Modeling the Impact of Problem-Solving Courts in Indiana

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Abstract

Background/Objectives: Many legal jurisdictions have developed "problem-solving courts" (PSCs) to address the increasing numbers of persons with drug-use disorders who enter the legal system. As part of a larger investigation demonstrating that problem-solving courts improved outcomes in several counties in Indiana, we constructed an agent-based simulation model to predict the impact of the introduction of PSCs into counties in Indiana that currently do not have such courts and developed a tool that county officials could use to examine those effects.

Methods: Under separate CDC funding, we had developed a complex, agent-based model that represents the development and progression of opioid use disorder (OUD) as a function of individual and county characteristics. It includes transitions back into use disorder states from treatment. The model has been calibrated to the number of overdoses and deaths within counties across multiple mid-western states. Using arrest data by county from Indiana, we simulated the arrest of individuals from the use-disorder population and modeled similar admission criteria into the PSCs in these counties. We estimated the long-term outcomes could be expected in the absence of PSCs and other typical interventions then with the benefits of PSCs. A web-based front end was developed to assist counties in examining their specific situation.

Results: The overall study found that PSCs had a positive effect on overdose death (OR 0.17), emergency services utilization (OR 0.66), and re-arrest (OR 0.07) compared to individuals who qualified for the program but did not complete. Under the assumption that similar results would be realized for counties that initiate PSCs, we present the expected impact on program enrollees.

Implications: This research has demonstrated the potential positive impact of expanding PSCs into Indiana counties that currently do not have them.

Background

Drug Overdose Rates in Indiana

Overdose Mortality AAR
- 5.1 - 10.5
- 10.6 - 16.1
- 16.2 - 19.9
- 20.0 - 26.8
- 26.9 - 62.4

