



Evaluation of Coccidioidomycosis Surveillance in San Diego County 2010-2014

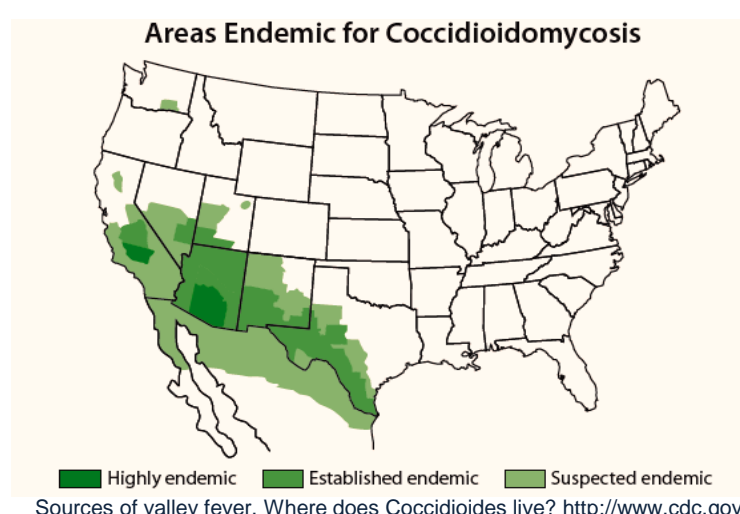
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BACKGROUND

- Coccidioidomycosis, also called valley fever, is caused by the fungi *Coccidioides immitis* and *Coccidioides posadasii*.
- These fungi are known to be found in soil in the western United States, certain parts of Mexico and Central America.¹



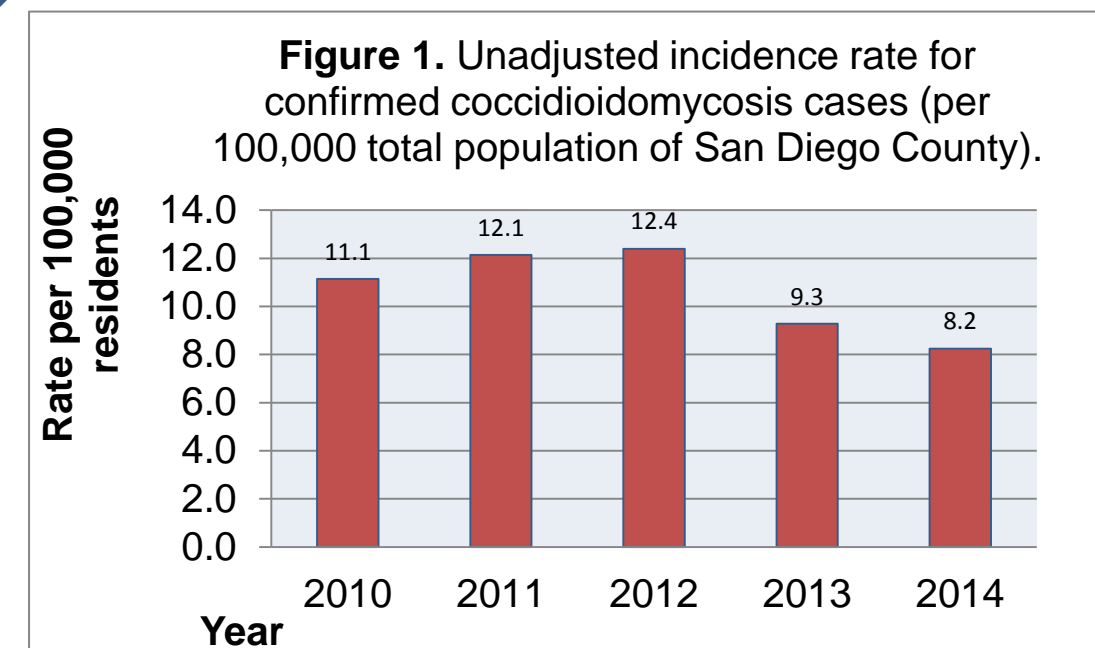
- Coccidioidomycosis can be acquired by breathing in the microscopic fungal spores from the air.
- About 60% of people infected with *Coccidioides* have no symptoms and will fight off the infection naturally. People who get sick usually develop a flu-like illness 1–3 weeks after exposure to the fungus.²
- San Diego County (SDC) has the sixth highest rate of valley fever in California: 2.6/100,000 population in 2014.³
- This evaluation assessed characteristics of coccidioidomycosis surveillance in SDC with the goal of identifying opportunities to improve the investigation and surveillance system.

