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Community Responses to Environmental Hazards

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Community Responses to Air Pollution in New Delhi

25.8 million people in India's capital city of New Delhi are exposed to a variety of toxic air pollutants that make Delhi the most polluted city in the world (World Health Organization). However, are all these people exposed to the same risks as one another? The pollution in Delhi is due to a variety of factors that impact the city's distinct communities in significantly different ways. The individuals with lower incomes are disproportionately burdened by the hazards of Delhi's air pollution and have the least impact in the fight against this environmental threat. This is apparent in the causes, effects, and proposed solutions to the air pollution in Delhi.

Some of the most prominent sources of the toxic mix of pollutants that permeate Delhi include road vehicles, power plants, particulate re-suspension, transport trucks driving through the city, brick kilns that run on raw wood, burning of agricultural waste, poor quality coal as a fuel source, roadside burning of organic and plastic waste and construction activities within the city's boundaries. Delhi is surrounded by largely agriculture-based land and other populated regions that inhibit Delhi's polluted air from flushing out by burning crops. The added pollution constrains air circulation and worsens the air quality in Delhi (Kumar). Delhi's air is particularly harmful due to its high levels of PM_{2.5} particles, which are ultrafine particles that have the ability to travel deep inside the lungs and cause a variety of serious respiratory problems (World Health Organization).

A significant source of air pollution is cooking, especially from surrounding regions of Delhi (Gargava). Burning solid biomass or cow dung on a makeshift cook stove, known as a “Chulha,” is a fairly common practice. This type of cook stove emits an assortment of particulate pollutants due to incomplete combustion of biomass, which leads to the formation of soot. Upon sampling of the PM_{2.5} particles in Delhi, studies found that biomass was a large component, particularly in the wintertime when demand for heat increases (Pant). Such stoves are used in slums and low-income neighborhoods. Inhabitants of such neighborhoods are most exposed to the fumes from the stoves, as they regularly use them in their homes (Government). According to Sanjai Joshi, an official of The Environmental Resource Institute in Delhi (TERI), “we cannot hold these people accountable for using such damaging resources, as they have no choice” (Joshi).

Another major source of pollution in Delhi is diesel generators, which are common for temporary power generation (Pant). The generators are an extremely important source of energy in areas of Delhi that are not adequately supplied with power networks or have faulty power networks due to low quality material used. They are used most frequently in extreme weather conditions that occur in the height of summer and winter. For small houses and shops, these portable generators are an important means of supplying electricity when the power supply fails, which happens often in the poorer, less developed areas of Delhi (Pandey).

The generators emit toxic pollutants like nitrogen oxides, carbon monoxide, hydrocarbons, particulate matter and visible smoke. In theory, the Ministry of Environment and Forests in India regulates generators; however, there is an unregulated black market of illegal generators coupled with minimal official inspections of generator emissions (Pandey). Furthermore, the generators tend to run on low quality diesel and are rarely serviced, further

adding to their polluting capacity (Kumar). Once again, the burden of the polluted air disproportionately falls on the lower income communities of Delhi that are forced to use generators due to lack of proper electricity circuits in their area.

Poorly tuned vehicles and diesel exhaust release high levels of the deadly black carbon, the most dangerous form of $PM_{2.5}$. Black carbon levels were more than three times higher and $PM_{2.5}$ levels were eight times higher on the roads than in other settings around Delhi (Apte). The ultrafine particles tend to come from large vehicles, such as trucks, that emit visible black smoke as they transport materials through Delhi (Apte).

Delhi's traffic, along with being a nuisance for commuters, is also a major source of pollution, which is heightened due to excessive levels of activity in areas that lack organization. Traffic intersections have been measured to have the highest levels of emissions of any location in Delhi. Compared to freely moving traffic, standing traffic results in particle concentration levels up to twenty times higher (Goel). In Delhi, traffic intersections serve as the ideal business locations for roadside vendors and beggars who go from car to car in order to earn money. These intersections also serve as homes for small roadside slums that foster surprisingly large communities (Government). Roadside inhabitants spend prolonged time amidst the fumes released by standing traffic everyday.

Delhi is characterized by its erratic architecture, which is a result of low urban planning investments. Buildings often have added floors, protruding balconies, precarious electricity wires, and narrow, overfilled alleyways. Pollutants produced by generators, cooking materials, and cars, which would usually disperse into the general atmosphere in an open environment, do not have a clear path of dispersion. In the denser areas of Delhi, with congested buildings of uneven heights, the diffusion of these harmful pollutants is inhibited, leading to dangerous levels

of pollutant build-up (Kumar). This occurs primarily where people with low incomes live and the infrastructure is lacking (Government).

Delhi is peppered with mounds of building material from unfinished construction projects, causing high levels of PM₁₀. PM₁₀ particles are larger and slightly less harmful than PM_{2.5} particles (World Health Organization). The dust from the mounds disperses with wind and thus makes up much of the PM₁₀ emissions, along with suspended dust from the unpaved roads (Kumar). Unfinished construction and unpaved roads are characteristics of the poorer parts of Delhi. Additionally, the construction workers who are regularly exposed to the dust are almost entirely slum-dwellers who pick up their makeshift homes and move their entire community from construction site to construction site (Government).

