

Urban Air Quality Monitoring and Presentation of Results in the Electronic Media in Prishtina, Kosovo

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ABSTRACT

Air pollution is a global threat leading to large impacts on health and urban ecosystems. The air quality index is based on measurement of particulate matter (PM_{2.5} and PM₁₀), Nitrogen Dioxide (NO₂), Sulfur Dioxide (SO₂), Carbon Monoxide (CO) and Ozone (O₃). Recent the years in Kosovo are installed nation air quality monitoring in different areas such as residential areas, industrial, roadside and reference areas. The study was conducted in Prishtina region between November-December 2021 and January 2022 in five monitoring stations. The purpose of this paper is to determine compliance with air quality limit value, to detect pollutant levels (NO₂, SO₂, CO, O₃), particulate matter (PM₁₀ and PM_{2.5}) and to study the values of exceedances, from the standards values for air quality. Air quality monitoring in this study was done in the study area Agglomeration-AKS1 (IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj). Particulate matter (PM₁₀) and (PM_{2.5}) and Nitrogen Dioxide (NO₂) have shown exceedances value from the standard values for air quality in Agglomeration-AKS1 area in Prishtina. Nitrogen Dioxide (NO₂) have shown exceedances value (100-120 µg/m³) from the standard values for air quality at the ex-Rilindja (132.2 µg/m³). PM_{2.5} has exceeded the limit values (20–25 µg/m³) in monitoring stations: IHMK, Obiliq, Dardhishte and Palaj. The respect and application of international standards for air quality strengthens the image of Kosovo, preserves the health of citizens, fulfills environmental criteria, while the contribution of the media is considered important.

Keywords: air quality index, pollution, monitoring, media, Kosovo.

INTRODUCTION

Over the last few decades the state of the global environment has become an issue of major concern. Air pollution is a global threat leading to large impacts on health and urban ecosystems. In Europe, the most serious pollutants in terms of damage to human health, are particulate matter PM₁₀ and PM_{2.5}, NO₂, CO, SO₂ and ground-level O₃. Air pollution is a great reason of early death and disease and is the single largest environmental health risk in Europe (Lim, 2012). Heart disease and stroke are the most common reasons for early death attributable to air pollution, followed by lung diseases and lung cancer (WHO, 2013).

According of European Environment Agency emissions and concentrations have increased in many areas worldwide (Amann, 2018). When it comes to Europe, air quality remains poor in many areas, despite reductions in emissions and ambient concentrations (EEA, 2018).

More than 70% of the European population, which will grow to about 523 million by the year 2000, live in urban areas. They are often exposed to elevated levels of air pollutants, predominantly emitted from a variety of sources concentrated in the city; the most important of these are usually road traffic, domestic dwellings, Industrial facilities and power generation plants. Poor air quality, along with other environmental problems, challenges citizens in the capital of Kosovo in Pristina

and the surrounding area, both in urban and rural areas (Balaj, 2017).

Air pollution is perceived as the second biggest environmental concern for Europeans after climate change and people expect the authorities to implement effective measures to reduce air pollution and its effects (EU, 2016).

The first automatic air quality monitoring station in Kosovo were installed in Prishtina on January 2009 (MESP, 2020). Air pollution in recent years in Kosovo and especially in Prishtina is poor for the health of citizens. Measurements are performed in frequented spaces where the movement and concentration of citizens is high.

The presentation of air quality values, role of electronic media for awareness of the air quality problem has been continuous, through informative editions and news.

According to the presentation in the media in Kosovo, air pollution is considered poor, especially during the autumn and winter seasons, when various factors affect the pollution of the environment and consequently cause a number of problems. In the summer months (May, June, July and August) air topics are covered less in the media, while with the drop in temperatures, especially during the winter season (November, December, January, February) and adding pollution from outdated vehicles and air quality topics are permanent topics in the media. Environmental experts consider and through the media make

public their positions and appeal that alternatives should be found to remove the use of fossil materials for heating.

Real-time updating and tracking of the factors that affect air pollution in Kosovo, in addition to being presented in the media, it is also public through social networks and static points positioned in urban environments such as in Prishtina so that citizens are informed of the situation real factors that affect air quality. The purpose of this paper is to determine compliance with air quality limit value, to detect pollutant levels and to study the values of exceedances from the standard values for air quality in Prishtina, Kosovo.

