JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

A 21st century approach to a World War I military legacy: Tracking health and environment in Spring Valley, Washington DC

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Photo credit: US ACE

Timeline

1917-1918 Chemical weapon and counter measures development and testing

1919-1920 Demobilization, transfer to Edgewood, MD

1921 Salvage and restoration of AU grounds

1930s – 80s Residential development

1993 Ordnance unearthed, environment and health investigations begin

To Date Disposal pits excavated, soil As remediation continues

Courtesy of the U.S. Army Corps of Engineers

Project Origins/Objectives

Origins

Multiple health studies

- DC Department of Health
- Agency for Toxic Substances and Disease Registry
- Informal/Anecdotal community surveys

Focus on arsenic, no public health context

Objectives: Conduct Scoping Study

Synthesize Existing Environmental, Exposure, and Health Data

Characterize Risks to Spring Valley Community

Identify Key Information Gaps

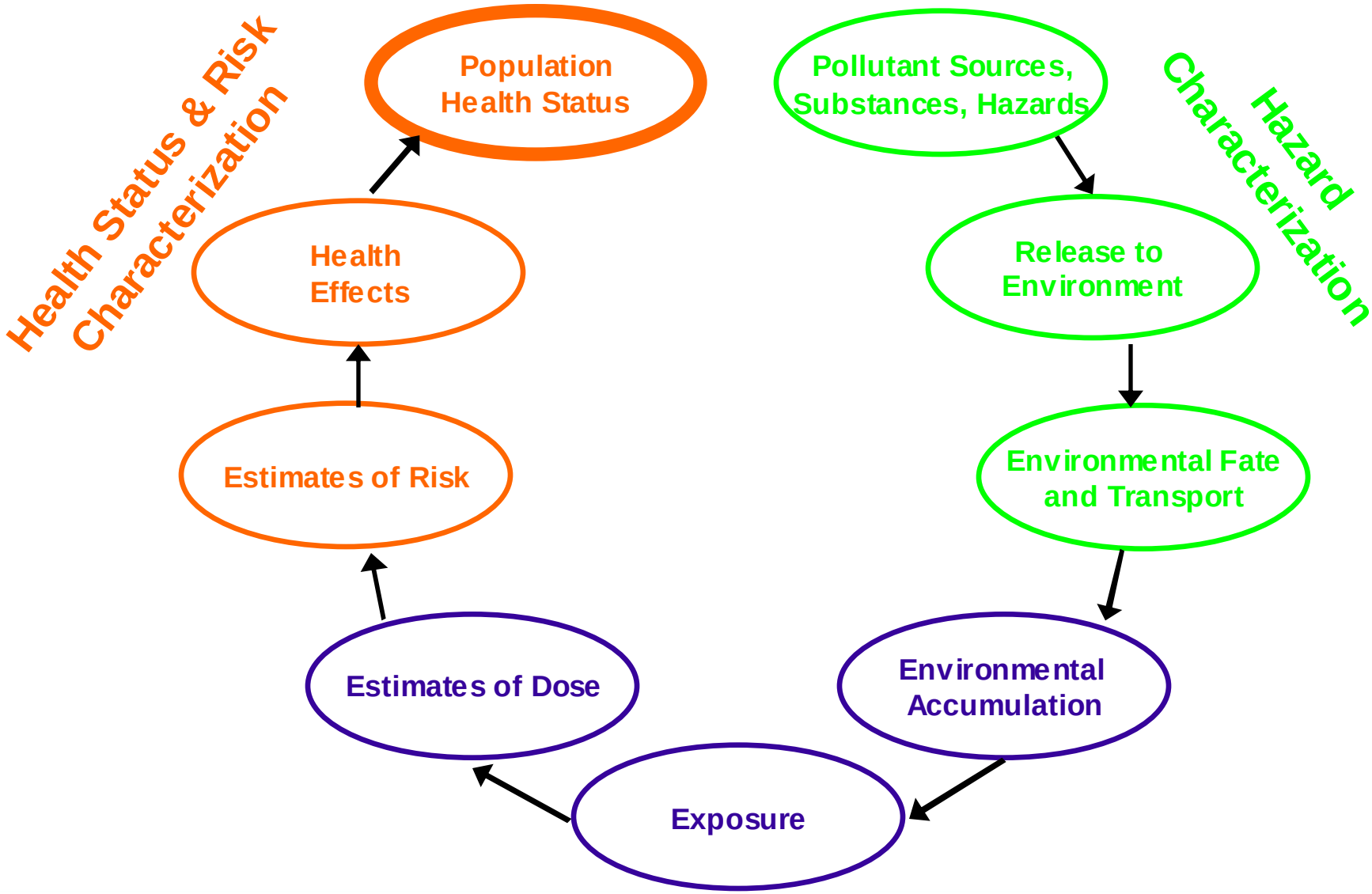
Provide Recommendations for Further Study

