# Assessing Effects of Exposures to DDE and PCBs on Premature Delivery via Ordinal Logistic Regression

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# Overview

# Introduction

- **Framework**:
  *Dichlorodiphenyldichloroethylene* (DDE) and *Polychlorinated Biphenyls* (PCBs) are chemicals that persist in the envirnoment and get stored in fatty depositis in the human tissues.
  $\Longrightarrow$ Potential adverse effect on health
- **Question**:
  *Is exposure to DDE and PBCs associated with a higher chance of premature delivery in pregnant women?*

## Pregnancy timeline

- **Dangerous preterm**: delivery at 34 weeks or before (when main organs are underdeveloped)
- **Preterm**: delivery beween 35 and 37 week
- **At term**: delivery after 37 weeks

# Data

Data contained gestational age (in weeks) of the mother, the DDE and PCBs concentration, socio-economic info and scores (race, occupation, education and income), and amount of triglycerides and cholesterol. Total sample size (after preprocessing) = 2336

**We contruct the following variables**:

- Total level of lipids[1]

$$lipid_i = 2.27 * cholesterol_i + triglycerides_i + 0.623$$

- Gestational age group

$$gestgroup_i = \begin{cases} 0 & if \text{ Dangerous preterm} \\ 1 & if \text{ Preterm} \\ 2 & if \text{ At term} \end{cases}$$

- Average (standardized) PCB

$$PCB_i = \frac{1}{11} \sum_{j=1}^{11} \frac{PCB_{ij} - mean_i(PCB_{ij})}{sd_i(PCB_{ij})}$$

[1] Using Phillips et al.(1989) and Bernert et al.(2007)

# Model (I) - Ordinal Logistic Regression

We run the following regression model

# Model (II) - Bayesian Ordinal Logistic Regression

# Results

# Conclusions

**Preprocessing**:

- Drop obs. with gestational age $> 45$ (the world record)
- Standardize and average the differnt PCBs (to avoid their correlation)
- Mean impute of occupation, education and income scores $\Longrightarrow$ Total obs. $= 2336$