MATERIAL AND METHODS

Study area

Location of this study was in region of Prishtina in Republic of Kosovo. National air quality monitoring network in Kosovo is presented in (Figure 1). Air quality monitoring in this study was done in the study area Agglomeration-AKS1 (IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj). The study was conducted in Prishtina region between November-December 2021 and January 2022 in five monitoring stations. Based on the Law on Environmental Protection, No. 03/L-025, Law on Air Pollution

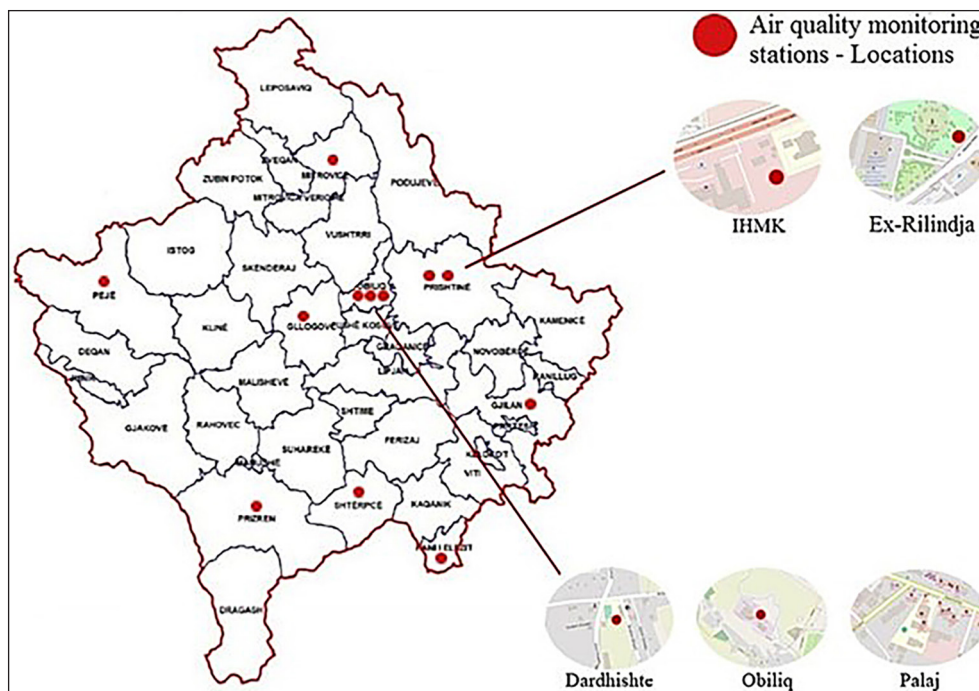


Figure 1. National air quality monitoring network in Kosovo

Protection, No.03/L-160 and the Law of Hydro meteorological Activity, No.02/L-79, Environmental Agency/Hydro meteorological Institute of Kosovo (AMMK/IHMK), is obliged to monitoring air quality throughout the territory of Kosovo. Kosovo Environmental Agency has a monitoring system of 12 stations and 1 mobile station. During the study have analyzed the current measurements and include these parameters: Particulate matter (PM_{10} and $PM_{2.5}$ $\mu\text{g}/\text{m}^3$), NO_2 ($\mu\text{g}/\text{m}^3$), SO_2 ($\mu\text{g}/\text{m}^3$), CO (mg/m^3), and O_3 ($\mu\text{g}/\text{m}^3$) and their values (Maximum value ($\mu\text{g}/\text{m}^3$), average value ($\mu\text{g}/\text{m}^3$), date of maximum value, number of days with exceedances).

RESULTS AND DISCUSSION

During the study for years 2021 and 2022, for Index air quality in Agglomeration area in Prishtina-AKS1, with monitoring stations (IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj) and analyzed parameters: Particulate matter (PM_{10} $\mu\text{g}/\text{m}^3$) and ($PM_{2.5}$ $\mu\text{g}/\text{m}^3$), NO_2 ($\mu\text{g}/\text{m}^3$), SO_2 ($\mu\text{g}/\text{m}^3$), CO (mg/m^3), and O_3 ($\mu\text{g}/\text{m}^3$). Their values (Maximum value, average value, date of maximum value, number of days with exceedances) are presented in tables below.

Table 1 shows maximum values of PM_{10} for November, 2021 according to monitoring stations in AKS1 are: IHKM ($77.1 \mu\text{g}/\text{m}^3$), ex-Rilindja ($77 \mu\text{g}/\text{m}^3$), Obiliq ($89 \mu\text{g}/\text{m}^3$), Dardhishte ($103.4 \mu\text{g}/\text{m}^3$) and Palaj ($77.1 \mu\text{g}/\text{m}^3$). The number of days

with exceedances at the IHKM station was (7), ex-Rilindja (5), Obiliq (6) Dardhishte (5) and Palaj (2). Average values for November were: IHKM ($34.1 \mu\text{g}/\text{m}^3$), ex-Rilindje ($39.7 \mu\text{g}/\text{m}^3$), Obiliq ($31.3 \mu\text{g}/\text{m}^3$), Dardhishte ($33.9 \mu\text{g}/\text{m}^3$) and ($25.2 \mu\text{g}/\text{m}^3$). PM_{10} has exceeded the limit values ($35\text{--}50 \mu\text{g}/\text{m}^3$) in monitoring stations: IHMK, ex-Rilindje, Obiliq, Dardhishte and Palaj.