- Hazard, Exposure or Outcome Tracking

Approach/Methods

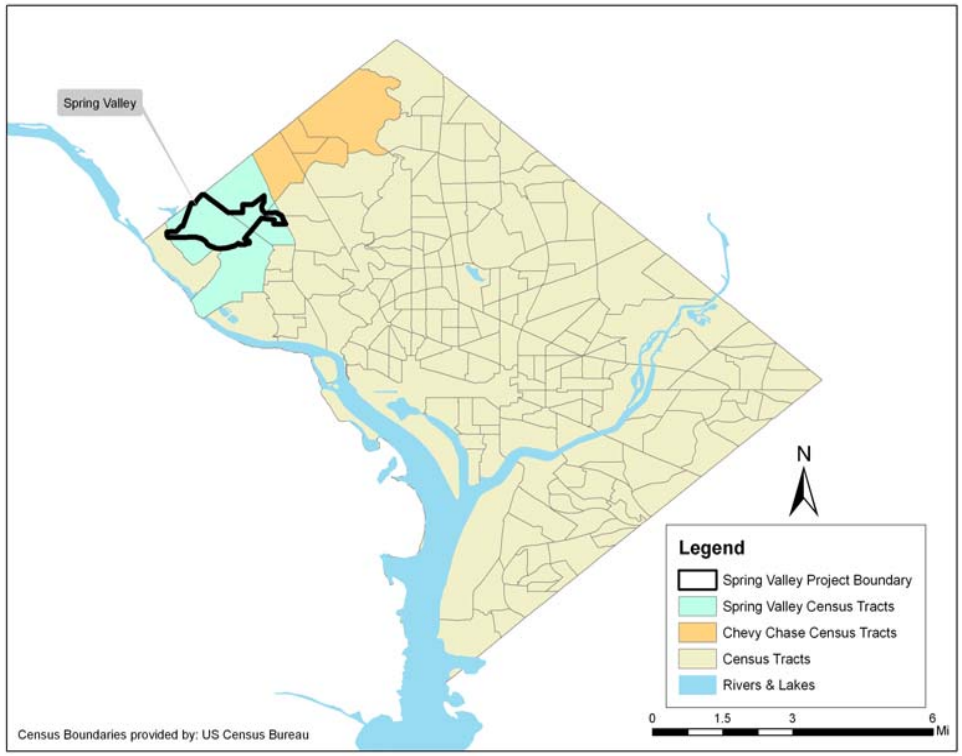
- Community-participatory approach
- Use existing data
- Exposure and Health Analysis
  - Community Health Status
  - Epidemiological and Toxicological Literature Review
  - Spatial Analysis of Exposure and Health
  - Chemical Risk Assessment
- Report and Recommendations

