Journal of The Gujarat Research Society

ISSN: 0374-8588
Volume 21 Issue 9, September 2019

Developing Countries Facing the Major Health Issues from Air Pollution

Kanchan Gupta
Department of Paramedical Sciences
Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

ABSTRACT:Many epidemiological studies globally have reliably recorded the detrimental effect of ambient air pollution on human health, and it has been estimated that at least seven million people die across the globe are due to the impact of air pollution yearly. A combination of thousands of elements is outdoor air pollution. Air pollution is now the greatest health danger to the atmosphere in the globe. Nitrogen oxides, volatile organic compounds, and particulate matter are the main air pollutants released into the environment by a variety of natural sources and human activities.There is growing evidence, in addition to poor ambient air quality, that indoor air pollution also represents a significant threat to public health, particularly in low-income nations that still use biomass fuels as an energy resource. The largest vulnerability to indoor air pollution is among women and children living in extreme poverty. The latest information of urban air pollution in financially disadvantaged communities is outlined in this study.

KEYWORDS: Air Pollution, Detrimental Effect, Developing Countries, Vulnerable Populations.

INTRODUCTION

Air pollution is well reported to have a variety of adverse effects on human health and to be considered a major concern for the global community. The World Health Organization (WHO) reported that nearly 7 million deaths were due to ambient air pollution in 2012, reflecting more than 10% of all-cause deaths and more than double previously estimated. Air pollution accounts for an estimated 9% of deaths worldwide due to lung cancer, 17% due to chronic pulmonary obstructive disease, more than 30% due to ischemic heart disease and stroke, and 9% due to respiratory infections.In 2012, the Global Burden of Disease study found that air pollution was one of the major risk factors for morbidity and mortality, accounting for 3.1 percent of all Disability-Adjusted Life Years alone globally (DALYs). All these results confirm that air pollution is now the greatest environmental health danger in the globe[1][2].

A combination of hundreds of elements is outdoor air pollution. Among them, the most significant from a health standpoint are airborne particulate matter (PM) and the gaseous pollutants ozone, nitrogen dioxide (NO2), volatile organic compounds (including benzene), carbon monoxide (CO) and sulphur dioxide (SO2). By combusting fossil fuels, primary pollutants like soot particles and nitrogen oxides and sulphur are emitted to the atmosphere.Motorized road traffic, electricity production, industrial activities, and domestic heating are significant sources of primary pollutants. In particular, ozone (O3) and PM are secondary contaminants produced when primary pollutants react or interact in the environment. The latter, of primary or secondary origin, consists of particles categorised as coarse (diameter < 10 _m; PM10), fine (diameter < 2.5 _m; PM2.5), or ultrafine (< 0.1 _m; PM0.1) on the basis of their scale. Within the coarse particle fraction, PM2.5 is found, usually comprising roughly 50 percent of the total mass of PM10.Coarse particles arise from the resuspending of soil and road particles from wind or moving vehicles, as well as building

ISSN: 0374-8588
Volume 21 Issue 9, September 2019

work and industrial pollution (PM10). Small particles are mainly generated from direct emissions from combustion products like petrol and diesel fuel, wood burning, power-generating coal burning, and industrial activities. Large distances (more than 100 km) can be travelled by small particulates, with the potential for high background levels over a broad area. As a result, depending on the meteorological conditions and human actions in a given geographical area, their composition can be highly diverse.Fresh pollutants from combustion-related causes like automobile emissions and environmental electrochemical oxidation are ultrafine pollutants and are recognised as essential indicators of traffic exhaust exposure along main roads. Fine and ultrafine pollutants are those that have the worst health consequences, since they can penetrate the deepest parts of the respiratory tract or even directly reach the blood system[3][4].

If, in western developed countries, acute and long-term exposure to ambient air pollution poses a serious health danger, the burden of this issue is much greater in developing countries, where population explosion, along with widespread industrialization coupled with urbanisation, has resulted in dense urban centres with poor air quality. However, enormous economic and social inequalities coexist in these underdeveloped nations; thus, in contribute to increased ambient air quality, citizens could also be related to excessive concentration of household air pollution owing to the use of biomass fuels (coal, wood and other solid fuels) as an energy resource, particularly in remote areas.Over 3 billion people around the world, mostly in underdeveloped nations, rely on biomass fuels for their household energy requirements. As a result, indoor pollution from the use of solid fuel has become a significant health problem and is projected to be among the five top main risk factors for the global disease burden (4.3 percent of global DALYs), responsible for 3.9 million premature deaths in 2010.In this respect, Asia, that has undergone rapid and disharmonious industrial development, urbanisation and transport growth in recent decades, offers the best instance, with the resulting levels of indoor and outdoor air pollution continuously far above the higher limits set by the WHO guidelines. In specific, China, the Asian nation with the highest industrial due to the rapid population growth, is now facing the world's worst air pollution crisis. This research focuses on this especially vulnerable community living in countries with low and medium incomes and directly exposed to both domestic and environmental contaminants[5][6].