Table 2 shows maximum values of $PM_{2.5}$ for November 2021 according to monitoring stations in AKS1 are: IHKM ($93.1 \mu\text{g}/\text{m}^3$), ex-Rilindja ($139.8 \mu\text{g}/\text{m}^3$), Obiliq ($159.8 \mu\text{g}/\text{m}^3$), Dardhishte ($128.1 \mu\text{g}/\text{m}^3$) and Palaj ($83.6 \mu\text{g}/\text{m}^3$). Average values for November were: IHKM ($27.9 \mu\text{g}/\text{m}^3$), ex-Rilindja ($26.2 \mu\text{g}/\text{m}^3$), Obiliq ($31.2 \mu\text{g}/\text{m}^3$), Dardhishte ($34.3 \mu\text{g}/\text{m}^3$) and Palaj ($16 \mu\text{g}/\text{m}^3$). The number of days with exceedances at the IHKM station was (4), ex-Rilindje (7), Obiliq (5) Dardhishte (3) and Palaj (2). $PM_{2.5}$ has exceeded the limit values ($20\text{--}25 \mu\text{g}/\text{m}^3$) in monitoring stations: IHMK, ex-Rilindje, Obiliq, Dardhishte and Palaj.

Table 3 shows maximum values of NO_2 for November, 2021 according to monitoring stations in AKS1 are: IHKM ($75.3 \mu\text{g}/\text{m}^3$), ex-Rilindja ($157.7 \mu\text{g}/\text{m}^3$), Obiliq ($42.6 \mu\text{g}/\text{m}^3$), Dardhishte ($1.4 \mu\text{g}/\text{m}^3$) and Palaj ($46.2 \mu\text{g}/\text{m}^3$). Average values for November were: IHKM ($20.3 \mu\text{g}/\text{m}^3$), ex-Rilindja ($35.8 \mu\text{g}/\text{m}^3$), Obiliq ($16.2 \mu\text{g}/\text{m}^3$), Dardhishte ($1.1 \mu\text{g}/\text{m}^3$) and Palaj ($12.8 \mu\text{g}/\text{m}^3$). NO_2 did not exceedance the limit values ($100\text{--}120 \mu\text{g}/\text{m}^3$) in all monitoring stations: IHMK, ex-Rilindje, Obiliq, Dardhishte and Palaj.

Table 1. Air quality value for PM_{10} in AKS1 – agglomeration during month-November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	34.1	77.1	13.11.2021	7
Ex-Rilindja - KS0102	39.7	74	13.11.2021	5
Obiliq - KS0110	31.3	89	13.11.2021	6
Dardhishte - KS0111	33.9	103.4	13.11.2021	5
Palaj - KS0112	25.2	65.6	13.11.2021	2

Table 2. Air quality value for $PM_{2.5}$ in AKS1 – agglomeration during month-November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	27.9	93.1	15.11.2021	4
Ex-Rilindja - KS0102	26.2	139.8	7.11.2021	7
Obiliq - KS0110	21.2	159.8	13.11.2021	5
Dardhishte - KS0111	24.3	128.1	13.11.2021	3
Palaj - KS0112	16	83.6	13.11.2021	2

Table 4 shows maximum values of CO for November, 2021 according to monitoring stations in AKS1 are: IHKM (3.4 $\mu\text{g}/\text{m}^3$), ex-Rilindja (3.6 $\mu\text{g}/\text{m}^3$), Obiliq (2.1 $\mu\text{g}/\text{m}^3$), Dardhishte (3.1 $\mu\text{g}/\text{m}^3$) and Palaj (0.5 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (1.9 $\mu\text{g}/\text{m}^3$), ex-Rilindja (2.3 $\mu\text{g}/\text{m}^3$), Obiliq (1.1 $\mu\text{g}/\text{m}^3$), Dardhishte (1.3 $\mu\text{g}/\text{m}^3$) and Palaj (0.1 $\mu\text{g}/\text{m}^3$). CO did not exceedance the limit values (10 $\mu\text{g}/\text{m}^3$) in all monitoring stations IHKM, ex Rilindje, Obiliq, Dardhishte and Palaj.

