

## Background

- Alpha-Gal allergy is a reaction to the carbohydrate epitope, galactose-alpha-1,3-galactose (Alpha-Gal), which is present on the tissues and cells of all mammals, except humans and apes
- First identified in patients with hypersensitivity reactions to the cancer drug, cetuximab<sup>1</sup>
- Alpha-Gal is associated with two forms of anaphylaxis<sup>2-4</sup>:
  - Immediate onset anaphylaxis after re-exposure to a tick bite
  - Delayed onset anaphylaxis 3-6 hours after ingestion of mammalian food products (Table 1)
- The allergy is strongly associated with tick bites, mainly from the lone star tick<sup>5</sup>
  - Ehrlichiosis is the most prevalent disease carried by the lone star tick in Arkansas
- Most often occurs in the central and southern parts of the United States, though the true number of affected individuals and distribution is unknown

**Table 1. Examples of Mammalian Meats and By-Products with Notable Concentrations of Alpha-Gal**

Mammalian Meats and By-Products		
Beef	Venison	Dairy Products
Pork	Goat	Gelatin
Lamb	Bison	

## Methods

- Only two commercial laboratories perform Alpha-Gal testing and on request, both submitted results for Arkansas residents tested between January 1, 2013 and September 30, 2015
- Data were combined from both laboratories, excluding those with specific mammalian IgE tests (e.g. IgE to pork, beef, etc.)
- A positive test result was characterized by a value greater than or equal to **0.35 kU/L**
- For those individuals with multiple tests, their first positive test result was used, or first test result if none were positive
- Analyses performed in SAS (Version 9.3, Cary, NC) to describe characteristics of those who tested positive

