Equity Implications of Air Quality

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African School on Air Quality & Pollution Prevention

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Air Quality - Equity

Critical aspect of environmental health

- **Health risks:** respiratory diseases, cardiovascular problems, etc.
- **Vulnerable Populations:** more susceptible to the adverse effects of air pollution
- **Healthcare Costs:** increased costs and lost productivity due to illness

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- **Ecosystem Damage:** acidify soils and water bodies, damaging vegetation, and disrupting wildlife habitats

- **Climate Change Interactions:** black carbon contributes to global warming by absorbing sunlight

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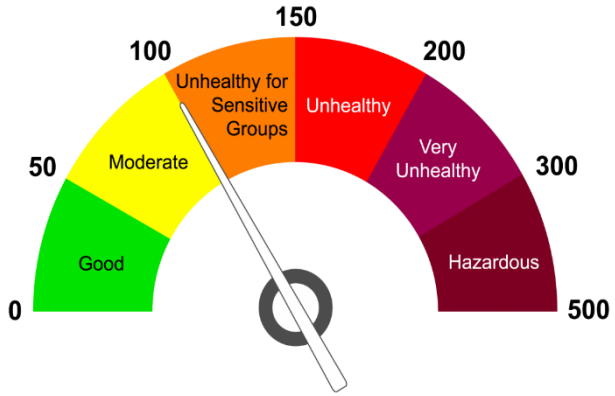
- **Monitoring & Regulation:** identify pollution sources, assess pollution levels and enforce regulations



- **Public Awareness:** raise awareness about air quality issues
- **Local Action:** zoning laws & education to promote public health

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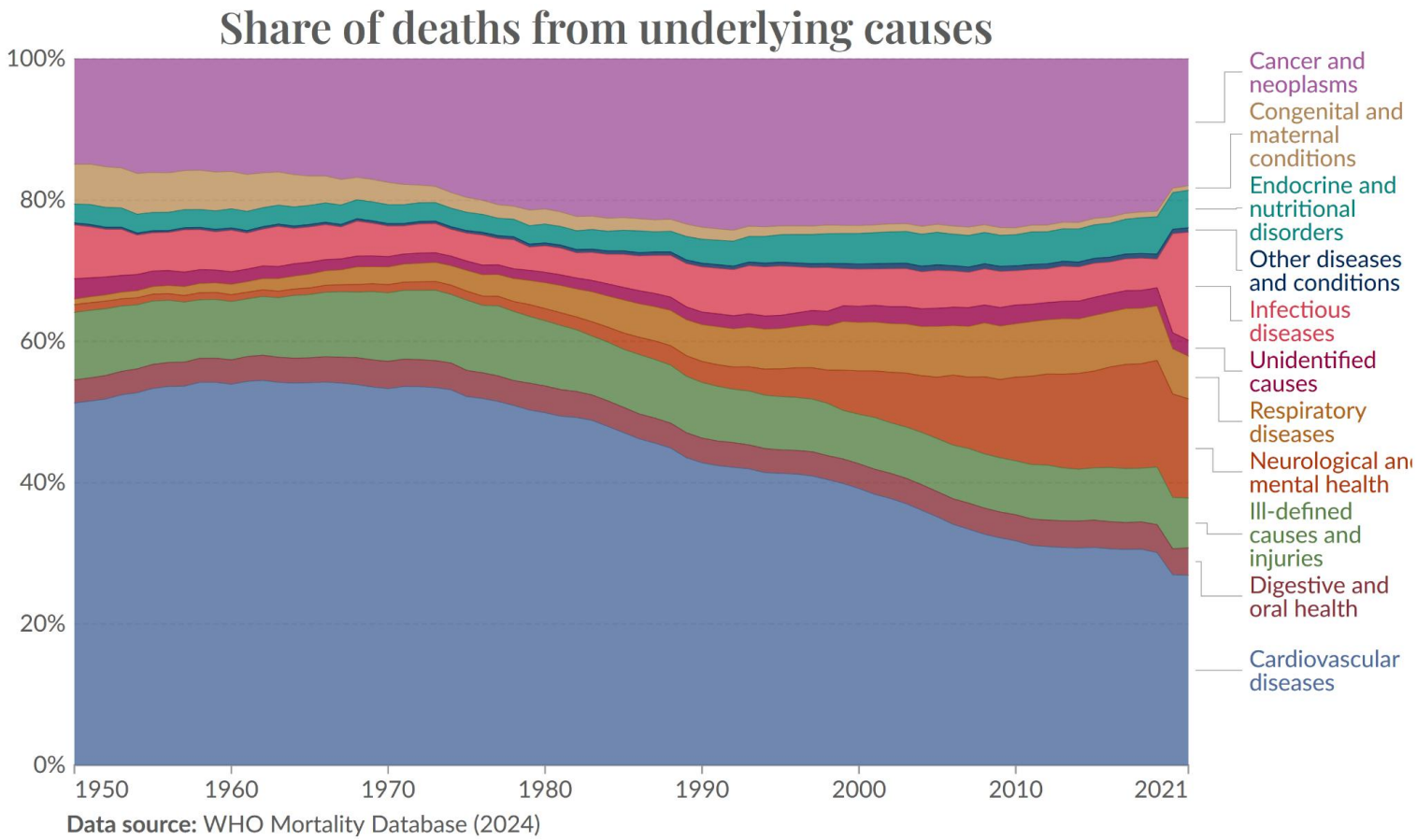
Air Quality in Relation to Share of Deaths



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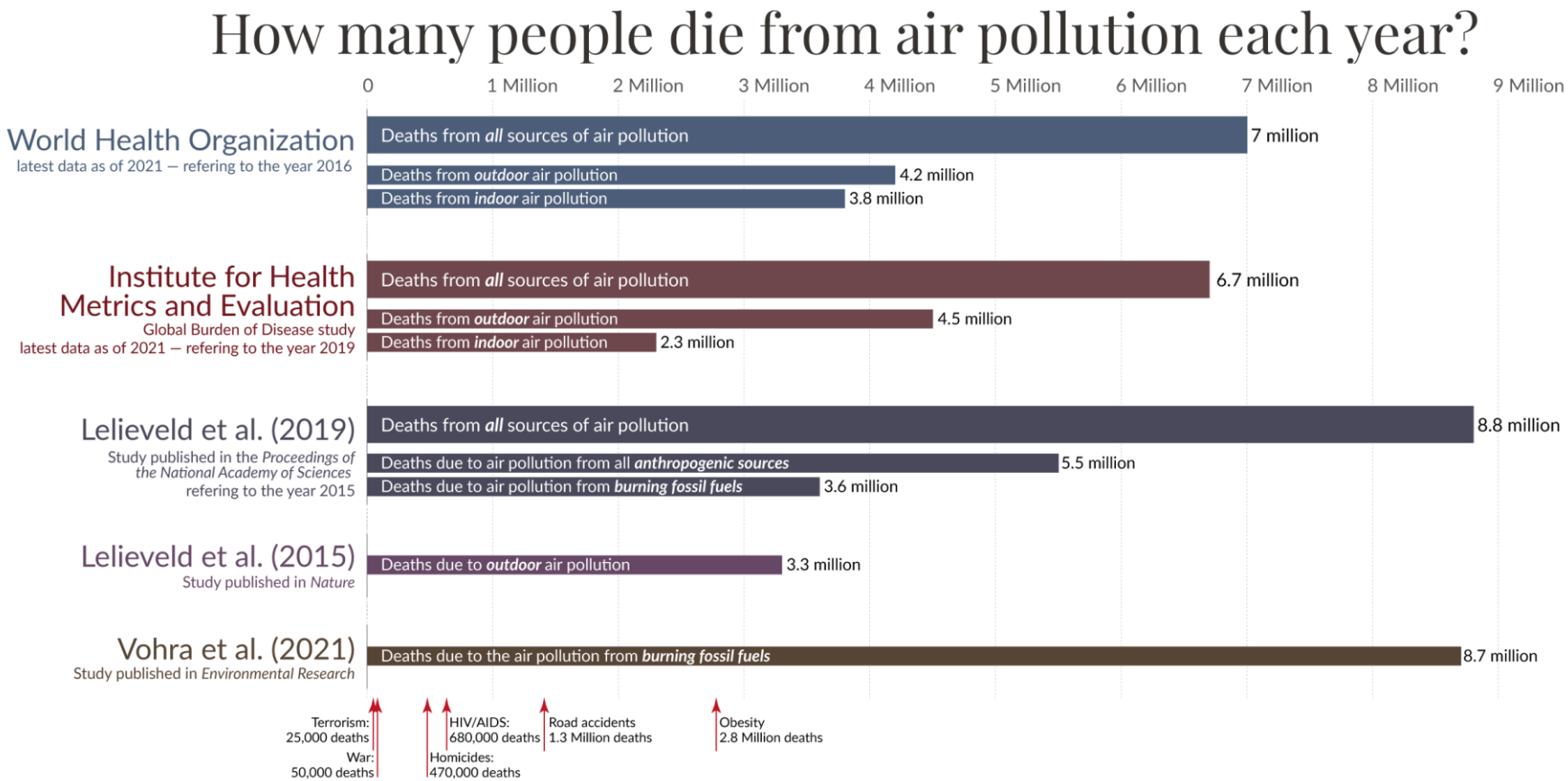
Annual Air Pollution Deaths



