

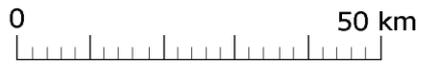
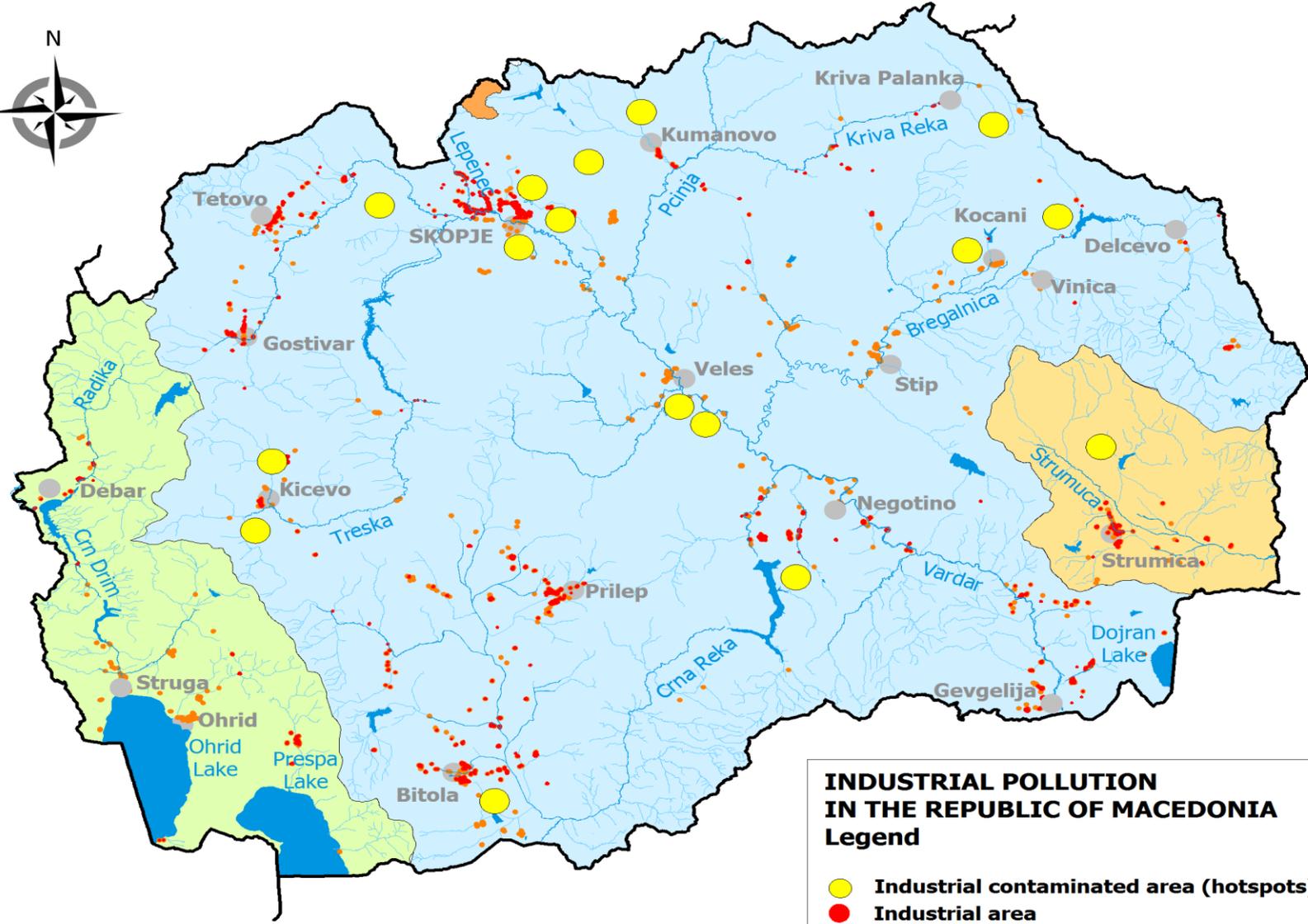
Monitoring of air pollution and its health impacts – Country situation in Macedonia

