

# Rocky Mountain Spotted Fever (RMSF) in Arizona: 2003-2012



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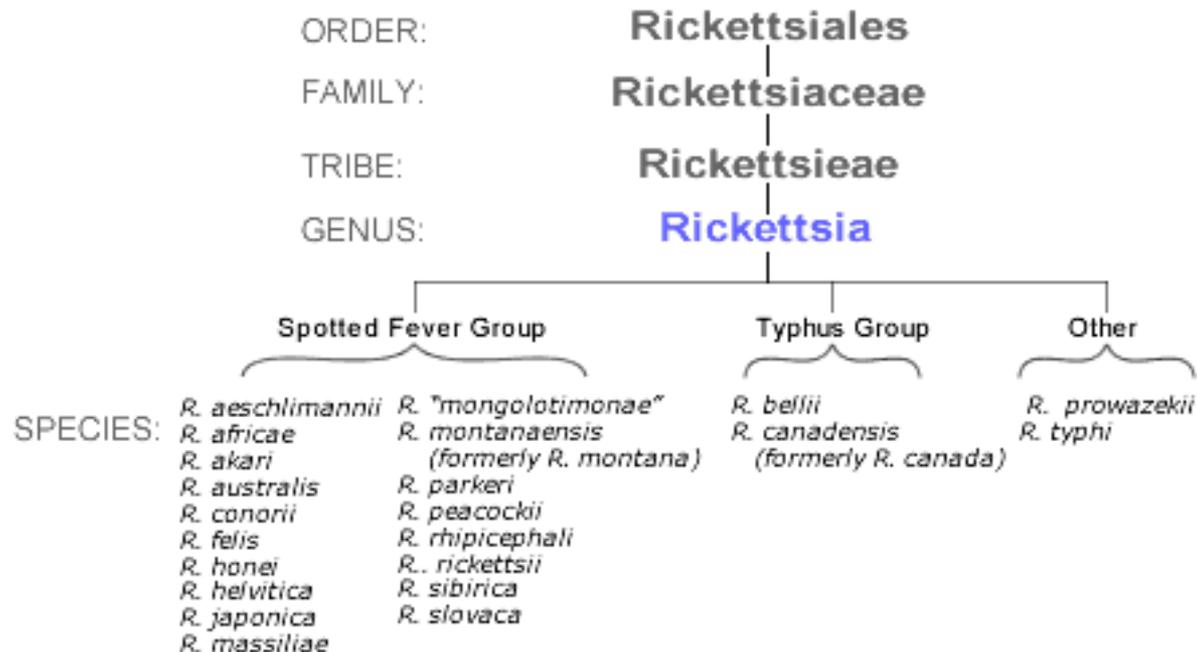
# Overview

- Overview of RMSF
- Brief history the emergence of RMSF in Arizona
- Background information on the vector
- The role of dogs in RMSF in Arizona
- Ongoing and planned control efforts