Table 5 shows maximum values of O₃ for November, 2021 according to monitoring stations in AKS1 are: IHKM (62.2 $\mu\text{g}/\text{m}^3$), ex-Rilindja (75 $\mu\text{g}/\text{m}^3$), Obiliq (50 $\mu\text{g}/\text{m}^3$), Dardhishte (75.2 $\mu\text{g}/\text{m}^3$) and Palaj (81.4 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (18.7 $\mu\text{g}/\text{m}^3$), ex-Rilindja (26.8 $\mu\text{g}/\text{m}^3$), Obiliq (12.6 $\mu\text{g}/\text{m}^3$), Dardhishte (27.3 $\mu\text{g}/\text{m}^3$) and Palaj (34.3 $\mu\text{g}/\text{m}^3$). O₃ In Aglomeracionin AKS1 did not exceedance the limit values (120–180 $\mu\text{g}/\text{m}^3$).

Table 6 shows maximum values of SO₂ for November, 2021 according to monitoring stations in AKS1 are: IHKM (23.6 $\mu\text{g}/\text{m}^3$), ex-Rilindja (24.7 $\mu\text{g}/\text{m}^3$), Obiliq (8.7 $\mu\text{g}/\text{m}^3$), Dardhishte (19.9 $\mu\text{g}/\text{m}^3$) and Palaj (20.5 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (2.8 $\mu\text{g}/\text{m}^3$), ex-Rilindja (10 $\mu\text{g}/\text{m}^3$), Obiliq (4 $\mu\text{g}/\text{m}^3$), Dardhishte (3.8 $\mu\text{g}/\text{m}^3$).

Table 6 shows maximum values of SO₂ for November, 2021 according to monitoring stations in AKS1 are: IHKM (23.6 $\mu\text{g}/\text{m}^3$), ex-Rilindja (24.7 $\mu\text{g}/\text{m}^3$), Obiliq (8.7 $\mu\text{g}/\text{m}^3$), Dardhishte (19.9 $\mu\text{g}/\text{m}^3$) and Palaj (20.5 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (2.8 $\mu\text{g}/\text{m}^3$), ex-Rilindja (10 $\mu\text{g}/\text{m}^3$), Obiliq (4 $\mu\text{g}/\text{m}^3$), Dardhishte (3.8 $\mu\text{g}/\text{m}^3$).

Table 3. Air quality value for NO₂ in AKS1 – agglomeration during month-November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	20.3	75.3	12.11.2021	0
Ex-Rilindja - KS0102	35.8	157.7	12.11.2021	5
Obiliq - KS0110	16.2	42.6	30.11.2021	0
Dardhishte	1.1	1.4	06.11.2021	0
Palaj - KS0112	12.8	46.2	13.11.2021	0

Table 4. Air quality value for CO in AKS1 – agglomeration during month-November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	1.9	3.4	07.11.2021	0
Ex-Rilindja - KS0102	2.3	3.6	07.11.2021	0
Obiliq - KS0110	1.1	2.1	30.11.2021	0
Dardhishte - KS0111	1.3	3.1	13.11.2021	0
Palaj - KS0112	0.1	0.5	01.11.2021	0

Table 5. Air quality value for O₃ in AKS1 – agglomeration during month-November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	18.7	62.2	28.11.2021	0
Ex-Rilindja - KS0102	26.8	75	02.11.2021	0
Obiliq - KS0110	12.6	50	20.11.2021	0
Dardhishte - KS0111	27.3	75.2	01.11.2021	0
Palaj - KS0112	34.3	81.4	01.11.2021	0

Table 6. Air quality value for SO₂ in AKS1 – agglomeration during month – November, 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	2.8	23.6	12.11.2021	0
Ex-Rilindja - KS0102	10	24.7	23.11.2021	0
Obiliq - KS0110	4	8.7	29.11.2021	0
Dardhishte - KS0111	3.8	19.9	18.11.2021	0
Palaj - KS0112	1.6	20.5	18.11.2021	0

Note: The air quality index in AKS1 – agglomeration during month – December, 2021.

m³) and Palaj (1.6 µg/m³). SO₂ In Aglomeracionin AKS1 did not exceedance the limit value (200–350 µg/m³) in all monitoring stations: IHMK, Rilindje, Obiliq, Dardhishte and Palaj.