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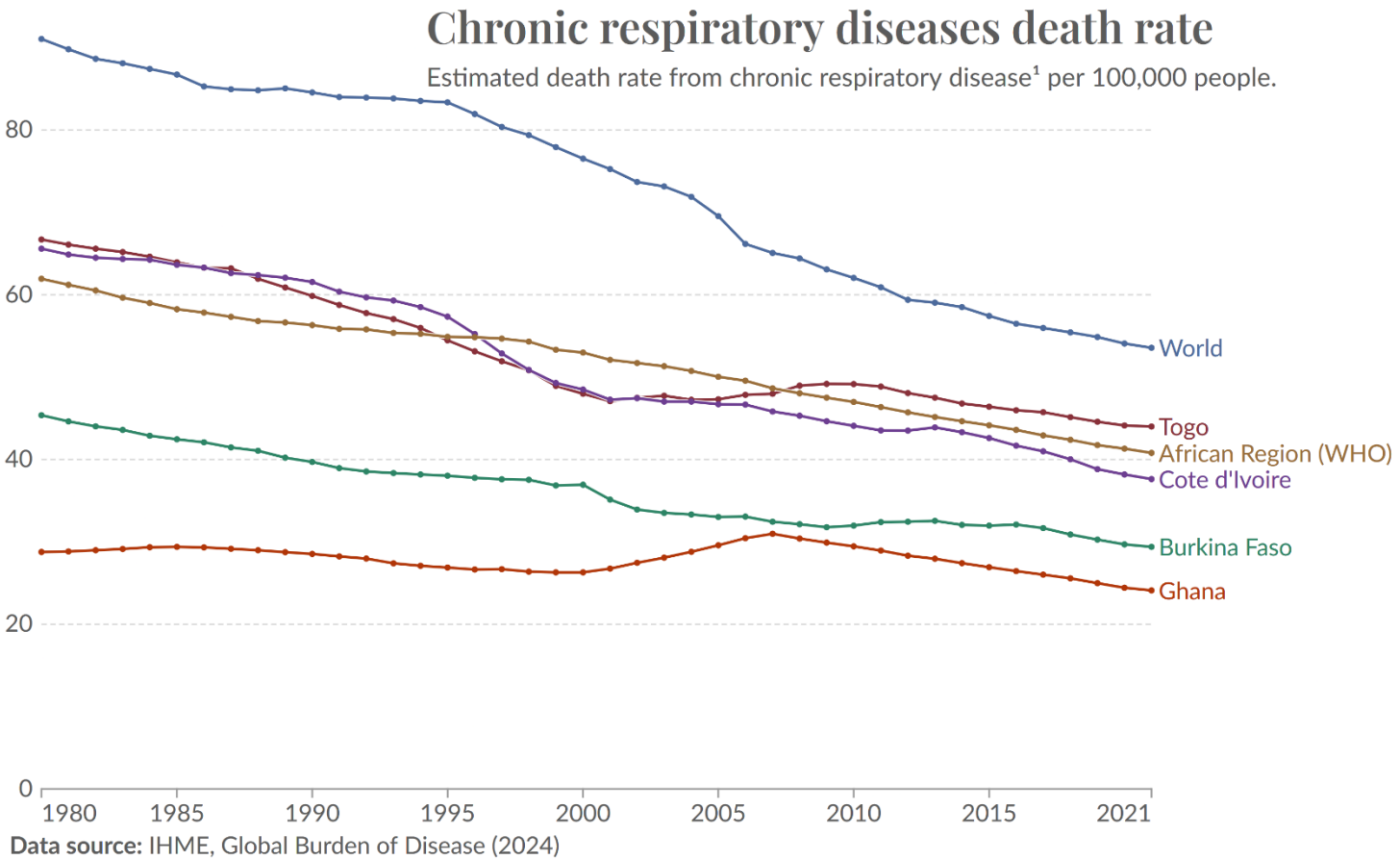
Air Quality - Chronic Respiratory Deaths



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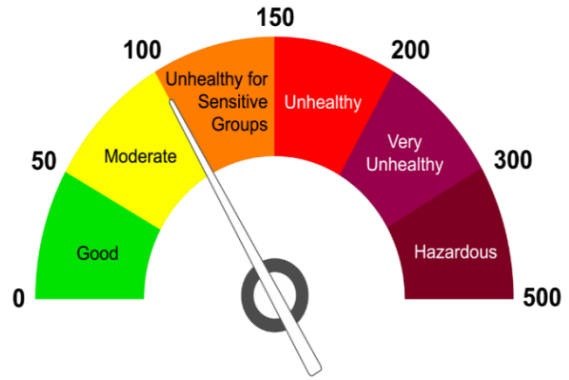
Air Quality - Equity

- **Equity:** implies social justice and distributive justice
- **Distributive justice**: allocation of resources, benefits, and burdens among individuals and groups within a society



- **Air quality disparity:** type of air quality difference that is closely linked with economic, social, or environmental **disadvantage**
- **Equity:** the commitment to eliminate air quality disparities and its determinants

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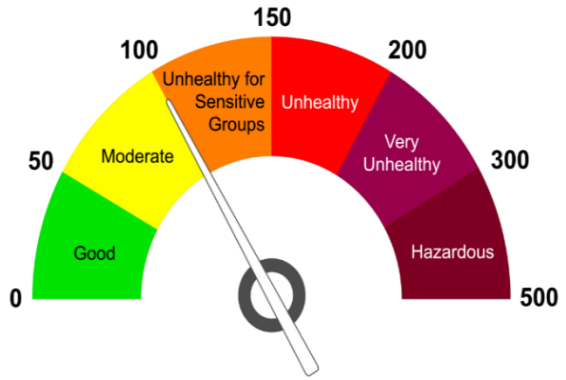
Air Quality - Equity

Equity Targets



- Equity Targets: distribution of Benefits & Burdens
- Fair **allocation** of air quality resources
- Fair opportunity to access air quality
- Reduce **adverse effects** of air pollution
- Widening participation in decision-making process
- Equity: is not directly **measured**
- **Equity**: eliminate or **absence of** air quality disparity

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Capability Approach

- A normative approach to **human welfare** that concentrates on the actual capability of persons to achieve lives they **value**
- Accounts for **diversity**, personal characteristics, and **distribution** of air quality resources

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Equity - Capability Approach

- **Resources**: commodities & intangible goods available to a person
- **Conversion factors**: personal features used to convert resources into capabilities
- **Capabilities** - outcome from combining resources and conversion factors to translates into a person's level of air quality
- **Functionings** - what people actually achieve

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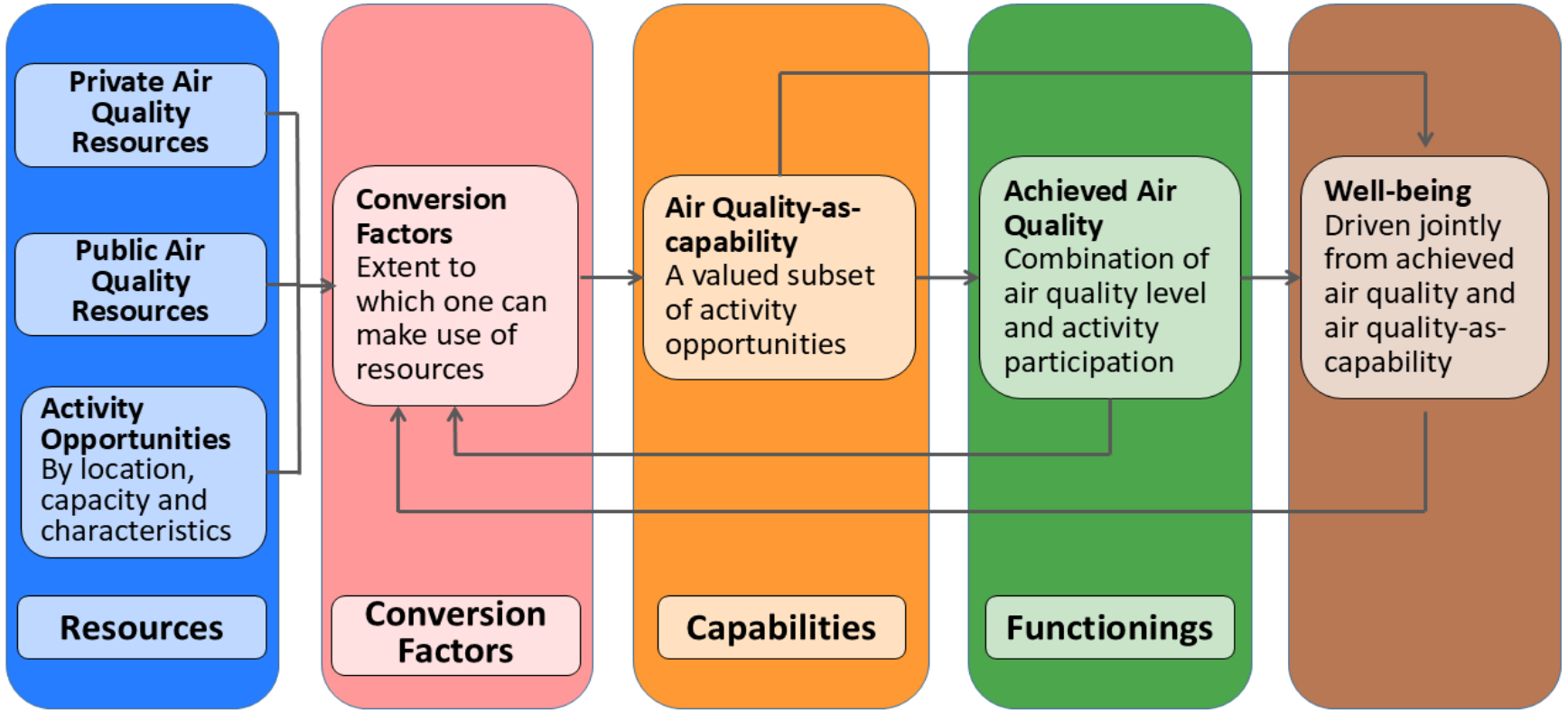
Air Quality – Human Capability Approach



