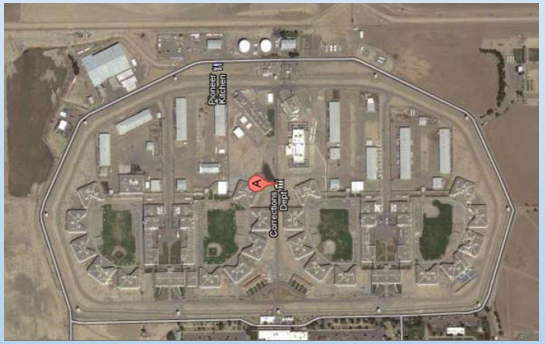
Valley fever among California State prison residents: epidemiology, prevention, and challenges



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November 17, 2022

NASEM Valley Fever Workshop

CALIFORNIA CORRECTIONAL HEALTH CARE SERVICES

Outline

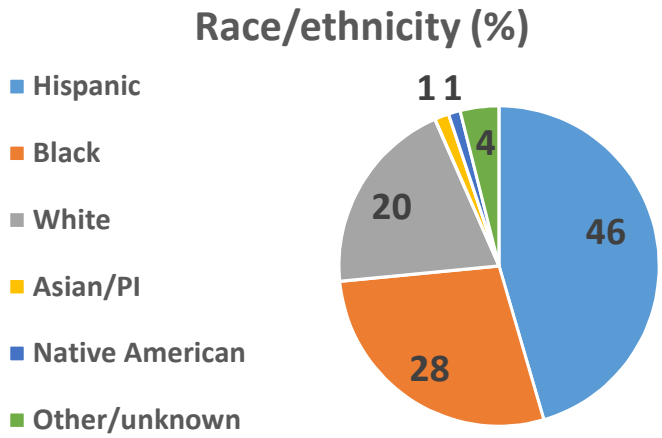
- **Introduction**
  - California State prisons population
  - Valley fever epidemiology (incarcerated residents)
- **Interventions**
  - Prevention of infection and severe disease
  - Medical restrictions and use of skin test for risk stratification
- **Challenges**

California Department of Corrections and Rehabilitation (CDCR)

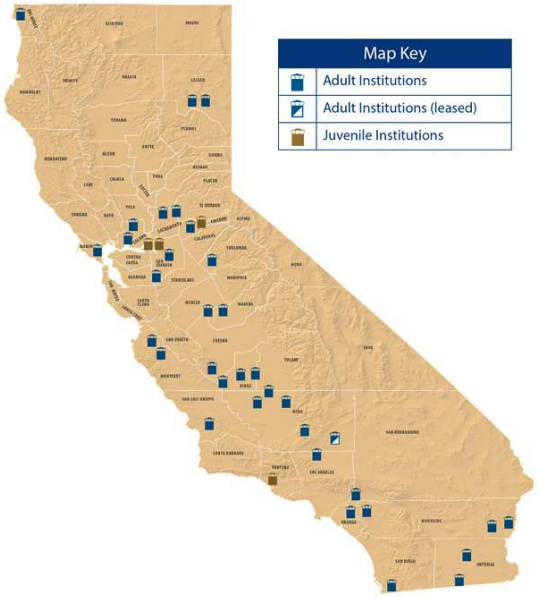
Approximately 97,000 adults in custody:

95,000 in prisons, 2,000 in camps

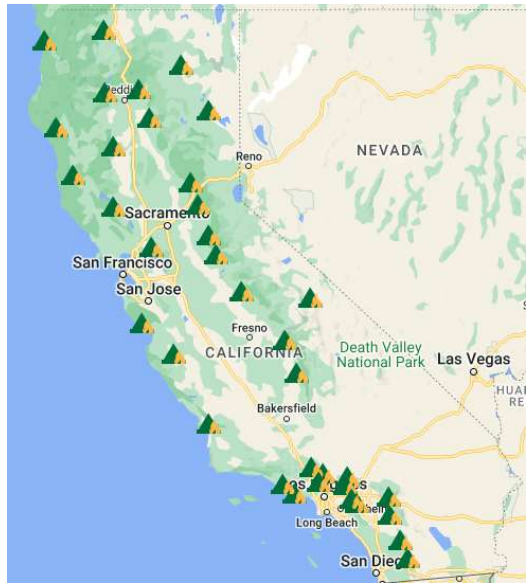
96% male, 4% female



34 State Prisons



36 Conservation Camps (Cal FIRE)



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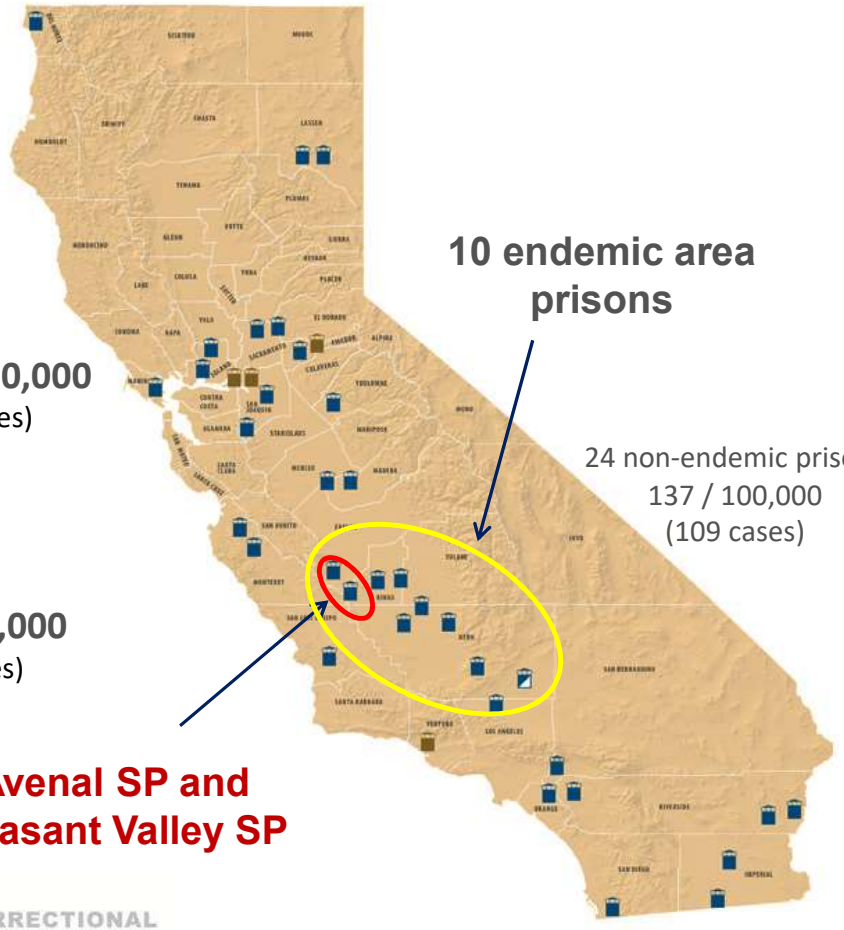
Case rates in endemic area prisons, 2017



ASP
PVSP

3,959 / 100,000
(271 cases)

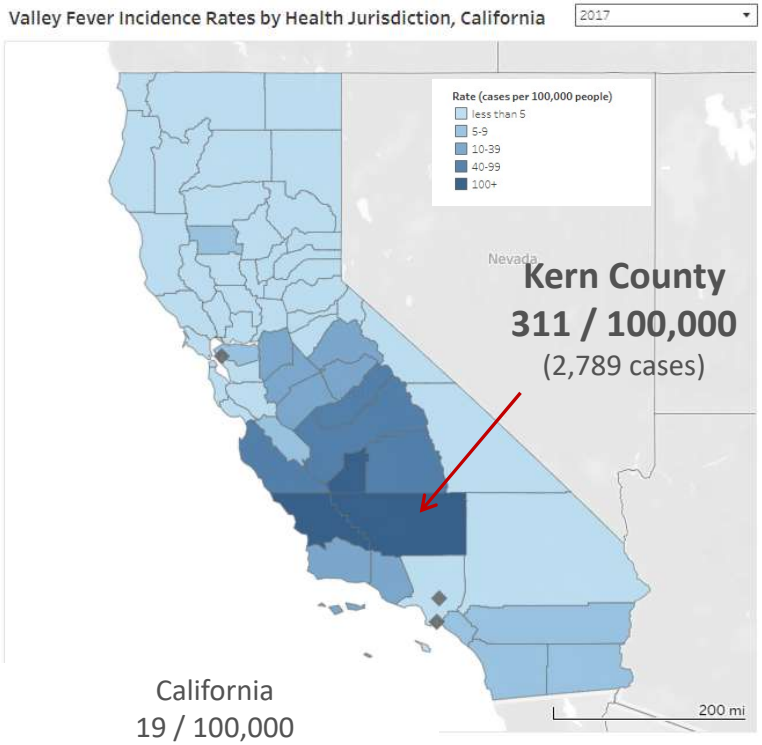
CAC
CCI
CMC
COR
KVSP
NKSP
SATF
WSP

304 / 100,000
(100 cases)

10 endemic area prisons

24 non-endemic prisons
137 / 100,000
(109 cases)

Avenal SP and Pleasant Valley SP



Kern County
311 / 100,000
(2,789 cases)

California
19 / 100,000
(7,689 cases)

https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/VFEpiSum2019Dashboard.aspx

