

Coccidioidomycosis Surveillance in Arizona: A Comparison of 2007 and 2011 Data

Corey Benedum and Clarisse Tsang, MPH

Arizona Infectious Disease Training & Exercise

August 2, 2012



Health and Wellness for all Arizonans

azdhs.gov

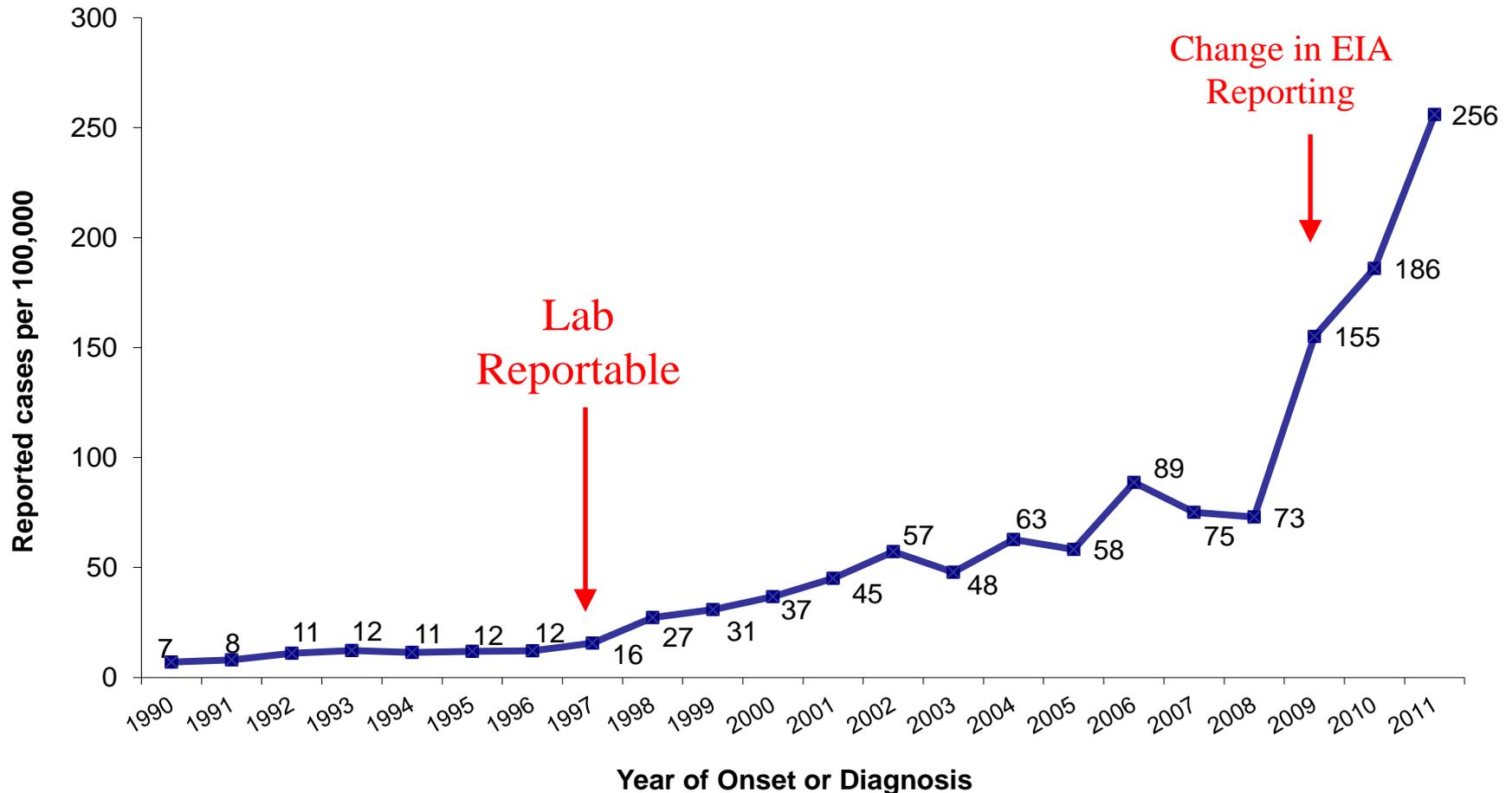


Surveillance: Cocci Case Definition

- Council for State and Territorial Epidemiologists (CSTE)
 - Updated in 2007
 - Clinical case definition
 - Lab criteria*
- Arizona Department of Health Services (ADHS)
 - Since 1997
 - No clinical symptoms required
 - Lab criteria*

*Lab criteria for diagnosis includes either detection of IgM by immunodiffusion (ID), enzyme immunoassay (EIA), latex agglutination, or tube precipitin OR IgG by ID, EIA, or complement fixation (CF) OR cultural, histopathologic, or molecular evidence of *Cocci* species

Rates of Reported Cocci Cases, Arizona, 1990-2011



Methods

- Study compared all 2007 data and 2011 data from 2/14/2011 to 12/31/11
 - Beginning in February 2011, ADHS began entering every positive cocci test result
- Multiple sub-sets were cleaned, created, compared, and analyzed using SAS statistical software

2007 Total Data
n=4,832

2011 Total Data
n=16,446

2011 Total Data
(2/14/11 – 12/31/11)
n=14,146

EIA Alone

n=10,819

- EIA IgM
- EIA IgG
- EIA IgG + EIA IgM

Combination Positives

n=3,327

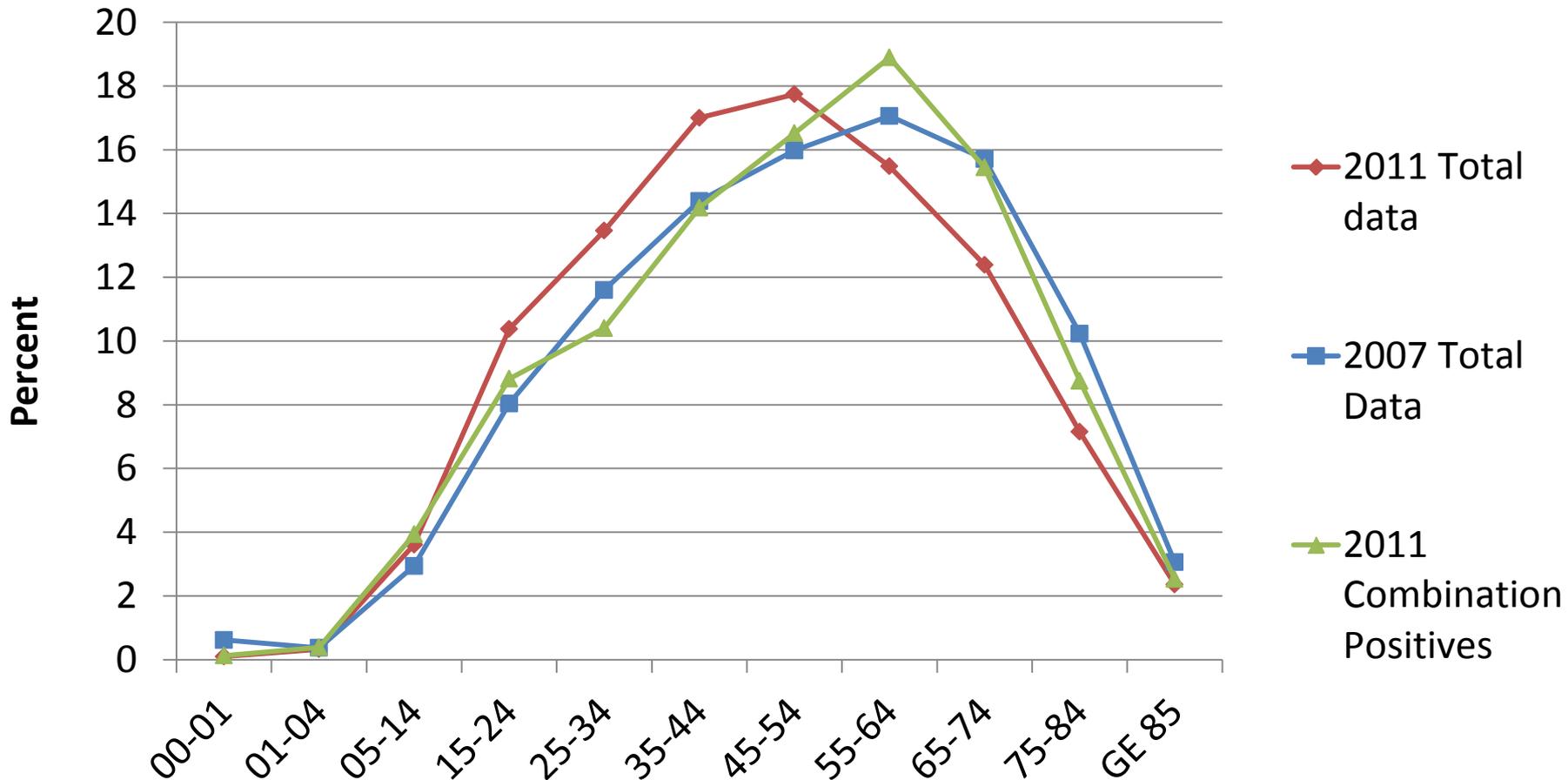
- EIA IgM + other
- EIA IgG + other
- EIA IgG + EIA IgM + other
- Other (ID, Culture, etc.)