Air Quality as a Human Capability (AQHC) adapted from Vecchio and Martens (2021)

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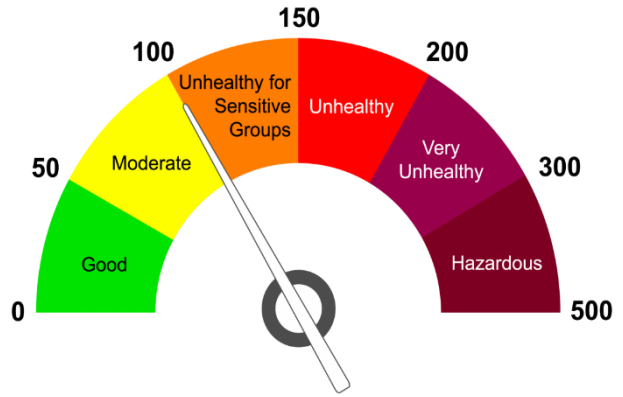
Equity Implications



- Disproportionate **Exposure**:
  - Vulnerable populations
  - Geographic & Gender disparities
- Health risks and burden: increased **health issues**
- **Economic impact**: healthcare cost & lost productivity
- **Energy poverty**: reliance on polluting fuel

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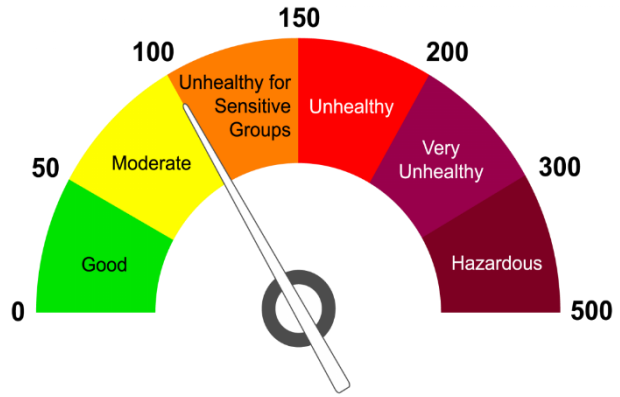
Air Quality - Equity

Key Sources of Air Pollution



- **Transportation**: e.g., road transport accounts for 40% of PM2.5 concentrations in Accra
- **Industrial Emissions**:
  - Power Plants - key source of NO2 and SO2
  - Manufacturing - Cement plants & metal smelters

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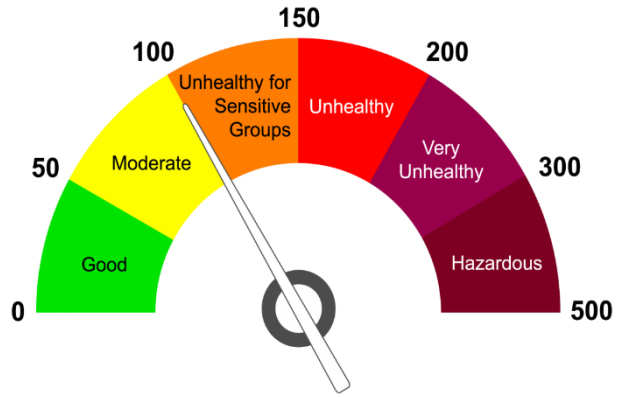
Key Sources of Air Pollution



- **Household Air Pollution**: Biomass & Waste Burning - wood, charcoal
- **Agriculture** - burning of crop residues
- **Natural Sources** – e.g., Saharan Dust - seasonal harmattan winds
- **Urbanization Effects** - increased construction transportation, manufacturing industries, etc.

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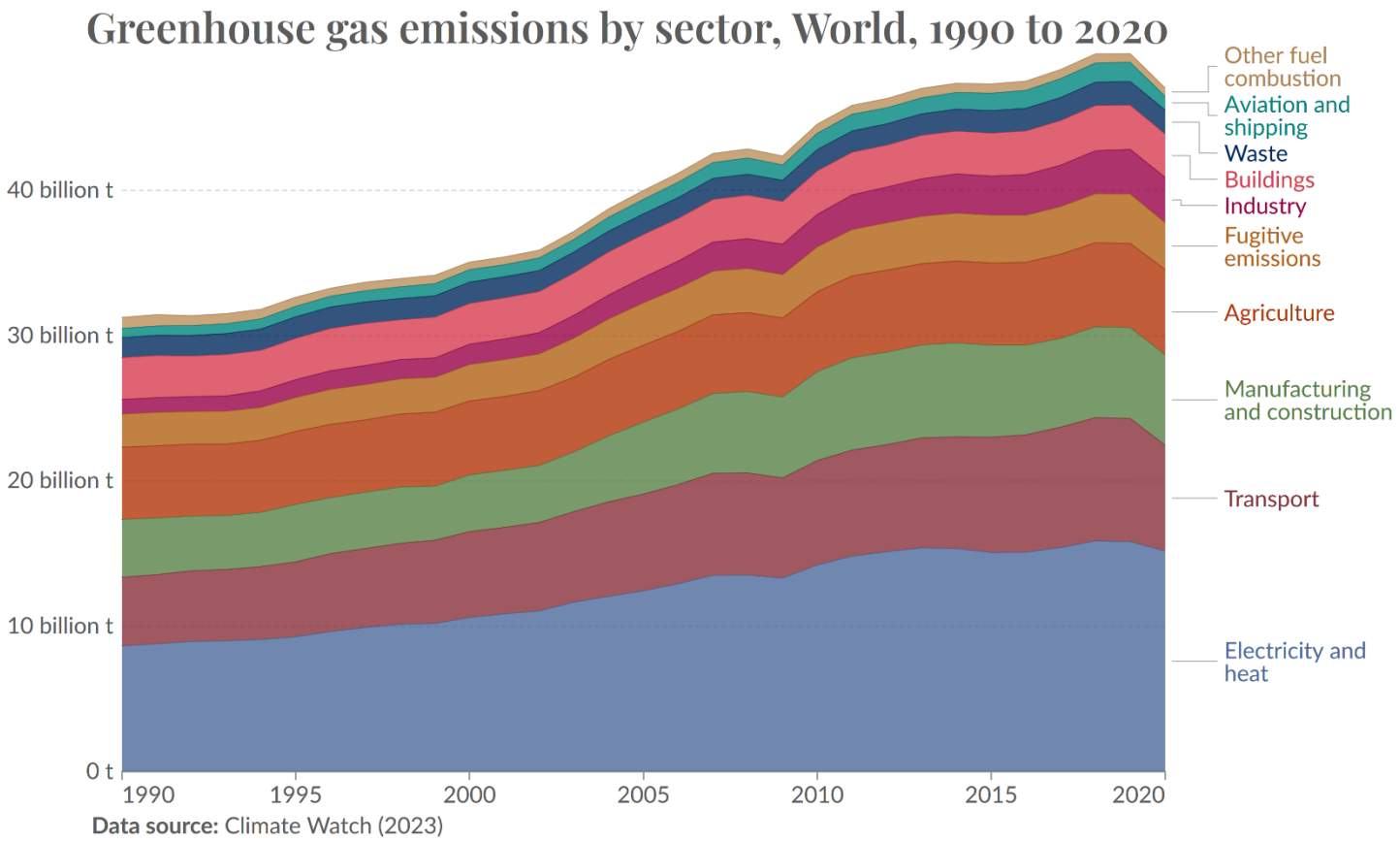