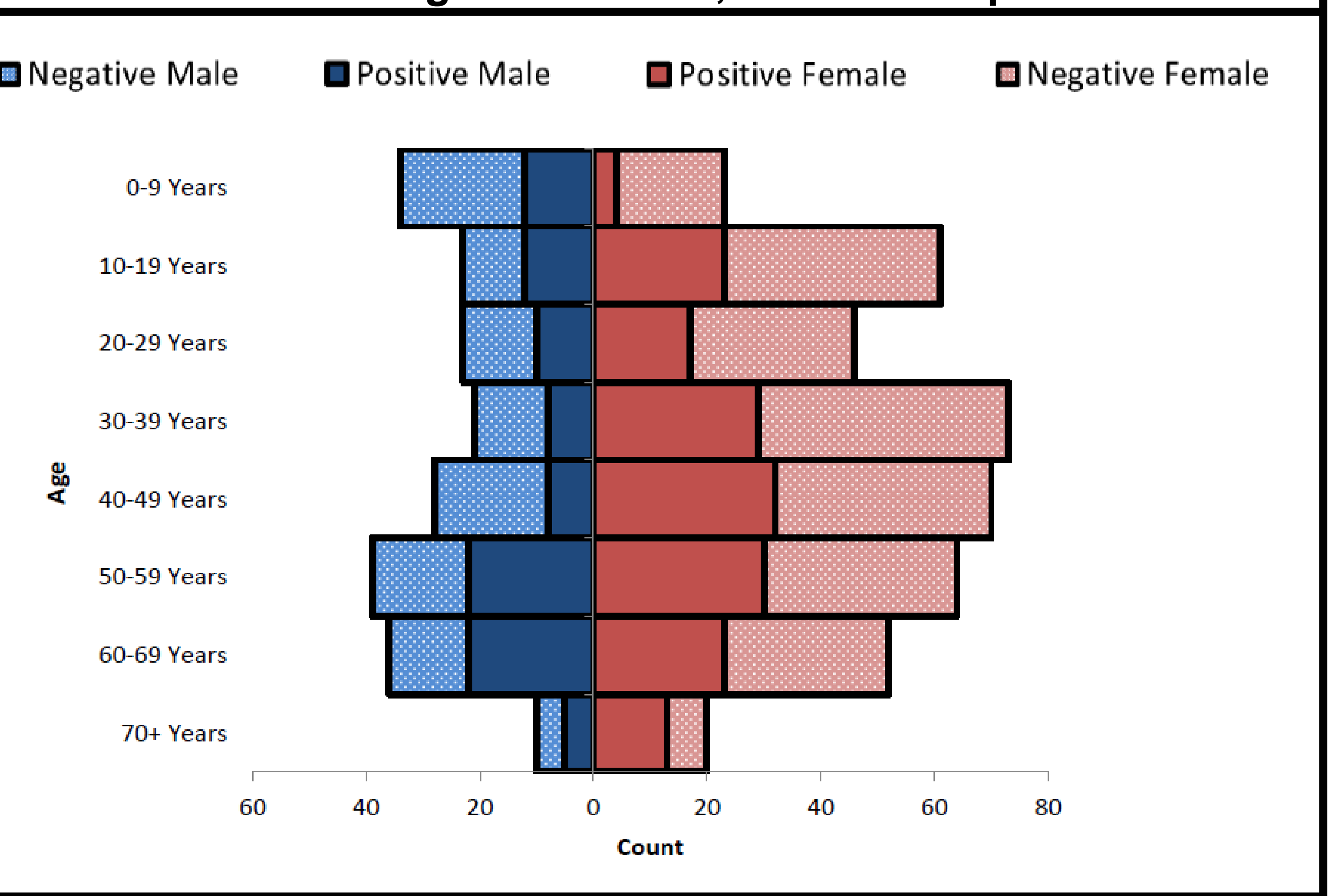
## Results

**Table 2. Characteristics of Arkansas Residents Tested for Alpha-Gal Allergy from January 2013-September 2015**

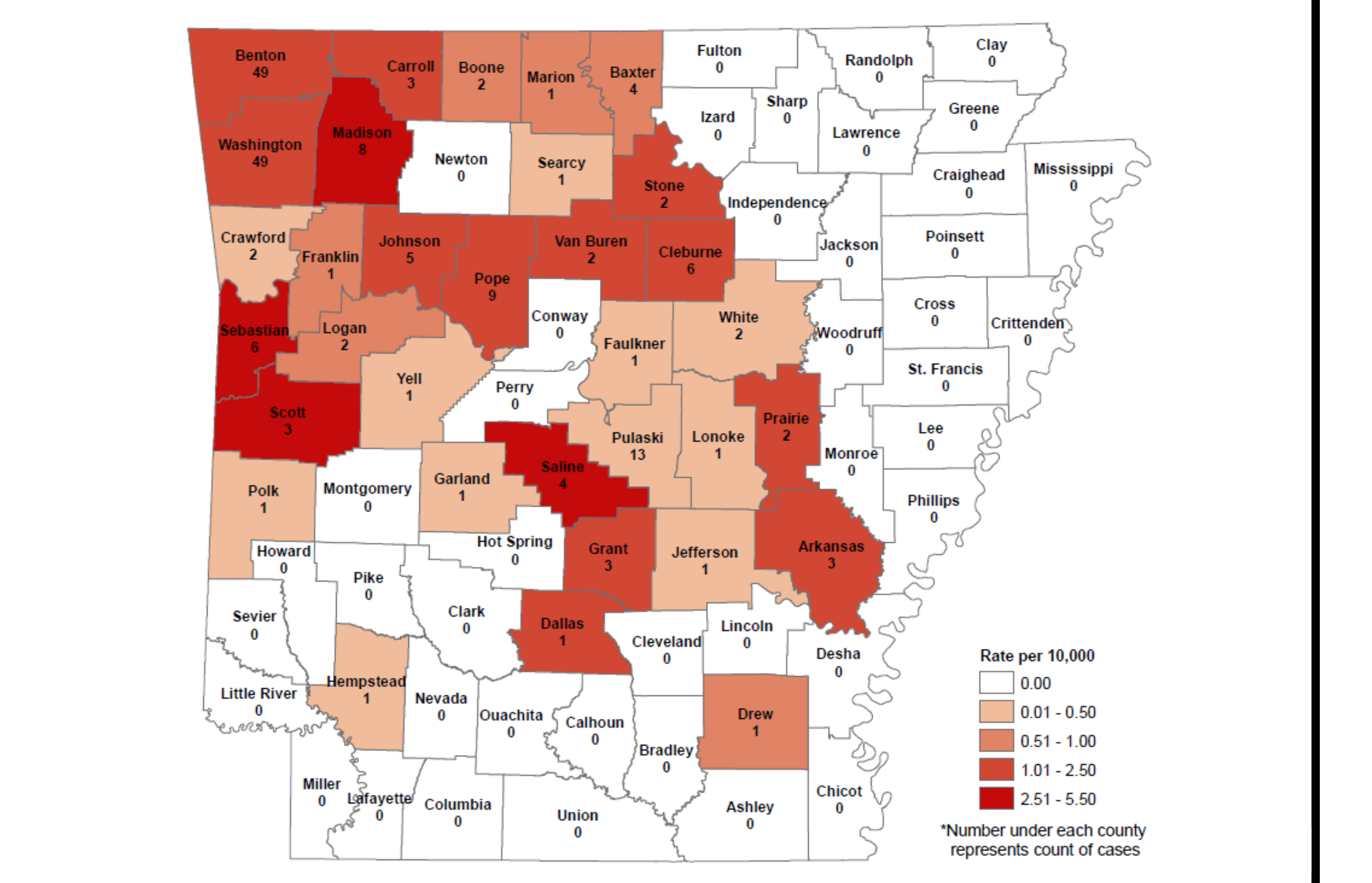
Demographic	Positive n (% of Row Total)	Total n	Odds Ratio* (95% CI)	Demographic	Positive n (% of Row Total)	Total N	Odds Ratio* (95% CI)
<b>Total Tested</b>	271 (43.2)	627		<b>Month Sampled</b>			
<b>Year</b>				January	13 (31.0)	42	Ref
2013	65 (53.3)	122	Ref	February	16 (37.2)	43	1.32 (0.54, 3.25)
2014	127 (42.2)	301	0.64 (0.42, 0.98)	March	24 (36.4)	66	1.28 (0.56, 2.91)
2015	79 (29.2)	204	0.55 (0.35, 0.87)	April	17 (36.2)	47	1.26 (0.52, 3.06)
<b>Gender<sup>a</sup></b>				May	21 (40.4)	52	1.51 (0.64, 3.56)
Female	171 (41.8)	409	Ref	June	24 (41.4)	58	1.57 (0.68, 3.64)
Male	99 (46.3)	214	1.20 (0.86, 1.67)	July	22 (50.0)	44	2.23 (0.92, 5.39)
<b>Age</b>				August	38 (43.7)	87	1.73 (0.79, 3.77)