Table 7 shows maximum values of PM₁₀ for November, 2021 according to monitoring stations in AKS1 are: IHKM (62.7 µg/m³), ex-Rilindja (81.3 µg/m³), Obiliq (65.4 µg/m³), Dardhishte (56.9 µg/m³) and Palaj (36.2 µg/m³). The number of days with exceedances at the IHKM station was (3), ex-Rilindja (8), Obliq (1) Dardhishte (2) and Palaj (1). Average values for November were: IHKM (24.6 µg/m³), Rilindje (36.7 µg/m³), Obiliq (25.4 µg/m³), Dardhishte (22.7 µg/m³) and Palaj (15.4 µg/m³). PM₁₀ has exceeded the limit values (35–50 µg/m³) in station monitoring: IHMK, Rilindje, Obiliq, Dardhishte and Palaj.

Table 8 shows maximum values of PM_{2.5} for November, 2021 according to monitoring stations in AKS1 are: IHKM (94.8 µg/m³), ex-Rilindja (141.1 µg/m³), Obiliq (166.9 µg/m³), Dardhishte (107.8 µg/m³) and Palaj (64 µg/m³). Average values for November were: IHKM (18.9 µg/m³), ex-Rilindja (24.7 µg/m³), Obiliq (21.7 µg/m³), Dardhishte (19.8 µg/m³)

and Palaj (13.1 µg/m³). PM_{2.5} has exceeded the limit values (20–25 µg/m³) in station monitoring: IHMK, Rilindje, Obiliq, Dardhishte and Palaj.

Table 9 shows maximum values of NO₂ for November, 2021 according to monitoring stations in AKS1 are IHKM (78.7 µg/m³), ex-Rilindja (138.2 µg/m³), Obiliq (54.9 µg/m³), Dardhishte (1.4 µg/m³) and Palaj (58.9 µg/m³). The number of days with exceedances at the IHKM station was (3), ex-Rilindja (4), Obliq (5) Dardhishte (1) and Palaj (2). Average values for November were: IHKM (23.6 µg/m³), ex-Rilindja (33.9 µg/m³), Obiliq (21.7 µg/m³), Dardhishte (1.1 µg/m³) and Palaj (13.9 µg/m³). NO₂ has shown exceeding the limit values (100–120 µg/m³) at the ex-Rilindja station (138.2), while in the monitoring stations: IHMK, Obiliq, Dardhishte and not has exceeded the limit values.

Table 10 shows maximum values of CO for November, 2021 according to monitoring stations in AKS1 are: IHKM (4.3 µg/m³), ex-Rilindja (4.8 µg/m³), Obiliq (3.1 µg/m³), Dardhishte (3.3 µg/m³) and Palaj (1 µg/m³). Average values for November were: IHKM (1.5 µg/m³), ex-Rilindja (3.8 µg/m³), Obiliq (1.4 µg/m³), Dardhishte

Table 7. Air quality value for PM₁₀ in AKS1 – agglomeration during month – December 2021

Monitoring station: Location and code	Average value (µg/m ³)	Maximum value (µg/m ³)	Date of maximum value (µg/m ³)	Number of days with exceedances (µg/m ³)
IHKM - KS0101	24.6	62.7	31.12.2021	3
Ex-Rilindja - KS0102	36.7	81.3	23.12.2021	8
Obiliq - KS0110	25.8	65.4	31.12.2021	1
Dardhishte - KS0111	22.7	56.9	31.12.2021	2
Palaj - KS0112	15.4	36.2	23.12.2021	1

Table 8. Air quality value for PM_{2.5} in AKS1 – agglomeration during month – December 2021

Monitoring station: Location and code	Average value (µg/m ³)	Maximum value (µg/m ³)	Date of maximum value (µg/m ³)	Number of days with exceedances (µg/m ³)
IHKM - KS0101	18.9	94.8	16.12.2021	3
Ex-Rilindja - KS0102	27.4	141.1	27.12.2021	4
Obiliq - KS0110	21.7	166.9	31.12.2021	5
Dardhishte - KS0111	19.8	107.8	13.12.2021	1
Palaj - KS0112	13.1	64.8	24.12.2021	2

Table 9. Air quality value for NO₂ in AKS1 – agglomeration during month – December 2021

Monitoring station: Location and code	Average value (µg/m ³)	Maximum value (µg/m ³)	Date of maximum value (µg/m ³)	Number of days with exceedances (µg/m ³)
IHKM - KS0101	23.6	78.7	28.12.2021	0
Ex-Rilindja - KS0102	33.9	138.2	24.12.2021	0
Obiliq - KS0110	21.7	54.9	06.12.2021	0
Dardhishte - KS0111	1.1	1.4	04.12.2021	0
Palaj - KS0112	13.9	58.9	23.12.2021	0

(1.1 $\mu\text{g}/\text{m}^3$) and Palaj (0.1 $\mu\text{g}/\text{m}^3$). CO did not exceedance the limit values (10 $\mu\text{g}/\text{m}^3$) in all monitoring stations: IHMK, Rilindje, Obiliq, Dardhishte and Palaj.