Rev. 01/06/2020
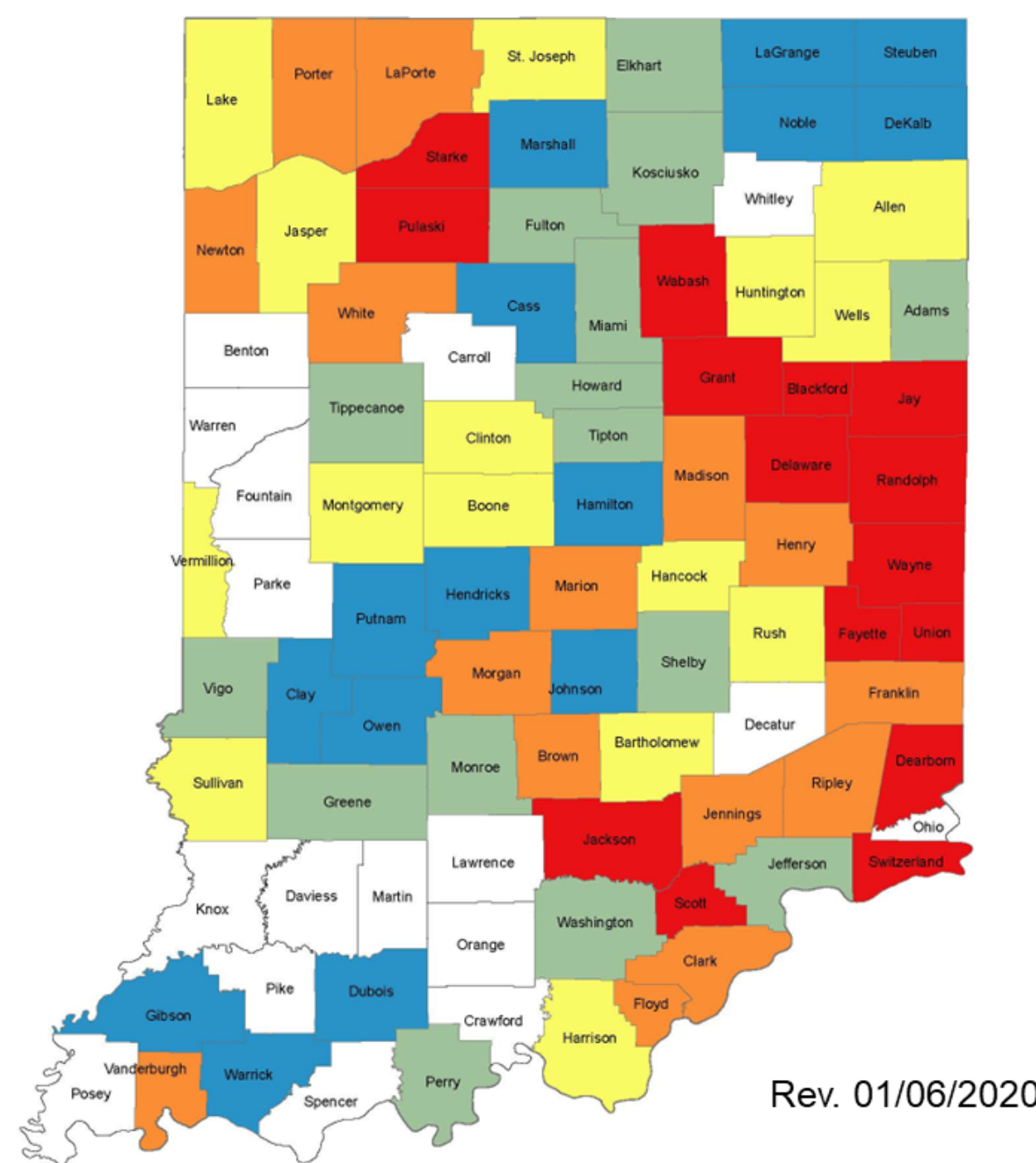
- Drug overdose rates vary tremendously across counties in Indiana
- Individuals arrested for drug infractions are eligible for "problem-solving courts" in some counties but nit others