Prof. Mihail Kochubovski MD PhD

Task Force on Health 17th meeting

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Bonn, Germany

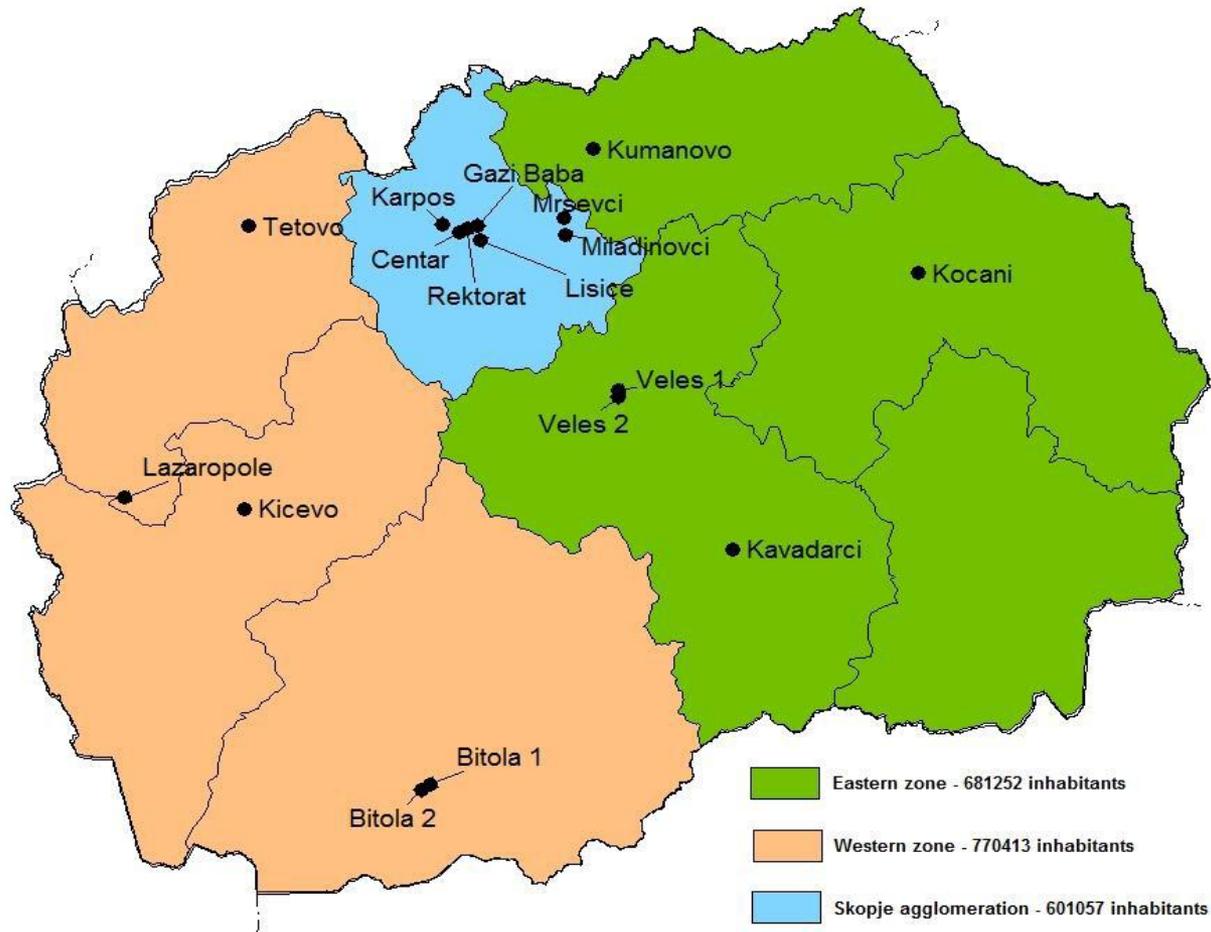


INDUSTRIAL POLLUTION IN THE REPUBLIC OF MACEDONIA Legend

-  Industrial contaminated area (hotspots)
-  Industrial area
-  Factory area
-  Major city
-  Crn Drim River Basin
-  Vardar River Basin
-  Binachka Morava River Basin
-  Strumica River Basin

Source:
Agency for Real Estate Cadastre, 2010
Ministry of Environment and Physical Planning, 2005
Ministry of Environment and Physical Planning, 2010

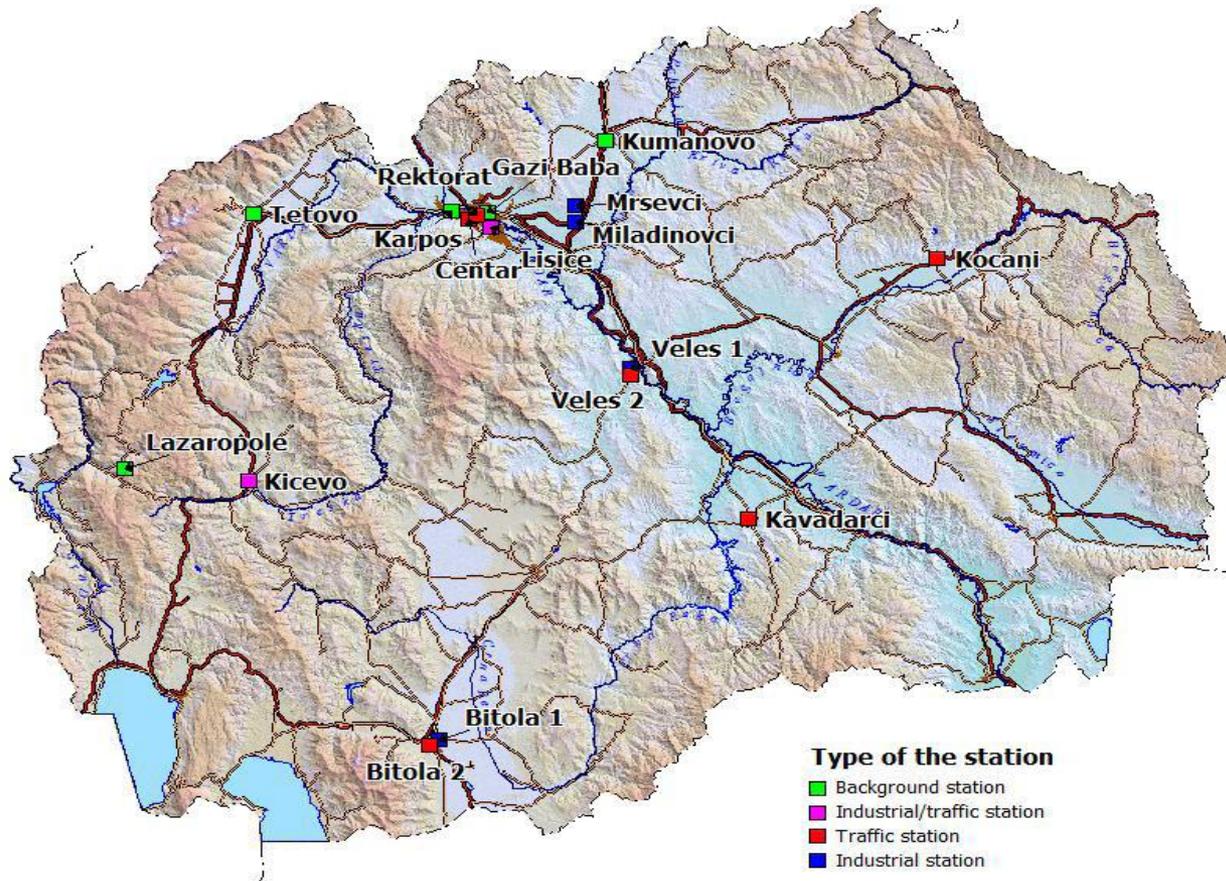
Zones and agglomerations for SO₂, CO, NO₂, NO_x, PM₁₀, PM_{2.5} and O₃



