

## Outcome 8: Influenza Vaccination in the Past Year - All Ages

Internal variable name: outc8\_flu\_vacc

Definition: During the past 12 months, have you had either a flu shot or a flu vaccine that was sprayed in your nose?

### Predictive models

	Mixed, demos only	Logit, no area effects	Mixed with area covariates
	b/se	b/se	b/se
Outcome 8: Influenza Vaccination in the Past Year - All Ages			
NH White	0.0000 (.)	0.0000 (.)	0.0000 (.)
NH Black vs. NH White	-0.5446*** (0.0941)	-0.5236*** (0.0876)	-0.5236*** (0.0966)
NH Asian vs. NH White	-0.0586 (0.1786)	-0.1182 (0.1790)	-0.1182 (0.1797)
NH Other vs. NH White	-0.4479*** (0.1263)	-0.4712** (0.1459)	-0.4712*** (0.1274)
Hispanic vs. NH White	-0.4340** (0.1608)	-0.4768*** (0.1284)	-0.4768** (0.1578)
SEX OF RESPONDENT=1	0.0000 (.)	0.0000 (.)	0.0000 (.)
Female	0.2695*** (0.0722)	0.2781*** (0.0632)	0.2781*** (0.0717)
Age 18-34 vs. 65+	-1.1418*** (0.0855)	-1.1685*** (0.0893)	-1.1685*** (0.0859)
Age 35-44 vs. 65+	-1.0431*** (0.1116)	-1.0532*** (0.0983)	-1.0532*** (0.1103)
Age 45-54 vs. 65+	-0.7925*** (0.1067)	-0.8122*** (0.0944)	-0.8122*** (0.1079)
Age 55-64 vs. 65+	-0.7054*** (0.0700)	-0.7092*** (0.0858)	-0.7092*** (0.0691)
65+	0.0000 (.)	0.0000 (.)	0.0000 (.)
Percentage calculated by dividing MLT_U10p_ACS_15_19 by Tot_Housing_Units_ACS_15		1.4546***	1.4546***
		(0.3866)	(0.2645)
VA BRFSS 2014 SAE		-0.2309	-0.2309

outc36_oweight_obese			
		(0.6191)	(0.5222)
Clinical care z-score, County Rankings		-1.2178***	-1.2178***
		(0.3680)	(0.3072)
_cons	0.7265***	0.7272	0.7272*
	(0.0710)	(0.4343)	(0.3636)
Area effect variance			
var(_cons[FIPS_county])	0.0721**		0.0000
	(0.0273)		(0.0000)

Number of alternative models used to estimate model error = 6.

## Results by health districts

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Augusta County	51015	45.3%	(34.7%, 56.4%)	56.4%	(54.0%, 58.8%)
Bath County	51017	72.1%	(35.9%, 92.2%)	49.3%	(45.0%, 53.6%)
Caroline County	51033	42.7%	(22.2%, 66.1%)	45.7%	(41.7%, 49.7%)
Clarke County	51043	41.1%	(18.1%, 68.7%)	51.1%	(47.2%, 55.0%)
Culpeper County	51047	39.1%	(23.7%, 57.1%)	52.1%	(49.5%, 54.7%)
Fauquier County	51061	48.2%	(34.2%, 62.4%)	54.0%	(51.7%, 56.2%)
Frederick County	51069	45.2%	(31.8%, 59.4%)	53.1%	(50.6%, 55.6%)
Highland County	51091	33.8%	(10.0%, 70.1%)	50.0%	(44.7%, 55.4%)
King George County	51099	36.5%	(19.5%, 57.6%)	47.8%	(45.2%, 50.5%)
Madison County	51113	40.1%	(19.2%, 65.4%)	52.7%	(49.9%, 55.5%)
Orange County	51137	42.1%	(25.1%, 61.3%)	53.4%	(51.1%, 55.7%)
Page County	51139	42.8%	(21.8%, 66.8%)	48.1%	(43.2%, 53.1%)
Rappahannock County	51157	50.4%	(17.8%, 82.7%)	48.2%	(45.1%, 51.4%)
Rockbridge County	51163	64.4%	(43.7%, 80.8%)	56.7%	(54.4%, 59.1%)
Rockingham County	51165	38.7%	(25.8%, 53.3%)	45.2%	(41.6%, 48.9%)
Shenandoah County	51171	41.1%	(26.8%, 57.2%)	52.4%	(49.2%, 55.6%)
Spotsylvania County	51177	49.8%	(38.6%, 61.1%)	49.7%	(47.2%, 52.2%)
Stafford County	51179	42.0%	(32.0%, 52.7%)	48.2%	(45.9%, 50.6%)
Warren County	51187	34.3%	(19.3%, 53.3%)	53.3%	(50.5%, 56.0%)
Buena Vista City	51530	60.1%	(14.8%, 92.9%)	57.2%	(54.9%, 59.5%)
Fredericksburg City	51630	49.6%	(28.8%, 70.5%)	58.6%	(55.8%, 61.3%)
Harrisonburg City	51660	37.8%	(15.9%, 66.0%)	57.1%	(52.4%, 61.7%)
Lexington City	51678	100.0%	(0.6%, 100.0%)	63.0%	(57.7%, 68.0%)
Staunton City	51790	60.9%	(22.1%, 89.5%)	62.2%	(59.7%, 64.5%)
Waynesboro	51820	79.0%	(16.9%, 97.0%)	61.9%	(58.0%, 65.5%)

City					
Winchester City	51840	35.7%	(12.0%, 69.3%)	58.8%	(56.4%, 61.1%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Albemarle County	51003	62.9%	(50.9%, 73.4%)	61.9%	(59.2%, 64.5%)
Alleghany County	51005	45.4%	(26.7%, 65.4%)	53.4%	(50.7%, 56.1%)
Amherst County	51009	52.4%	(35.1%, 69.2%)	50.3%	(47.3%, 53.3%)
Appomattox County	51011	46.2%	(29.7%, 63.5%)	52.0%	(49.2%, 54.7%)
Arlington City	51013	62.9%	(52.6%, 72.2%)	70.1%	(67.2%, 72.9%)
Bedford County	51019	41.4%	(31.4%, 52.2%)	55.2%	(52.7%, 57.6%)
Botetourt County	51023	49.7%	(29.7%, 69.8%)	58.7%	(55.9%, 61.4%)
Campbell County	51031	42.7%	(31.1%, 55.0%)	47.8%	(45.2%, 50.4%)
Craig County	51045	19.1%	(5.1%, 68.3%)	54.5%	(49.3%, 59.5%)
Fairfax County	51059	56.5%	(51.8%, 61.1%)	61.1%	(59.1%, 63.0%)
Fluvanna County	51065	41.7%	(21.1%, 65.5%)	56.0%	(52.8%, 59.1%)
Greene County	51079	87.8%	(47.3%, 96.1%)	49.4%	(45.6%, 53.2%)
Loudoun County	51107	46.2%	(38.7%, 53.9%)	56.2%	(53.3%, 59.1%)
Louisa County	51109	36.5%	(19.5%, 57.7%)	52.0%	(48.3%, 55.7%)
Nelson County	51125	81.2%	(45.8%, 95.6%)	55.4%	(52.8%, 58.0%)
Prince William County	51153	50.1%	(43.1%, 57.1%)	48.1%	(45.5%, 50.8%)
Roanoke County	51161	63.4%	(52.8%, 72.8%)	63.7%	(60.9%, 66.4%)
Alexandria City	51510	58.9%	(47.8%, 69.1%)	64.0%	(59.8%, 68.1%)
Charlottesville City	51540	52.1%	(32.2%, 71.3%)	65.0%	(61.5%, 68.3%)
Covington City	51580	0.0%	(0.0%, 81.2%)	54.3%	(44.7%, 63.7%)
Fairfax City	51600	65.2%	(48.4%, 79.0%)	60.7%	(57.8%, 63.6%)
Falls Church City	51610	42.1%	(16.9%, 72.3%)	75.8%	(70.5%, 80.5%)
Lynchburg City	51680	50.5%	(37.1%, 63.7%)	56.7%	(54.3%, 59.0%)
Manassas City	51683	36.2%	(17.8%, 59.8%)	47.1%	(43.0%, 51.3%)
Manassas Park City	51685	20.6%	(4.6%, 69.9%)	48.1%	(43.1%, 53.1%)
Salem City	51775	33.0%	(10.1%, 68.3%)	60.6%	(57.7%, 63.4%)



