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AIR POLLUTION AND CHILD HEALTH

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Content

- Literature review
- Ambient air pollution
- Indoor air quality
- Prevalence of disease and forecasting
- Environmental health surveillance system
- Further action

Air pollution health impact assessments

Date	Field	Air pollution indicators
1990-before	Respiratory system disease	- SO₂ - NO₂
1990-2007	- Respiratory system disease - Immune system	- SO₂ - NO_x - TSP
Since 2008	- Respiratory system disease - Cardiovascular system disease - Impant impact - Burden of disease - Indoor air quality - Personnel exposure	- PM10 - PM 2.5 - SO₂ - NO_x - O₃

Since 1980, more than 40 health impact assessments were conducted



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Indoor air quality is at the level harmful for human health

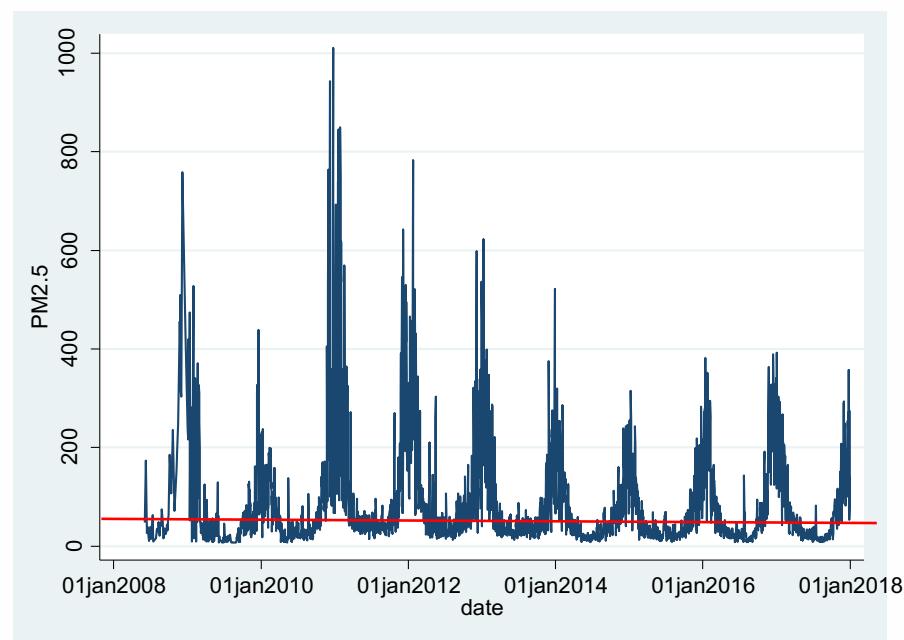
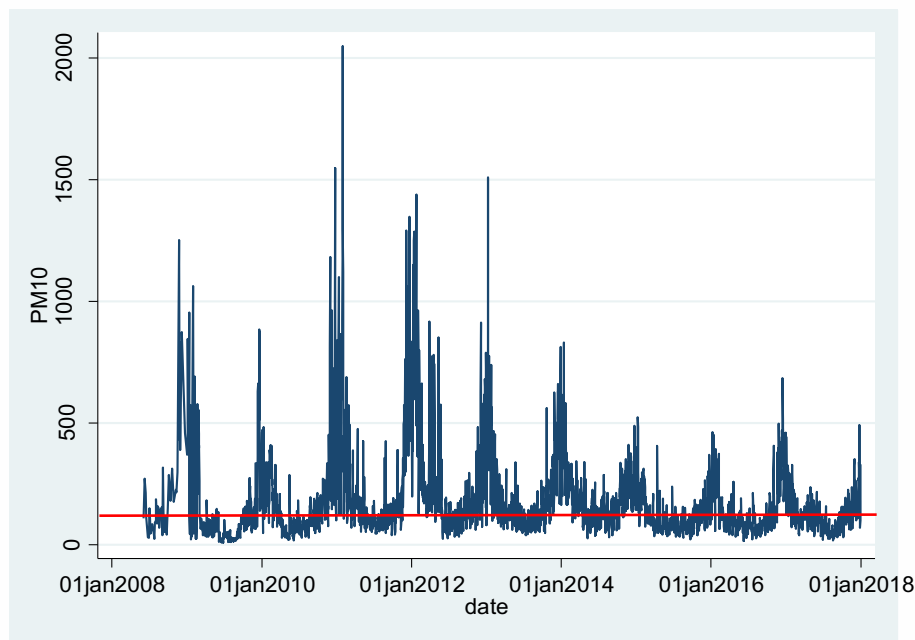
With the support of WHO

