How the Utah DEQ Ensures Quality in its Assessments

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Soft Coal and the “Smoke Belt”
An early environmental health issue

• 1890 - The Salt Lake City council passed an ordinance to regulate the burning of soft coal.

• 1905 - Salt Lake County Commission and Board of Health met to discuss the “smoke belt”.

• 1914 - Pressure from women and men led the city council to pass an ordinance modeled after other cities.

• 1919 – City, funded research reported by Osborn Monnett in 1921.

• 1927 - Chamber organized educators, Boy Scouts, railroads, and various other interests into subcommittees to promote the "smoke abatement work."

• By the 1925-26 season virtually all businesses had redesigned their furnaces or installed new equipment.

• But, 75 percent of the smoke was still coming from "residential sources.”
Air Quality is the new “Smoke Belt”

Utahns rank poor air quality the biggest con to living in Beehive State

Utah residents rank air pollution as No. 1 threat to quality of life

Utah gets F on air quality report card

Most Polluted Cities
By Short-Term Particle Pollution
#7: Salt Lake City-Provo-Orem, UT
#8: Logan, UT-ID
Concerned Folks are Organized
Ensuring Quality Risk Assessment
Utah’s Approach
Inter-Agency Alignment

Department of Environmental Quality
• Director (Cabinet Member)
• Deputy Director
• Public Information Officer
• Division Directors
• Division Risk Assessment Staff
  • Air
  • Water (Lakes & Streams, Drinking)
  • Soil (Waste, Underground Tanks)

Department of Health
• Director (Cabinet Member)
• Deputy Director
• Public Information Officer
• Bureau Directors
• Epidemiology Programs
  • Environmental Epidemiology
    • APPLETREE
    • Environmental Public Health Tracking

http://www.deq.utah.gov/classic.htm
http://health.utah.gov/about/index.html
Gold King Mine Release

On August 5, 2015, the Environmental Protection Agency (EPA) began clearing material from the opening of the Gold King Mine north of Silverton, Colorado, to install a pipe to pump water out of the mine. At 10:30 A.M., the material blocking the tunnel entry suddenly gave way and a large buildup of water that had collected behind the debris was released into Cement Creek, a tributary of the Animas River.
The event has evolved into a three-state data collection process; i.e., three risk assessments.
Utah Agencies are Tracking/Report

http://www.deq.utah.gov/Topics/Water/goldkingmine/data.htm

But we are not alone.

http://www.health.utah.gov/enviroepi/appletree/GKM/
Federal Aid Dollars

EPA provides $600,000 for 3 states and 2 Indian tribes to monitor. DENVER (AP).

US gives Navajos $465,000 to monitor river after mine spill
Multiple Jurisdictions Collecting Data

Sampling standards have not been standardized.

Collection protocols, storage, chain-of-custody all vary.

Multiple Risk Assessments
Nathan La Coss developed a Gold King Mine exposure dose calculator
Looking Forward

Listen to the people. Maintain the standards. Promote a healthy outdoor lifestyle.
Air Quality and Outdoor Exercise

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Utah Department of Environmental Quality; University of Utah, Department of Family and Preventive Medicine

Problem Statement

- Physical inactivity and exposure to air pollution are important risk factors for death and disease globally (1) (Figure 2).
- The Environmental Protection Agency (EPA) has developed an Air Quality Index (AQI) and public health advisories associated with increasing pollution levels (2).
- Measurable reductions of outdoor activity have been documented based on media alerts from EPA health advisories (3).
- Reduced levels of physical activity have been associated with increased risk of obesity (4), depression (4), and reduced life expectancy (2).
- Health care providers and their patients could benefit from an analysis of air pollution risks versus reduced health benefits associated with physical inactivity.

Methods

A focused literature review was undertaken between April 2014 and June 2014 to evaluate the current body of knowledge regarding air pollution and outdoor exercise. PubMed, Google Scholar, and Google search engine were used to identify relevant research.

