CHEMICAL EXPOSURE AND ITS HEALTH EFFECTS

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IMR

INTRODUCTION

- Chemicals improve health & well-being: -
  - Pharmaceutical – increase life expectancy
  - Agrochemicals – improve crop yields & modify crops to be more resistant
  - Products that prevent water and food borne diseases
  - Detergents and sterility products
  - Improve energy efficiency
- Chemicals hazardous to health: -
  - Persistent and bio-accumulative substances
  - Endocrine disrupting chemicals
  - Heavy metals

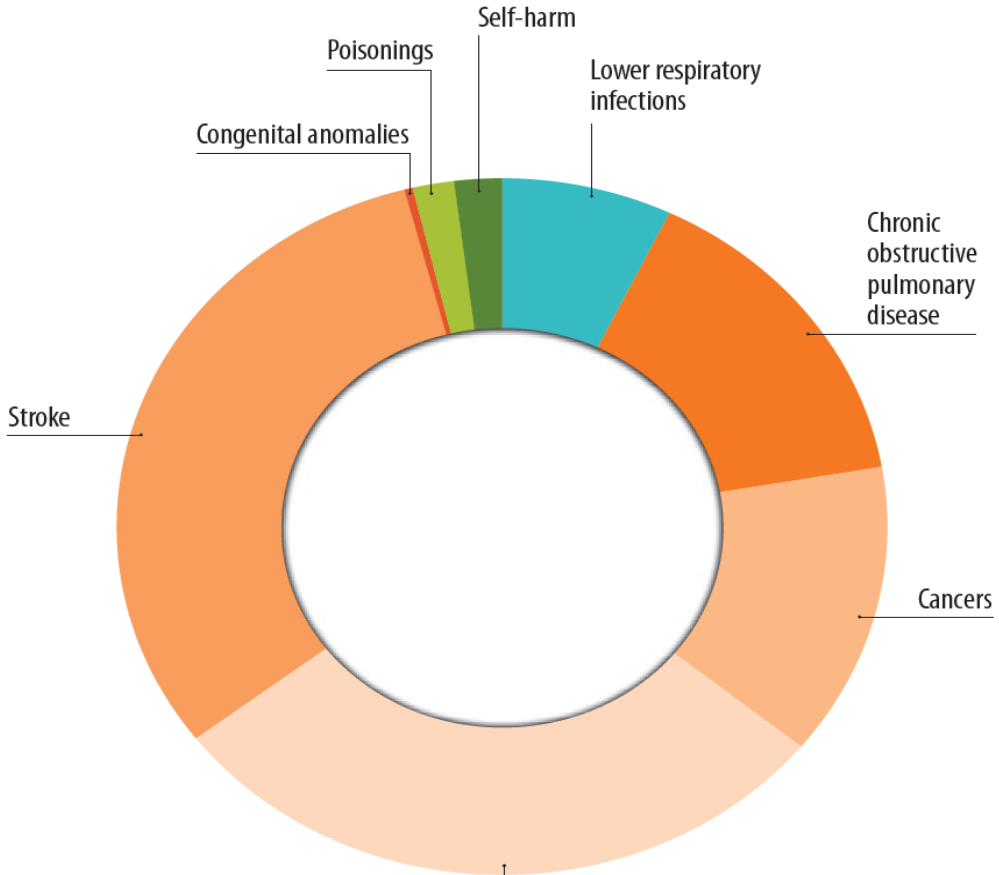
INTRODUCTION

- Health effects depends on: -
  - Toxic properties
  - Level of exposure
  - Frequency of exposure
  - Duration of exposure
  - Individual susceptibility
  - Route of exposure

POPULATION HEALTH IMPACTS FROM ENVIRONMENT

- Difficult to establish causal relationship for some chemicals
- Interpretation of human data difficult as health effect not seen immediately
  - Chronic exposure
  - Variable level of exposure
  - Exposure to multiple chemicals
  - Other predisposing factors: genetic factor, other existing disease
- Evidence from epidemiological studies and animal studies