Reported Cocci Cases, Age and Gender

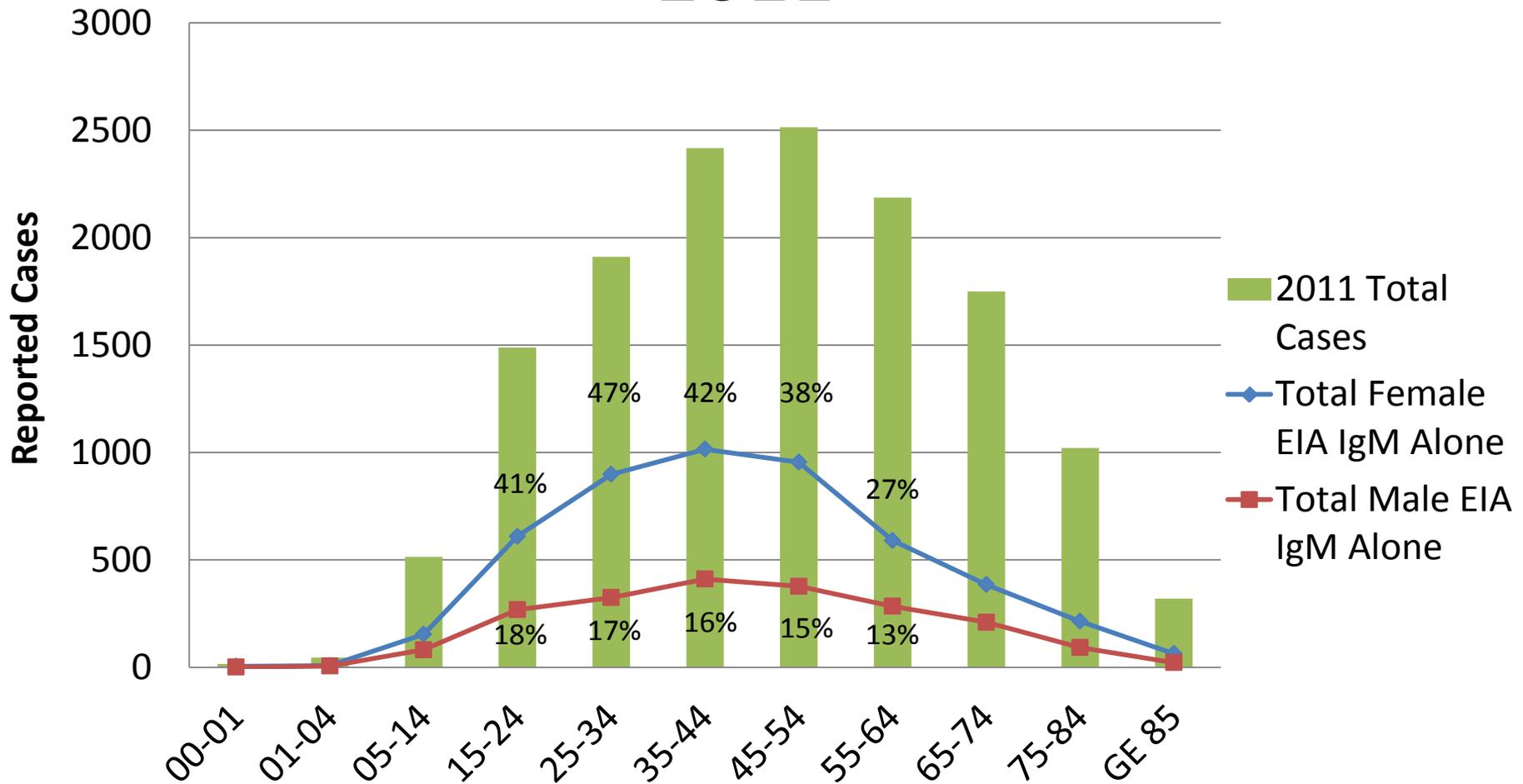
Year	Age (median, mean)	Gender (% female)	<i>p</i> -value (Gender) 2007 vs. Year
2007	52, 51	46%	
2008	51, 50	48%	<i>p</i> = .0516
2009	47, 47	54%	<i>p</i> < 0.0001
2010	48, 47	57%	<i>p</i> < 0.0001
2011 (2/14-12/31)	47, 47	58%	<i>p</i> < 0.0001
EIA Alone	46, 46	62%	<i>p</i> < 0.0001
Combination Positives	52, 50	43%	<i>p</i> = 0.07

**p* value was determined using total female and male case numbers and not percentages

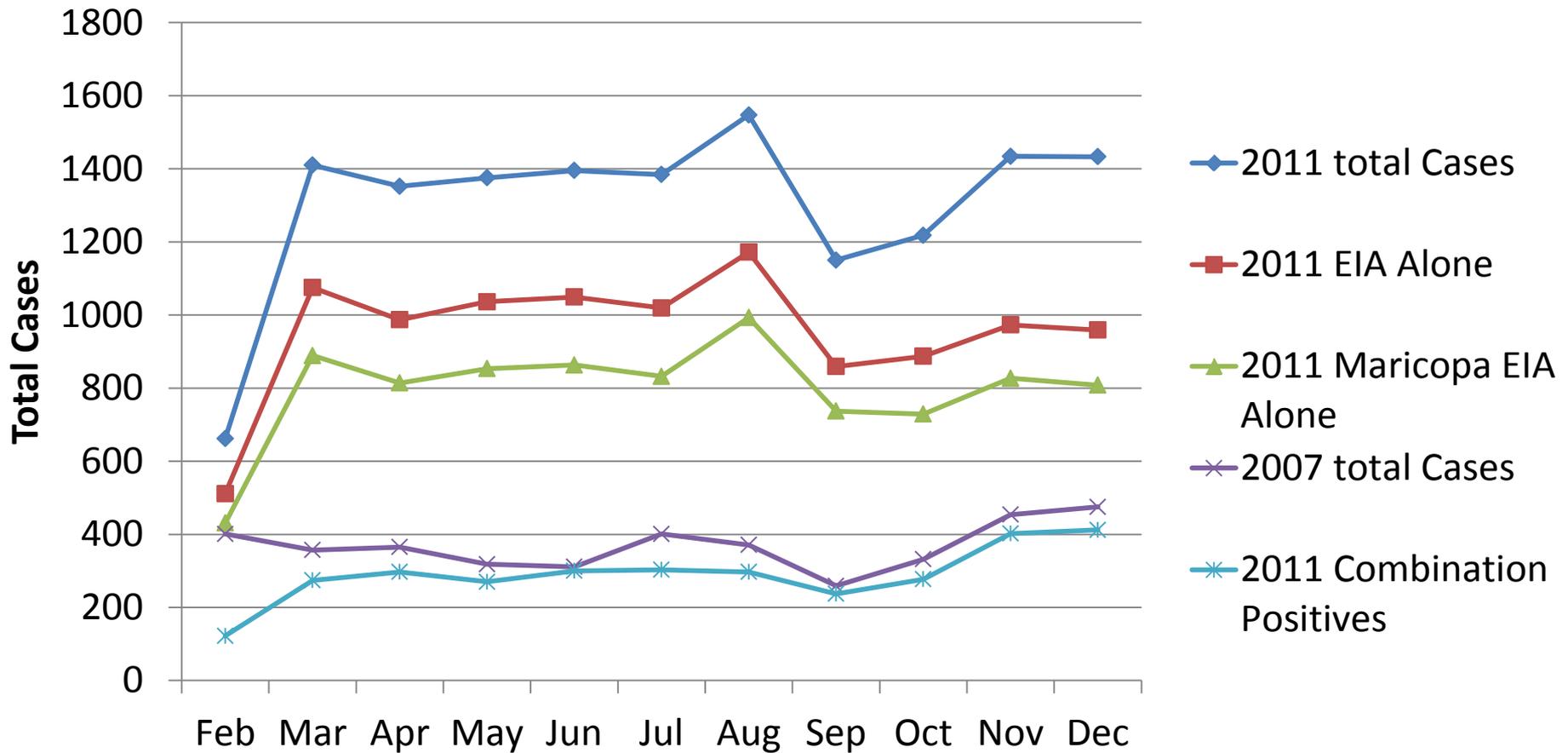
Percentage of Reported Cocci Cases by Age Group



