THIAGARAJAR COLLEGE OF ENGINEERING

TCE ENVIS RP

ENVIRONMENTAL INFORMATION SYSTEM

N E W S L E T T E R

VOLUME IV - ISSUE 1: APRIL - JUNE 2019

AIR POLLUTION

WHO REPORT ON AIR POLLUTION

MAJOR CAUSES OF AIR POLLUTION

JOIN HANDS

TO WORK TOWARDS **#BEAT AIR POLLUTION** AND CREATE AN ECO FRIENDLY SUSTAINABLE ENVIRONMENT

INDIA`S MAJOR POLLUTED CITIES

AIR POLLUTION AWARENESS POSTERS

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TCE ENVIS RESOURCE PARTNER,
CENTRE FOR PLASTIC WASTE MANAGEMENT

FUNDED BY MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

Editorial Message

Dear Readers,

It is noted by WHO an average of nine out of 10 people around the world are exposed to air pollutants that exceed safe levels. This year's observance of World Environment Day on June 5 focuses on air pollution and its effects to the environment. The United Nations organization announces that every year in developing countries like India, the household indoor pollution is linked to 3.8 million premature deaths. Moreover, the pollution from transport, is linked to some 400,000 deaths annually. The transport sector accounts for nearly a fourth of carbon dioxide emissions, with the UN expecting the proportion to increase.

Steps had been taken by developing countries which have resisted efforts to completely stop using coal for energy generation, arguing that the cheap fuel is needed to power industries. Governments started providing more incentives to the private sector for investing in green energy, including support in research and development.

The observance of World Environment Day by the UN is urging governments to do more to beat air pollution. The observance also aims to inspire individuals to do their share in improving air quality. Often, the most vulnerable to the health risks posed by air pollution are those who produce it.

An awareness magazine on air pollution and its problem is to be published among the public and it is the need of the hour. This magazine takes care of that !!!

EDITOR

Beat Air Pollution | WORLD ENVIRONMENT DAY | CHINA 2019 | UN environment #BeatAirPollution

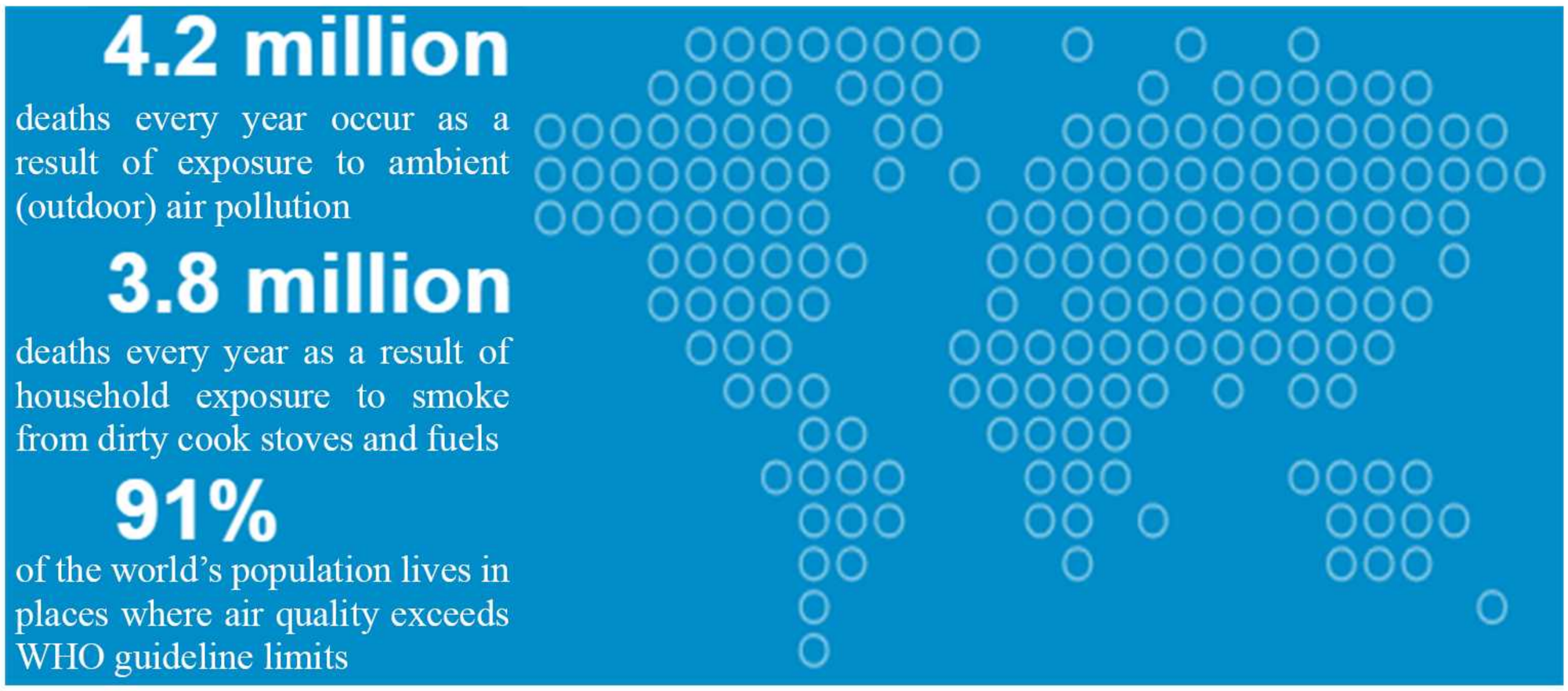
World Health Organization Report on Air Pollution

Overview:

Air pollution kills an estimated seven million people worldwide every year. WHO data shows that 9 out of 10 people breathe air containing high levels of pollutants. WHO is working with countries to monitor air pollution and improve air quality.

From smog hanging over cities to smoke inside the home, air pollution poses a major threat to health and climate. The combined effects of ambient (outdoor) and household air pollution cause about seven million premature deaths every year, largely as a result of increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer and acute respiratory infections.

More than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed WHO guideline limits, with low- and middle-income countries suffering from the highest exposures, both indoors and outdoors.



Credit: WHO

Ambient air pollution:

From smog hanging over cities to smoke inside the home, air pollution poses a major threat to health and climate. Ambient air pollution accounts for an estimated 4.2 million deaths per year due to stroke, heart disease, lung cancer and chronic respiratory diseases. Around 91% of the world's population live in places where air quality levels exceed WHO limits. While ambient air pollution affects developed and developing countries alike, low- and middle-income countries experience the highest burden, with the greatest toll in the WHO Western Pacific and South-East Asia regions.

The major outdoor pollution sources include vehicles, power generators, building heating systems, agriculture/waste incineration and industry. Policies and investments supporting cleaner transport, energy-efficient housing, power generation, industry and better municipal waste management can effectively reduce ambient air pollution.

Air quality is closely linked to earth's climate and ecosystems. Many of the drivers of air pollution (i.e. combustion of fossil fuels) are also sources of high CO2 emissions. Policies to reduce air pollution, offer a "win–win" strategy for both climate and health, lowering the burden of disease attributable to air pollution, as well as contributing to the near- and long-term mitigation of climate change.

KEYFACTS

- Air pollution is a major environmental risk to health. By reducing air pollution levels, countries can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma.
- The lower the levels of air pollution, the better the cardiovascular and respiratory health of the population will be, both long- and short-term.
- The WHO Air Quality Guidelines: Global Update 2005 provide an assessment of health effects of air pollution and thresholds for health–harmful pollution levels.
- In 2016, 91% of the world population was living in places where the WHO air quality guidelines levels were not met.
- Ambient (outdoor air pollution) in both cities and rural areas was estimated to cause 4.2 million premature deaths worldwide in 2016.
- Some 91% of those premature deaths occurred in low- and middle-income countries, and the greatest number in the WHO South-East Asia and Western Pacific regions.
- Policies and investments supporting cleaner transport, energy-efficient homes, power generation, industry and better municipal waste management would reduce key sources of outdoor air pollution.
- In addition to outdoor air pollution, indoor smoke is a serious health risk for some 3 billion people who cook and heat their homes with biomass, kerosene fuels and coal.