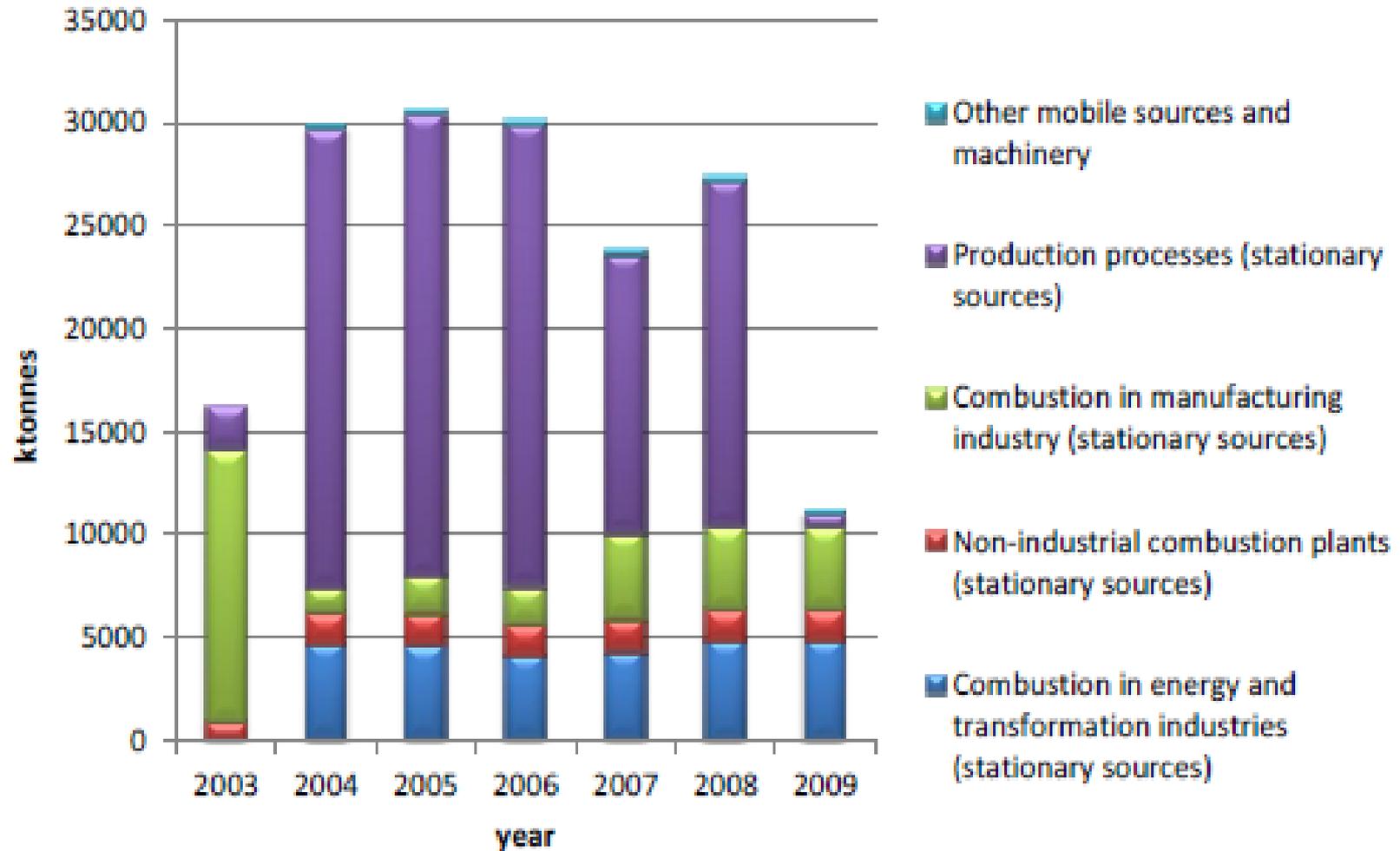
Types and number of stations in the Republic of Macedonia