Most air quality monitors in Delhi are located in isolated areas on top of buildings or inside complexes rather than on the roads. In a study, a group of scientists collected air quality data directly from the roads by travelling around the streets of Delhi in a motor rickshaw with a air quality monitor. The study determined that air pollutant levels are much higher on roads than in residential or business areas. The collected air pollution levels from the study were much more hazardous than the levels the WHO used to rank New Delhi as the most polluted city in the world; pollutant and PM_{2.5} levels were up to eight times higher on the road than in surrounding areas (Apte). Because of this, people who have prolonged exposure to the roads of Delhi are at a major disadvantage. Their exposure to air pollution is not captured by the general air quality data as they move around on streets where the pollution is concentrated. Half of New Delhi residents live within 300 meters of a major road; thus, they are regularly exposed to higher pollution levels (Daigle). These neighborhoods are typically occupied by low-income communities that deal with loud traffic noises, insufficient protection, blocked roadways, and now the added hazard of

disproportionately polluted air. Facing geographic inequity, these communities are at higher risk of many negative impacts caused by the surrounding pollutants.

Outdoor air pollution was responsible for the deaths of more than 627,000 individuals in India in 2010 (World Health Organization). Because nearly every significant source of air pollution has an amplified effect on the lower class of Delhi, members of this community make up the larger portion of the reported deaths due to air pollution. A study that investigated the indoor air quality in select urban slums of Delhi found that the “inefficiently designed houses having poor ventilation,” the resuspended particulate matter from roads and the excess production of indoor air pollutants are causing a higher rate of illness in low income communities than in the rest of the population (Kulshreshtha). Illnesses included many respiratory problems like cough, phlegm, wheezing, breathlessness and severe respiratory infections. The study concluded that poor urban households were at greatest risk of many ailments (Kulshreshtha). Another study demonstrated that the relatively high level of pollution in slums is leading to an extremely high rate of disease among infants of that community (Saksena).

In 2014, when the WHO declared New Delhi as the most polluted city in the world, the previously ignored issue of the city’s air quality came into the public’s eye (Harris). When United States President, Barrack Obama, came to New Delhi in 2015 to attend the annual Republic Day Parade and meet with Prime Minister Narendra Modi, an article about how he lost about six hours of his life as a result of breathing Delhi air for three days went viral (Harris). News stories such as these were once uncommon; however, as of 2015 such articles appear in the headlines almost daily. The articles report on health issues, crowded hospitals, and global response to New Delhi’s air (Harris). The media outlets in Delhi have made it their goal to educate the public about the imminent pollution problems. Arindam Sengupta, executive editor

of *The Times of India*, told the *New York Times* about the newspaper's campaign against air pollution, "We felt this was an issue we should take up, and we have taken it up" (Harris).

Historically, the government of Delhi has only made small efforts to combat the rising problem of air pollution. The Supreme Court of India mandated in 1998 that all public transportation in Delhi will run on compressed natural gas (CNG), which is a much cleaner burning fuel than the typical low quality diesel used by most cars. This action reduced air pollution levels when it was put in place; however, now the problem centers on the PM_{2.5} levels (Kumar). Furthermore, the Delhi Government built flyovers, allowing vehicles to drive over traffic intersections via elevated overpass roads (Kumar). This action reduced congestion; however, since Delhi adds 1,500 new cars to its streets daily, further government action is needed (HT Correspondent).

As of this year, the Delhi government is making an increased effort to improve air quality. The Chief Minister of Delhi, Arwind Kejriwal, tried to raise awareness about the air pollution by implementing a "car-free day" during which New Delhi's six-kilometer road from India Gate to the President's House was blocked off for cars for five hours. Kejriwal complemented this action with social media promotion in which he explained to people the effects of air pollution and its sources (Majumdar). This effort targeted those who have cars and access to social media, which in most cases does not include the lower class people of Delhi. There appears to be very little effort to make those who are most at risk aware of their circumstances.

Kejriwal, in December of 2015, also made the decision to implement the most drastic and intrusive environmental policy in Delhi so far. This law, effective from the first day of 2016, will dramatically reduce the number of cars on the roads by only allowing even-numbered cars on

even days and odd-numbered ones on odd days (HT Correspondent). The Delhi government has also announced that it will stop congestion-causing roadside parking, improve the public transportation, give Delhi cleaner fuel prior to the rest of the country, permanently close the outdated and inefficient power plant near the city, and stop diesel-burning trucks from entering the city before 11 pm and causing heavy traffic. The government has already prohibited all privately owned cars older than 10 years from driving on the roads (HT Correspondent).