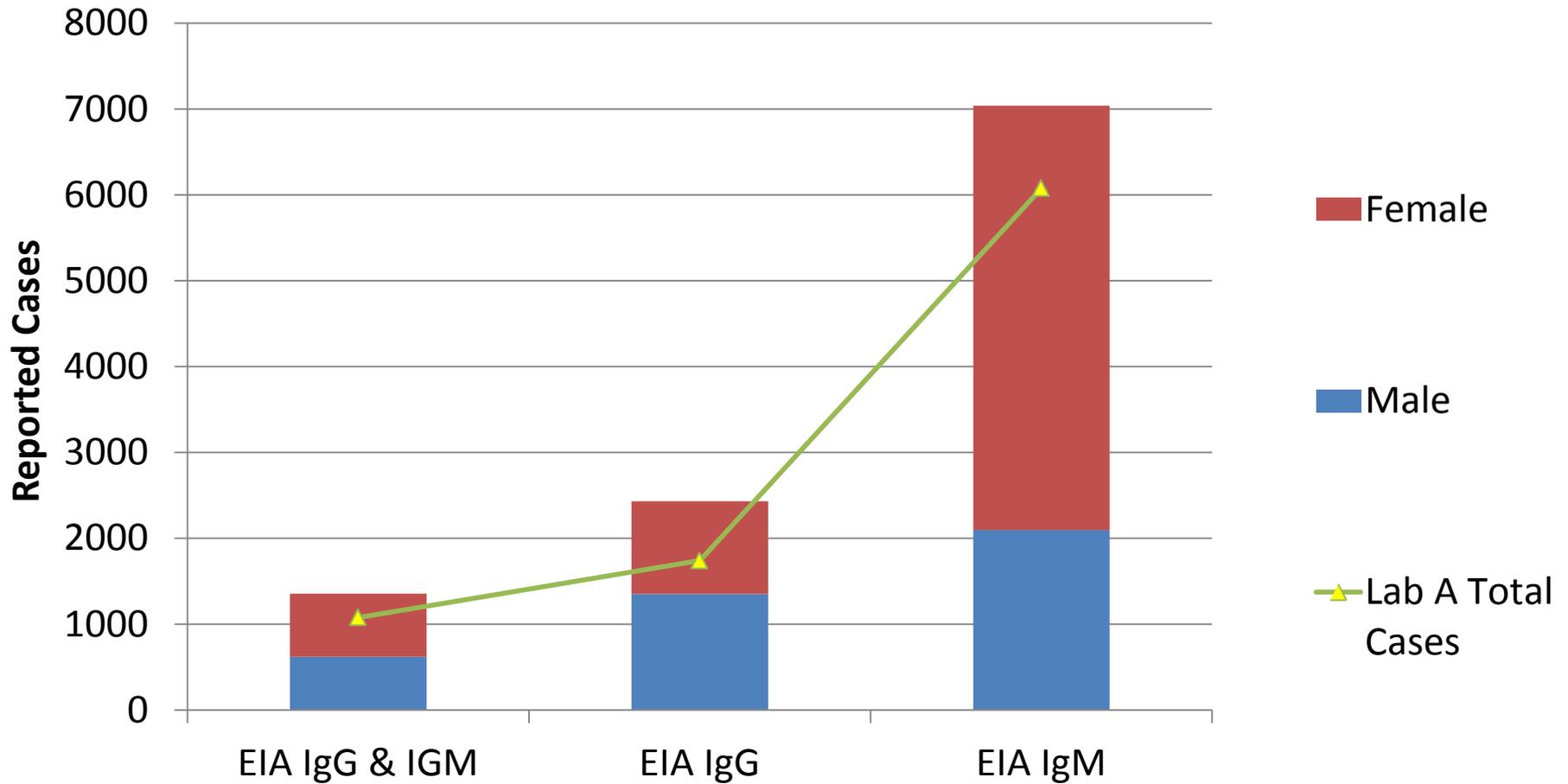
Total Cases By Age Group, 2011



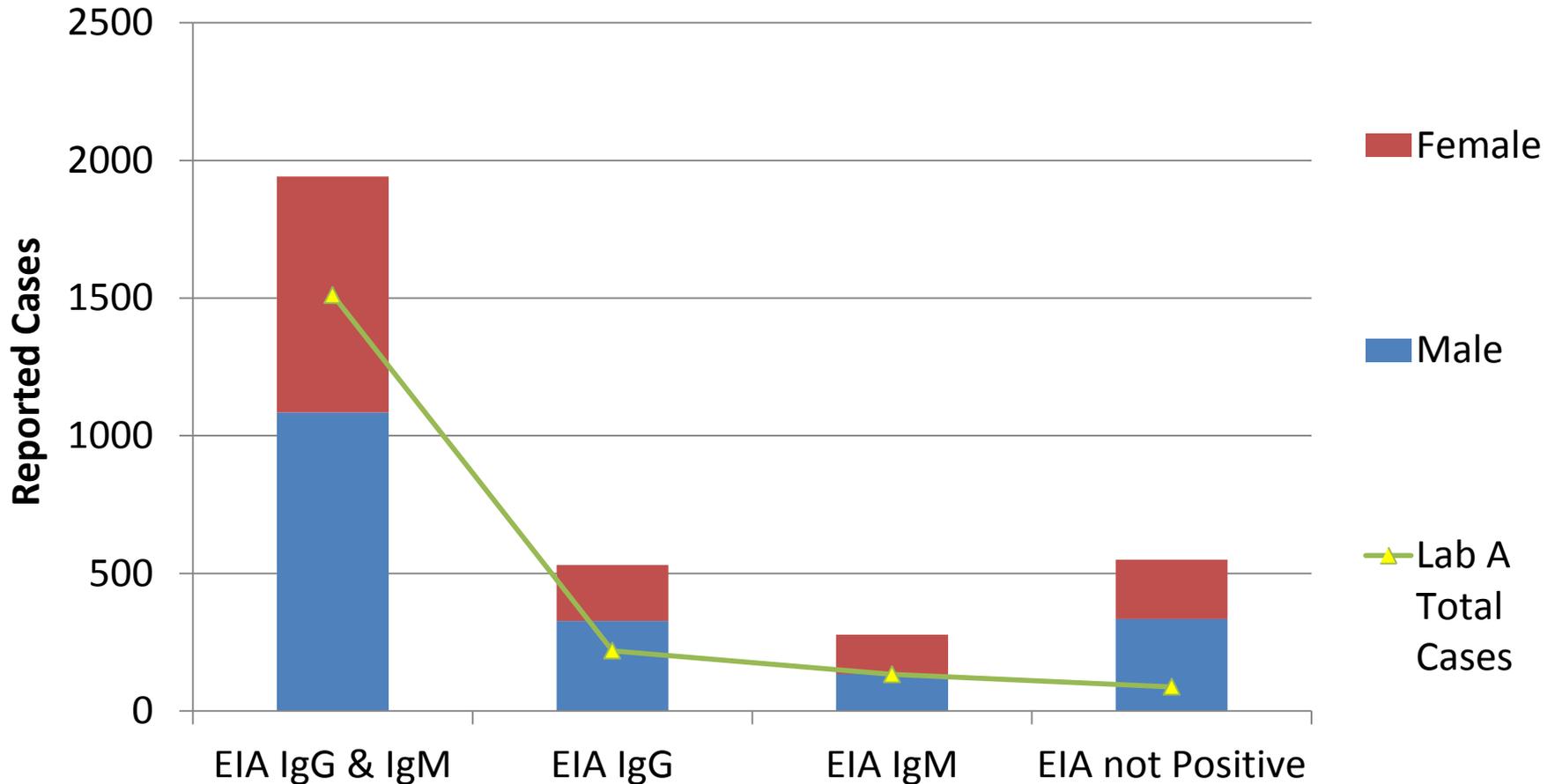
Reported Cocci Cases by Month, and Data Group,