Household air pollution:

Household air pollution is one of the leading causes of disease and premature death in the developing world.

Exposure to smoke from cooking fires causes 3.8 million premature deaths each year, mostly in low- and middle-income countries. Burning fuels such as dung, wood and coal in inefficient stoves or open hearths produces a variety of health-damaging pollutants, including particulate matter (PM), methane, carbon monoxide, polyaromatic hydrocarbons (PAH) and volatile organic compounds (VOC). Burning kerosene in simple wick lamps also produces significant emissions of fine particles and other pollutants. Particulate matter is a pollutant of special concern.

Many studies have demonstrated a direct relationship between exposure to PM and negative health impacts. Smaller-diameter particles (PM2.5 or smaller) are generally more dangerous and ultrafine particles (one micron in diameter or less) can penetrate tissues and organs, posing an even greater risk of systemic health impacts.

Exposure to indoor air pollutants can lead to a wide range of adverse health outcomes in both children and adults, from respiratory illnesses to cancer to eye problems.

Members of households that rely on polluting fuels and devices also suffer a higher risk of burns, poisonings, musculoskeletal injuries and accidents.

KEYFACTS

- Around 3 billion people cook using polluting open fires or simple stoves fuelled by kerosene, biomass (wood, animal dung and crop waste) and coal.
- Each year, close to 4 million people die prematurely from illness attributable to household air pollution from inefficient cooking practices using polluting stoves paired with solid fuels and kerosene.
- Household air pollution causes noncommunicable diseases including stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer.
- Close to half of deaths due to pneumonia among children under 5 years of age are caused by particulate matter (soot) inhaled from household air pollution.

Impacts on health

3.8 million people a year die prematurely from illness attributable to the household air pollution caused by the inefficient use of solid fuels and kerosene for cooking. Among these 3.8 million deaths:

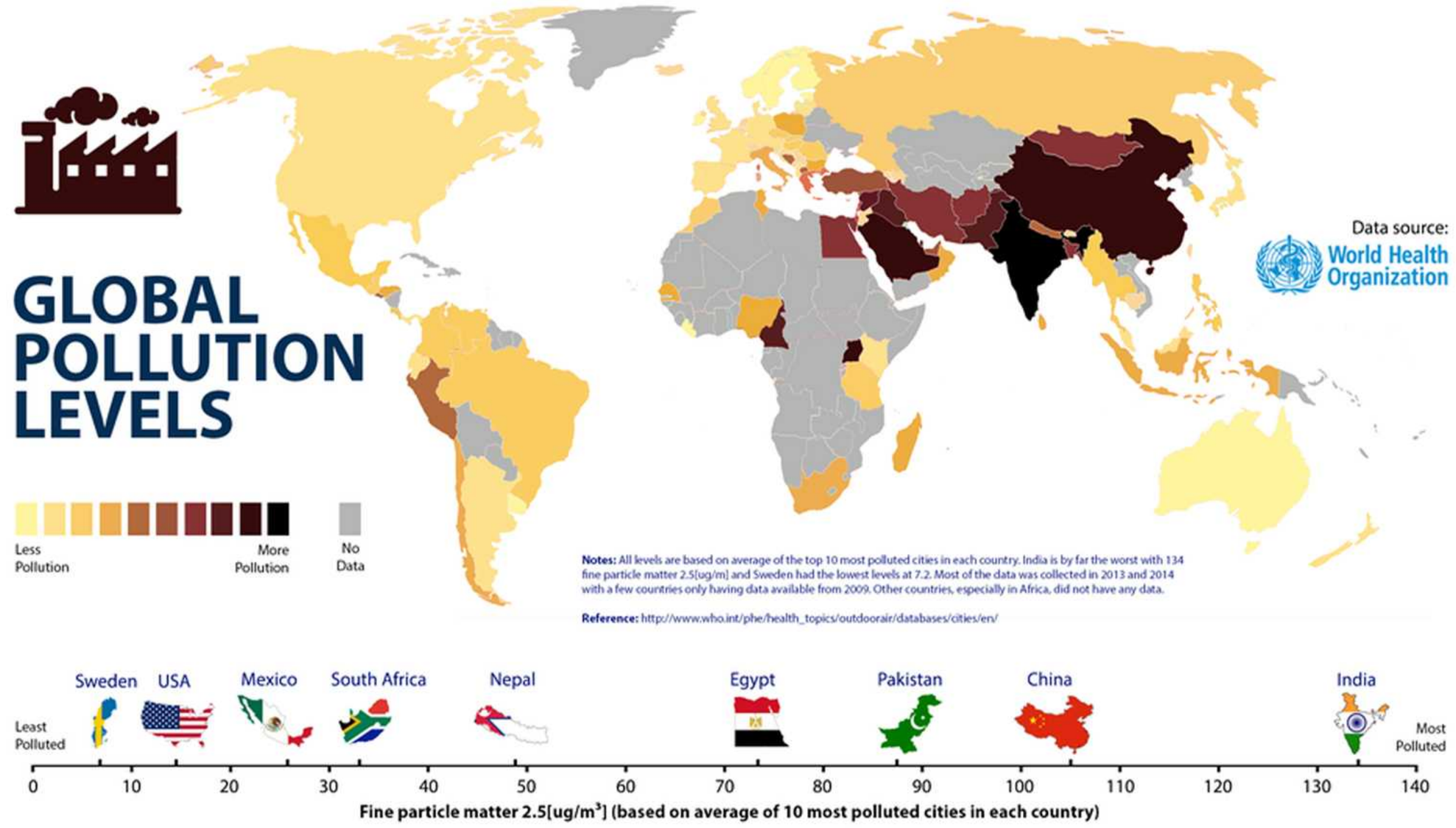
- 27% are due to pneumonia
- 18% from stroke
- 27% from ischaemic heart disease
- 20% from chronic obstructive pulmonary disease (COPD)
- 8% from lung cancer.

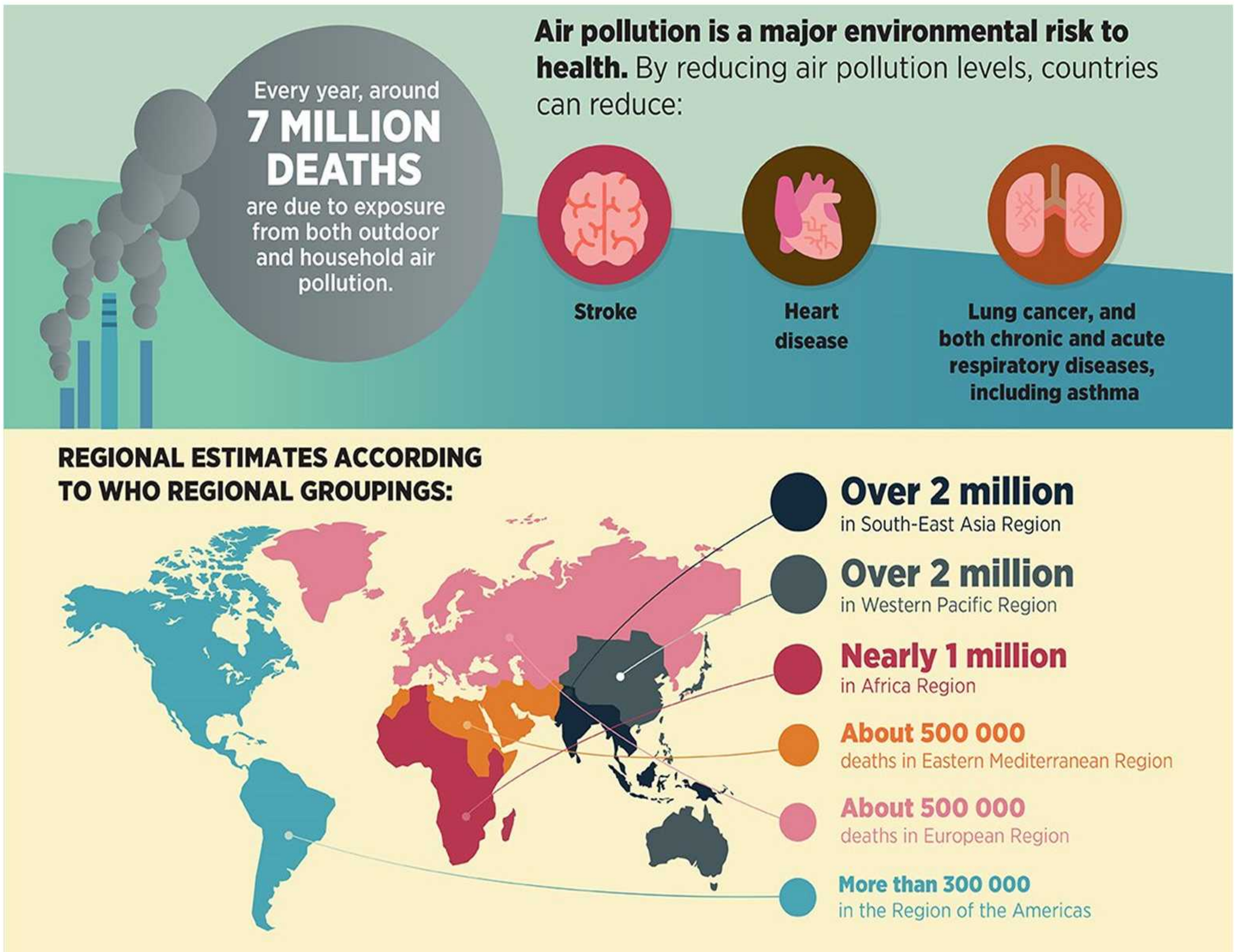
Impacts on health equity, development and climate change

