CASE STUDY
Air Quality and Health City Outlook
City: Mexico City

1. Air Quality Management and Health Indicators

Indicator	Value	Units	Reference
Annual mean concentration of fine particulate matter (PM2.5) in urban areas (ug/m³). Year: 2019	22.61	µg/m³	- Methodology to interpolate the values, weighted inverse distance interpolation: Escuela de Salud Pública de Harvard T.H. Chan – SEDEMA (2018). *Análisis histórico de los beneficios en la salud de la población, asociados a la calidad del aire en la Ciudad de México entre 1990 y 2015.* http://www.data.sedema.cdmx.gob.mx/beneficios-en-salud-por-la-mejora-de-la-calidad-del-aire/descargas/analisis-espanol.pdf - Calculation of the metric used in this evaluation, annual average of PM2.5, according to the methodology established by the Mexican regulation NOM-025: Secretaria de Salud. (2021). Criteria for evaluating the quality of ambient air, with respect to suspended particles PM10 and PM2.5. Standardized values for the concentration of suspended particles PM10 and PM2.5 in ambient air, as a measure to protect the health of the population (NOM-025-SSA1-20219). - SIMAT. (2019). Pollutants_2019. opendata/anuales_horarios/contaminantes_2019.csv
Annual mean concentration of particulate matter (PM10) in urban areas (ug/m³). Year: 2019	41.79	µg/m³	
Total number of air quality monitoring stations	34	Units	- Air Quality. (s.f.). *Estaciones de monitoreo*. Secretariat of Environment of Mexico City. http://www.aire.cdmx.gob.mx/default.php?opc=%27ZaBhnmI=&dc=%27ZA== - Air Quality. (s.f.). *El monitoreo de la calidad del aire*. Secretariat of Environment of Mexico City. http://www.aire.cdmx.gob.mx/default.php?opc=%27ZaBhnmI=%27
Number of fine particulate matter (PM2.5) monitoring stations	22	Units	- Air Quality. (s.f.). *Estaciones de monitoreo*. Secretariat of Environment of Mexico City. http://www.aire.cdmx.gob.mx/default.php?opc=%27ZaBhnmI=&dc=%27ZA==
Number of particulate matter (PM10) monitoring stations	25	Units	
Emissions Inventories Year 2018	Yes	NA	- SIMAT. (2018). *IE_2018* [Conjunto de datos]. Emissions inventory. opendata/inventario_emisiones/ Inventario_Emisiones/IE_2016.csv

Indicator	Value	Units	Reference
Regulatory Framework Based on WHO Guidelines	Yes	NA	The update of the national air quality standards contained in the Mexican Official Norms considers the revision of the WHO Air Quality Guidelines. By 2026, the standards in Mexico for all air pollutants will be the same as the 2005 AQG.
Health Sector Involvement on AQ Management	Yes	NA	There is increasing collaboration between the health and environment sectors in the management of air quality in Mexico City. Some programs, projects and specific actions in which they collaborate are: - Carrying out health risk assessments due to air pollution - The development of the Epidemiological Surveillance System for Health Effects of Air Pollution in Mexico City - Actions to communicate the AIR and HEALTH index to the population - The Secretariat of Health chairs the Technical Scientific Surveillance Committee on air pollution in Mexico City and SEDEMA is part of said Committee and supports coordination. - The Secretariat of Health chairs the intersectoral Commission for health promotion, which had an environmental health working group in which the problem of air quality was addressed. The topic will now be addressed as part of the Social Metabolism working group. - Training to doctors from health centers in Mexico City on air quality and health. - The Management Program to improve air quality in the Metropolitan Area of the Valley of Mexico 2021-2030 has a chapter on health and communication, with an estimate of the health benefits of implementing ProAire and a health measure public and communication. Secretaria del Medio Ambiente y Recursos Naturales. (2019). Guidelines for obtaining and Communication of the Air Quality and Health Risk Index. (NOM-172-SEMARNAT-2019). http://www.aire.cdmx.gob.mx/descargas/monitoreo/normatividad/NOM-172-SEMARNAT-2019.pdf Escuela de Salud Pública de Harvard T.H. Chan – SEDEMA (2018). *Análisis histórico de los beneficios en la salud de la población, asociados a la calidad del aire en la Ciudad de México entre 1990 y 2015.* http://www.data.sedema.cdmx.gob.mx/beneficios-en-salud-por-la-mejora-de-la-calidad-del-aire/descargas/analisis-espanol.pdf SEDESA (2020) Dirección Epidemiología y Medicina Preventiva. http://sersalud.cdmx.gob.mx/sspcdmx/Documentos/direccion/demp/Informacion%20DEMP%20para%20pagina%20y%20facebook%20institucional.pdf SEDESA (2018) Scientific committee highlights the effectiveness of “Sentinel” hospitals in monitoring illnesses due to contamination. https://www.salud.cdmx.gob.mx/comunicacion/nota/comite-cientifico-destaca-efectividad-de-hospitales-centinela-en-monitoreo-de-padecimientos-por-contaminacion