County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Bland County	51021	88.3%	(35.3%, 96.4%)	56.7%	(53.5%, 59.8%)
Buchanan County	51027	36.3%	(18.2%, 59.3%)	43.5%	(37.7%, 49.6%)
Carroll County	51035	36.9%	(17.4%, 61.8%)	55.3%	(52.8%, 57.8%)
Dickenson County	51051	39.4%	(19.2%, 63.9%)	51.7%	(48.5%, 54.9%)
Floyd County	51063	22.5%	(9.7%, 44.0%)	48.7%	(45.9%, 51.5%)
Franklin County	51067	28.6%	(17.6%, 42.8%)	56.1%	(53.7%, 58.4%)
Giles County	51071	28.4%	(10.0%, 58.6%)	50.2%	(47.5%, 53.0%)
Grayson County	51077	29.4%	(13.2%, 53.2%)	52.3%	(48.9%, 55.7%)
Henry County	51089	47.1%	(33.7%, 60.9%)	51.7%	(49.3%, 54.2%)
Lee County	51105	48.6%	(27.5%, 70.3%)	50.5%	(46.7%, 54.3%)
Montgomery County	51121	54.3%	(42.5%, 65.5%)	58.8%	(55.2%, 62.3%)
Patrick County	51141	55.4%	(33.1%, 75.6%)	48.3%	(45.2%, 51.5%)
Pittsylvania County	51143	49.9%	(37.8%, 62.1%)	51.2%	(48.6%, 53.8%)
Pulaski County	51155	50.3%	(32.2%, 68.3%)	51.2%	(48.8%, 53.6%)
Russell County	51167	54.7%	(32.6%, 75.2%)	48.9%	(45.1%, 52.7%)
Scott County	51169	46.6%	(32.8%, 60.9%)	54.5%	(51.4%, 57.6%)
Smyth County	51173	58.2%	(40.3%, 74.1%)	54.6%	(52.2%, 57.0%)
Tazewell County	51185	36.4%	(24.3%, 50.5%)	51.1%	(47.1%, 55.1%)
Washington County	51191	45.1%	(32.3%, 58.5%)	54.5%	(51.9%, 57.1%)
Wise County	51195	53.8%	(40.4%, 66.7%)	54.7%	(51.9%, 57.3%)
Wythe County	51197	53.1%	(35.3%, 70.1%)	54.8%	(52.3%, 57.2%)
Bristol City	51520	38.6%	(7.5%, 83.0%)	57.2%	(53.5%, 60.7%)
Danville City	51590	32.6%	(13.8%, 59.3%)	57.2%	(54.9%, 59.5%)
Galax City	51640	100.0%	(7.8%, 100.0%)	57.1%	(52.6%, 61.5%)
Martinsville City	51690	77.4%	(37.8%, 95.1%)	54.3%	(51.5%, 57.0%)
Norton City	51720	21.8%	(0.9%, 95.7%)	58.4%	(55.3%, 61.5%)
Radford City	51750	58.4%	(33.8%, 79.5%)	62.3%	(58.8%, 65.6%)
Roanoke City	51770	49.0%	(36.1%, 62.1%)	56.1%	(53.3%, 58.8%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Amelia County	51007	56.9%	(27.0%, 82.5%)	47.8%	(44.0%, 51.5%)
Brunswick County	51025	42.1%	(21.1%, 66.4%)	47.6%	(44.5%, 50.7%)
Buckingham County	51029	50.1%	(23.5%, 76.7%)	46.9%	(42.8%, 51.1%)
Charles City County	51036	66.4%	(15.7%, 95.5%)	49.8%	(46.6%, 53.0%)
Charlotte County	51037	29.2%	(12.5%, 54.2%)	46.8%	(43.4%, 50.3%)
Chesterfield County	51041	52.5%	(44.5%, 60.4%)	55.9%	(53.8%, 58.0%)
Cumberland County	51049	32.0%	(12.4%, 60.9%)	47.2%	(43.3%, 51.2%)
Dinwiddie County	51053	40.6%	(24.8%, 58.6%)	44.4%	(41.2%, 47.6%)
Goochland County	51075	51.2%	(21.5%, 80.0%)	60.4%	(57.3%, 63.4%)
Greensville County	51081	60.5%	(27.9%, 85.8%)	45.7%	(42.8%, 48.7%)
Halifax County	51083	55.3%	(39.9%, 69.7%)	50.2%	(47.5%, 52.9%)
Hanover County	51085	66.4%	(51.9%, 78.4%)	58.4%	(55.8%, 60.9%)
Henrico County	51087	53.1%	(44.2%, 61.8%)	58.2%	(55.9%, 60.5%)
Lunenburg County	51111	37.9%	(17.1%, 64.3%)	46.0%	(42.0%, 50.2%)
Mecklenburg County	51117	61.8%	(46.0%, 75.5%)	50.3%	(47.8%, 52.8%)
New Kent County	51127	37.6%	(17.6%, 63.0%)	53.9%	(50.9%, 57.0%)
Nottoway County	51135	54.4%	(30.8%, 76.1%)	49.2%	(46.4%, 52.0%)
Powhatan County	51145	27.5%	(11.5%, 52.4%)	55.5%	(52.1%, 58.9%)
Prince Edward County	51147	53.3%	(31.4%, 74.1%)	51.1%	(47.8%, 54.4%)
Prince George County	51149	50.5%	(31.0%, 69.8%)	47.1%	(44.3%, 50.0%)
Surry County	51181	43.3%	(13.1%, 79.4%)	50.3%	(47.0%, 53.5%)
Sussex County	51183	42.1%	(19.0%, 69.3%)	43.3%	(39.8%, 46.8%)
Colonial Heights City	51570	66.6%	(41.4%, 84.9%)	50.9%	(46.7%, 55.1%)
Emporia City	51595	39.8%	(3.1%, 93.2%)	48.6%	(44.4%, 52.8%)
Hopewell City	51670	57.3%	(28.1%, 82.2%)	46.2%	(42.3%, 50.0%)
Petersburg	51730	35.6%	(17.2%, 59.4%)	50.3%	(46.1%, 54.4%)