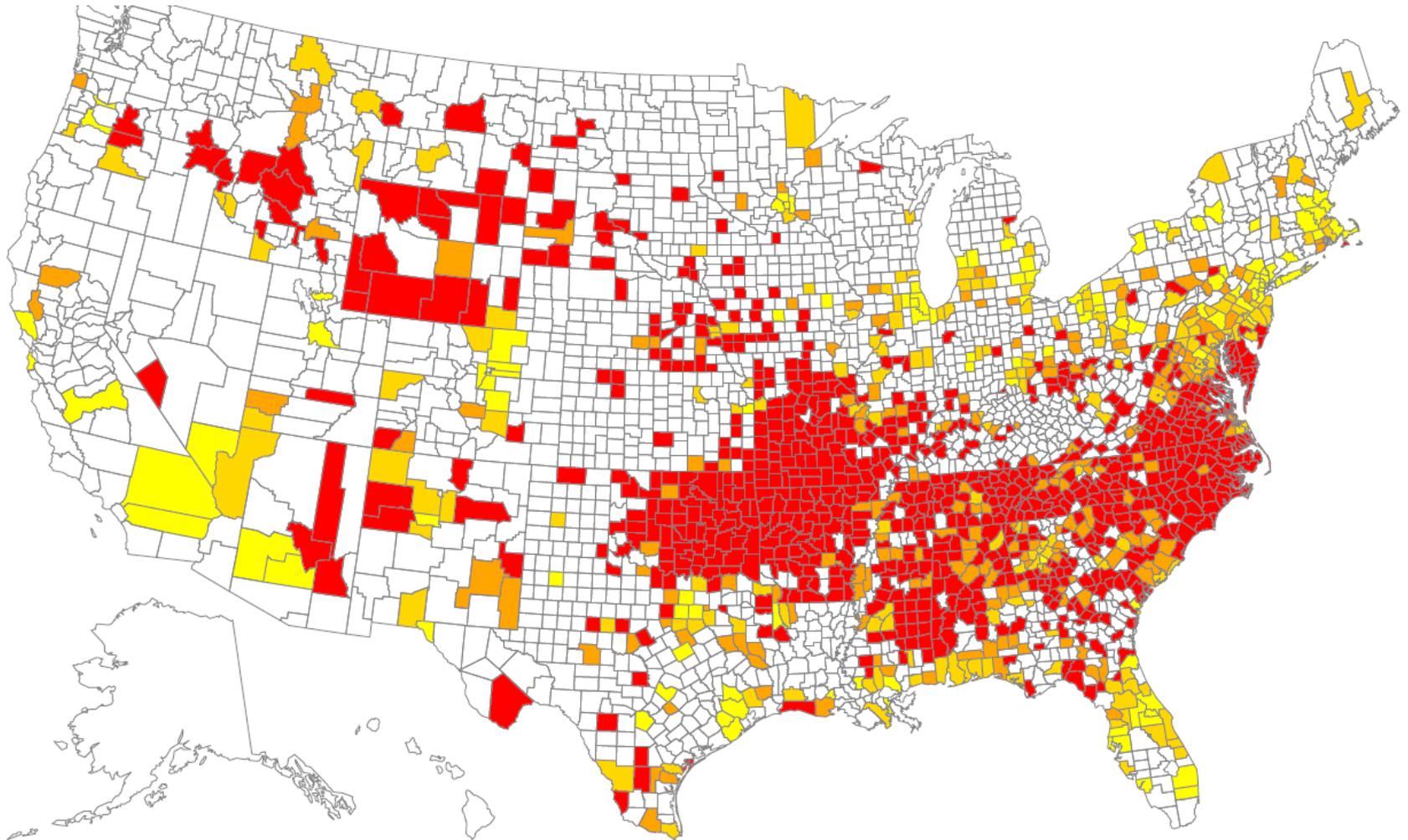
# RMSF : Background

- The most severe rickettsial illness of humans, caused by *Rickettsia rickettsii*
  - First specific notation of the disease in 1896
  - Endemic to North and South America
- Intracellular rickettsial pathogen
- Infects endothelial cells, causes widespread vascular damage

