**Chapter 05: Impact of pollution on health and**

**Environment**

Visible or insidious, air pollution appears increasingly present in the city. Tirelessly, it resurfaces during periods of great heat. But what is its real Health impact? Can it aggravate certain diseases or promote their onset?

Are effects on mortality observed?

Many studies now show that even at low levels, the pollution has a negative impact on our health. According to the World Health, "three million people die each year from pollution atmospheric, or 5% of the world’s 55 million annual deaths. Given the of uncertainty in estimates, the actual number of deaths per year could be between 1.4 and 6 million".

**What are the risks?**

Pollutants can be of different kinds. They may be gases or particles having respiratory irritant properties. The consequences range from a decrease in respiratory capacity at an impact on mortality at more or less long term.

**Short term:**

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| **Pollutants** | **Health effects** |
| **Nitrogen dioxide (NO2) Gas** | Irritant gas that can penetrate deep into the lungs. It alters respiratory activity and increases attacks in asthmatics.  In younger people, it promotes infections the bronchi. The effects of this are not all identified. It is a good indicator of the motor vehicle pollution. |
| **Ozone (O3)** | Aggressive gas, highly irritating to mucous membranes ocular and respiratory. It penetrates easily to the thinnest respiratory tract. It can thus cause Irritation of the nose, eyes and throat, skin impaired lung function, shortness of breath and cough. It exacerbates asthma attacks.  It does not seem possible to determine a threshold in below which the pollutant would be completely harmless.  In addition, the effects of chronic exposure along term are still not well known. |
| **Sulphur dioxide (SO2)** | Irritant gas that can cause seizures in patients asthma, increase respiratory symptoms acute in adults and children: respiratory gene, access to cough or asthma attacks. |
| **Suspended particles** | The larger ones are retained by the airways higher. The most dangerous are the finer, because  they can penetrate deep into the lungs and transport toxic compounds.  They increase the risk of respiratory infections acute in children and increase sensitivities allergic or pre-existing conditions.  Much of this pollution comes from transport. Emissions from diesel engines are particularly rich in small particles. Also, some suspended particles contain hydrocarbons Polycyclic aromatic (PAH) with properties mutagens and carcinogens |
| **Carbon monoxide (CO) A** | At high doses, it is a cardio-respiratory toxin often fatal;  At low doses, it decreases the oxygenation capacity of the brain, heart and muscles.  Its noxiousness is particularly important in coronary insufficiencies and foetuses. |
| **Benzene (C6H6)** | Human carcinogenic compound. |

**Long-term:**

The long-term effects remain poorly known because they are difficult to assess. However, some US studies comparing mortality rates of cities with the best quality air with the most polluted seem to confirm the harmful action of pollution.

**At the global level:**

Air pollution is due to the emission of elements of different kinds in the atmosphere. Even if they are emitted locally (at a city level for example), these pollutants have consequences at local, regional and global levels:

- **Acid rain:** under the effect of nitrogen oxides (NOx) and sulphur dioxide (SO2), rain, snow and fog become more acidic and alter ecosystems;

- **Contribution to the greenhouse effect and global warming:** industry, agriculture, transport emits pollutants such as carbon dioxide, Methane... these gases contribute to the greenhouse effect and therefore to global warming.

- **The destruction of the ozone layer:** the ozone layer is a part of the ozone-containing stratosphere (O3). Located between 30 and 40 km from the surface terrestrial, the ozone layer absorbs a significant part of the radiation ultraviolet (UV) of the sun that is dangerous for living organisms.

Without the ozone layer, life on Earth would not be possible. But since 1980’s, scientists measured a sharp drop in ozone in the stratosphere over the Antarctic continent. This is the famous “ozone hole”