Without a substantial policy change, the total number of people lacking access to clean fuels and technologies will remain largely unchanged by 2030 (International Energy Agency, 2017 (1)) and therefore hinder the achievement of the 2030 Agenda for Sustainable Development.

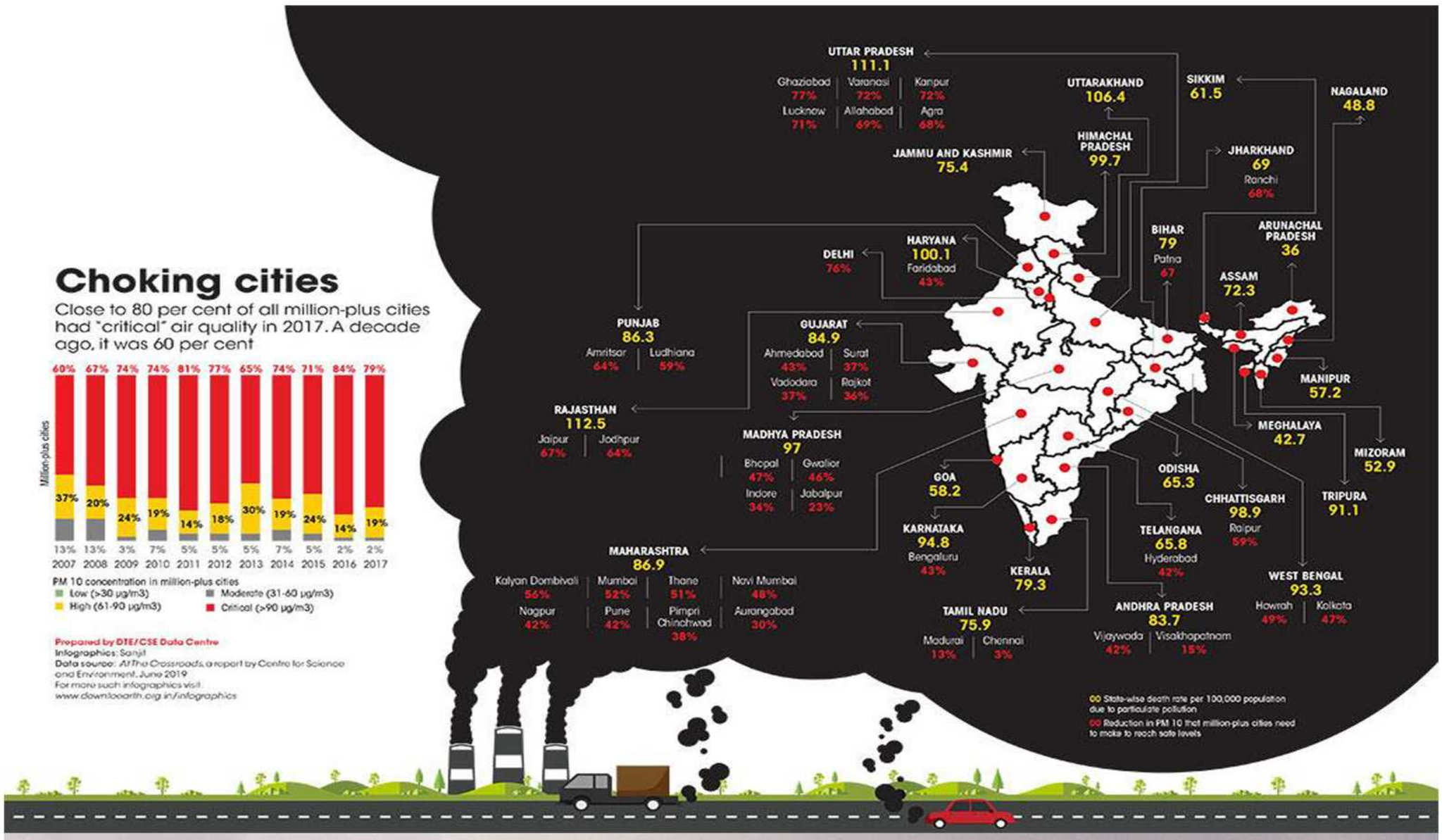
- Fuel gathering increases the risk of musculoskeletal damage, consumes considerable time for women and children, limits other productive activities (such as income generation) and takes children away from school. In less secure environments, women and children are at risk of injury and violence during fuel gathering.
- Black carbon (sooty particles) and methane emitted by inefficient stove combustion are powerful climate change pollutants.
- Many of the fuels and technologies used by households for cooking, heating and lighting present safety risks. The ingestion of kerosene is the leading cause of childhood poisonings, and a large fraction of the severe burns and injuries occurring in low- and middle-income countries are linked to household energy use for cooking, heating and/or lighting.
- The lack of access to electricity for 1 billion people (many of whom then use kerosene lamps for lighting) exposes households to very high levels of fine particulate matter. The use of polluting lighting fuels introduces other health risks, such as burns, injuries, poisonings, and constrains other opportunities for health and development, like studying or engaging in small crafts and trades, which require adequate lighting.

