

## Supplementary Materials

Table S1 - Approximate total population and over 30-years old population of the 10 cities

City	1 <sup>st</sup> periods <sup>a</sup>		2 <sup>nd</sup> period <sup>a</sup>		3 <sup>rd</sup> period <sup>a</sup>		Monitors: total (valid)
	Total Populati on	Populati on > 30 year	Total Populati on	Populati on > 30 year	Total Populati on	Populati on > 30 year	
Tehran	8209730	4638750	8652820	4815000	8866500	4988250	37(7)
Mashhad	2831220	1295910	2982200	1396200	3046550	1457950	12(8)
Isfahan	2002670	1044000	2067360	1082400	2222580	1192890	7(4)
Shiraz	1578720	765600	1665500	829000	1755000	897520	3(2)
Tabriz	1557600	805940	1602000	859490	1673380	900240	6(2)
Ahvaz	1256920	549293	1282058	575181	1349715	633185	3(2)
Arak	555390	273360	609400	308000	632800	326480	2(1)
Sanandaj	387600	178220	404430	190320	420000	202000	2(2)
Khoram Abad	352000	163840	377400	179520	393050	192150	1(1)
Ilam	177600	80160	187000	87000	198640	94640	1(1)
Total	19371970	9795073	19947098	10322111	20558215	10885305	74(45)

<sup>a</sup> First period, 21 March 2013 to 20 March 2014; second period, 21 March 2014 to 20 March 2015; and third period, 21 March 2015 and 19 March 2016

## 1- Comparison between cities

### One Way Analysis of Variance

**Data source:** Data 1 in Concentrations.JNB

**Normality Test (Kolmogorov-Smirnov)** Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

**Data source:** Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
Tehran	1094	0	35.395	27.015	47.710
Mashhad	1095	27	27.740	20.813	36.572
Isfahan	1095	4	44.650	34.000	57.150
Shiraz	1095	78	25.680	19.450	32.705
Tabriz	1095	108	19.820	13.910	28.130
Ahvaz	1095	4	44.430	33.280	60.200
Arak	1091	181	26.385	18.455	37.998
Sanandaj	1036	54	24.505	17.055	34.627
Khoram Abad	1095	0	29.490	17.330	44.480
Ilam	1095	17	21.110	15.635	29.400

$H = 2426.166$  with 9 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
Isfahan vs Tabriz	4282.353	32.428	Yes
Isfahan vs Ilam	3962.243	30.692	Yes
Isfahan vs Sanandaj	3368.216	25.472	Yes
Isfahan vs Shiraz	3279.260	25.027	Yes
Isfahan vs Arak	2876.537	21.314	Yes
Isfahan vs Mashhad	2711.152	20.952	Yes
Isfahan vs Khoram Abad	2539.246	19.747	Yes
Isfahan vs Tehran	1214.641	9.444	Yes
Isfahan vs Ahvaz	66.761	0.519	No
Ahvaz vs Tabriz	4215.591	31.923	Yes
Ahvaz vs Ilam	3895.482	30.175	Yes

Ahvaz vs Sanandaj	3301.455	24.967	Yes
Ahvaz vs Shiraz	3212.499	24.517	Yes
Ahvaz vs Arak	2809.776	20.820	Yes
Ahvaz vs Mashhad	2644.391	20.436	Yes
Ahvaz vs Khoram Abad	2472.485	19.227	Yes
Ahvaz vs Tehran	1147.880	8.925	Yes
Tehran vs Tabriz	3067.712	23.246	Yes
Tehran vs Ilam	2747.602	21.298	Yes
Tehran vs Sanandaj	2153.575	16.297	Yes
Tehran vs Shiraz	2064.619	15.767	Yes
Tehran vs Arak	1661.896	12.322	Yes
Tehran vs Mashhad	1496.511	11.573	Yes
Tehran vs Khoram Abad	1324.605	10.308	Yes
Khoram Abad vs Tabriz	1743.106	13.211	Yes
Khoram Abad vs Ilam	1422.997	11.033	Yes
Khoram Abad vs Sanandaj	828.970	6.274	Yes
Khoram Abad vs Shiraz	740.014	5.653	Yes
Khoram Abad vs Arak	337.290	2.501	No
Khoram Abad vs Mashhad	171.906	1.330	Do Not Test
Mashhad vs Tabriz	1571.200	11.838	Yes
Mashhad vs Ilam	1251.091	9.640	Yes
Mashhad vs Sanandaj	657.064	4.944	Yes
Mashhad vs Shiraz	568.108	4.313	Yes
Mashhad vs Arak	165.385	1.220	Do Not Test
Arak vs Tabriz	1405.816	10.176	Yes
Arak vs Ilam	1085.706	8.023	Yes
Arak vs Sanandaj	491.680	3.555	Yes
Arak vs Shiraz	402.724	2.936	No
Shiraz vs Tabriz	1003.092	7.468	Yes
Shiraz vs Ilam	682.983	5.197	Yes
Shiraz vs Sanandaj	88.956	0.661	No
Sanandaj vs Tabriz	914.136	6.747	Yes
Sanandaj vs Ilam	594.027	4.480	Yes
Ilam vs Tabriz	320.110	2.417	No

**Note: The multiple comparisons on ranks do not include an adjustment for ties.**

## 2- Trend of concentrations in Tehran

### One Way Analysis of Variance

**Data source:** Data 1 in Concentrations.JNB

Dependent Variable: Tehran

**Normality Test (Kolmogorov-Smirnov)** Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

**Data source:** Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	0	38.940	31.060	49.365
2.000	365	0	34.940	26.815	46.765
3.000	365	1	31.350	24.933	45.508

