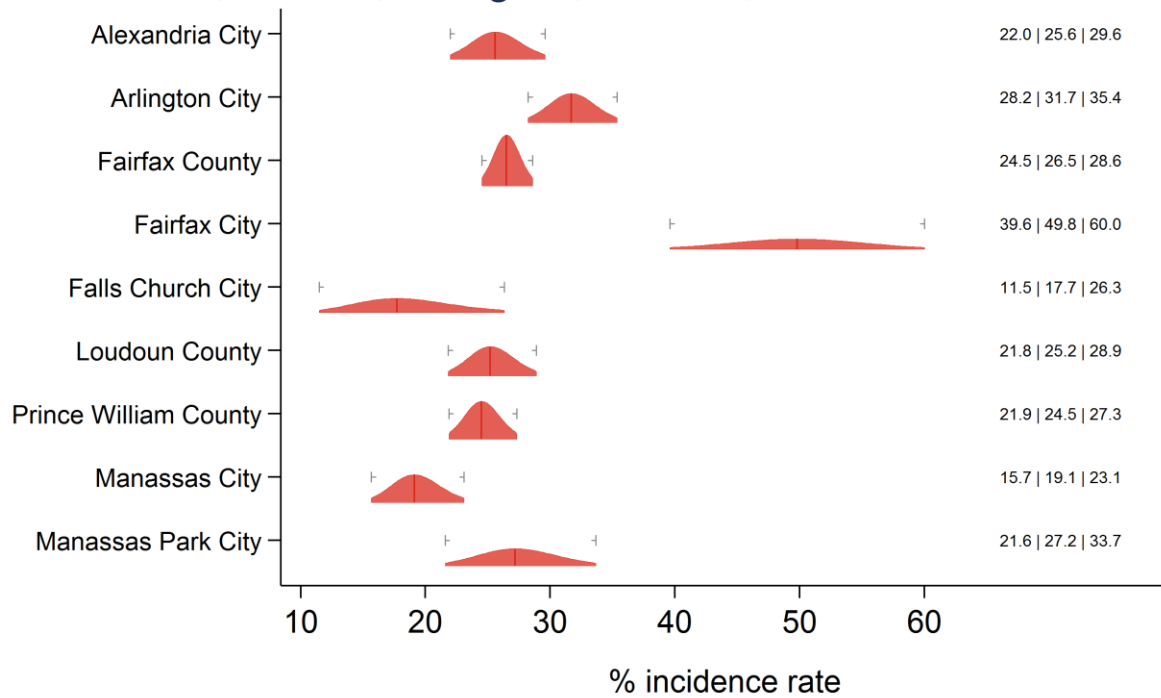
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) Thomas Jefferson and Piedmont HDs



