The Opportunities of Using Linked Medical Databases in Studying Health Effects of Air Quality

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Air Quality, Health and Society Conference
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Six Objectives

1. Gold Mine of Linked Medical Databases Unique To Utah
2. Examples of Health Outcome Data
3. Expanding the Gold Mine with more GIS Data
4. Expanding the Scope of Health Studies Designs
5. Simulate Future Scenarios
6. Grow Research Partnerships & Training
Long History of Associating Air Quality with Health in Utah

"What constitutes health, wealth, joy, and peace?

In the first place, good pure air is the greatest sustainer of animal life.

Other elements of life we can dispense with for a time, but this seems to be essential every moment"

Brigham Young, 1860
Utah Population Database

University of Utah Research Resource
Facilitate High-Quality Health Related Research
35 Years of Research
7 Million People
160 Approved Projects

http://www.huntsmancancer.org/updb
Utah Population Database

Huntsman Cancer Institute

University of Utah Senior VP Health Sciences

University of Utah VP Office for Research

Resource for Genetic and Epidemiologic Research (RGE)

1982 Executive Order of Governor Est. RGE

http://www.huntsmancancer.org/updb
Sources of Data Comprising the Utah Population Database

- Genealogies
  (Family History Library)
- DOH Birth, Death, Marriages, Divorces
- DOH Inpatient Discharge, Ambulatory Surgery
- Utah Cancer Registry, Cancer Registry of Idaho
- Social Security Death Records
- Utah Voter Registration
- Driver License Division
- University of Utah Health Sciences Center
- Intermountain Healthcare
- Center for Medicare & Medicaid Studies (CMS) - Medicare Claims
Selected Studies Using UPDB

- Cancer Studies
  - Breast, colon, leukemia melanoma, pancreas, pediatric cancer, prostate, sarcoma, testicular
- Obstetric complications and childhood studies
  - Preeclampsia and preterm births
  - Birth defects, autism, juvenile idiopathic arthritis
- Chronic and other diseases and conditions
  - Diabetes, rheumatoid arthritis
  - Inflammatory bowel disease
  - Macular degeneration, interstitial lung disease, chronic pain, aneurysms
- Aging and mortality
  - Longevity
  - Memory in aging and Alzheimer’s Disease
- Obesity
Asthma Hospitalizations Utah
Ages <5 and 5-9, 1996-2011

Source: Inpatient Discharge - UPDB
Asthma Related Claims Per Week from 2003 – 2009
Salt Lake County Residents
Utah Medicare Claims Data Inpatient, Outpatient, and Carrier Claims
• Addresses in UPDB
• UTM coordinates
• Assign air quality exposure estimates and levels of precision to places
• Assign other environmental exposures (e.g., Radon)
LEVERAGE UPDB FOR STUDIES OF AIR QUALITY AND GREEN HOUSE GASES
Studying Associations between Air Quality and Health Outcomes: 

*Life Course Exposures and Delayed Effects*
Studying Associations between Air Quality and Health Outcomes:

*Interaction with other Comorbidities*

- Pre-natal AQ Exposure
- Birth
- Early Adulthood
- Early Life AQ Exposure
- Adult AQ Exposure
- Disease X
- Disease Y
- Asthma
- Co-Morbidities
Studying Associations between Air Quality and Health Outcomes:

*Interaction with Other Exposures*
Studying Associations between Air Quality and Health Outcomes:

Effects on Population Relocation

Selection From the Population

Out Migration
Turn of the century photograph of the family of Joseph F. Smith. Picture depicts members of his family, including his sons and daughters, as well as their spouses and children.
Gene-Environment Interactions

Dr. Scholand and Dr. Hoidal
Department of Internal Medicine

- COPD, Emphysema, Chronic Bronchitis
- Trimmed Pedigree, 9 generations, 268 descendants
- Full pedigree, 13 generations, 30,088 descendants
Mechanisms for Recruitment

General Population

Resource for Genetic and Epidemiologic Research

Clinical Population

Physicians

Family Expansion
Research Simulations, Forecasts and Policy Evaluation

- Individual-level data and health effects
- Identify associations amenable to policy
- Construct forecasts under different scenarios ... changes in:
  - Air pollution and greenhouse gases
  - Transportation and housing
  - Location of industry and residences
  - Fertility and net migration
Research Partners and Data Contributors

Ctr for Air Quality

DAO
Geography and DIGIT Lab
Biology
Public Health
Pulmonary Medicine
Pediatrics/ObGyn
Atmospheric Sci. & Engineering

UPDB
DOH and Env Epi

Training
# PPR, RGE, Informatics

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<th>Faculty and Administration</th>
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<th>Record Linkers</th>
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- Carole Schaefer, BACS
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- Jathine Wong, BSc

- Software Design & Development
- HCI Research Informatics
- Computer Professional
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THANK YOU