

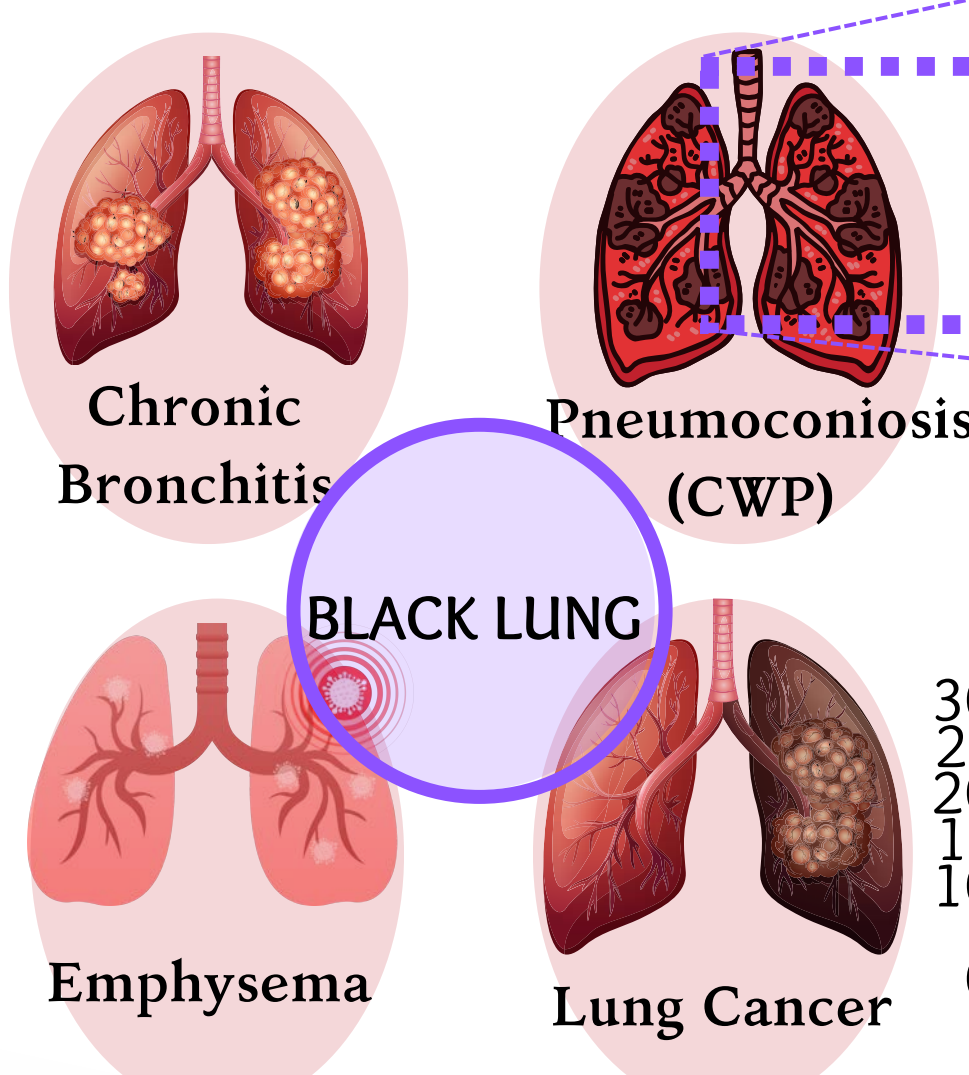
# PREDICTIVE MODEL FOR COAL WORKERS PNEUMOCONIOSIS (CWP) RISK IN THE US

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