Gastric Cancers in Texas: Are Nitrates the Problem?

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Abstract

-Significant Correlations found with:
  -Percent Hispanic population
  -Percent white population
  -Percent urban population

-Relationship between nitrates and gastric cancer may not be as significant a factor as reported elsewhere.
Cancer of stomach and esophagus

14th most common cancer in the United States

2nd leading cause of cancer death
Previous research has shown a link between nitrogen based chemical as used in explosives and fertilizers.
-Risk Factors:
  - Age: most cases diagnosed in mid-fifties
  - Sex: more common in men than women
  - Blood Type: A, A+, and A- have higher risk
  - Diet: low in fruits and vegetables and high in salted, smoked, and preserved food have higher risk
  - H. pylori: Helicobactor pylori infection
Hypotheses

- Hispanics have a higher rate of gastric cancer mortality than blacks or whites.
- Males have higher gastric cancer mortality rates than females.
- Counties with lower socioeconomic status have higher rates of gastric cancer mortality.
- Counties with large agricultural and mining industries have higher rates of gastric cancer mortality.
Hypotheses

- Counties with large urban populations have higher gastric cancer mortality than counties with large rural populations.
- Counties with high median nitrate concentration if ground water wells have higher gastric cancer mortality.
- Vital Web’s ICD-9 database:
  - Stomach Cancer (code 151)
  - Esophageal Cancer (code 150)
  - 1980-1998

- Texas Water Development Board

- 2000 U.S. Census
Gastric Cancers in Texas

Age-Adjusted Death Rate due to Gastric Cancers Between 1980-1998

Deaths per 100,000

- 0 - 5
- 6 - 10
- 11 - 14
- 15 - 18
- 20 - 24

0 60 120 180 240 300 360 420 Miles
Race/Ethnicity

- Significant negative correlation between gastric cancer and percent white population ($r=-.354$, $p=0.001$)
- Significant positive correlation between gastric cancer and percent Hispanic population ($r=.296$, $p=0.001$)
- Statewide:
  - Black=18.2
  - Hispanic=11.6
  - White=7.5
Race/Ethnicity

Percent White Population

Percent Hispanic Population
Men:
- mean=12.6
- median=12.6

Women:
- mean=5.3
- median=5.2
- No correlation found for state as a whole

- Significant correlations between race/ethnicity and median income:
  - Percent Hispanic and Median Income
    \( r = -0.400, p = 0.001 \)
  - Percent White and Median Income
    \( r = 0.377, p = 0.001 \)
Agriculture and Mining

Percent Agriculture

Percent Mining
- Significant positive correlation between percent urban population and gastric cancer mortality \((r=0.177, \ p=0.005)\)

- Significant negative correlation between percent rural population and gastric cancer mortality \((r=-0.177, \ p=0.005)\)
Nitrate Concentration

High Nitrate Concentration and High AADR

Legend
- High AADR and High Nitrate

Percent Mining

Percent Mining
- 0 - 5
- 6 - 11
- 12 - 16
- 17 - 22
- 23 - 27
Conclusion

- High rates of gastric cancer mortality found in the southern portion of the state

- Positive relationship w/ Hispanics, negative w/ whites

- Higher mortality in males than females

- Socioeconomic status could be a factor

- Higher rates in urban areas than rural
- Agriculture and mining show no relationship
- Nitrate concentrations show no relationship
- High AADR and high nitrate concentration are in or near areas of large percent of mining
Limitations

-Does not take into account:
  - Percent groundwater use per county
  - Latency of cancer
  - Mobility of people