TOTAL DEATHS ATTRIBUTABLE TO CHEMICALS



Source: WHO. 2016. The public health impact of chemicals: Knowns and unknowns

CANCERS

- Globally, 20% (9–43%) of all cancers were estimated to be attributable to the environment, resulting in 1.7 million deaths each year.
- An estimated 36% of lung cancer globally was attributable to environmental factors, with 20% in high income countries and 46% in low- and middle-income countries (LMIC).
- In LMIC 18% of all cancers other than lung cancer in men and 16% in women were attributable to environment

CANCERS

- **Lung cancers**:
  - 14% due to air pollution
  - 1.8% due to ETS
  - 6.6% due to occupational exposure
- Chemicals associated with lung cancer:
  - Asbestos
  - Diesel engine exhaust
  - Chromium (VI)

CANCERS

- **Breast cancers**: causal links to environmental exposures such as polychlorinated biphenyls (PCBs) and ethylene oxide
- **Lymphoma/ multiple myeloma & leukemia** linked to benzene, formaldehyde, chemicals in rubber manufacturing processes, pesticides & herbicides and solvents.
- **Bladder cancer**: arsenic, aromatic amines (2-naphthylamine, 4-aminobiphenyl and benzidine) in paint, dry cleaners, hairdressers and textile manufacturers

ISCHAEMIC HEART DISEASE (IHD)

- Estimated 35% of total burden of IHD was attributed to environment.
- Major chemicals in environment that attributed to IHD:
  - Ambient air pollution
  - Household air pollution
  - Second-hand tobacco smoke
  - Lead
- Chemicals linked to IHD
  - Arsenic
  - Persistent organic pollutants

STROKE

- Globally, 42% of the total burden of stroke was attributed to the environment.
- Chemicals in environment causing stroke is similar with IHD.
- Links to various other environmental chemicals include:
  - Polychlorinated biphenyl (PCB)
  - Dioxins
  - Phthalates
  - pesticides
  - radiation

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

- 35% of COPD could be attributed to the environment
- Sources of exposure:
  - Dust or chemicals at the workplace
  - Air pollution
  - Second hand tobacco smoke
  - Indoor air pollution from burning of solid fuels

NEUROLOGICAL DISORDERS

- Small to moderate link of these disorders to environment or occupation
- Intellectual disability: caused by lead & methylmercury
- Autism and attention deficit disorders associated with perinatal exposure to EDCs
- Parkinson’s disease and other neurodegenerative diseases linked to pesticides, solvents and heavy metals

CONGENITAL ANOMALIES

- Estimated 6% of global infant deaths are due congenital anomalies and 5% of congenital anomalies were attributable to environmental causes
- Examples of congenital anomalies:
  - Down Syndrome
  - Edward Syndrome
  - Congenital organ defects
- Chemicals linked during prenatal exposure include:
  - congenital heart disease: pesticides, organic solvents and air pollution
  - cryptorchidism and hypospadias: endocrine disrupting chemicals

ARSENIC CONTAMINATION

- Exposure usually from well water.
- May also occur because of mining or industrial activities
- Proportion of population exposed to elevated As that develops arsenicosis range from 15% - 30%.
- Long latency period. Minimum of 2-5 years
- Longer for cancer ~ 20 years
- Health Effects:
  - thickening and discoloration of the skin;
  - nausea and diaorrhea;
  - decreased production of blood cells;
  - abnormal heart rhythm and blood vessel damage
  - numbness in the hands and feet.
  - Bladder, liver and lung cancer

BAUXITE MINING

- Unsustainable mining processes
- Health effects due to air, water and soil pollution, as well as food contamination
  - Respiratory problems – bronchial asthma, bronchitis
  - Cardiovascular problems
  - Skin and eye irritation – irritant dermatitis, eczema
  - Heavy metals may cause neuro toxicity, neurodevelopmental delays, nephrotoxicity, cardiovascular diseases

SUMMARY

- Premature death and disease due to environmental exposure can be prevented
- Promote healthier environment
- Through well established and cost effective interventions
- Cannot be done by a single agency
- Important of strong intersectoral action to create healthier environment and sustainably improve lives of our people

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