- This effort was designed to estimate the impact of problem-solving courts, and create county-based tools to estimate the impact
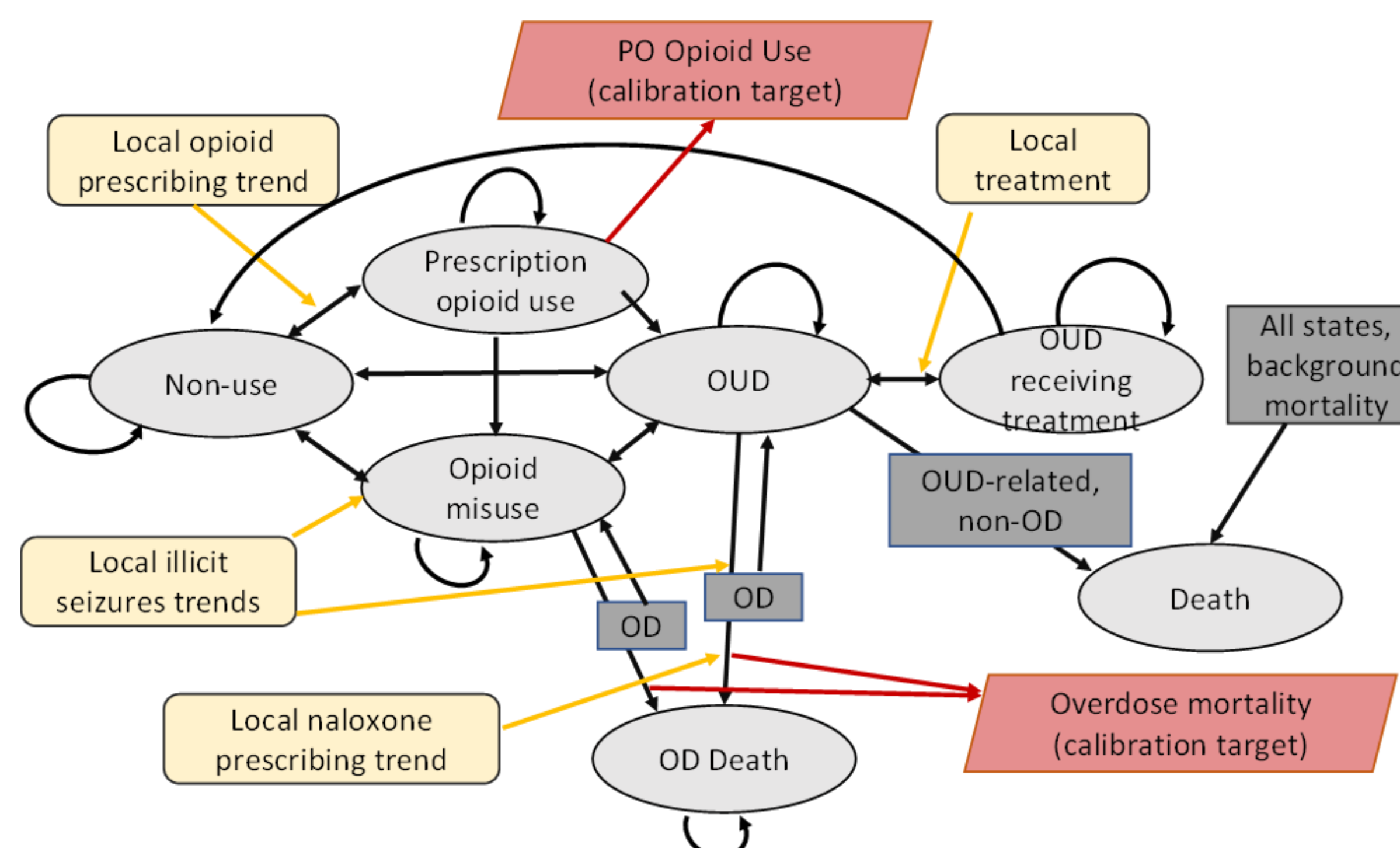
Methods