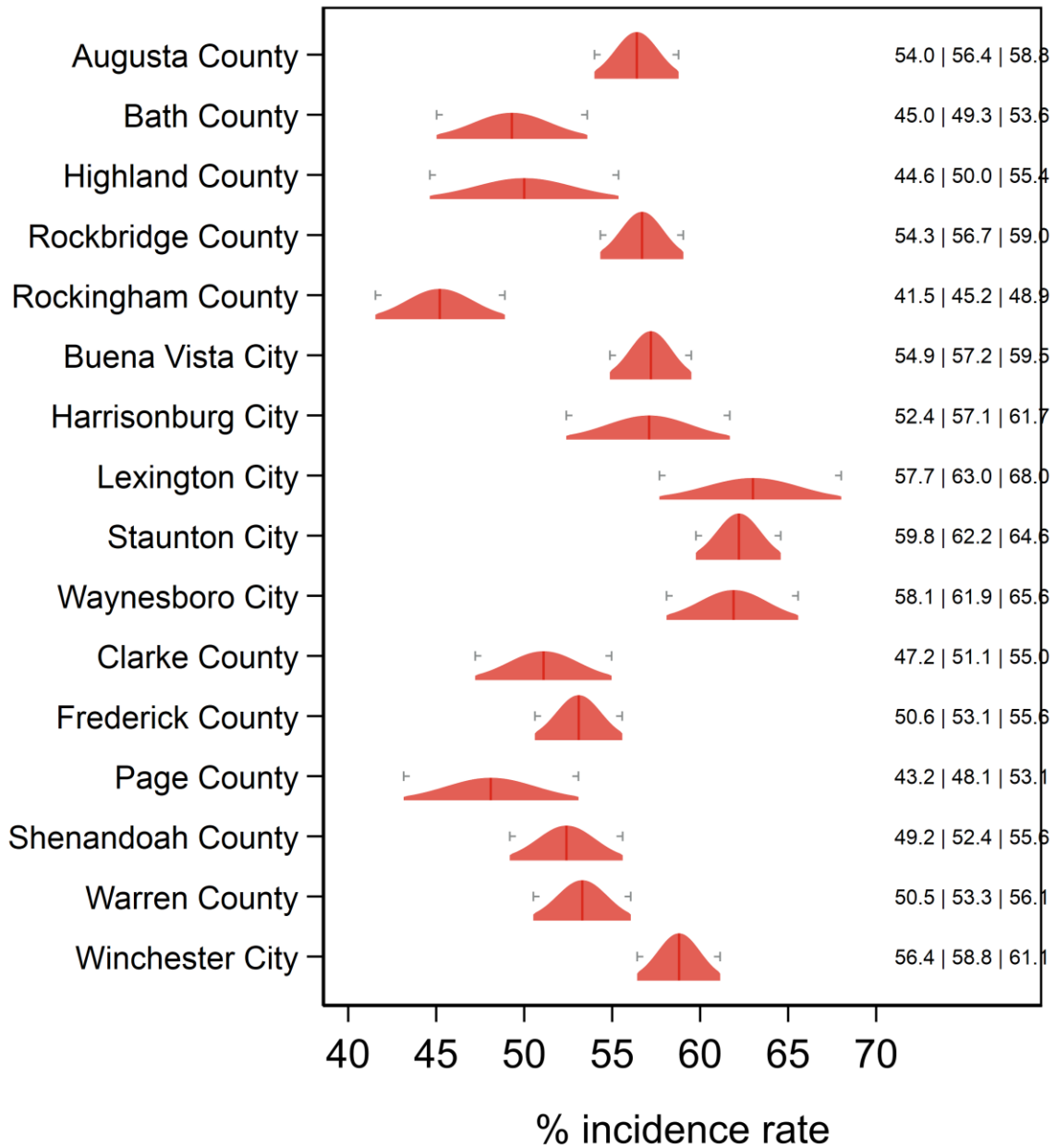
City					
Richmond City	51760	46.1%	(35.8%, 56.9%)	53.1%	(50.2%, 55.9%)

County name	County FIPS	Direct estimate	Direct 95% CI	SAE composite	SAE CI
Accomack County	51001	43.5%	(29.7%, 58.5%)	49.9%	(46.6%, 53.3%)
Essex County	51057	60.6%	(36.1%, 80.7%)	55.3%	(52.3%, 58.2%)
Gloucester County	51073	59.9%	(43.7%, 74.2%)	56.5%	(53.6%, 59.4%)
Isle of Wight County	51093	38.5%	(21.5%, 58.9%)	52.7%	(50.2%, 55.2%)
James City County	51095	65.2%	(52.9%, 75.8%)	60.2%	(56.9%, 63.3%)
King and Queen County	51097	71.5%	(32.6%, 92.9%)	52.8%	(46.4%, 59.1%)
King William County	51101	63.4%	(32.7%, 86.0%)	54.0%	(51.7%, 56.4%)
Lancaster County	51103	64.7%	(38.4%, 84.4%)	57.1%	(53.0%, 61.0%)
Mathews County	51115	67.0%	(42.8%, 84.6%)	57.7%	(54.2%, 61.2%)
Middlesex County	51119	42.4%	(19.2%, 69.4%)	54.3%	(50.8%, 57.6%)
Northampton County	51131	46.4%	(25.3%, 68.9%)	54.6%	(51.0%, 58.1%)
Northumberland County	51133	64.3%	(40.3%, 82.7%)	56.5%	(50.8%, 62.1%)
Richmond County	51159	41.6%	(25.7%, 59.5%)	54.4%	(49.8%, 58.9%)
Southampton County	51175	37.8%	(18.4%, 62.0%)	46.8%	(43.8%, 49.8%)
Westmoreland County	51193	48.7%	(29.3%, 68.4%)	49.4%	(45.9%, 53.0%)
York County	51199	59.6%	(44.3%, 73.2%)	61.4%	(58.3%, 64.4%)
Chesapeake City	51550	50.1%	(42.0%, 58.2%)	53.8%	(51.6%, 56.0%)
Franklin City	51620	68.1%	(24.5%, 93.3%)	51.3%	(47.9%, 54.6%)
Hampton City	51650	45.9%	(36.5%, 55.6%)	50.5%	(47.6%, 53.4%)
Newport News City	51700	56.8%	(47.1%, 66.0%)	51.6%	(48.9%, 54.3%)
Norfolk City	51710	48.7%	(40.2%, 57.2%)	49.6%	(47.4%, 51.9%)
Poquoson City	51735	36.4%	(11.8%, 71.1%)	56.9%	(53.9%, 59.9%)
Portsmouth City	51740	48.1%	(36.6%, 59.8%)	49.0%	(46.3%, 51.7%)
Suffolk City	51800	51.8%	(38.8%, 64.6%)	52.4%	(49.5%, 55.3%)
Virginia Beach City	51810	50.3%	(43.3%, 57.3%)	55.3%	(53.6%, 57.0%)
Williamsburg City	51830	38.8%	(13.2%, 72.5%)	60.6%	(57.2%, 63.9%)