- **In 2004-2005**
 - 77.8 % of children covered by the study had some kind of disease symptom. Children living in ger or houses with traditional heating source have higher incidence of symptoms of respiratory diseases compared to those living in apartments.
- **In 2007**
 - Type of fuel directly impacts indoor environment. Combustion heated houses have PM10 ($71.19 \pm 83.5 \mu\text{g}/\text{m}^3$) and PM2.5-ын ($26.69 \pm 3.4 \mu\text{g}/\text{m}^3$) at the level when they have negative impact on health.
- **2016– UNICEF**
 - Concentrations of PM inside the schools covered by the survey showed that they exceed Mongolian air quality standards by 3.1-10.05 times which would negatively impact schoolchildren's health.

Source: PHI, MOH, Indoor air quality of the ger, 2007

Source: PHI, MOH, Indoor air quality of ger, 2016

24 hours average daily concentration of PM10 and PM2.5, 2008-2017, Ulaanbaatar

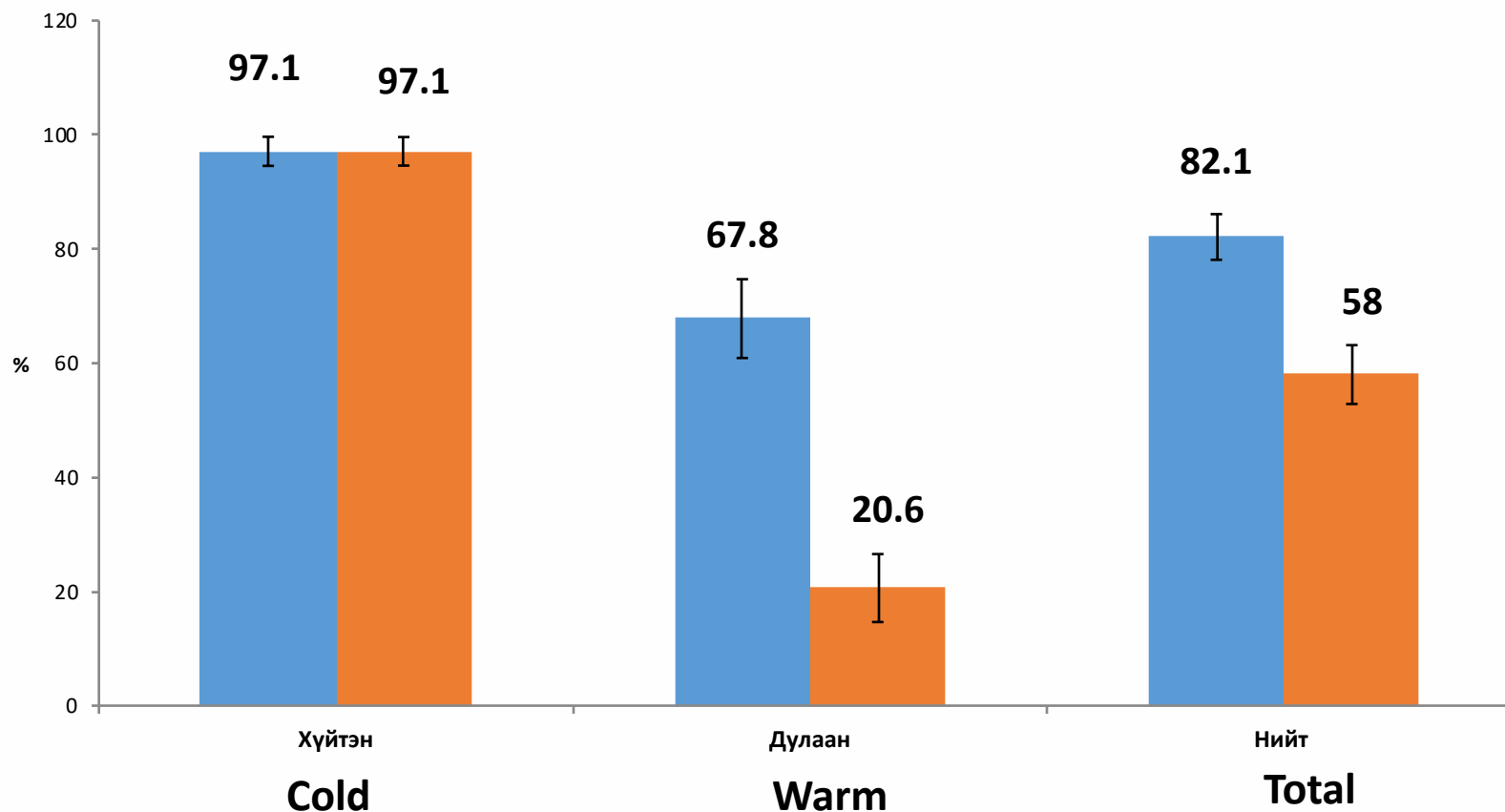


Indicators	PM10 µg/m³				PM25 µg/m³			
	Ordinary day	Weekend	Warm	Cold	Ordinary day	Weekend	Warm	Cold
$\bar{x} \pm \sigma$	182.59±178.70	183.05±174.52	95.01±87.00	226.78±200.12	85.65±105.03	85.88±101.25	29.21±19.92	114.10±116.6
Max	2047	1548	576	2047	1010	868	303	1010
P value	0.39		<0.0001**		0.55		<0.0001**	

Ulaanbaatar ambient air PM concentration, 2018

Indicator	PM10 , мкг/м ³		PM2.5 , мкг/м ³	
	Mean	95%CI	Mean	95%CI
Warm	79.2	72.2-86.3	18.9	17.5-20.2
Cold	199.0	183.9-214.1	126.6	112-140.4
Total	136	127.6-148.2	74	62.8-80.5
National standard	100 µg/m ³ - 24 hours, 50µg/m ³ -annual		50 µg/m ³ - 24 hours, 25 µg/m ³ -annual	
WHO	50 µg/m ³ - 24 hours, 20 µg/m ³ -annual		25 µg/m ³ - 24 hours, 10 µg/m ³ - annual	

