

# POSSIBLE IMPACTS ON HIGH PRETERM BIRTH RATES IN PUERTO RICO

FACULTY ADVISOR: DR. INGRID Y. PADILLA, UPR MAYAGÜEZ  
PROGRAM COORDINATOR UPR, MAYAGÜEZ: DR. ALBERTO FIGUEROA  
PROGRAM COORDINATOR URI: GEMA VINUALES



# Overview

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- Introduction: Preterm births in Puerto Rico – Causes and Impacts
- Objectives and Methods of the study
- Results: How do contaminants and their impacts change over time?
- Summary

# Preterm Births

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- Gestational age of 37 weeks or less
- Third leading cause of infant mortality in US
- Higher risk of neurodevelopmental impairments, respiratory and gastrointestinal complications

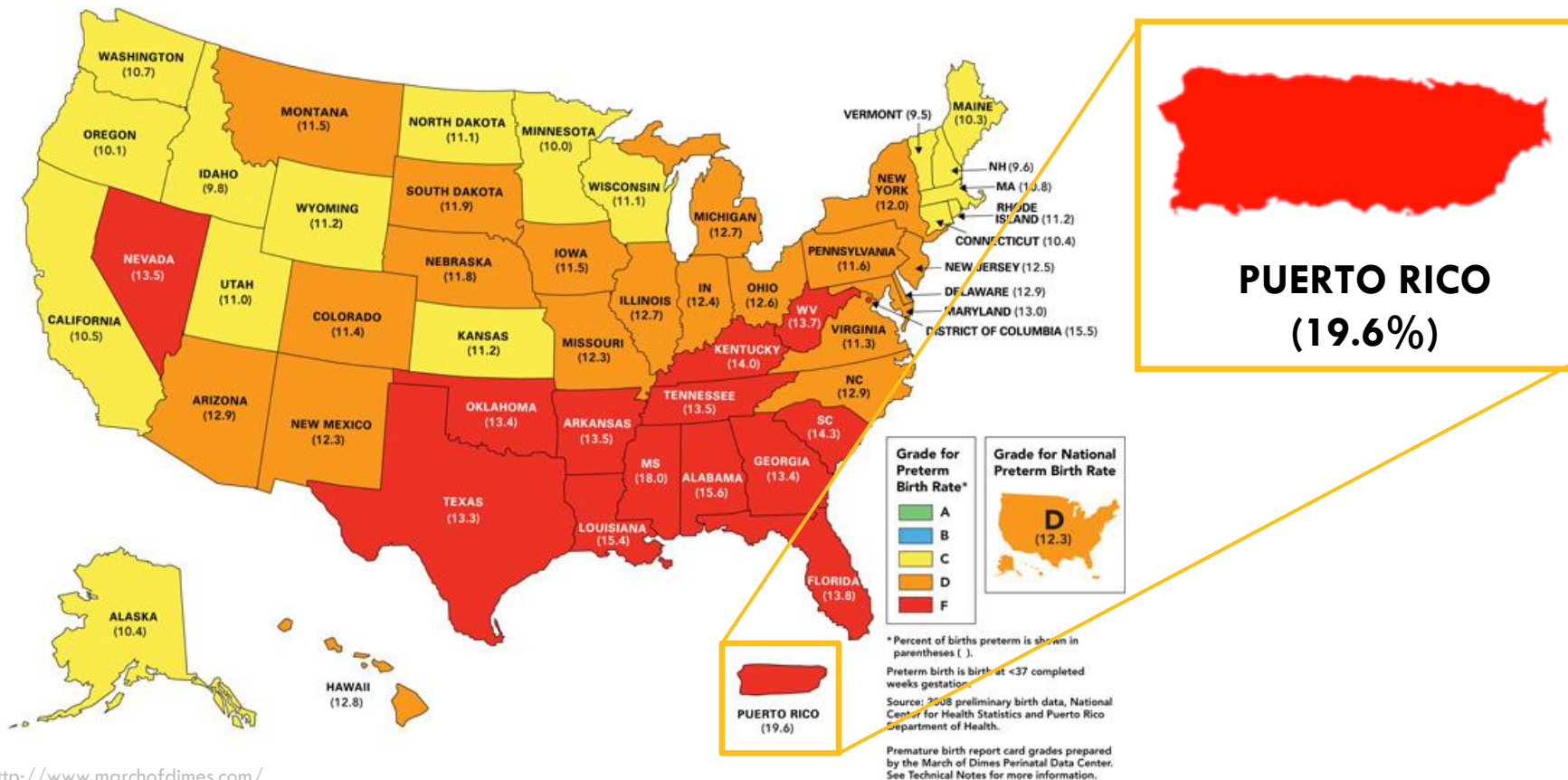


[www.newslime.com](http://www.newslime.com)