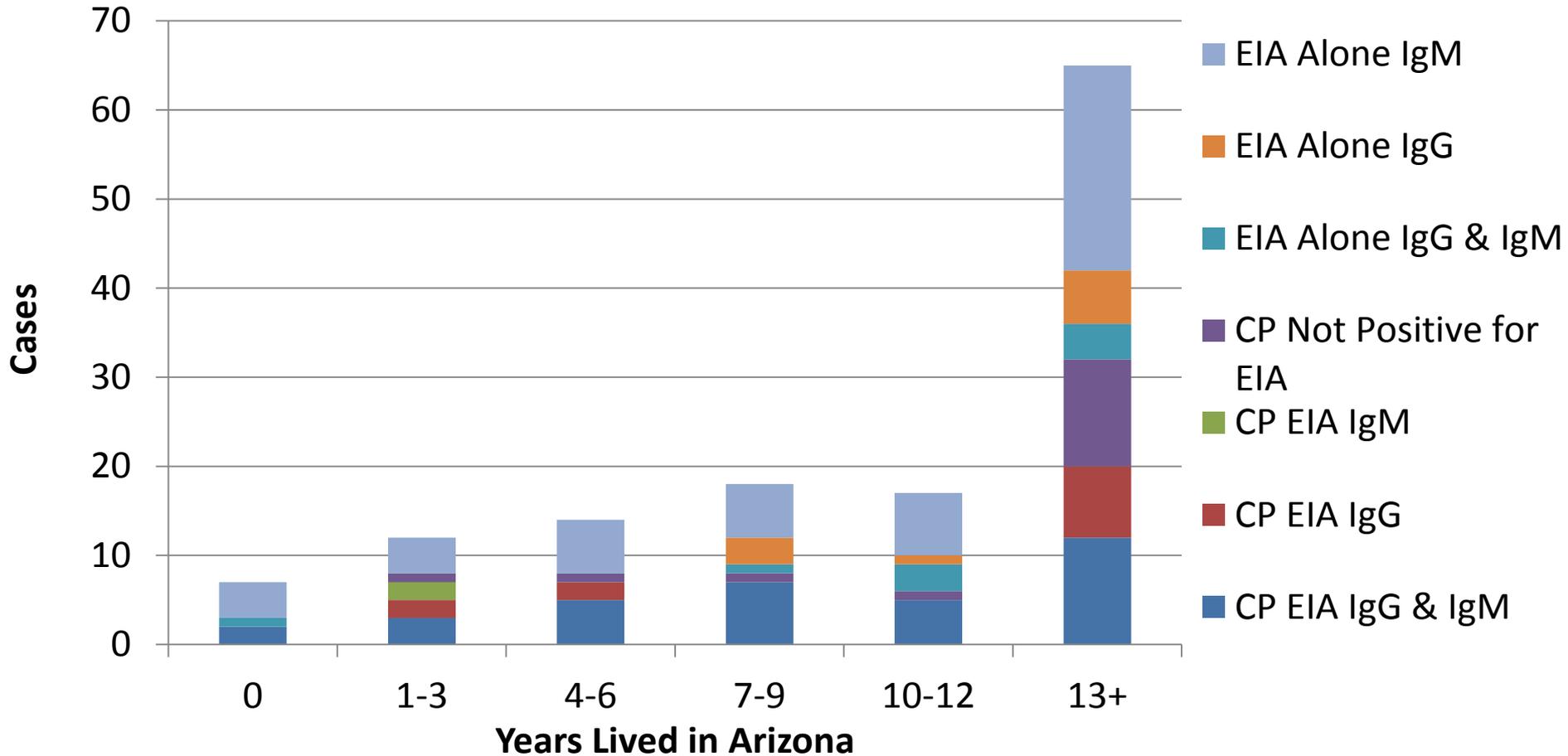
EIA Alone Data 2011



Combination Positives Data 2011

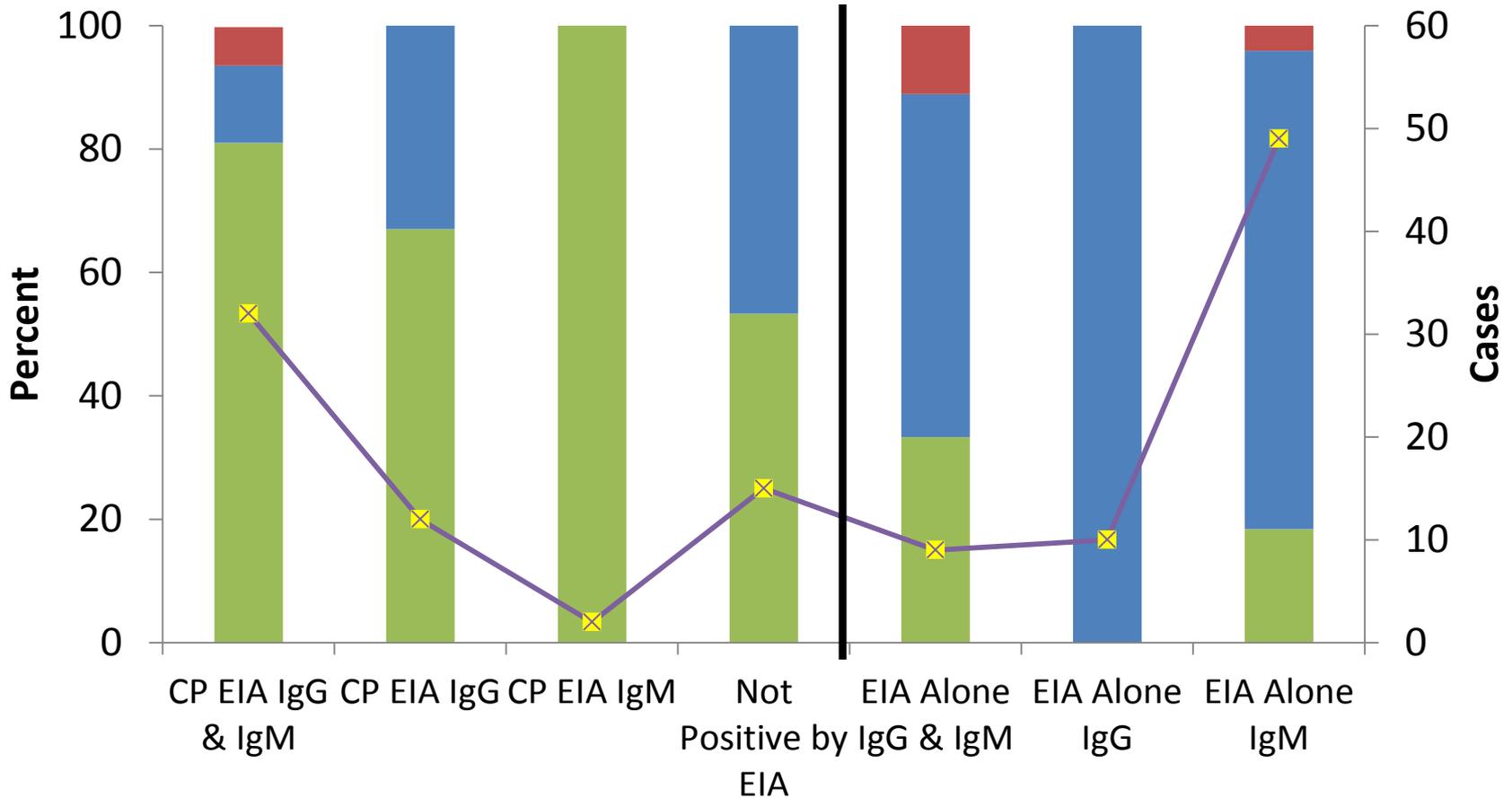


Years Lived in Arizona



n= 133

Antifungal Prescription



n = 133, 4 missing

■ Unknown
 ■ No
 ■ Yes
 —x— Number of Cases per Group



Health and Wellness for all Arizonans



Conclusions

- Including cocci cases positive by EIA only resulted in a significant shift in the data
 - Mostly females and younger populations
- 77% of all cases are EIA Alone, 65% of which are IgM positive
- The rate of patient treatment is highest for those who are positive by both EIA AND another test
- Additional studies are needed to establish the role of EIAs in cocci surveillance

Limitations

- Negative results are not required to be reported, resulting in the inability to determine if the non-presence of a test result is due to a negative result or it not being ran.
- Possible data entry errors, i.e. incorrect result being recorded.
- The possibility of recall bias exists within case interviews.

Future Steps

- Examine EIA IgMs and EIA IgGs, respectively and single EIA positives that are positive only one time without additional positive EIA results
- Investigate EIA Alone cases through interviews and medical record reviews to look at clinical symptoms
- Educate laboratories in reporting complete cocci test results
- Educate providers in interpreting cocci test results

Acknowledgments

- ADHS
 - Clarisse Tsang
 - Shoana Anderson
 - Jessica Rigler
 - Peter Kelly
 - Ken Komatsu
 - Sara Imholte
 - Cara Christ
 - IDES Data Entry/Epis
- VFCE
- CDC
- Reporting laboratories and providers

Questions

Corey Benedum

Corey.Benedum@azdhs.gov

602-364-3676

Or

Clarisse Tsang

tsangc@azdhs.gov

602-364-3817

Additional Slides

CSTE Definition

Clinical Description

- Influenza like signs and symptoms
- Pneumonia or other pulmonary lesion
- Erythema nodosum or erythema multiforme rash
- Meningitis
- Involvement of bones joints etc. by dissemination

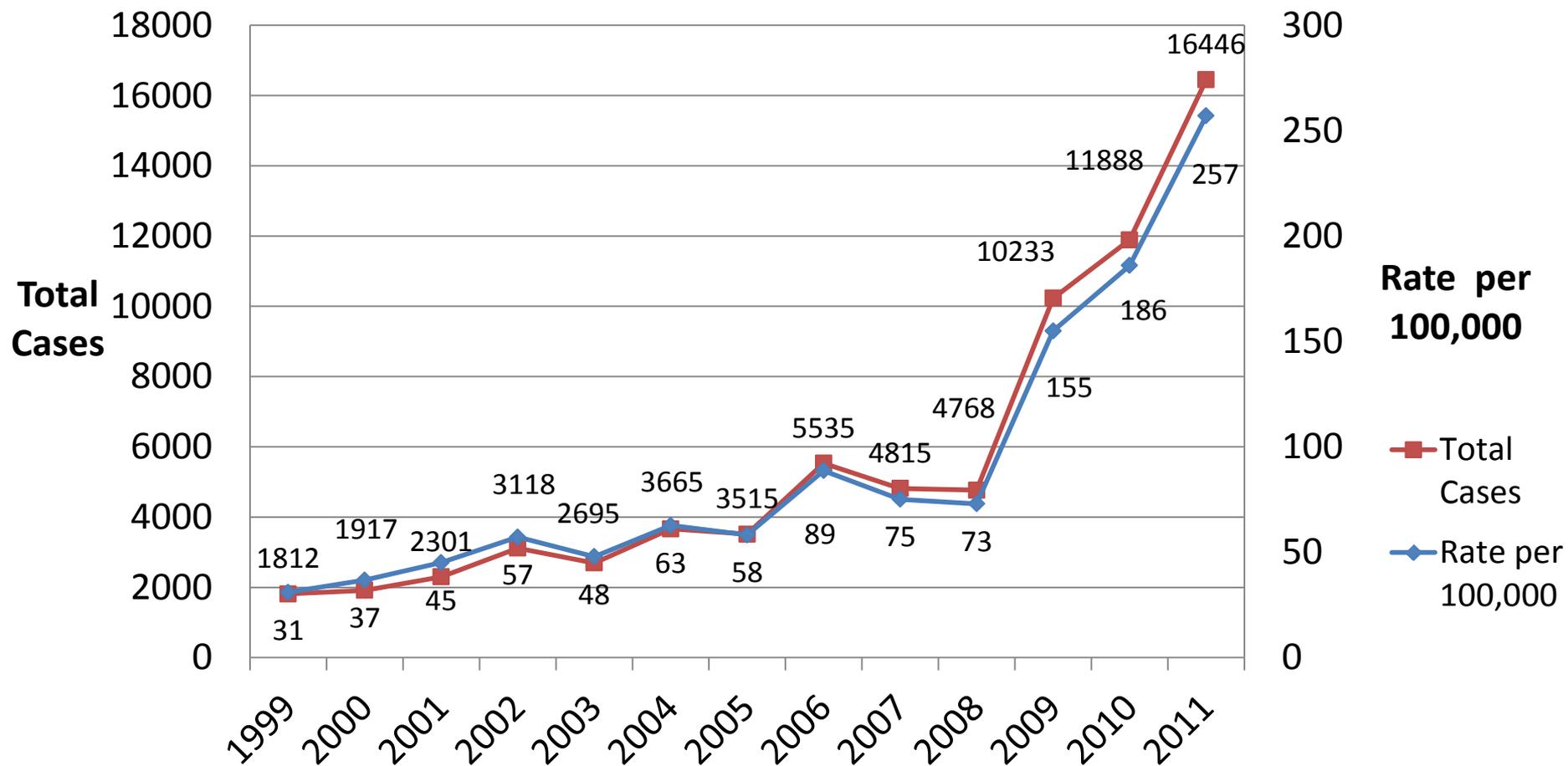
Laboratory Criteria

- Cultural, histopathologic, or molecular evidence of infection
- Positive serologic test for Cocci antibodies in serum CS fluid or other bodily fluid

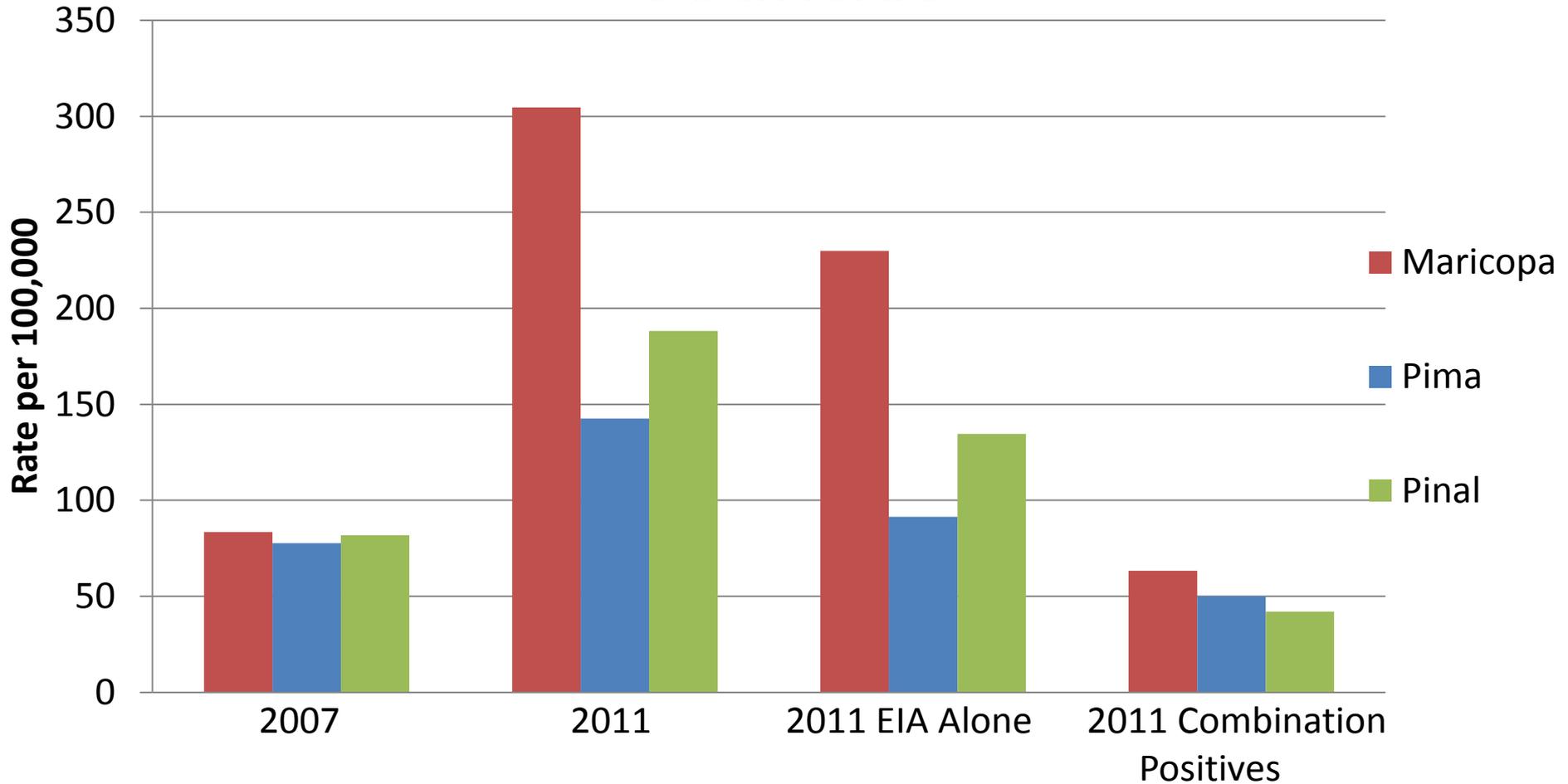
Cocci Symptoms

- Influenza like symptoms
 - Fever, chest pain, cough, myalgia, arthralgia, fatigue, and headache
- Night sweats
- Chills
- Shortness of breath
- Rash or skin lesions
- Stiff neck
- Hemoptysis
- Weight loss
- Nodules in the lungs

