# Evidence-Based Practices Estimates

## ESTIMATING POPULATIONS FOR FSP, IPS, and CSC IMPLEMENTATION

PRESENTED BY

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*Webinar 4*

# CSC for FEP Model & Considerations for Interpretations of Estimates

For Uninsured + Medi-Cal Eligible individuals 12-64 years old

CalMHSA

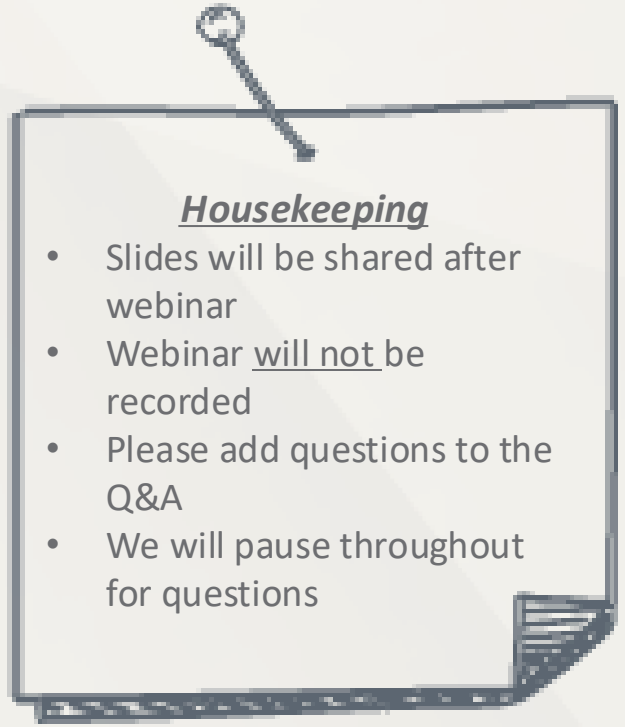
# Webinar Series

1. **Introduction & Methods Overview – October 28, 2025**
2. **FSP and IPS Model – October 31, 2025**
3. **Justice-Involvement, ACT/FACT Model – November 4, 2025**
4. **CSC for FEP Model & Considerations for Interpretation of Estimates – November 6, 2025**

You are here

# Agenda

- Background and EBP Overview
- Methods for Base Population
- CSC Model Overview
- CSC Model – Input Studies
- Review of results – CSC for FEP
- Considerations for interpretation of estimates
- Webinar close out
- Q&A



# Keep in mind...



This will get complicated....

Because estimating clinical need and planning new services using publicly available data is complicated!

# Model Objectives

Objectives

To assist BHPs with completing their BHSA Integrated Plan, DHCS commissioned CalMHSA to estimate Medi-Cal + uninsured populations that may have a clinical need for the following:

Full-Service Partnerships (FSP) and the following sub-categories within FSP:

- Assertive Community Treatment (ACT)
  - Forensic Assertive Community Treatment (FACT)
- FSP Intensive Case Management (ICM)
- Individual Placement and Support Supported Employment (IPS)
- Coordinated Specialty Care for First Episode Psychosis (CSC FEP)

**Additional Ask**
Estimate justice involvement among FSP populations

Estimating clinical need ≠ who will access the service

# BHSA is Designed to Serve a Broader Population



People eligible for Medi-Cal

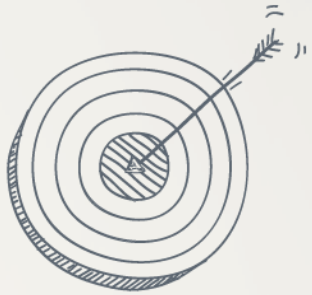
People who are uninsured or not eligible for Medi-Cal

BHSA Expansion

# BHSA and BH-CONNECT are Complementary

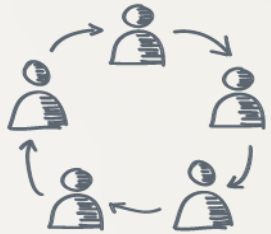


## Similar mission



Designed to meet the behavioral health needs of the most vulnerable Californians living with significant behavioral health needs

## Serve the same priority populations



Focused on bolstering services for:

- People experiencing or at risk of homelessness
- People involved in the justice system
- Children and youth involved in the child welfare system

## Strengthen investments in housing & workforce

BH-CONNECT allows for federal funding to support the workforce, while BHSA provides additional county-level and statewide investments

**BH-CONNECT – Medi-Cal Only**
**BHSA – Medi-Cal ++**

Source: DHCS BHSA and BH-CONNECT EBP Overlap (Updated August 2025)

# CSC for FEP

EBP Overview

**Target Population**

People presenting with or at risk for FEP


Source: National Alliance on Mental Illness

# Medi-Cal & Uninsured Population Estimates

Methods for Base Population

## The Challenge

- Age ranges are broad in available data for Medi-Cal Enrollment (0-18, 19-44, 45-64) and Uninsured (0-18, 19-64) populations
- Incidence of FEP varies significantly by age (12-17,18-25, 26-40, 41-64)

## Approach: Proportional Distribution Method

Apply each county's general population age distributions (from CA Department of Finance 2024 projections) to Medi-Cal enrollment and Uninsured estimates

## Formula

$$\text{\# Medi-Cal Eligible 12-17 years of age} = \text{\# Medi-Cal Eligible Estimates for 0-18 years} \times \frac{\text{\# 12-17-year-olds in County Population}}{\text{\# 0-18-year-olds in County Population}}$$

# Example: CSC Base Populations

Methods for Base Population

**Goal:** Estimate number of uninsured individuals 26-40 years old in California

1. **Start with Uninsured Population 19-64 in California:** 1,191,137

2. **Get CA Population Proportions for the proportion of 19-64 year olds that are 26-40 years old**
   - Ages 26-40 in CA: 8,246,067
   - Ages 19-64 in CA: 23,515,321
   - Proportion: 35.1%

3. **Apply proportion to uninsured population estimate:** 1,191,137 x 35% = 416,898

# Any Questions?

# CSC Model Overview



**Challenges**

- Several studies estimating incidence of FEP by age – which to choose?
- Studies with different settings, populations, payer mix