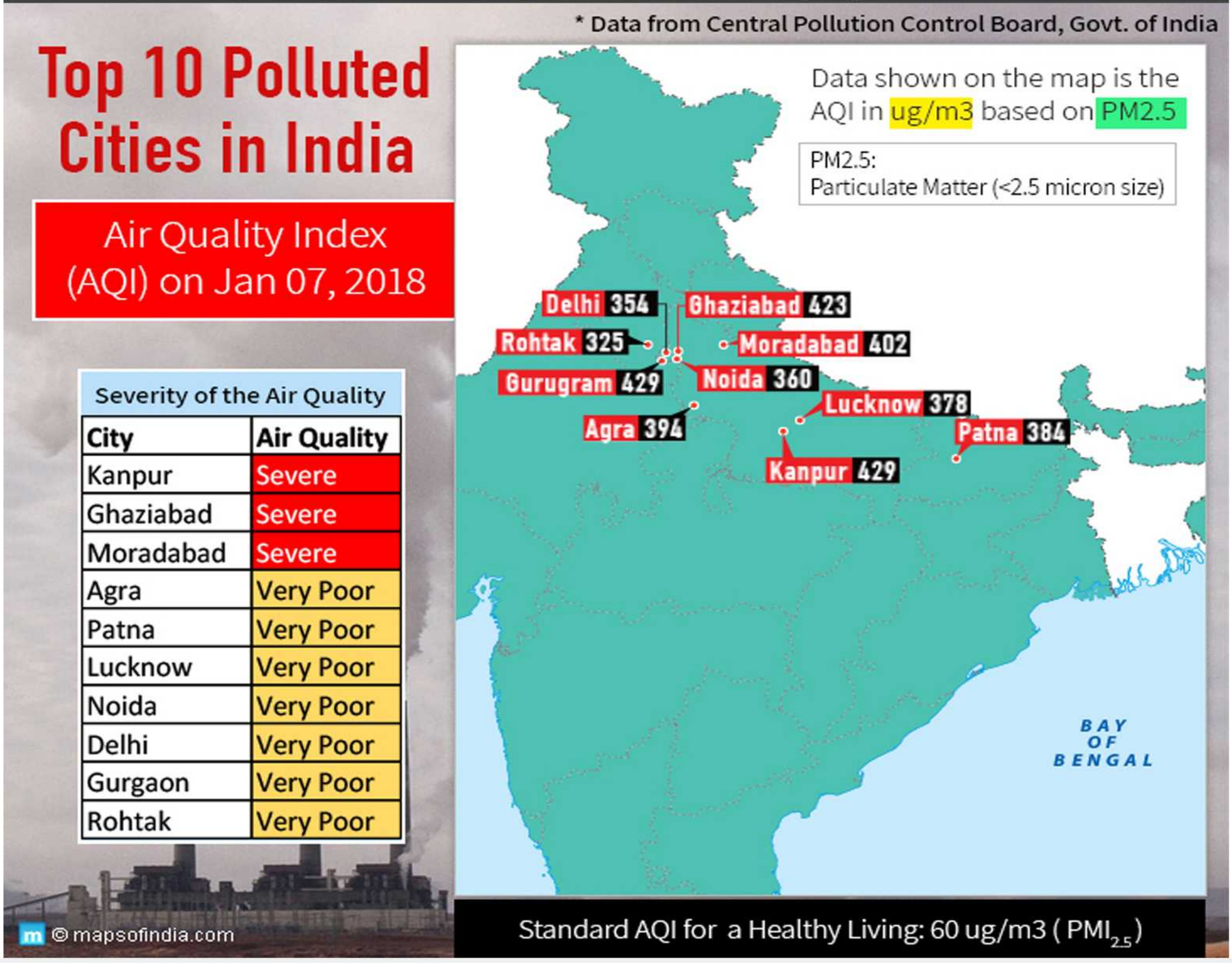
Global Air Pollution Status and Health Risk





Top Air Polluted Cities in India





Severity of the Air Quality	
City	Air Quality
Kanpur	Severe
Ghaziabad	Severe
Moradabad	Severe
Agra	Very Poor
Patna	Very Poor
Lucknow	Very Poor
Noida	Very Poor
Delhi	Very Poor
Gurgaon	Very Poor
Rohtak	Very Poor

Major Causes of Air Pollution

Introduction:

Air pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment. A substance in the air that can be adverse to humans and the environment is known as an air pollutant. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made. Pollutants can be classified as primary or secondary. Usually, primary pollutants are directly produced from a process, such as ash from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or sulphur dioxide released from factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone – one of the many secondary pollutants that make up photochemical smog. Some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants

MAJOR PRIMARY POLLUTANTS PRODUCED BY HUMAN ACTIVITY INCLUDE:

- Sulphur oxides (SOx) - especially sulphur dioxide, a chemical compound with the formula SO2. SO2 is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulphur compounds, their combustion generate sulfur dioxide. Further oxidation of SO2, usually in the presence of a catalyst such as NO2, forms H2SO4, and thus acid rain. This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.
- Nitrogen oxides (NOx) - especially nitrogen dioxide are expelled from high temperature combustion, and are also produced naturally during thunderstorms by electric discharge. Can be seen as the brown haze dome above or plume downwind of cities. Nitrogen dioxide is the chemical compound with the formula NO2. It is one of the several nitrogen oxides. This reddish-brown toxic gas has a characteristic sharp, biting odor. NO2 is one of the most prominent air pollutants.
- Carbon monoxide (CO) - is a colourless, odourless, non-irritating but very poisonous gas. It is a product by incomplete combustion of fuel such as natural gas, coal or wood. Vehicular exhaust is a major source of carbon monoxide.
- Volatile organic compounds - VOCs are an important outdoor air pollutant. In this field they are often divided into the separate categories of methane (CH4) and non methane (NMVOCs). Methane is an extremely efficient greenhouse gas which contributes to enhanced global warming. Other hydrocarbon VOCs are also significant greenhouse gases via their role in creating ozone and in prolonging the life of methane in the atmosphere, although the effect varies depending on local air quality. Within the NMVOCs, the aromatic compounds benzene, toluene and xylene are suspected carcinogens and may lead to leukemia through prolonged exposure. 1, 3-butadiene is another dangerous compound which is often associated with industrial uses.
- Particulates, alternatively referred to as particulate matter (PM), atmospheric particulate matter, or fine particles, are tiny particles of solid or liquid suspended in a gas. In contrast, aerosol refers to particles and the gas together. Sources of particulates can be manmade or natural. Some particulates occur naturally, originating from volcanoes, dust storms, forest and grassland fires, living vegetation, and sea spray. Human activities, such as the burning of fossil fuels in vehicles, power plants and various industrial processes also generate significant amounts of aerosols. Averaged over the globe, anthropogenic aerosols—those made by human activities – currently account for about 10 percent of the total amount of aerosols in our atmosphere. Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer.

- Persistent free radicals connected to airborne fine particles could cause cardiopulmonary disease.
- Toxic metals, such as lead and mercury, especially their compounds.
- Chlorofluorocarbons (CFCs) - harmful to the ozone layer emitted from products currently banned from use.
- Ammonia (NH3) - emitted from agricultural processes. Ammonia is a compound with the formula NH3. It is normally encountered as a gas with a characteristic pungent odour. Ammonia, either directly or indirectly, is also a building block for the synthesis of many pharmaceuticals. Although in wide use, ammonia is both caustic and hazardous.
- Odors – such as from garbage, sewage, and industrial processes
- Radioactive pollutants – produced by nuclear explosions, nuclear events, war explosives, and natural processes such as the radioactive decay of radon.

SECONDARY POLLUTANTS

Particulates created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution; the word "smog" is a portmanteau of smoke and fog. Classic smog results from large amounts of coal burning in an area caused by a mixture of smoke and sulphur dioxide. Modern smog does not usually come from coal but from vehicular and industrial emissions that are acted on in the atmosphere by ultraviolet light from the sun to form secondary pollutants that also combine with the primary emissions to form photochemical smog.

FACTORS RESPONSIBLE FOR AIR POLLUTION

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Sources of air pollution refer to the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphereMan-made sources mostly related to burning different kinds of fuel.

- "Stationary Sources" include smoke stacks of power plants, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel-burning heating devices.
- In developing and poor countries, traditional biomass burning is the major source of air pollutants; traditional biomass includes wood, crop waste and dung.
- "Mobile Sources" include motor vehicles, marine vessels, aircraft and the effect of sound etc.
- Chemicals, dust and controlled burn practices in agriculture and forestry management. Controlled or prescribed burning is a technique sometimes used in forest management, farming, prairie restoration or greenhouse gas abatement.
- Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning stimulates the germination of some desirable forest trees, thus renewing the forest.
- Fumes from paint, hair spray, varnish, aerosol sprays and other solvents.
- Waste deposition in landfills, which generate methane. Methane is highly flammable and may form explosive mixtures with air.
- Military, such as nuclear weapons, toxic gases, germ warfare and rocketry

NATURAL SOURCES

- Dust from natural sources, usually large areas of land with few or no vegetation.
- Methane, emitted by the digestion of food by animals, for example cattle.
- Radon gas from radioactive decay within the Earth's crust. Radon is a colorless, odorless, naturally occurring, radioactive noble gas that is formed from the decay of radium. It is considered to be a health hazard. Radon gas from natural sources can accumulate in buildings, especially in confined areas such as the basement and it is the second most frequent cause of lung cancer, after cigarette smoking. Smoke and carbon monoxide from wildfires.
- Vegetation, in some regions, emits environmentally significant amounts of VOCs on warmer days. These VOCs react with primary anthropogenic pollutants – specifically, NOx, SOx, and anthropogenic organic carbon compounds – to produce a seasonal haze of secondary pollutants.
- Volcanic activity, which produce sulfur, chlorine, and ash particulates.