Graphical representation

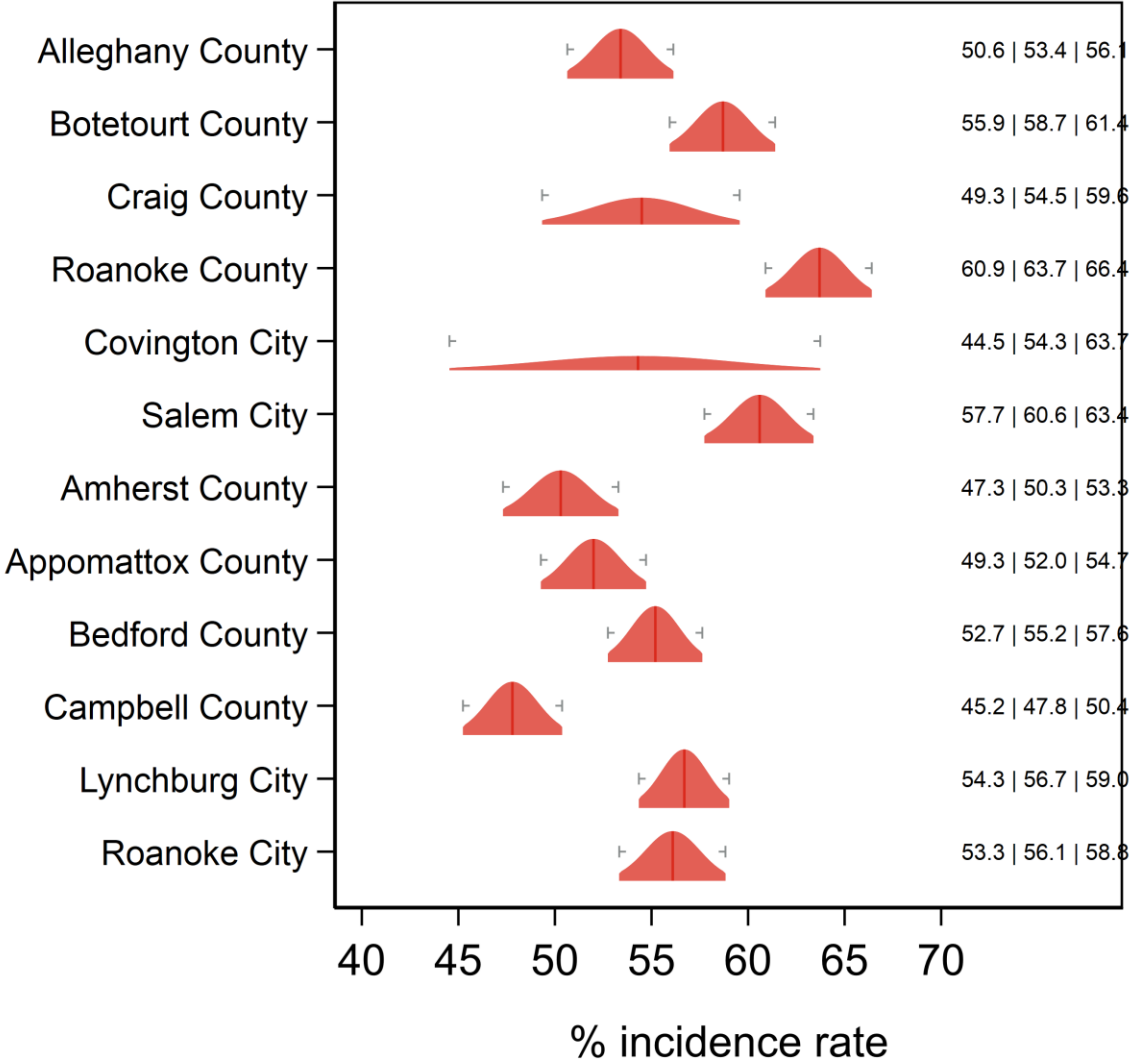
# Flu vaccination past yr Central Shenandoah and Lord Fairfax HDs