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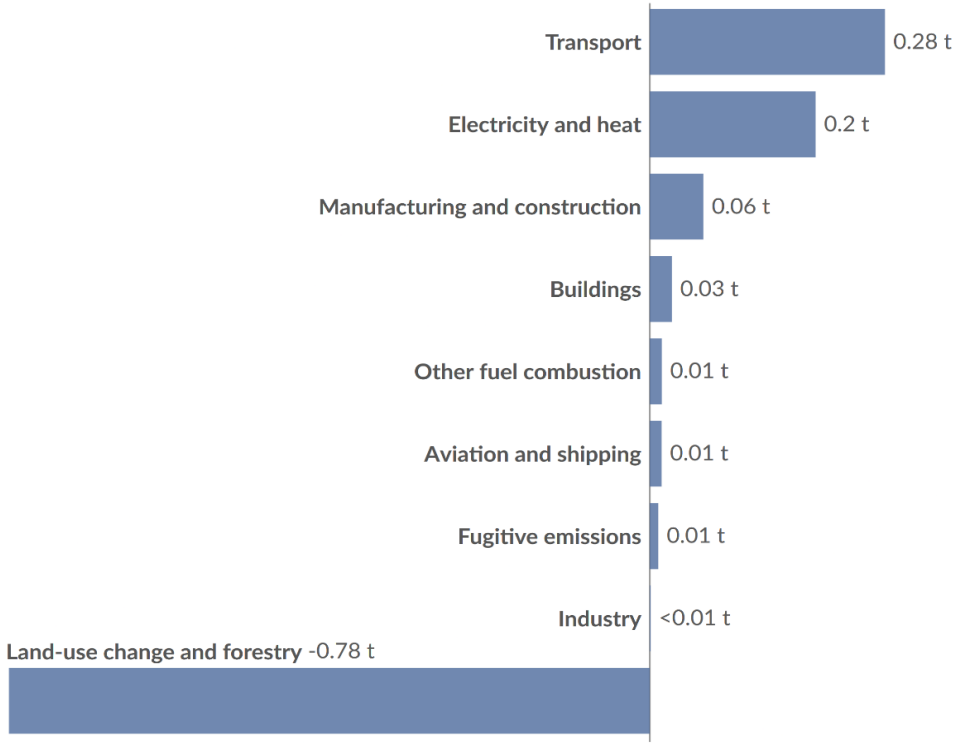
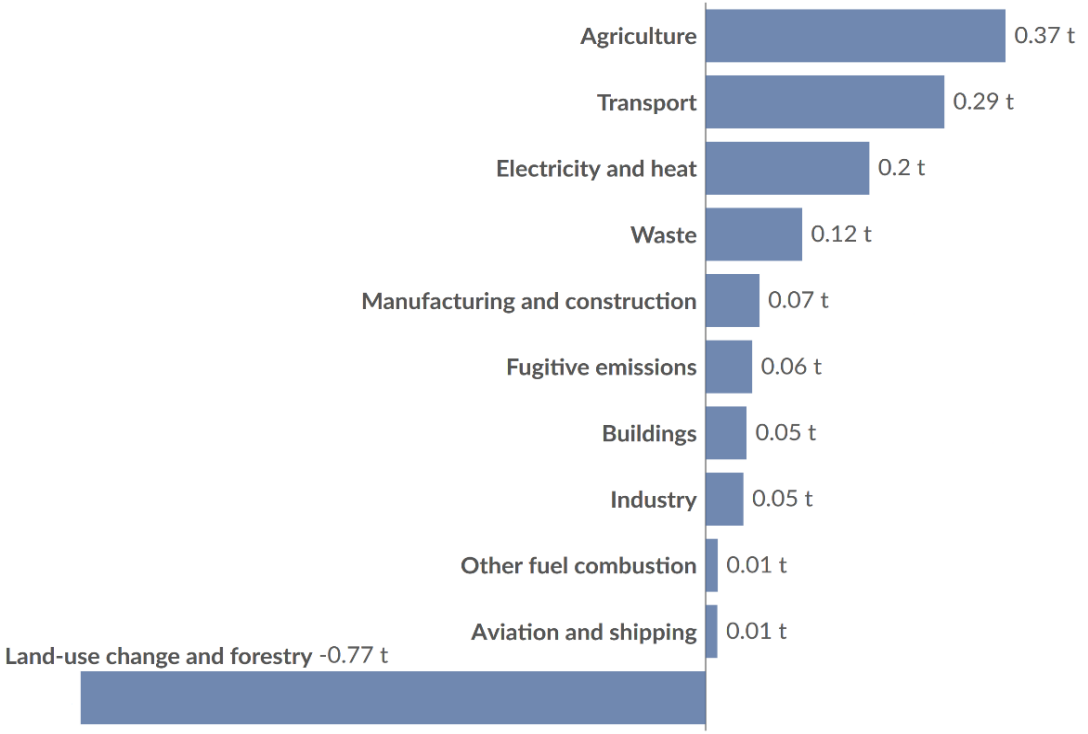
Key Sources of Air Pollution

Per capita CO_2 emissions by sector, Ghana, 2020



Data source: Climate Watch (2023); Population based on various sources (2023)

Per capita greenhouse gas emissions by sector, Ghana, 2020



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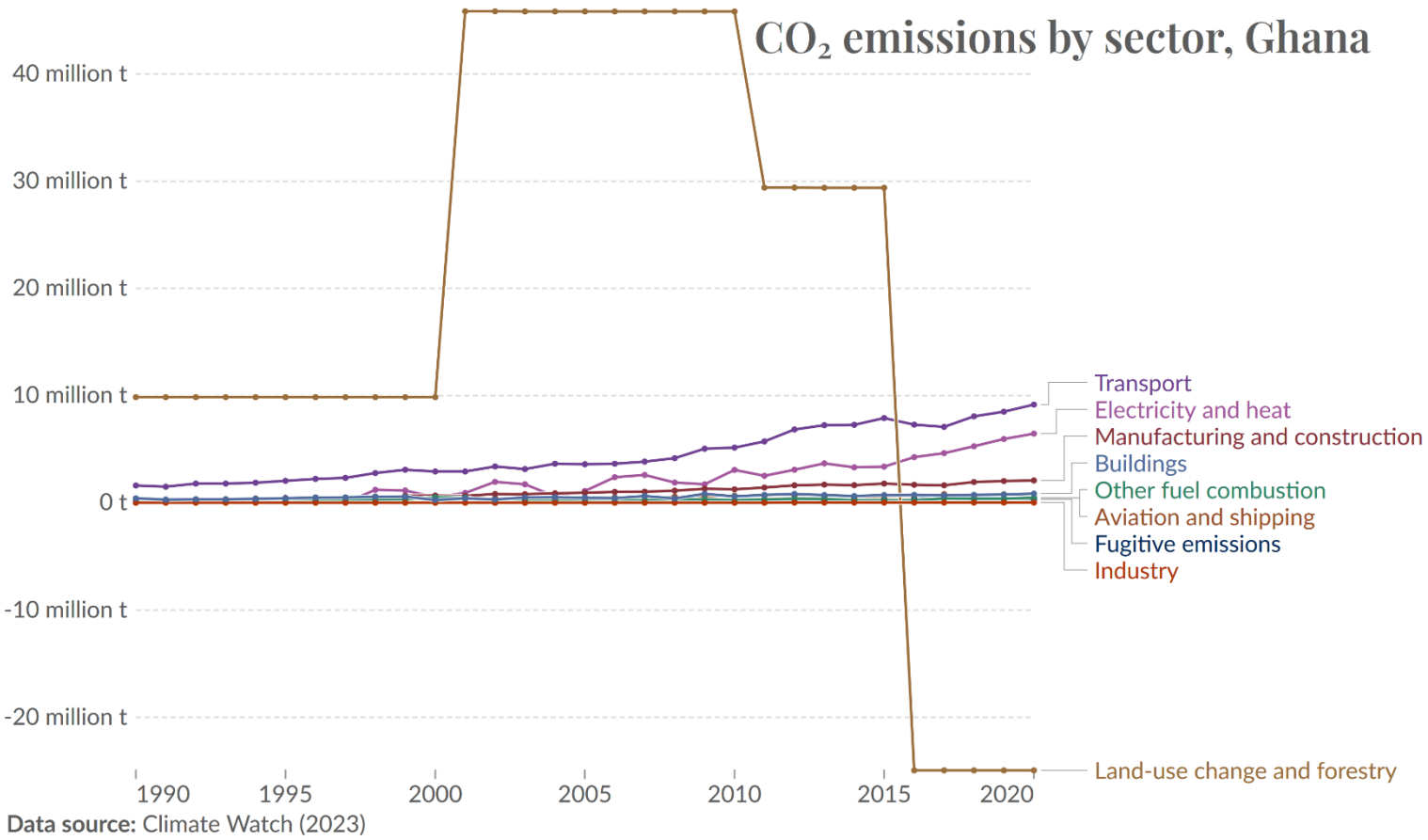
Key Air Pollution Sources