**Solution**

Literature-based FEP Incidence Rates

Model to combine study estimates

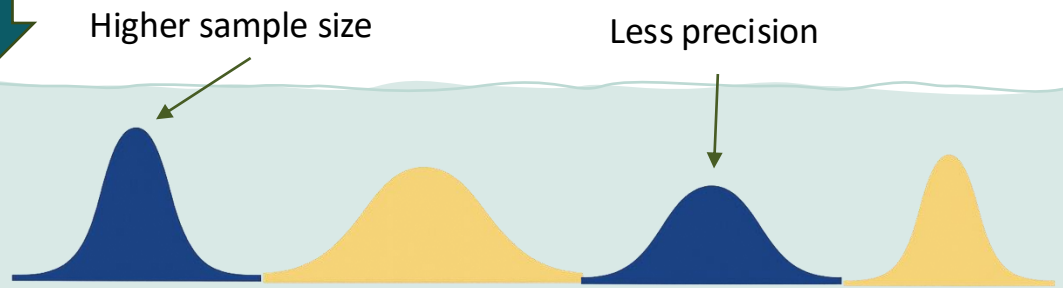
CSC Model Overview

## Conduct literature review on rates of FEP by age group

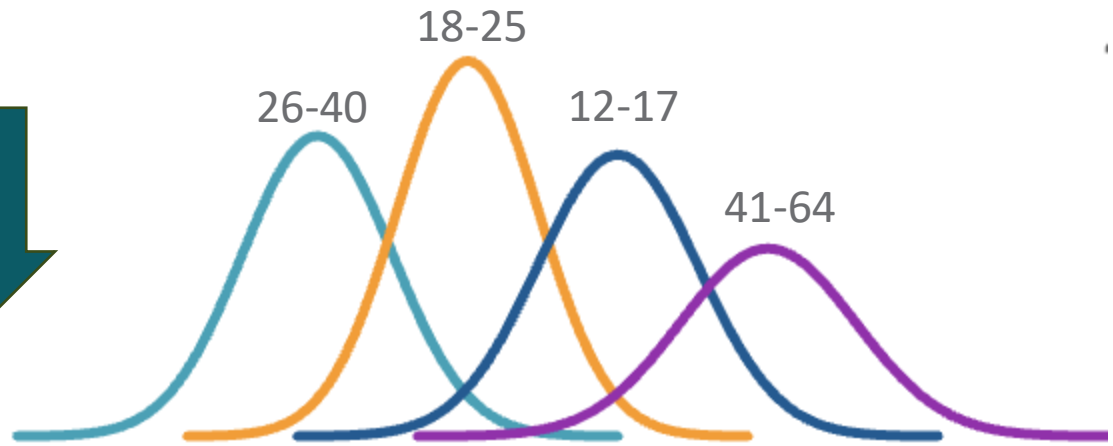
Targeted on Medicaid and community behavioral health populations

## Observed FEP rates vary by study

- Studies are conducted in different populations
- Studies have larger or smaller sample sizes




## Model designed to weight by sample size and precision




## Final, weighted rates by age group

Rates applied to estimated population uninsured + Medi-Cal for each age range

# Bayesian Hierarchical Model

CSC Model Overview

1. **Standardize incidence rates for combination:** Convert all studies to annual rates per 100,000 person-years and determine percentage overlap between target age groups and study age groups

2. **Build the statistical model to summarize incidence rates:** Use Bayesian methods to estimate FEP incidence by age group while accounting for study differences

3. **Generate uncertainty estimates:** Conduct Monte Carlo simulations to capture realistic uncertainty

4. **Apply final rates to each county's age-specific estimates:** Multiply rates and 95% credible intervals from the model to each age group to generate a range of expected case counts

# Bayesian Hierarchical Model

CSC Model Overview

## 1 Standardize incidence rates for combination

### The Challenge with Combining Many Studies

| Study | Age Range | Rate Type | Setting |
|---|---|---|---|
| Radigan et al. 2019 | 18-30 | Person | New York Medicaid |
| Simon et al. 2017 | 15-40 | Person-year | Mixed payer type |
| WA State Medicaid Study 2023 | 12-64 | Person | Washington State Medicaid |

### Our Solution

✓**Age Groups:** Distribute each study's findings across our target age groups (12-17, 18-24, 25-40, 41-64) based on how much the result overlaps with the target range

✓**Person-Years:** Use reported rate time to calculate total observation time for proper statistical weighting

✓**Annual Rates:** Convert all rates to "per 100,000 people per year"

# Bayesian Hierarchical Model

CSC Model Overview

## 2 Build the statistical model to summarize incidence rates

### Why "Bayesian"?

Instead of a single estimate, we get a range of plausible values with associated probabilities based on:

- **Prior Knowledge** (what we expect, what is biologically plausible)
- **Data** (what we observe in input studies)

### Why "Hierarchical"?

The model has **two levels:**

- **Level 1:** Overall FEP rates by age group (the "population average")
- **Level 2:** Study-specific adjustments that account for natural differences between studies

# Bayesian Hierarchical Model

CSC Model Overview

## 2 Build the statistical model to summarize incidence rates

### Traditional Approach

- Relies on single point estimates
- Difficult to capture variability when combining studies
- No way to incorporate prior knowledge

### Bayesian Approach

- Captures full probability distributions
- Better estimates uncertainty explicitly
- Natural framework for meta-analyses
- Can incorporate prior/expert knowledge

# Bayesian Hierarchical Model

CSC Model Overview

**3** **Generate uncertainty estimates**

**4** **Apply final rates to each county's age-specific estimates**

Use **Monte Carlo** simulations (n=16,000) to explore all plausible scenarios given the model

- Uses the Bayesian fitted model based on input studies
- Generates new parameter values
- Creates "what if" scenarios
- Use simulation results to generate mean and 95% credible intervals

416,898 uninsured individuals who are 26-40 years old

Model rate for 26-40 years old

Run 16,000 times across possible range

# Bayesian Hierarchical Model



3 **Generate uncertainty estimates**

4 **Apply final rates to each county's age-specific estimates**

## Traditional Approach

- Multiply mean from model by population

**Problem:** You only get one number and don't capture real uncertainty from input studies

## Monte Carlo Approach

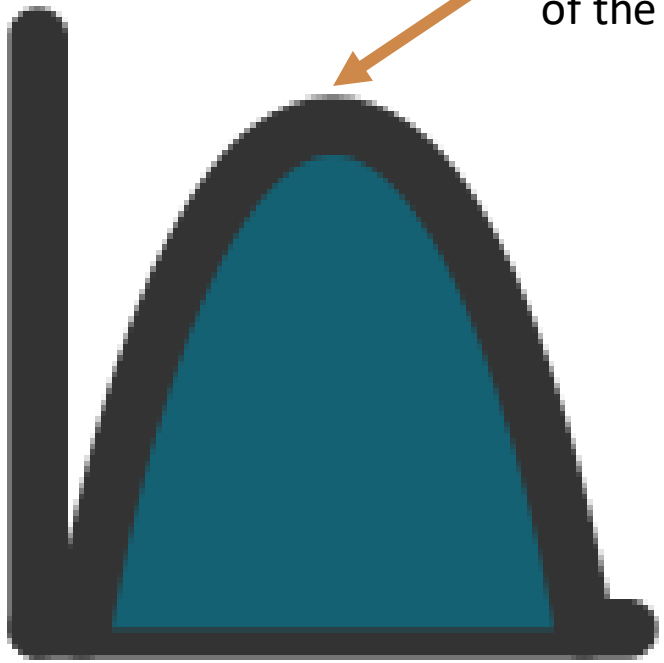
- Use all plausible rates to see the full range of possible values
- Better captures study variability to generate realistic scenarios
- Explicit that there's not one "true" answer

# How do we handle uncertainty?



**95% Credible Intervals:** Based on the model and available data, estimates the range in which the value is expected to fall with 95% probability