Type of station	Type of area	Automated stations	Measurement places	Total stations
Traffic	Urban	6	3	9
Traffic	Suburban		1	1
Industrial	Urban	5	4	9
Industrial	Suburban	3		3
Background	Suburban	1		1
Background EMEP	Rural Lazaropole	1		1
Background	Urban	1	9	10
<i>TOTAL</i>		<i>17</i>	<i>17</i>	<i>34</i>

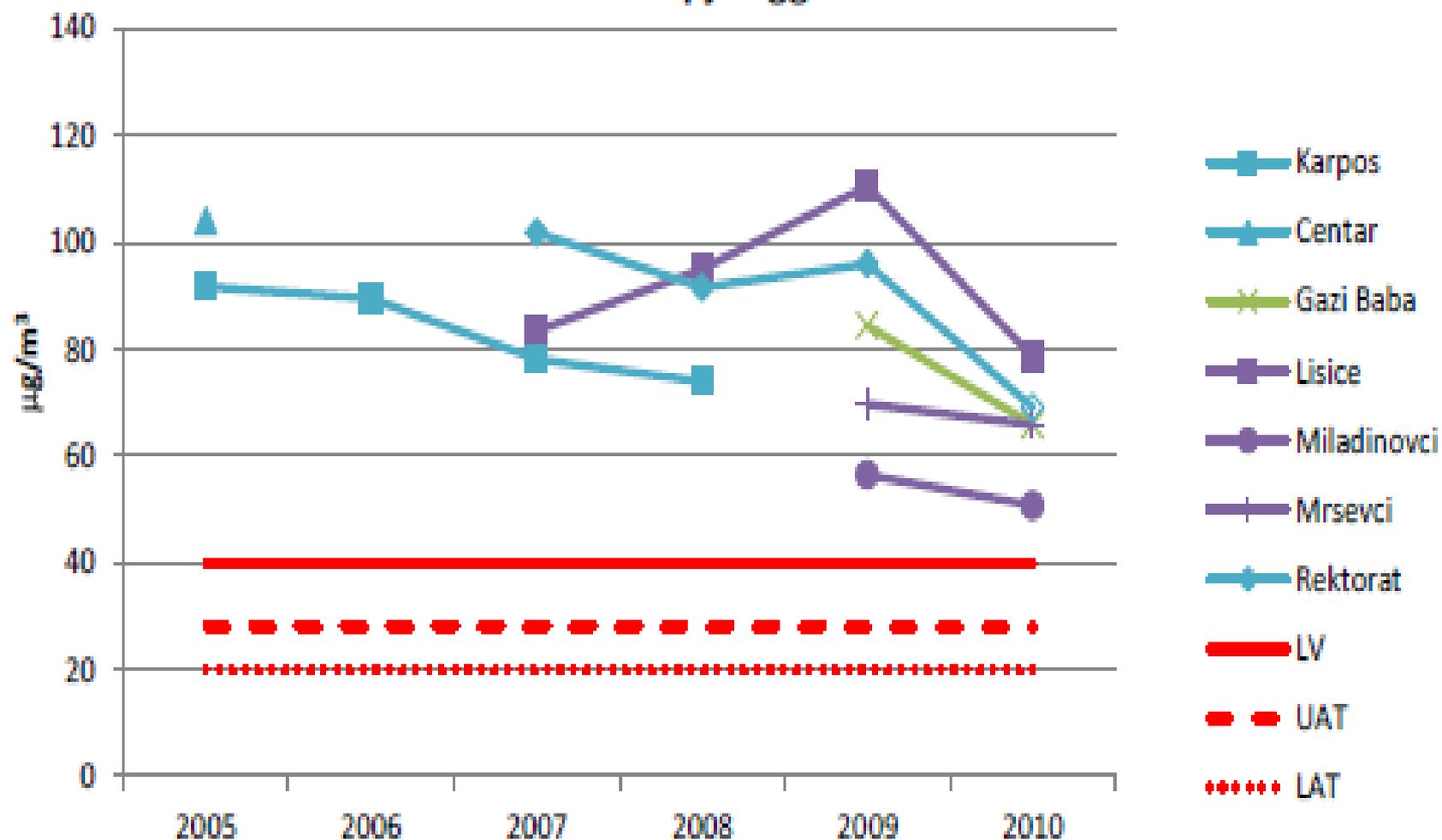
Distribution of air quality monitoring stations in Republic of Macedonia