FRED (**F**ramework for **R**econstructing **E**pidemiological **D**ynamics) is an agent-based modeling platform that incorporates population-based agent demographics, locations (home, neighborhood, workplace and school) and agent interactions to simulate disease outbreaks and evaluate interventions.

Now includes OUD from CDC contract

Characteristics of Problem-solving courts

Which courts have which services
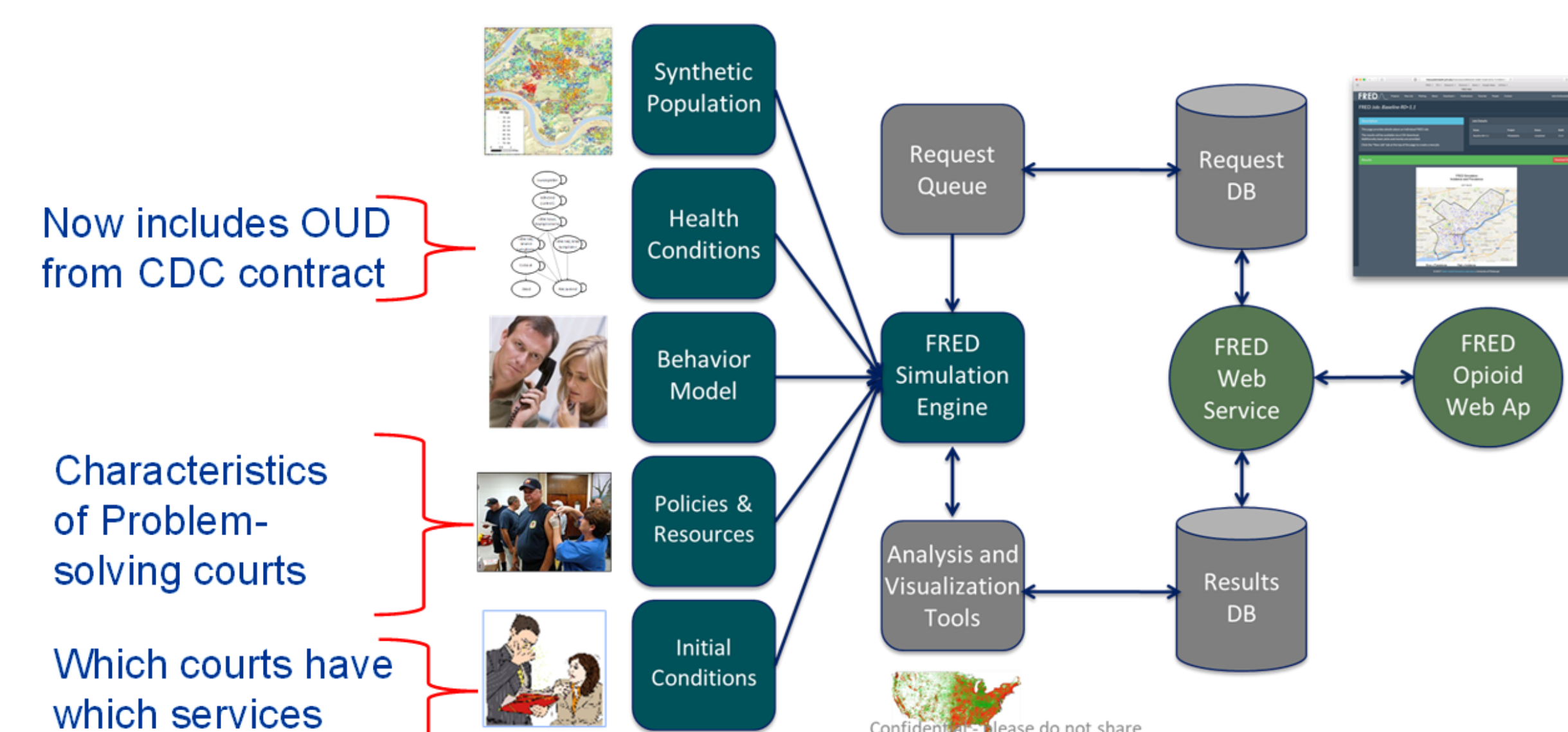
Methods (continued)

Under previous CDC Funding (CDC 75D30118C01377-Advancing Analytics to Improve Actionable Changes in the Opioid Overdose Epidemic) we developed an agent-based model of opioid use disorder and the impact of multiple interventions.

Opioid Use Disorder Model

Under the current grant (CDC-R01CE003152) we collected data from multiple courts in Indiana that had problem-solving programs
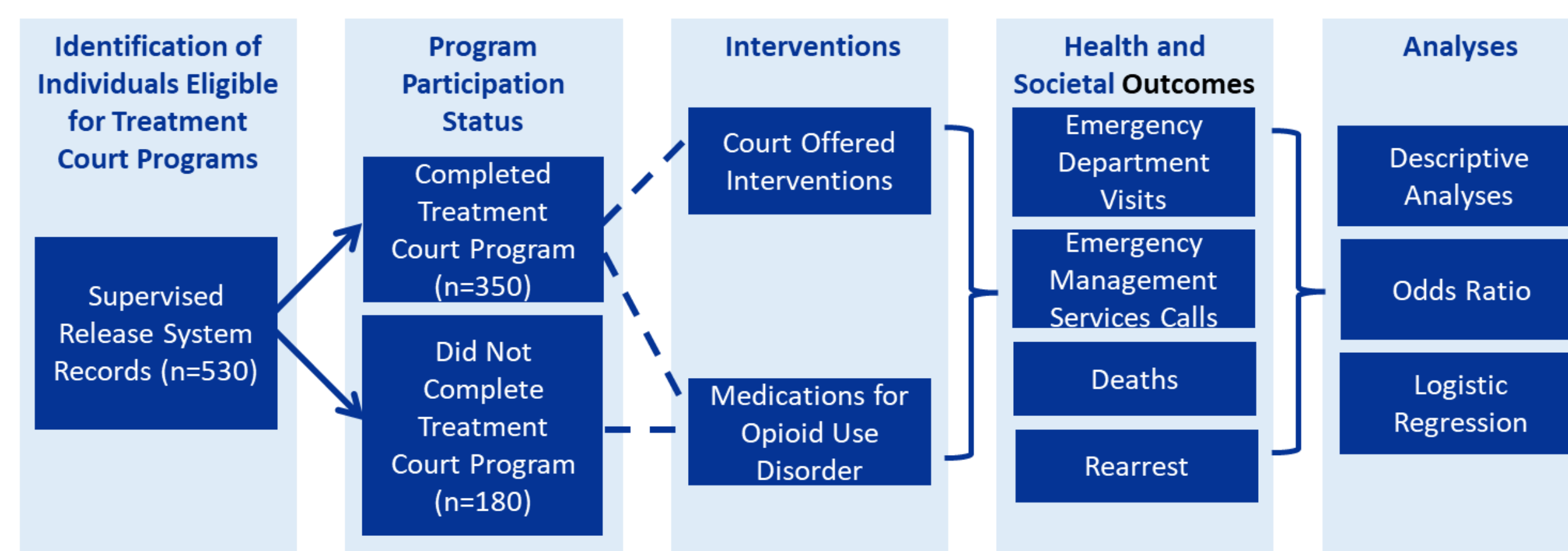
Simulation Model Methods