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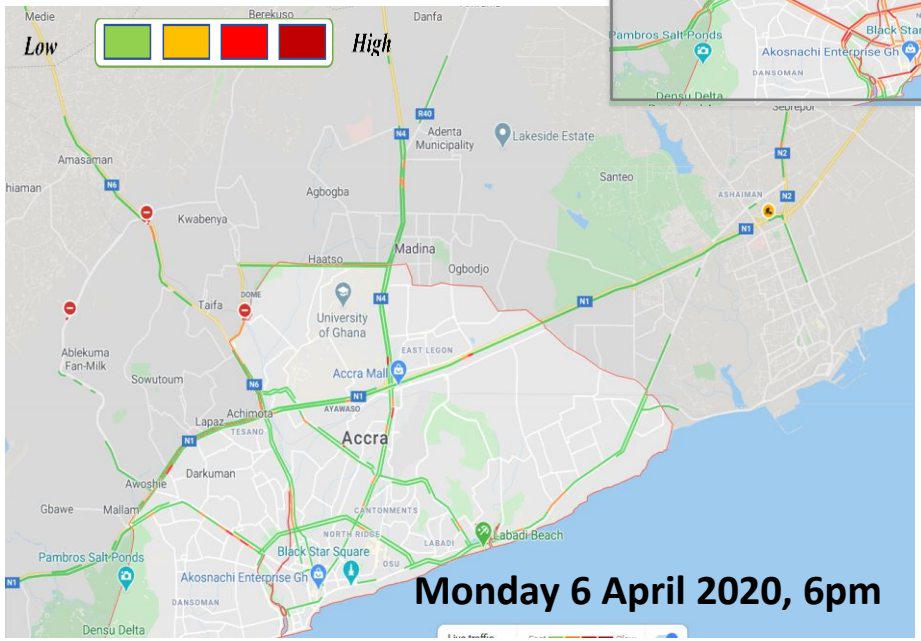
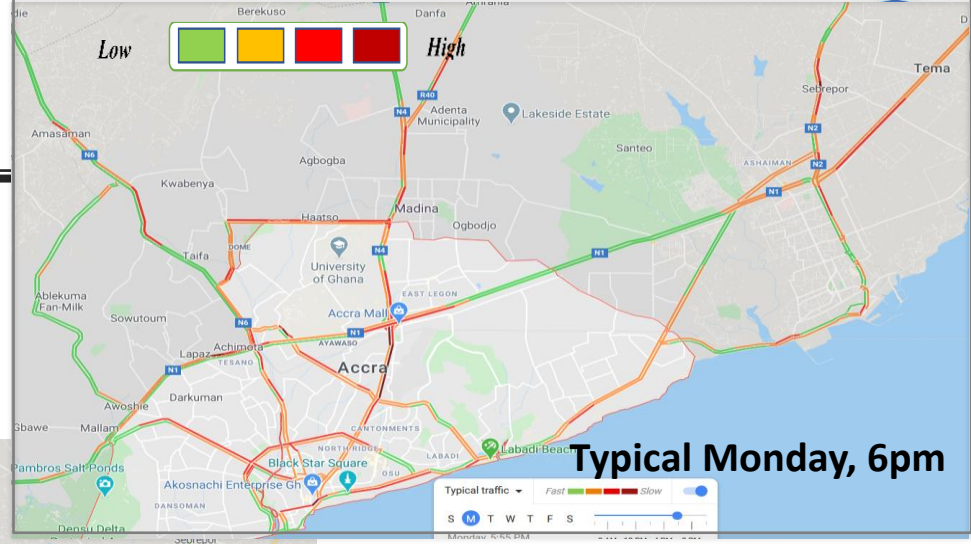
COVID–19: Road Traffic

Road Traffic in Greater Accra





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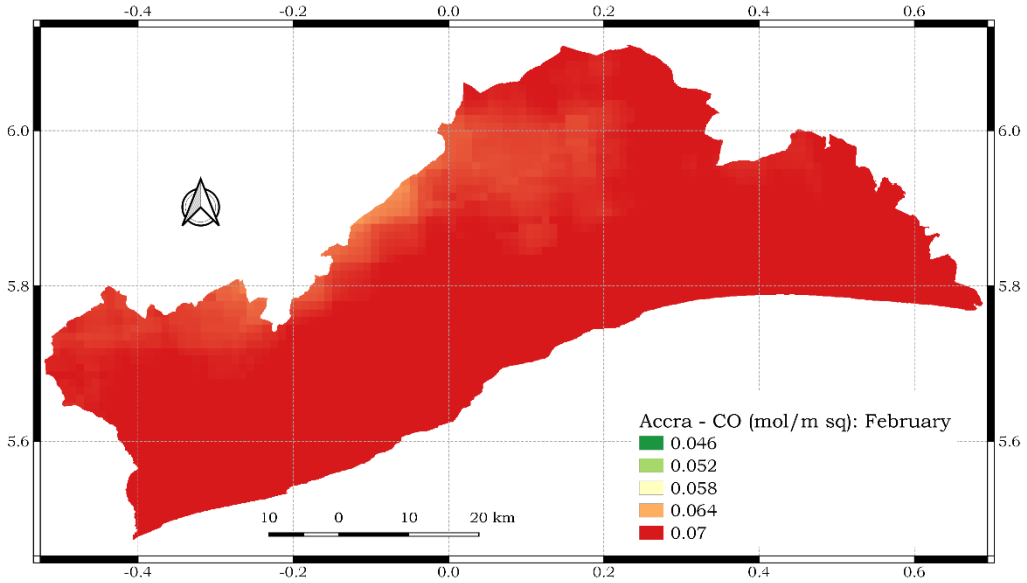
COVID–19: Air Quality – CO

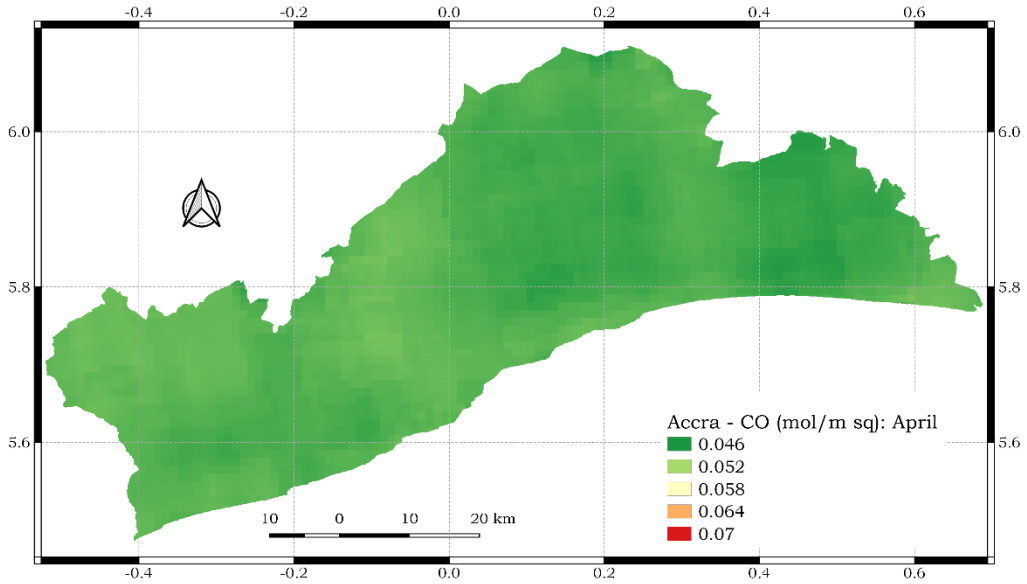
Carbon Monoxide – Greater Accra

CO – Before Start of Lockdown



Data Source: Sentinel-5 Precursor (S5P) – ESA

CO – After Start of Lockdown



Change: 31% reduction

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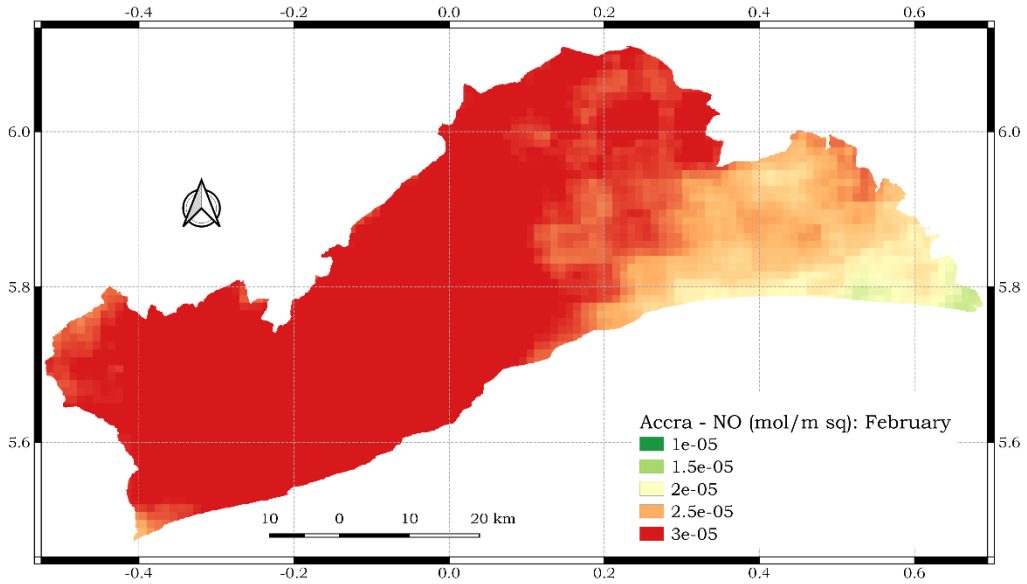
COVID–19: Air Quality – NO_2