Exceeding percentage of PM10 and PM2.5 from permissible level





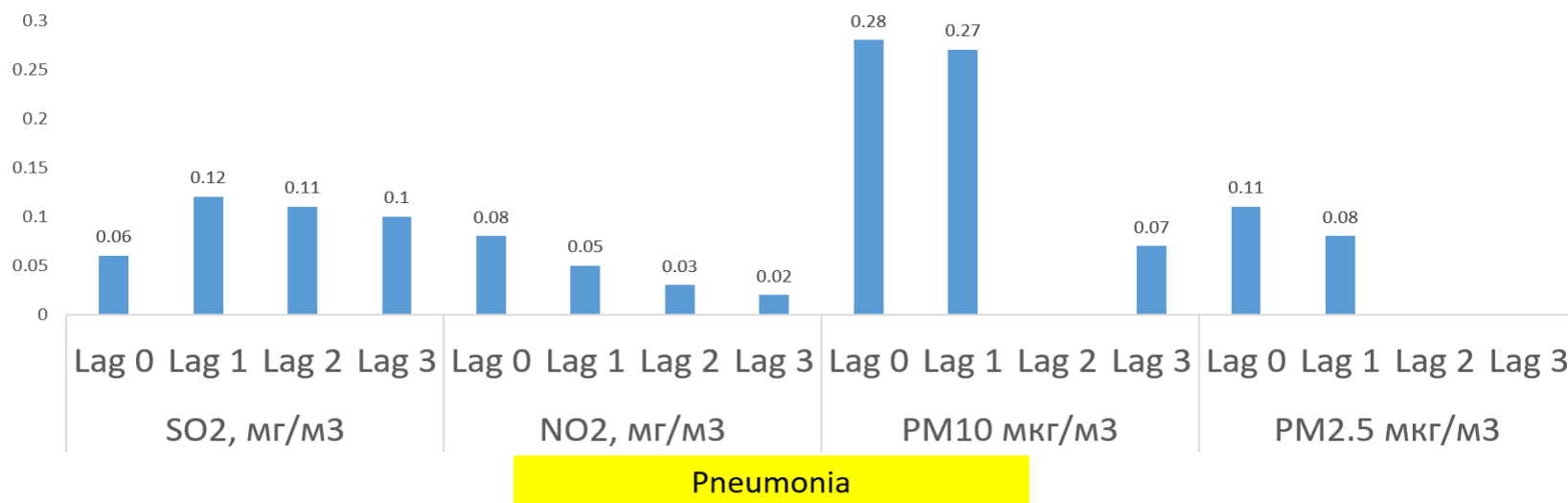
Air pollution health impact assessments

- Burmaajav.B and Saijaa. N were initiated the first studies of air pollution health impact assessment.
- Since 2009, PM_{10} and $PM_{2.5}$, the most hazardous effects on health, have been measured constantly. Those measurements played important role to assess air pollution impact on population's health.

Hospital admission due to RSD and CVD, by age group and disease category, Ulaanbaatar, 2008-2017

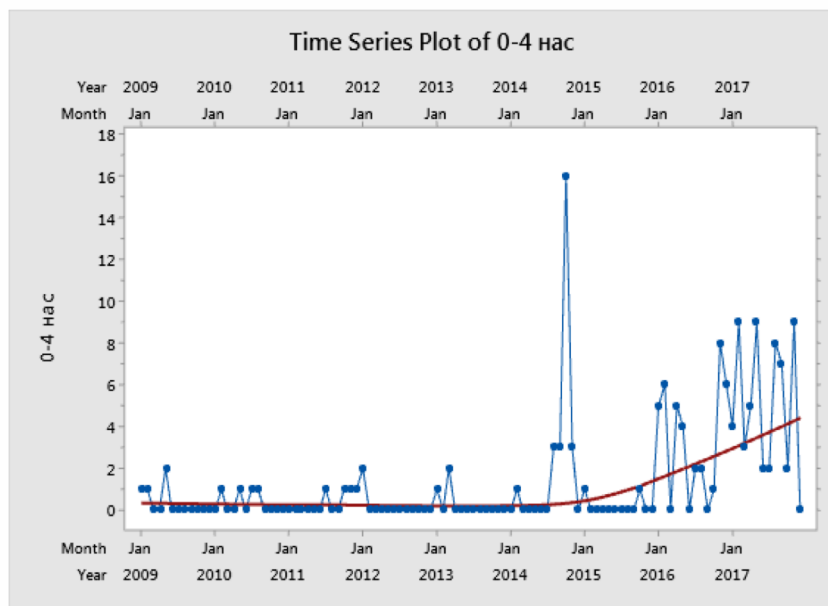
Category of diseases	0-4	5-64	65 over	Total
Respiratory system disease				
Diseases of pulmonary circulation and other forms of heart (I00-I09, I26-I52)	74 (0.0%)	316 (0.1%)	31 (0.1%)	421 (0.0%)
Acute upper respiratory tract infections (J00-J06)	190991 (41.5%)	125141 (31.9%)	4013 (10.4%)	320145 (35.9%)