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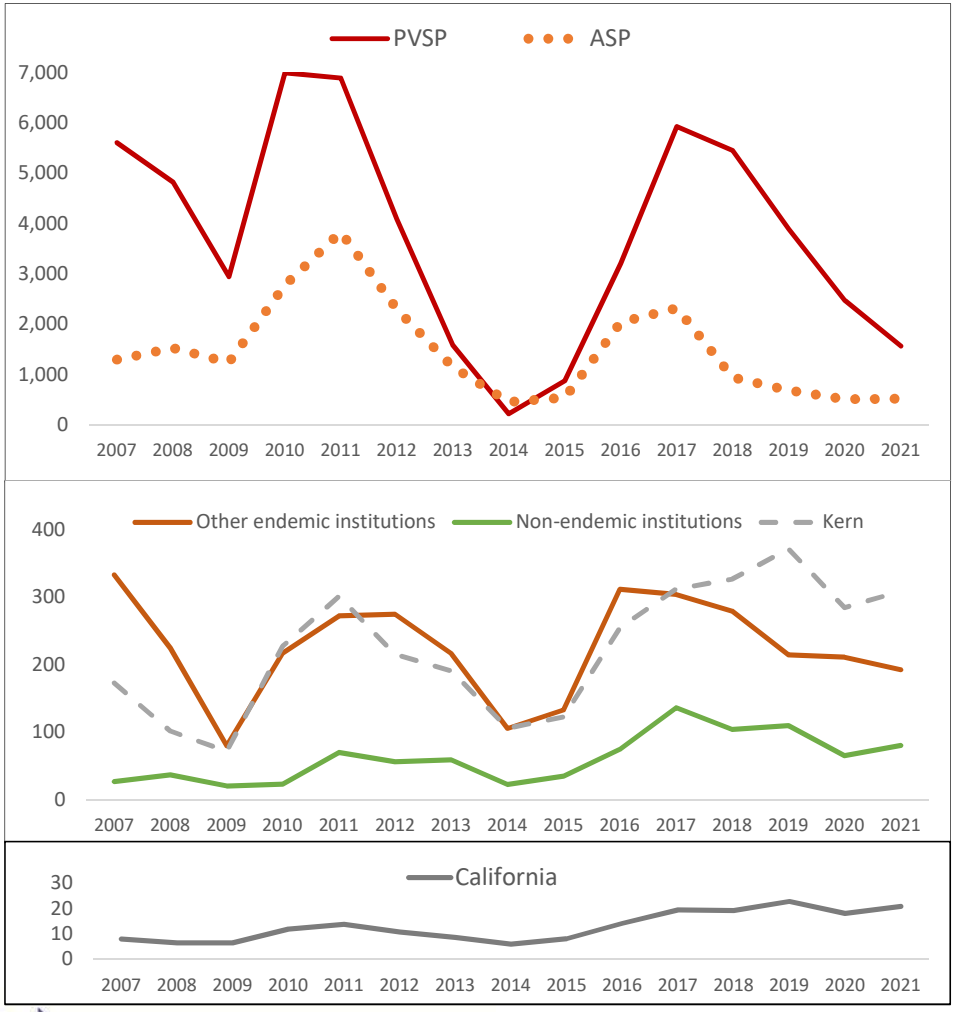
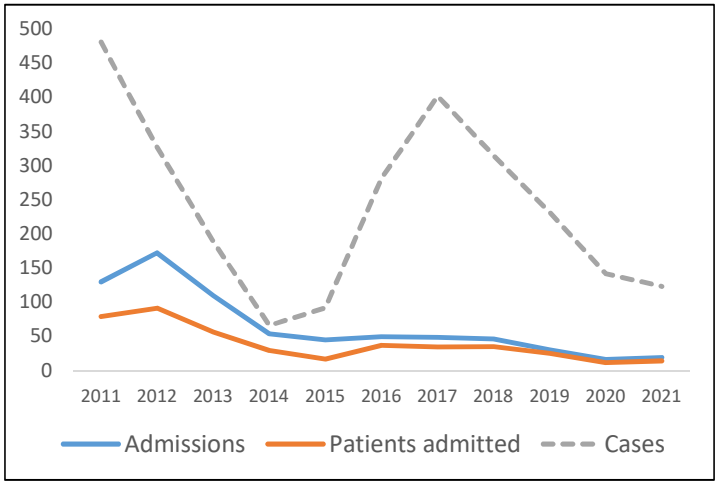
Epidemiology

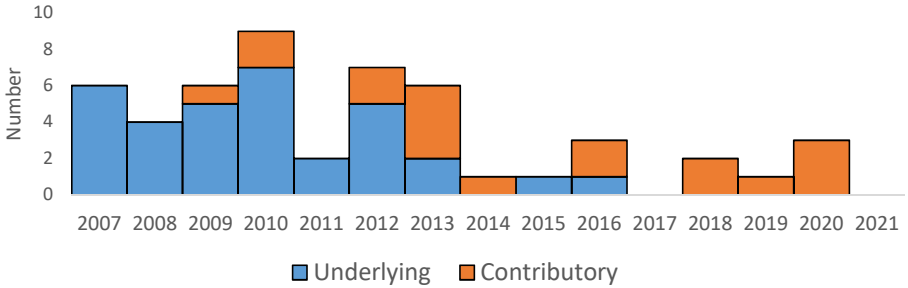
Coccidioidomycosis cases per 100,000 CDCR residents, 2007–2021