Nitrogen Dioxide – Greater Accra

NO_2 – Before Start of Lockdown



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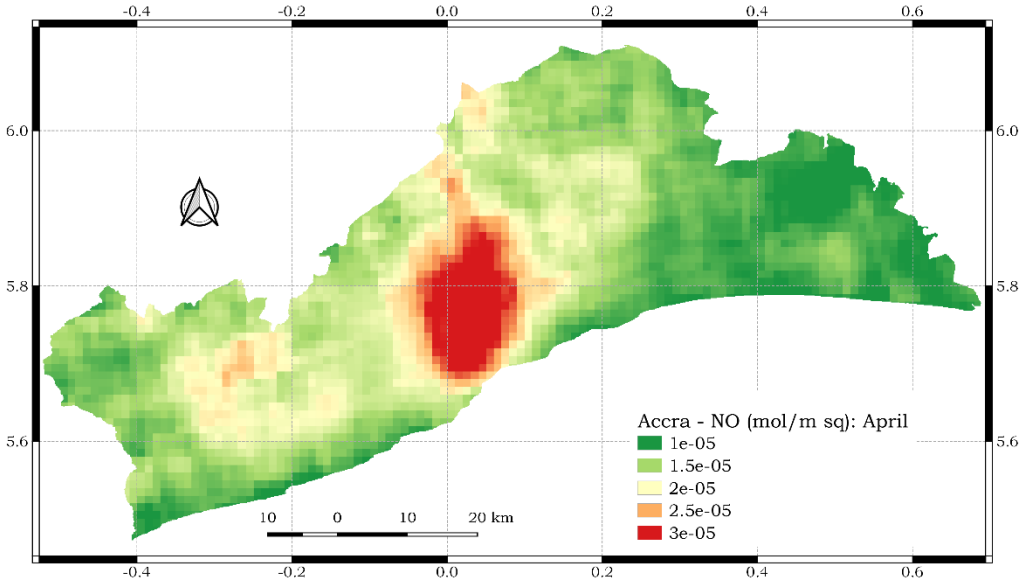
NO_2 – After Start of Lockdown



Change: 38% reduction

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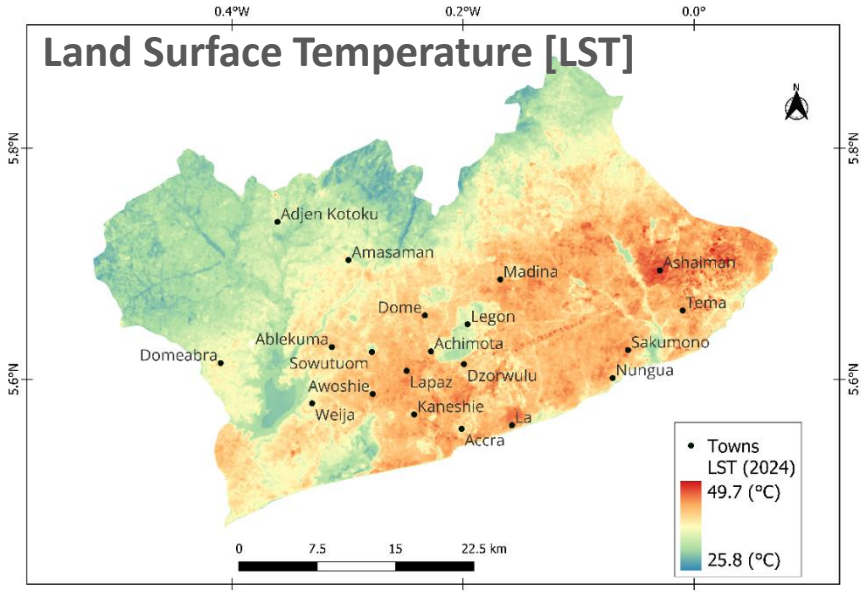
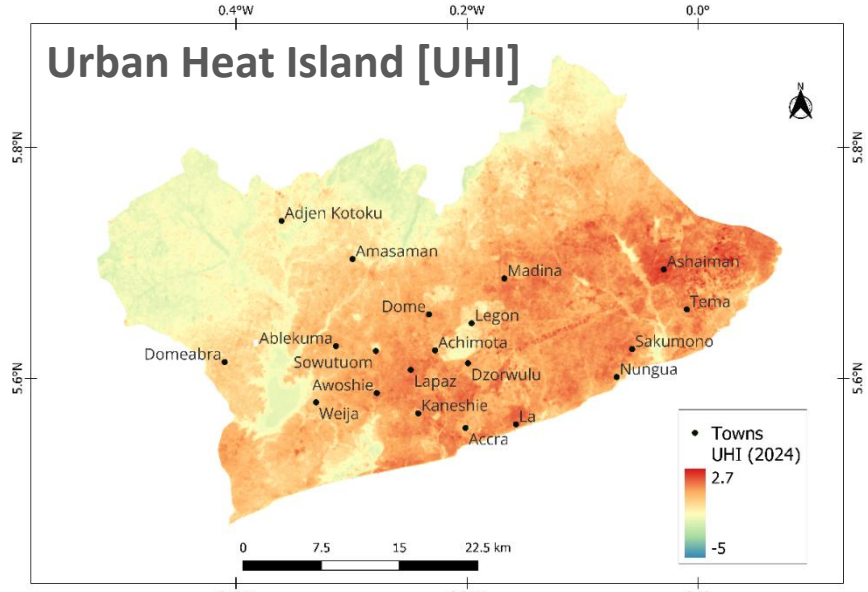
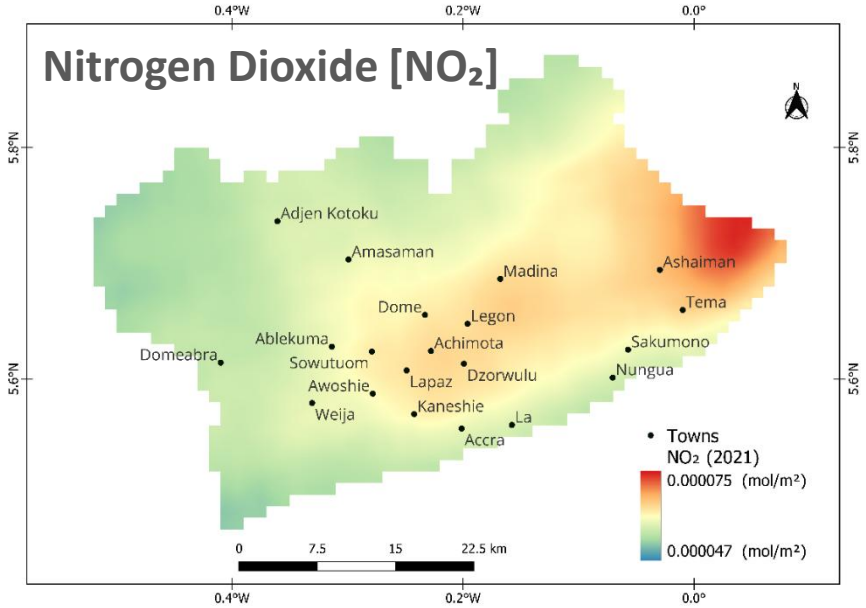
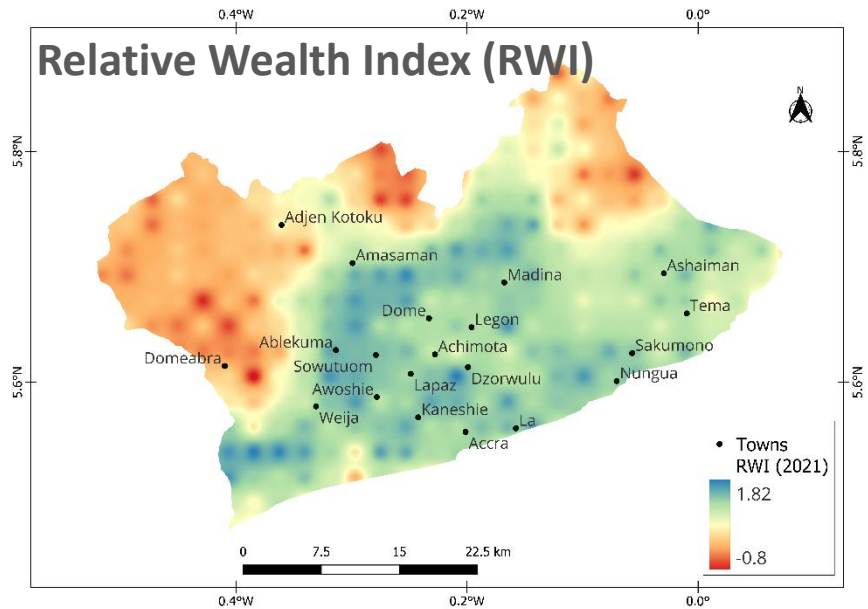
Urban Heat, Air Quality & Wealth