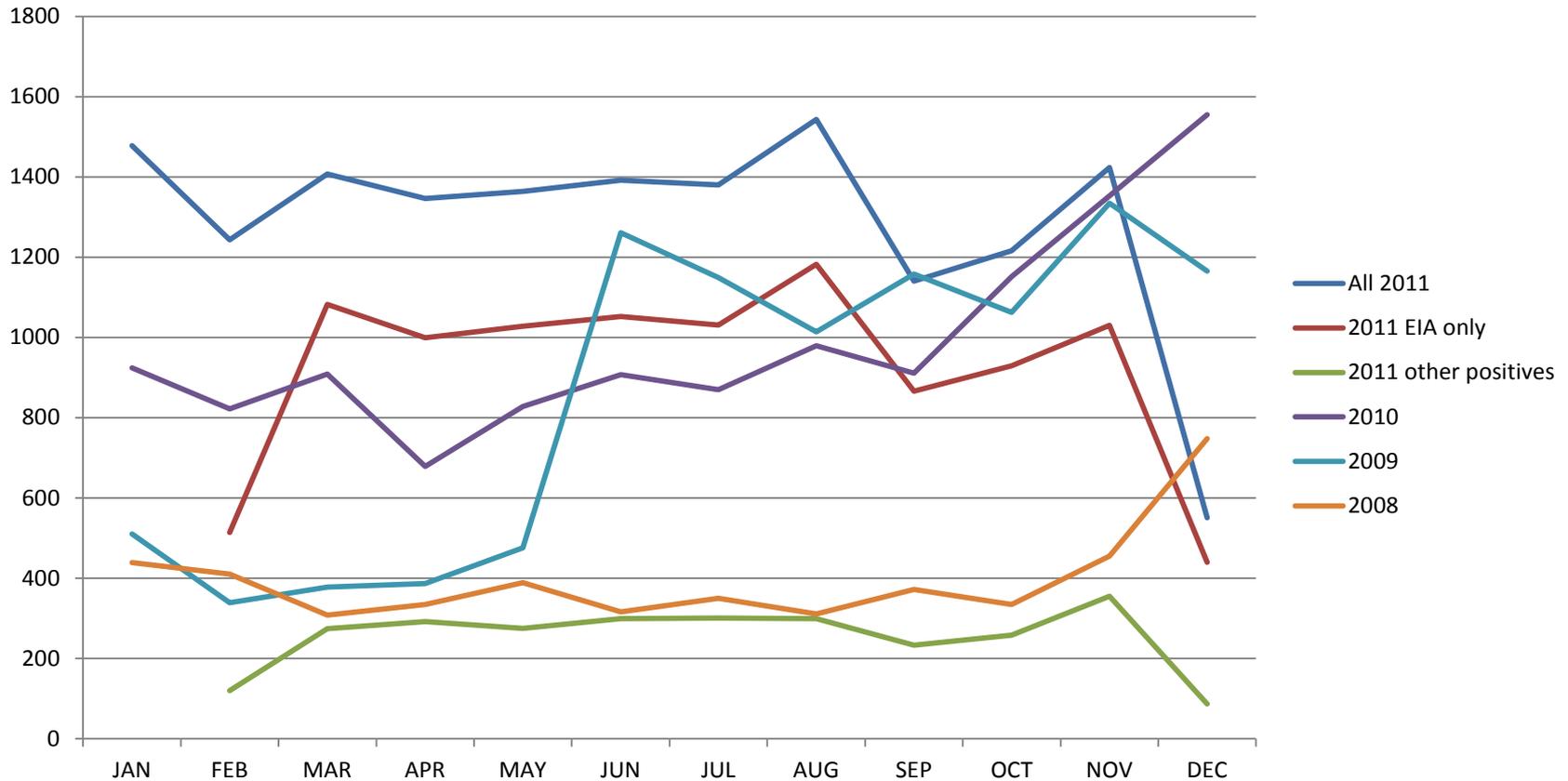
Total Number and Rate of Reported Cocci Cases, 1999-2011



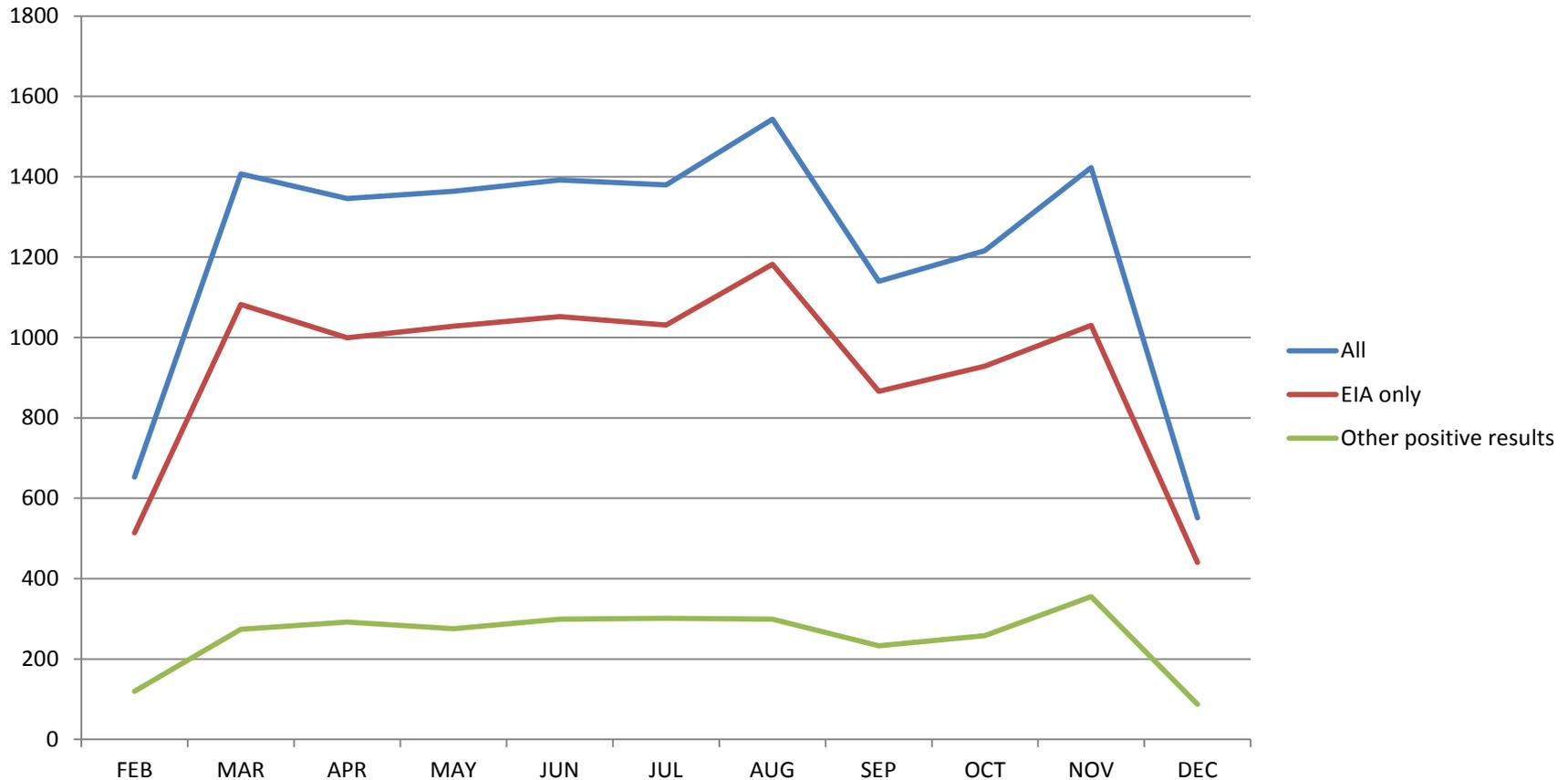
Rate of Reported Cocci Cases by Top 3 Counties