Effects of Air Pollution:

HEALTH EFFECTS

Air pollution is a significant risk factor for multiple health conditions including respiratory infections, heart disease, and lung cancer, according to the WHO. The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing, asthma and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death.

The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, the individual's health status and genetics

The most common sources of air pollution include particulates, ozone, nitrogen dioxide, and sulfur dioxide. Both indoor and outdoor air pollution have caused approximately 3.3 million deaths worldwide. Children aged less than five years that live in developing countries are the most vulnerable population in terms of total deaths attributable to indoor and outdoor air pollution.

The World Health Organization states that 2.4 million people die each year from causes directly attributable to air pollution, with 1.5 million of these deaths attributable to indoor air pollution

The worst short term civilian pollution crisis in India was the 1984 Bhopal Disaster. Leaked industrial vapours from the Union Carbide factory, belonging to Union Carbide, Inc., U.S.A., killed more than 25,000 people outright and injured anywhere from 150,000 to 600,000. The United Kingdom suffered its worst air pollution event when the December 4 Great Smog of 1952 formed over London. In six days more than 4,000 died, and 8,000 more died within the following months. An accidental leak of anthrax spores from a biological warfare laboratory in the former USSR in 1979 near Sverdlovsk is believed to have been the cause of hundreds of civilian deaths.

Around the world, children living in cities with high exposure to air pollutants are at increased risk of developing asthma, pneumonia and other lower respiratory infections. Because children are outdoors more and have higher minute ventilation they are more susceptible to the dangers of air pollution. Risks of low initial birth weight are alsoheightened in such cities.

ENVIRONMENTAL EFFECTS

Poisonous air pollutants (toxic chemicals in the air) can form acid rain. It can also form dangerous ground level ozone. These destroy trees, crops, farms, animals and continue to make water bodies harmful to humans and animals that live and depend on water.

ECONOMICAL EFFECTS

The effect of air pollution on the economy may be a derived one. In simple language, the economy thrives when people are healthy, and business that depends on cultivated raw materials and natural resources are running at full efficiency. Air pollution reduces agricultural crop and commercial forest yields by billions of money each year. This in addition to people staying off work for health reasons can costs the economy greatly.

Measures to reduce Air Pollution:

Solution efforts on pollution are always a big problem. This is why prevention interventions are always a better way of controlling air pollution. These prevention methods can either come from government (laws) or by individual actions. In many big cities, monitoring equipment's have been installed at many points in the city. Authorities read them regularly to check the quality of air.

GOVERNMENT LEVEL PREVENTION

- Governments throughout the world have already taken action against air pollution by introducing green energy. Some governments are investing in wind energy and solar energy, as well as other renewable energy, to minimize burning of fossil fuels, which cause heavy air pollution.
- Governments are also forcing companies to be more responsible with their manufacturing activities, so that even though they still cause pollution, they are a lot controlled.
- Companies are also building more energy efficient cars, which pollute less than before.