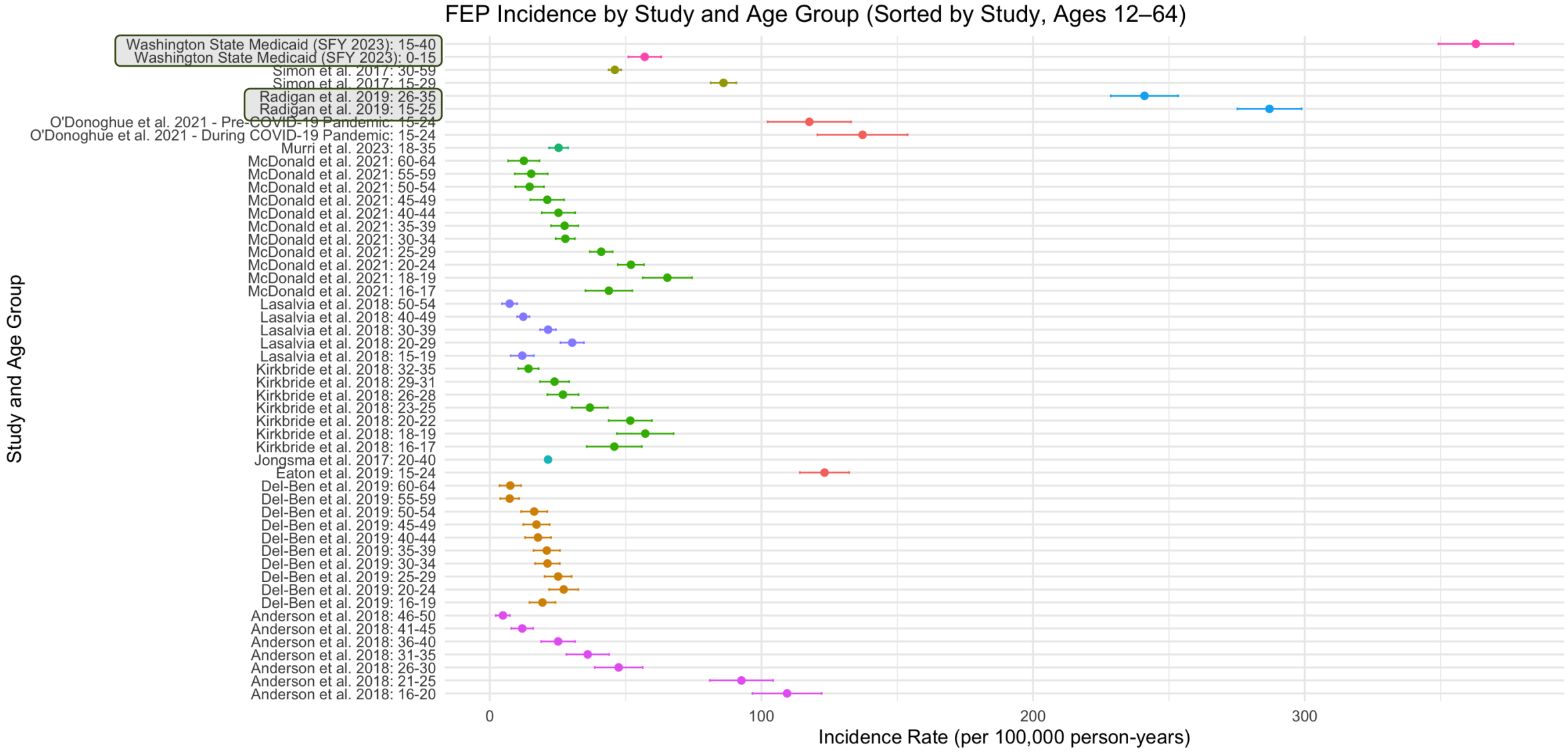
**Average:** Where the estimate fell in most of the simulations



**Low:** 5th percentile of where estimates fell in simulations

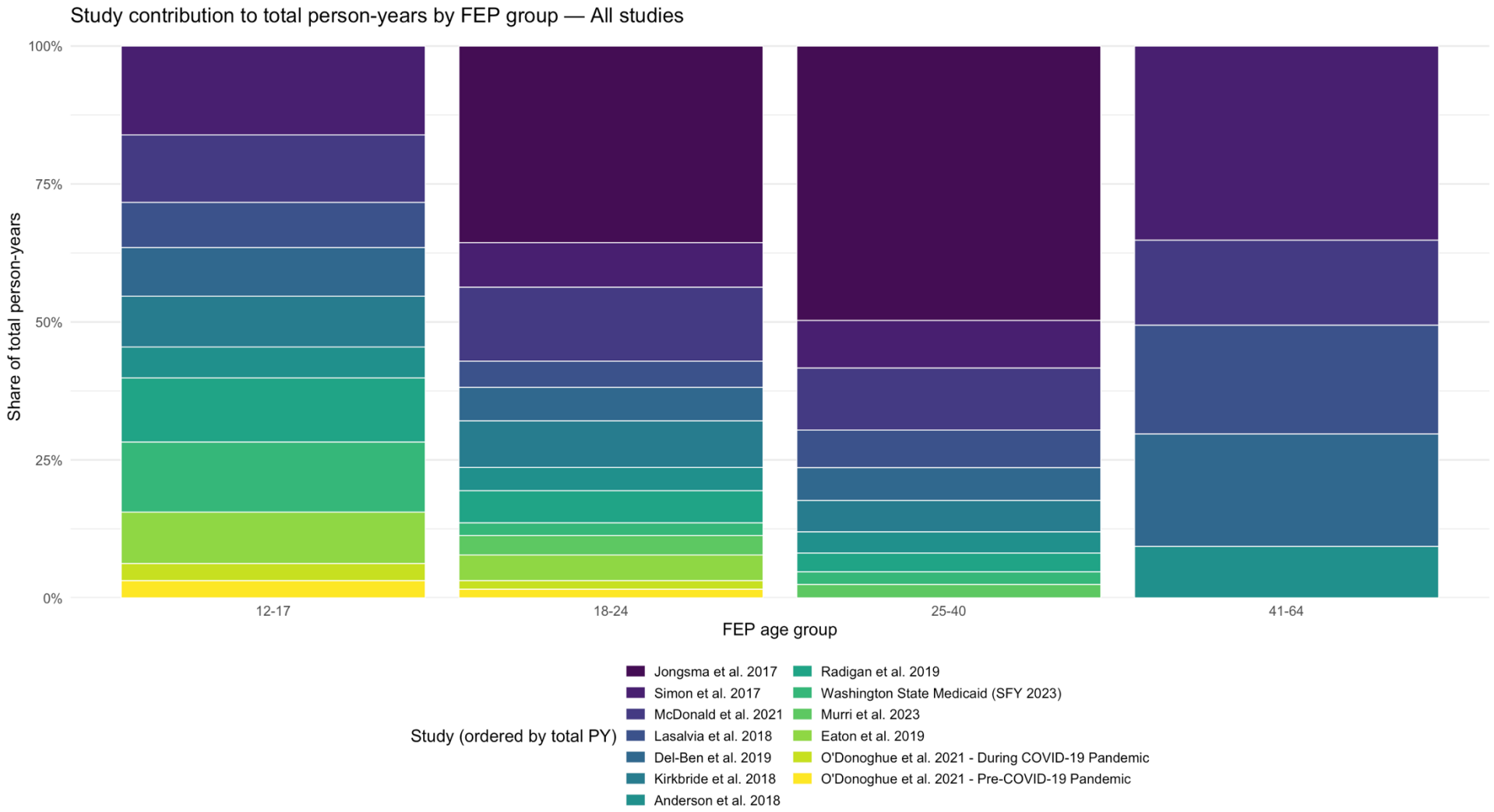
**High:** 95th percentile of where estimates fell in simulations

