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Breathing Poison Everyday

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January 2015

Current Events Analysis Series

Purpose of the Report

We take the air we breathe for granted. The average adult breathes over 15 cubic metres of air every day. But little do we realize that we are inhaling millions of harmful substances each time we breathe in. The International Agency for Research on Cancers (IARC) and the World Health Organization (WHO) have found that when it comes to cancer, air pollution is more dangerous than smoking[1] . In a city like Dhaka, where the majority of its population resides in areas with extensive commercial use, the air quality is very poor. The Ministry of Environment and Forests says that vehicles in Dhaka move at 14 kmph on an average; this slow pace leads to the burning of more fuel and hence more pollution[2] . If air pollution is reduced by 20 percent, Bangladesh would save around US $500 million in healthcare costs, according to an environmental assessment jointly conducted by the World Bank and the Government of Bangladesh[3] . This report explores the causes of air pollution, the susceptibility of the urban population of Bangladesh, and suggests possible ways out of this looming epidemic.

What is Air Pollution?

The Environmental Protection Agency (EPA) defines a pollutant as any substance in air that could, in high enough concentrations, harm living creatures[4] . There are many pollutants in the air and the intensity of those pollutants varies from one area to another. However, some pollutants, such as ozone, nitrogen dioxide, particulate matter and sulphur dioxide, are more closely monitored as they have detrimental effects on the environment or health.

Table 1 shows some salient causes of few major air pollutants:

Table 1: Major Air Pollutants

Pollutants	Sources	Harmful Effects
Sulphur Oxides / Sulphur Dioxide	From burning coal and oil, cement manufacturing, petroleum refineries.	Causes respiratory illness, asthma, aggravates existing heart and lung conditions, and even premature death.
Nitrogen Oxide	It is a major component of exhaust fumes from motor vehicles, power plants and other sources that burn fossil fuels.	Asthma, lung disease
Carbon Monoxide	From incomplete combustion, i.e. air-conditioning and central heating.	Reduces the amount of oxygen the blood can carry around the body, causing temporary or permanent damage to different parts of the body.
Carbon Dioxide	Combustion processes, cars and power plants as well as volcanic activities	Wheezing, cough and difficulty in breathing/shortness of breath
Particulate matter	Fine particles through natural erosion or from human processes such as, burning fossil fuels, construction work	Increases incidence of lung diseases, irritates nose, throat, respiratory tract
Volatile organic compounds	Evaporates from sources such as vehicle exhausts, cleaning agents, furniture polish, paint.	Asthma, skin allergies, throat and nose irritation, dyspnoea (difficulty in breathing)
Persistent organic pollutants[5]	Sources include industrial process and unintended chemical byproducts, pesticides, waste incineration	Cancer, damage to nervous system, learning and behavior disabilities, reproductive disorders, disruption of immune system
Ozone	Formed from a chemical reaction during sunlight	Shortness of breath, cough, sore or scratchy throat, inflamed airways, aggravated lung diseases such as asthma, emphysema, and chronic bronchitis[6]

Dhaka: The Ultimate Gas Chamber

Air pollution has emerged as an acute problem in Dhaka, one of the most densely populated cities in the world, with an approximate population of 13 million which is growing at a rate of 6 percent each year (Bangladesh Bureau of Statistics -Community Report 2011). It is also the 31st most polluted city out of 132 cities across the world[7] .

There are many causes of Dhaka's poor air quality. The two major sources of air pollution in Dhaka, include vehicular emissions, and industrial emissions. Additionally, many brick kilns burn coal and wood, resulting in the emission of particulate matter, oxides of sulphur, and volatile organic compounds. Other sources of air pollution include dust from traffic and construction sites, open burning, cement manufacturing and metal smelting[8] . Although, the overall situation of lead emission has improved in Dhaka since 1999 after unleaded gasoline was introduced and 2-strokes and 3-wheelers were banned, dilapidated vehicles are still plying the roads, creating traffic jam and billowing black exhaust fumes into the air, endangering the health of the commuters.