- Created new population of eligible participants from county-based arrest records
- Simulated the outcomes (primarily opioid use disorder and overdose deaths) under two conditions
  - No problem soling court in the county
  - Problem-solving Court in county, effectiveness as found in the overall study
- Created maps and totals of the impact of standard interventions (Naloxone an Buprenorphine and problem-solving courts

Outcomes

- The presence of a problem-solving court decreased the death rates overall in participants as compared to non-participants
- There was insufficient sample size to measure the impact of various different components of the problem-solving courts
- We produced estimates of the impact of increasing Naloxone and Buprenorphine as a comparator for program effectiveness

Outcome	Overall Odds Ratio and 95%CI
Death	0.17 (0.07, 0.42)
Emergency Department Utilization	0.66 (0.36-1.19)
Emergency Management Services Utilization	0.17 (0.11, 0.26)
Emergency Management Services Utilization for Drug Use	0.26 (0.17, 0.38)
Emergency Services Utilization with Naloxone	0.60 (0.36, 0.97)
Re-Arrest	0.07 (0.04, 0.11)

Web-based tool
(available at https://fred.publichealth.pitt.edu/psc

Over the baseline simulation period (2020 through 2024),
- 20,852 +/- 36 cases of opioid use disorder (mean +/- S.E.M.)
- 5,051 +/- 19 overdose deaths (mean +/- S.E.M)

0% increase in naloxone, 0% increase in MOUD, and the availability of of a PSC over the simulation period (2020 through 2024),
- 20,892 +/- 49 cases of opioid use disorder (mean +/- S.E.M.) (0% change)
- 4,790 +/- 18 overdose deaths (mean +/- S.E.M.) (-5% change)

Notes:
1. Each red dot represents an overdose death and each blue dot represents a case of opioid use disorder (OUD).
2. This simulation uses the synthetic population of Marion County, which has 897,849 agents, representing the number of people in the county.

FRED Web vPUB.5.0.0, © 2021 Public Health Dynamics Laboratory, University of Pittsburgh

Limitations

- Due to data-sharing rules in Indiana, we were not able to compare the death rates of incarcerated individuals who did not participate in problem solving courts with those who did
- If an incarcerated individual did not die from an overdose, they returned to the state of Opioid Use Disorder
- We did not have sufficient data to examine which components of problem-solving courts carried the biggest impact

Conclusions

- This work provides tools policy makers can use to decide the value of problem-solving courts in their county
- Simulation modeling can be used to integrate data from specific locations and specific populations to produce outcomes expected from multiple interventions
- Estimates would be more useful with more detailed data and larger sample sizes