# Preterm Births in Puerto Rico

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- Puerto Rico ~20% compared to USA 12%



# Possible Causes of Preterm Birth

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- Possible causes:
  - ▣ Medical risks (current and past)
  - ▣ Demographic background
  - ▣ Behavioral risks
  
- Water and air contamination



# Water and Air Pollution - Impacts

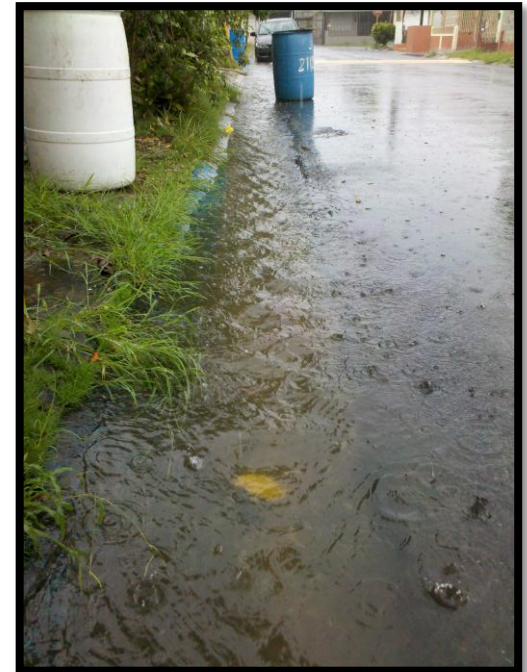
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- Reproductive damage
- Increased risk for spontaneous abortion
- Decreased gestational length – preterm births
- Leukemia and other cancers
- Neurologic and sensory disabilities
- Learning disabilities

# Contaminant Sources

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- Water pollution:
  - National Priorities List (NPL) and Resource Conservation and Recovery Act (RCRA)
    - Chlorinated solvents, metals, pesticides/herbicides, petroleum hydrocarbons
  - Highway Runoff
- Air pollution:
  - Emissions from cars
    - $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{NO}_x$ ,  $\text{SO}_x$ ,  $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$ , Volatile Organic Compounds



# Objectives

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- How are preterm birth rates distributed spatially and temporally in Puerto Rico?
- Are preterm birth rates related to contaminated sites?
  - 21 active superfund sites in Puerto Rico
  - What is the spatial and temporal distribution of contaminated sites in Puerto Rico?
- Are car emissions impacting preterm birth rates?
  - Daily Vehicle Miles Travelled (DVMT) increased by 42% during study period

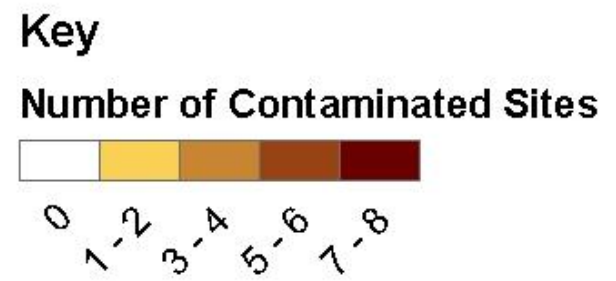
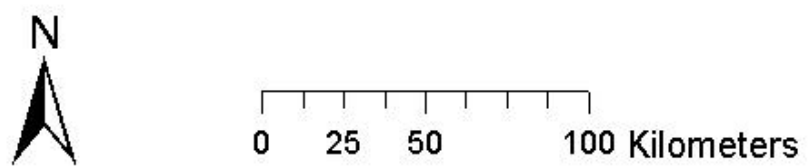
# Methods

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- Data Collection
  - ▣ Preterm Birthrates – Vital Statistics Annual Report
  - ▣ NPL/RCRA – Environmental Protection Agency
  - ▣ DVMT– US Federal Highway Administration
- Spatial Analysis
- Descriptive Analysis
- Statistical Analysis
  - ▣ Linear Mixed Effects Models
  - ▣ ANOVA