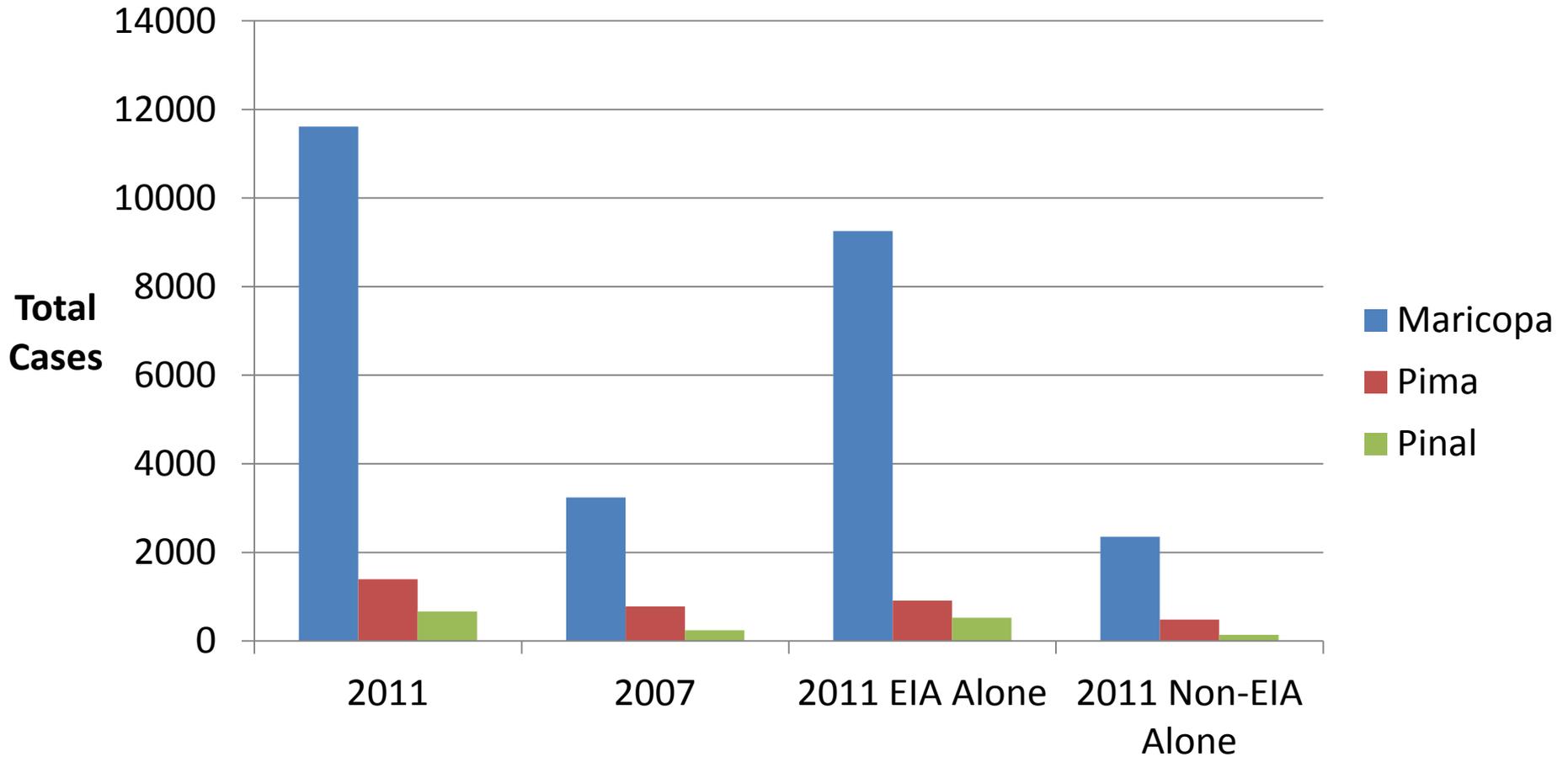
Reported Cocci Cases by Month, Arizona, 2008-2011



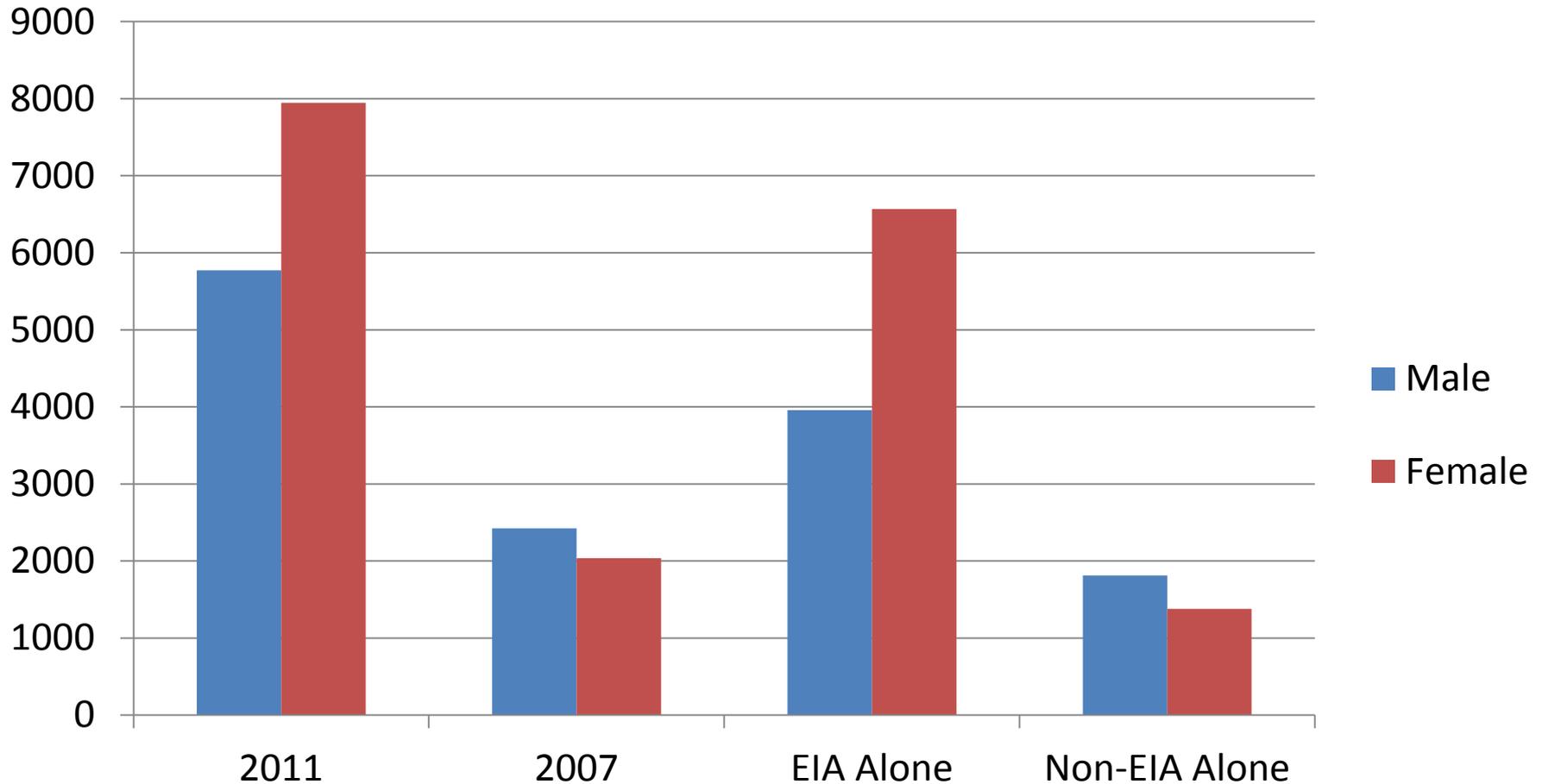
Reported Cocci Cases by Month, Arizona, 2/14/11-12/8/11



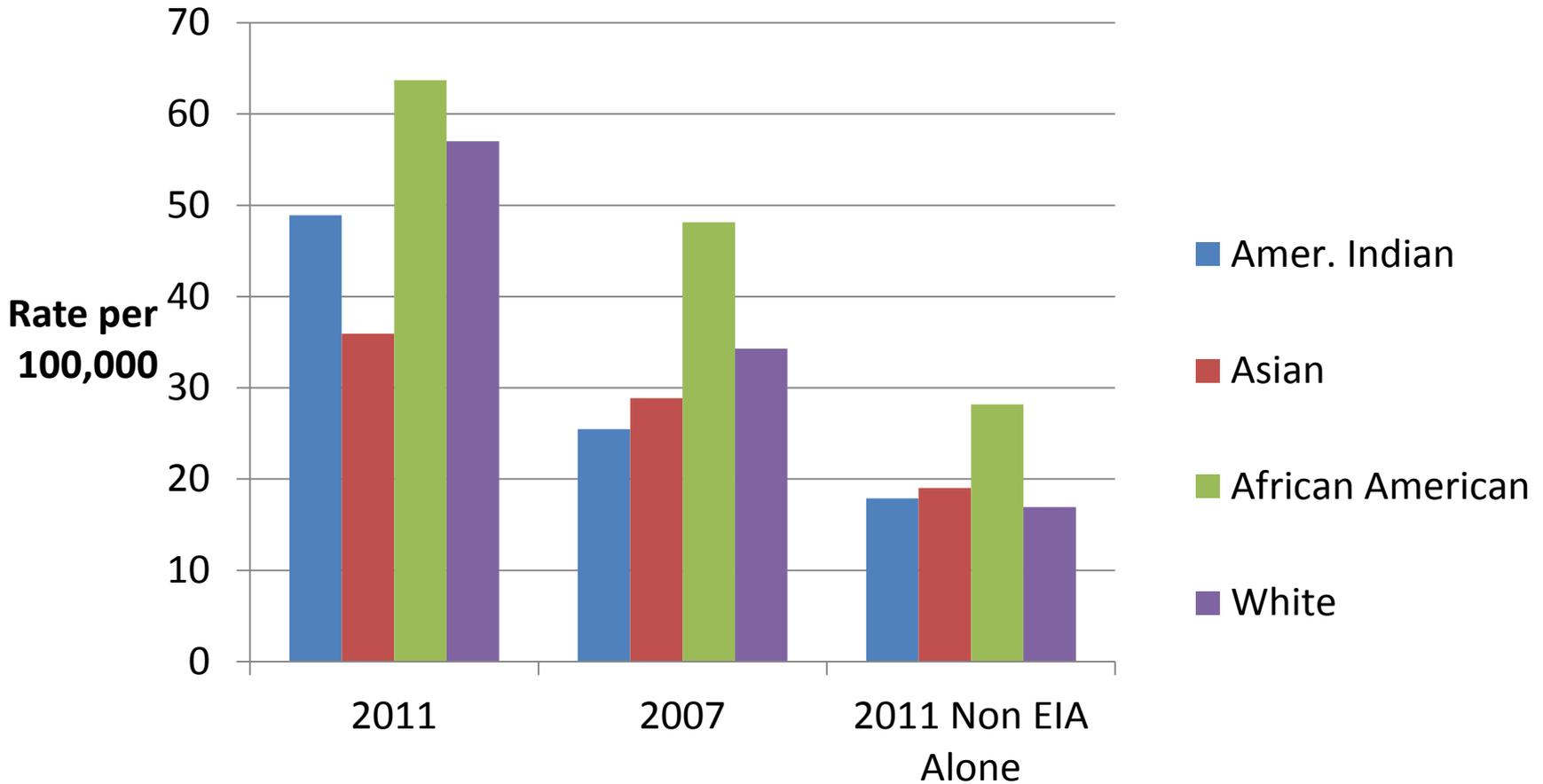
Total Reported Cocci Cases by County, 2007 and 2011