Table 11 shows maximum values of O_3 for November, 2021 according to monitoring stations in AKS1 are: IHKM (60.4 $\mu\text{g}/\text{m}^3$), ex-Rilindja (77.4 $\mu\text{g}/\text{m}^3$), Obiliq (58.5 $\mu\text{g}/\text{m}^3$), Dardhishte (43.6 $\mu\text{g}/\text{m}^3$) and Palaj (68.4 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (19.3 $\mu\text{g}/\text{m}^3$), ex-Rilindja (28.6 $\mu\text{g}/\text{m}^3$), Obiliq (17.1 $\mu\text{g}/\text{m}^3$), Dardhishte (25.8 $\mu\text{g}/\text{m}^3$) and Palaj (36.6 $\mu\text{g}/\text{m}^3$). O_3 in Agglomeracionin AKS1 did not exceedance the limit values (120–180 $\mu\text{g}/\text{m}^3$).

Table 12 shows maximum values of SO_2 for November, 2021 according to monitoring stations in AKS1 are: IHKM (26.7 $\mu\text{g}/\text{m}^3$), ex-Rilindja (46.7 $\mu\text{g}/\text{m}^3$), Obiliq (20.5 $\mu\text{g}/\text{m}^3$), Dardhishte (19.2 $\mu\text{g}/\text{m}^3$) and Palaj (14.8 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (3.1 $\mu\text{g}/\text{m}^3$), ex-Rilindja (12.3 $\mu\text{g}/\text{m}^3$), Obiliq (7.3 $\mu\text{g}/\text{m}^3$), Dardhishte (5.5 $\mu\text{g}/\text{m}^3$) and Palaj (2 $\mu\text{g}/\text{m}^3$). SO_2 In Agglomeracionin AKS1 did not

exceedance the limit value (200–350 $\mu\text{g}/\text{m}^3$) in all monitoring stations: IHMK, Rilindje, Obiliq, Dardhishte and Palaj.

Table 13 shows maximum values of PM_{10} for November, 2021 according to monitoring stations in AKS1 are: IHKM (97 $\mu\text{g}/\text{m}^3$), ex-Rilindja (95.9 $\mu\text{g}/\text{m}^3$), Obiliq (76.5 $\mu\text{g}/\text{m}^3$), Dardhishte (75.8 $\mu\text{g}/\text{m}^3$) and Palaj (59.1 $\mu\text{g}/\text{m}^3$). The number of days with exceedances at the IHKM station was (12), ex-Rilindja (13), Obliq (9) Dardhishte (8) and (3). Average values for November were: IHKM (41.8 $\mu\text{g}/\text{m}^3$), ex-Rilindja (51.4 $\mu\text{g}/\text{m}^3$), Obiliq (38.3 $\mu\text{g}/\text{m}^3$), Dardhishte (41.6 $\mu\text{g}/\text{m}^3$) and Palaj (28.8 $\mu\text{g}/\text{m}^3$). PM_{10} has exceeded the limit values (35–50 $\mu\text{g}/\text{m}^3$) in station monitoring: IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj.

Table 14 shows maximum values of $\text{PM}_{2.5}$ for November, 2021 according to monitoring stations in AKS1 are: IHKM (139.5 $\mu\text{g}/\text{m}^3$), ex-Rilindja (148.6 $\mu\text{g}/\text{m}^3$), Obiliq (167.2 $\mu\text{g}/\text{m}^3$), Dardhishte (135.5 $\mu\text{g}/\text{m}^3$) and Palaj (103.9 $\mu\text{g}/\text{m}^3$). The number of days with exceedances at the IHKM station was (9), ex-Rilindja (13), Obliq (11) Dardhishte

Table 10. Air quality value for CO in AKS1 – agglomeration during month – December 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM- KS0101	1.5	4.3	19.12.2021	0
Ex-Rilindja- KS0102	3.8	4.8	25.12.2021	0
Obiliq- KS0110	1.4	3.1	31.12.2021	0
Dardhishte- KS0111	1.1	3.3	23.12.2021	0
Palaj- KS0112	0.1	1	28.12.2021	0

Table 11. Air quality value for O_3 in AKS1 - agglomeration during month – December 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	19.3	60.4	11.12.2021	0
Ex-Rilindja - KS0102	28.6	77.4	11.12.2021	0
Obiliq - KS0110	17.1	58.5	11.12.2021	0
Dardhishte - KS0111	25.8	43.6	08.12.2021	0
Palaj - KS0112	36.6	68.4	11.12.2021	0

Table 12. Air quality value for SO_2 in AKS1 – agglomeration during month – December 2021

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	3.1	26.7	22.12.2021	0
Ex-Rilindja - KS0102	12.3	46.7	22.12.2021	0
Obiliq - KS0110	7.3	20.5	23.12.2021	0
Dardhishte - KS0111	5.5	19.2	21.12.2021	0
Palaj - KS0112	2	14.8	15.12.2021	0

Note: the air quality index in AKS1 – agglomeration during month-Janary, 2022.