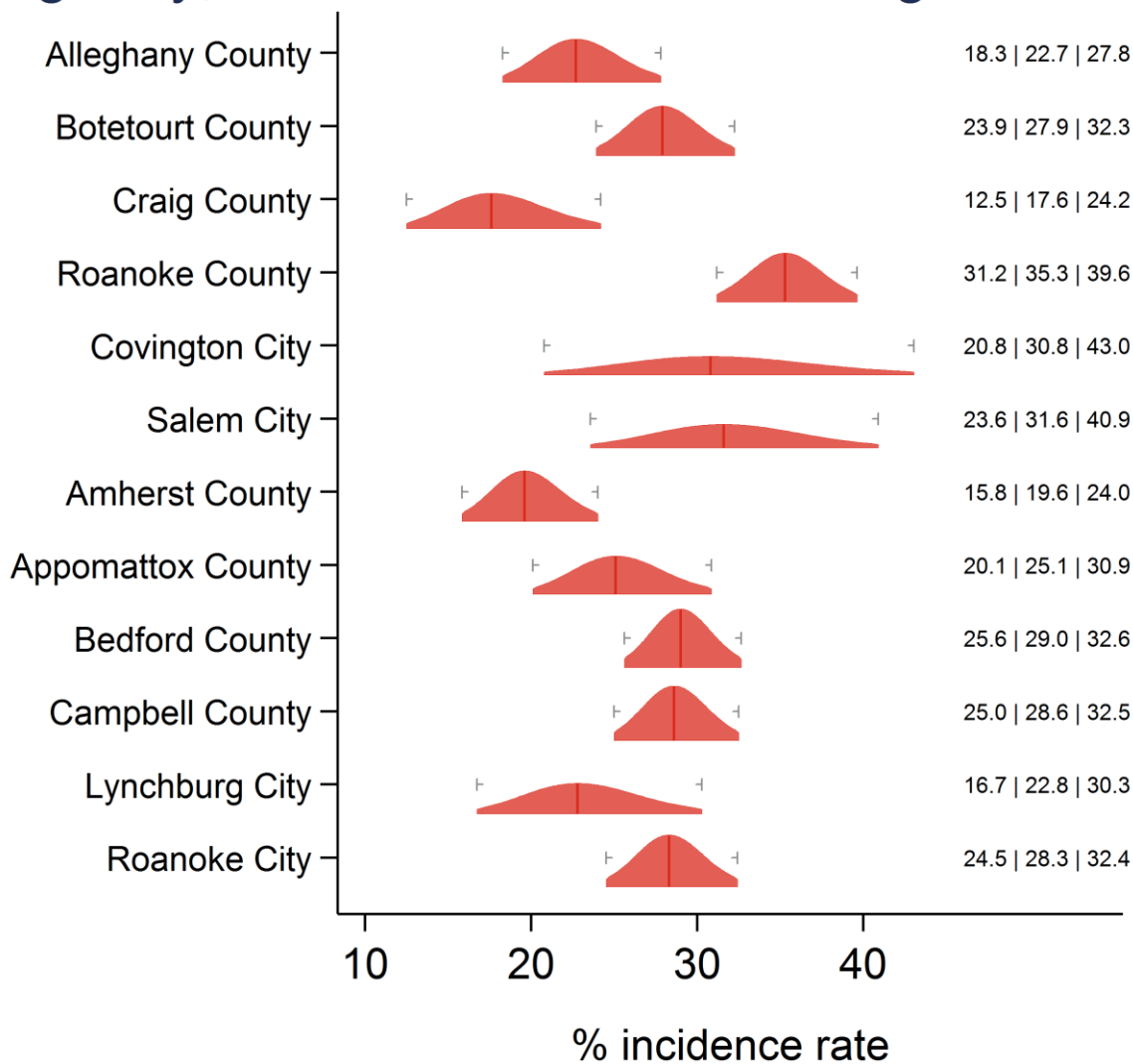
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) Alexandria, Fairfax, Arlington, Loudon, Prince William HDs



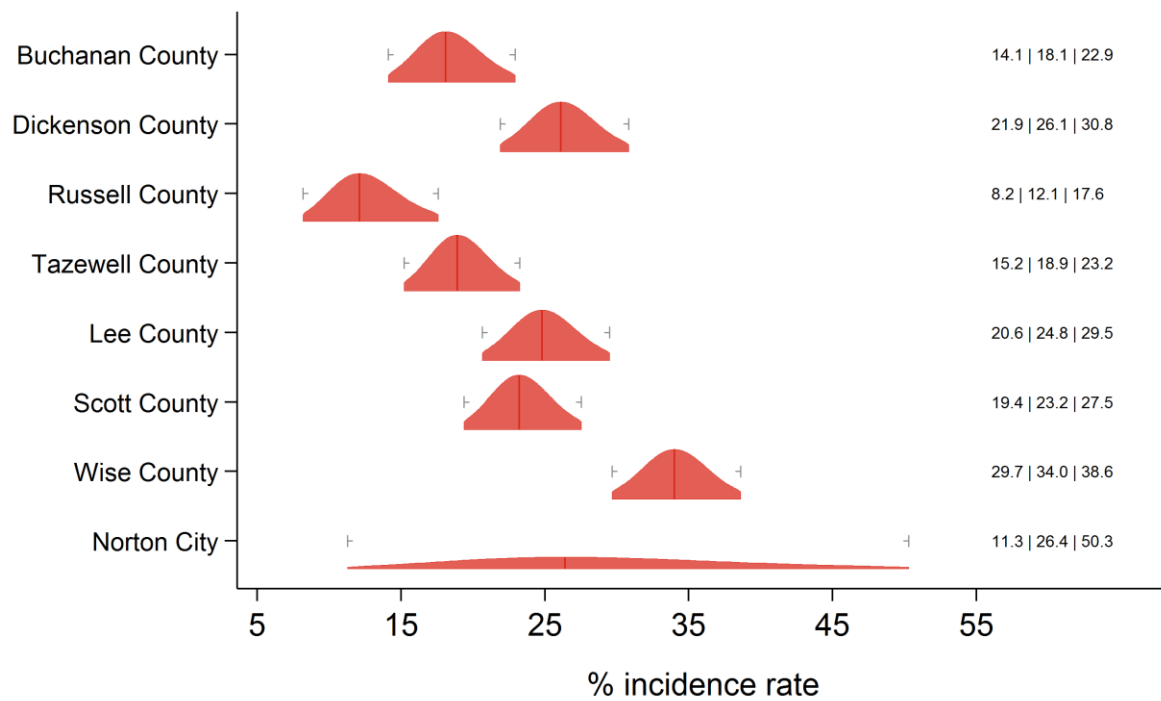
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) Alleghany, Roanoke and Central Virginia HDs