0-9 Years	16 (27.6)	58	Ref	September	28 (38.4)	73	1.39 (0.62, 3.11)
10-19 Years	35 (41.2)	85	1.84 (0.90, 3.77)	October	22 (51.2)	43	2.34 (0.96, 5.67)
20-29 Years	27 (39.1)	69	1.69 (0.80, 3.58)	November	26 (63.4)	41	3.87 (1.55, 9.62)
30-39 Years	37 (39.4)	94	1.70 (0.84, 3.46)	December	20 (64.5)	31	4.06 (1.52, 10.85)
40-49 Years	40 (40.8)	98	1.81 (0.90, 3.66)	<b>Season<sup>b</sup></b>			
50-59 Years	52 (50.0)	104	2.63 (1.31, 5.25)	Winter	48 (35.8)	134	Ref
60-69 Years	46 (51.7)	89	2.81 (1.38, 5.71)	Spring	62 (38.0)	163	1.10 (0.69, 1.77)
70+ Years	18 (60.0)	30	3.94 (1.55, 9.98)	Summer	92 (44.2)	208	1.42 (0.91, 2.22)
				Fall	69 (56.6)	122	2.33 (1.41, 3.86)

\*Univariable logistic regression was used to calculate odds ratio estimates of testing positive for Alpha-Gal, given each predictor  
<sup>a</sup>Four individuals with missing/unknown gender  
<sup>b</sup>Seasons categorized by official beginning and end dates for each year