Total Cases by Gender and Year



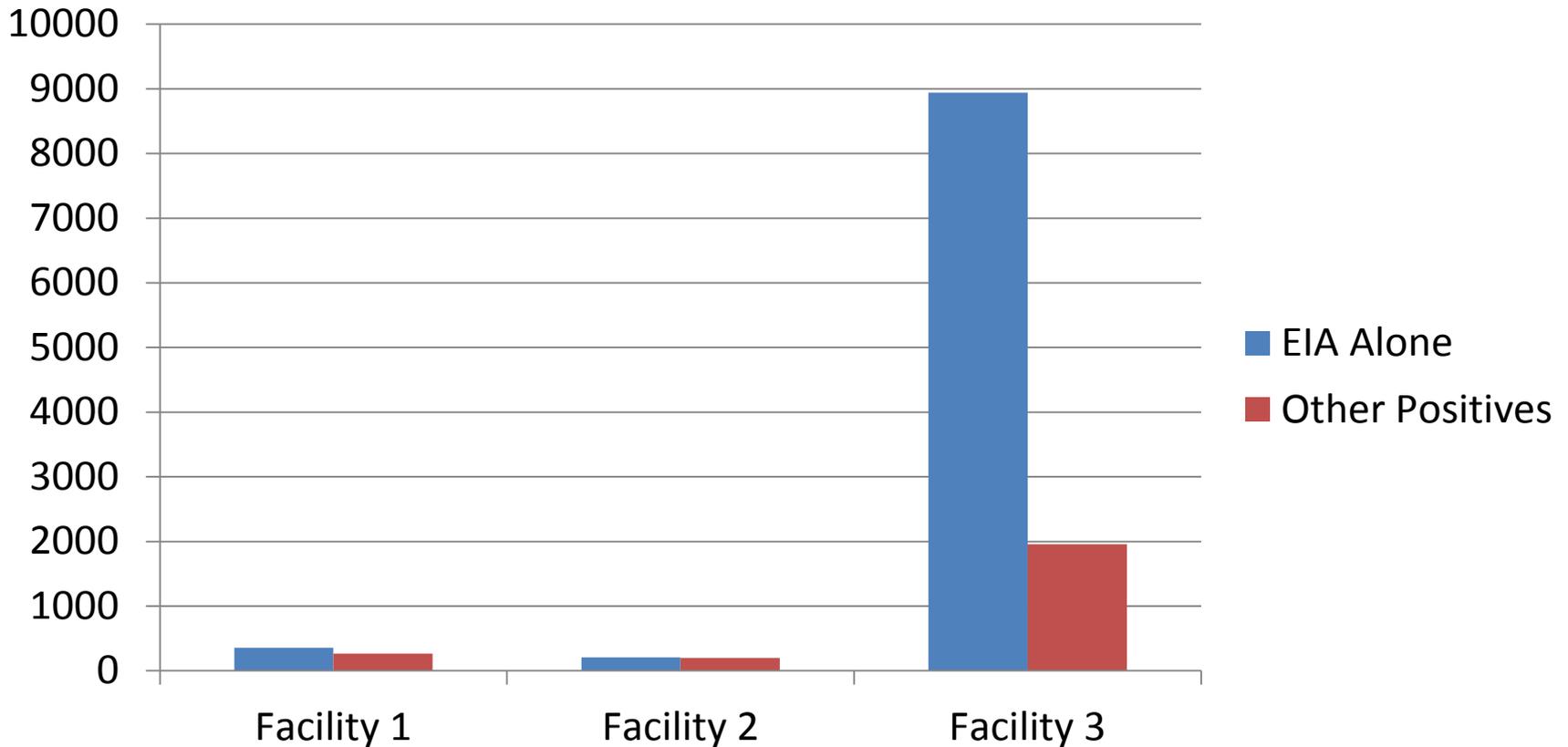
Rates of Reported Cocci Cases by Race



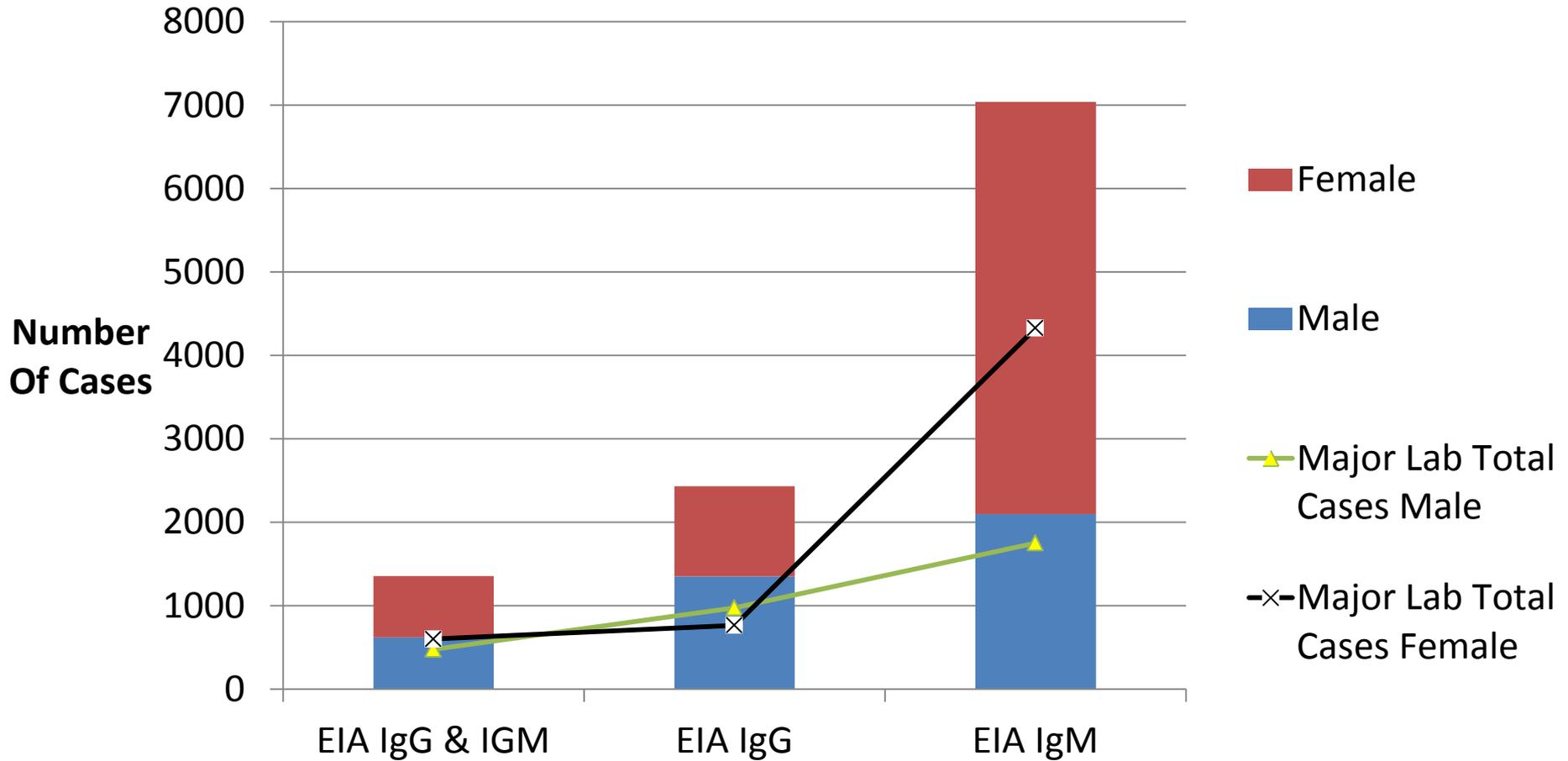
Major Commercial Lab Reported Data

	2011	2007
Total Cases	10859	1449
EIA Alone	8899	*
Non-EIA Alone	1960	*

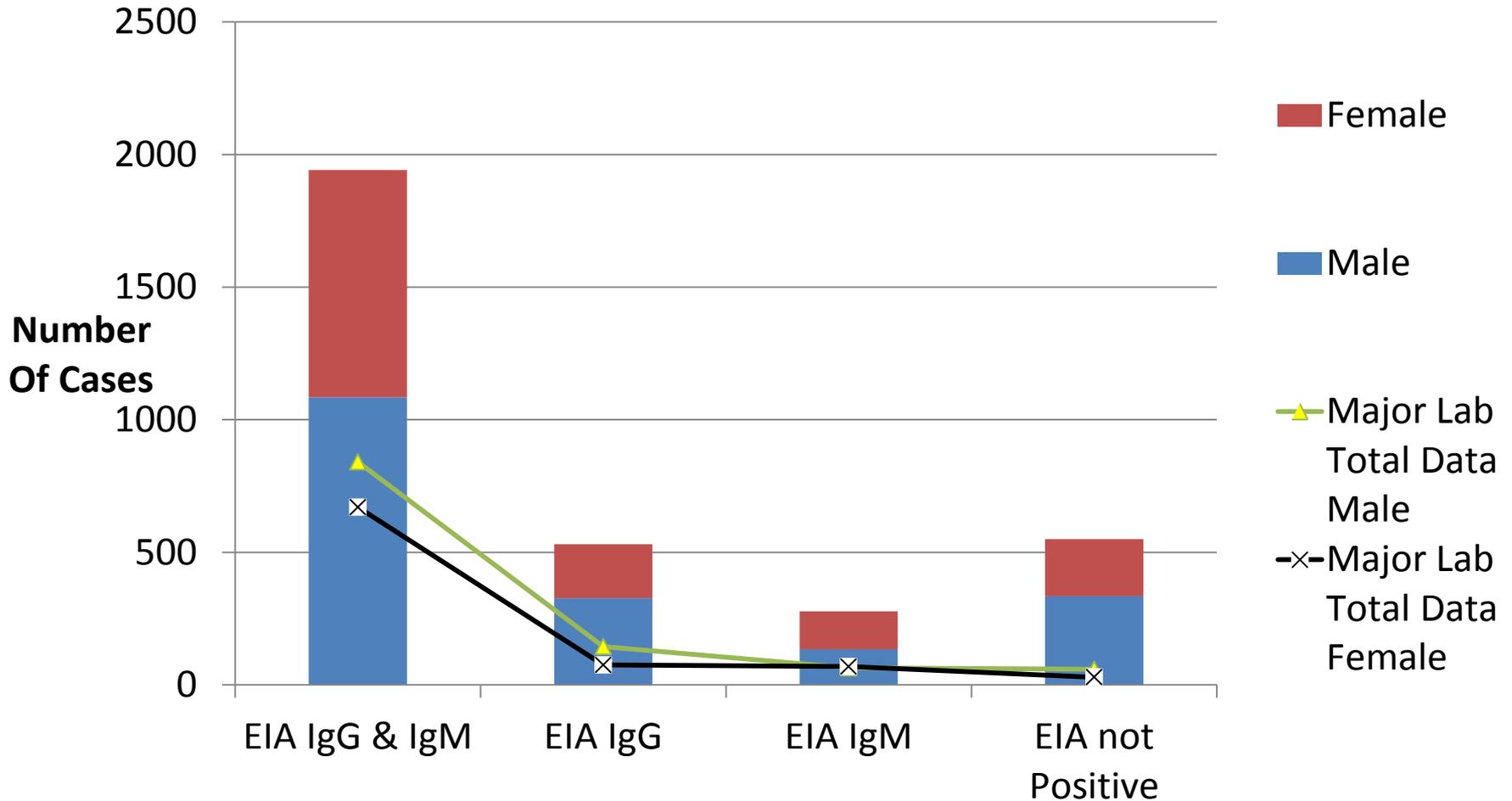
EIA Alone vs. Combination Positives (2007, 2011)