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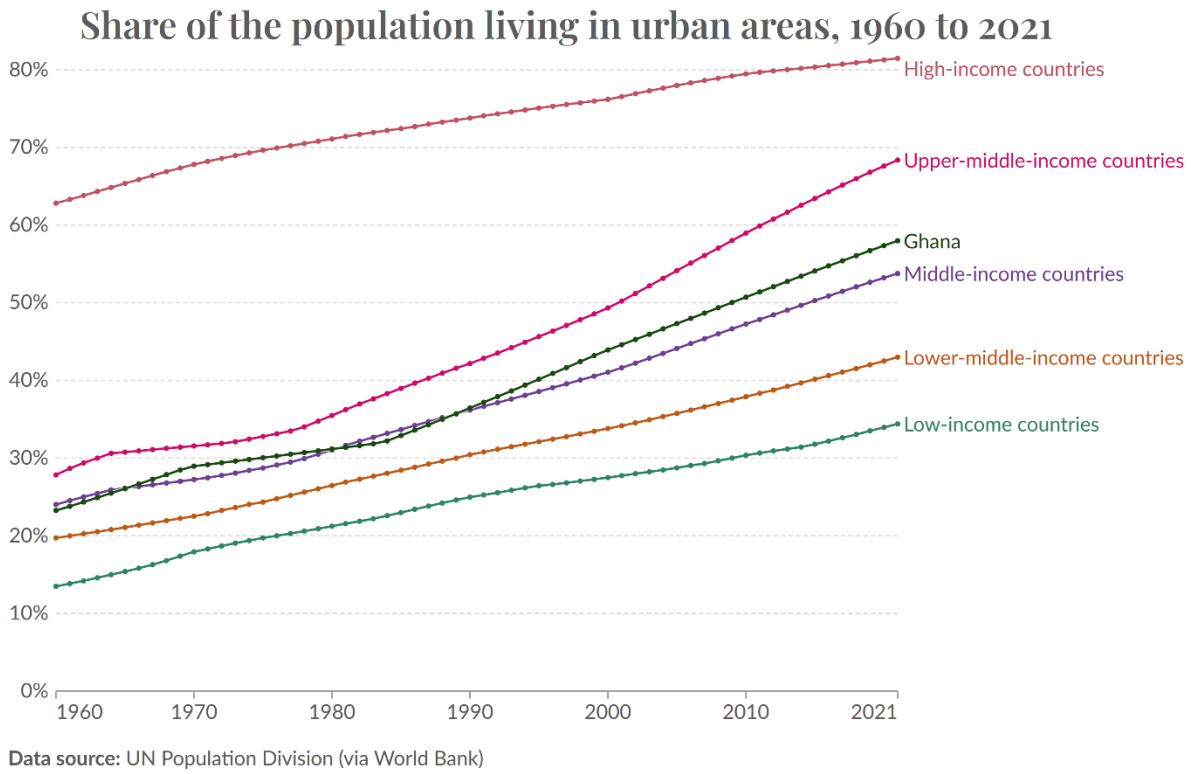
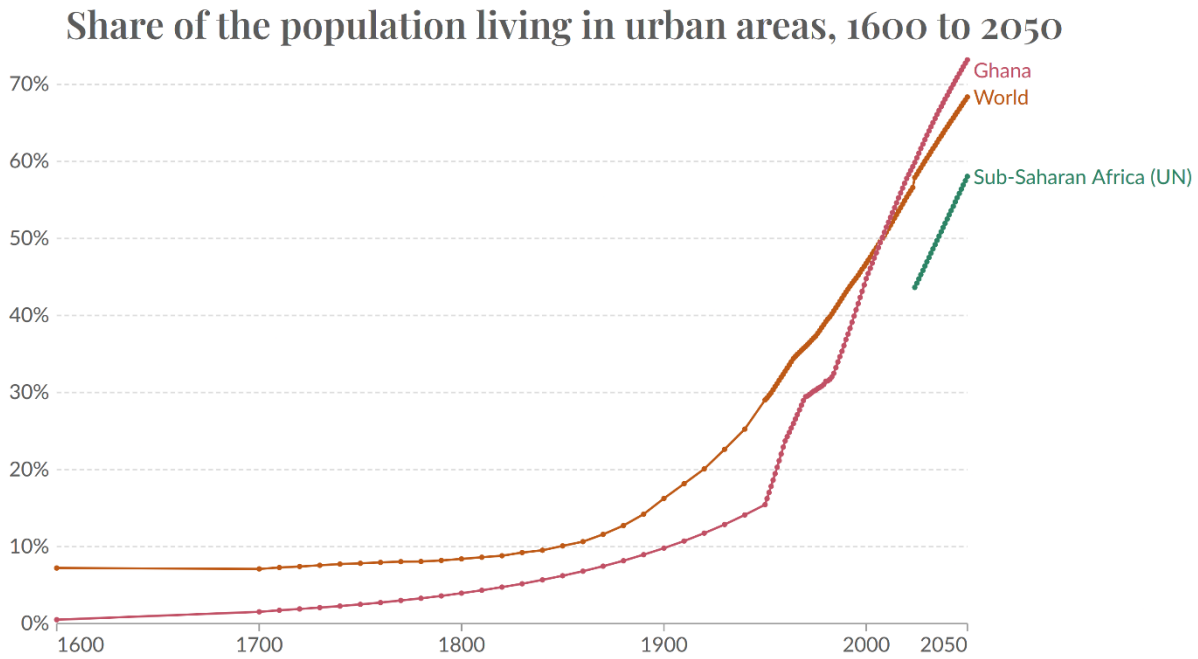


Data source: UN Population Division (via World Bank)

Share of Population Living in Urban Areas

Increasing Urban Population Growth



Data source: United Nations, Department of Economic and Social Affairs, Population Division (2018); HYDE (2023)

