Social Determinants of Health
Concepts and Methods Relevant to Air Pollution

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2020-05-20
‘A Terrible Price’: The Deadly Racial Disparities of Covid-19 in America

For the Zulu club, a black social organization in New Orleans, Mardi Gras was a joy. The coronavirus made it a tragedy.
Disproportionate racial impact of COVID-19 on deaths

Pandemic exposure reveals underlying inequalities in social conditions.

“We have long known that emissions coming from these facilities are very dangerous to the health of people who live nearby, and it is black people who live the closest. So I’m getting tired of being told our Covid death rates are only because we’re obese or have diabetes or are eating badly, without any regard to the systematic harm pollution has caused us.”

-Beverly Wright

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"The conditions in the social and physical environment where people live, work, attend school, play and pray have an outsize influence on health outcomes."

"Those in the public-health field call these conditions social determinants of health".

What are Social Determinants of Health?
The social determinants of health are the conditions in which people are born, grow, live, work and age.

- Availability of resources (e.g., safe housing and local food markets)
- Access to educational, economic, and job opportunities
- Access to health care services
- Quality of education and job training
- Availability of community-based resources in support of community living and opportunities for recreational and leisure-time activities
- Transportation options
- Public safety

- Social support
- Social norms and attitudes (e.g., discrimination, racism, and distrust of government)
- Exposure to crime, violence, and social disorder
- Socioeconomic conditions (e.g., concentrated poverty)
- Residential segregation
- Language/Literacy
- Access to mass media and emerging technologies
- Culture

Sources: WHO Commission on Social Determinants of Health (2008); https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health
Conceptual Ideas
Medical care matters, but not much Standards of living, hygiene, public health, policies, drive outcomes.

McKinlay & McKinlay (1977); McKeown (1979)
Universal health insurance did not reduce inequalities.

More ambitious interventions needed in education, housing and social welfare, in addition to improved clinical care.

Black et al. (1980)
Mechanisms may change, but social inequality will reproduce health inequalities.

19th Century \[ \rightarrow \] 21st Century

\[ \text{Social Inequality} \]

- Dirty water
- Poor sanitation
- Inequalities in Cholera Diarrhea

\[ \text{~ 150 years} \]

\[ \text{Social Inequality} \]

- Smoking
- Diet
- Inequalities in Heart Disease Lung cancer

Link and Phelan (1995)
Risk factors are insufficient

"The social class difference was partly explained by known coronary risk factors: men in the lower grades smoked more and exercised less, they were shorter and more overweight, and they had higher blood pressures and lower levels of glucose tolerance.

Most of the difference, however, remains unexplained. It seems that there are major risk factors yet to be identified"

-Rose and Marmot, 1981

Rose and Marmot, Br Heart J (1981, p.13)
Interventions need to be social

"...the primary determinants of disease are mainly economic and social, and therefore its remedies must also be economic and social."

- Geoffrey Rose

Note 👇 y-axis difference!

Figure 1: Rates of homicide in Chicago and England and Wales by age and sex of perpetrator

Rose (1992, p.129); Marmot (1998)
"Social injustice is killing people on a grand scale."

Health equity through action on the social determinants of health
SDOH model

- Explicit links between social exposures
- Differential exposure and susceptibility

Diderichsen et al. (2001)
SDOH model

- Explicit links between social exposures
- Differential exposure and susceptibility
- Key leverage points for policy intervention

Diderichsen et al. (2001)
Persistent racial and socioeconomic inequalities in exposure

"...findings raise serious questions about the ability of current policies and institutions to adequately protect people of color and the poor from toxic threats."

Individual vs. population determinants

Apte (2018)
Important heterogeneity

Most find that risks are more concentrated among disadvantaged social groups.

Plea for better methods

Reviews of evidence on pollution and SDOH

O’Neill (2003); Benmarhnia (2014); Hajat (2015); Appleton (2016); Fairburn (2019)
Methodological Issues
1. Clarity about the study goal

Descriptive aims require attention to relevant units and measures.
Measures of the "social" are context dependent.

Need to fit for purpose.

What is the relevant risk for a particular pollutant?

Source: Galobardes (2004)
Social position isn't static

"Status" takes place in the context of an overarching structure.

Source: https://www.hamiltonproject.org/charts/annual_earnings_of_teachers_and_non-teachers
1. Clarity about the study goal

Descriptive aims
require attention to relevant units and measures.

Interventions
need all of the above 🤔 plus causal evidence.

Causal inference is hard.
Causal models have implications for analysis.

How do social factors and environmental exposures relate to one another?

Beckerman (2012); Ritz (2018)
2. Multi-level, multi-causal

Incorporating social determinants necessitates integrating multiple causes to explain inequalities.

Social determinants operate at different levels and analyses should reflect it.
...the individual contribution of PM2.5 is comparable in magnitude to any single individual- or neighborhood-level factor.
Parting thoughts

Incorporating social determinants requires conceptual and methodological adjustments.

Estimating the impact of interventions requires (broad) causal inference.

Attention to social determinants should enrich and improve environmental science and policy.