GIS Modeling

Case Study
Optimal location/suitability analysis for a lead poisoning center

- Determine tracts that are **high risk** (either have $> 500$ children or where children are $> 25\%$ of the population)
• Determine tracts that have high exposure
  o > 3 cases of lead poisoning in the past
  o > 25% of housing units built before 1950
  o within 1/8 mile of major highways

2) Exposure submodel

a) tracts
   ───> point-in-polygon
   ┌───────────────┐
   │ cases by tract │
   │ summarize and table join │
   │ tracts with number of cases │
   │ select by attribute │
   │ tracts with > 3 cases │

b) tracts
   ───> housing units data
   ┌───────────────┐
   │ select │
   │ housing units built before 1950 │
   │ spatial join │
   │ housing units by tract │
   │ summarize and table join │
   │ tracts with number of housing units │
   │ table join │

  total number of housing units by tract and number of housing units built before 1950 yields percent of housing units built before 1950
   ───> select by attribute
   ┌───────────────┐
   │ tracts with > 25% of housing units built before 1950 │


c) tracts
   ───> major highways
   ┌───────────────┐
   │ buffer 1/8 mile │
   │ areas within 1/8 mile of major highways │
   ┌───────────────┐
   │ clip │
   │ tracts within 1/8 mile of major highways │

d) tracts with > 3 cases
   ───> union
   ┌───────────────┐
   │ tracts with > 25% of housing units built before 1950 │
   │ tracts within 1/8 mile of major highways │

   ┌───────────────┐
   │ tracts meeting any of the criteria │
   ┌───────────────┐
   │ tracts with high exposure │

   ┌───────────────┐
   │ tracts with > 3 cases │
   │ tracts with > 25% of housing units built before 1950 │
   │ tracts within 1/8 mile of major highways │
- Determine tracts that are **vulnerable**
  - Low median income or low education level
  - Outside of health care buffers

- Determine the **optimal location**
  - Combine tracts of high risk, high exposure, and high vulnerability