# Rickettsia Taxonomy



# National RMSF Incidence by County, 2000-2007



Rate per 1,000,000 persons



> 0 – < 5



5 – < 15



15 – < 30



>= 30

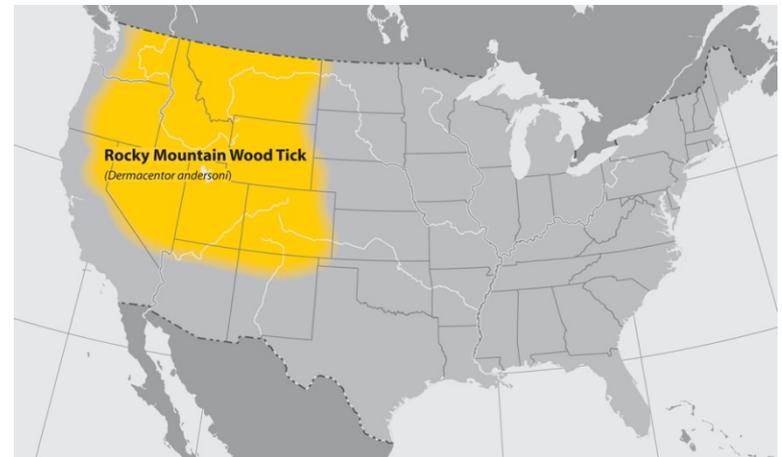
# The Primary U.S. Tick Vectors of RMSF



***Dermacentor variabilis***  
**American dog tick**



***Dermacentor andersoni***  
**Rocky Mountain wood tick**



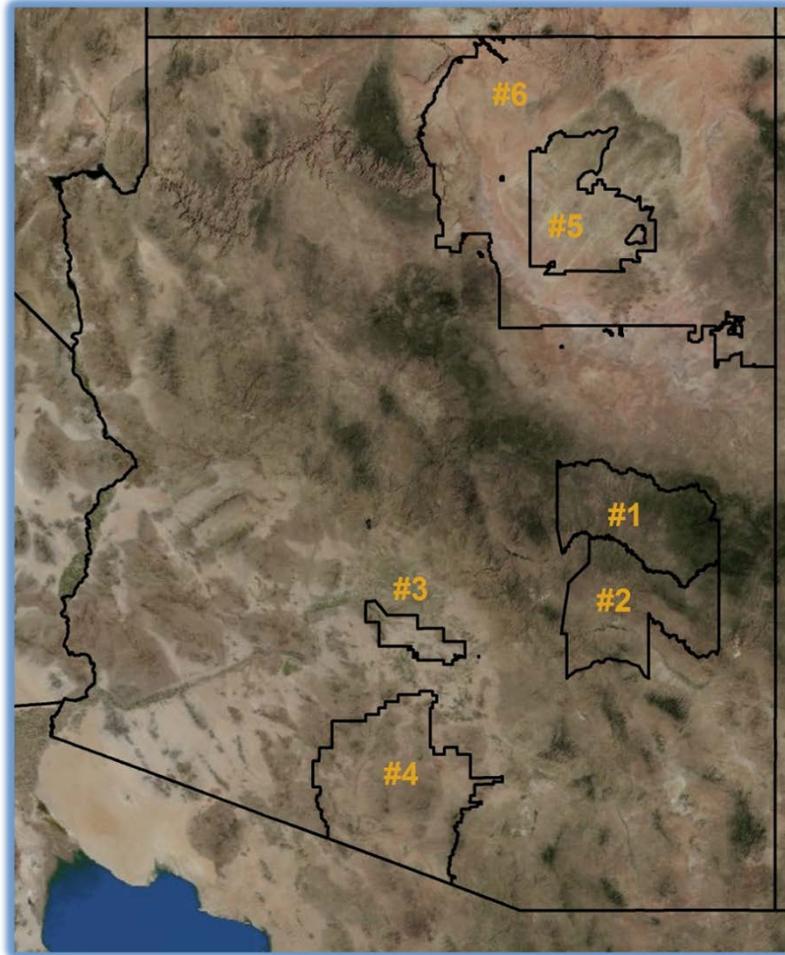
# RMSF in Arizona: Background

- Until 2003 RMSF was rarely seen in Arizona
- In 2002 the first case in an AZ resident with no travel was identified
  - From a tribal community in eastern AZ (Reservation 1)
- In 2002 14 month old child died of suspected sepsis following a febrile rash
  - From same tribal community in eastern AZ as 2002 case
  - PCR positive for *R. rickettsii*
- Environmental investigation found no *Dermacentor variabilis* or *Dermacentor andersoni*. 1000+ *Rhipicephalus sanguineus* found
- 5.6% of trapped ticks positive for *R. sanguineus*
  - 10.5% of dogs in the community positive for RMSF
  - First time *R. sanguineus* identified as a vector for RMSF