Purpose of surveillance system: To comply with California Code of Regulations reporting requirements, identify/prevent outbreaks, monitor morbidity and mortality, and detect changes in incidence.

METHODS

- SDC coccidioidomycosis surveillance system was evaluated according to CDC Guidelines for Evaluating Surveillance Systems.
- Discussions with county epidemiology staff were arranged to assess various aspects of the system.
- Confidential morbidity registry data were obtained from SDC from January 2010 to December 2014.
- Death surveillance data files from 2010 to 2014 were reviewed to summarize the number of coccidioidomycosis deaths in SDC and to identify death cases not reported to surveillance system.
- Analysis of SDC disease registry data (WebCMR) consisted of:
 - Reviewing confirmed cases for potential misclassification, accuracy of residency status, and duplicate reports.
 - Assessing of demographic information in confirmed cases was completed to evaluate data quality.
 - Comparing confirmed coccidioidomycosis cases reported by SDC and California Department of Public Health (CDPH) to assess sensitivity of the system.
 - Calculating Predictive Value Positive (PVP) of cases by year.
 - Assessing representativeness of surveillance data, a descriptive analysis of the multiple reporting sources of data for confirmed cases and comparing laboratory reports with physician reports.

RESULTS



Simplicity:

- Case investigation process is not simple; a review of medical records (for symptoms) and positive lab results are needed to meet case definition. Demographic data are only available if submitted by the provider or if an optional case report form is completed.
- It may be difficult to distinguish between chronic and acute coccidioidomycosis cases as onset date is often unknown.

Flexibility:

- The system has been able to adapt to acute needs, such as changes in case definition over the years.
- The system does not allow to differentiate between chronic and acute in some cases.

Acceptability:

- Willingness to use the system by persons outside the sponsoring agency was found to be high, median time in days for reporting from laboratories and health providers was 5 days; less than required by law.

Table 1. Number of days from time of diagnosis to reporting incident to San Diego County for coccidioidomycosis confirmed cases (N=701).

Number of cases with a diagnosis date	480
Missing Values for diagnosis date	221
Mean (days)	13
Median (days)	5
Standard deviation	54

Timeliness:

- The overall median time duration to complete an investigation (from date created in WebCMR to date close) for confirmed cases was estimated to be 26 days (table 2).

Table 2. Investigation time (days) duration for confirmed coccidioidomycosis cases.

Total	N =701
Mean (days)	49.3
Std. Error of Mean	2.9
Median	26 days
Std. Deviation	76.5
Minimum	0
Maximum	976