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

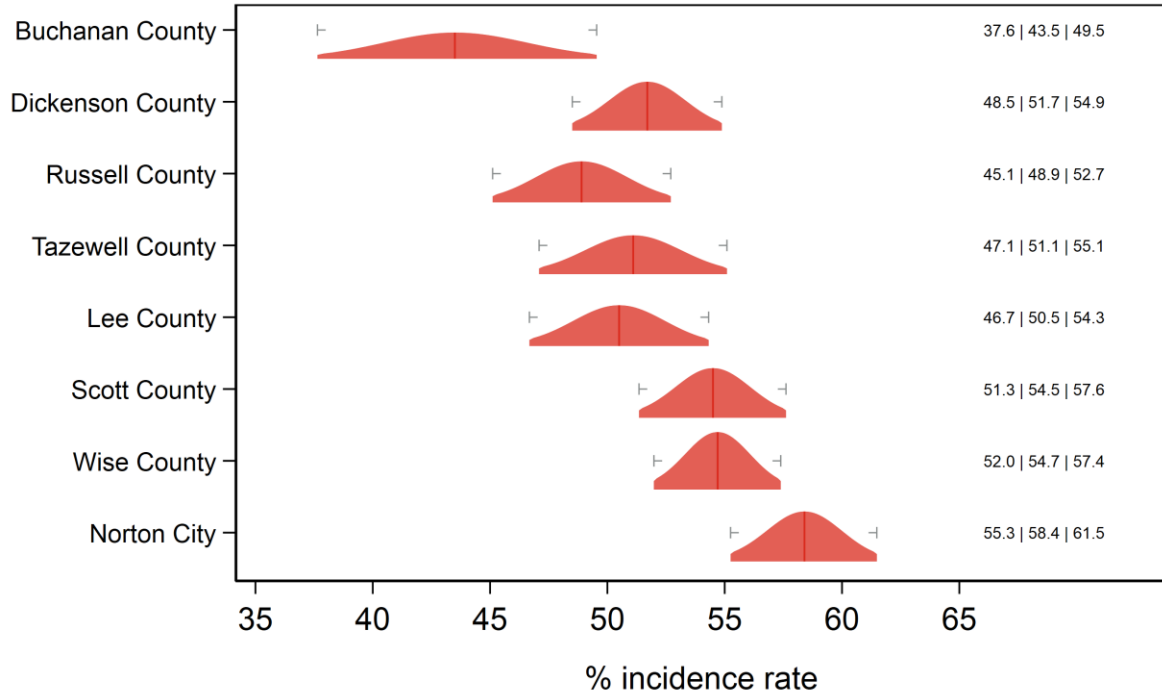


# Flu vaccination past yr Alleghany, Roanoke and Central Virginia HDs



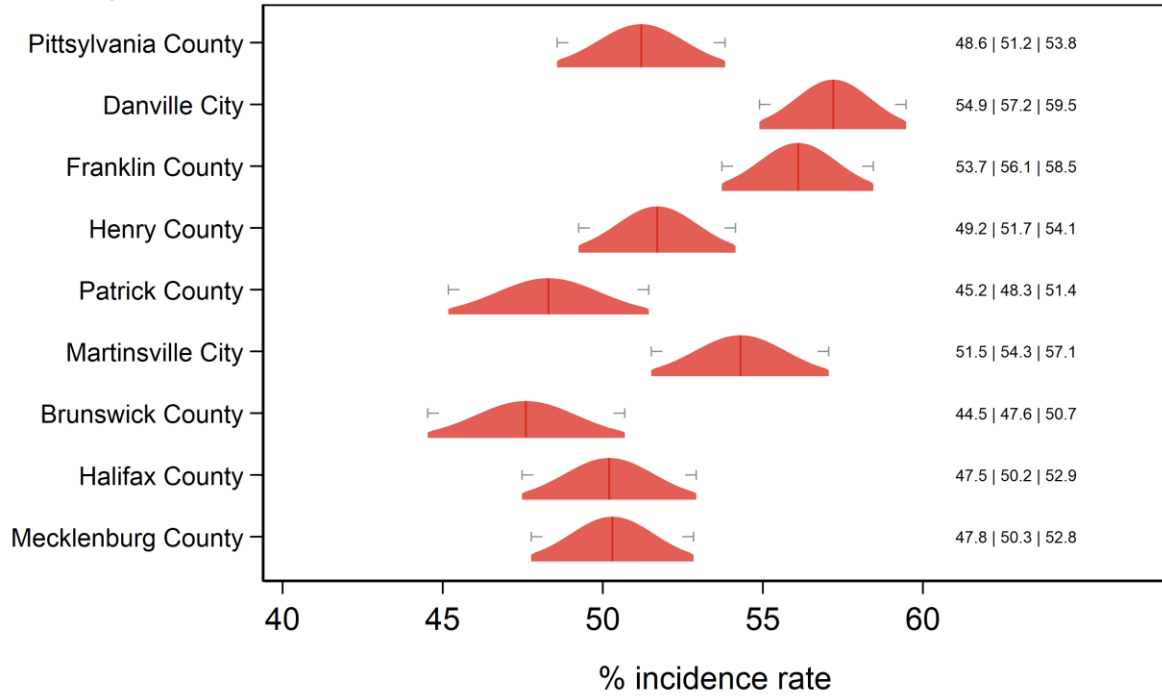
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

## Flu vaccination past yr Cumberland Plateau and Lenowisco HDs



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

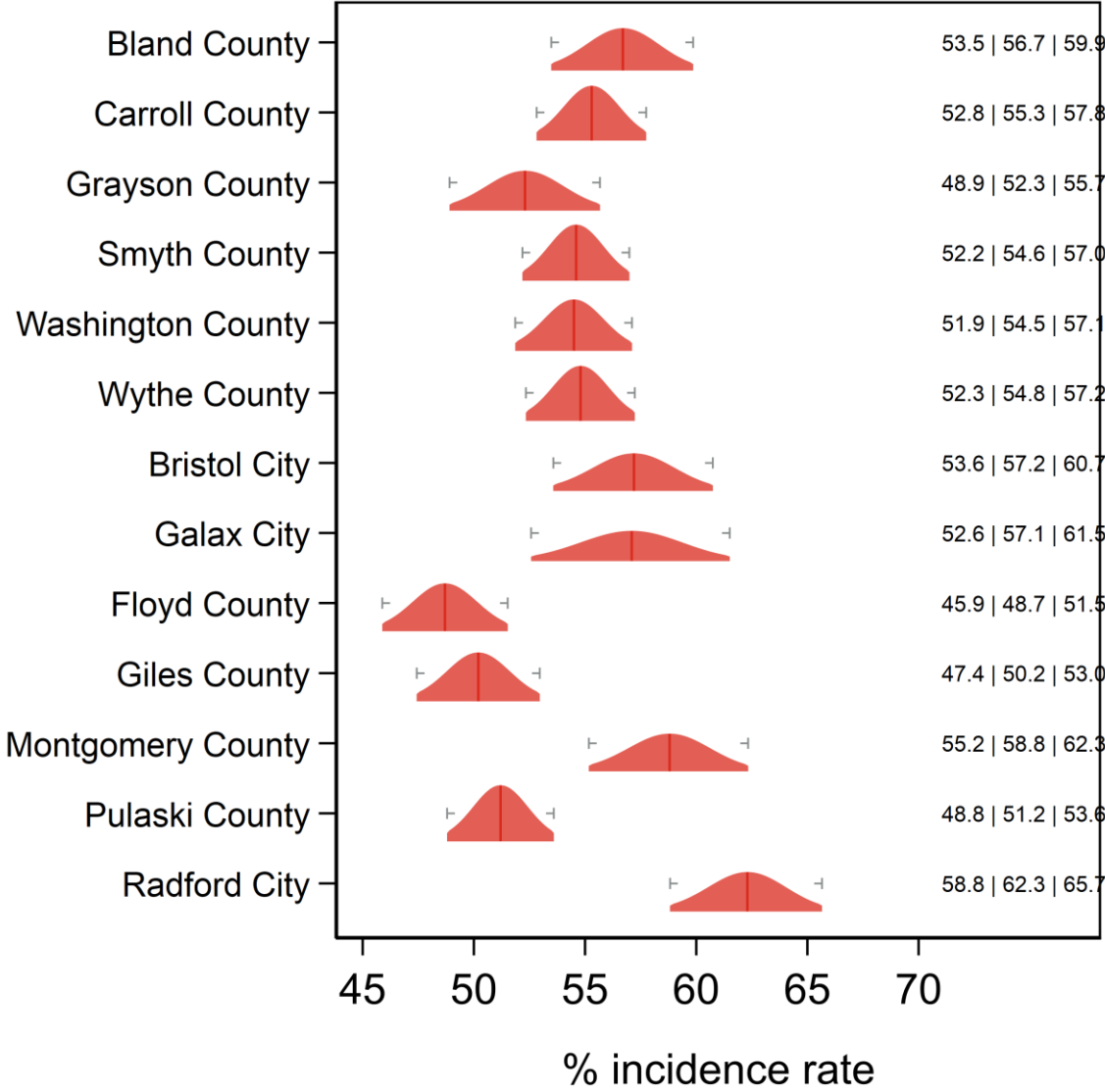
## Flu vaccination past yr Pittsylvania/Danville, Southside and West Piedmont HDs