# Any Questions?


FEP Incidence by Study and Age Group (Sorted by Study, Ages 12–64)
Study and Age Group
Washington State Medicaid (SFY 2023): 15-40
Washington State Medicaid (SFY 2023): 0-15
Simon et al. 2017: 30-59
Simon et al. 2017: 15-29
Radigan et al. 2019: 26-35
Radigan et al. 2019: 15-25
O'Donoghue et al. 2021 - Pre-COVID-19 Pandemic: 15-24
O'Donoghue et al. 2021 - During COVID-19 Pandemic: 15-24
Murri et al. 2023: 18-35
McDonald et al. 2021: 60-64
McDonald et al. 2021: 55-59
McDonald et al. 2021: 50-54
McDonald et al. 2021: 45-49
McDonald et al. 2021: 40-44
McDonald et al. 2021: 35-39
McDonald et al. 2021: 30-34
McDonald et al. 2021: 25-29
McDonald et al. 2021: 20-24
McDonald et al. 2021: 18-19
McDonald et al. 2021: 16-17
Lasalvia et al. 2018: 50-54
Lasalvia et al. 2018: 40-49
Lasalvia et al. 2018: 30-39
Lasalvia et al. 2018: 20-29
Lasalvia et al. 2018: 15-19
Kirkbride et al. 2018: 32-35
Kirkbride et al. 2018: 29-31
Kirkbride et al. 2018: 26-28
Kirkbride et al. 2018: 23-25
Kirkbride et al. 2018: 20-22
Kirkbride et al. 2018: 18-19
Kirkbride et al. 2018: 16-17
Jongsma et al. 2017: 20-40
Eaton et al. 2019: 15-24
Del-Ben et al. 2019: 60-64
Del-Ben et al. 2019: 55-59
Del-Ben et al. 2019: 50-54
Del-Ben et al. 2019: 45-49
Del-Ben et al. 2019: 40-44
Del-Ben et al. 2019: 35-39
Del-Ben et al. 2019: 30-34
Del-Ben et al. 2019: 25-29
Del-Ben et al. 2019: 20-24
Del-Ben et al. 2019: 16-19
Anderson et al. 2018: 46-50
Anderson et al. 2018: 41-45
Anderson et al. 2018: 36-40
Anderson et al. 2018: 31-35
Anderson et al. 2018: 26-30
Anderson et al. 2018: 21-25
Anderson et al. 2018: 16-20
0
100
200
300
Incidence Rate (per 100,000 person-years)
Study among Medicaid only populations
Study Setting
Australia
Brazil
Colorado and California
England
Italy
Meta-analysis including data from 6 countries
New York
North-eastern Italy
Ontario, Canada
Washington

# Studies contributed to each relevant age group based on sample size and overlap with the target age range – All Studies

