

## The Additional Risk of Neurological Ramifications Heightens the Need for Exact Pinpointing of where Rocky Mountain Spotted Fever Cases have Occurred

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### Quotation

The ultimate aim of this survey has been to better understand what were the underlying reasons why outbreaks have occurred in specific townships within the four Pennsylvania counties where cases have been reported.

### Introduction

*Rickettsia* are “obligate” gram negative intracellular pathogens. The species *Rickettsia rickettsii* is the causative agent of Rocky Mountain Spotted Fever (RMSF) [1-3].

This disease has been identified traditionally by the presence of classical “red-spotted petechial rashes on the palms and soles of the feet” [3]. These classical clinical markers are, however, manifested “only in 50 to 80% of the time” [1-5]. The early manifestations can be nonspecific [3]. RMSF can be fatal in victims who are very young, very old or immuno-compromised [3].

The neurological manifestations of RMSF involving the central nervous systems are indeed quite serious [4]. Hospitalization is often necessary in 95% of the cases [4]. The clinical and neurological findings include: a) headache, b) confusion, c) altered mental state, d) meningismus, e) meningoencephalitis, f) CSF pleocytosis [4].

It is thus imperative that antibiotic therapy be started immediately in cases where there is suspected RMSF (Treatment is usually with tetracycline antibiotics such as Doxycycline-even in cases involving children) [3]. Chloramphenicol has also been used in the treatment of RMSF [3]. In the era of effective antibiotic therapy against RMSF, fatalities have occurred in 2 to 6% of patients infected with this pathogen [1-5].

In the Eastern USA Rocky Mountain Spotted fever is most frequently caused by the Dog Tick (*Dermacentor variabilis*), Lone Star Tick (*Amblyomma americanum*), and the Red Dog Tick (*Rhipicephalus sanguineus*) [1-6]. The animal hosts associated with RMSF carrying ticks are dogs, field mice, rabbits and rarely cats [1-6]. The transmission cycle is animal hosts to ticks. Human victims are infected by bites from ticks infected from blood feed derived from the animal host [1-3].

Ninety percent of the cases of RMSF are seen during the months of April through September [1-4]. Approximately half of the patients who are infected with RMSF are under the age of 15 [1-3]. The cases of RMSF have often involved children because of their association with dogs [1].

The communicable diseases center of the United States has recently reported that cases of Rocky Mountain Spotted Fever (RMSF) have increased by 300% [1-5]. It has also been reported that frequently tick pathogen carriage surveys for RMSF often only detect the presence of *R. rickettsia* in about 1% of ticks examined [1-6].

To further add to the complexities of RMSF case reporting, it has now noted that some of the reported cases of RMSF could actually be due to another rickettsial pathogen, *Rickettsia parkeri* [2]!

Thus because of the serious neurological and other consequences of Rocky Mountain Spotted Fever, is extremely important to pinpoint specific locations where cases of RMSF have occurred. Pinpointing needs to focus in at the county and township level.

### Methods

The survey data was collected from reported cases of Rocky Mountain Spotted Fever at the Wayne Memorial Hospital Tick Borne Diseases (TBD) Wellness Centre and also from the office of Dr C. Mattos in the period of Jan-Dec 2023. The survey data was entered into data tables with respect to: County Townships, zip codes and number of cases per county townships (See tables A-D). The final results were depicted in bar graphs (See figures A-C).

### Results

In viewing figure A one observed that the Pike County townships of Hawley, Milford, and Shohola had a higher number of cases than the other townships of Pike County. Shohola Township had the most cases of RMSF (i.e. 7 cases) (See figure A).

Figure B showed that in Wayne County the most cases of RMSF occurred in Newfoundland and Waymart townships (See figure B).

Table C and D showed that cases reported at the TBD Wellness Centre at Wayne Memorial Hospital involving patients from Lackawanna and Monroe County each revealed only one case of RMSF per county township in one township in those aforementioned counties.

When viewing figure C, it was noted that Pike County had the highest number of reported cases of RMSF at 19 cases. Wayne County has the next highest number of reported cases at 7 cases. Lackawanna and Monroe Counties had only one case per county.

The bar graph in figure C clearly depicts the differences in number of reported cases of RMSF in each of the counties surveyed. Pike County had the most number of reported cases (i.e. 19 cases), and Wayne County had the next highest number of report cases (i.e. 7 cases).

Pike County Township	Zip Code	No. Cases of RMSF
Bushkill	18324	1
Dingsmans Ferry	18328	1
Greeley	18425	1
Greentown	18426	1
Hawley	18428	4
Milford	18337	4
Shohola	18458	7

**Table A:** Total number of cases of RMSF seen at Wayne Memorial Hospital TBD Centre and Office of Dr C. Mattos Jan-Dec 2023 from Pike County townships 19 cases.