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

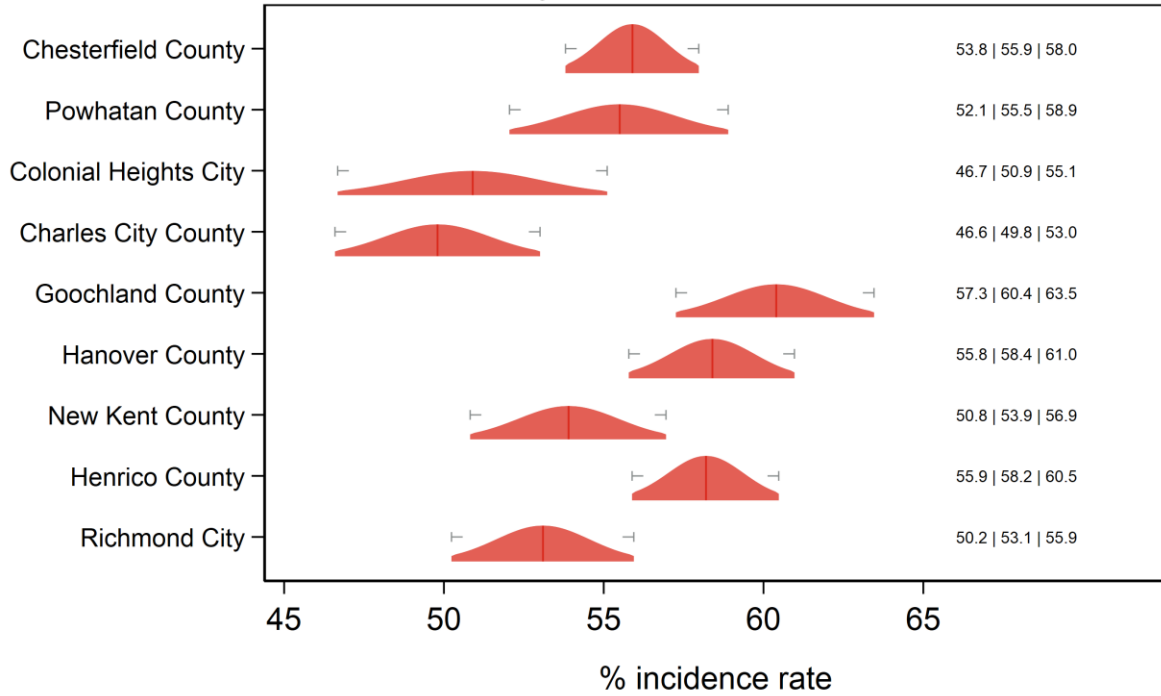


# Flu vaccination past yr New River and Mount Rogers HDs



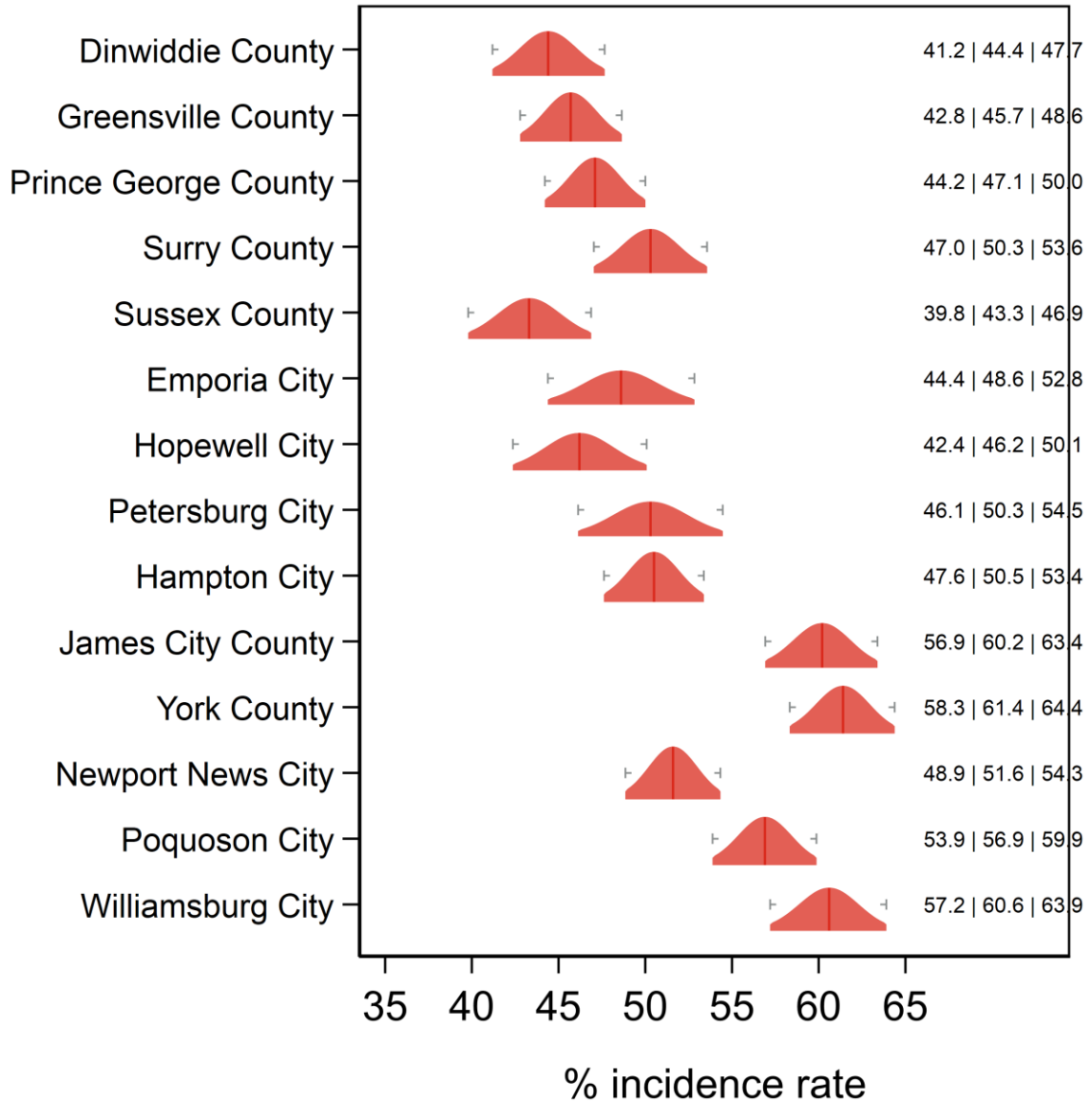
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

## Flu vaccination past yr Chesterfield, Chickahominy, Henrico and Richmond HDs



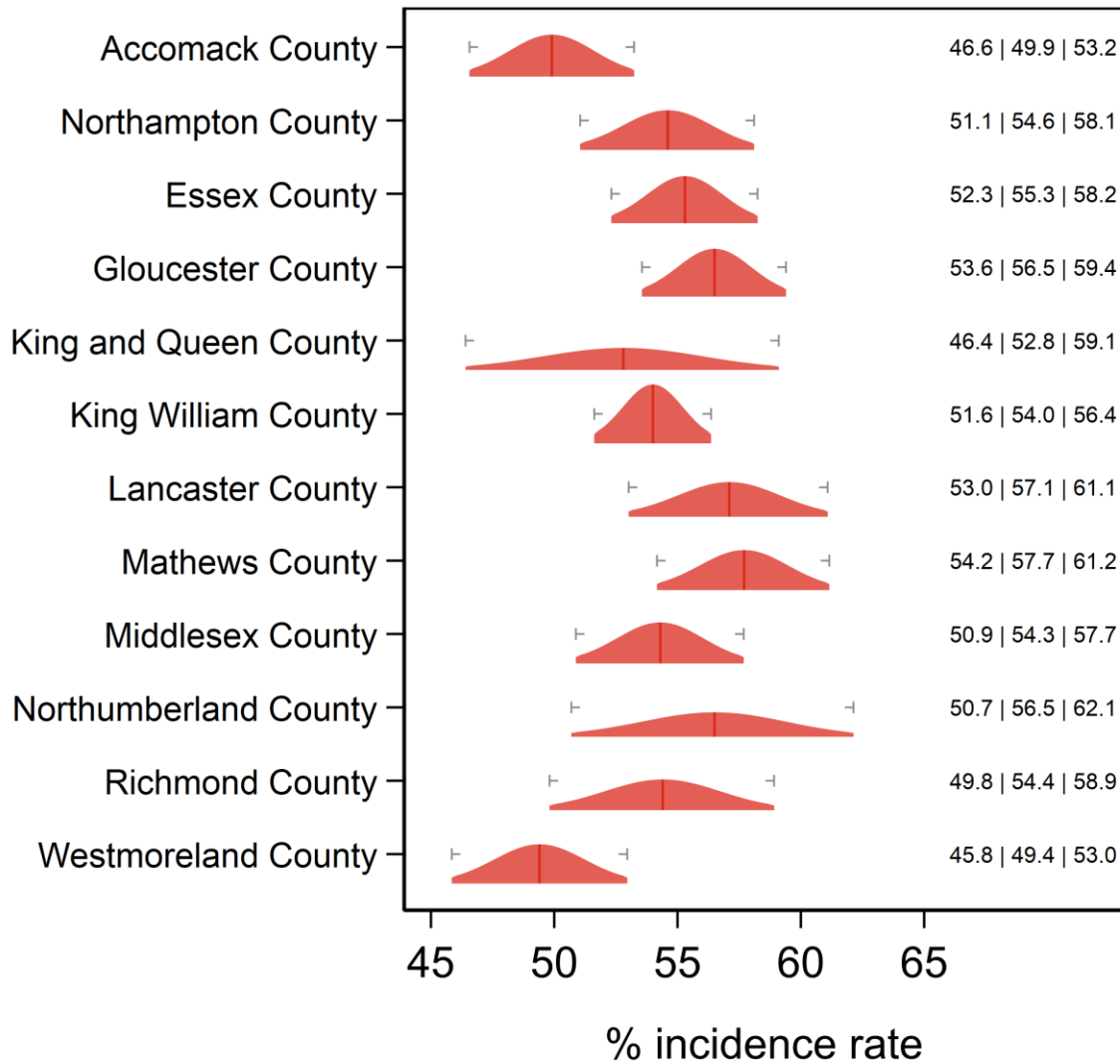
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