Indicator	Value	Units	Reference
			SEDEMA (2021). *Programa de gestión para mejorar la calidad del aire de la Zona Metropolitana del Valle de México 2021 – 2030.* http://www.aire.cdmx.gob.mx/descargas/publicaciones/flippingbook/proaire2021-2030/
Total Population	9,031,213	inhabitants	INEGI/SEDESA Dirección de Información en Salud (2020). *Defunciones 2018* [Conjunto de datos]. Defunciones. http://pwidgis03.salud.gob.mx/cubos/defunciones/seed_98_2018_hist.htm 1/ Rate per 100,000 inhabitants, based on the Population Projections of Mexico, 2010-2050, CONAPO, 2013.
Urban Population	8,940,001	inhabitants	Cuéntame. (s.f.). *Población*. Instituto Nacional de Estadística y Geografía. https://cuentame.inegi.org.mx/monografias/informacion/df/poblacion/distribucion.aspx?tema=me&e=09
Rural Population	90,312	inhabitants	
Population over 25 years	6,004,770	inhabitants	
Natural mortality excludes accidental A00 R99	**7,294**	**deaths**	**Estimated in this project**
Ischemic heart disease mortality I20-I25 IHD	**2,468**	**deaths**	
Mortality due to cerebrovascular disease I60-I69	**497**	**deaths**	
Mortality due to Chronic Obstructive Pulmonary Disease COPD J40-J44, J47	**396**	**deaths**	
Lung Cancer Mortality C30-C39	**126**	**deaths**	

2. Advances in Air Quality Management

Mexico City has been recognized for having had a drastic reduction in pollutants since the beginning of air quality monitoring and the generation of environmental policies, in the case of particles, it can be seen when graphing the annual averages and indicators of 24-hour average from 1989 to 2022 for PM10 and from 2004 to 2022 for PM2.5 (Figure 1 and Figure 2).

Despite the significant improvement in air quality in Mexico City, the maximum permissible limits of the official Mexican standards continue to be exceeded, which is why it is necessary to continue with the implementation of measures aimed at addressing the main sources of pollution in the city. the city, as well as continue strengthening the air quality management tools in the City.

The main advances and management instruments that the city has developed in terms of air quality as of 2004 are:

- The formal start of the measurement of particles smaller than 2.5 micrometers, thanks to 8 stations with automatic equipment and 7 with manual equipment, in collaboration with the National Center for Environmental Research and Training (CENICA), the Autonomous Metropolitan University (UNAM) Unit Xochimilco and the National Institute for Nuclear Research (ININ).
- Installation of equipment in 10 stations of the RAMA for the measurement of UV.
- Installation of new stations since 2010, the last two installed in 2019, to form the most robust monitoring network in the country.
- Monitoring of BTEX and toxic and reactive hydrocarbons.
- Implementation of a unique air quality model in Mexico that combines three different models, one for chemical transport, one for meteorology and one for emissions.
- The status of air quality can be checked every hour, plus forecast maps and other useful tools to inform the population are available on a web page and in an application for mobile devices.
- Various updates have been made to the Atmospheric Environmental Contingencies Program.
- In 2013, the Center for Remote Environmental Inspection and Surveillance (CIVAR) was created, in addition to the strengthening of a vehicle verification program and replacement of catalytic converters.
- The development of an emissions inventory that is updated every two years. The most recent is base year 2018 and was published in 2021.
- Implementation of Programs to improve air quality in the Metropolitan Area of the Valley of Mexico (PROAIRE). The most recent was published in 2021 and is valid for 10 years.
- Risk Index for Susceptible Persons (IRPS).
- Health risk assessments due to air pollution.

