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Air pollution and Health: Amidst of COVID-19

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It is estimated that 91% of the world's population breathes polluted air. This results in air pollution being a prominent risk factor for the health of the people. The research studies have demonstrated associations between air pollution exposure and increased diseases and deaths. It is estimated that air pollution exposure results in over nine million premature deaths every year.

Air pollutants affect almost all health systems of the human body. When we breathe, air pollutants enter the body. Therefore, the respiratory system is the first contact with air pollutants. Depending on the type and dose of inhaled pollutants and components of the respiratory system damage, they cause different symptoms and diseases in the respiratory system. Respiratory infections could be upper respiratory tract infections (i.e., infections limited to the upper part of the respiratory system) or lower respiratory infections such as pneumonia (i.e., infections affect the lower part of the respiratory system). The commonly seen respiratory symptoms and diseases are repeated cough, wheezing, exacerbation of asthma, respiratory infections, etc. Diseases such as chronic obstructive pulmonary diseases among adults could occur and increase the severity.

Once the air pollutants are in contact with sensitive respiratory system components such as the lungs, the pollutants could enter the blood stream and may end up in different health systems in the human body and damage them. These damages in health systems will result in various diseases. Scientific research has shown several diseases in the health systems of the human body that are associated with exposure to air pollution. The association between air pollutant exposure and cardiovascular diseases is well estab

lished by scientific research. They may change cardiovascular functions and increase blood pressure. These changes result in increased heart diseases and strokes. The latest scientific research shows that the toxic substances in air pollutants have damaging effects on the nervous system. This may lead to neurological complications and psychiatric disorders. Neuro development delays have been shown among young children. Air pollution exposures during the pregnancy period have shown that it increases the possibility of occurrence of miscarriages, preterm deliveries and low birth weight babies. The damage to the endocrine system will result in the diseases such as diabetes. Exposure to some air pollutants also increases the possibil

ity of certain types of cancers. In addition, research studies show the association of tuberculosis, eye conditions, including cataracts, skin disorders, etc. On top of the different diseases that air pollution exposures are associated with, the possibility of COVID19 is also increased. COVID-19 infection is caused by a virus. An infected person with COVID-19 expels virus-laden droplets. Some one else may inhale these droplets with viruses. Once they enter the body through the respiratory system, they will attach themselves to the cells covering the lining of the nose, mouth and throat. In addition, they may stick to the cells covering the eyes as well. Once viruses enter the cells of the outer layers of the respiratory system, they multiply, and the immune system in the body reacts against the viruses. At this moment,

the person will have symptoms such as fever, dry cough, sore throat, loss of smell and taste, or head and body aches.

If the immune system doesn't control the viruses during this initial phase, the virus then multiplies and spread down in the respiratory system approaching the lungs. Once viruses reach the lungs and the small air exchange components (i.e., known as alveoli), they will damage the respiratory system's sensitive components and disrupt the oxygen transfer to the bloodstream. The virus reactions in the lung cells and the immune system's reactions will result in conditions such as pneumonia. At this level, the person infected with COVID-19 viruses will have the symptoms such as cough, fever, and rapid and shallow respiration. If the condition is medically uncontrollable, the patient may end up with death.

The latest research findings have shown that exposure to air pollution could increase the possibility of contracting the COVID-19 through known and unknown mechanisms. For example, (1) particulate matter, a common air pollutant, functions as a carrier for COVID-19 viruses, and (2) air pollutants increase the permeability of the soft outer layers of the respiratory system. This increases the possibility of COVID-19 viruses entering and spreading viruses in the human body's respiratory system.

Air pollution could be (1) indoor air pollution or (2) outdoor air pollution. Indoor air pollution can be described as pollutant exposure in indoor environments such as office buildings, factories, households, etc. In comparison, outdoor air pollution can describe as pollutant exposure with the outdoor environments such as in cities. Since we spend more time indoors, especially with the social restrictions during the COVID19 outbreak period, exposure to indoor air pollution increased. Especially the air pollution exposures within the households (i.e., household air pollution) is increased. Therefore, it is essential to take precautions to expose the polluted air, especially in this period.

Household air pollution exposures could be minimized by preventing or minimizing pollutants from indoor sources. One of the key sources of indoor air pollution is the burning of wood for cooking. If the cooking fuel is shifted from wood burning to clean energy (e.g., liquid petroleum gas (LPG), electricity), this will reduce the emission of air pollutants. Although it may not be practical to shift the cooking fuel to a cleaner fuel type such as electricity or LPG, we can use different methods to minimize the exposures while using wood as the energy for cooking. One of the methods is to use the improved cookstoves, which would reduce the emissions during the wood-burning. A chimney in the kitchen is important. This will reduce the accumulation of smoke inside the household. However, the chimney should be unobstructed to expel the smoke. Therefore, the cleaning of the chimney is important. Also, it is important the behaviour and practices of cooking person. If he/she does not spend more time close to the cookstove, the chances of exposure to air pollution would be reduced.

Similarly, if the cooking session is completed in a shorter period, the emission of pollutants would be low. The ventilation (open windows and doors) in the household is important to expel the smoke outside the household. Some people use plastic and polythene in cookstoves. The smoke emits from plastic and polythene will badly affect the health of humans and affect the environment. Other than the wood-burning for cooking, different pollutants may emit from the household members' habits. Mosquito coils expel smoke,

which may be harmful to the residents. Mechanical methods such as mosquito nets would omit this problem.

Unlimited use of incense within the household would increase the smoke, and exposure would harm the health.

Like indoor air pollution, outdoor air pollution would also increase exposure to humans and damage the environment to a greater extent. Emissions from vehicles are the key source of outdoor pollution in Sri Lanka. Each individual having a vehicle should have a national commitment to keep his/her vehicle at the highest standard with minimizing pollution. The factories should follow the procedures to reduce the emission of pollutants into the air to mitigate the health impacts and damage to the environment. Open burning is common among some people.

This may include the plastics and burning of other on-degradable items as well. This will pollute the outdoor air and can intrude into the indoors as well.

Finally, all these air pollutants (indoor or outdoor) accumulate in the atmosphere and damage the environment enormously. They may be in the atmosphere for days to years. The damage to the climate, in turn, affects the human and surrounding environment in many ways. Therefore, it is essential to change our behaviours to minimize both indoor air outdoor air pollution.