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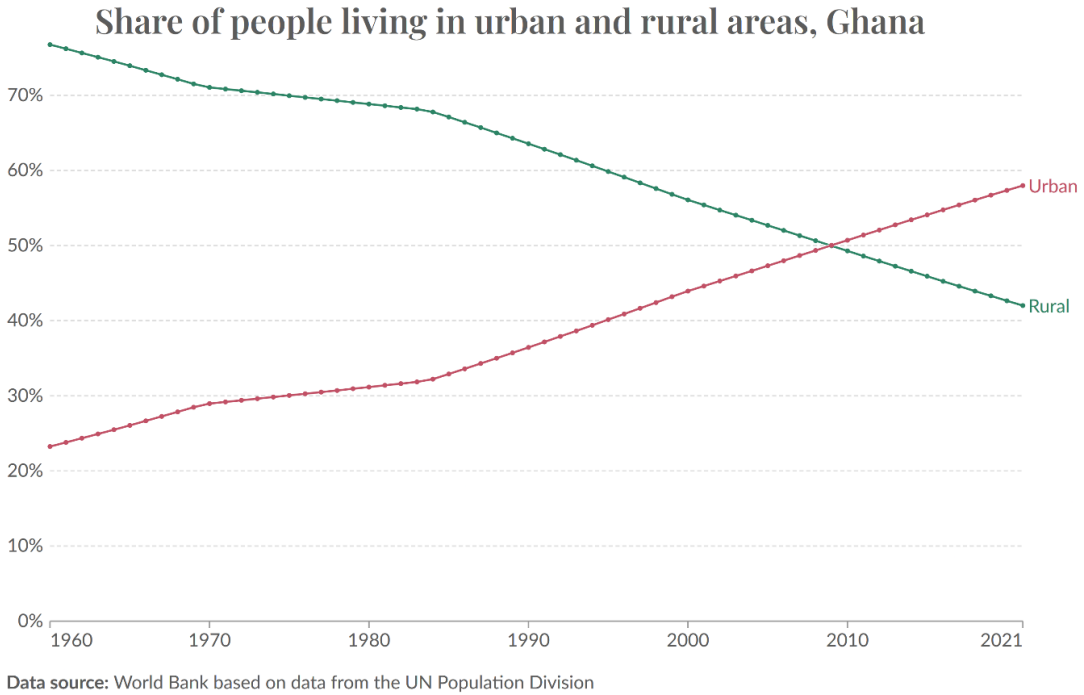
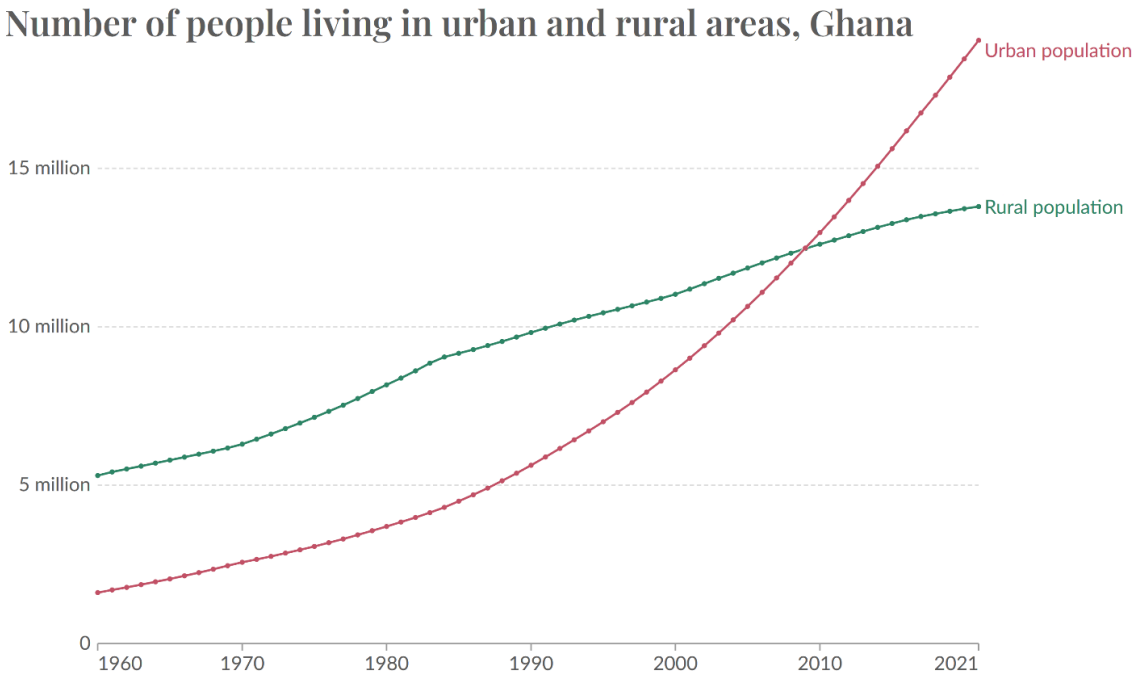


Data source: World Bank based on data from the UN Population Division

Share of Population Living in Urban Vs. Rural Areas

Increasing Urban Population Growth



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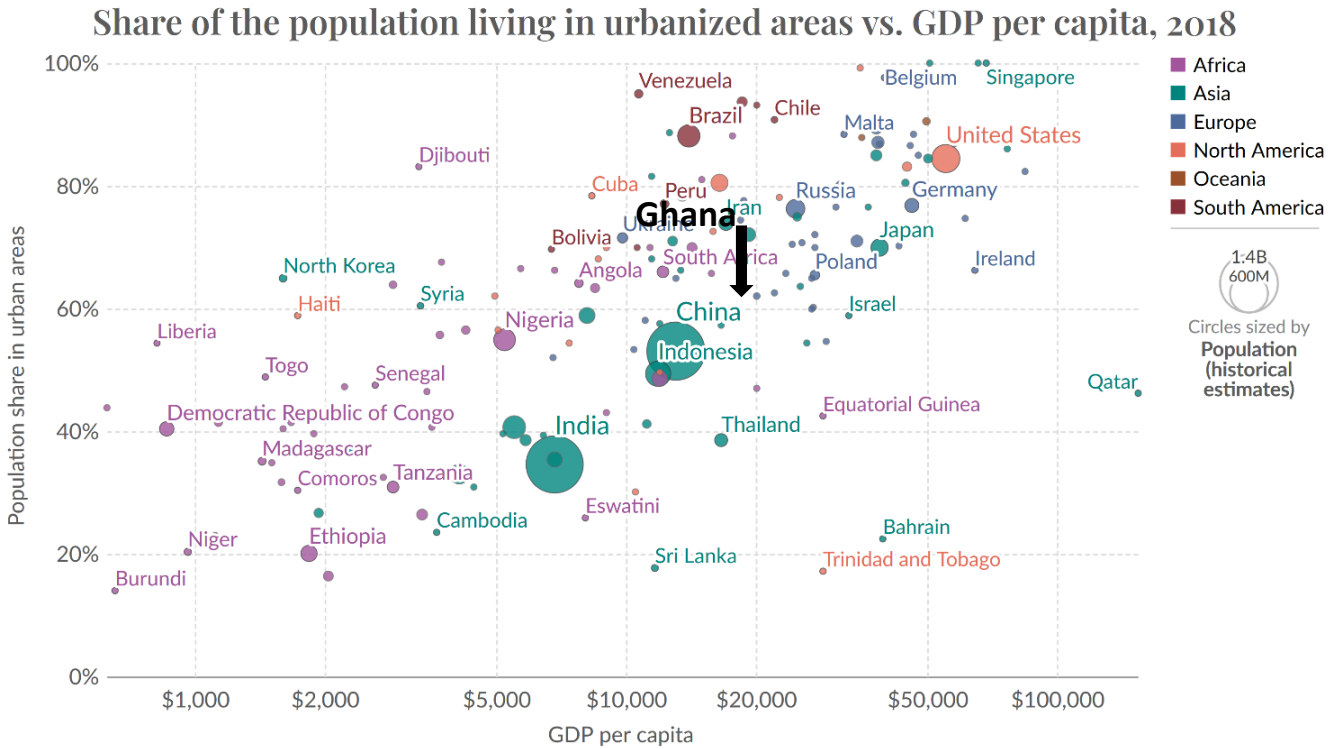
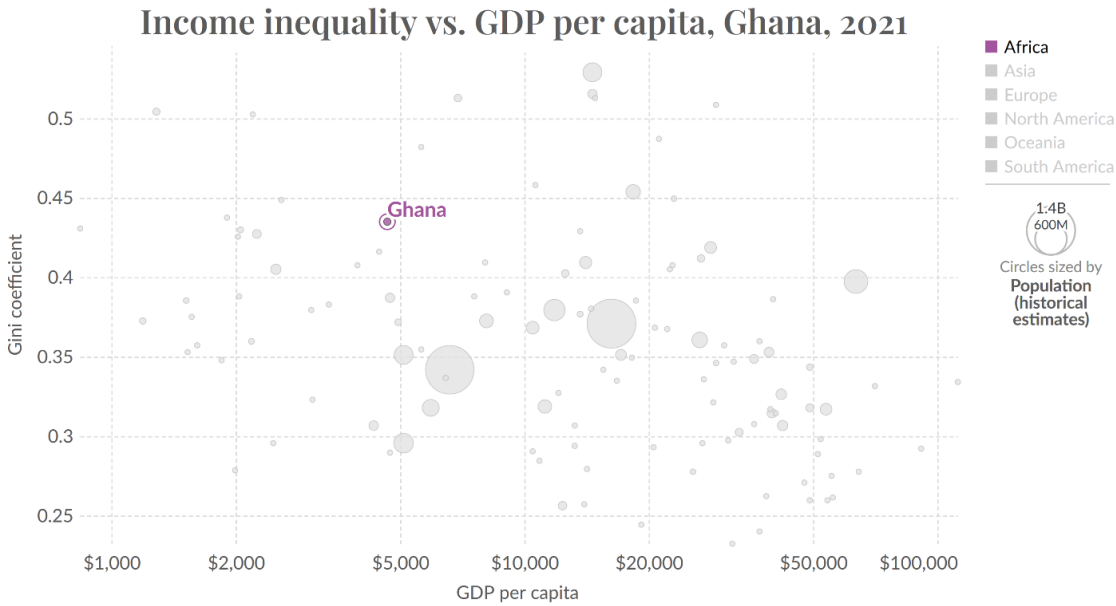


Data source: HYDE (2023); Maddison Project Database 2020 (Bolt and van Zanden, 2020)

Income Inequality



Data source: World Bank Poverty and Inequality Platform (2023); World Bank (2023)

Share of Population Living in Urban Vs. Income

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Summary

- Air pollution is **a silent killer**
- Air quality can be enhanced – COVID
- **Urban growth** is good for progress
- Rapid urbanization is increasing **inequity** leading to **air quality disparities**
- Balance urban growth with **equitable air quality**

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Air Quality - Equity

Take-Home Message

- Investigate **disparities** of air quality
- **Equitable** air quality policies – target vulnerable populations
- Account for **human capability** – individuals, communities, environments
- **Structural changes** - clean energy solutions, enhance public transport, enforce regulations

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Access Talk Online

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