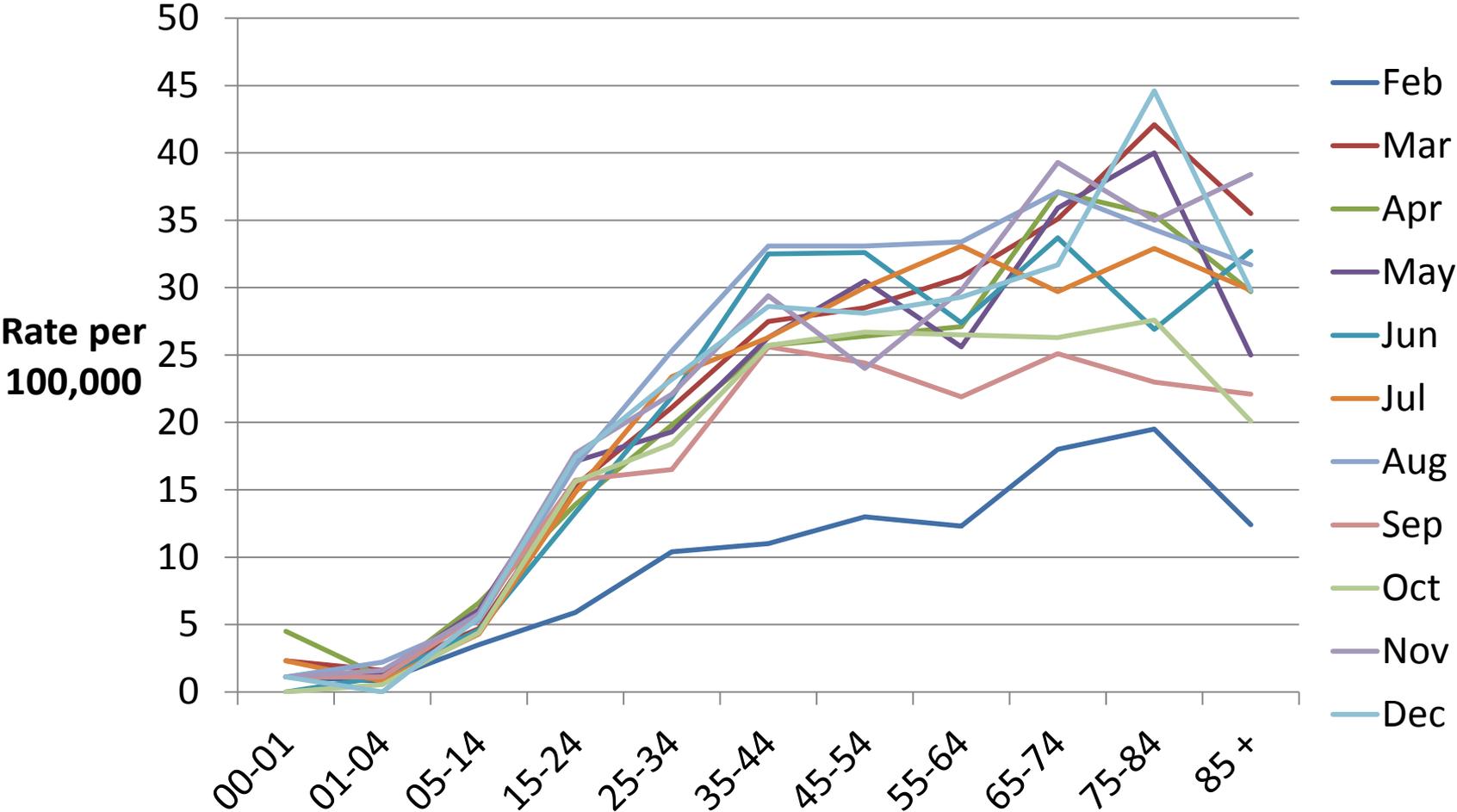
EIA Alone Data 2011



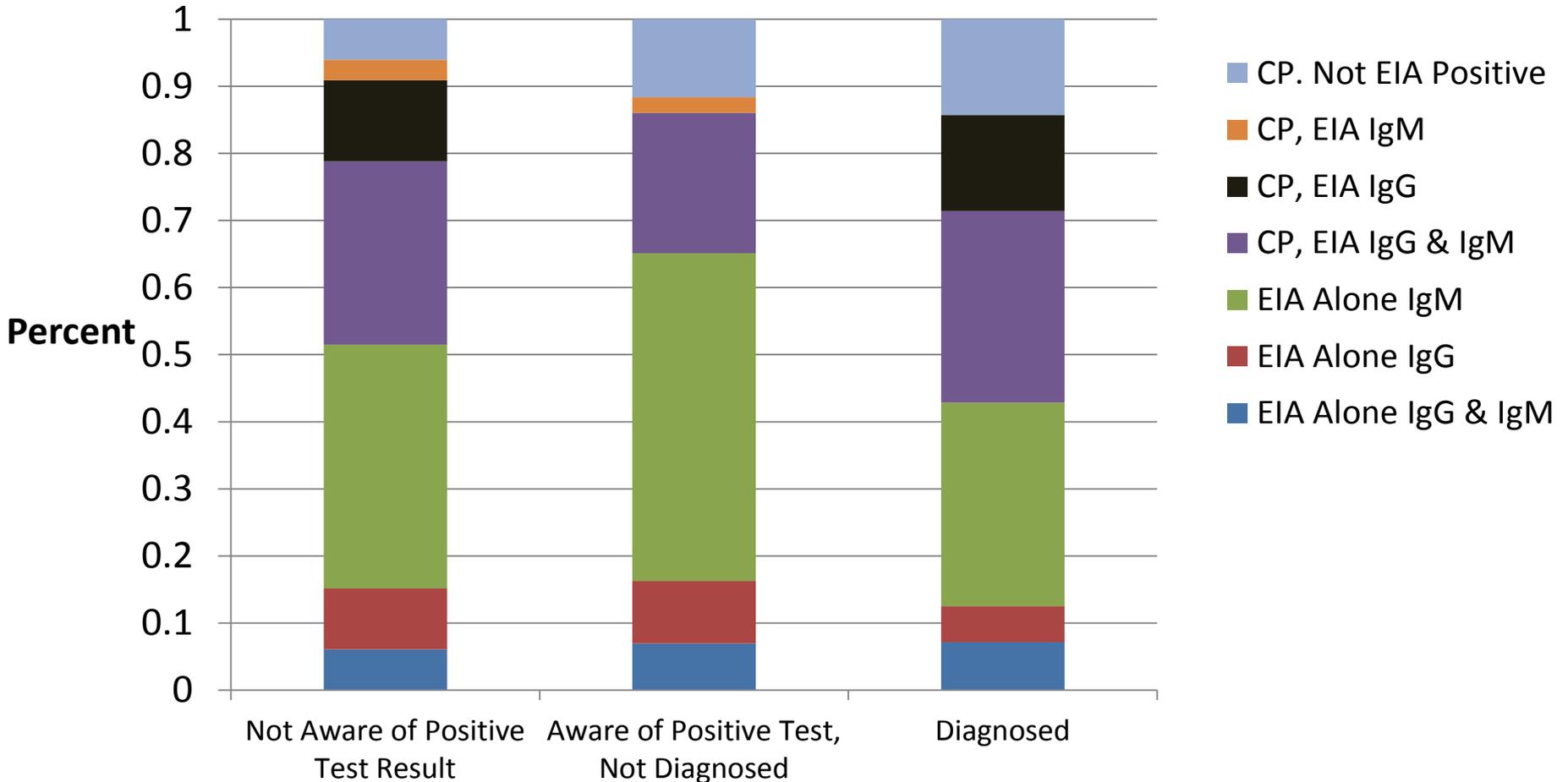
Combination Positives Data 2011



Rate of Cases per age group by month



Patient Diagnosis and Test Awareness



n= 133, 1 missing

Common Questions 1

- Why did you choose to use 2007 data as a comparison?
 - Gives buffer room since 2008 data is too close to 2009 data, where the change in reporting was done
- Why weren't all positive cocci results entered prior to 2011?
 - AZ did not have the resources to enter all positive cocci results since we get thousands of cases/year but in 2011, we wanted to investigate the impact of EIAs further so we started entering all positive cocci results

Common Questions 2

- Can you compare the 2011 EIA data to 2007 EIA data?
 - We did not have the resources to enter all positive cocci test results prior to 2011 so we would not know if there were other positive test results (aside from EIAs) in previous years' data. Negative results are not reportable to the state.

Common Question 3

- Why did you not look at EIA IgMs and EIA IgGs, respectively?
 - We did not have the resources to differentiate the two. It is a very time intensive process especially since the method between reporting positive cocci test results is not standardized. We plan on investigating this in the future.

Common Questions 4

- Do you think that the recent large dust storms (haboobs) have caused an increase in cocci cases?
 - If you look at slide 19, we can see that in early 2011, we were already seeing an increase in cocci cases even before the haboob hit. There may be many factors to why cocci is increasing (increase in susceptible population, increase in testing and awareness, construction, etc.). It is hard to directly correlate to dust storms. *ADHS has looked into monitoring cocci in air filters; however cocci has not been able to be detected in the air filters, even during the haboobs.*