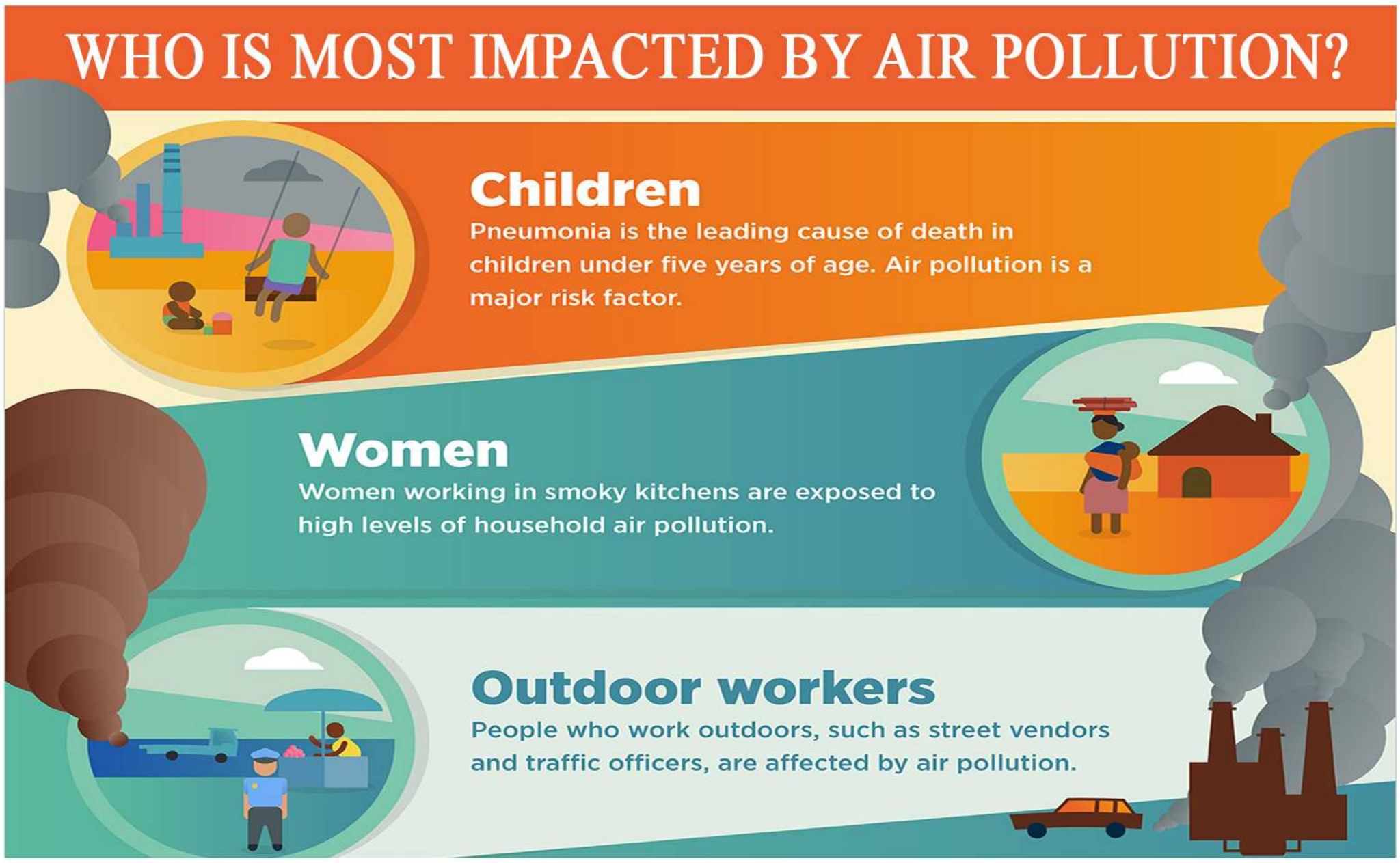
INDIVIDUAL LEVEL PREVENTION

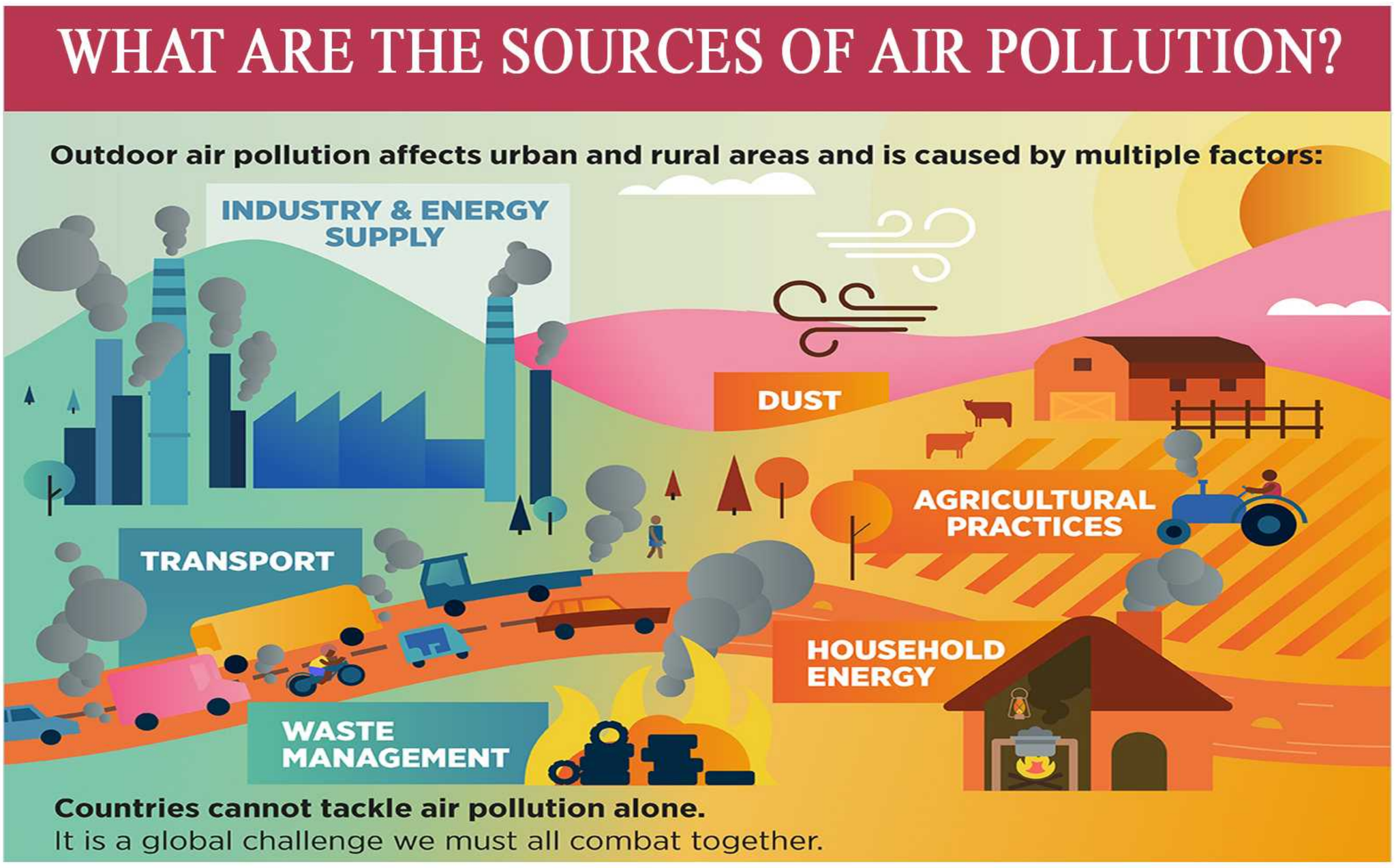
- Encourage your family to use the bus, train or bike when commuting. If we all do this, there will be fewer cars on road and less fumes.
- Use energy (light, water, boiler, kettle and fire woods) wisely. This is because lots of fossil fuels are burned to generate electricity, and so if we can cut down the use, we will also cut down the amount of pollution we create.
- Recycle and re-use things. This will minimize the dependence of producing new things. Remember manufacturing industries create a lot of pollution, so if we can re-use things like shopping plastic bags, clothing, paper and bottles, it can help

Conclusion:

Air pollution can be prevented only if individuals and businesses stop using toxic substances that cause air pollution in the first place. This would require the cessation of all fossil fuel-burning processes, from industrial manufacturing to home use of airconditioners. This is an unlikely scenario at this time. However, we have to make rules which set stringent regulations on industrial and power supply manufacturing and handling. The regulations are to be designed to further reduce harmful emissions into the Earth's atmosphere.

Air Pollution - Awareness Posters





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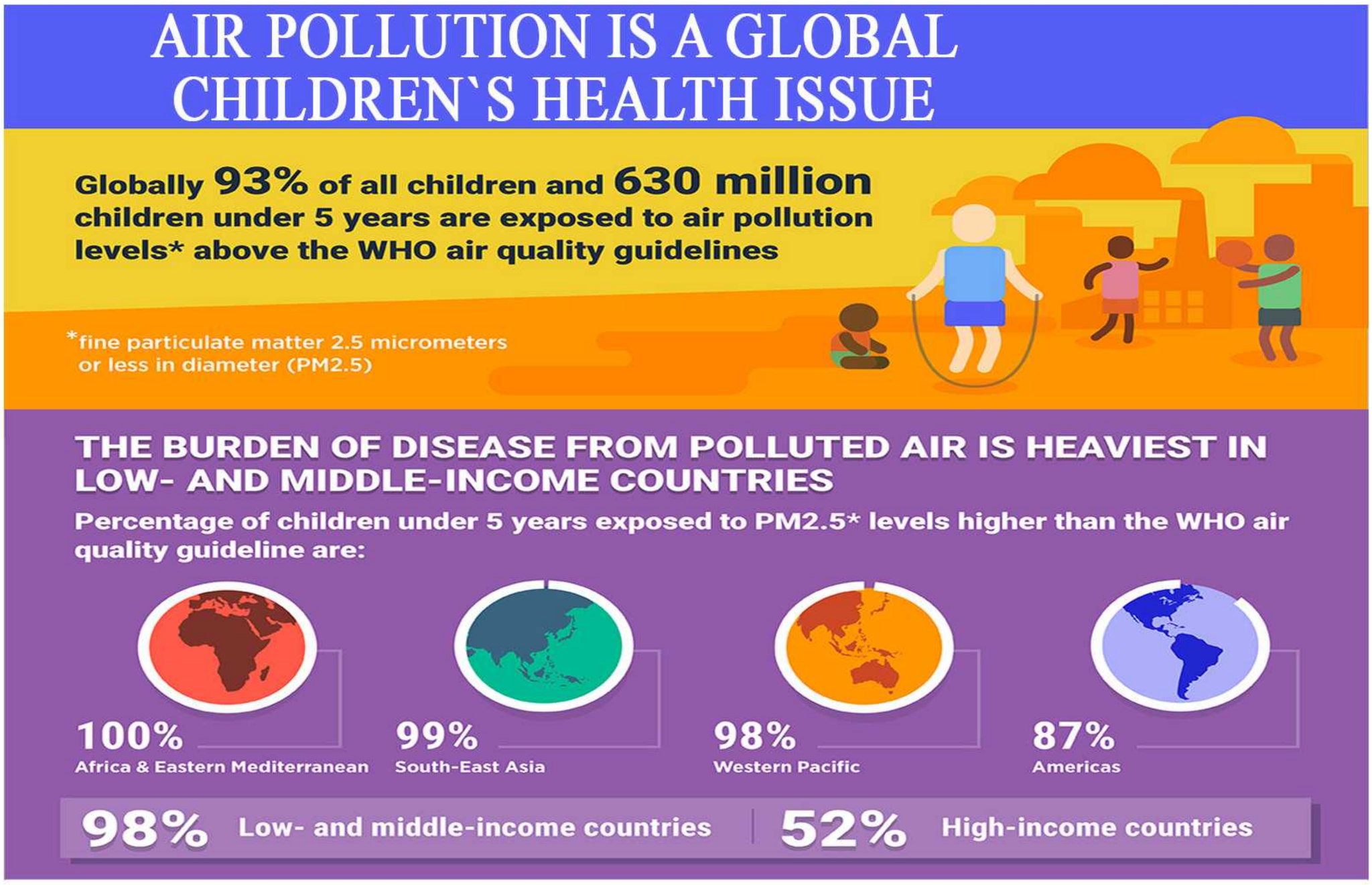
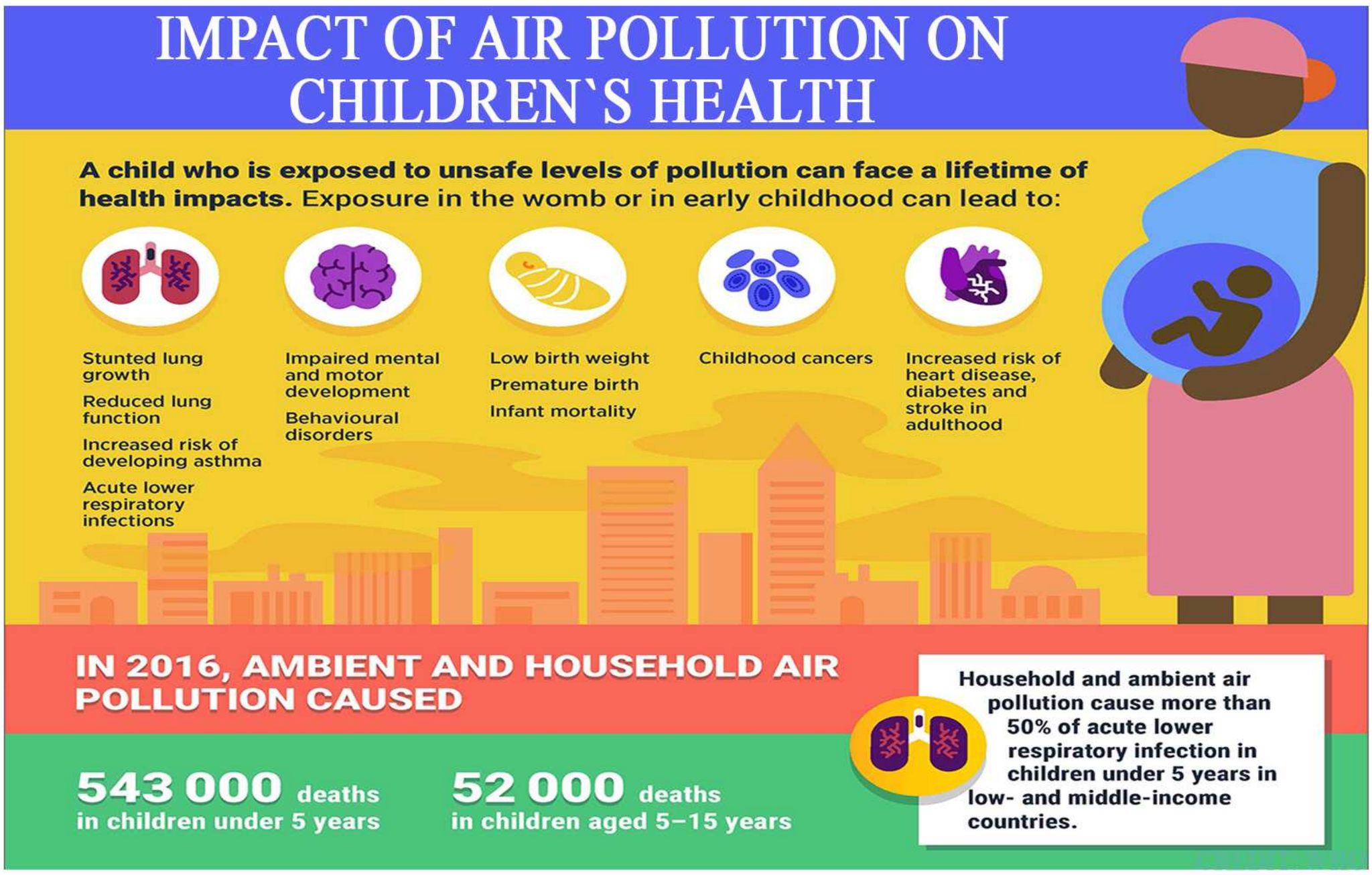
Air Pollution - Awareness Posters