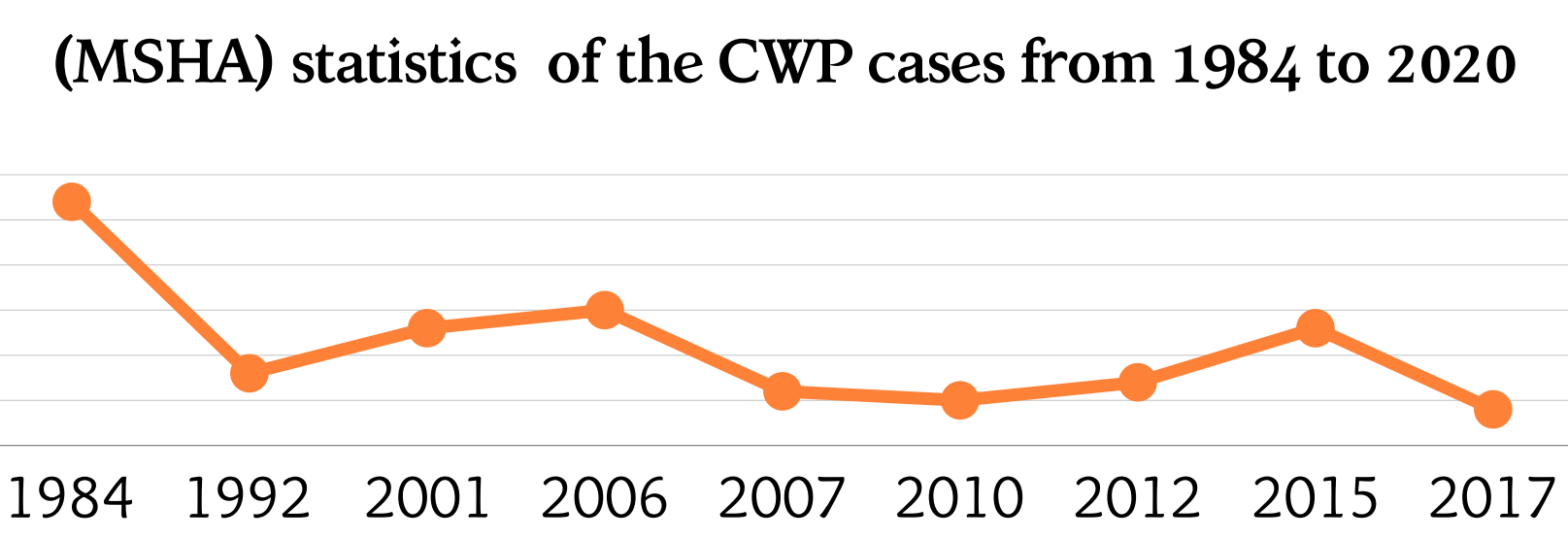
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## Background

What you need to know about Coal Workers Pneumoconiosis (CWP) is:



- Deadly
- Irreversible
- No treatment



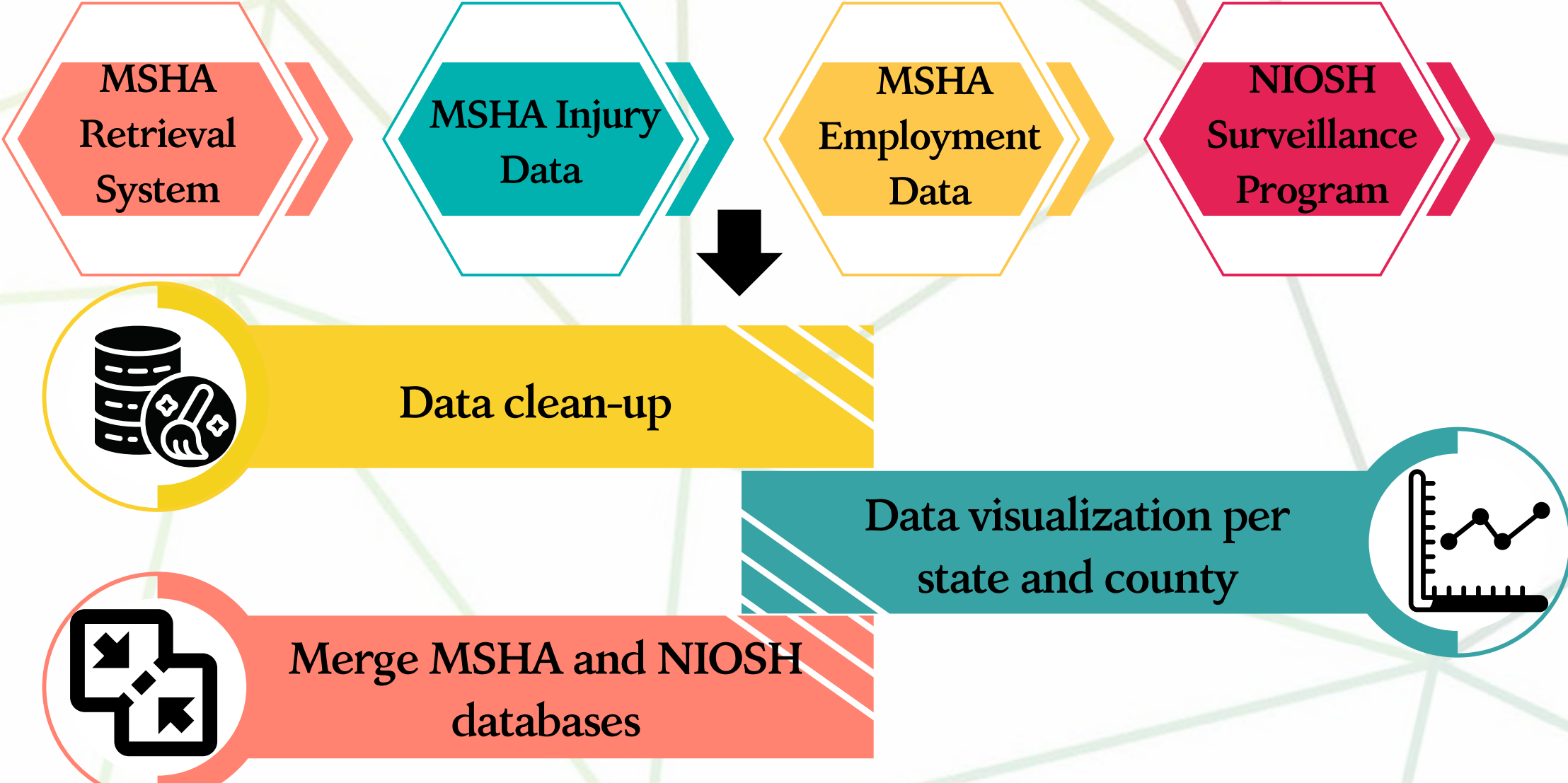
## Objectives

Problem statement: the optional usage of CPDM in non-production areas and the assumption that all workers are not overexposed