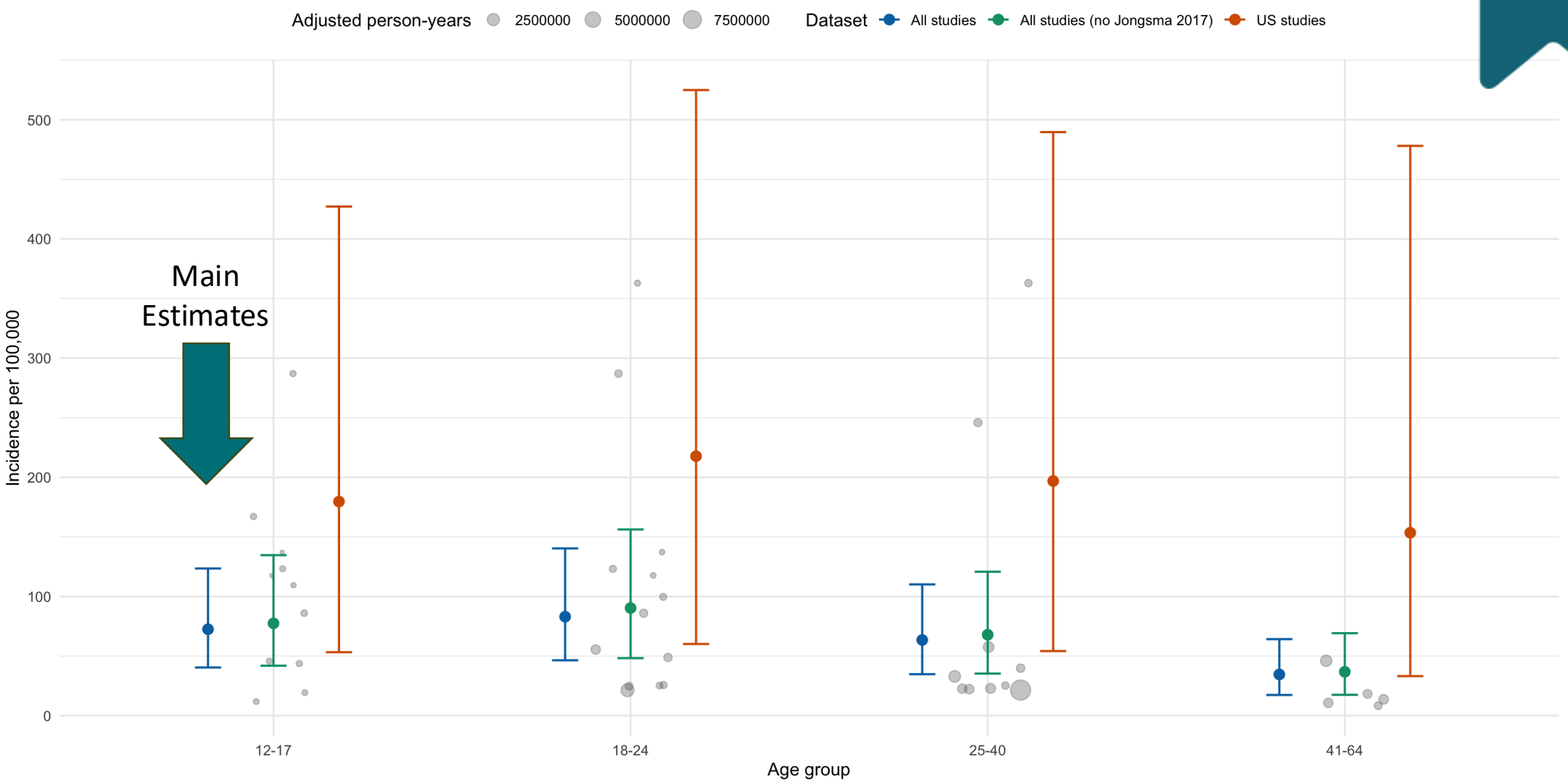
CSC Model Results




Jongsma et al. 2017 contributes a large amount to 18–40-year-old estimates

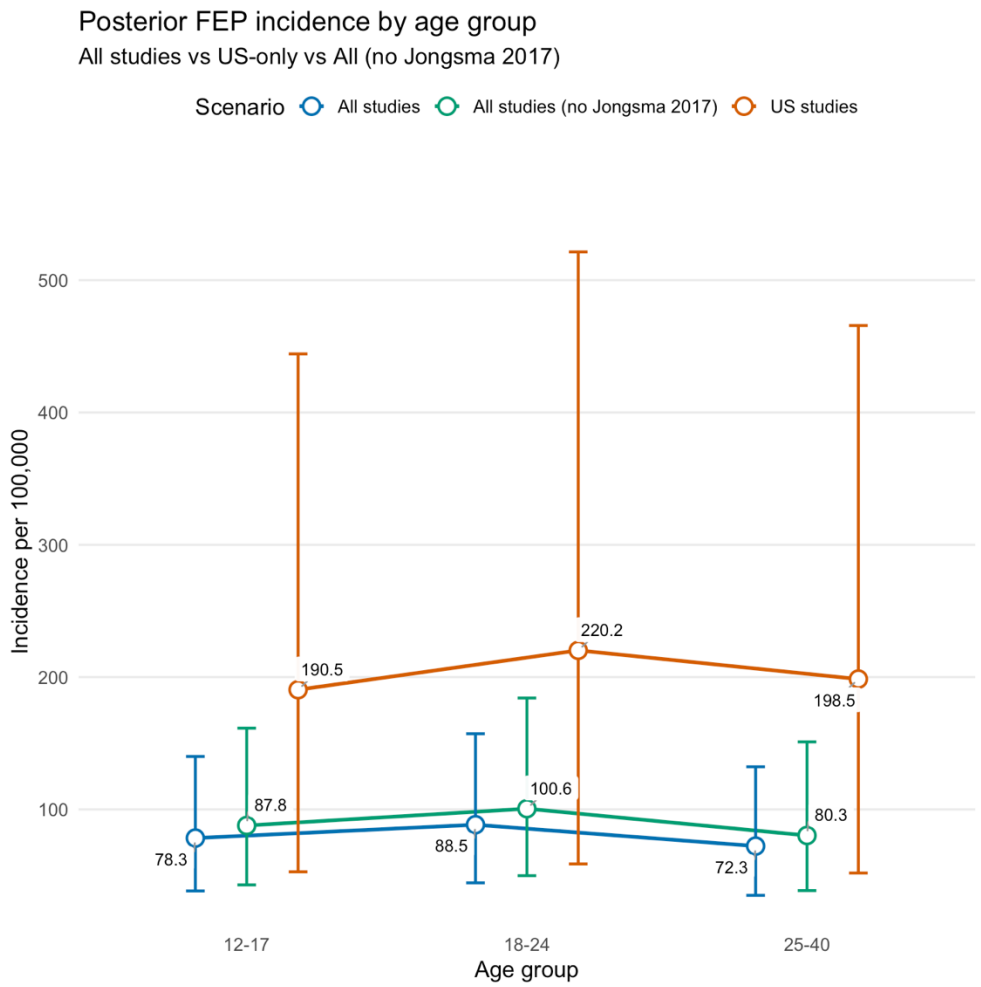
Simon et al. 2017 contributes ~30% to 41–64-year-old estimates

CSC Model Results



# Approximately 20% of total person-years contributed by US studies
# US studies had a higher FEP incidence and considerable variability

CSC Model Results




Total Person-years contributed among studies

| Age Group | All Studies* | US Studies |
|---|---|---|
| 12-17 | 1,847,066 | 746,803 |
| 18-24 | 8,615,206 | 1,392,524 |
| 25-40 | 19,764,815 | 2,831,268 |
| 41-64 | 5,936,376 | 2,088,966 |
| Total | 36,163,464 | 7,059,561 |

*Jongsma et al. 2017 contributed 12,900,000 total person-years, so the scenario removing that study had 23,263,464 total person-years

# CSC Estimates Statewide

CSC Model Results

| Age Group | Medi-Cal Eligible 12-40 (#) | Estimated CSC - Medi-Cal Eligible | Uninsured <=250% FPL (#) | Estimated CSC - Uninsured |
|---|---|---|---|---|
| 12-17 years | 1,677,478 | 1,217 (678-2,072) | 55,493 | 40 (22-69) |
| 18-24 years | 1,596,178 | 1,325 (742-2,240) | 178,342 | 148 (83-250) |
| 25-40 years | 3,314,582 | 2,105 (1,154-3,651) | 439,825 | 279 (153-484) |
| 41-64 years | 3,678,506 | 1,272 (639-2,362) | 584,433 | 202 (101-375) |
| **Total** | 10,266,744 | **5,919 (3,443-9,735)** | 1,258,089 | **670 (385-1,113)** |

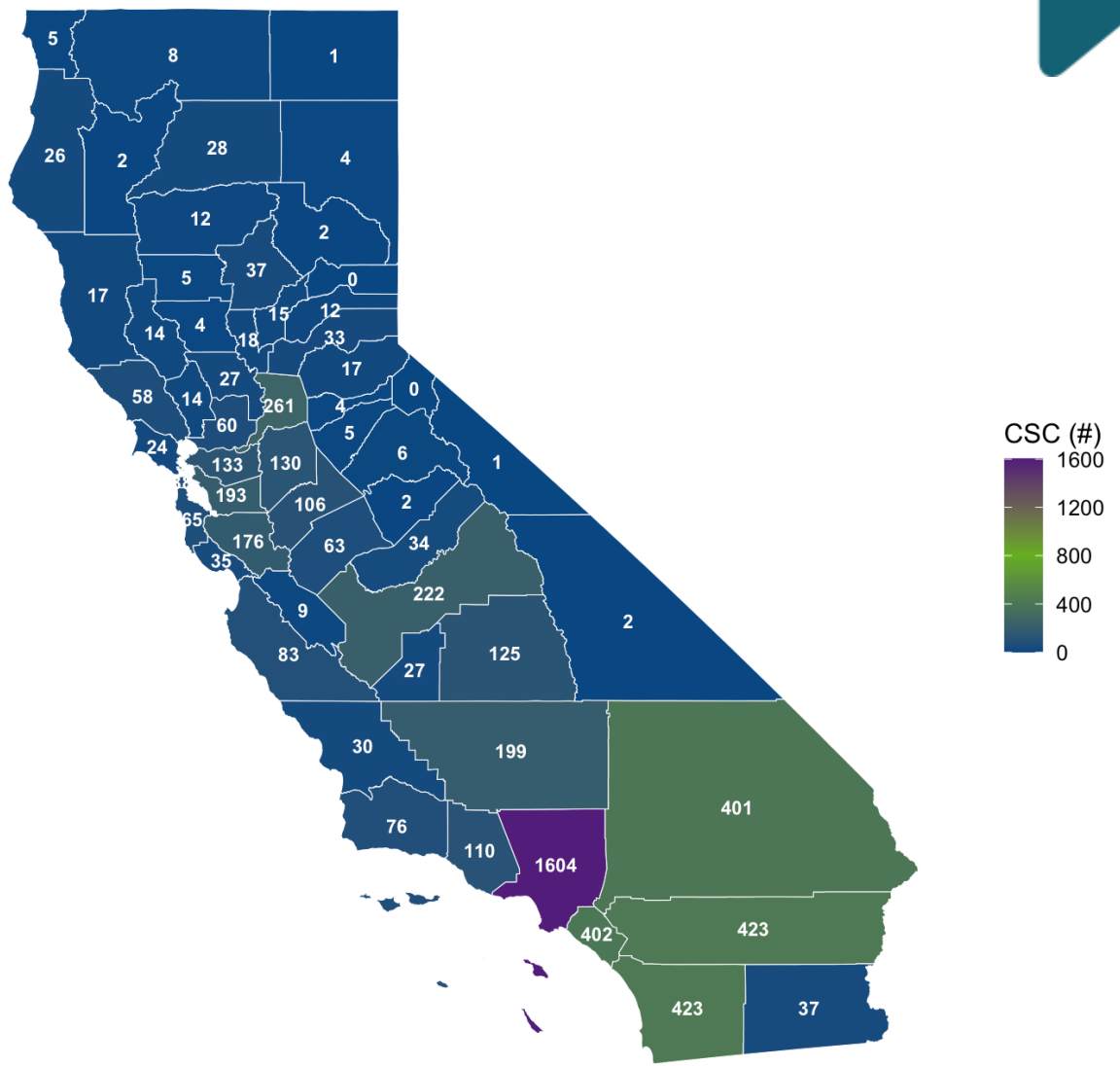
# CSC Population Estimates by County



Clinical Need for CSC among Medi-Cal eligible individuals 12-64 years of age ranged between 0 (0-0) in Alpine and Sierra to 1,604 (933-2,644) in Los Angeles