Wayne County Township	Zip Code	No. Cases of RMSF
Honesdale	18431	1
Lake Ariel	18436	1
Lakeville	18438	1
Newfoundland	18445	2
Waymart	18472	2

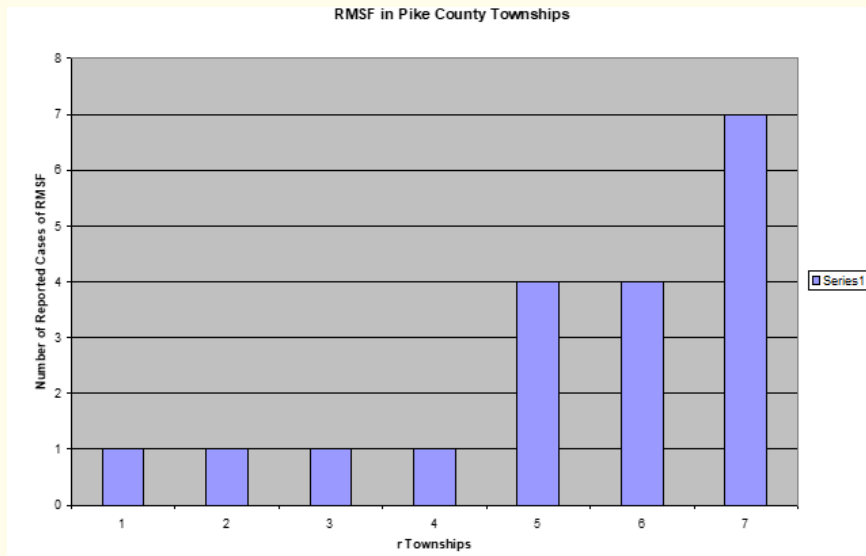
**Table B:** Total number of cases of RMSF seen at Wayne Memorial Hospital TBD Center Jan-Dec 2023 from Wayne County townships 7 cases.

Lackawanna County Township	Zip Code	No Cases of RMSF
Moscow	18444	1

**Table C:** Total number of cases of RMSF seen at Wayne Memorial Hospital TBD Centre Jan-Dec 2023 from Lackawanna County townships 1 case.

Monroe County Townships	Zip Code	No. Cases of RMSF
Stroudsburg	18360	1

**Table D:** Total number of cases of RMSF seen at Wayne Memorial Hospital TBD Centre Jan-Dec 2023 from Monroe County townships 1 case.



**Figure A:** Legend: Townships: 1=Bushkill, 2=Dingmans Ferry, 3=Greeley, 4=Greentown, 5= Hawley, 6=Milford, 7= Shohola.

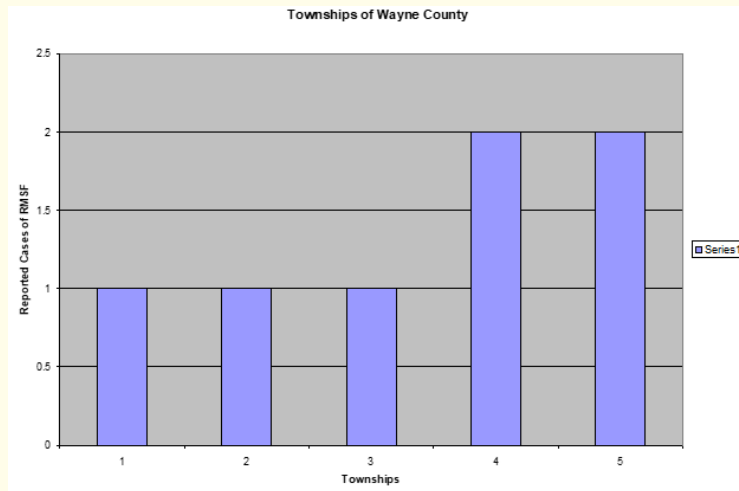


Figure B: Legend: Townships: 1=Honesdale, 2=Lake Ariel, 3=Lakeville, 4= Newfoundland, 5= Waymart.

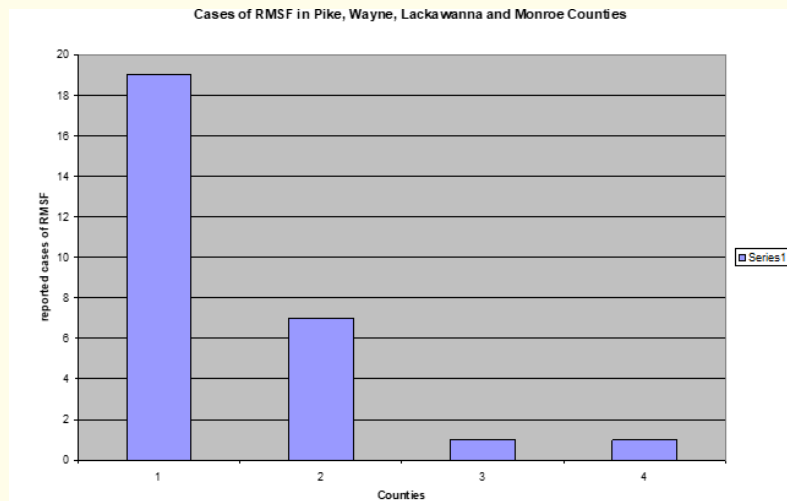


Figure C: Legend: Counties: 1= Pike County, 2=Wayne County, 3=Lackawanna County, 4= Monroe Count.

## Discussion

The County/Township Survey showed its worth because it has enabled one to pinpoint the locations where cases and clusters of cases of RMSF had occurred. This is extremely important especially when the victims of tick bite display neurological manifestations [4].

There are several points that now should be addressed especially where neurological manifestations have occurred namely: a) could the reason for these higher levels of occurrence be due to specific geographic features that favor the appearance of the specific species of ticks associated with RMSF in the Eastern USA, b) could there be a larger number of animal hosts in these townships, and c) could there be a higher level of pet ownership of potential RMSF hosts.

## **Conclusions**

The survey did enable one to view specific locations where cases of RMSF had occurred. In addition, this survey could also provide additional vital information as relates patients who were victims of tick bites, and displayed neurological manifestations that could be linked to neurological cases of RMSF.

## **Acknowledgement**

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