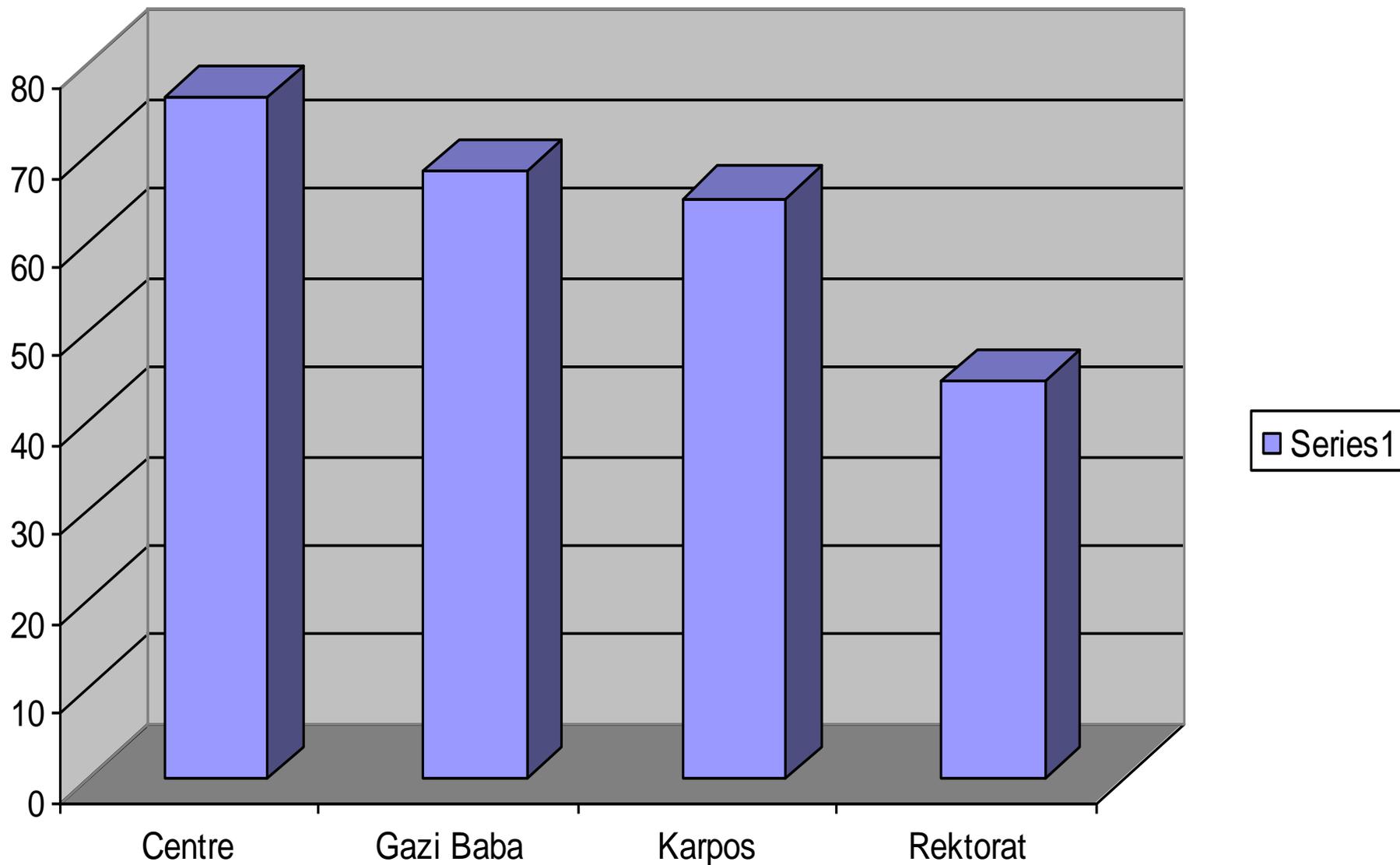
Total emissions of TSP for the period 2003 - 2009