**Estimated CSC Population by County (Ages 12-64)**

Medi-Cal populations only

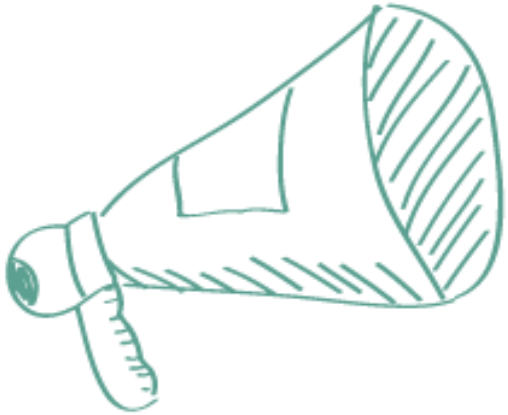


# CSC - Conclusions and Limitations

Conclusions

- We designed a model to estimate the incidence of FEP using data from 12 studies across geographic settings, age groups, and payer types
- These estimates may provide a helpful guide for individuals with clinical need for CSC for FEP
- Population models relying on local data (e.g., program capacity, populations served, and individual-level diagnoses) would arrive at different estimates
- Limited studies available explicitly in Medi-Cal and U.S. populations for some of this age range (2023 Washington State Medicaid Report and Radigan et al. 2019). Other studies included:
  - Mixed payer populations (e.g., Simon et al. 2017)
  - Publicly funded insurance in another country (e.g., Murri et al. 2023)

# Any Questions?



"All models are wrong, but some are useful"
-George E. P. Box

In absence of BHP-specific data, these estimates incorporate prior knowledge from the literature or unique county contexts while also capturing uncertainty to inform BHP planning

CalMHSA

# Remember…



Data is a clue not a conclusion

These estimates are meant to aid with program planning and implementation

They do not identify who you will serve

# We have imperfect tools to measure something that is not currently measured

Interpretation

## True Population Need

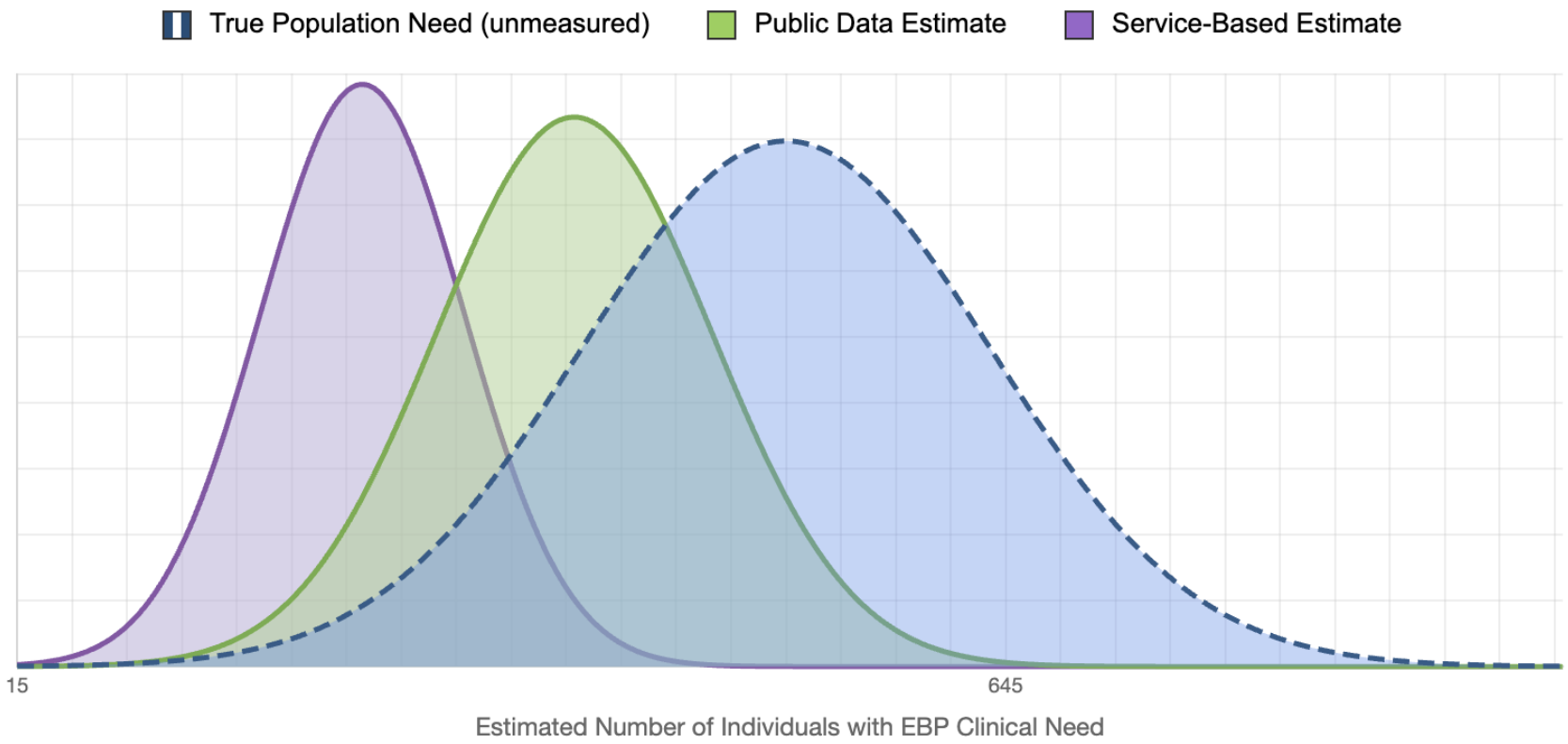
The actual number of individuals in the community with clinical need for FSP services, including those who never access the system

## Public Data Estimate

Estimates from general population surveys and epidemiological studies, some fo which are not specific to Medi-Cal and uninsured populations

## Service-Based Estimate

Estimates derived from people currently in services - typically underestimates total need because it only counts those already accessing the system




*Visual and numbers for illustrative purposes and does not reflect statewide, public, or service-based estimates.