Findings

Air quality is measured under the direction of the EPA (5). While many pollutants can be present in air, two common pollutants of concern are PM 2.5 and Ozone. PM 2.5 is made up of solid or liquid particles that may include dust, dirt, soot, and smoke (6). Ozone is produced by nitrogen and organic compounds in the presence of sunlight (7).

There is a small, but identifiable risk to population level exposure to air pollution. Bell et al., 2004 showed that a 10 ppb increase in ozone resulted in a 0.52% increase in daily mortality (8). Bell et al., 2013 also found increased mortality rate of 0.34% (in younger people) and 0.64% (in older people) with each 10 μg/m³ increase in particulate matter with a 35% reduction in cardiovascular disease, coronary heart disease, and stroke (10). Kokkinos et al. showed that the risk of death was 13% lower for every 1 MET increase in physical activity level (2). In general, the more vigorous the activity, the more METs will be expended (11).

Regular exercise may result in a 30% reduction in all-cause mortality with a 35% reduction in cardiovascular disease, coronary heart disease, and stroke (10). Kokkinos et al. showed that the risk of death was 13% lower for every 1 MET increase in physical activity level (2). In general, the more vigorous the activity, the more METs will be expended (11).

METS for Common Activities

Walking the Dog = 3.5 METS
General Golf = 4.0 METS
Skateboarding = 5.0 METS
General Jogging = 7.0 METS
General Tennis = 7.0 METS
Mountain Biking = 8.5 METS
Rock Climbing, ascending = 11.0 METS (8)

Conclusions

Although there is a recognized and quantifiable risk of negative health outcome associated with exposure to air pollution, the positive health effects of physical activity outweigh those risks. Based on review of current medical literature, for otherwise healthy people, the large benefit of physical activity outweighs the small risk of exposure to air pollution, even on days with higher levels of pollution. A number of electronic resources, such as Utah’s myAir Health App, may help individuals with pre-existing medical conditions make informed choices regarding outdoor activity and their unique health profiles.

References

Physical Activity
In adults lowers

- Premature death (20% - 40%)
- Cardiovascular disease (35%)
- Coronary heart disease (35%)
- Hypertension (34%)
- Type 2 diabetes (37%)
- Depression (18%)
- Stroke (60%)
World Health Organization (WHO)

http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_oart2.pdf2ua=1
## Protective Design

<table>
<thead>
<tr>
<th>AQI 0-50</th>
<th>AQI 51-100</th>
<th>AQI 101-150</th>
<th>AQI 151-200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyone</td>
<td>Unusually sensitive</td>
<td>Sensitive</td>
<td>Sensitive, Avoid prolonged physical outdoor activity.</td>
</tr>
<tr>
<td>Unusually Sensitive</td>
<td>75</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Sensitive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-sensitive</td>
<td></td>
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</tr>
</tbody>
</table>

**myAir**

- Near zero: Low risk to few
- Low risk to most
- High risk to all

- AQI 0-50: Everyone, No limit to length of physical outdoor activity.
- AQI 51-100: Unusually sensitive, Consider limiting prolonged physical outdoor activity.
- AQI 101-150: Sensitive, Limit prolonged physical outdoor activity.
Capturing Opportunity Time Windows
Avoiding Risky Exposures

Hours of unseen risk

Hours of unseen opportunity
Personalized Risk Assessment and Management

Utah DOH Calculator

Utah Air Quality Dose Calculator
Personalized Air Quality Exposure Calculator

https://www.apple.com/researchkit/

Empowering medical researchers, doctors, and now you
Summary

• Align and coordinate state agencies
• Monitor/track environmental stressors and pollutants
• Monitor/track adverse health incidents
• Develop risk assessment/messages for specific audiences
• Follow the development of personized risk management and open source research using mobile devices.
Lloyd: What do you think the chances are of a guy like you and a girl like me...ending up together?
Mary: Well, that’s pretty difficult to say.
Lloyd: Hit me with it! I've come a long way to see you, Mary. The least you can do is level with me. What are my chances?
Mary: Not good.
Lloyd: You mean, not good like one out of a hundred?
Mary: I’d say more like one out of a million.
Lloyd: So you’re telling me there’s a chance. Yeah!