# Contaminated Sites in Puerto Rico 1990 - 2005

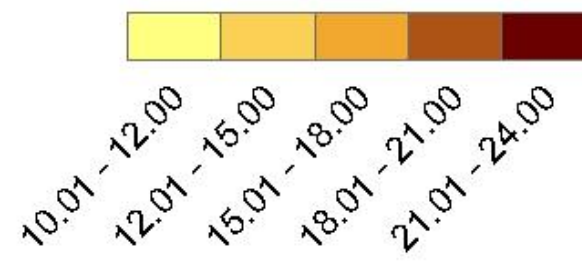


# Premature Births in Puerto Rico 1990 - 2005



## Key

Preterm Birthrates (%)

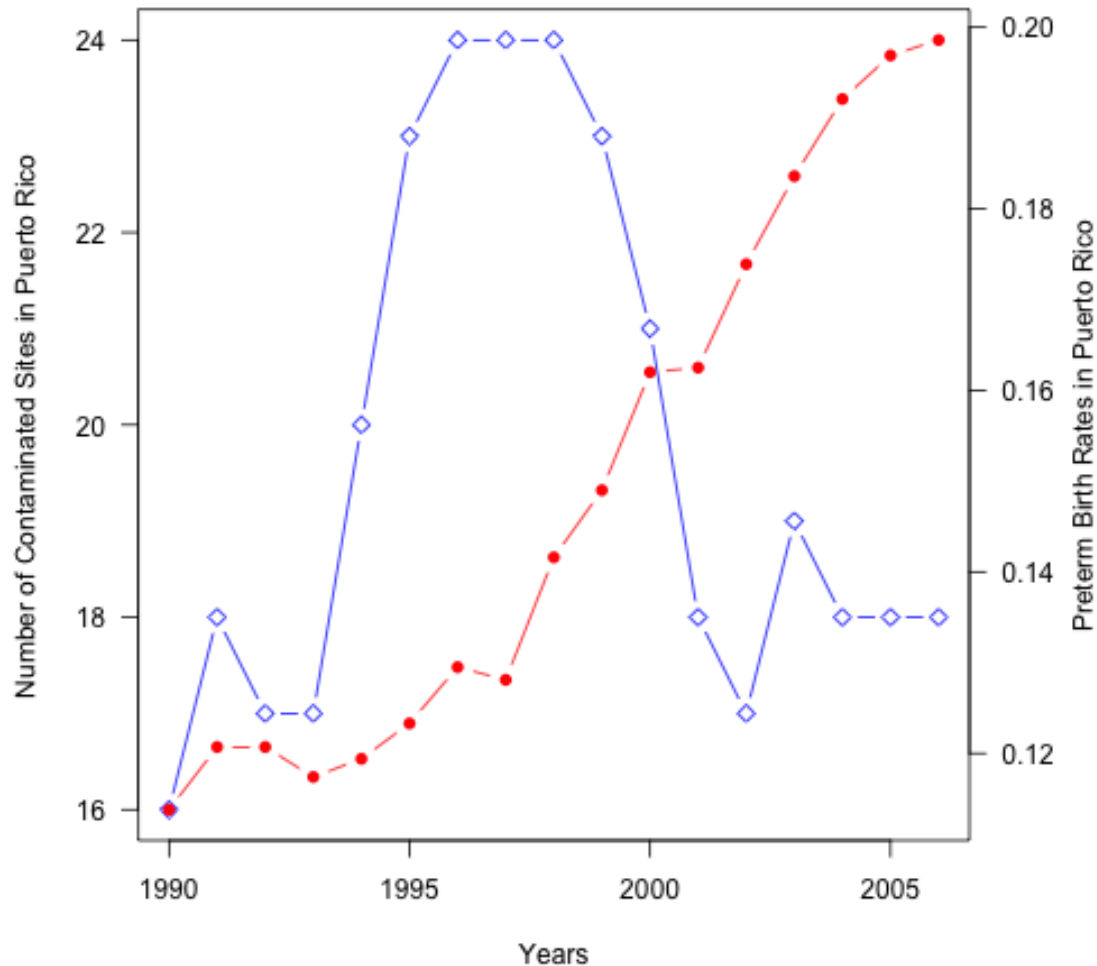


0 25 50 100 Kilometers

A horizontal scale bar with tick marks at 0, 25, 50, and 100 kilometers.