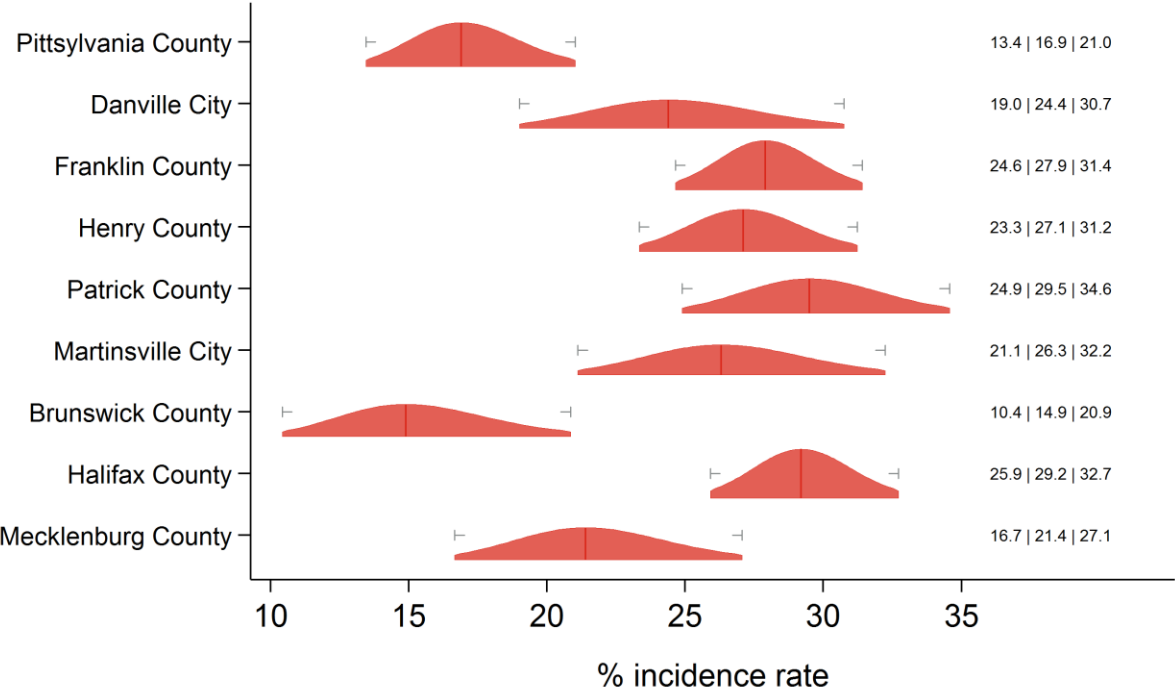
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) Cumberland Plateau and Lenowisco HDs



