C40 CITIES
CLIMATE LEADERSHIP GROUP

BENEFITS OF URBAN CLIMATE ACTION

C40 Cities Technical Assistance Report

QUEZON CITY

CLIMATE, AIR QUALITY AND HEALTH

C40 and Johnson & Johnson are working in partnership to connect the dots between climate action, improved air quality in cities and better health amongst citizens.

C40 has undertaken cutting-edge research, working with 26 cities to date to measure the air quality and health benefits of climate action, and use this to make a stronger case for action.

The time for urgent climate action

Cities are responsible for about 70% of global CO_2 emissions and play a leading role in limiting global increases in temperature to 1.5°C, in line with the Paris Agreement. Simultaneously, cities need to take adaptation measures to protect themselves against current and future extreme weather events, such as extreme cold and hot weather, floods and droughts. Finally, cities need to attend local issues of air pollution, including pollutants and toxic compounds.

In order to tackle both air quality and climate change, cities need clean and efficient transport, buildings and industry solutions.

QUEZON CITY

Quezon City is located in the Metropolitan area of Manila and is the former capital of the Philippines (1948-1967). With an area of 161 km² and a population of approximately 2.7 million people, the city is the most populous in the Philippines and the largest in Metro Manila.

The transport sector represents a key contribution to greenhouse gas (GHG) emissions in the Philippines, accounting for about 15% of the total GHG emissions in the country[1].

15% OF THE COUNTRY'S GHG EMISSIONS COME FROM THE TRANSPORT SECTOR

THE NEED TO TACKLE AIR QUALITY

In recent years, air pollution has become a serious problem for Quezon City and the country as a whole. Diseases that are directly correlated with poor air quality are on the rise.

According to the World Health Organization (WHO), the annual average concentration of $PM_{2.5}$ should not exceed 10 µg/m³. In Manila, the annual mean average is around 18 µg/m³, which exceeds the WHO threshold. In some areas, where traffic is intense, concentrations can reach an average of 50 µg/m³, which can cause significant health issues for residents.

$PM_{2.5}$ CONCENTRATION IS 1.8 TO 5 TIMES GREATER THAN THE WHO RECOMMENDED VALUE

THE HEALTH BURDEN

Pollutants such as $PM_{2.5}$ and NO_2 represent a major risk to people's health, particularly affecting children and older people. Often used as an indicator of air pollution, $PM_{2.5}$ can penetrate deep into lungs and is linked to respiratory and cardiovascular morbidity and mortality, even at low concentrations.

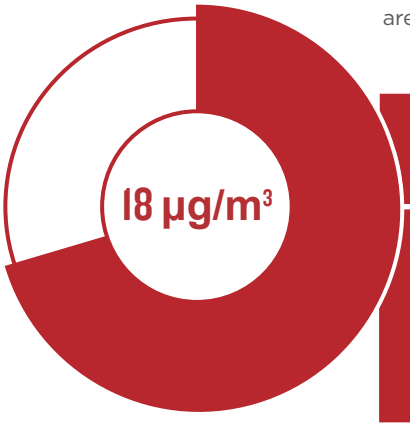
In Quezon City, about 3,900 premature deaths every year are attributable to the current $PM_{2.5}$ levels.

3,900 PREMATURE DEATHS EACH YEAR IN QUEZON CITY ARE DUE TO $PM_{2.5}$ LEVELS

Understanding the problem

The road transport sector in Quezon City is responsible for around 69% of the total $PM_{2.5}$ concentration in the city.

The city is located at the heart of Metro Manila. Local traffic is dramatically intensified by public and private vehicles that travel across the city from different parts of the metropolitan area. In addition to the health hazards, the excessive concentrations of air pollutants can also result in poor visibility that may affect transportation safety.



QUEZON CITY ROAD TRANSPORT SECTOR

69% OF THE TOTAL PM2.5 CONCENTRATION COMES FROM THE ROAD TRANSPORT SECTOR

INTENSE TRAFFIC

POOR VISIBILITY

The action

The Environmental Protection and Waste Management Department in Quezon City conducts daily roadside testing of vehicle exhaust opacity levels to verify that $PM_{2.5}$ limits are respected. In order to pass the test, the opacity level should not exceed a Light Absorption Coefficient of 2.5. Latest data available show that in 2017 only 7% of the tested vehicles passed the test while the remaining 93% were directed to conduct maintenance.

This action is part of the Anti-Smoke Belching Program adopted in Metro Manila and enforced by the Department of Environment and Natural Resources (DENR). This in an effort to reduce air pollution in the city, limiting its adverse effect on the population's health.

Currently, the daily tests are carried out by a team of 30 people. The city is now looking to improve the enforcement of emission standards by expanding the testing team, which will allow a greater area and more vehicles to be checked. This analysis shows the benefits the city would have by doubling the number of officials carrying out roadside tests.