Scoping Study Framework

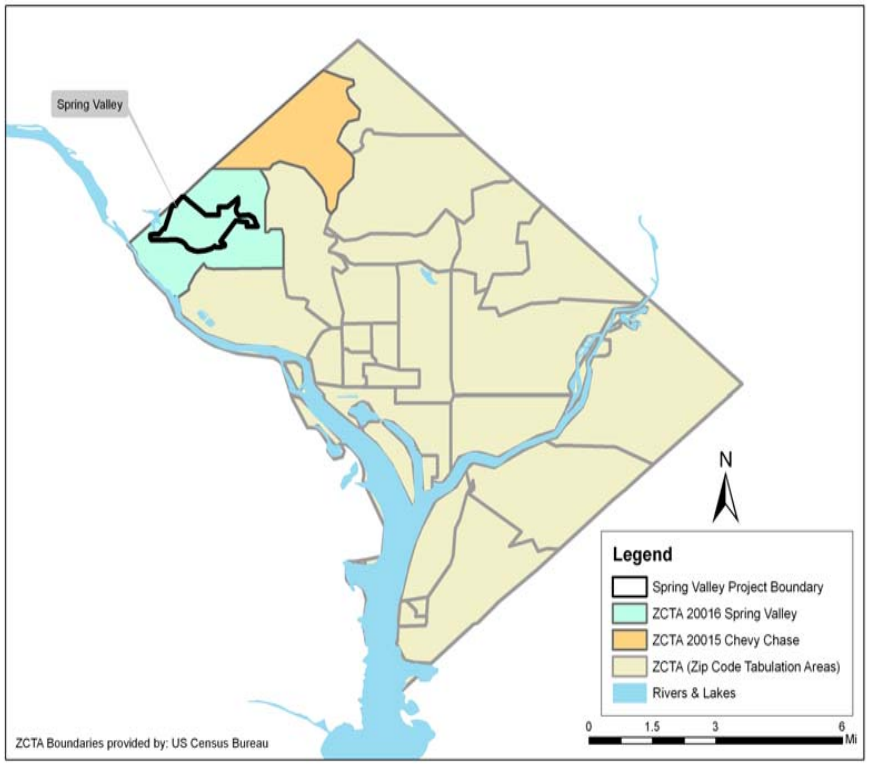


Exposure and Spatial Analysis

Community Health Status



Census Tracts:
Cancer Registry

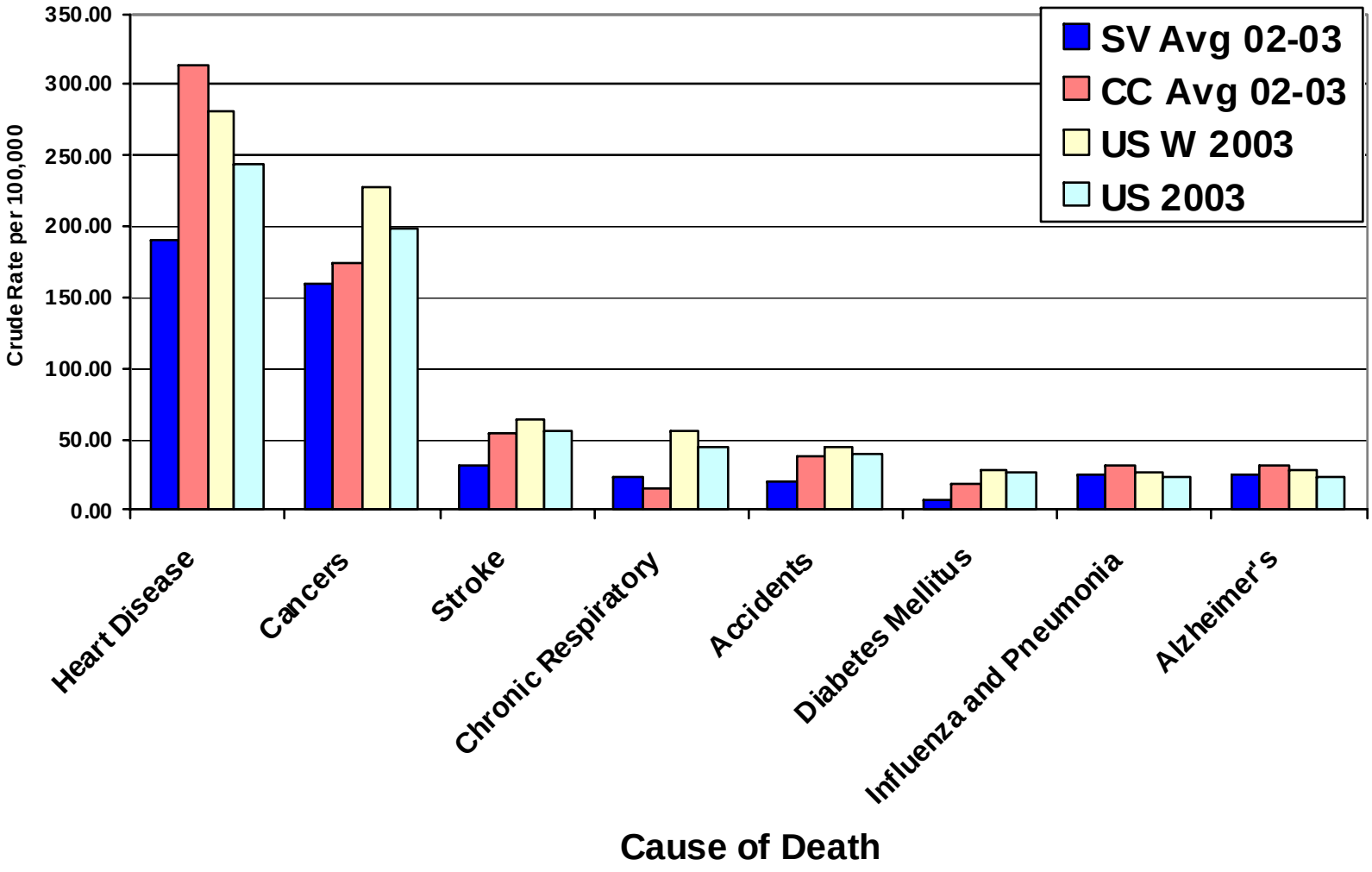


Zip Codes:
Top 15 Causes of Mortality

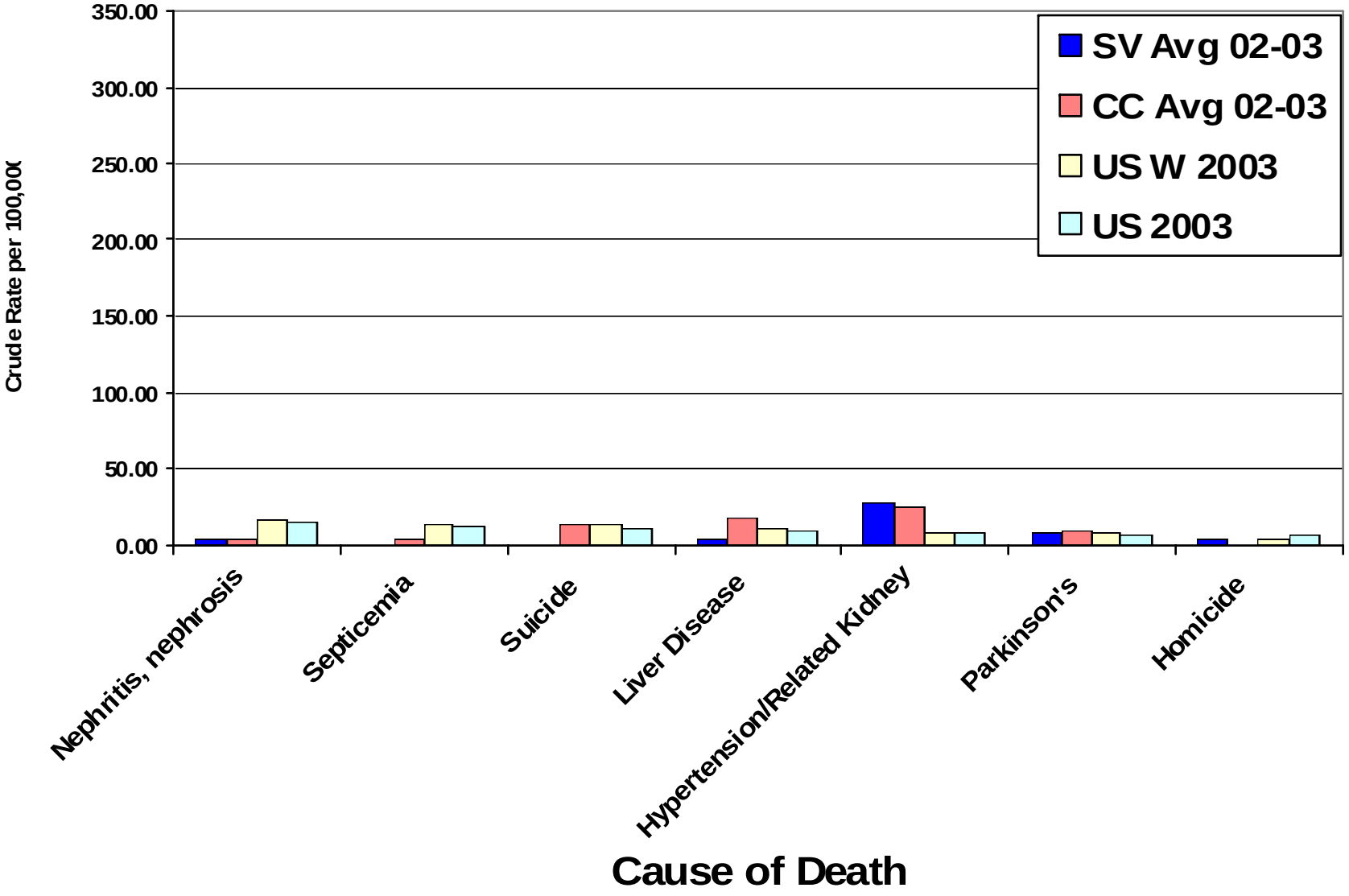
Community Age Distributions

Age Category	Spring Valley Zip Code 20016	Chevy Chase Zip Code 20015	U.S. Whites	U.S. All Races
Less than 20 years	19.4 %	20.1 %	26.1 %	28.60 %
20 to 39 years	33.1 %	21.5 %	27.6 %	28.98 %
40 to 59 years	27.5 %	31.5 %	27.6 %	26.15 %
60 to 79	14.4 %	17.9 %	14.7 %	13.0 %
80 and up	5.7 %	9.2 %	3.9 %	3.3 %