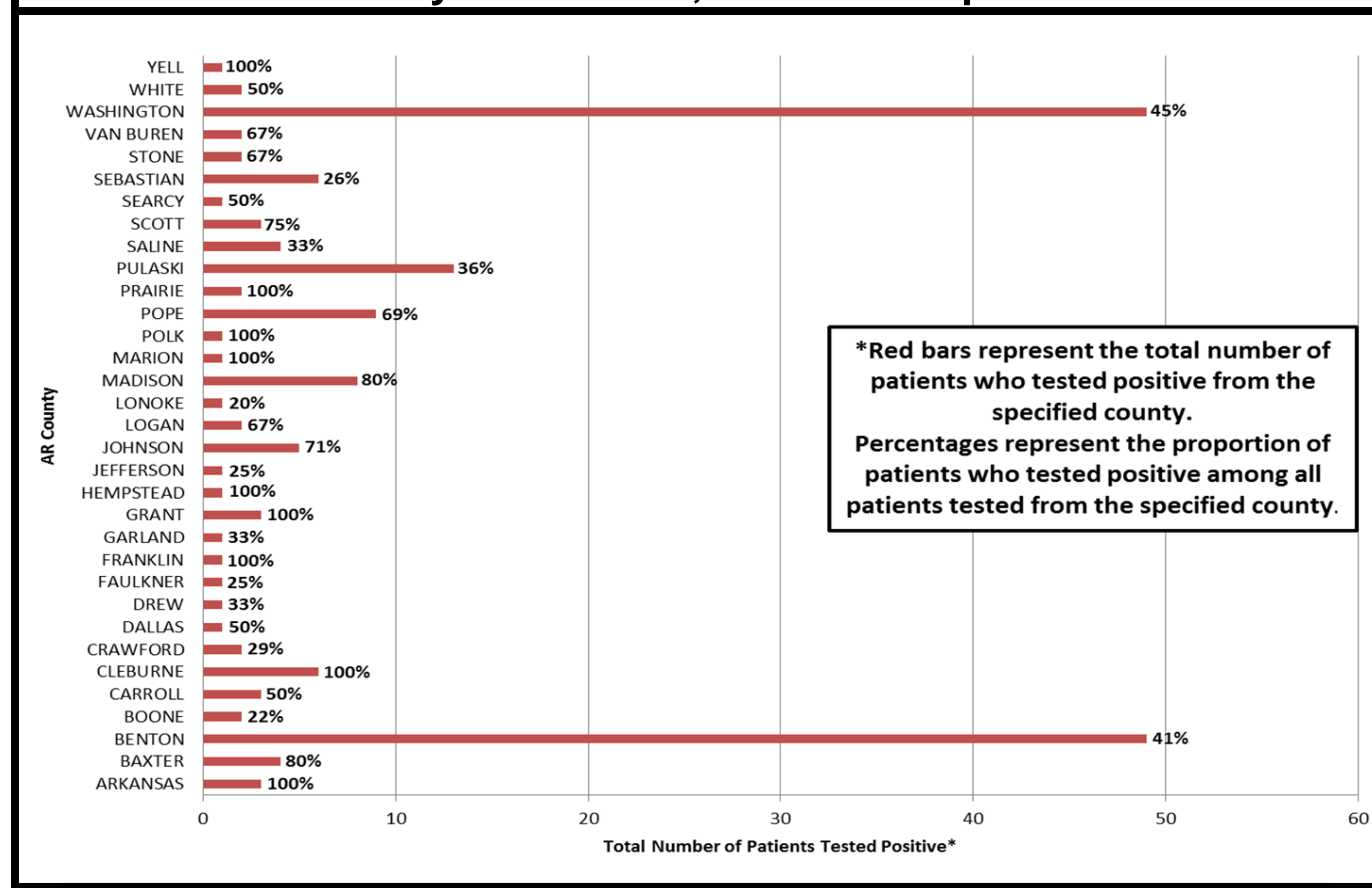
**Figure 1. Distribution of Positive Alpha-Gal Test Results by Gender and Age – Arkansas, Jan 2013-Sep 2015**