# Public data estimates may be higher or lower than true number depending on context

Interpretation

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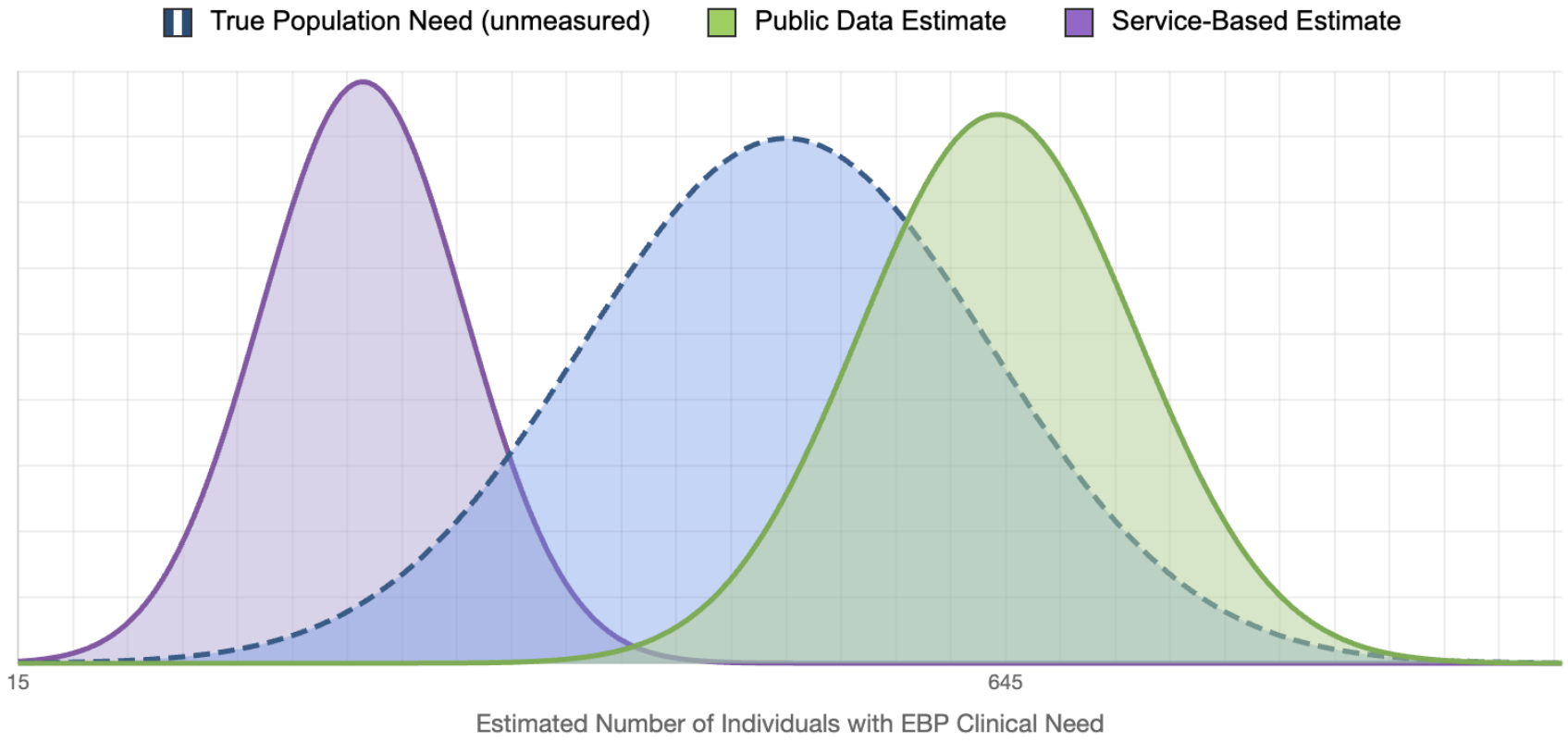


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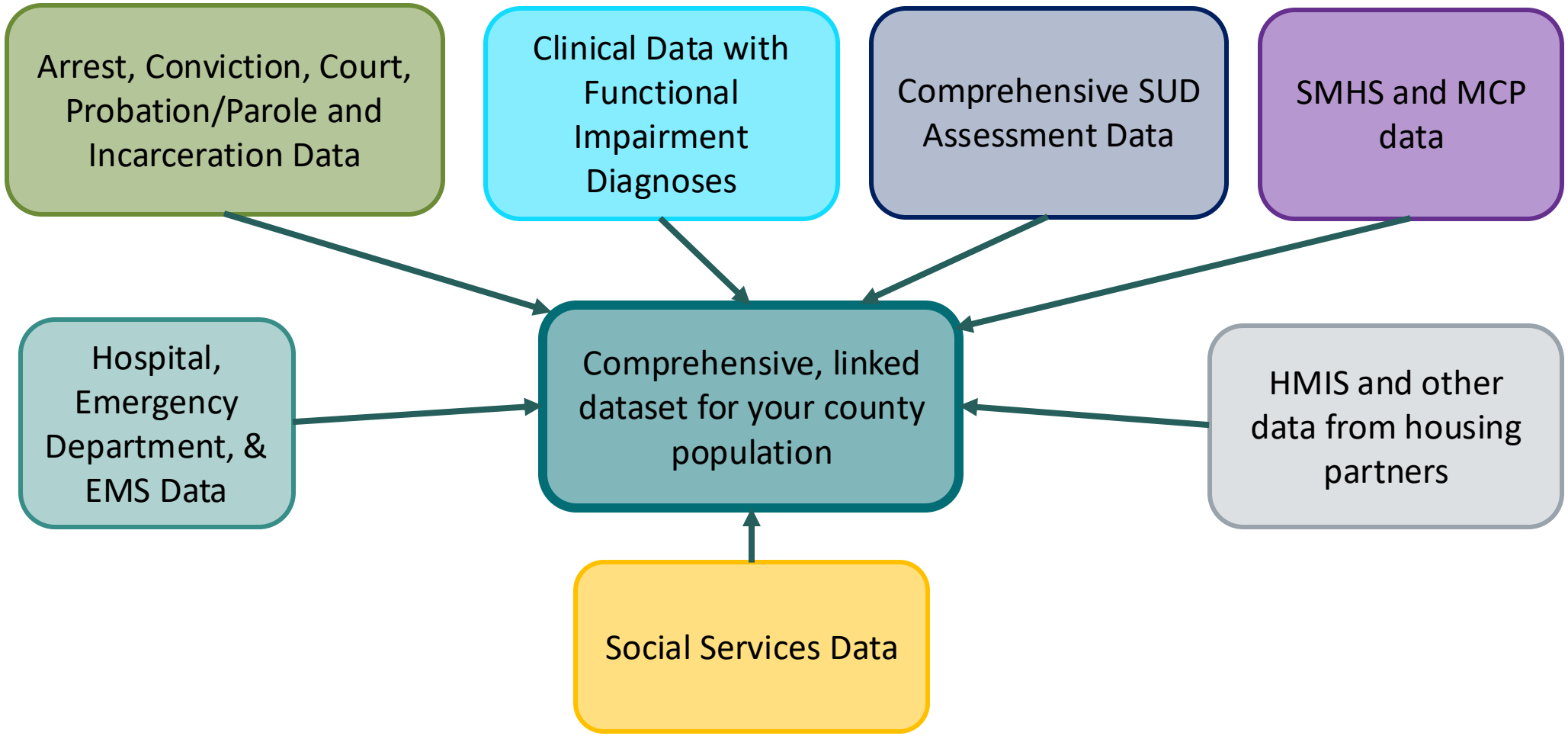
# Although EHR data are limited…what if we had a more complete data system

Interpretation



# Adult EBP Population Model Strengths

Interpretation

**Evidence-based**

Estimates drawn from peer-reviewed research and publicly available data sources

**Incorporates uncertainty**

95% credible intervals help capture known uncertainty and relax model assumptions

**Payer-specific for BHSA planning**

Separate estimates provided for Medi-Cal and uninsured populations to help with BHSA planning

# Adult EBP Population Modeling

Interpretation

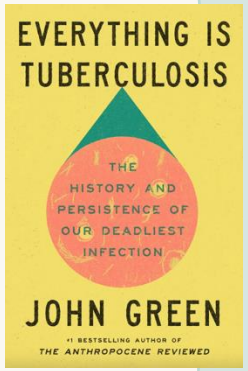
## Model estimates can be useful for service planning

- Estimated provider teams needed based on EBP team requirements
- Plan for outreach and anticipated case loads
- For budget planning and expected costs

## Important Considerations

- Contextualize estimates with local knowledge (e.g., resource capacity, existing services, local partnerships)
- Actual caseloads will depend on may factors (e.g., outreach effectiveness, acceptability)