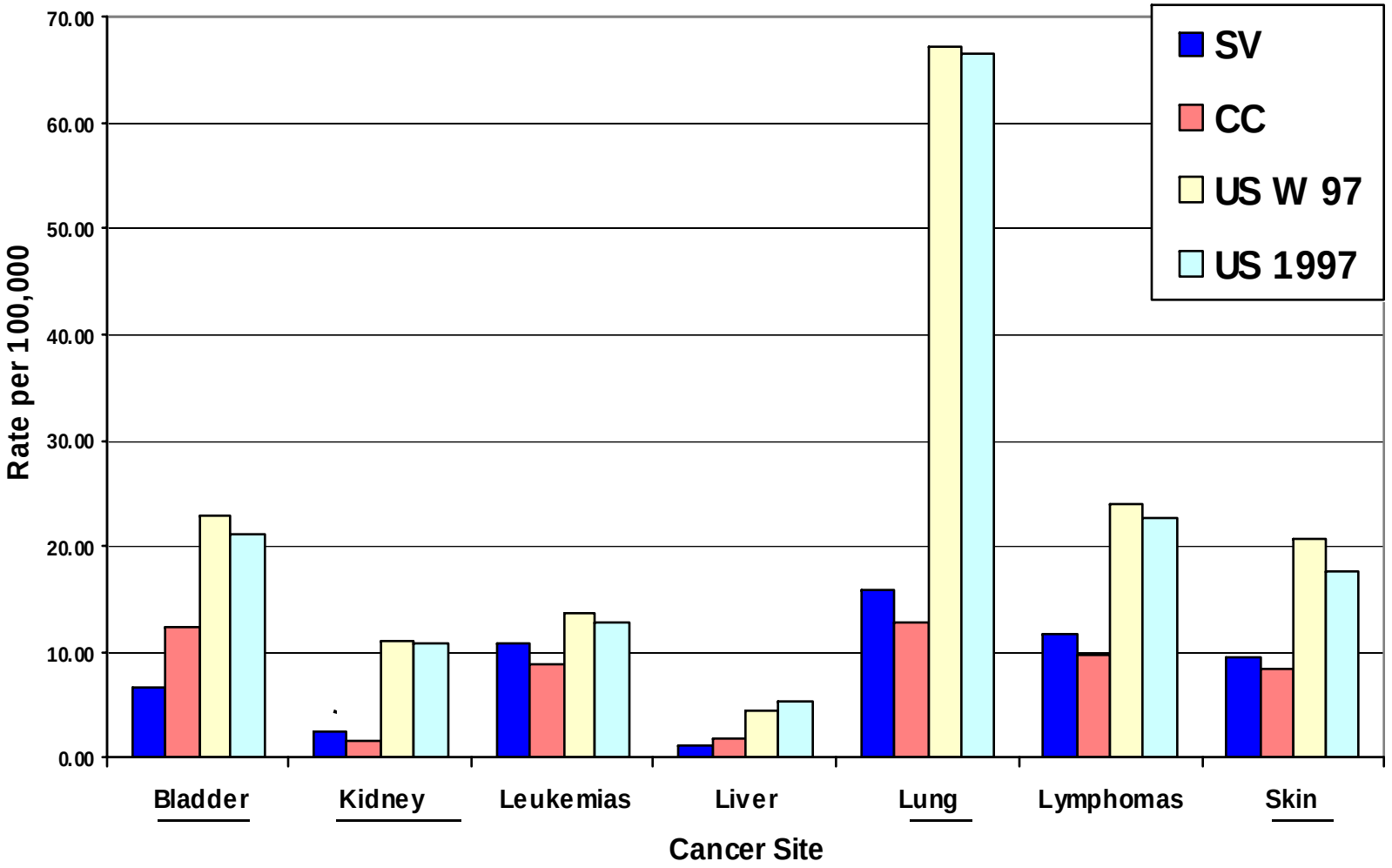
Top 8 Causes of Death in US