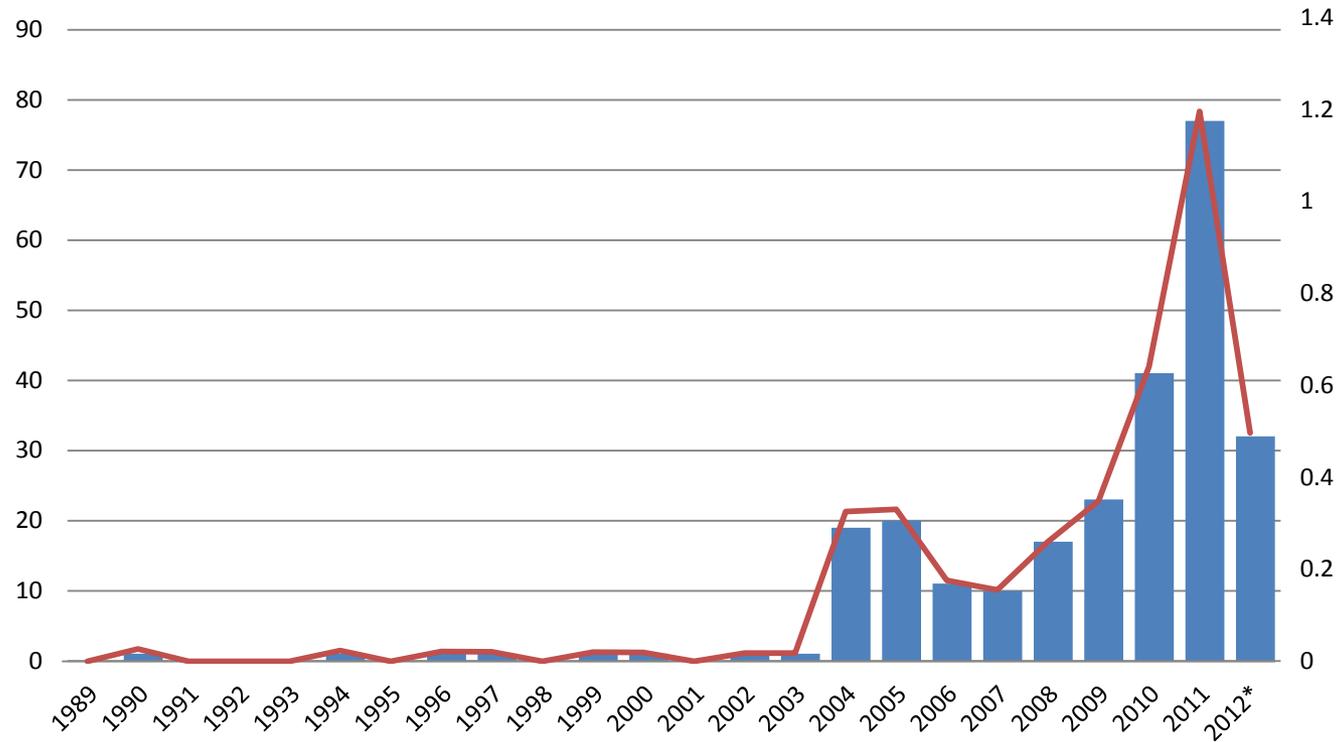
# RMSF in Arizona: Background

- Pediatric serosurvey identified antibodies to spotted group
  - 10% seroprevalence in Reservation 1
  - 16% seroprevalence in a neighboring reservation (Reservation 2)
- Control efforts implemented in Reservation 1 and Reservation 2, but limited by lack of funding and resources
- In 2009, three human cases (one death) identified in a third reservation (Reservation 3)
  - Limited spread. 5% of dogs were seropositive. No new cases since 2009
  - Dog seroprevalance comparable to areas with no human cases
- In 2011, first human cases identified in a fourth reservation (Reservation 4) in southern Arizona
  - 29% of dogs seropositive, but >50% in some communities
- Two additional reservations with RMSF in dogs (Reservations 5 and 6)

# Affected Reservations in Arizona



# Arizona RMSF Cases and Incidence



# The Primary Arizona Tick Vector of RMSF



***Rhipicephalus sanguineus***  
**Brown dog tick**



# Tick Biology

- Most ticks have moisture and temperature requirements
  - Vulnerable to desiccation, like high humidity, low tolerance for temperature extremes
- The brown dog tick is different
  - Thrives in hot climates
  - Requires less water than other ticks
  - Vulnerable to colder temperature
  - Can live indoors as long as there are dogs
  - Can crawl up and hide in walls, stucco, cracks, carpet, and hide in crevices