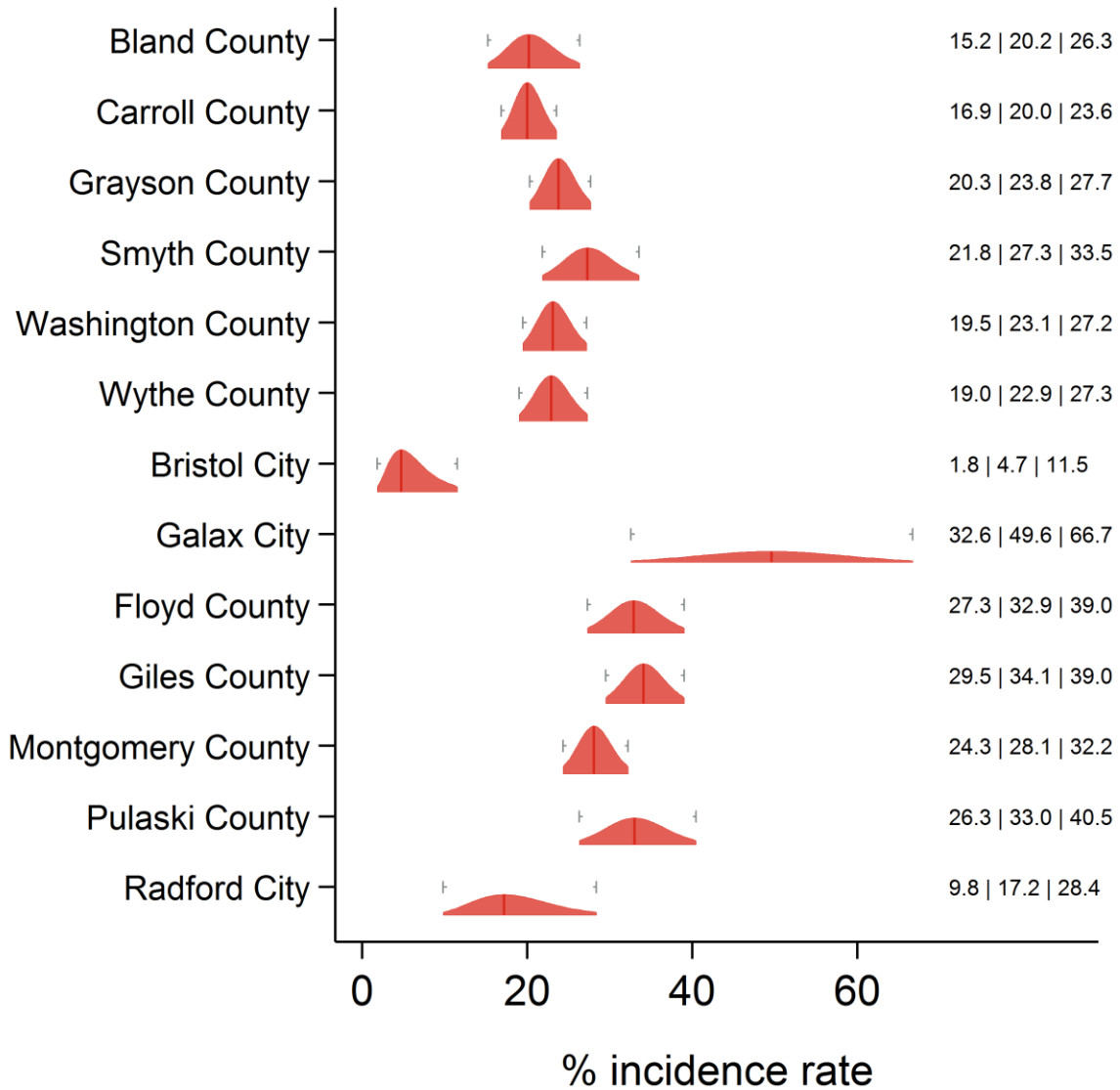
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