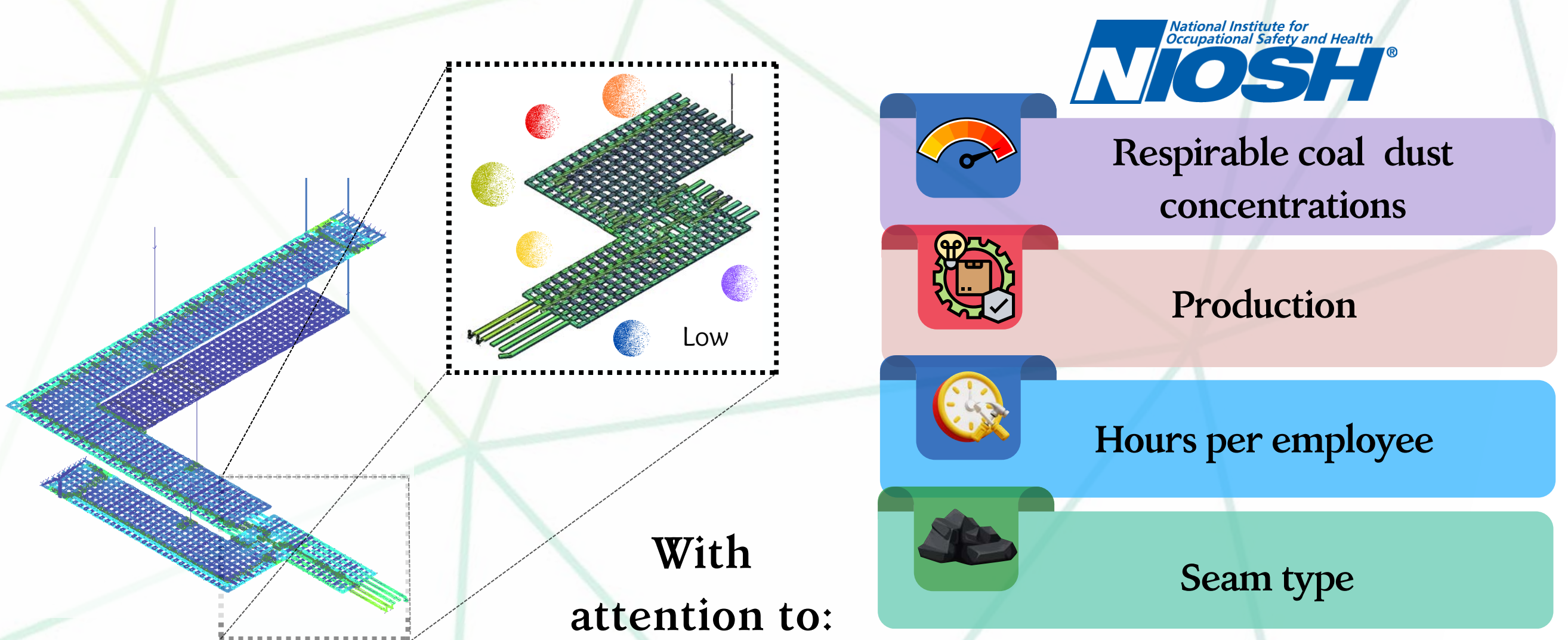
Recognize the US counties with high risk of CWP cases in the future decades