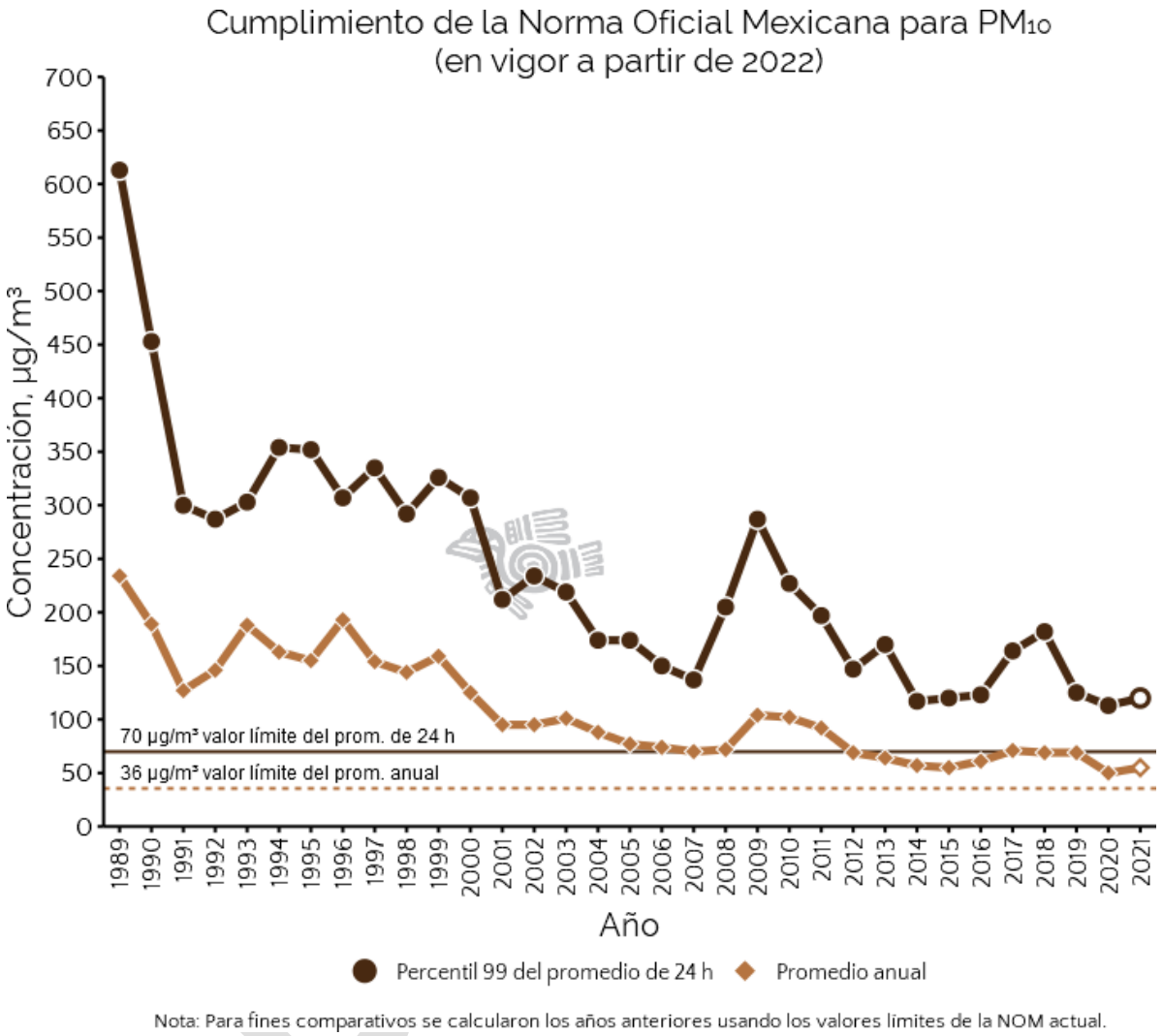

Figure 1. Trend graph calculated based on the annual indicators of the PM10 standards updated until May 2022, where the permissible limit value is observed, with the entry into force of NOM-025-SSA1-2021.