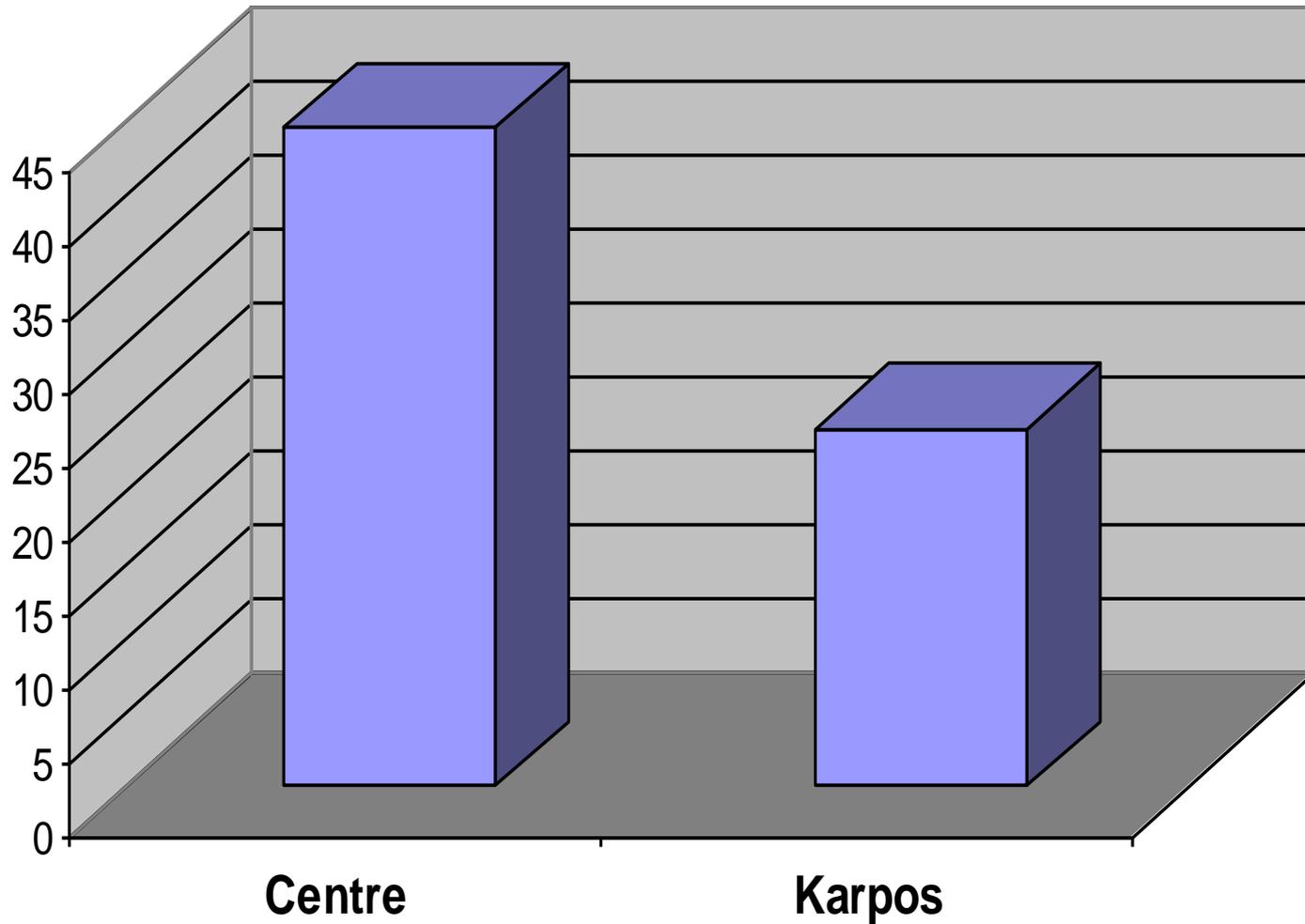
Annual average concentration of PM10 for the period 2005-2010 in Skopje agglomeration



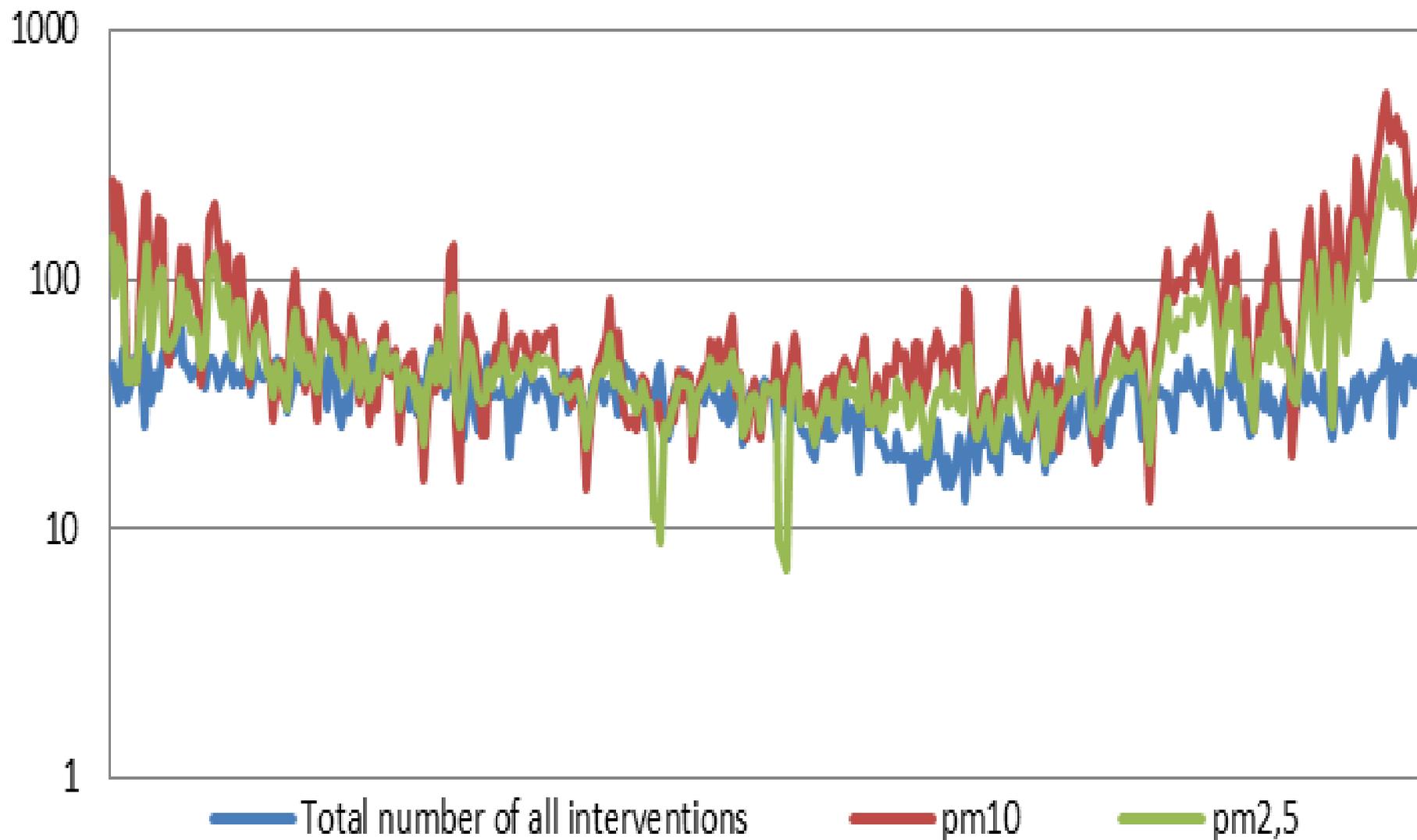
Air pollution with PM10 in Skopje in 2013



