Air Pollution and Health in East Africa

Perspectives from the State of Global Air (SoGA) Initiative

Victor Nthusi
Health Effects Institute
vnthusi@healtheffects.org
29 – 31 March 2023 | Sarova Panafric Hotel, Nairobi, Kenya
Key messages

• More than 1 million deaths linked to air pollution in Africa

• Stark differences in exposure to PM$_{2.5}$ across the continent, highest exposures in Western African countries

• Household air pollution due to use of solid fuels for cooking remains a significant source of PM$_{2.5}$ across much of the continent.

• Varying trends for contribution of fossil fuel emissions to PM$_{2.5}$; highest contribution in Southern African countries
Patterns of exposure to air pollution across Africa

Average Exposure to PM$_{2.5}$

http://www.stateofglobalair.org/
Producing the air quality estimates; gaps in data

Satellite data

Chemical Transport Models

Ground monitoring data

Limited ground monitoring data from Africa >> higher uncertainties in exposure estimates

Source: 2022 Open Air Quality Data: The Global Landscape, OpenAQ

https://www.stateofglobalair.org/
Household air pollution and health

Exposures to particulate matter from household air pollution often exceed levels in outdoor air by orders of magnitude.

Increased risk of non-communicable diseases, including lung and heart diseases, type II diabetes and lung cancer as well as death.

Exposure to air pollution in mothers can result in increased risk of their infants being born too small or too early.
Trends in HAP Exposure in Africa

Percentage of population using solid fuels for cooking

Trends in death rates linked to HAP, 2010 – 2019

http://www.stateofglobalair.org/
Patterns of disease burden linked to air pollution vary across East Africa

Kenya

Total number of deaths in 2019

<table>
<thead>
<tr>
<th>Age (in years)</th>
<th>Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;28 days</td>
<td>4000</td>
</tr>
<tr>
<td>28-364 days</td>
<td>1000</td>
</tr>
<tr>
<td>1-4 years</td>
<td>500</td>
</tr>
<tr>
<td>5-9 years</td>
<td>200</td>
</tr>
<tr>
<td>10-19 years</td>
<td>100</td>
</tr>
<tr>
<td>20-24 years</td>
<td>50</td>
</tr>
<tr>
<td>25-34 years</td>
<td>25</td>
</tr>
<tr>
<td>35-39 years</td>
<td>15</td>
</tr>
<tr>
<td>40-44 years</td>
<td>10</td>
</tr>
<tr>
<td>45-49 years</td>
<td>5</td>
</tr>
<tr>
<td>50-54 years</td>
<td>5</td>
</tr>
<tr>
<td>55-59 years</td>
<td>5</td>
</tr>
<tr>
<td>60-64 years</td>
<td>10</td>
</tr>
<tr>
<td>65-69 years</td>
<td>20</td>
</tr>
<tr>
<td>70-74 years</td>
<td>30</td>
</tr>
<tr>
<td>75-79 years</td>
<td>40</td>
</tr>
<tr>
<td>80-84 years</td>
<td>60</td>
</tr>
<tr>
<td>85-89 years</td>
<td>80</td>
</tr>
<tr>
<td>90-94 years</td>
<td>100</td>
</tr>
<tr>
<td>95+ years</td>
<td>200</td>
</tr>
</tbody>
</table>
Patterns of disease burden linked to air pollution vary across East Africa

Uganda

State of Global Air
Estimating health impacts; gaps

Concentration-response relationship

Baseline disease rates

Epidemiology studies on health effects of air pollution

https://www.stateofglobalair.org/

Limited studies on health effects of air pollution in high-pollution environments, no studies from Africa in the integrated concentration-response functions

Limited availability of baseline disease rates
How are the estimates produced?

- Satellite data
- Chemical Transport Models
- Ground monitoring data

Baseline disease rates

Minimum risk exposure level

Concentration-response relationship

Epidemiology studies on health effects of air pollution

Burden of Disease Linked to Air Pollution

https://www.stateofglobalair.org/
Major air pollution sources across Africa

<table>
<thead>
<tr>
<th>Source</th>
<th>Energy</th>
<th>Industry</th>
<th>Transport</th>
<th>Waste</th>
<th>Residential</th>
<th>Agriculture</th>
<th>Windblown Dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>22.5%</td>
<td>6.8%</td>
<td>6.5%</td>
<td>3.9%</td>
<td>16%</td>
<td>6.2%</td>
<td>8.5%</td>
</tr>
<tr>
<td>DRC</td>
<td>1.8%</td>
<td>4.4%</td>
<td>1.4%</td>
<td>1.2%</td>
<td>11.7%</td>
<td>2.2%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Kenya</td>
<td>7.9%</td>
<td>4.6%</td>
<td>6.1%</td>
<td>2.1%</td>
<td>26.7%</td>
<td>0.5%</td>
<td>25.1%</td>
</tr>
<tr>
<td>Ghana</td>
<td>2.2%</td>
<td>1.2%</td>
<td>3.1%</td>
<td>0.7%</td>
<td>6.6%</td>
<td>1.8%</td>
<td>67.6%</td>
</tr>
<tr>
<td>Egypt</td>
<td>11.7%</td>
<td>5.3%</td>
<td>6.3%</td>
<td>5.8%</td>
<td>4%</td>
<td>5.9%</td>
<td>42%</td>
</tr>
</tbody>
</table>

- Understanding major air pollution sources underpins clean air action planning and identification of cost-effective solutions

- Sources responsible for PM$_{2.5}$ pollution vary within and between countries and regions across Africa
Interactive literature database for East Africa

Online (dynamic) database of published evidence on air pollution and health in East Africa

80 articles | 6 countries

Highlight available data and evidence and geographic distribution across East Africa

Upcoming: synthesis of the local health evidence for broad audiences, support for local organizations

Welcome input and feedback

https://tinyurl.com/EAfricaAQandHealthDatabase
Let’s talk!

Twitter
@HEIresearch | @HEISoGA
#EastAfricaAQ2023

Email
vnthusi@healtheffects.org