Identify the parameters that contribute with the prevalence of CWP incidents

## Data Collection

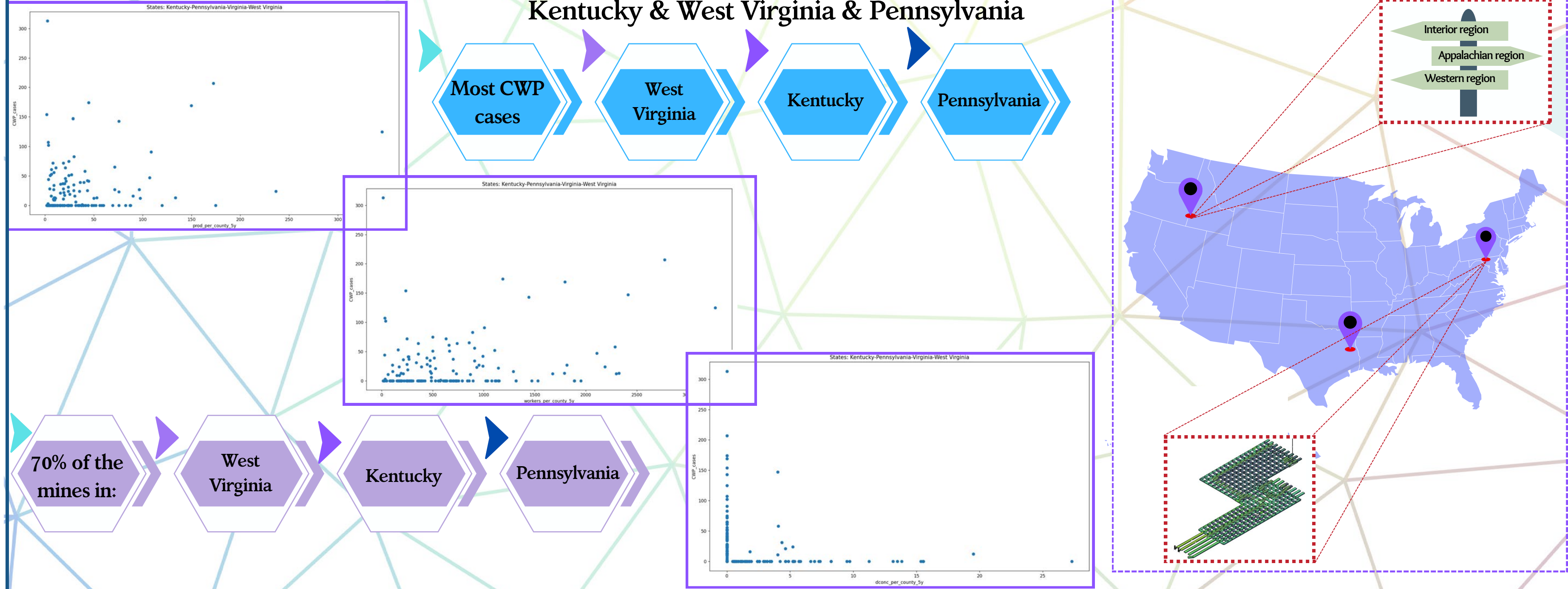


The data was focused in underground coal mines

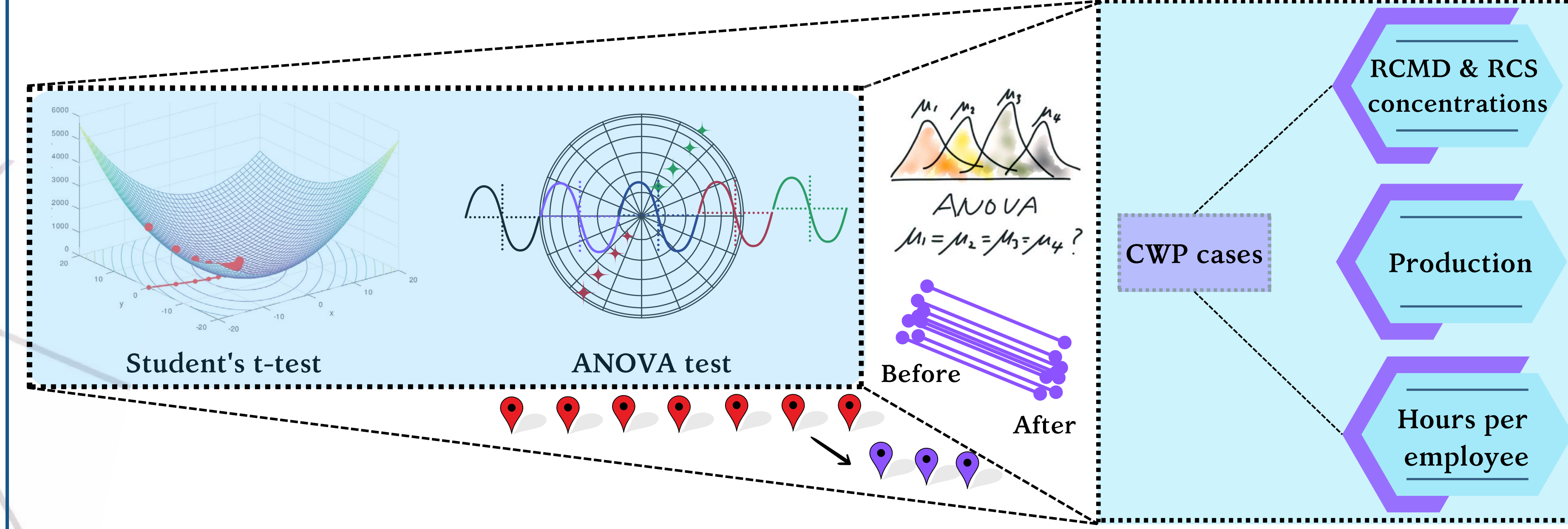


## Data Visualization

Kentucky & West Virginia & Pennsylvania

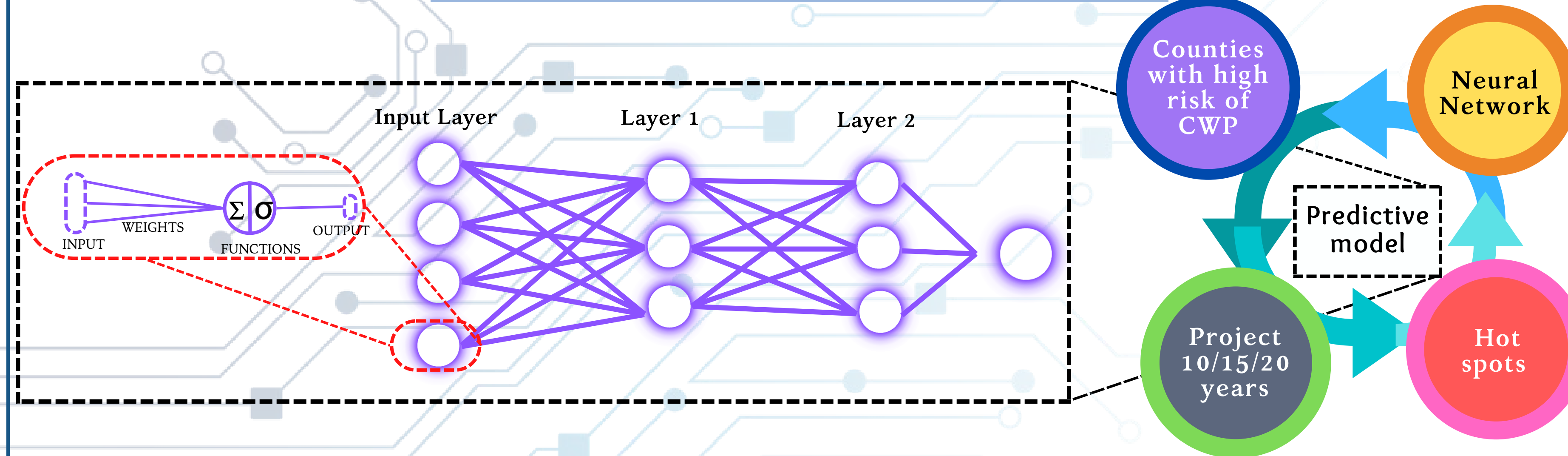