Measuring Pollution in the Air

Levels of air pollution are often measured by the mass per volume of air. The measurement commonly used is the number of micrograms of pollution per cubic meter (ug/m^3). According to the Department of Environment (DOE), the density of airborne particles in Dhaka is around 250 ug/m^3, which is five times the acceptable level of 50 ug/m^3 set by the National Ambient Air Quality Standard of Bangladesh[9] . In Dhaka, the concentrations of "respirable particulate matter" were found to be much higher than in Cairo, Ho Chi Minh City and Dakar, by the air quality screening studies conducted by the WHO[10]. The air pollution situation is particularly grave in winter due to a higher concentration of particulate matter because of the dry period. Winter is the time when all 6,356 brick kilns are reported to be operational as most of the small kilns, located in low lying land, are usually flooded during rainy seasons[11]. According to the DOE, the density of lead in Dhaka's air during December to March, also climbs up to 463 ug/m^3 which is 10 times higher than the acceptable standards and the highest in the world. The highest amount of lead was found in the dust collected from Sayedabad and the lowest was found around the Dhaka University campus[12] .

Brick kilns: A Major Polluter

According to a 2011 World Bank report, brick-manufacturing accounts for about 40 percent of Dhaka's fine-particle air pollution which causes 750 premature deaths a year from cancer, heart and lung related diseases[13] . The "fixed-chimney" kilns cause the most harm as these are inefficient and use obsolete technology to burn coal and firewood. They are usually located on lowlands that flood during monsoons, which is why they only operate during the dry season. Burning firewood in kilns has been illegal since 1989, yet nearly 2 million tons of firewood is burned in kilns, each year.

In 2010, the national government ordered a shutdown of fixed-chimney kilns or converting those to more energy efficient versions, such as, Zigzag, Hybrid Hoffman and Vertical Shaft kilns by July 2013[14]. Facing opposition from kiln owners, the government has extended the deadline several times. As of July 2014, only 30 percent of the brick kilns have been converted. Unlike the problems surrounding the readymade garment industry, the kiln problem does not garner much international attention and hence remains unaddressed. Figure 1 shows the fixed chimney kiln cluster (marked as black spots) situated in the north Dhaka[15] .