Analysts credit Arvind Kejriwal's genuine desire to help the people of Delhi for the recent surge in environmental policy (HT Correspondent). The Delhi government has also received a lot of input from non-governmental organizations (NGOs) in Delhi. For instance, the Delhi-based Center for Science and Environment released a detailed report on several strategies to combat Delhi's air pollution and informative scientific statistics to reinforce their solutions (Narain). Additionally, Greenpeace India worked with the Health Minister of Delhi to ensure that schools in Delhi had health advisories that kept the children safe from air pollution hazards (*Economic Times* Correspondent). Although the NGOs are not explicitly focused on the plight of the poor and their disproportionate burden, they work with the government to implement policy solutions that reduce the overall amount of pollution.

How does it feel like to wake up every morning knowing you live in the most polluted city in the world? Only a small number of Delhites can attest, but this number is rapidly growing. Although this rise in awareness caused increased community response and action to air pollution, the response was focused almost entirely on the problems faced by the upper class of Delhi. Most solutions addressed only the problems faced by the rich, while the problems suffered by the poor, that were often much more hazardous, were pushed aside or ignored.

The issues the community addresses reflects that the community action is led entirely by those who are least impacted by the pollution. For example, each neighborhood in Delhi has an established official Resident Welfare Society; however, this is limited to neighborhoods that have high enough income to lead the society for themselves. Resident Welfare Societies tend to deal with small scale issues such as planting some trees in their area or building gates that do not allow trucks in past a certain time (Delhi Government). All these are small-scale benefits that slums do not have.

The slum society leaders are inevitably slumlords who take advantage of the system greatly. They do not work in favor of the slum-dwellers, as they are extremely profit driven; this results in a lack of representation for the poor (Krishna). Furthermore, dealing with lack of clean water and food, the slum-dwellers do not view the air pollution as a more serious issue than the ones they face daily. Sanjai Joshi from TERI comments, “The people who live below the poverty line cannot see the ultrafine particles they are breathing in all day. Air pollution does not do anything to harm them immediately, so they tend not to care about it. For them it is a matter of finding food and making it to the next day, rather than looking into the future to see how they can improve life for themselves” (Joshi). The less fortunate of Delhi have so many imminent threats that surround them; they are unable to afford the time and effort to advocate for clean air, an issue that seems negligible when compared to finding clean water and food.

In contrast, air pollution is at the forefront of the minds of many upper class Delhities and foreign expatriates. The initiatives taken by the rich, especially the expatriates, revolve entirely around immediate benefit for exclusively themselves. For example, the United States Embassy in New Delhi recently bought 1,800 expensive air purifiers for their foreign employees’ homes. Some other large embassies in Delhi have followed the US Embassy’s footsteps. Starting off in

the expatriate community, the air purifier trend has spread to the elite of New Delhi, causing BreatheEasy, the air filtration company based in Delhi, to earn major profits (Harris). Along with investing in air filtration, many diplomats can be seen wearing air pollution masks (Harris). Several embassies have begun to warn potential foreign employees from coming to New Delhi, and many diplomats have decided to move away for health reasons (Harris). Efforts such as these focus on minimizing the effect of the air pollution solely on the diplomats and the elite. Although the hazards the poor face are much more severe and damaging, the community response has been largely based around helping those who need it the least.

A few individuals from the poorer communities of Delhi are offended by the rich community's blatant disregard for the well being of poorer communities. Upon interview, Praveen, a rickshaw driver, comments, "The rich keep buying more and more cars. Some have ten cars for just one house and they are ruining our air, it is their fault" (Praveen). When questioned about potential community action, he replied, "Who will listen to us? We have no effect in whatever the government is doing"(Praveen).

Neither the rich nor poor communities are taking on any large-scale projects or demanding that the government take action. According to scientist Ajay Ojha, "the problem is nobody owns air pollution. Nobody is individually responsible. So unless the public is demanding action, officials have no reason to even bring it up... More understanding is needed before people will start to get upset" (Daigle). Scientist Joshua Apte explained that European countries and the U.S only started making an effort to clear air pollution after people's income began to rise and they started demanding for action. He says, "I expect fully that we'll see the same thing in India" (Daigle). However, presently, the media, government, and NGOs lead the action to counter the worsening air pollution in Delhi.

The Mumbai slum of Annawadi, described in Katherine Boo's *Behind the Beautiful Forevers*, is also a clear example of environmental inequity. Annawadi residents regularly see garbage dumped on their complex, sewage released in their lake, and waste burnt near their homes. The people of Annawadi are burdened by the waste of the wealthy Mumbai residents and foreign luxury hotel occupants; since they are only partially aware of the true inequality they suffer, they continue to work in the ways that society pushed them into (Boo). Similarly, in Delhi the low-income citizens do not question or fight against their inequity, perhaps because they do not understand its real extent.

Often times, those who suffer the most have the least potential to make a difference. The low-income community of Delhi suffers the greatest dangers of air pollution, but as a result of their circumstances, they are unable to take significant action to counter it. The high-income community of Delhi makes an effort that focuses entirely on helping themselves, resulting in a segmented population that accomplishes very little at a time when a lot is needed.

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