# Tetanus Diphtheria (Tdap) Pittsylvania/Danville, Southside and West Piedmont HDs



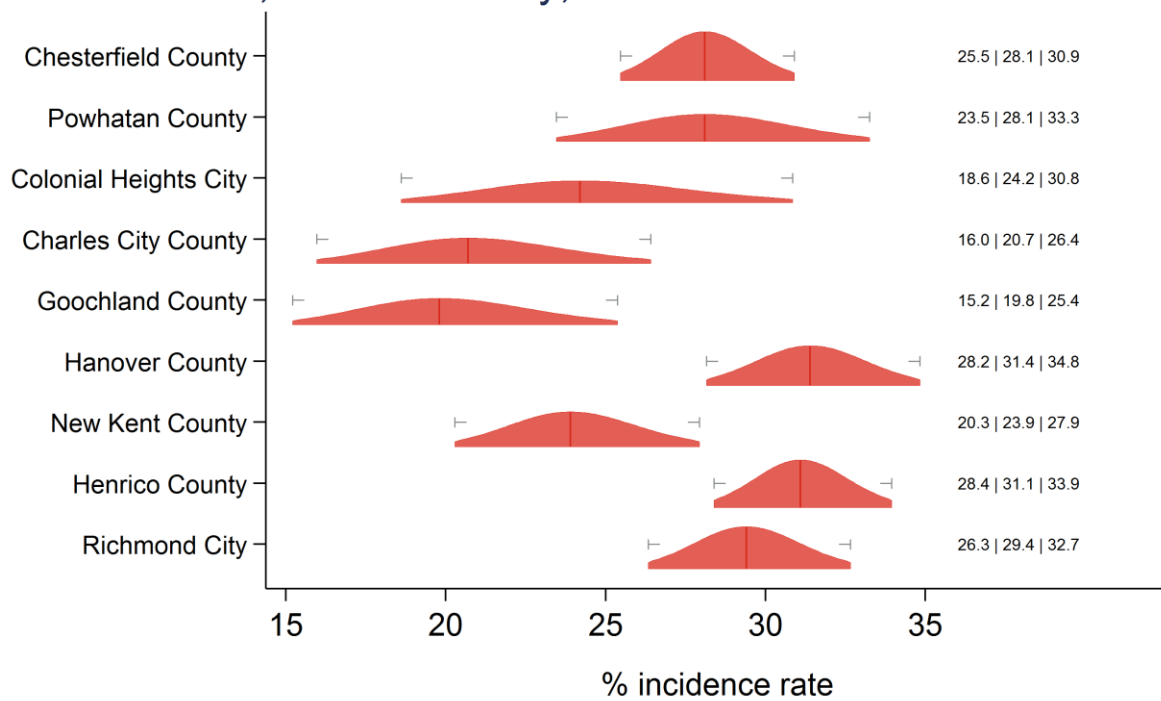
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) New River and Mount Rogers HDs



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

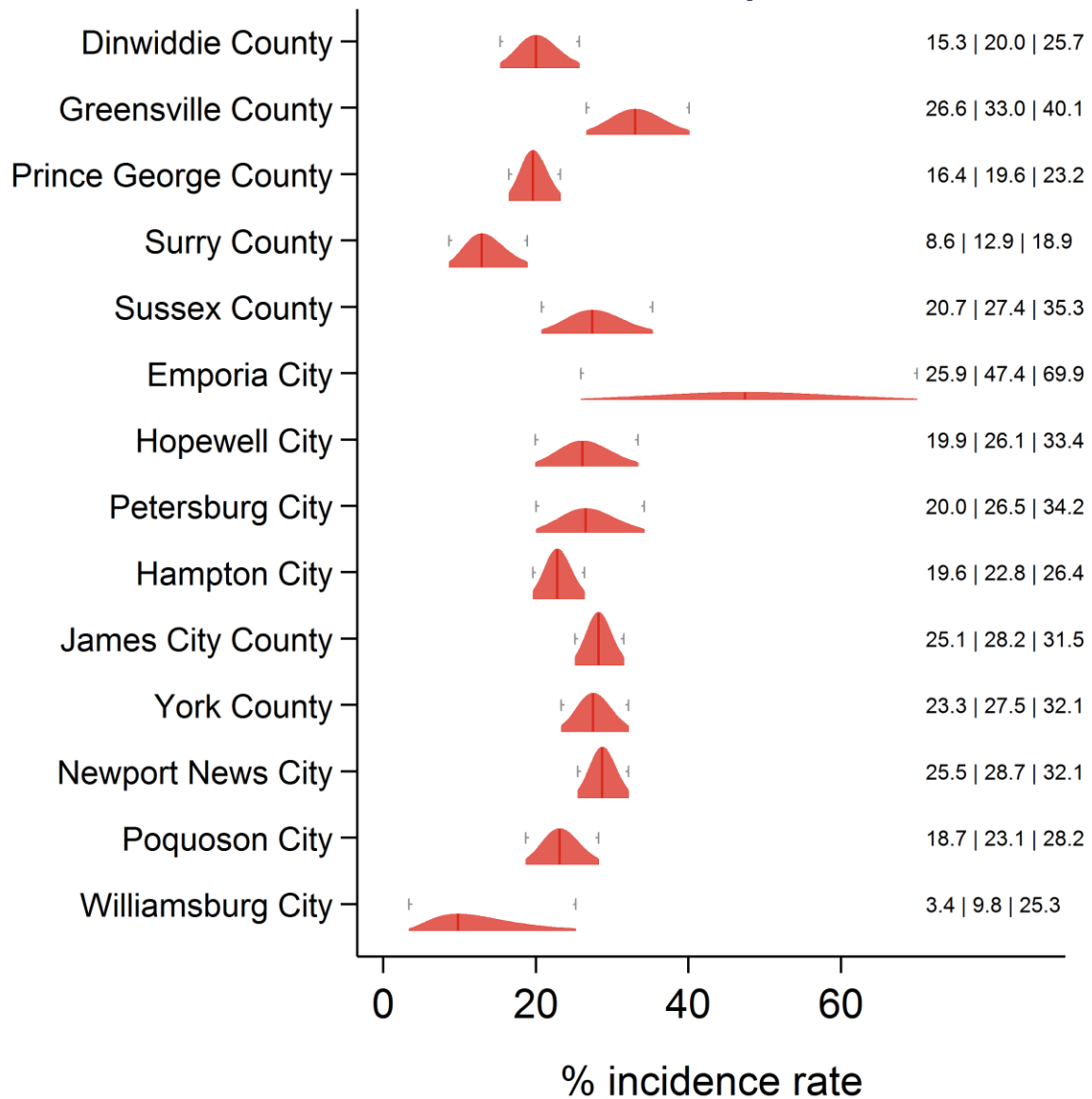
## Tetanus Diphtheria (Tdap) Chesterfield, Chickahominy, Henrico and Richmond HDs



