# Investigating the impact of open burn pits on air pollution in Albania

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## Abstract

Limited air quality studies carried out in Tirana over the last decades indicate that PM10 and PM2.5 levels frequently exceed the EU limit and WHO guidelines [1-3]. In addition to PM emissions, primary and secondary air pollutants contribute to formation of complex gaseous toxic mixtures of CO, $NO_x$, $SO_2$, $O_3$ and volatile organic compounds (VOCs), and other poorly characterized pollutants that can lead to a range of adverse health effects, including development of lung cancers, asthma and chronic obstructive pulmonary diseases, respiratory infections, cardiovascular diseases, neurological disorders and stroke [4,5]. Open pit burning of mixed municipal waste can generate highly toxic mixtures of gaseous and PM pollutants, including dioxins, furans, heavy metals, PAHs, CO, SO2, $NO_X$, and environmentally persistent free radicals. This collaborative research project- funded through the READ (Research Expertise from the Academic Diaspora) program - aims to determine the airborne concentration and chemical composition of PM pollution in Tirana and adjacent areas with active and frequent open burn pits. A TECORA ECHO PM10/PM2.5 Sampler is being used for PM measurements in 4 representative stations for at least 2-week intervals capturing spatial and seasonal variations in airborne $PM_{2.5}$ and $PM_{10}$. Gravimetric analysis will be complemented with chemical composition analysis, including for heavy metals, PAHs, free radical (ROS) generation, dioxins and other organic and inorganic compounds, will be carried out at UMASS Lowell, by using a range of modern techniques. Deposition of dust fall by the gravimetric standard method (ASTM 2017, D1739 − 98) will be measured at the same stations to expand the coverage time and further chemical composition analysis will be carried out, intending to identify signature pollutants associated with open burning of waste streams, including plastics, batteries, electronics, or medical waste. The obtained results can serve as the first critical step in understanding the air pollution toxicology, their sources and health impact, and can inform larger scale monitoring efforts.

## References

[1]     WHO global air quality guidelines (2021): particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. https://iris.who.int/handle/10665/345329.

[2]     TOTONI (LILO), R, BARAJ E. *Study of PM10 levels in urban air of Tirana (Vasil Shanto cross-road) and statistical analysis of data collected*, ICRAE 2013

[3]     EU (2022) Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on ambient air quality and cleaner air for Europe.  COM (2022) 542 final/2 2022/0347 (COD)

[4]     SCHRAUFNAGEL, D.E. The health effects of ultrafine particles. Experimental & Molecular medicine (2020), 52: 311-317, https://doi.org/10.1038/s12276-020-0403-3.

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**Figure 1:** TECORA ECHO PM10/PM2.5 Sampler nearby "Vasil Shanto" crossroad