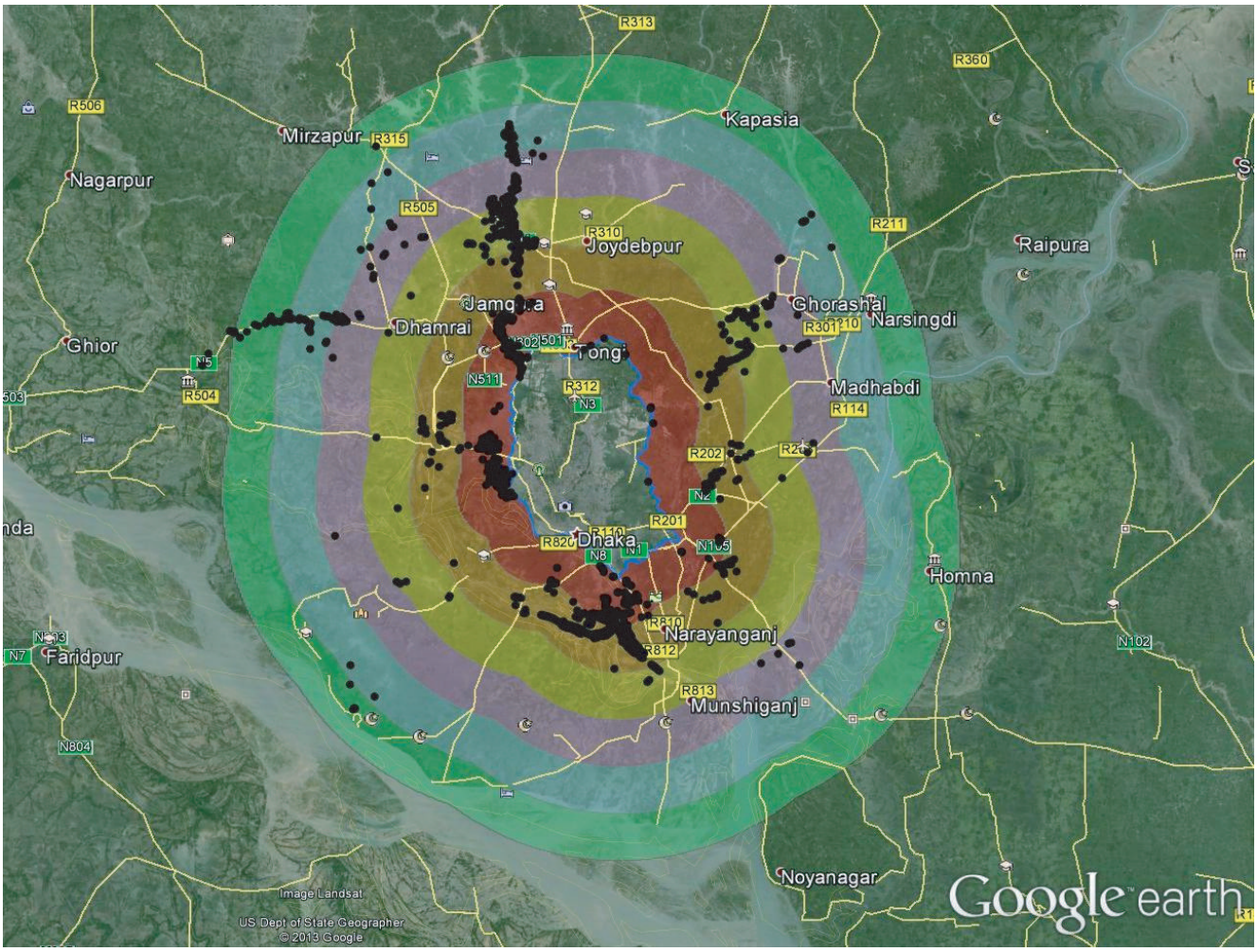

Figure: 1: The fixed chimney kiln cluster located in the north Dhaka

Who are the most vulnerable to air pollution?

Although most of these pollutants in the air are often invisible, they can severely damage our lungs, the heart and other organ systems, and even the developing fetus in pregnant women. Particulate matter with diameters less than 10µm can penetrate deep into the lungs and have adverse effects on the respiratory and cardiovascular systems. Those who already suffer from lung diseases such as asthma and chronic obstructive pulmonary diseases such as chronic bronchitis and emphysema (i.e. a condition in which the air sacs of lungs are damaged and enlarged, causing breathlessness), suffer the most. However, the elderly, children and developing babies are also at an increased risk of experiencing harmful effects from exposure to air pollution. According to the National Institute of Diseases of Chest and Hospital, nearly seven million people in Bangladesh suffer from asthma; more than half of them are children[16] .

Towards solutions

There is still hope that Dhaka residents may have cleaner air in the future. Clean-burning kiln technologies have been demonstrated through a World Bank-funded program known as the Clean Air and Sustainable Development project[17] . However there are a few more things the government can do to reduce pollution:

- Ensure annual inspection of all vehicles.
- Order immediate relocation of factories of the manufacturing industries (such as tannery, tobacco, pharmaceuticals, and those producing plastic, rubber, batteries etc) away from Dhaka city. However, the generated wastes should be treated and safely disposed.
- Create Public awareness on air pollution through media campaigns.
- Plant more trees inside the cities to maintain or restore the ecological balance.

As an individual there are also many things we can do to reduce pollution levels:

- Instead of choosing a car for a journey, we can consider the benefits offered by other modes of transport, like cycling, walking or using public transport.
- Consider car sharing or car pooling when doing the school run, shopping or going to work, turn off the engine while stationary and maintain the car properly.
- Buy vehicles which are most efficient and consume less fuel.
- Try to reduce our energy consumption at home or switching to clean renewable energy sources.

Concluding remarks

Lung diseases cause about one sixth of all deaths worldwide and are one of the world's biggest health concerns[18] . In Bangladesh, up to 10,000 premature deaths a year are attributed to air pollution, according to an air pollution study conducted in Dhaka in 2011 by Bangladesh's DoE and the Norwegian Institute for Air Research (NILU)[19]. It is high time that the government translates its National Environmental Policy (NEP 2013) into action and updates and implements the laws [such as Environment Conservation Rules (1997), Factories Act (1965) and Motor Vehicles Act] made to protect the environment and ensure the air quality. This is a critical moral test of our national will to preserve a better quality of life for generations to come and save lives in the process.

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