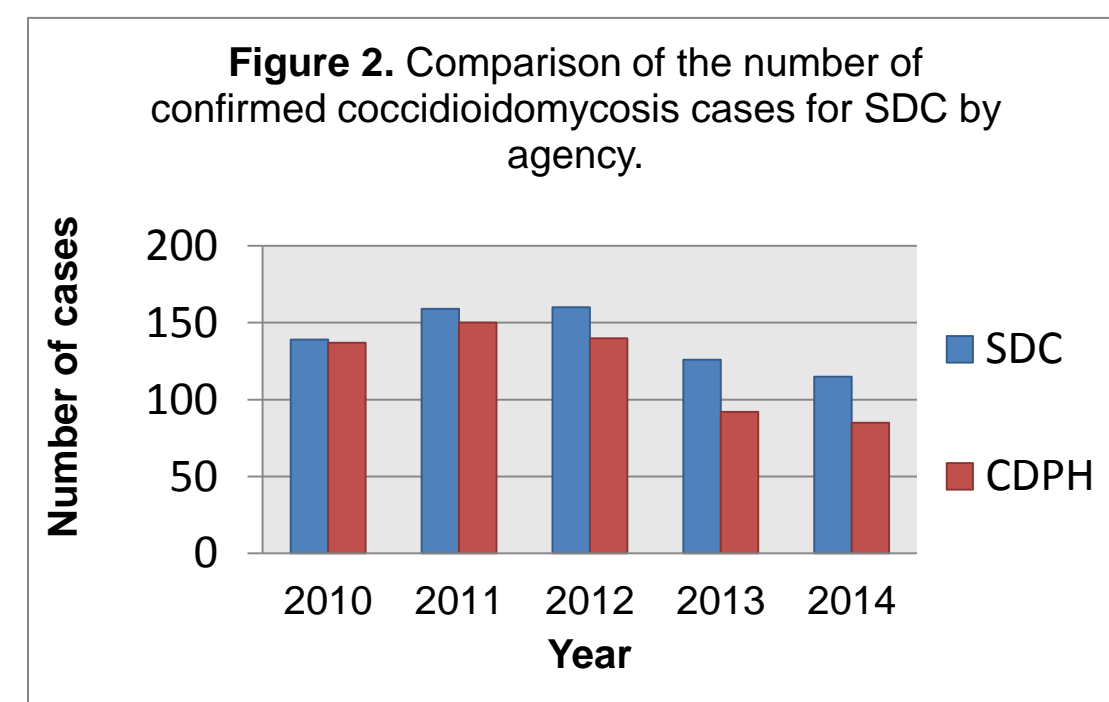
Sensitivity and Predictive Value Positive:

- 18 coccidioidomycosis related deaths were identified in vital records; 6 were not SDC residents.
- 4 out of 12 resident death cases (33%) were not found previously reported to SDC in WebCMR.

Table 3. Number of coccidioidomycosis deaths per year in San Diego County.

Year	2010	2011	2012	2013	2014	Total
SDC resident deaths	4	3	1	1	3	12
Not in WebCMR	-	2*	1*	1*	-	4
Non-resident	1	-	3	2	-	6

*SD county resident



- The proportion of persons identified as being cases who actually do have the condition under surveillance was similar across all years (Table 4).

Table 4. Predictive value positive of cases reported by year.*

Year	2010	2011	2012	2013	2014
Reports received	224	216	281	196	169
PVP (%)	64.7%	73.6%	58.0%	62.8%	65.7%

*Proportion of confirmed coccidioidomycosis cases compared to the number of reports received in WebCMR by year.

Representativeness:

- There were no coccidioidomycosis cases reported from five hospitals in San Diego County. It is unexpected that no cases were reported from these hospitals; yet, it is likely that coccidioidomycosis cases at these facilities could have been reported previously by their health care providers.

