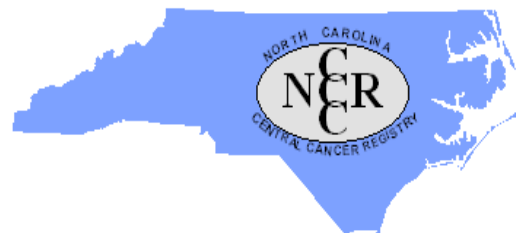# Cluster Analysis at a Glance
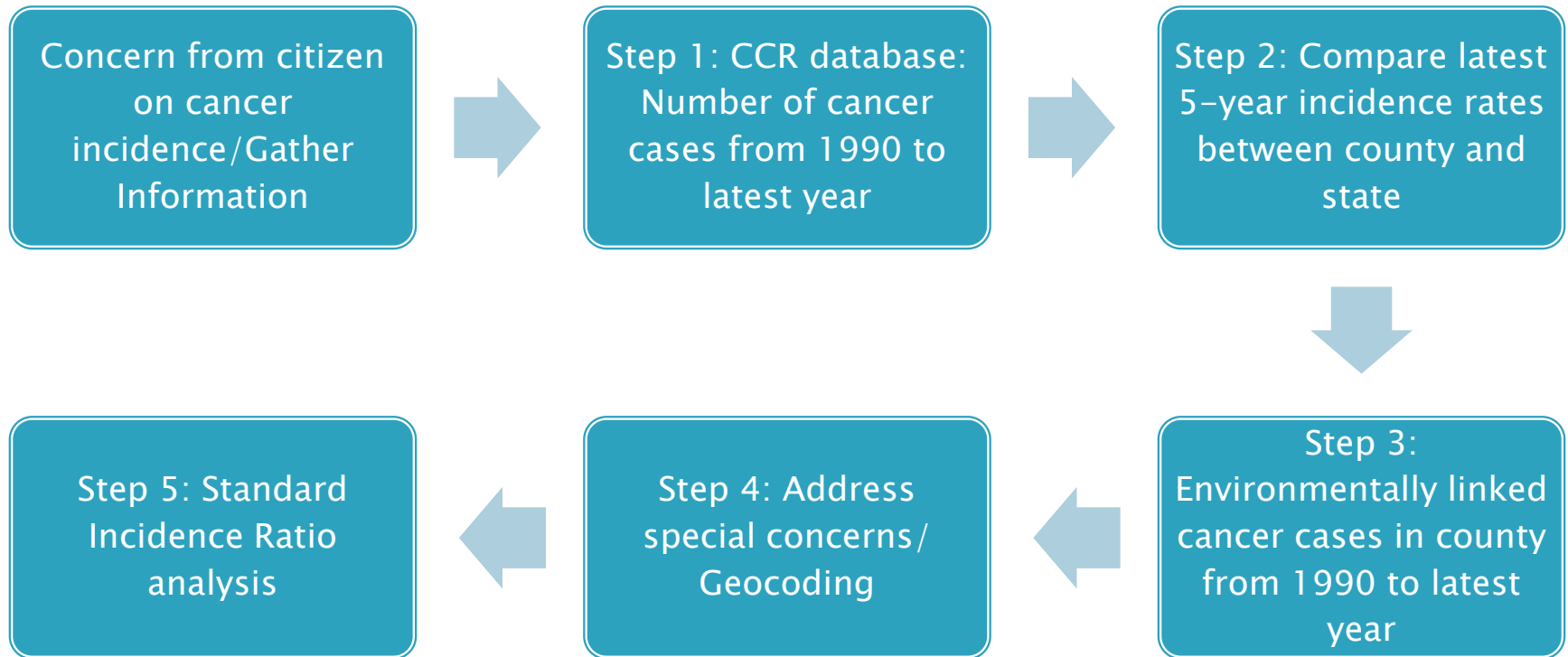
By Soundarya Radhakrishnan
North Carolina Central Cancer Registry

What is a Cancer Cluster

- A cancer cluster is a greater than expected number of cancer cases that occurs within a group of people in a geographic area over a defined period of time.
  - MMWR, Investigating Suspected Cancer Clusters and Responding to Community Concerns. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6208a1.htm)

Steps in Cluster Investigation

Concern from citizen on cancer incidence/Gather Information	→	Step 1: CCR database: Number of cancer cases from 1990 to latest year	→	Step 2: Compare latest 5-year incidence rates between county and state

Step 5: Standard Incidence Ratio analysis	←	Step 4: Address special concerns/ Geocoding	←	Step 3: Environmentally linked cancer cases in county from 1990 to latest year

Gather Information

- Specific area of concern – streets/neighborhood
- Cancer sites
- Ages
- Environmental concerns
- Diagnosis years

Communicate to requestor about timeline

Step 1: CCR Database

Examine distribution of cancer cases in county/area of concern from 1990 – current by:

- ➤ Cancer Site:
  - ▪ Top 4 cancers combined – 50% of total cancers
  - ▪ Cancers of concern – Compared to state

- ➤ Age-Group:
  - ▪ Pediatric cancers – Less than 2% of total
  - ▪ Ages 50 and older – 80% of total cancers