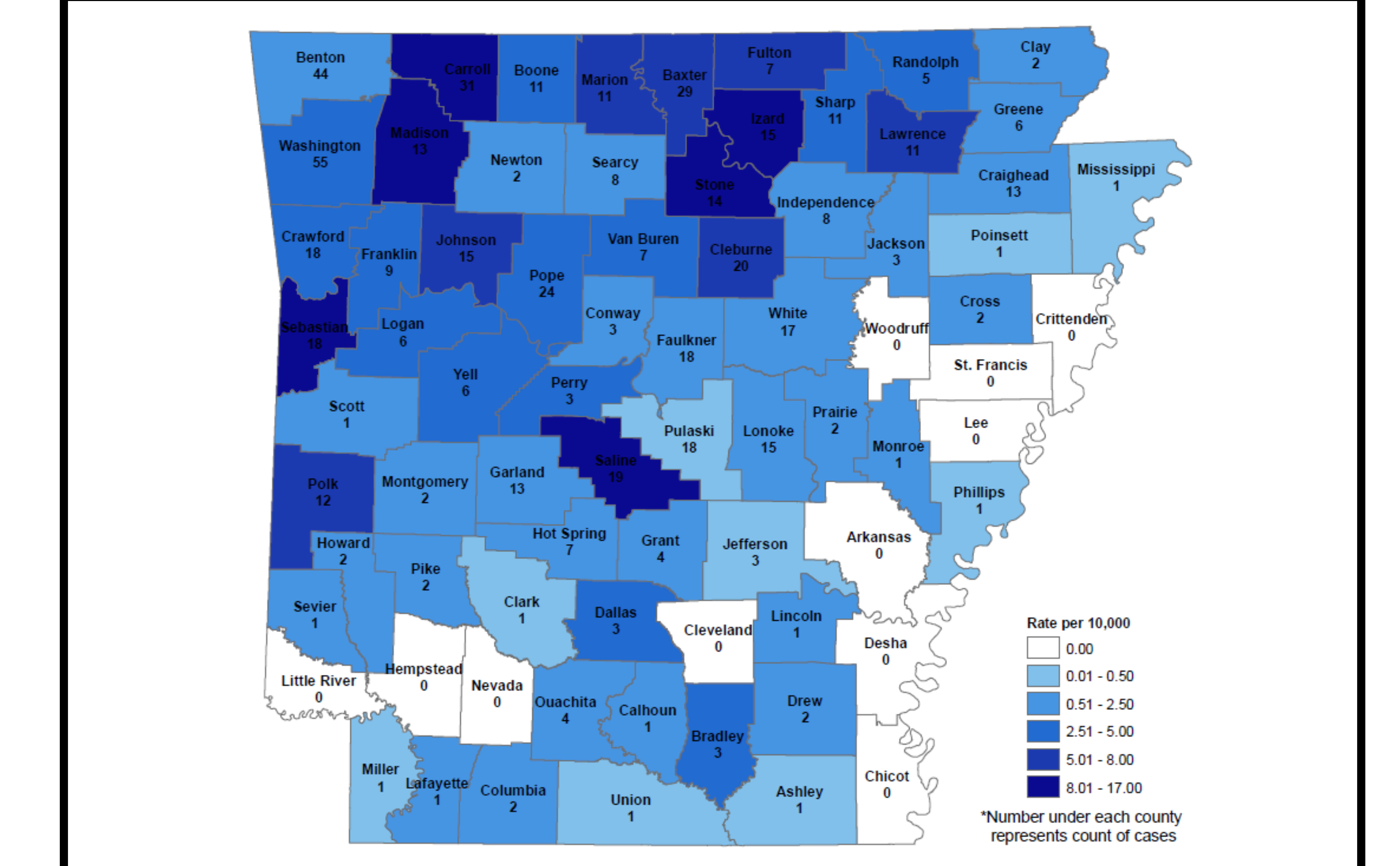
**Figure 3. Rates of Alpha-Gal – Arkansas, Jan 2013-Sep 2015**



**Figure 2. Distribution of Positive Alpha-Gal Test Results by County – Arkansas, Jan 2013-Sep 2015**



**Figure 4. Rates of Ehrlichiosis – Arkansas, 2013-2015**



## Conclusions

- Overall, 43% of 627 individuals tested for Alpha-Gal had a positive result
- Limited laboratory data suggest that in Arkansas, Alpha-Gal allergy can affect anyone, particularly older (50+) female adults, although among those tested, males had a higher odds of being positive
- Most samples were collected in August-September, implying that incidence and/or diagnosis occurs primarily during the summer, albeit higher odds for testing positive were seen for fall
- Two counties in northwest Arkansas accounted for the majority of the tests ordered, suggesting that providers there are aware of and interested in Alpha-Gal
- Rates of Alpha-Gal and Ehrlichiosis, both transmitted by the same tick, are similarly distributed across the state, but not identical

## Limitations

- Only had data up to September 30, instead of the entire year for 2015
- Only one of the two laboratories provided county information for each individual tested, so missing data were omitted for county analyses
- No formal case definition or diagnostic guideline has been developed for Alpha-Gal
  - We see markedly different levels of interest in testing across the state
  - There is possible over-diagnosis in some areas and under identification in others

## References

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**Acknowledgement:** This study was supported in part by an appointment to the CSTE Applied Epidemiology Fellowship Program administered by the Council of State and Territorial Epidemiologists (CSTE) and funded by the Centers for Disease Control and Prevention (CDC) Cooperative Agreement Number 1U38OT000143-03.