Air pollution impact to quality of life

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Brief information of the country profile- Mongolia

- Territory - 1.56 mln.sq.km
- Rich of natural resources - Copper, Molybdenum, Gold, Coal,
- Educational level of people: (about 20% of Government budget dedicated to Education)
    - literacy rate 97.6%

- Total population: 3 070 754;

- Urban 67% ; Rural: 33% (2016)

- Life expectancy: Male: 64.9; Female: 74.3

Background

- Large effects on human well-being are found to stem from the quality of the environment.

- Environmental quality matters extremely to people's feelings of happiness and satisfaction with their life.

Arik Levinson (2012)

- Air pollution is an increasingly serious problem in Mongolia and especially in capital city Ulaanbaatar and several other urban areas (Darhan, Erdenet, Sharyngol and Choibalsan)

MOH 2005, DOH 2008

- Air pollution is rising from September and peak season is January.

Some images of Ulaanbaatar in winter months

Goal

To define relationship between air pollution and its quality of life impact in Ulaanbaatar, Mongolia.

Methods and tools

- This is a cross sectional survey.

- Residents of UB city, Orkhon and Darkhan city

- We had enrolled 2552 respondents of 3 biggest cities of Mongolia,
  - 1171 of them were enrolled during warm season and
  - 1381 of them were enrolled to the survey during cold period of time.

Methodology

Quality of life data

- WHO Original WHOQOL100.

- The WHOQOL six domain scores denote an individual's perception of quality of life in the following domains:
  - Physical, Psychological, Level of Independence, Social Relationships, Environment, and Spirituality.

- Individual items are rated on a 5 point Likert scale where 1 indicates low, negative perceptions and 5 indicates high, positive perceptions.

Air quality parameters data

- In Mongolia, NANHEM is operating and proving daily monitoring air quality of UB city.

- Ambient air quality was used the nearest to person's monitoring data of air quality station.
  - NO_2, SO_2, PM10, PM2.5

Statistical Analysis

- All statistical data will be analyzed by software SPSS version 21.

- Related parametric and nonparametric analysis will be used for statistical analysis.

General characteristics of respondents

- 63.4% of total respondent were female,
- 48.6% of them had at least bachelor degree,
- 72.4% of them were married,
- 52.9% of them had at least a child and
- 56.4% of them were living in the gar area either in a ger (28.9%) or private dwellings (27.5%).
- Only 776 respondents were answered in question related to the current pregnancy status and 25.9% of them were pregnant.
- Median age of respondents are 32±10.37

Average level of some indicators by season of taken questionnaire

Indicators		Warm season			Cold season		
		PM10	SO2	NO2	PM10	SO_2	NO_2
UB	Mean	73.64	6.39	24.65	255.10	76.60	65.20
	Std. Dev	6.54	2.53	1.46	0.00	0.00	0.00
	Min	73.40	6.30	24.60	255.10	76.60	65.20
	Max	255.10	76.60	65.20	255.10	76.60	65.20
Orkhon	Mean	71.00	3.00	41.00	91.00	10.00	65.00
	Std. Dev	0.00	0.00	0.00	0.00	0.00	0.00
	Min	71.00	3.00	41.00	91.00	10.00	65.00
	Max	71.00	3.00	41.00	91.00	10.00	65.00
Darkhan	Mean	66.00	3.00	16.00	90.00	31.85	29.00
	Std. Dev	0.00	0.00	0.00	0.00	2.09	0.00
	Min	66.00	3.00	16.00	90.00	3.20	29.00
	Max	66.00	3.00	16.00	90.00	32.00	29.00

During the cold reason (255.1 µg/m^3) average level of ambient air PM10 was 3.46 times higher than the warm season (73.64 µg/m^3).

Quality of life index during warm season was relatively high

Residents of Darkhan, female, and apartment people's quality of index of all aspects are higher than others

Season		Physical	Psychological	Level of Independence	Social Relationships	Environment	Spirituality
Warm	Median	14.00	14.60	15.00	14.33	12.50	15.00
	Range	11.00	11.80	11.25	14.00	13.38	16.00
	Minimum	7.00	7.60	8.00	6.00	6.88	4.00
	Maximum	18.00	19.40	19.25	20.00	20.25	20.00
Cold	Median	13.00	13.80	14.00	13.67	12.38	14.00
	Range	11.00	16.60	11.50	19.33	12.75	16.00
	Minimum	6.67	8.80	7.75	7.33	5.75	4.00
	Maximum	17.67	25.40	19.25	26.67	18.50	20.00
Total	Median	13.33	14.20	14.50	14.00	12.38	14.00
	Range	11.33	17.80	11.50	20.67	14.50	16.00
	Minimum	6.67	7.60	7.75	6.00	5.75	4.00
	Maximum	18.00	25.40	19.25	26.67	20.25	20.00
P value (Mann-Whitney U test)		0.00001	0.00001	0.00001	0.00001	0.009	0.00001

Correlation Coefficient with quality of life with air pollution indicators and socioeconomic value during the warm and cold season

Dependent and Independent variables		Physical		Psychological		Independence		Social Relationships		Environment		Personal Beliefs	
		Warm	Cold	Warm	Cold	Warm	Cold	Warm	Cold	Warm	Cold	Warm	Cold
NO_2	R	0.05	**0.16****	0.0	0.04	0.1	**0.06***	0.04	**0.08****	0.03	**0.07***	0.1	**0.11****
	P value	0.107	**0.000**	0.09	0.103	0.072	**0.026**	0.346	**0.005**	0.254	**0.013**	0.006	**0.0001**
SO_2	R	0.1	**0.134****	0.18	0.036	**0.13***	0.05	**0.16***	**0.065***	0.08	**0.074****	**0.11***	**0.1****
	P value	0.001	**0.001**	0.001	0.183	**0.0001**	0.055	**0.0001**	**0.015**	0.004	**0.006**	**0.0001**	**0.000**
PM10	R	0.10*	**0.157****	0.19	0.044	**0.134****	**0.06***	**0.16***	**0.075****	0.09	**0.067***	0.12	**0.12****
	P value	0.001	**0.000**	0.001	0.103	**0.000**	**0.026**	**0.000**	**0.005**	0.002	**0.013**	0.0001	**0.000**
Age	R	0.121**	**0.147****	**0.1***	**0.055***	**0.14***	**0.155****	**0.06***	**0.067***	0.07	**.094****	0.02	0.01
	P value	0.0001	**0.000**	**0.001**	**0.039**	**0.0001**	**0.000**	**0.039**	**0.013**	0.011	**0.000**	0.61	0.643
Income	R	0.09*	**0.064***	**0.09***	**0.151****	**0.08***	**0.128****	0.07	**0.092****	**0.17***	**0.22****	**0.12***	**0.13***
	P value	0.005	**0.028**	**0.002**	**0.0001**	**0.013**	**0.0001**	0.019	**0.001**	**0.0001**	**0.0001**	**0.0001**	**0.0001**

Conclusion

Air pollution is not only harmfully affect to the human health but also it is reversely influenced to human's quality of life in Mongolia.

Terima kasih

Thank you very much for kind attention