- ➤ Year of Diagnosis

Step 2: Comparison of Rates

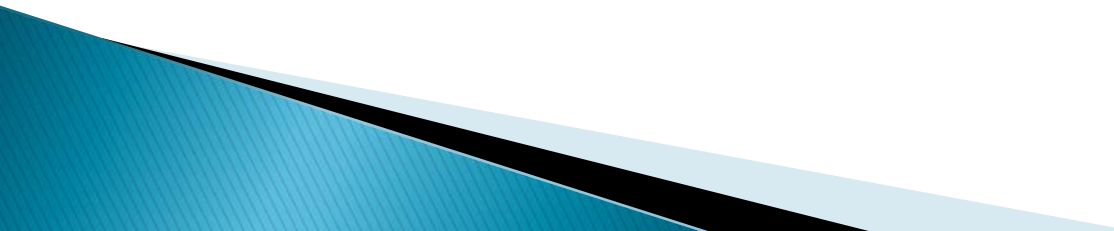Compare latest 5-year incidence rates between County and State by

➤ Cancer Site
➤ Age-group

Step 3: Cancers Linked to Environmental Factors

Examine distribution of cancers likely to be associated with environmental risk factors

- Liver
- Pancreas
- Brain/other CNS (Central Nervous System)
- Bladder
- Kidney
- Leukemia
- Multiple myeloma
- Non-Hodgkin Lymphoma

Step 4: Geocoding

- Concern expressed on specific area such as landfill – request referred to geospatial analyst.

- Spatial analyst geocodes at Census Block Groups/Census Tract level – determine if cases are concentrated in concerned area.

- Geocoded data used for analysis.

Dissemination of Report

After completion of analysis, standard cluster report sent to

➤ Requestor

➤ Occupational and Environmental Epidemiology Branch

➤ Local Health Department

Step 5: Standardized Incidence Ratio (SIR)

> SIR analysis will be conducted for further investigation

> SIR is calculated to see if occurrence of cancer in concerned (study) population is higher compared to general (reference) population
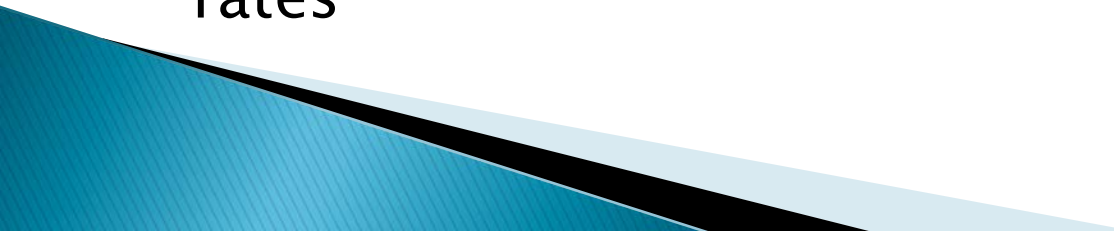
Standardized Incidence Ratio (SIR)

- SIR – Ratio of number of observed cases to number of expected cases

- Observed cases – Cases occurred in concerned (study) population in a specific timeframe (cases from CCR database)

- Expected Cases – Cases that would occur in the concerned population if cancer occurrence is same as the reference population (generally state)

Standardized Incidence Ratio (SIR)

➢ Expected cases – Estimated using the State cancer incidence by age and population of concerned area for the specific time period

➢ Divide observed cancer cases in the area for the specific time period by the expected number of cases Observed cases/Expected cases= SIR

➢ SIR of > 1.0 - Indicates that observed number of cases is greater than the expected number of cases – cause for concern

Limitations

- CCR report only includes North Carolina Residents (Address at Diagnosis State, North Carolina) – NC residents diagnosed out of state are included but out of state residents are not included.

- Time lag in reporting – It takes at least 6 months from time of diagnosis, for facilities to report to CCR.

- CCR analysis includes only 'Address at the time of diagnosis'.

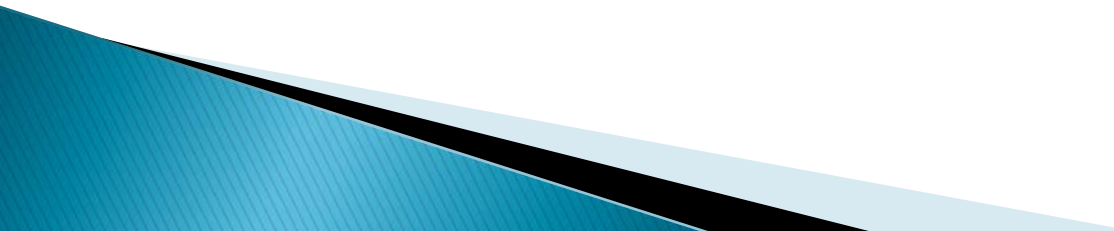- Small numbers – Lead to uncertainty and instability of rates

Cancer Cluster Info

- For more information on cancer cluster investigations and cancer cluster guidelines, please visit http://www.cdc.gov/nceh/clusters/

- http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6208a1.htm

Contact

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THANK YOU!