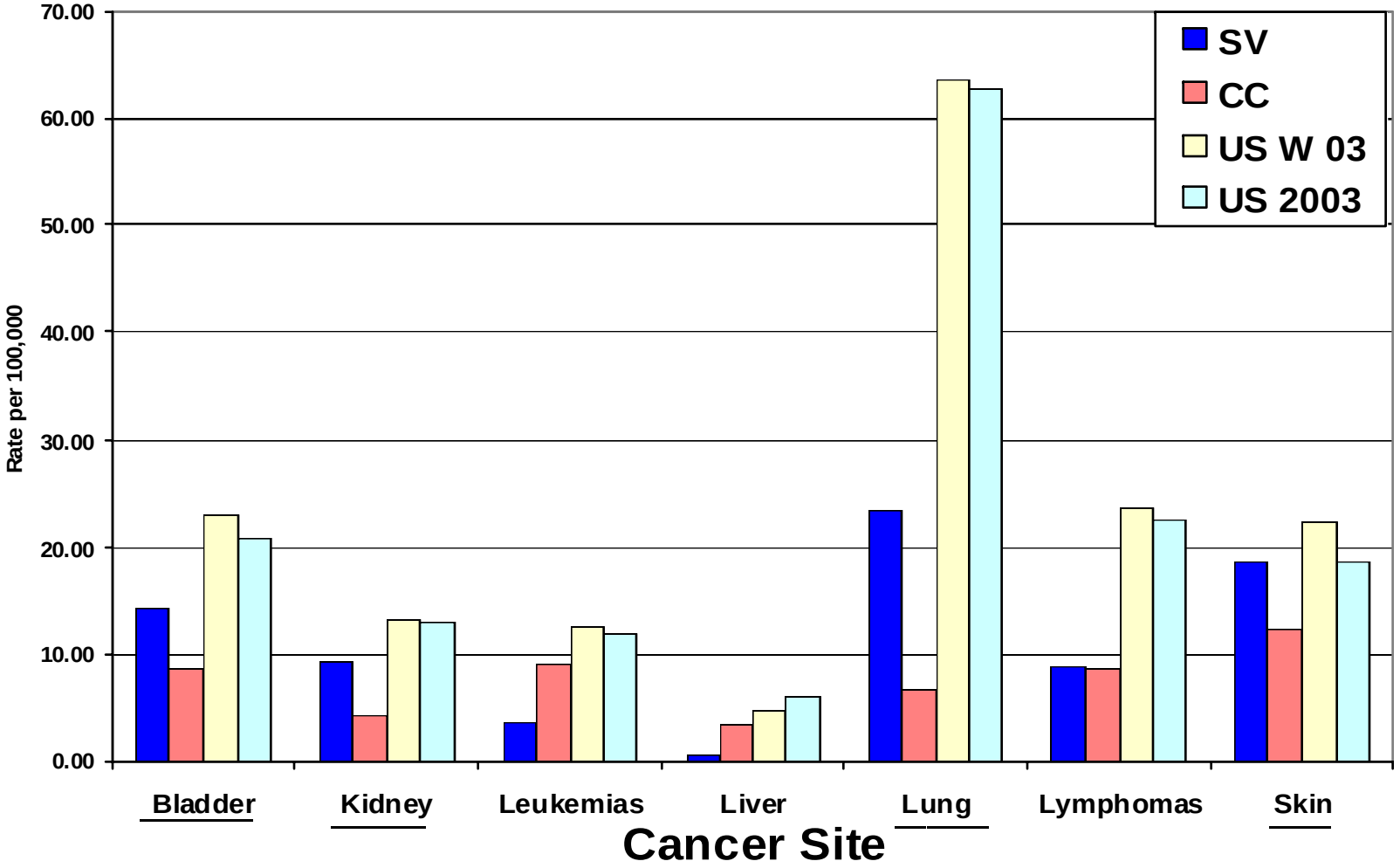
Top Causes of Death in US (#9 - 15)