Coccidioidomycosis-related hospitalizations per 100,000 CDCR residents, 2011–2021



Deaths with coccidioidomycosis as an underlying or contributory cause among CDCR residents, 2007–2021



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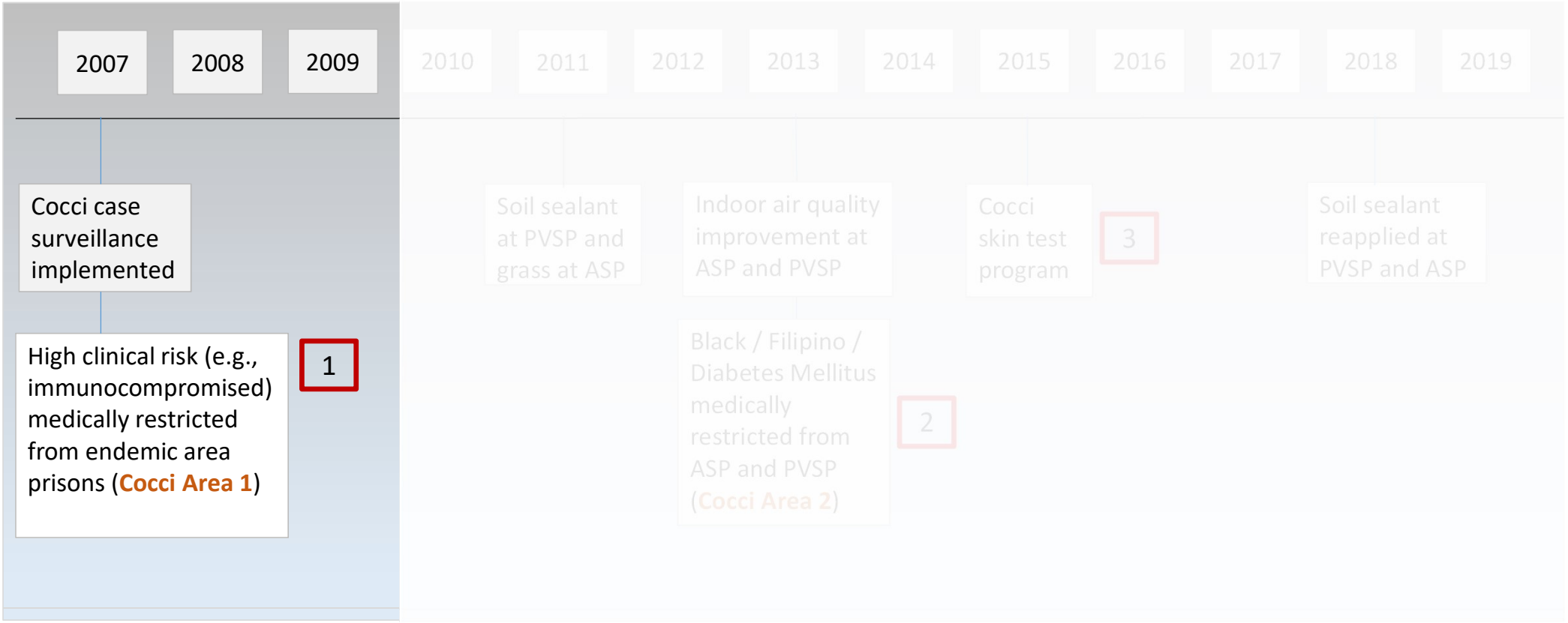
CCHCS provisional data as of 11/10/22

Variety of prevention interventions since 2007

- Case surveillance
- Environmental mitigation
- **Restrictions from endemic area prisons**
  - **Medical**
  - **Demographic**
  - **Cocci skin test**

Timeline of prevention interventions in CDCR



1

Medical restrictions from Cocci Area 1 (2007)

Outbreak at PVSP, 2005

CCHCS request for CDPH assistance

166 cases, 29 hospitalizations, 4 deaths

Rates 38 times rate in community (Coalinga) and 600 times rate in Fresno County

Disease associated with comorbid conditions, increased outdoor time, Black race, >40

- Medical restrictions
  - **HIV infection**
  - **History of lymphoma**
  - **Organ transplant recipient**
  - **Chronic immunosuppressive therapy**
  - **Chemotherapy for cancer**
  - **Severe COPD**
- PVSP construction cancelled
- Resident and staff education

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CA EPI 06-02: Coccidioidomycosis at a State Prison, 2005 (Jan 2007)

CCHCS assessment: impact of medical restrictions

- **Endemic area prisons showed no persistent declines in coccidioidomycosis case rates**
- **PVSP, ASP, WSP, NKSP case rates higher than the counties** (2006–2010)

Rates at PVSP still far higher than immediately surrounding communities, 2007–2010

	Location	Median (range) cases per 100,000
	PVSP	6,206 (3745–6840)
6X	Coalinga State Hospital	1,071 (335–1738)
17X	City of Coalinga	356 (151–488)
489X	Fresno County	13 (8–37)

27 deaths with coccidioidomycosis as an underlying or contributory cause, 2006–2010