(7) and Plaj (4). Average values for November were: IHKM (34. $\mu\text{g}/\text{m}^3$), ex-Rilindja (39.9 $\mu\text{g}/\text{m}^3$), Obiliq (33.2 $\mu\text{g}/\text{m}^3$), Dardhishte (35.5 $\mu\text{g}/\text{m}^3$) and Palaj (23 $\mu\text{g}/\text{m}^3$). $\text{PM}_{2.5}$ has exceeded the limit values (20–25 $\mu\text{g}/\text{m}^3$) in station monitoring: IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj.

Table 15 shows maximum values of NO_2 for November, 2021 according to monitoring stations in AKS1 are: IHKM (122.6 $\mu\text{g}/\text{m}^3$), ex-Rilindja (133.9 $\mu\text{g}/\text{m}^3$), Obiliq (64.1 $\mu\text{g}/\text{m}^3$), Dardhishte (56.1 $\mu\text{g}/\text{m}^3$) and Palaj (55.5 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (35.9 $\mu\text{g}/\text{m}^3$), ex-Rilindja (30.5 $\mu\text{g}/\text{m}^3$), Obiliq (24.6 $\mu\text{g}/\text{m}^3$), Dardhishte (21.5 $\mu\text{g}/\text{m}^3$) and Palaj (14.3 $\mu\text{g}/\text{m}^3$). NO_2

has shown exceeding the limit values (100–120 $\mu\text{g}/\text{m}^3$) at the Ex Rilindja station (126.2), while in the monitoring stations: IHMK, Obiliq, Dardhishte and Palaj not has exceeded the limit values.

Table 16 shows maximum values of CO for November, 2021 according to monitoring stations in AKS1 are: IHKM (7 $\mu\text{g}/\text{m}^3$), ex-Rilindja (5 $\mu\text{g}/\text{m}^3$), Obiliq (4.5 $\mu\text{g}/\text{m}^3$), Dardhishte (3.6 $\mu\text{g}/\text{m}^3$) and Palaj (0.1 $\mu\text{g}/\text{m}^3$). Average values for November were: IHKM (2.4 $\mu\text{g}/\text{m}^3$), ex-Rilindja (2.5 $\mu\text{g}/\text{m}^3$), Obiliq (1.9 $\mu\text{g}/\text{m}^3$), Dardhishte (1.2 $\mu\text{g}/\text{m}^3$) and Palaj (0.1 $\mu\text{g}/\text{m}^3$). CO did not exceedance the limit values (10 $\mu\text{g}/\text{m}^3$) in all monitoring stations IHMK, ex-Rilindja, Obiliq, Dardhishte and Palaj.

Table 13. Air quality value for PM_{10} in AKS1 – agglomeration during month – January, 2022

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	41.8	97	14.01.2022	12
Ex-Rilindja - KS0102	51.4	95.9	20.01.2022	13
Obiliq - KS0110	38.3	76.5	14.01.2022	9
Dardhishte - KS0111	41.6	75.8	14.01.2022	8
Palaj - KS0112	28.8	59.1	14.01.2022	3

Table 14. Air quality value for $\text{PM}_{2.5}$ in AKS1 – agglomeration during month – January, 2022

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	34	139.5	17.01.2022	9
Ex-Rilindja - KS0102	39.9	148.6	30.01.2022	13
Obiliq - KS0110	33.2	167.2	14.01.2022	11
Dardhishte - KS0111	35.5	135.5	15.01.2022	7
Palaj - KS0112	23	103.9	15.01.2022	4

Table 15. Air quality value for NO_2 in AKS1 - agglomeration during month – January, 2022

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	35.9	122.6	14.01.2022	0
Ex-Rilindja - KS0102	30.5	133.9	14.01.2022	0
Obiliq - KS0110	24.6	64.1	25.01.2022	0
Dardhishte	21.5	56.1	25.01.2022	0
Palaj - KS0112	14.3	55.5	14.01.2022	0

Table 16. Air quality value for CO in AKS1 – agglomeration during month – January, 2022