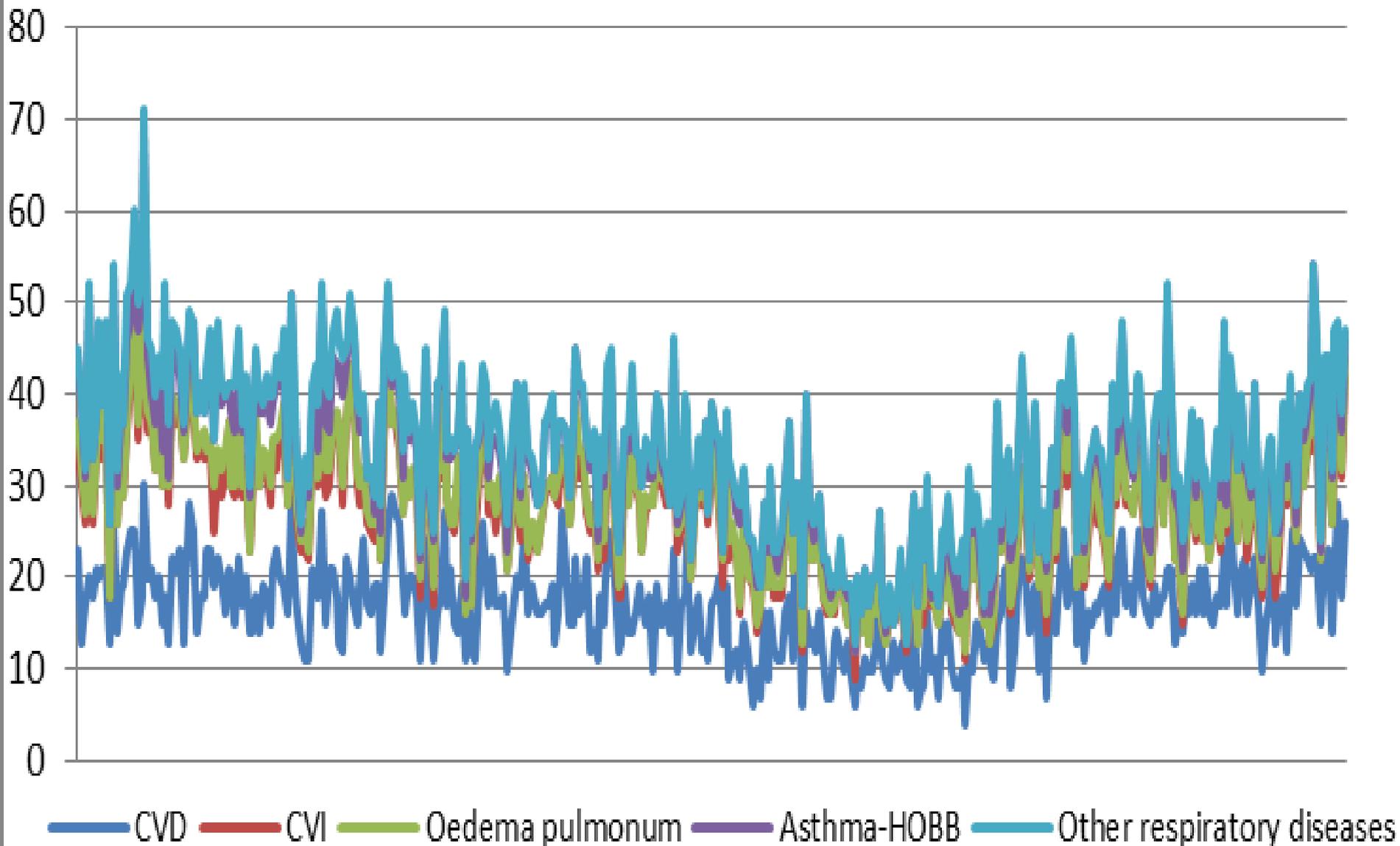
Air pollution in Skopje with PM2,5 in 2013