LITERATURE REVIEW

Health Effects in Adult Population

A variety of research and meta-analyses have shown that, both in developed and emerging nations, high mortality rate is correlated with short and long-term exposures to PM. For all-cause mortality due to short-term PM exposure, the percentage relative risk (RR) growth was calculated to vary between 0.4 percent to 1.5 percent per 20 g/m3 change in coarser PM10 and from 0.6 percent to 1.2 percent per 10 g/m3 increase in finer PM2.5. Interestingly, the findings, including more than 60 million, of a recent major analysis conducted in the U.S.Healthcare providers from 2000 to 2012 found that there had been a related 7.3 percent higher in all-cause deaths per each 10 g/m3 rise in PM2.5. When the study was limited to the Healthcare subcategory, this strong correlation was even more obvious, demonstrating that people with low socioeconomic status are much more likely to have access to higher levels of pollutants (and therefore experience an increased rate of negative impacts) than the rest of the population. As stated earlier, this relationship may be of particular significance in East Asian

ISSN: 0374-8588
Volume 21 Issue 9, September 2019

countries, which are subjected to very high levels of radiation due to their rapidly growing economies and dense populations.For example, with urbanisation growing from 26 percent in 1990 to 50 percent in 2010, China has experienced dramatic epidemiological transitions, and ambient and household air pollution rated fourth and fifth, separately, among the risk factors accountable for DALYs. A recent meta-analysis of 33 time-series and case-crossover studies performed in China to evaluate the mortality effects of short-term air pollution exposure showed that each 10 g/m3 rise in PM2.5 was correlated via an increase in overall mortality of 0.38 percent (95 percent CI 0.31–0.45), a 0.51 percent increase in respiratory mortality (95 percent CI 0.30–0.73), and a 0.44 percent (95 percent CI 0.31–0.45) increase in overall death rate.The short-term impacts of air pollution on health in developing countries outside the Asian region have also been the focus of extensive study. In nine Latin American cities, for example, the ESCALA (Estudio de Salud y ContaminaciondelAire en Latinoamerica) research discovered a strong correlation among repeated exposure to PM10 and O3 and daily mortality. Likewise, indoor air quality in much less developed countries like pakistan and India has been shown to have a major effect on the health of communities residing in rural communities[7].

As stated earlier, air pollution is the trigger and aggravating factor of many respiratory disorders, such as chronic obstructive pulmonary disease, asthma, and lung cancer, with regard to the negative impacts on the lungs. In different studies performed in Hong Kong and Taipei, elevated ambient O3, NO2, PM2.5, and SO2 levels have been frequently linked with greater hospital admissions for asthma and pneumonia. A systematic review reported that indoor air quality was indeed a significant risk factor for chronic obstructive pulmonary disease in older adults living in low-income nations, particularly in non-smoking females, attributable to solid combustion process.Furthermore, the connection among air pollution and the likelihood of developing lung disease has been repeatedly reported in a variety of studies; women bear the highest risk, possibly resulting in increased human exposure to air pollution. Many health risk estimates depending on time have also shown that cigarettes and solid-fuel use have consistently led to 75% of China's lung cancer deaths. Each 10 g/m3 rise in the two-year average of PM2.5 was significantly associated with an increased risk of men and women lung disease[8].

Health Effects in Particularly Vulnerable Populations

Air pollution, whether indoor or outdoor, is recognized to be a significant health concern in developing countries, the pressure of this concern is even higher for especially vulnerable populations, like pregnant women, newborns and infants. In general, vulnerability to indoor pollutants emitted by the combustion of solid biofuels is a major public health risk affecting primarily women and young children living in poor rural households and urban populations in developing countries.Recent research studies have found pollution levels, contributing in preterm birth, preterm delivery, growing limitation, and possible detrimental cardiorespiratory consequences, might affect the developing foetus through prenatal exposure. In this context, a variety of clinical and epidemiological experiments done in low-income countries suggested an association among human exposure to air pollutants while pregnancy and preterm birth and premature birth, and a meta-analysis by Pope and colleagues estimated that the RR of low birth weight and stillbirth due to indoor air quality in underdeveloped nations was 21% and 26% respectively.A significant correlation among household air pollution through solid fuel usage and the incidence of serious pregnancy