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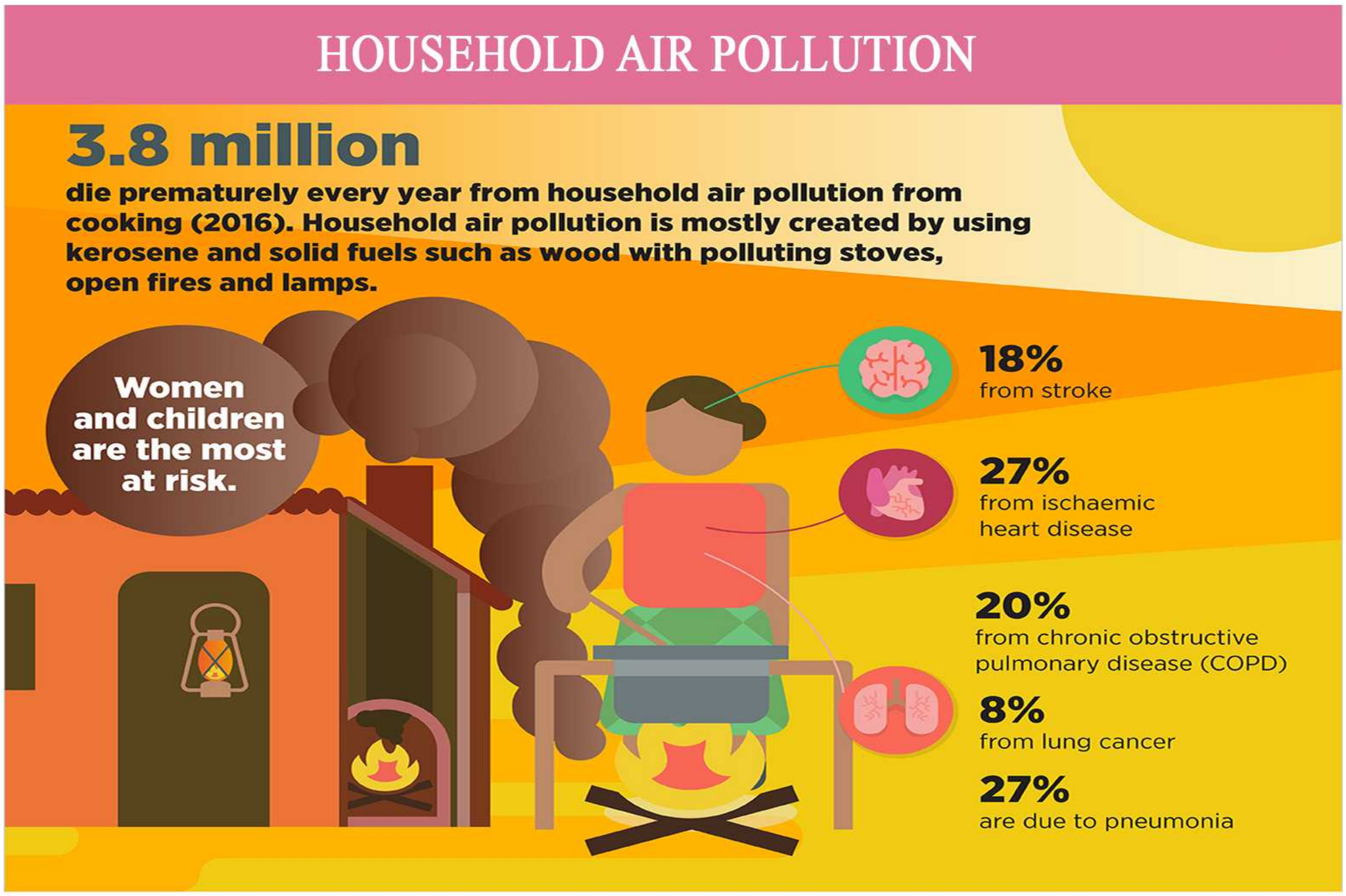