Monitoring station: Location and code	Average value ($\mu\text{g}/\text{m}^3$)	Maximum value ($\mu\text{g}/\text{m}^3$)	Date of maximum value ($\mu\text{g}/\text{m}^3$)	Number of days with exceedances ($\mu\text{g}/\text{m}^3$)
IHKM - KS0101	2.4	7	15.01.2022	0
Ex-Rilindja - KS0102	2.5	5	15.01.2022	0
Obiliq - KS0110	1.9	4.5	15.01.2022	0
Dardhishte - KS0111	1.2	3.6	15.01.2022	0
Palaj - KS0112	0.1	0.1	15.01.2022	0

Table 17. Air quality value for O₃ in AKS1-Agglomeration during month – January, 2022

Monitoring station: Location and code	Average value (µg/m ³)	Maximum value (µg/m ³)	Date of maximum value (µg/m ³)	Number of days with exceedances (µg /m ³)
IHKM - KS0101	18.8	60.3	30.01.2022	0
Ex-Rilindja - KS0102	29.4	77.7	25.01.2022	0
Obiliq - KS0110	13.8	44.5	16.01.2022	0
Dardhishte - KS0111	19.9	41.6	13.01.2022	0
Palaj - KS0112	35.8	81.2	14.01.2022	0

Table 18. Air quality value for SO₂ in AKS1-Agglomeration during month – January, 2022

Monitoring station: Location and code	Average value (µg/m ³)	Maximum value (µg/m ³)	Date of maximum value (µg/m ³)	Number of days with exceedances (µg /m ³)
IHKM - KS0101	1.9	18.2	31.01.2022	0
Ex-Rilindja - KS0102	13.9	93.4	31.01.2022	0
Obiliq - KS0110	11.2	19.4	14.01.2022	0
Dardhishte - KS0111	8	47.3	11.01.2022	0
Palaj - KS0112	4.7	20.2	02.01.2022	0

Table 17 shows maximum values of O₃ for November, 2021 according to monitoring stations in AKS1 are: IHKM (60.3 µg/m³), ex-Rilindja (77.7 µg/m³), Obiliq (44.5 µg/m³), Dardhishte (41.6 µg/m³) and Palaj (81.2 µg/m³). Average values for November were: IHKM (18.8 µg/m³), ex-Rilindja (29.4 µg/m³), Obiliq (13.8 µg/m³), Dardhishte (19.9 µg/m³) and Palaj (35.8 µg/m³). O₃ in Agglomeration in AKS1 did not exceedance the limit values (120–180 µg/m³).

Table 18 shows maximum values of SO₂ for November, 2021 according to monitoring stations in AKS1 are: IHKM (18.2 µg/m³), ex-Rilindja (93.4 µg/m³), Obiliq (19.4 µg/m³), Dardhishte (47.3 µg/m³) and Palaj (20.2 µg/m³). Average values for November were: IHKM (1.9 µg/m³), ex-Rilindja (13.9 µg/m³), Obiliq (11.2 µg/m³), Dardhishte (8 µg/m³) and Palaj (4.7 µg/m³). SO₂ In Agglomeration in AKS1 did not exceedance the limit value (200–350 µg/m³) in all monitoring stations: IHKM, ex-Rilindja, Obiliq, Dardhishte and Palaj.

CONCLUSIONS

Particulate matter (PM₁₀ and PM_{2.5}) and Nitrogen Dioxide (NO₂) have shown exceedances value from the standard values for air quality in Agglomeration-AKS1 area in Prishtina. Sulfur Dioxide (SO₂), Ozone (O₃), and Carbon Monoxide (CO) emissions, have not shown exceedances value, from the standard values for air quality. Exceeding the values from the standard values for

air quality were during the months of November, December and January. Maximum values of PM₁₀ for November, 2021 according to monitoring stations in AKS1 are: IHKM (77.1 µg/m³), ex-Rilindja (77 µg/m³), Obiliq (89 µg/m³), Dardhishte (103.4 µg/m³) and Palaj (77.1 µg/m³). The number of days with exceedances at the IHKM station was (7), ex-Rilindja (5), Obliq (6) Dardhishte (5) and Palaj (2). Nitrogen Dioxide (NO₂) has shown exceeding the limit values (100-120 µg/m³) at the ex-Rilindja (126.2). The presentation of air quality values, role of electronic media for awareness of the air quality problem has been continuous, through informative editions and news. According to the presentation in the media in Kosovo, air pollution is considered poor, especially during the autumn and winter season, when various factors affect the pollution of the environment and therefore cause a number of problems. The respect and application of international standards for air quality strengthens the image of Kosovo, preserves the health of citizens, fulfills environmental criteria, while the contribution of the media is considered important.

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