## Hypothesis Testing



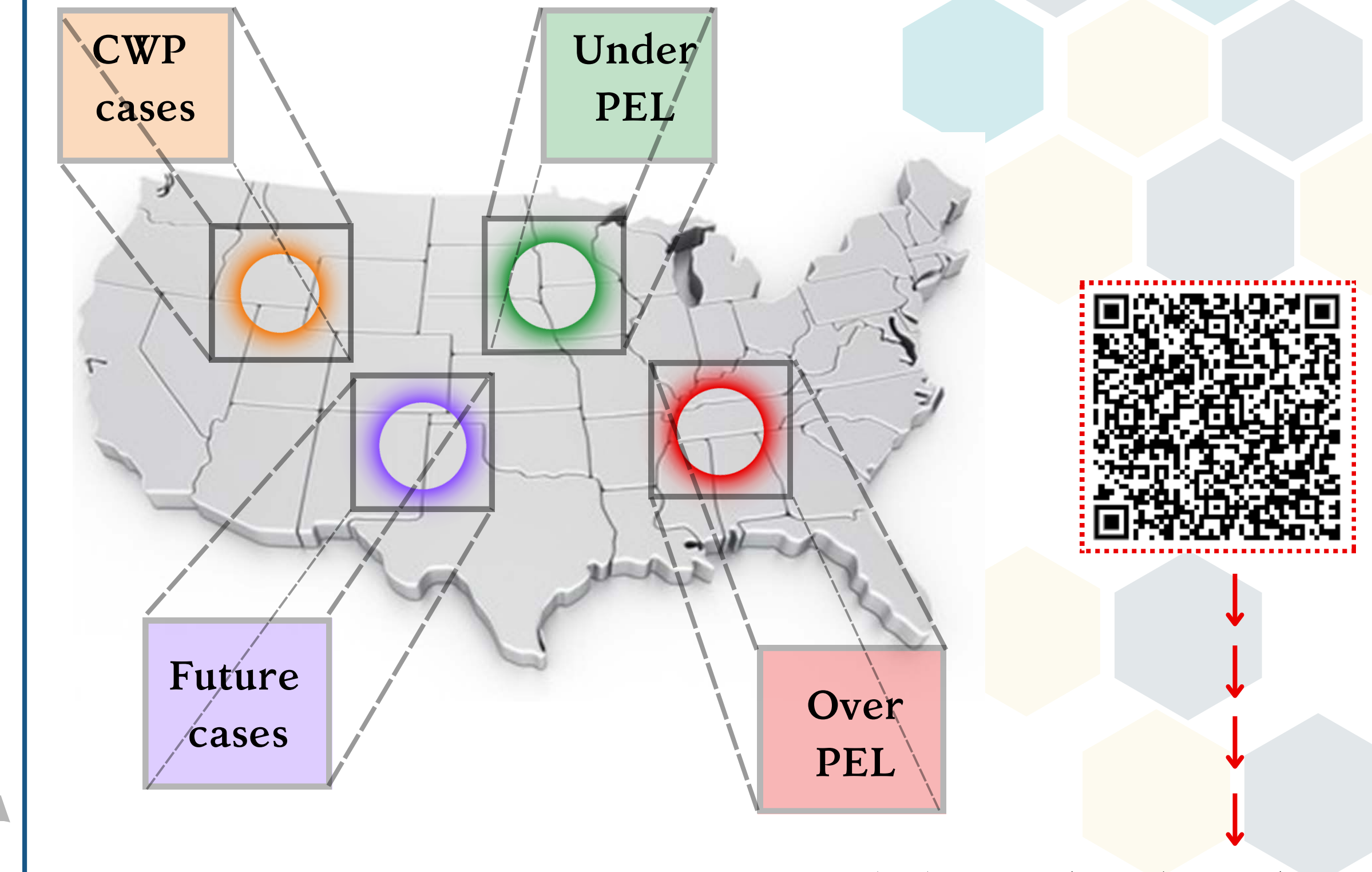
CWP cases & production	CWP cases & concentration	CWP cases & work hrs
F: 20.015, PR>F: 1.22093E-08	F: 1.612735, PR>F: 0.187709	F: 5.250922, PR>F: 0.005590
P-value<0.05 (ANOVA): strong evidence that production category affects CWP cases	P-value>0.05 (ANOVA): Not evident link between concentration and CWP cases	P-value<0.05 (ANOVA): strong evidence that work hours affects CWP cases
T-test high vs low (p-value = 0.1675)	Skipped post-hoc t-tests	T-test high vs low (p-value = 0.2608)
Conclusion: Exists a strong relationship between production and CWP cases	Conclusion: No significant relationship between production and CWP cases	Conclusion: Exists a strong relationship between work hours and CWP cases