# Brown Dog Ticks in the Human Environment



# The Role of Dogs in RMSF

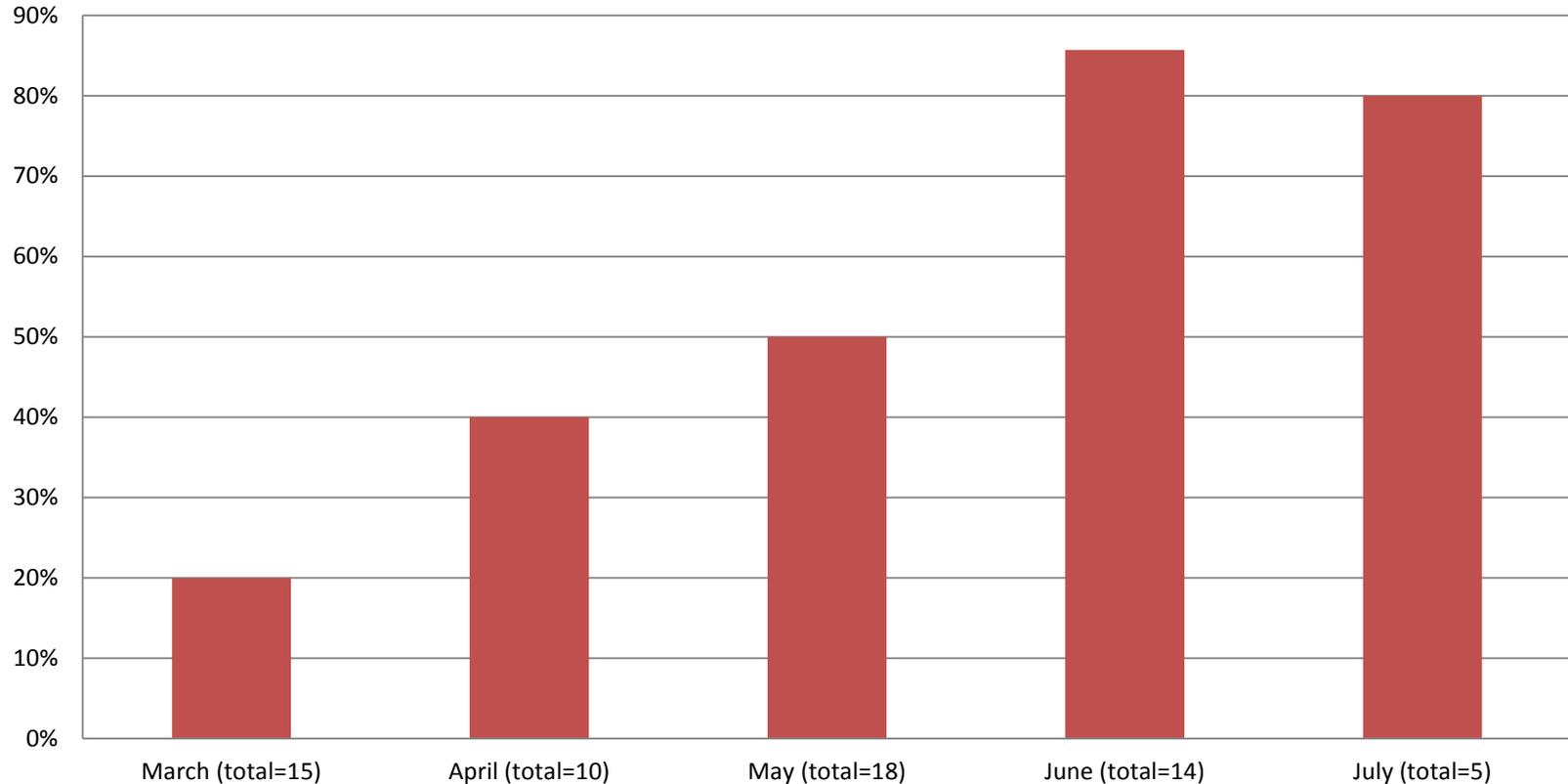
- Dogs cannot transmit RMSF, but they are preferred hosts
- Ticks require a dog to find a mate
- Free-roaming dogs spread ticks into nearby homes and yards
- New puppies (especially sick ones) may increase the number of infected ticks
- Seropositivity in dogs and human risk
  - In general, no human cases have occurred in communities where canine seropositivity is ~5%
  - Human cases observed in communities where canine seropositivity is >50%
  - Threshold for human cases somewhere in between
  - Canine seropositivity has been observed prior to first reported human cases in some reservations