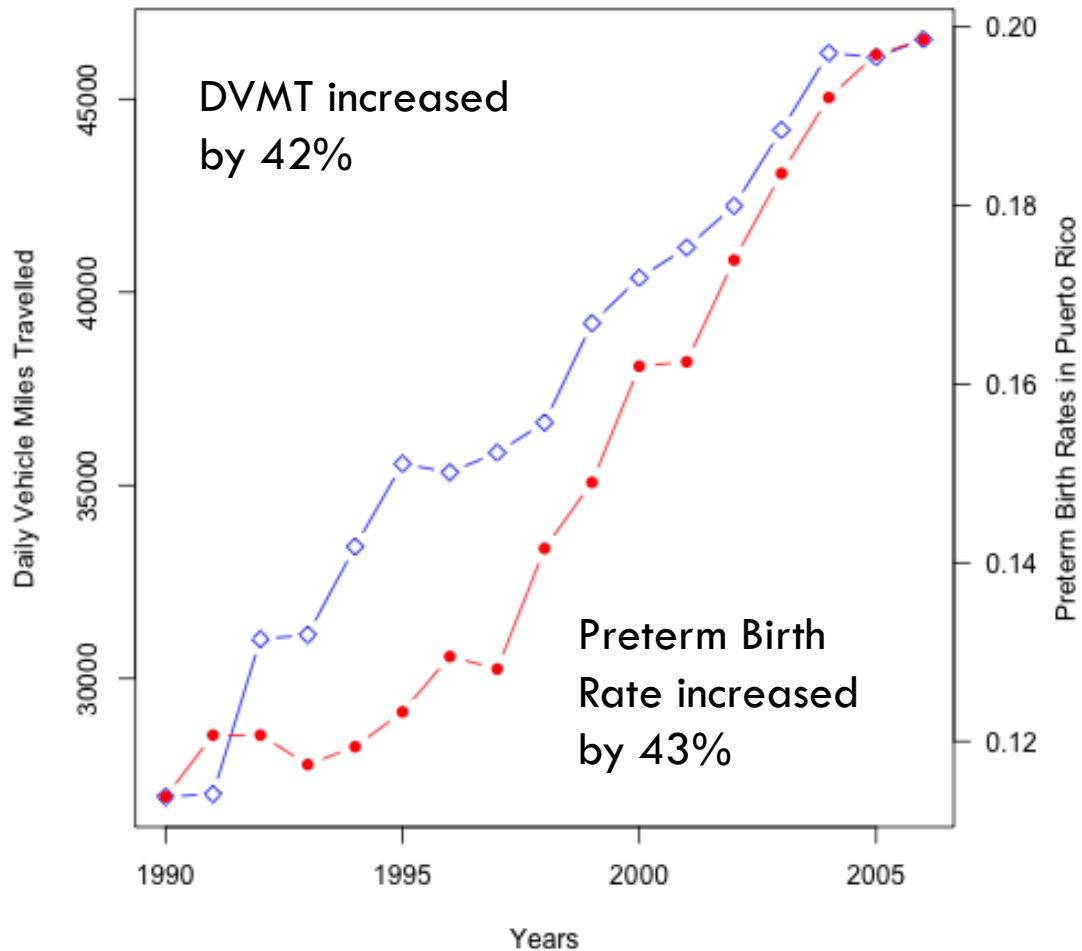
# Results – Preterm Birth and Contaminated Sites

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Preterm Birth Rate increased by 43%

# Results – Preterm Birth and DVMT



# Summary

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- 43% increase in preterm birth rates from 1990 – 2006
- 42% increase in DVMT from 1990 - 2006
- Contaminated sites within a region explain 84% of the variance in regional preterm birth rates