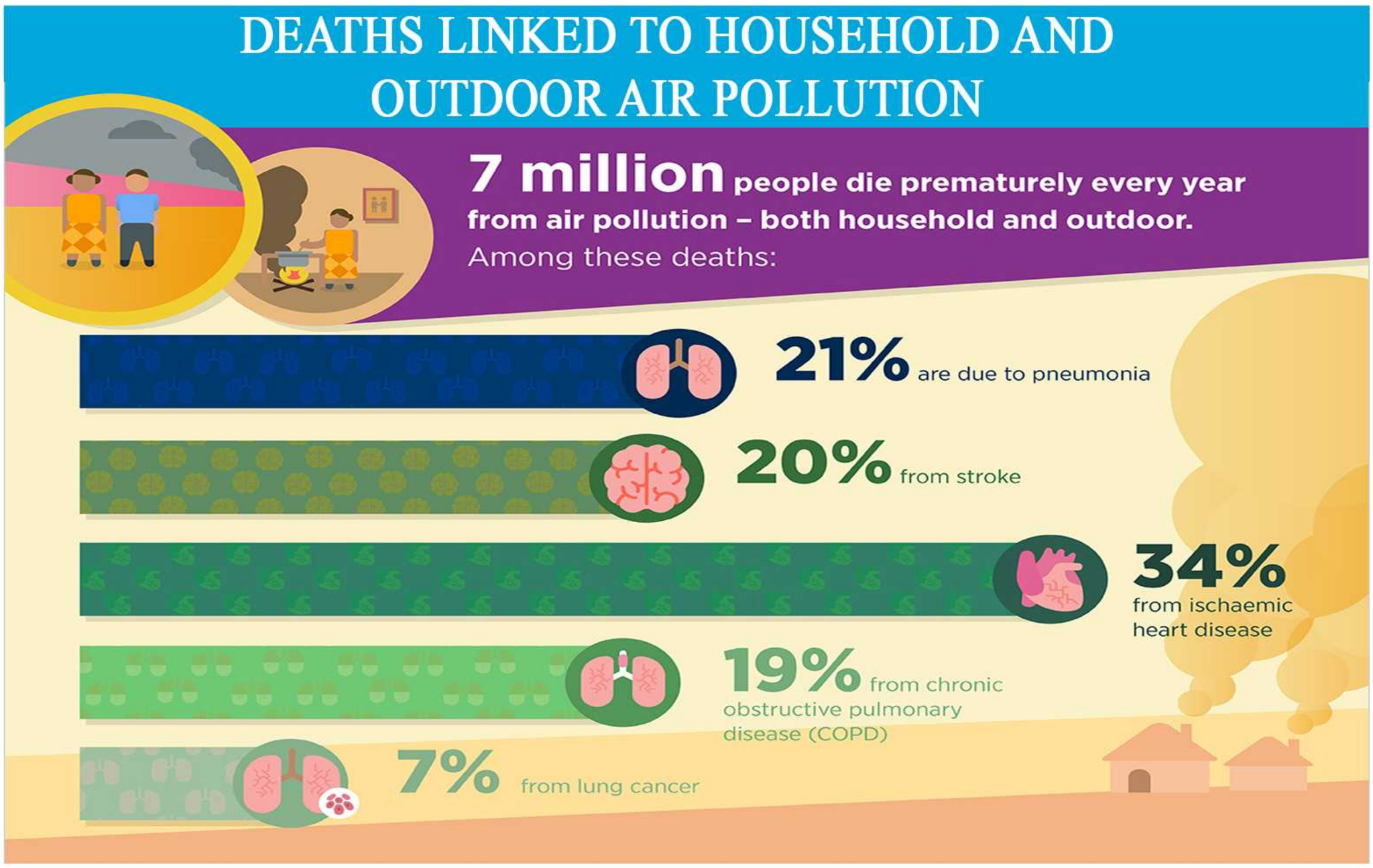

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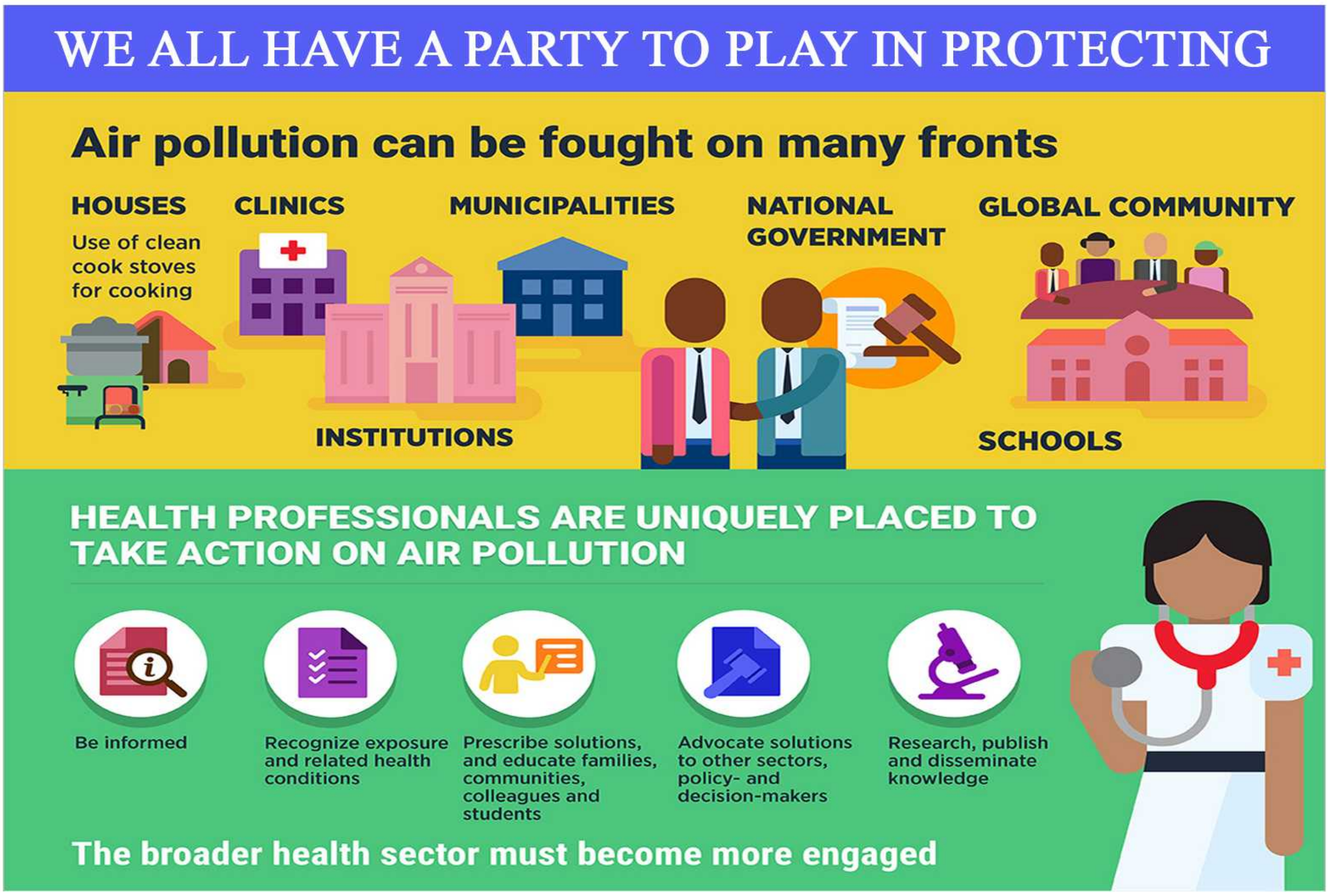
Air Pollution - Awareness Posters



World Health Organization

TCE ENVIS ACTIVITY

NEWSLETTER - VOLUME 1V - ISSUE 1 - APRIL - JUNE 2019

JUNE 15 2019

ATTENDED 1ST GLOBAL CONFERENCE AND AWARDS, EXHIBITION ON RECYCLING, WASTE MANAGEMENT & ENVIRONMENT / CLIMATE CHANGE, EPR, CONDUCTED BY CIRCULAR ECONOMY

MAY 17 2019

ATTENDED SEMINAR AT ISRO MAHENDRAGIRI KAVALKINARE AS PART OF CELEBRATION OF INNOVATION DAY 2019 & DISTRIBUTION OF INNOVATION AWARD 2018

APRIL 12 2019

CONDUCTED STUDY AND TEST ON PLASTIC TAR LAID AT M/S DUROFLEX, HOSUR USING PLASTIC WASTE WITH AN INITIATIVE TO CREATE AND PROMOTE AWARENESS ON PLASTIC WASTE USE IN TAR ROAD LAYING

APRIL 02 2019

ATTENDED NATIONAL REVIEW MEET OF ENVIS WITH STALL TO EXHIBIT THE KNOWLEDGE PRODUCTS, ACTIVITY'S AND GSDP DETAILS OF ENVIS HUB AND RP IS HELD ON 02ND APRIL 2019 AT ENVIS SECRETARIAT

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