# RMSF Control Efforts: ADHS

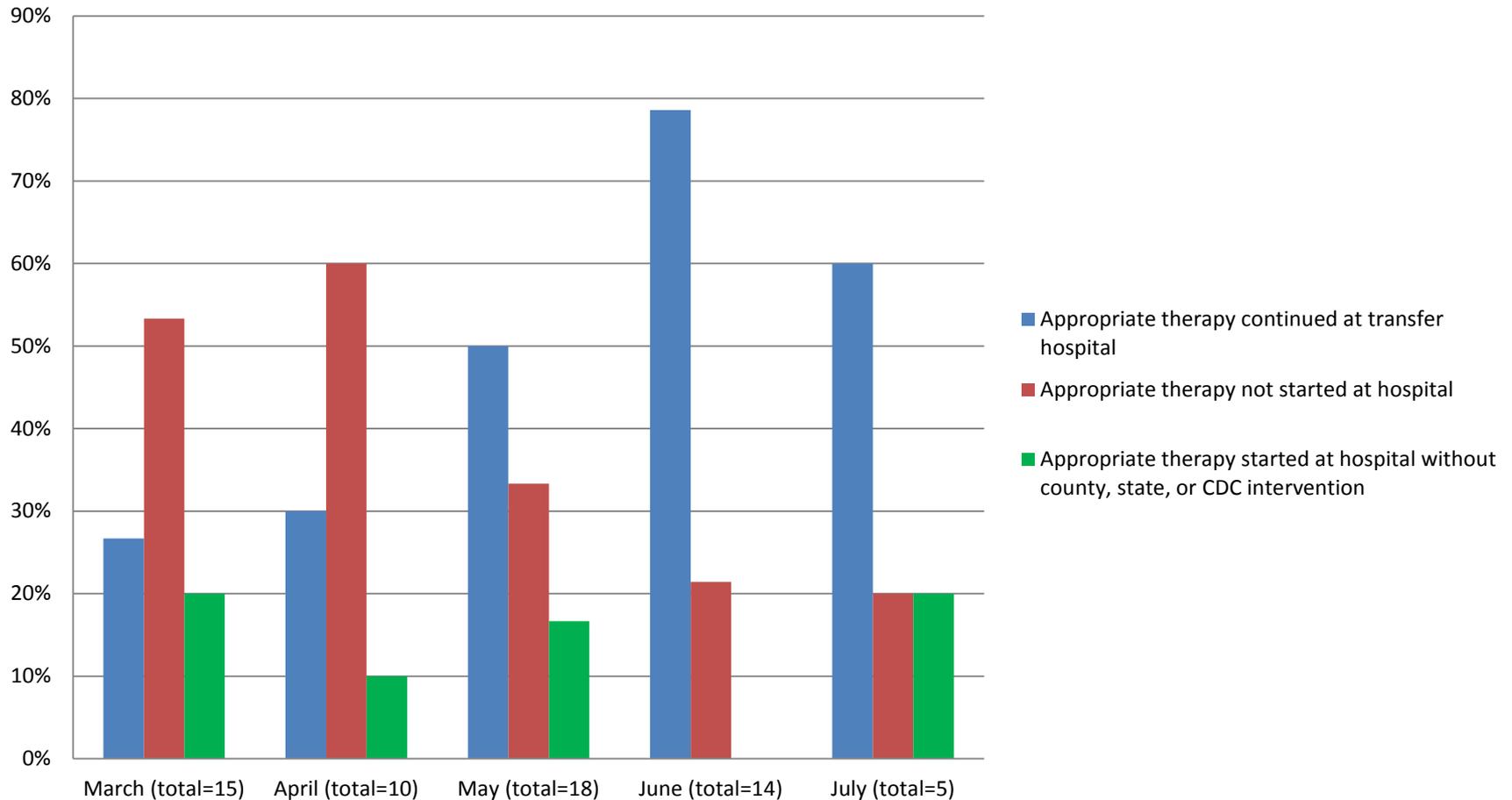
- Developed and implemented RMSF transfer protocol
- Outreach to counties
- Develop surveillance tools for emergence of RMSF in new areas
- Assist in Epi-Aids and prevention projects
- Statewide Tribal RMSF Stakeholder meetings
  - February 2012 & Fall (October/November) 2012
- Provide tick control supplies
- Ongoing surveillance for cases and laboratory testing