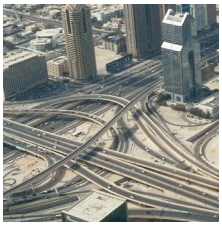
QUEZON CITY VEHICLE TESTS

TESTING OF VEHICLE EXHAUST OPACITY

93% OF TESTED VEHICLES NEEDED MAINTENANCE

TEAM OF 30 PEOPLE TESTING

AIMS TO EXTEND TO A GREATER AREA



The benefits

With support from C40, the city analysed the social and economic impacts of conducting daily roadside and garage test of suspected polluting vehicles.

The results showed that increasing the personnel conducting roadside tests would have a massive improvement on air quality, which would in turn improve the population's health and produce considerable economic benefits.

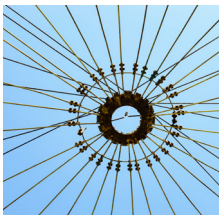
Air quality, expressed here in terms of $PM_{2.5}$ concentration, is expected to improve.

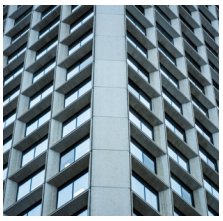
The air quality improvement leads to a reduction in the health burden of cardiovascular- and respiratory-related diseases and deaths. Hospital admissions are used as an indicator for morbidity (diseases), while the change in premature deaths, life expectancy and life years gained are used to quantify mortality impacts.

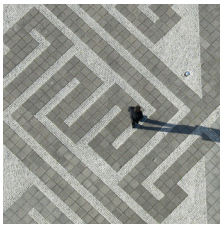
The economic impact represents the monetary value of averting a hospital admission and of gaining an extra year of life.

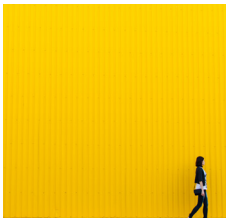
AIR QUALITY

2.4% $PM_{2.5}$ REDUCTION IN THE WHOLE CITY AREA









55 PREMATURE DEATHS AVERTED PER YEAR

+821 LIFE YEARS GAINED FOR THE WHOLE POPULATION

+14 DAYS IN LIFE EXPECTANCY PER CITIZEN

77 AVERTED HOSPITAL ADMISSIONS PER YEAR

HEALTH

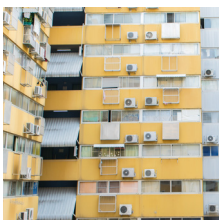
77 averted hospital admissions per year, including 61 for respiratory diseases, and 16 for cardiovascular diseases.

The value of averted hospital admissions is ₱ 11 million Philippine Pesos for respiratory and ₱ 3 million for cardiovascular diseases.

₱ 761 M TOTAL VALUE OF AVERTED DEATHS

₱ 14 M AVOIDED HEALTHCARE COSTS

ECONOMICS



DRIVING ACTION

IMPROVE DATA AVAILABILITY

The main challenge identified by Quezon City is building the case to expand the team conducting the roadside testing. These obstacles are mainly created by the lack of strong evidence of bad air quality, given the limited number of monitoring stations in the city. The city currently relies on data provided by the national government.

MAKE THE CASE

The city will use the results shown in this analysis to demonstrate the adverse impacts of air pollution and the opportunities associated with improving roadside testing and to promote bolder actions.

Results will also be used to make the case for further expansion of the team as part of the Anti-Smoke Belching Program.

BOOST COLLABORATION

The potential air quality and health benefits will be communicated to policymakers within the city, and to the DENR, in order to secure stronger support for current and future actions.

NEXT STEPS

Based on this analysis, the city will work on the installation of at least one monitoring station, to improve the data availability and understanding of air quality issues. The City Government will seek assistance in selecting the most appropriate air quality monitoring station.

The results of the report will be translated into a readily comprehensible form for the public to persuade them to participate in clean air programs and projects.

The city will establish strong collaborations with the academic sector and government agencies. The aim is to develop a robust and sustainable air quality management plan along with a proposal for policy interventions that will improve air quality.

METHOD AND ASSUMPTIONS

Methodology available here.

Key assumptions:

- *$PM_{2.5}$ concentration calculated using one roadside monitoring station. This is likely to be an overestimation of the average concentration in the city as it is located in the proximity of a highway.*
- *WHO $PM_{2.5}$ source apportionment data for Manila are used.*
- *Proxy data from Auckland (New Zealand) is used for VOLY and VHA and converted from 2016 USD using the relevant Purchasing Power Parity exchange rate.*
- *Burden of air pollution on mortality was calculated by using the relative risk from published studies relating air pollution concentrations to health outcomes. This was applied to the difference between city-wide annual average $PM_{2.5}$ concentration and the GBD's theoretical minimum exposure (5.8 µg/m³), and to the mortality rate in the local population. This is assuming impacts only in adults (ages 30+).*

The analysis has been carried out following the methodology outlined in the BUCA Guidance Manual.

Next steps for the analysis:

Future data collection activities based on the data gaps in the analysis include:

- *Collecting $PM_{2.5}$ source apportionment data for Quezon City*
- *Increase spread of air quality monitoring stations*
- *Collecting data for NO_x and NO_2*
- *Collecting of hospital admission data by gender and age*
- *Developing a local VHA and VOLY for Quezon City.*

Notes: [1] *USAID Philippines GHG Emissions Fact Sheet*

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