- All men
- 68% Black (RR 8.1; 95% CI: 2.7–24 vs. CA community)
- Median 52 years old, range 26–68

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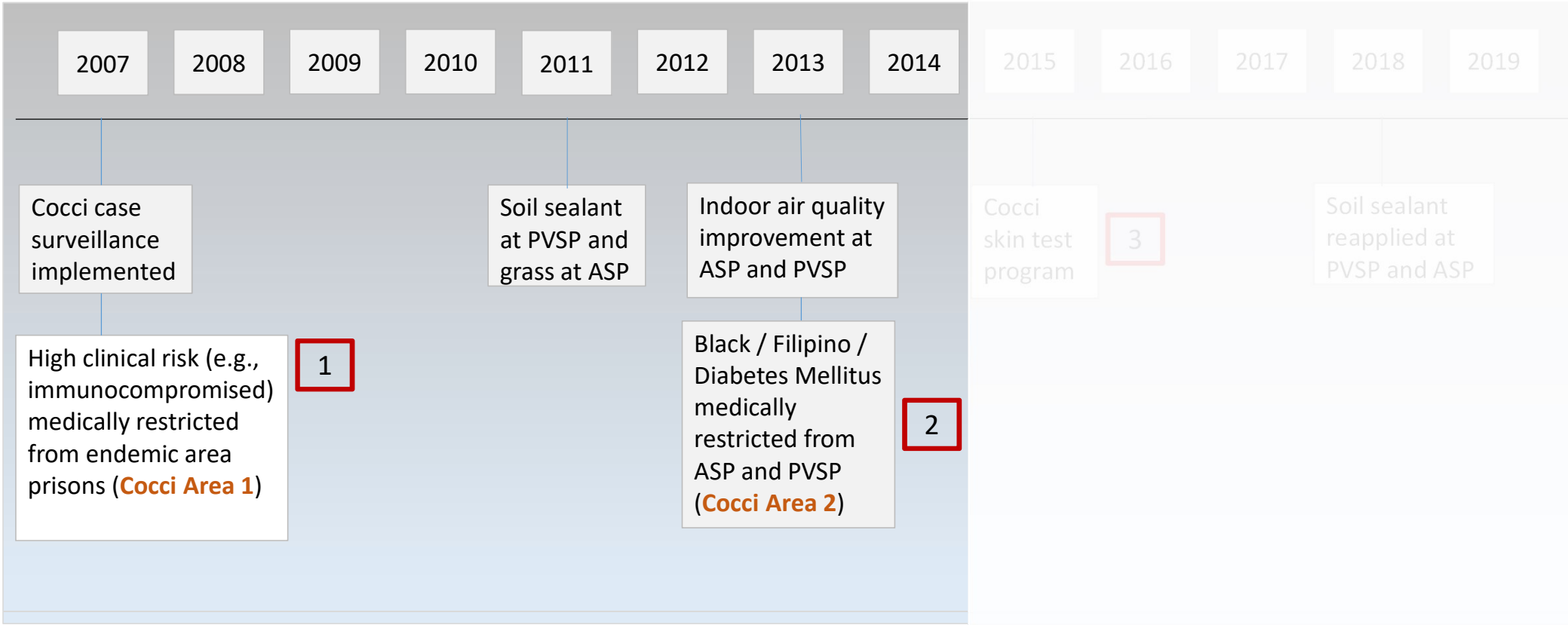
CCHCS Public Health and Quality Management (2012). *Coccidioidomycosis in California's adult prisons 2006–2010*.

Timeline of prevention interventions in CDCR



2 Medical restrictions from Cocci Area 2 (2013)

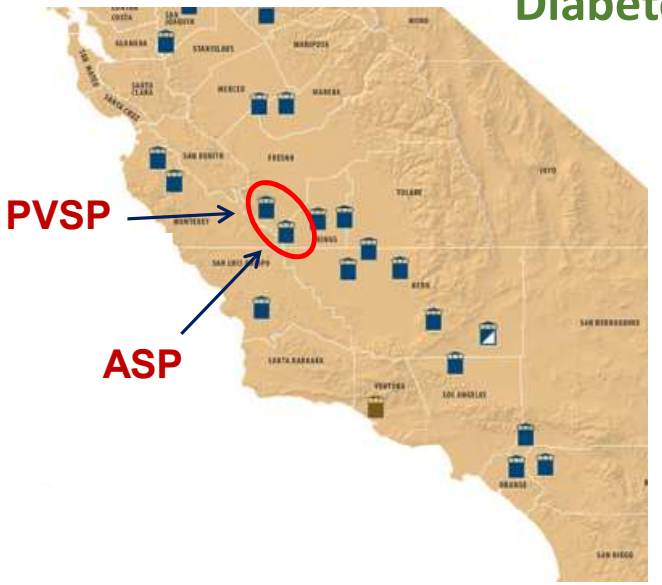
In 2013, CCHCS Public Health assessed case rates and risk factors at PVSP and ASP to identify additional medical restrictions