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

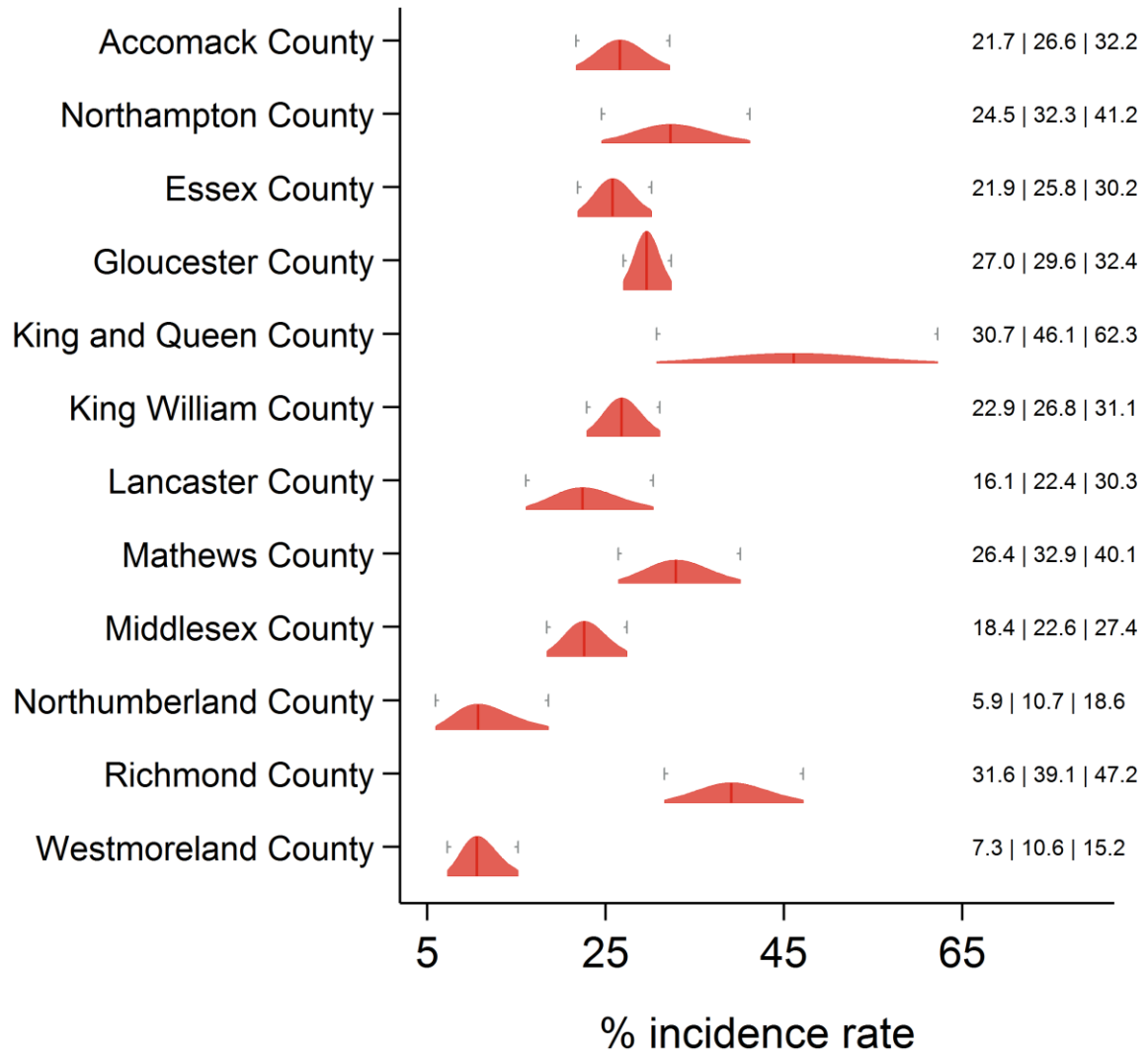


## Tetanus Diphtheria (Tdap) Crater, Peninsula and Hampton HDs



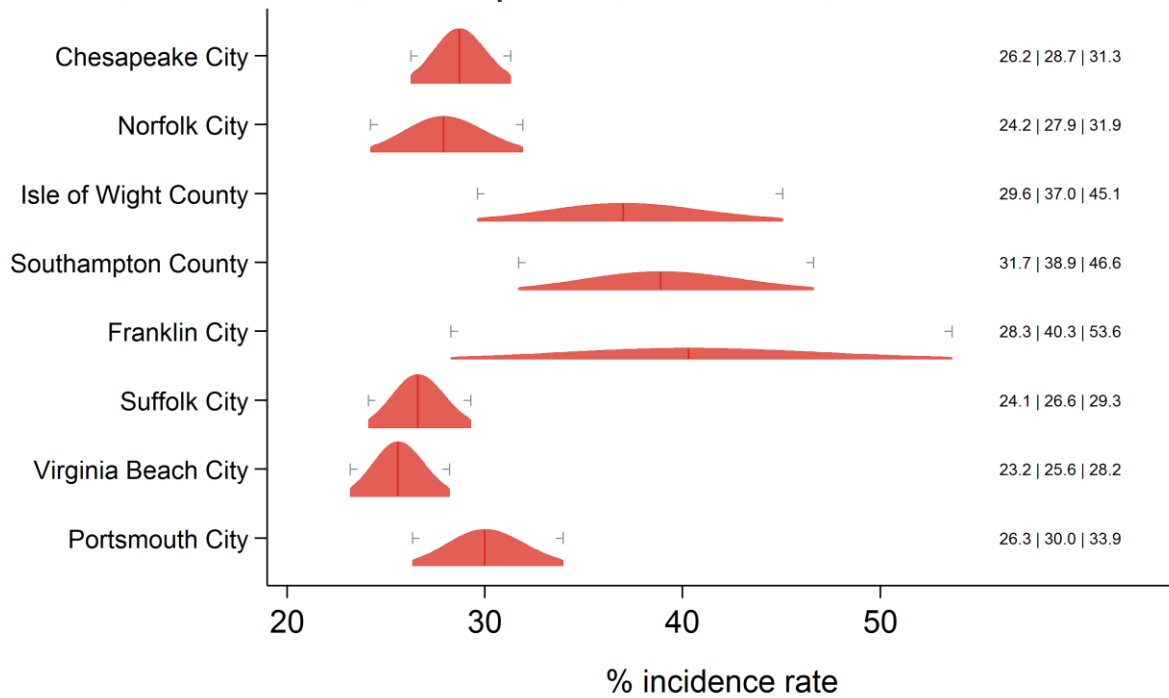
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
Gray markers: 95% confidence interval

## Tetanus Diphtheria (Tdap) Eastern Shore and Three Rivers HDs



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

## Tetanus Diphtheria (Tdap) 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: 54 areas.

Direct estimate is outside the 95% SAE Wilson CI: 79 areas.

SAE estimate is inside the 95% direct Wilson CI: 127 areas.

SAE estimate is outside the 95% direct Wilson CI: 6 areas.

SAE Wilson 95% CI is fully inside the 95% direct Wilson CI: 110 areas.

SAE Wilson 95% CI partially overlaps with the 95% direct Wilson CI: 23 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: 129 areas.

SAE standard error is greater than the (nonzero) direct standard error: 2 areas.

Direct standard error is zero: 2 areas.

Proportion of SAE variance due to ACS sampling error: min = 0.12%; med = 3.17%; max = 15.80%.

Proportion of SAE variance due to sampling error in regression coefficient estimates: min = 49.95%; med = 89.86%; max = 97.96%.

Proportion of SAE variance due to model selection: min = 0.32%; med = 5.90%; max = 49.94%.

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