$H = 37.739$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 3	143.272	6.122	Yes
1 vs 2	81.952	3.504	Yes
2 vs 3	61.320	2.620	Yes

**Note:** The multiple comparisons on ranks do not include an adjustment for ties.

### 3- Trend of concentrations in Mashhad

#### One Way Analysis of Variance

**Data source:** Data 1 in Concentrations.JNB

Dependent Variable: Mashhad

**Normality Test (Kolmogorov-Smirnov)** Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

#### Kruskal-Wallis One Way Analysis of Variance on Ranks

**Data source:** Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	25	30.725	23.462	41.132
2.000	365	2	24.800	18.670	32.490
3.000	365	0	28.010	21.355	34.330

$H = 47.854$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

#### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 2	160.816	6.908	Yes
1 vs 3	75.830	3.262	Yes
3 vs 2	84.986	3.717	Yes

**Note:** The multiple comparisons on ranks do not include an adjustment for ties.

#### 4- Trend of concentrations in Isfahan

##### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Isfahan

Normality Test (Kolmogorov-Smirnov) Failed (P < 0.050)

Test execution ended by user request, ANOVA on Ranks begun

##### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	4	49.140	41.030	63.020
2.000	365	0	50.460	40.125	64.240
3.000	365	0	32.600	27.695	43.980

H = 223.967 with 2 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

##### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
2 vs 3	304.351	13.049	Yes
2 vs 1	3.618	0.155	No
1 vs 3	300.733	12.858	Yes

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 5- Trend of concentrations in Shiraz

### One Way Analysis of Variance

**Data source:** Data 1 in Concentrations.JNB

Dependent Variable: Shiraz

**Normality Test (Kolmogorov-Smirnov)** Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

**Data source:** Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	61	29.705	23.280	37.273
2.000	365	17	24.085	19.495	29.877
3.000	365	0	22.860	17.470	31.560

$H = 60.048$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 3	156.111	6.845	Yes
1 vs 2	155.695	6.752	Yes
2 vs 3	0.416	0.0189	No

**Note:** The multiple comparisons on ranks do not include an adjustment for ties.



## 6- Trend of concentrations in Tabriz

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Tabriz

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	8	24.910	16.885	36.830
2.000	365	92	16.030	11.755	21.025
3.000	365	8	19.750	14.270	27.575

$H = 104.243$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 2	233.923	10.206	Yes
1 vs 3	106.464	4.990	Yes
3 vs 2	127.459	5.561	Yes

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 7- Trend of concentrations in Ahvaz

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Ahvaz

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	2	47.320	36.300	68.170
2.000	365	1	41.220	31.085	54.485
3.000	365	1	45.510	33.142	63.610

$H = 22.696$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 2	110.281	4.719	Yes
1 vs 3	41.931	1.794	No
3 vs 2	68.350	2.926	Yes

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 8- Trend of concentrations in Arak

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Arak

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	83	33.865	20.910	53.428
2.000	365	61	28.505	22.820	36.882
3.000	365	41	21.120	14.255	27.977

H = 111.993 with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 3	213.501	9.974	Yes
1 vs 2	48.808	2.246	No
2 vs 3	164.694	7.847	Yes

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 9- Trend of concentrations in Sanandaj

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Sanandaj

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	54	24.630	16.820	37.150
2.000	365	0	27.090	18.935	35.595
3.000	365	59	21.075	15.290	29.688

$H = 26.405$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
2 vs 3	109.675	4.989	Yes
2 vs 1	26.068	1.191	No
1 vs 3	83.607	3.661	Yes

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 10- Trend of concentrations in Khoram Abad

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Khoram Abad

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	0	29.190	15.895	40.155
2.000	365	0	35.910	22.080	50.465
3.000	365	0	25.570	14.860	40.150

$H = 37.004$  with 2 degrees of freedom. ( $P = < 0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = < 0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Tukey Test):

Comparison	Diff of Ranks	q	$P < 0.05$
2 vs 3	48841.500	8.084	Yes
2 vs 1	39817.500	6.590	Yes
1 vs 3	9024.000	1.494	No

Note: The multiple comparisons on ranks do not include an adjustment for ties.

## 11- Trend of concentrations in Ilam

### One Way Analysis of Variance

Data source: Data 1 in Concentrations.JNB

Dependent Variable: Ilam

Normality Test (Kolmogorov-Smirnov) Failed ( $P < 0.050$ )

Test execution ended by user request, ANOVA on Ranks begun

### Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Data 1 in Concentrations.JNB

Group	N	Missing	Median	25%	75%
1.000	365	1	23.195	17.470	30.817
2.000	365	11	19.770	15.528	27.123
3.000	365	5	19.805	13.573	29.698

$H = 21.633$  with 2 degrees of freedom. ( $P = <0.001$ )

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference ( $P = <0.001$ )

To isolate the group or groups that differ from the others use a multiple comparison procedure.

### All Pairwise Multiple Comparison Procedures (Dunn's Method) :

Comparison	Diff of Ranks	Q	P<0.05
1 vs 3	95.135	4.111	Yes
1 vs 2	91.231	3.926	Yes
2 vs 3	3.904	0.168	No

Note: The multiple comparisons on ranks do not include an adjustment for ties.