Coccidioidomycosis cases, 2011	Risk factor	Adjusted Odds Ratio (95% CI)
Primary disease	Black Hispanic Age 36–55 Age >55	1.9 (1.5–2.4) 1.3 (1.1–1.7) 1.4 (1.1–1.6) 1.6 (1.2–2.2)
Severe disease* (hospitalized ≥10 days)	Diabetes Mellitus	3.2 (1.8–5.8)
Disseminated disease*	Black	1.9 (1.0–3.4)

*Controls: cases not hospitalized; not disseminated

- Additional medical restrictions

Black
Filipino
Diabetes Mellitus



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https://cchcs.ca.gov/wp-content/uploads/sites/60/2017/08/20130501-Doc-2601-Receivers-Report-re-Valley-Fever-motion.pdf
Wheeler C, Lucas KD, Mohle-Boetani JC (2015) https://stacks.cdc.gov/view/cdc/26680

CCHCS assessment: impact of prevention interventions comparing 2016 to 2011 (peak years in CA)

Cases per 100,000 among CDCR residents and in Kern County and California

Location	2011		2016		Odds Ratio (95% Confidence Interval)
	Cases (N)	Rate	Cases (N)	Rate	
ASP	227	3,956	65	2,009	0.5 (0.4-0.7)
PVSP	320	6,999	90	2,796	0.4 (0.3-0.5)
ASP/PVSP	547	5,306	155	2,401	0.4 (0.4-0.5)
Other endemic	110	283	91	291	1.0 (0.8-1.4)
Non-endemic	70	71	42	52	0.7 (0.5-1.1)
CCHCS	727	492	288	242	0.5 (0.4-0.6)
Kern County	2,573	303	2,238	252	0.8 (0.8-0.9)
California	5,217	14	5,372	14	1.0 (0.9-1.0)

CCHCS Public Health (2018). *Coccidioidomycosis case surveillance among CCHCS patients, 2007–2016.*

CCHCS assessment: impact of prevention interventions comparing 2016 to 2011 (peak years in CA)

Coccidioidomycosis hospitalizations per 100,000 among CDCR residents

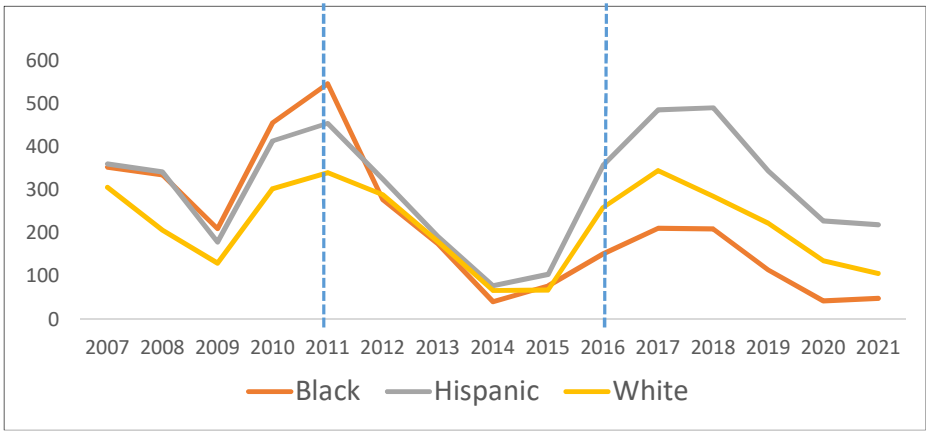
	2011		2016		Odds Ratio
	(N)	Rate	(N)	Rate	(95% Confidence Interval)
Hospitalizations due to cocci	191	129	54	45	0.4 (0.3–0.5)
Hospitalized cases	117	79	41	34	0.4 (0.3–0.6)

CCHCS Public Health (2018). *Coccidioidomycosis case surveillance among CCHCS patients, 2007–2016.*

CCHCS assessment: impact of prevention interventions comparing 2016 to 2011 (peak years in CA)

Cases per 100,000 among CDCR residents by race/ethnicity

Race/Ethnicity	2011		2016		Odds Ratio (95% Confidence Interval)
	Cases (N)	Rate	Cases (N)	Rate	
African-American	246	562	45	129	0.2 (0.2–0.3)
Hispanic	273	468	161	322	0.7 (0.6–0.8)
White	138	357	61	230	0.6 (0.5–0.9)