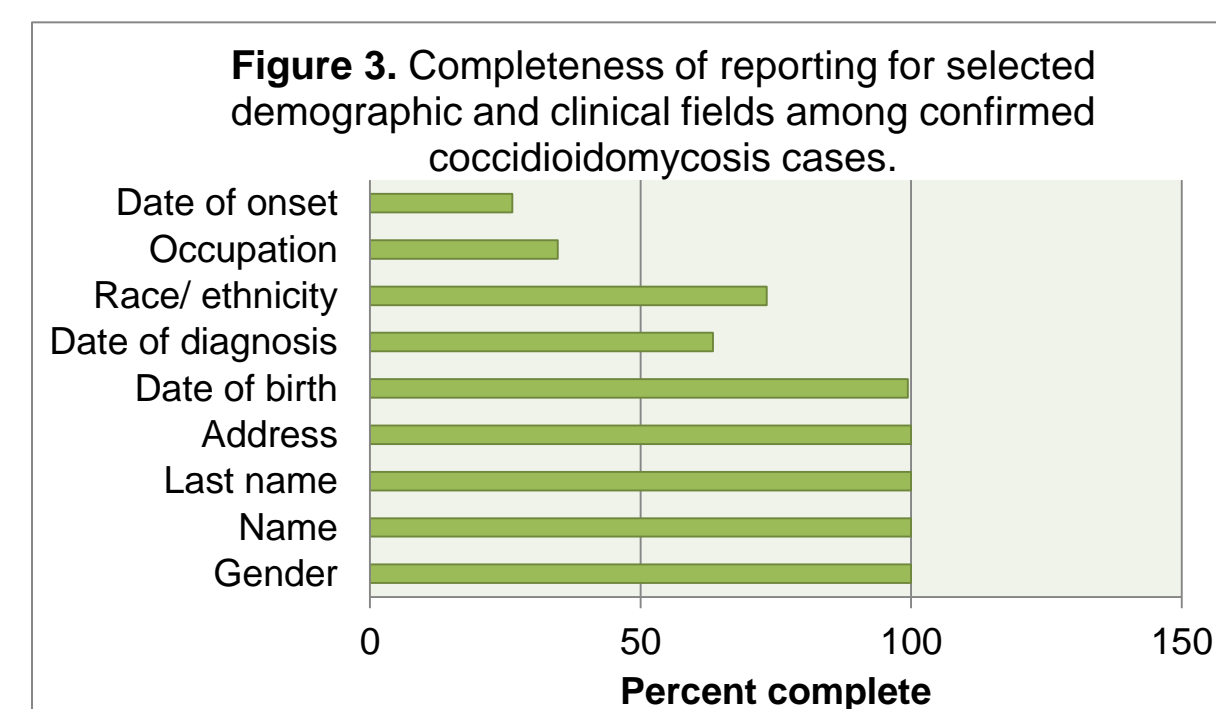
Table 5. Reporting sources for confirmed coccidioidomycosis cases in San Diego County, 2010-2014.

Reporting Source	Count	%
Clinics	40	5.7
Correctional facilities	1	0.14
Health Departments	10	1.4
Hospitals	164	23.4
Laboratories	411	58.6
Non-Lab Clinicians ^a	47	6.7
Other ^b	28	3.9
Total	701	100

^a Private practice doctors; ^b Includes naval hospitals and medical centers.

Data Quality:

- 65.4% of confirmed coccidioidomycosis cases were missing occupation data.
- Completeness of date of diagnosis and date of onset has decreased during the period studied.



SUMMARY OF RESULTS

- Incidence of coccidioidomycosis in SDC has decreased from 2012 to 2014.
- A total of 1,086 WebCMR coccidioidomycosis reports were extracted; duplicate reports, misclassification in disease resolution status, residency status or/and combinations of these factors were identified in 22/1086 (2.1%).
- After review, 363 reports were classified as not cases; a total of 701 (64.5%) reports were classified as confirmed coccidioidomycosis cases.
- Out of the 18 coccidioidomycosis related deaths identified in the vital records data, four deaths cases (22%) were not found in WebCMR. Six deaths (33%) were not SDC residents at the time of death or at diagnosis based on WebCMR records.
- Predictive value positive (PVP) of the system was 64.5%.
- Demographic information was mostly complete (>90%) among true cases; onset date (26.3%), occupation (34.7%) and race and ethnicity (73%) had the lowest percentage of completeness.
- A variety of reporting sources were observed among confirmed cases, including hospitals, laboratories, and providers.
- Differences in the total number of coccidioidomycosis cases reported by SDC and CDPH were found. CDPH reported less number of cases for all years.

RECOMMENDATIONS

- Ensure investigators are trained to complete data fields of the following variables: date of diagnosis, race/ethnicity, and occupation and date of onset.
- Establish a quality assurance strategy to more frequently review for case duplications, misclassifications and death cases not reported to WebCMR.
- Establish a method for case verification between CDPH and SDC to improve system sensitivity of the system.

CONCLUSIONS

- Findings suggest that surveillance system for coccidioidomycosis is a highly useful system for estimating morbidity in SDC.
- Low sensitivity and PVP are due to differences in case counts between state and SDC.
- Acceptability was found to be very high as well as flexibility.
- System has been able to adapt to acute case definition cases over time.

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