# Flu vaccination past yr Crater, Peninsula and Hampton HDs



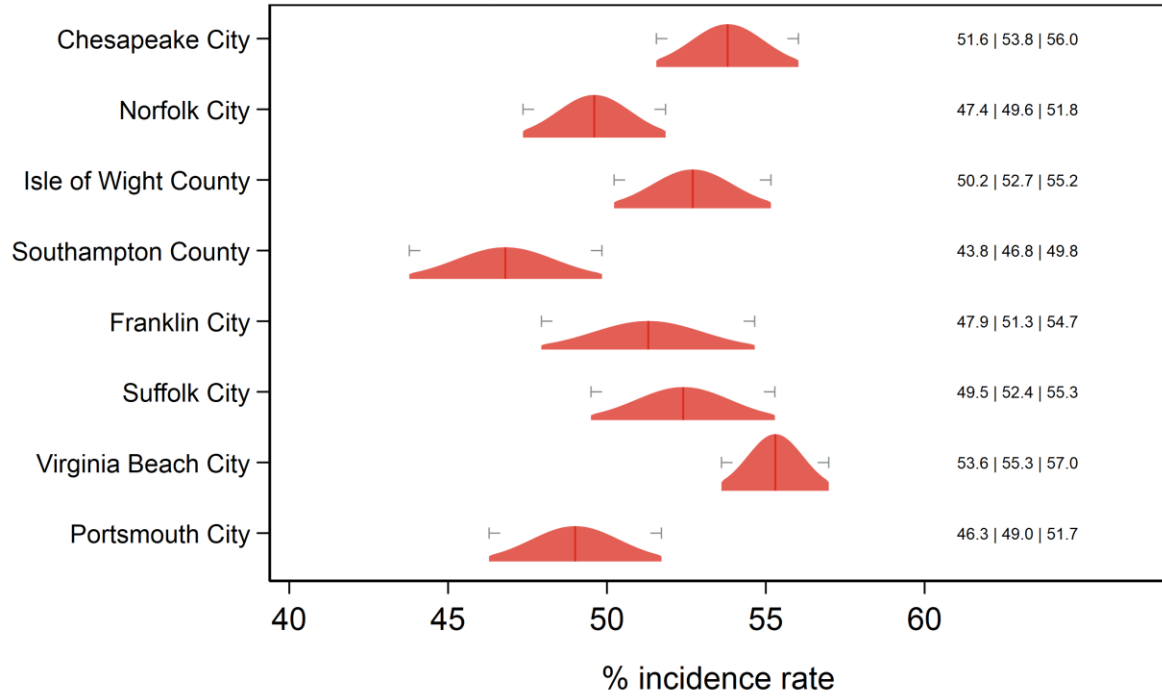
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

# Flu vaccination past yr Eastern Shore and Three Rivers HDs



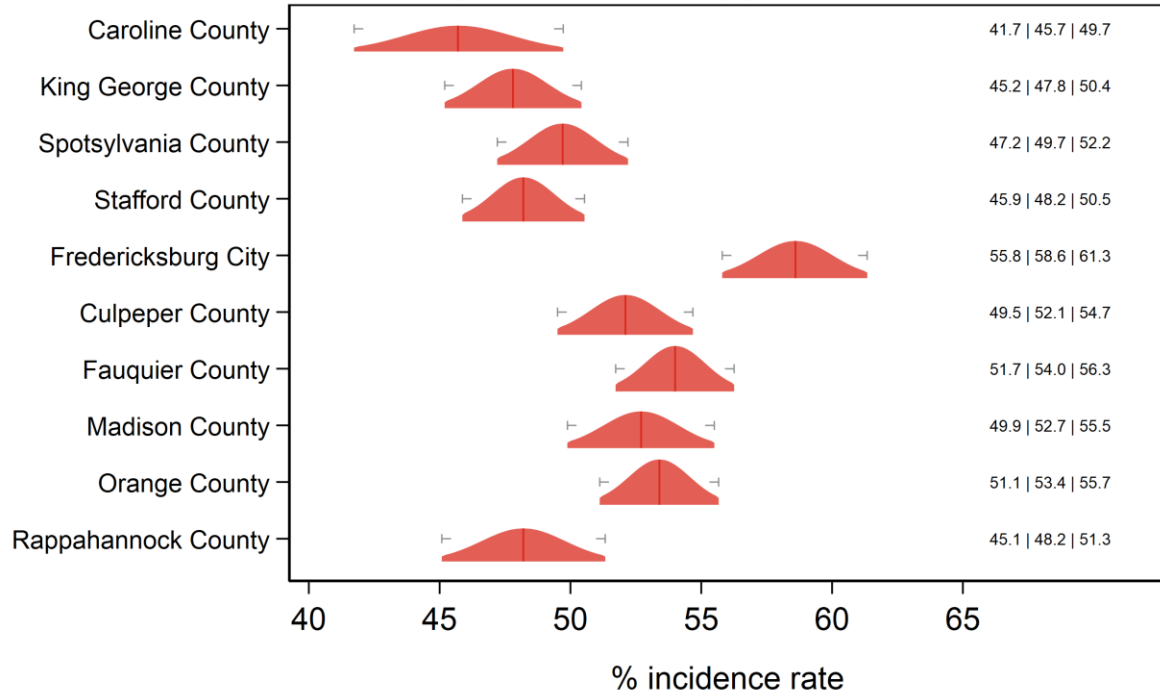
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