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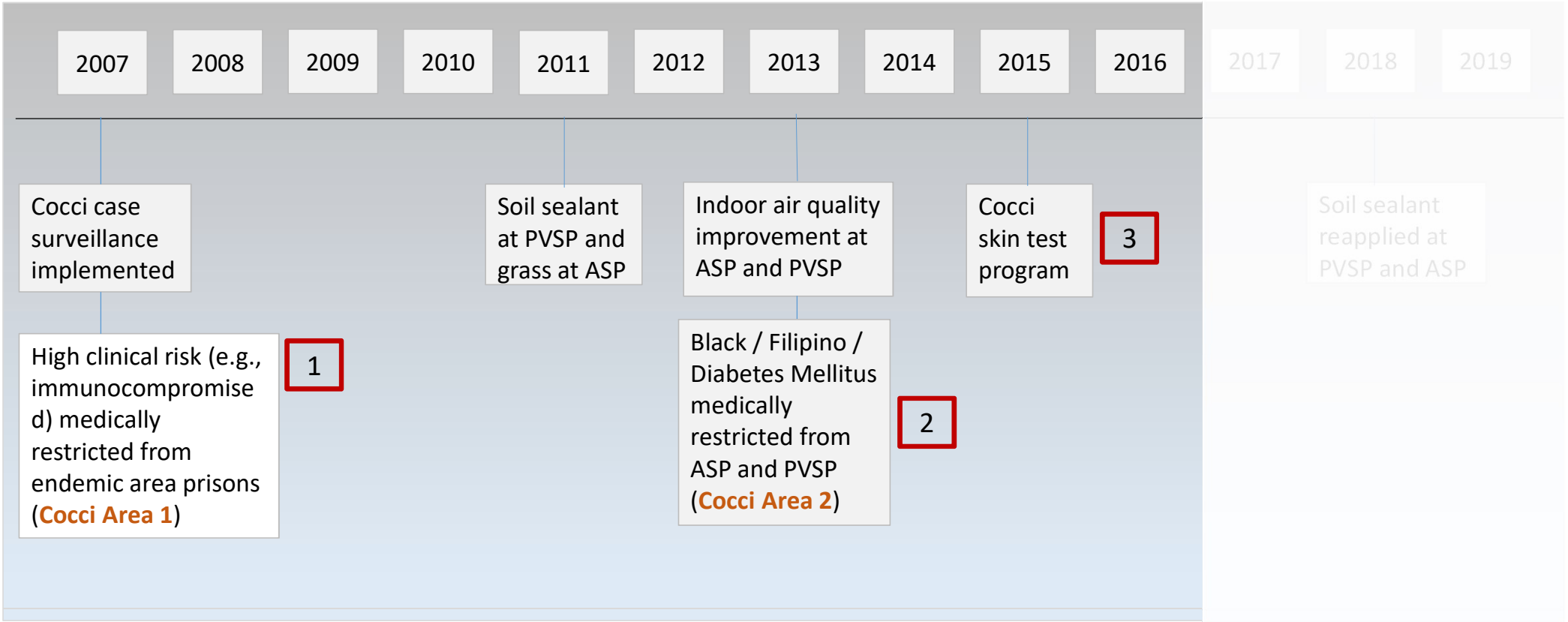
CCHCS Public Health (2018). *Coccidioidomycosis case surveillance among CCHCS patients, 2007–2016.*

Timeline of prevention interventions in CDCR



3 Cocci skin test risk stratification (Cocci Area 2)

(2013) CCHCS and CDPH request for CDC assistance

(2014) CDC predicted a 61% decrease in disease if PVSP and ASP were populated with residents with positive skin tests (previously infected)

(2015) Spherusol® became commercially available

- Skin test offered to CDCR residents statewide
- Integrated skin test into reception center intake screening (residents with a negative test restricted from PVSP and ASP)

CDC (2014). Epi-Aid 2013-050 Trip Report: Coccidioidomycosis in Pleasant Valley State Prison and Avenal State Prison in the California central valley

CCHCS preliminary assessment: skin test

Skin test performance

Positive	8%
Sensitivity	60%
Specificity	97%
PVP	0.74

Effectiveness in risk stratification

- If PVSP and ASP were populated with residents with positive skin tests, 74% of cases could be prevented

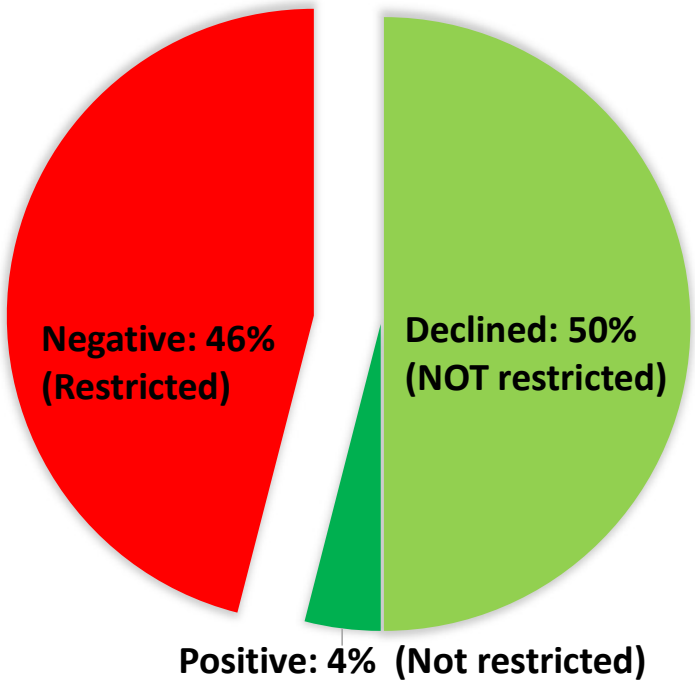
Current PVSP and ASP residents

10% skin test positive
88% declined testing

- Expect to reduce case rates by 7.4%

Reception center

50% acceptance



Of residents who could be placed at PVSP and ASP, estimate:

8% positive (immune)

- 4% test positive
- 4% of declined

92% negative (not immune)

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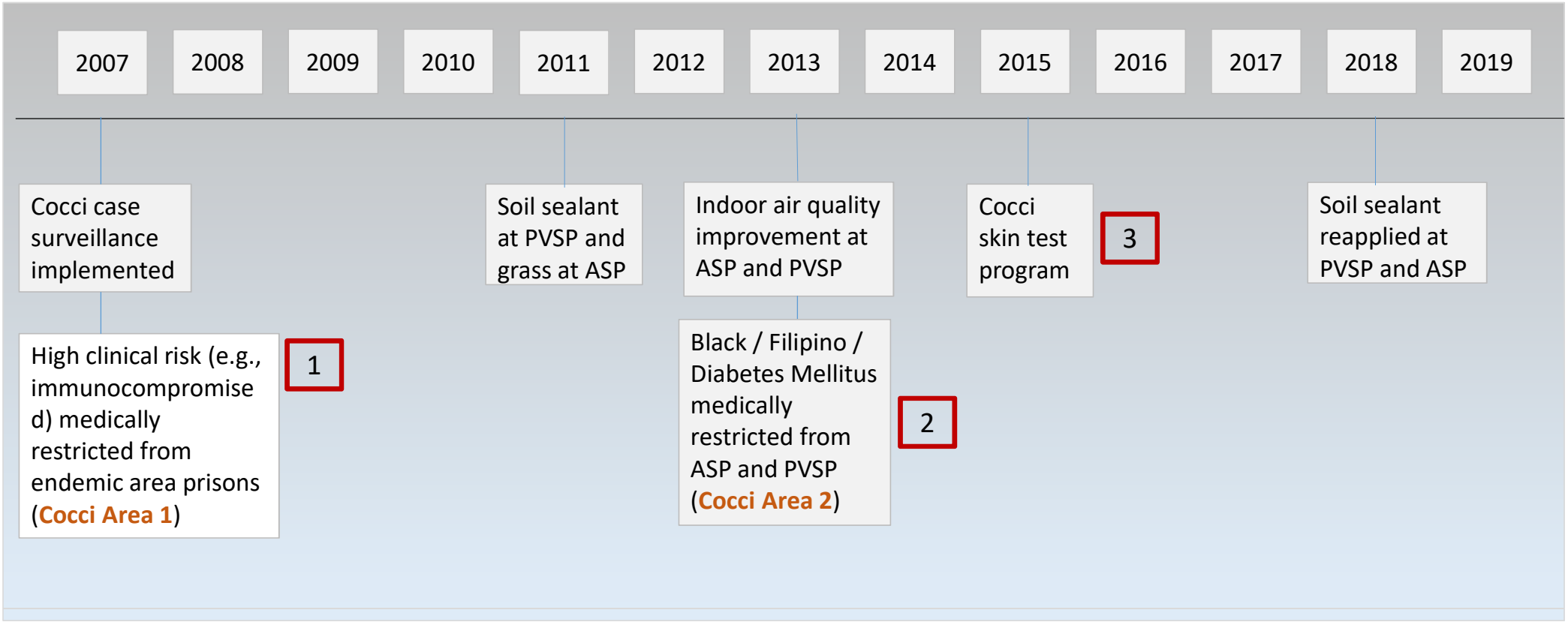
Lucas KD, Mohle-Boetani JC. *Cocci skin test: sensitivity, specificity, and effectiveness in risk stratification.* Cocci Study Group, July 2017 Annual Meeting, Palo Alto, CA

Timeline of prevention interventions in CDCR



Challenges

- Higher prevalence of risk factors for infection or severe disease among incarcerated residents
- Susceptibility (majority enter prisons from urban non-endemic areas)
- Medical restrictions apply to nearly 1/3rd of prisons, potentially impacting
  - Resident access to programming and visiting (proximity to family, friends)
  - Custody operations
- Low acceptance of skin test likely related to policies impacting prison placement and required transfer out of PVSP or ASP if test negative
- Expanding endemic areas throughout California
- Increasing intensity and duration of drought and epidemic cycles

Summary

- CCHCS and CDCR interventions including medical and demographic restrictions from endemic area prisons and environmental mitigation over the years since 2007 appear to have decreased Valley fever rates at PVSP and ASP and eliminated disparities in infection and severe outcomes for Black residents.
- Although rates of Valley fever at PVSP and ASP have declined since 2017, while California rates continue to climb, rates in these prisons remain orders of magnitude higher than community rates, including in Kern County.

Acknowledgements

CCHCS

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Thank you!

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