Age-Adjusted Cancer Incidence Rates 1994-1999

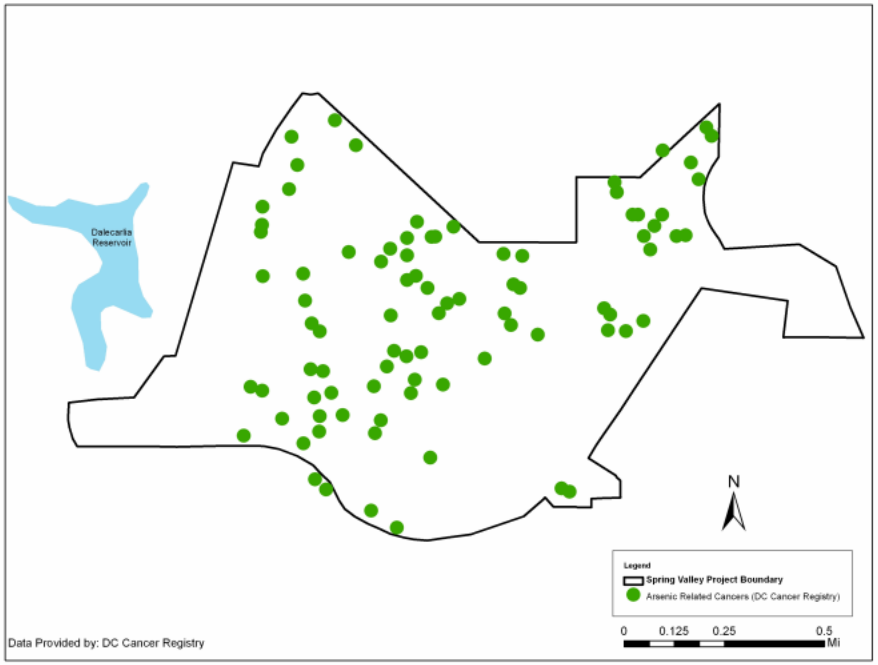


Age Adjusted Cancer Incidence Rates 2000-2004



Spatial Analysis of Cancer

Arsenic–Related Cancers	Within a Boundary of Interest OR (CI)
Anecdotal N= 25	2.09 (0.81, 5.1)
DC Cancer Registry N=90	0.60 (0.30, 1.11)



- Anecdotal Health Reports are More Likely to be Within Boundaries of Interest (May Be Due to Targeted Sampling & Reporting)

- Arsenic Related Cancer Cases from the DC Cancer Registry Are Not More Likely to be Within the Boundaries of Interest

Risk Assessment Overview

Pre-remediation soil samples

Exposure to Dose modeling

- Soil ingestion
- Dermal uptake
- Inhalation – ambient and indoor air
- Adult and child resident, worker (landscaper)
- Average and high-end exposures

Risk Characterization

- Cancer - estimate lifetime excess risk
- Other – increased lifetime risk Y/N

Summary - Risk Assessment Results

Exposure/Health Effect	Population at Increased Risk	Location
Arsenic – Cancer	Children with average and high exposures	Disposal pit and daycare center
Arsenic – Non Cancer	Children with high exposures	Disposal pit and daycare center
Other chemicals – Cancer		
Other chemicals – Non Cancer	Children with high exposures	Disposal pit

Summary of Health Findings

Health Concerns	Anecdotal Community Reports	Scoping Study Community Health Analysis	Scoping Study Review of Literature	Scoping Study Risk Assessment
Cancers	√	√	√	√
Kidney Diseases	√	√	√	
Blood Disorders	√		√	√
Neurological Conditions	√		√	

Study Recommendations

Health

- Examine Additional Years of Mortality and Cancer Registry Data
- Further Investigation of Non-Cancer Outcomes of Concern (Blood Disorders, Neurological and Kidney Diseases)
  - Develop Strategy for Case Finding and Verification and, if Warranted, Other Epidemiological Follow-Up
- Obtain/Review Detailed Data From the ATSDR Biomonitoring Studies
  - If Warranted, Consider a Systematic Exposure Study

For Environmental Public Health Tracking

Value of a basic community health assessment

Combined analyses more than sum of parts

Model for community investigations/assessments

- Using available surveillance data to
  - Address community questions
  - Identify potential environmental contributors to disease