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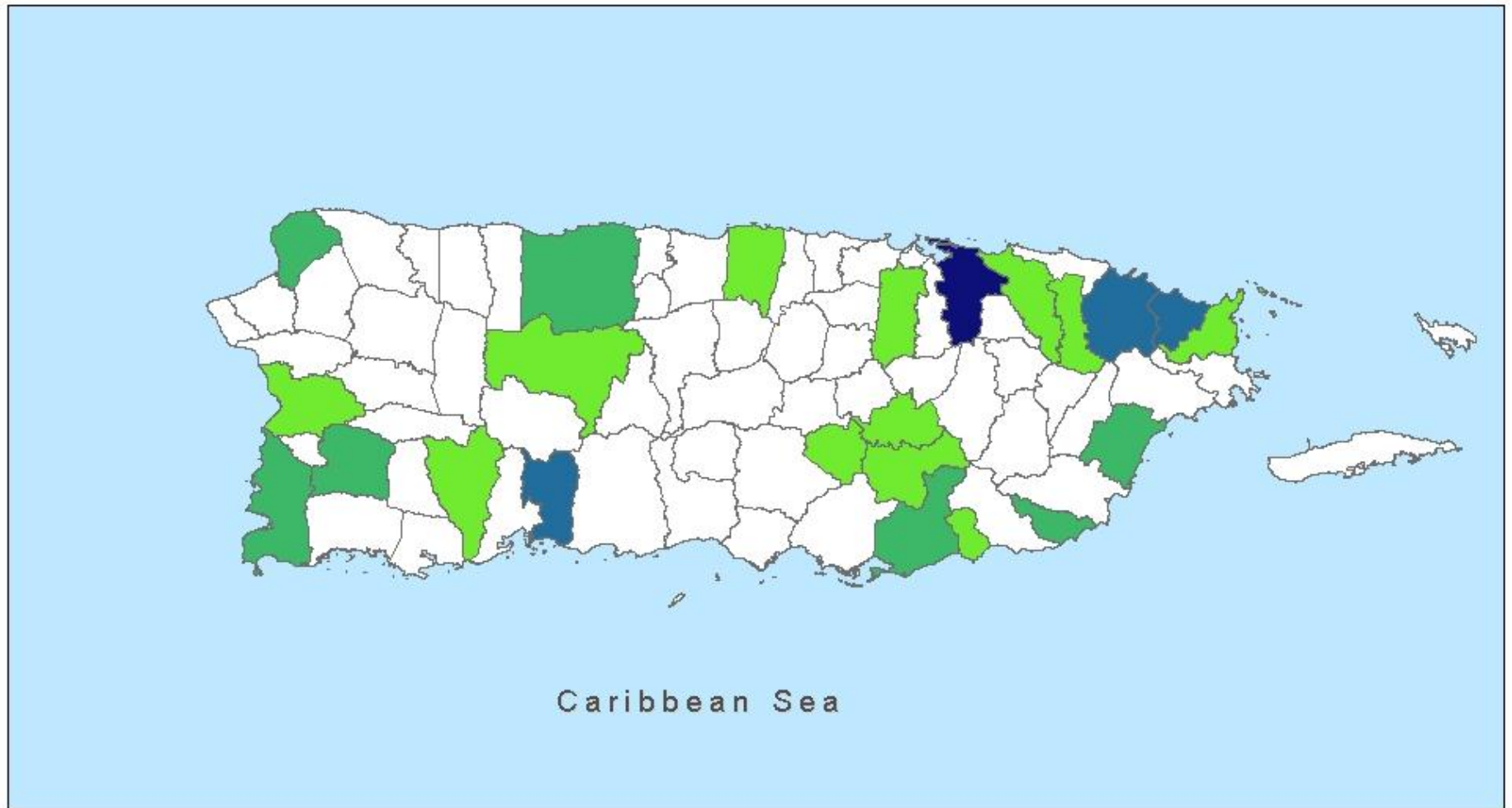
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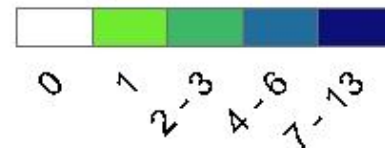
# Number of Hospitals in Puerto Rico



0 25 50 Kilometers

## Key

### Hospitals



# Preterm Birth Rates in Puerto Rico 1990 - 2005

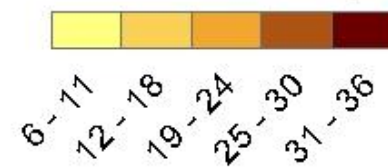


0 25 50 100 Kilometers

A horizontal scale bar with tick marks at 0, 25, 50, and 100 kilometers.

## Key

Premature Births (%)



# Air Emissions in Puerto Rico