# Flu vaccination past yr Norfolk, Portsmouth, Chesapeake, VA Beach, W. Tidewater HDs



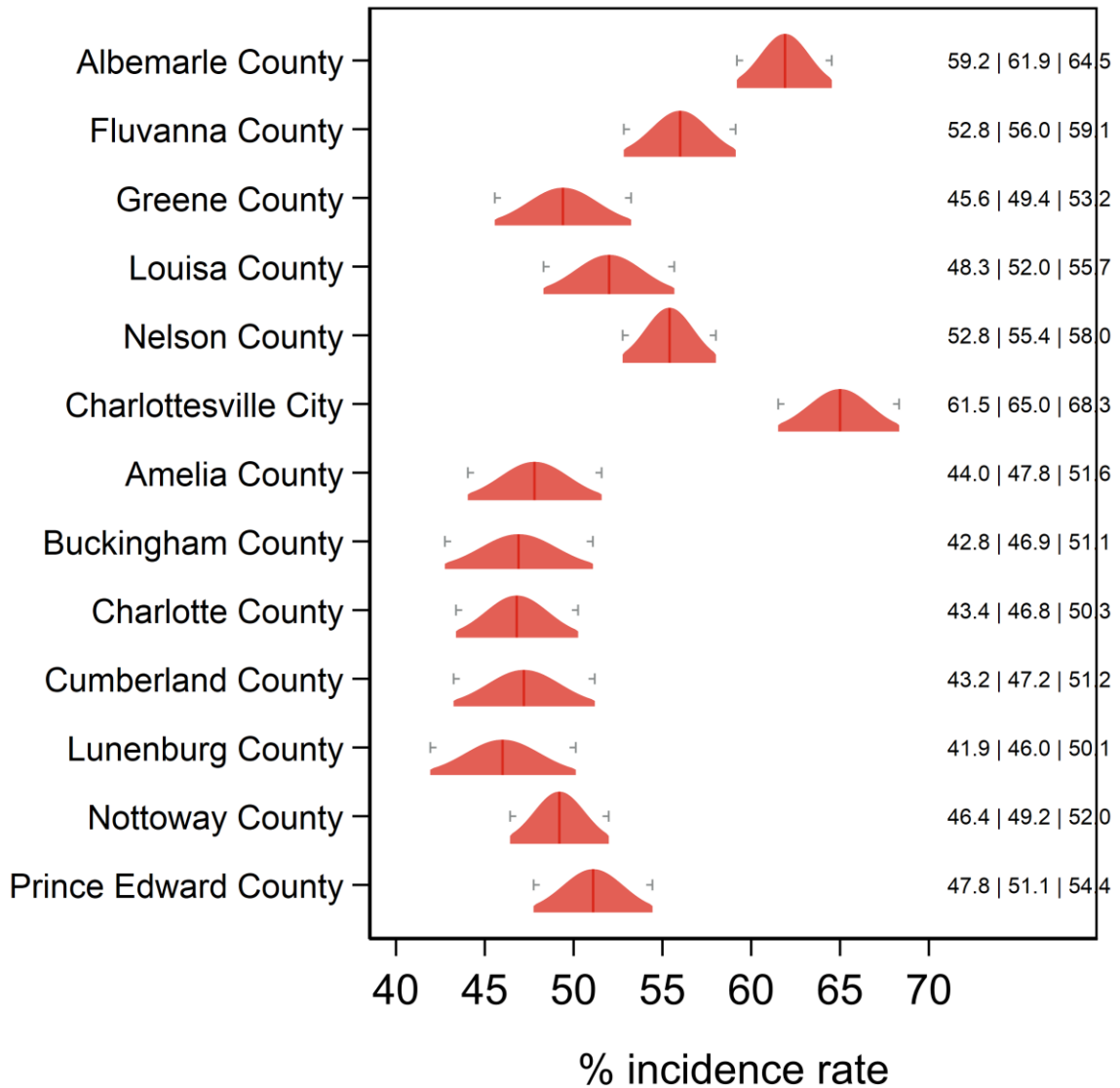
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

## Flu vaccination past yr Rappahannock/Rapidan and Rappahannock HDs



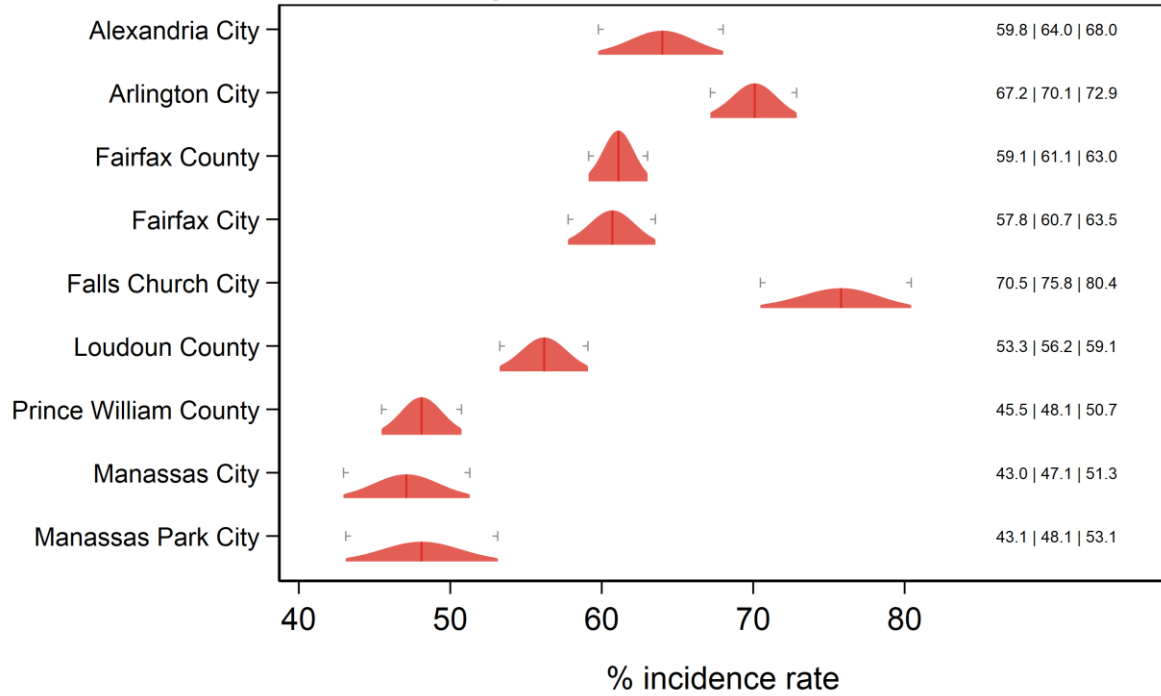
Text at right: 2-sided 95% LCB | Point Estimate | 2-sided 95% UCB  
 Gray markers: 95% confidence interval

# Flu vaccination past yr Thomas Jefferson and Piedmont HDs



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

## Flu vaccination past yr 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





## Additional diagnostics

Direct estimate is inside the 95% SAE Wilson CI: 21 areas.

Direct estimate is outside the 95% SAE Wilson CI: 112 areas.

SAE estimate is inside the 95% direct Wilson CI: 124 areas.

SAE estimate is outside the 95% direct Wilson CI: 9 areas.

SAE Wilson 95% CI is fully inside the 95% direct Wilson CI: 119 areas.

SAE Wilson 95% CI partially overlaps with the 95% direct Wilson CI: 14 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: 130 areas.

SAE standard error is greater than the (nonzero) direct standard error: 0 areas.

Direct standard error is zero: 3 areas.

Proportion of SAE variance due to ACS sampling error: min = 1.89%; med = 24.45%; max = 71.30%.

Proportion of SAE variance due to sampling error in regression coefficient estimates: min = 14.27%; med = 66.16%; max = 89.49%.

Proportion of SAE variance due to model selection: min = 0.12%; med = 5.62%; max = 75.62%.

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