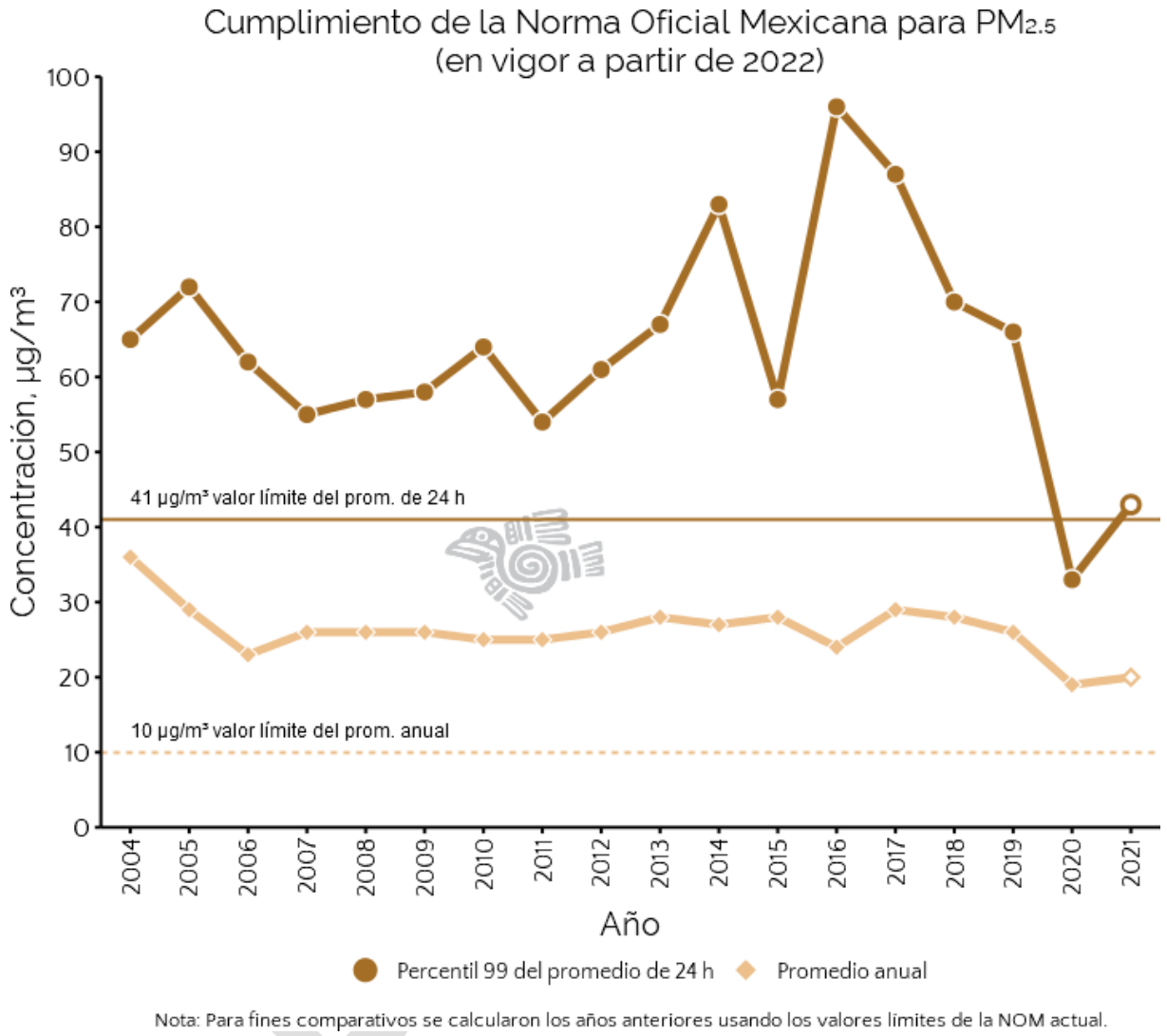

Figure 2. Trend graph calculated based on the annual indicators of PM2.5 standards updated until May 2022, where the permissible limit value is observed, with the entry into force of NOM-025-SSA1-2021.

3. Main Challenges and Opportunities

Challenges

1. Geographical characteristics of the city, for example, that it is surrounded by volcanic mountain ranges such as the Ajusco-Chichinautzi corridor to the south, Popocatépetl and Iztaccihuatl volcanoes to the east, and Las Cruces, Monte Alto and Monte Bajo mountain ranges to the west (SEDEMA ,2015). And it has a significant height of 2,240 meters above sea level (PAOT, 1999).
2. A significant percentage of ozone precursor emissions come from area sources, which are scattered and difficult to deal with, such as LP gas leaks in households.
3. The updating at the national level of multiple Official Mexican Standards that regulate emissions from polluting sources such as vehicles and industries, motor vehicle technology, the content of Volatile Organic Compounds in domestic, commercial and industrial products, is required. and fuel quality.
4. Obtain financing to implement the measures contained in ProAire and continue strengthening air quality management tools.

Opportunities

1. SEDEMA's technical capacities allow it to continually strengthen air quality management.
2. The high-level research centers that exist in Mexico City.
4. Strengthen intersectoral collaboration, especially between the health and environment sectors.
5. Improve communication to the population of the different policies and programs, as well as information of direct use to people, such as knowing the state of air quality, health risks and recommendations to reduce their exposure.

4. Key Actors to Potentiate Air Quality Management

- Comisión Ambiental de la Megalópolis
- Local and federal health departments
- Secretariat of the Environment and Natural Resources (Federal Institution)
- Public and private universities, as well as researchers in environmental areas, engineering, chemistry, medicine, among others.
- Local governments of the states belonging to CAME, in conjunction with the federal government.
- Civil society and environmental organizations.

5. References

Biodiversidad CDMX. (s.f.). *Geografía*. Secretaría del Medio Ambiente de la Ciudad de México. http://data.sedema.cdmx.gob.mx/biodiversidadcdmx/geografia.html

Condiciones Geográficas, Población y Desarrollo Económico del Distrito Federal y Zona Metropolitana (1999). *Ubicación geográfica*. Procuraduría Ambiental y del Ordenamiento Territorial. https://paot.org.mx/centro/inegi/ambdf/condic.html#:~:text=Ubicaci%C3%B3n%20Geogr%C3%A1fica,-El%20Distrito%20Federal&text=La%20altitud%20va%20aumentando%20de,con%20Morelos%20colinda%20al%20sur.