# Outcome of RMSF Transfer Protocol Pilot

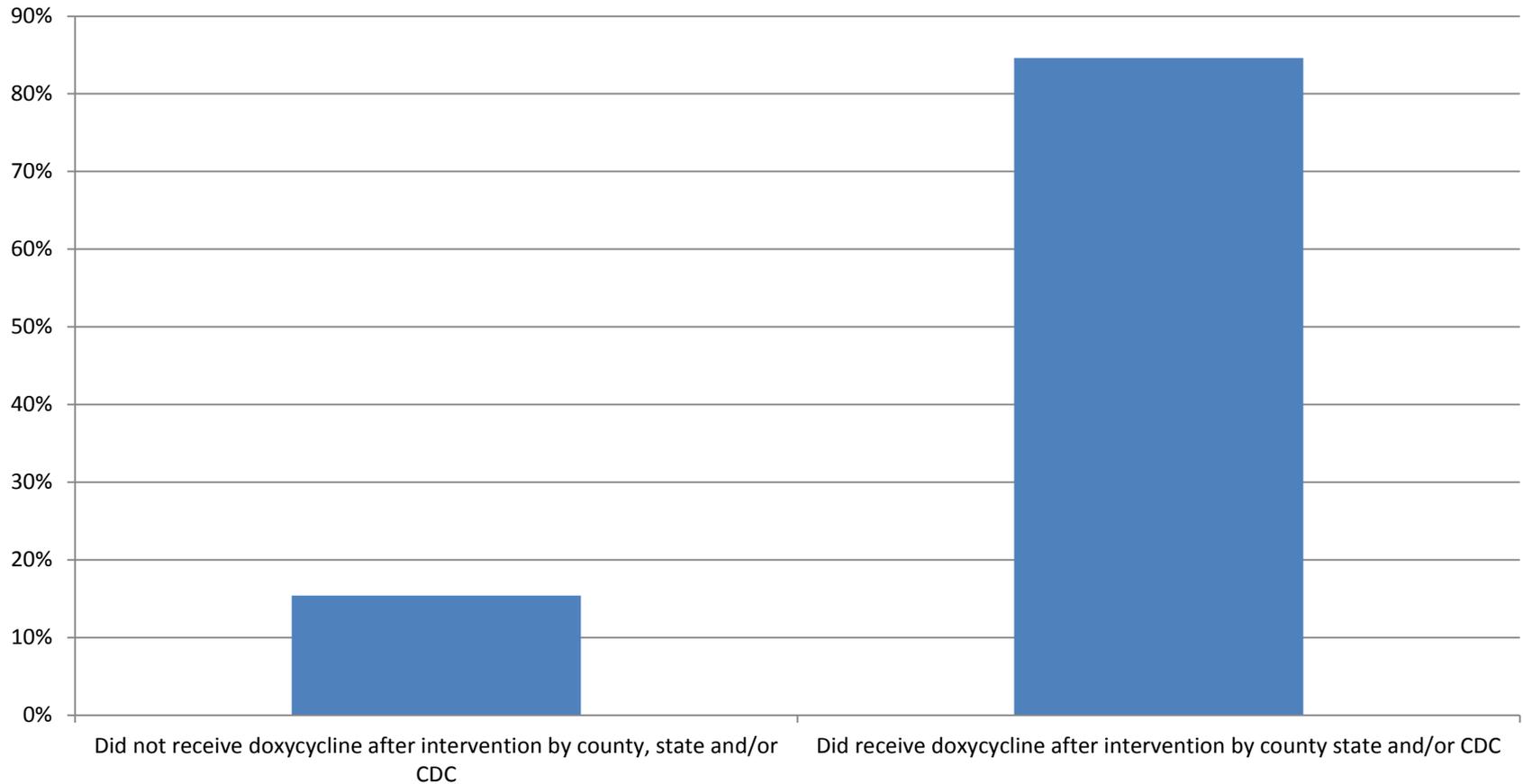
Percent of patients given doxycycline prior to transfer



# Outcome of RMSF Transfer Protocol Pilot



# Outcome of RMSF Transfer Protocol Pilot



# RMSF Control Efforts: Counties

- Outreach to clinicians to improve recognition of RMSF
- Follow-up for transfer patients
- Participation in RMSF prevention stakeholder meetings
- Assistance to tribal animal control programs
- Assistance with tick treatment and dog collaring on tribal lands

# RMSF Control Efforts: CDC

- Multiple Epi-Aids
- RMSF Rodeo Prevention Project
  - Demonstration project of best practices for 525 homes in a high RMSF risk neighborhood
- Integrated Pest Management training targeting ticks and RMSF prevention
- Canine serosurveys
- Provide tick control supplies
- Funding for ADHS RMSF efforts through ELC grant
- Ongoing laboratory testing and clinical education support

# RMSF Control Efforts: Future

- Use findings of RMSF Rodeo Prevention Project to better implement control programs
- Expand transfer protocol to other IHS and tribal 638 facilities
- Education and protocol for advice line nurses that serve affected communities
- Improved education on animal health and wellness, including spay and neuter
- Expand and improve animal control programs
- Expand and improve tick control programs

# Contact information

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ADHS RMSF Website:

<http://www.azdhs.gov/phs/oids/vector/rmsf/index.htm>

# Questions?