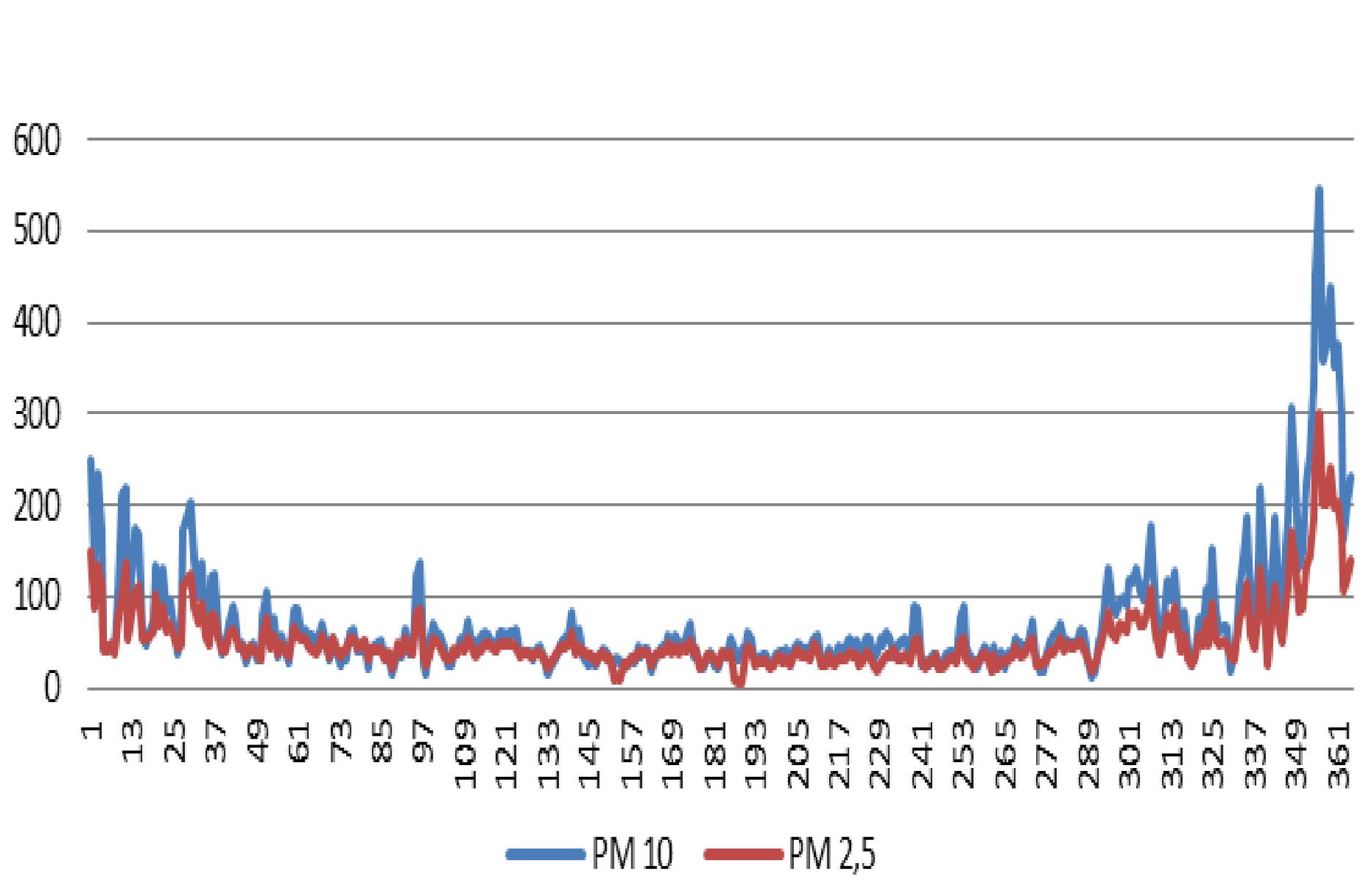
Distribution of the total number of all interventions versus PM10 and PM 2,5 in Skopje for 2013



Distribution of daily number of specific diseases in Skopje for 2013



Concentration of the particulate matters (PM10 and PM2,5 μm) in Skopje for 2013 by days



Skopje 2013/ Daily	CVD	CVI	Oedema pulmonum	Asthma- HOBB	Other respiratory diseases	Total number of all interventions
PM 10	0.2755	0.1664	0.0921	0.1294	0.0607	0.2786
P-Value	0.0000	0.0014	0.0787	0.0134	0.2472	0.0000
PM 2,5	0.3592	0.2509	0.1106	0.1876	0.1081	0.3876
P-Value	0.0000	0.0000	0.0347	0.0003	0.0390	0.0000

**Average daily PM10 for 2013 in Skopje was 72.21783
(70.96 in 2012)**

**Average daily PM2.5 for 2013 in Skopje was 52.71149
(51.54 in 2012)**

The PM2.5/PM10 ratio for 2013 in Skopje was 1,370059

Future work

- **Further improvement of quality of measurement data (correction and validation of data, field calibration, better data coverage);**
- **improved quality and coverage of emission data (traffic, small scale wood burning);**
- **determination of national emission factors in order to decrease uncertainty of emission data;**
- **use of dispersion models it is possible to enlarge the spatial distribution of concentrations and forecast future emission situations. The complementing of measurements with the use of models can affect to a reduction in the number of monitoring stations. The use of models can also contribute to a more accurate description of air quality in urban areas.**
- **additional measurement campaigns performed to assess the air quality in context of heavy metals;**
- **continuous measurement of PM2.5;**
- **different environments (i.e. urban background areas near residential areas, rural residential areas, traffic influenced areas outside cities (along motorways), rural background areas) to be covered with monitoring stations;**
- **use of mobile measurements and passive sampling for indicative and short term measurements campaigns**