ISSN: 0374-8588
Volume 21 Issue 9, September 2019

outcomes was identified in an another recent study and meta-analysis; these exposures contributed in an 86.43 g decrease in low birthweight and a 35 percent and 29 percent enhanced risk of low birth weight and premature birth, respectively. Initiatives to minimise residential air pollution exposures can contribute to better survival rates for all children. In particular, a study assessing the mortality effects of indoor air pollution and urban ambient PM pollution in Mexico projected that in the absence of these environmental exposures, the yearly infant mortality rate will decline by 0.1 per 1000 children[9][10].

CONCLUSION

Low and middle-income countries are experiencing an extreme urbanisation and industrialisation transition in a quite short amount of time relative to most industrialised nations which have undergone industrial development programmes for many years, that has driven them and become the nations with the greatest air pollution-related stresses in recent times. As they are vulnerable to the combined harmful effects of domestic and ambient air pollution, this practice has detrimental influence on the life of people living in such developing nations.

As they spend more time near cookers, women and children living in extreme poverty do have highest vulnerability to household air pollution through solid fuel utilization. As a result, these disadvantaged people get an elevated likelihood of suffering air pollution-related short-term and long-lasting negative impacts and therefore require closer follow-up. In this context, the comprehensive monitoring of ambient air quality by regulatory authorities in these nations would allow measures aimed at reducing the levels of hazardous air pollutants to be introduced and evaluated.The expense of these services would be mostly amortised by the cost saved by the reduction of morbidity and mortality due to air pollution in the community. An remarkable example of the possible positive effect of these measures on the health of the population stems from the 2008 Olympic Games in Beijing, where sustaining PM10 intensity below the 100 g/m3 level and during Games was correlated with a decrease of almost 40% in wellness economic costs relative to the pre-Games era.In conclusion, more clinical and epidemiological air quality research in the developing countries are required in order to determine the degree of air quality pressure on healthcare outcomes and to prioritise the implementation of local environmental protection measures.

REFERENCES

[1] M. Franchini, C. Mengoli, M. Cruciani, C. Bonfanti, and P. M. Mannucci, “Association between particulate air pollution and venous thromboembolism: A systematic literature review,” *European Journal of Internal Medicine*. 2016, doi: 10.1016/j.ejim.2015.11.012.

[2] A. S. V. Shah *et al.*, “Short term exposure to air pollution and stroke: Systematic review and meta-analysis,” *BMJ*, 2015, doi: 10.1136/BMJ.h1295.

[3] M. Franchini and P. M. Mannucci, “Short-term effects of air pollution on cardiovascular diseases: Outcomes and mechanisms,” *Journal of Thrombosis and Haemostasis*. 2007, doi: 10.1111/j.1538-7836.2007.02750.x.

[4] M. Bonzini *et al.*, “Effects of inhalable particulate matter on blood coagulation,” *J. Thromb. Haemost.*, 2010, doi: 10.1111/j.1538-7836.2009.03694.x.

[5] OECD, “The cost of air pollution: health impacts of road transport,” *Oecd*. 2014.

ISSN: 0374-8588
Volume 21 Issue 9, September 2019

[6] M. S. Burroughs Peña and A. Rollins, "Environmental Exposures and Cardiovascular Disease: A Challenge for Health and Development in Low- and Middle-Income Countries," *Cardiology Clinics*. 2017, doi: 10.1016/j.ccl.2016.09.001.

[7] J. Lelieveld, J. S. Evans, M. Fnais, D. Giannadaki, and A. Pozzer, "The contribution of outdoor air pollution sources to premature mortality on a global scale," *Nature*, 2015, doi: 10.1038/nature15371.

[8] S. S. Tsai, C. C. Chang, and C. Y. Yang, "Fine particulate air pollution and hospital admissions for chronic obstructive pulmonary disease: A case-crossover study in Taipei," *Int. J. Environ. Res. Public Health*, 2013, doi: 10.3390/ijerph10116015.

[9] R. E. Dales, S. Cakmak, and C. B. Vidal, "Air pollution and hospitalization for venous thromboembolic disease in Chile," *J. Thromb. Haemost.*, 2010, doi: 10.1111/j.1538-7836.2010.03760.x.

[10] P. V. M. Lakshmi *et al.*, "Household air pollution and stillbirths in India: Analysis of the DLHS-II National Survey," *Environ. Res.*, 2013, doi: 10.1016/j.envres.2012.12.004.