## Neural Network Predictive Model

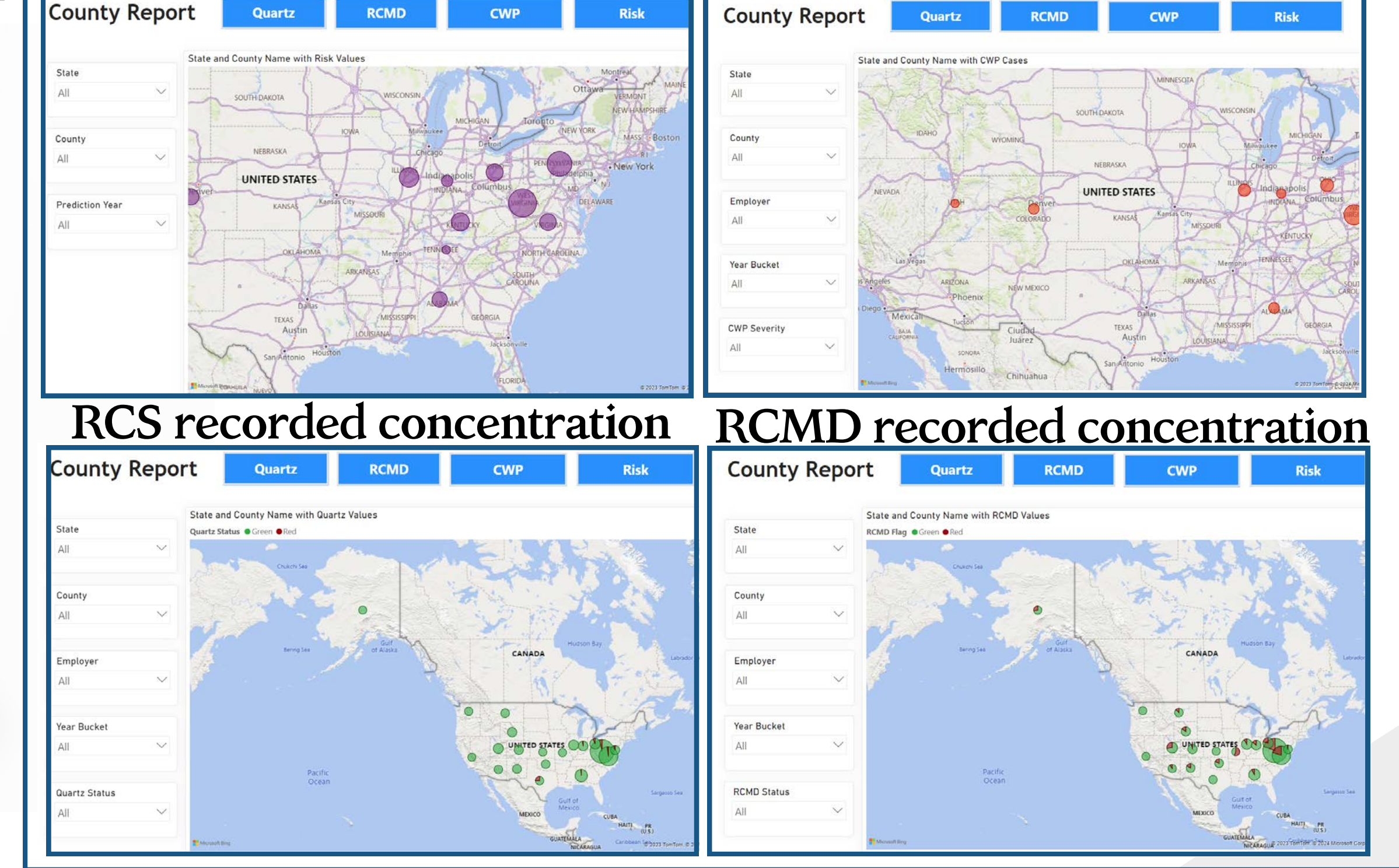


## Predictive Model Interface

## CWP Awareness (POWER-BI)



## Predicted cases (until 2050) Recorded cases (until 2012)



## Conclusions

- According to the prediction model, there is still evidence of a considerable number of cases over the next 25 years in the same problematic states: West Virginia, Kentucky and Pennsylvania
- One of the hypotheses suggests that the concentration level may not be as relevant as time of exposure. A higher concentration will not influence the CWP cases as much as exposure over the years will
- Considering that most of the CWP cases registered in the different states and counties were non-existent, it is recommended to improve the structure of the neural network to improve performance and results
- The development of the proposed predictive algorithm allows us to clarify the main problems identified: the use of the optional CPDM in non-production areas and the assumption that all workers are not overexposed

## REFERENCES



## CONTACT INFORMATION