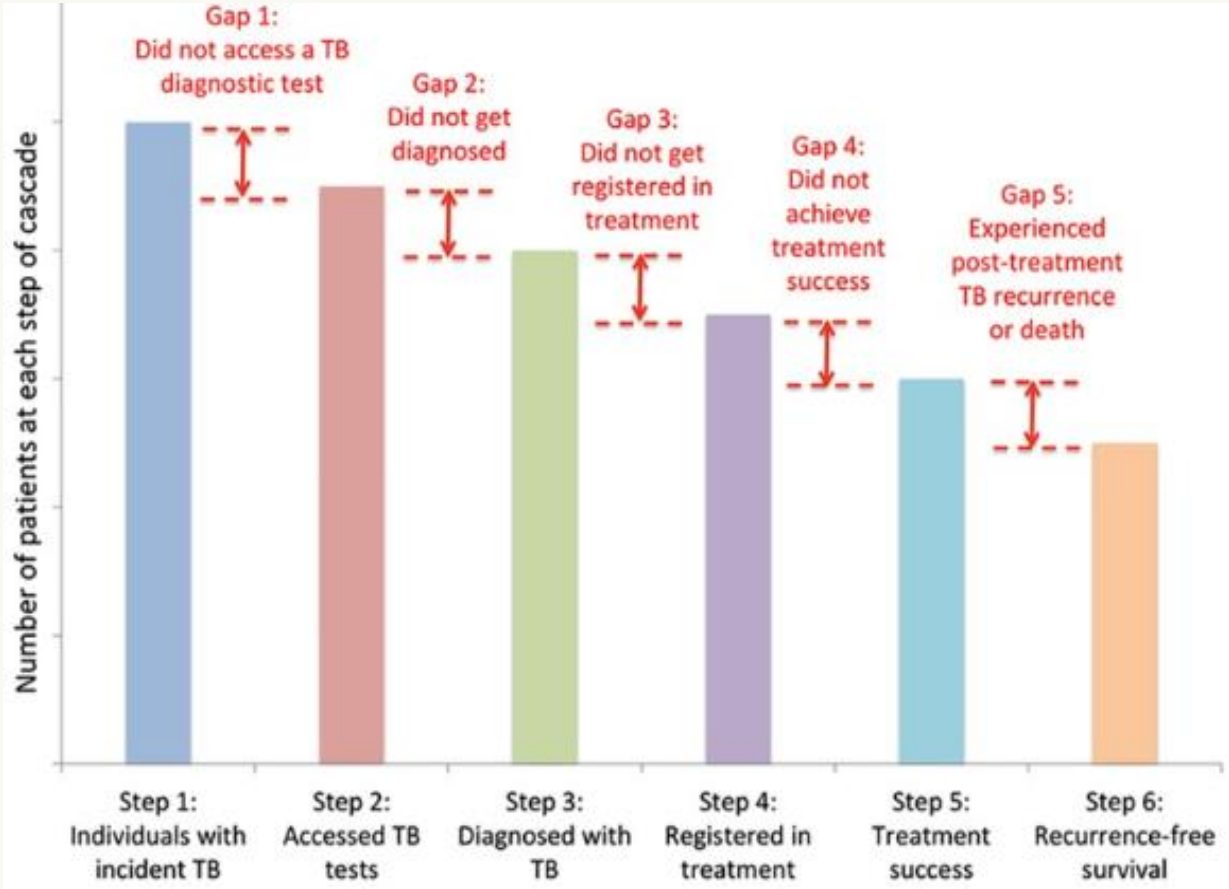
# Clinical Need ≠ Served




Many people who qualify for an intervention may not access it.

Only 43% of those eligible for TB treatment were successfully treated.

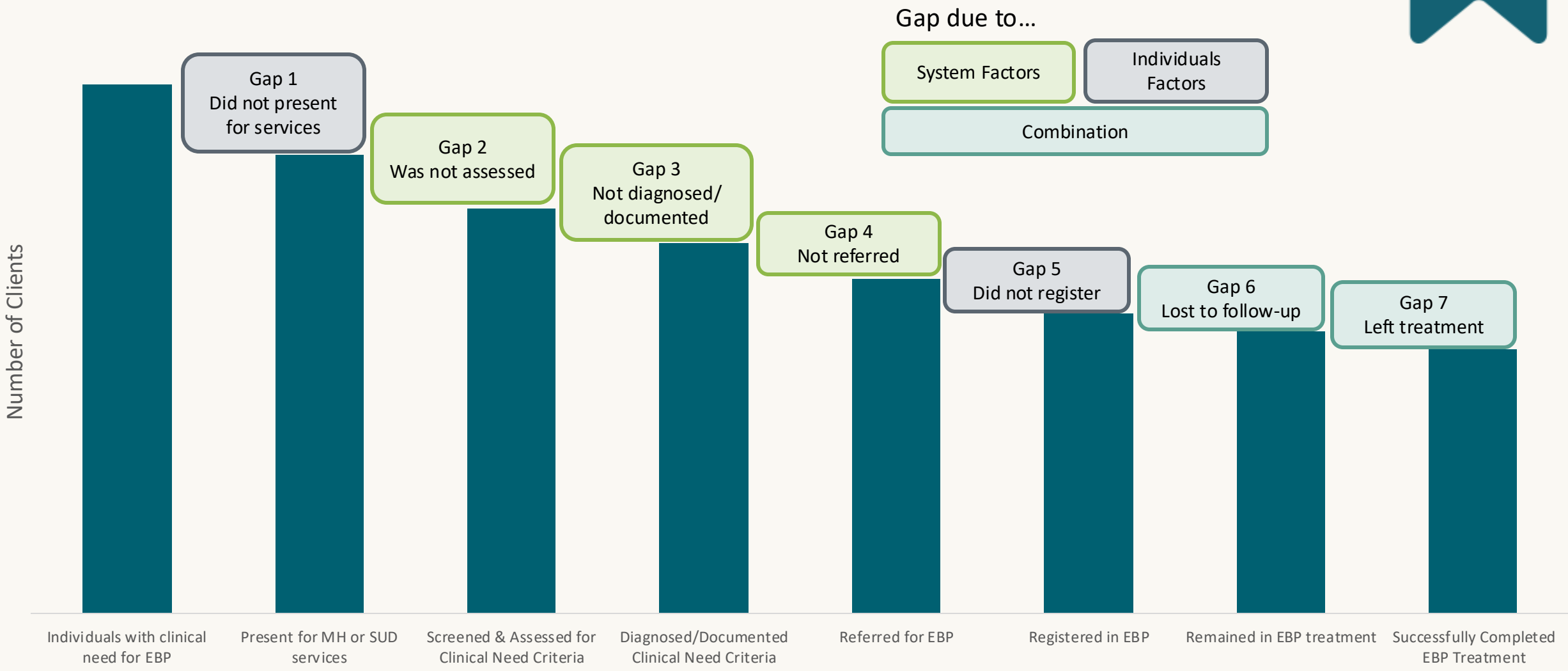
**TB Care Cascade – General Model for people with any form of active TB in India, 2013**




Source: Subbaraman et al. 2019

# Behavioral Health EBP Care Cascade

Interpretation



## Estimated Population ≠ Served Population

Multiple contributing factors affect the subset of individuals who will access and use these services

### Individual Factors*

- Not able to access services (e.g., incarceration, hospitalization)
- Refusal or inability to engage
- Mismatch with available FSP model (e.g., prefers lower-intensity care)

### System Factors*

- FSP funding available (e.g., 35% of BHSA funds)
- Provider shortages/workforce limitations
- Program capacity & fidelity constraints

## Served Population

Estimated Population with clinical need reduced by Individual Factors and/or System Factors

*The listed components serve as examples and are not comprehensive of all contributing factors.

# Any Questions?

# Thank You!

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