Influenza (J10-J11)	28220 (6.1%)	21167 (5.4%)	1575 (4.1%)	50962 (5.7%)
Pneumonia (J12-J18)	122179 (26.6%)	43796 (11.2%)	5582 (14.4%)	171557 (19.2%)
Rhinitis and Sinusitis (J30-J32)	3823 (0.8%)	40080 (10.2%)	2956 (7.6%)	46859 (5.3%)
Bronchitis (J40-J42)	711 (0.2%)	37975 (9.7%)	10186 (6.3%)	48872 (5.5%)
Emphysema (J43)	0 (0.0%)	284 (0.1%)	165 (0.4%)	449 (0.1%)
Other chronic obstructive pulmonary disease (J44)	12 (0.0%)	8749 (2.2%)	5743 (14.9%)	14504 (1.6%)
Asthma (J45-J46)	150 (0.0%)	10599 (2.7%)	2366 (6.1%)	13115 (1.5%)
Other diseases of the respiratory system (J20-J22, J33-J39, J47-J99)	113732 (24.7%)	104559 (26.6%)	6052 (15.7%)	224343 (25.2%)
Total	459892	392666	38669	891227
Cardiovascular disease				
Diseases of pulmonary circulation and other forms of heart (I00-I09, I26-I52)	207 (25.2%)	44790 (11.9%)	6255 (3.8%)	51252 (9.5%)
Hypertensive diseases (I10-I15)	0 (0.0%)	158964 (42.4%)	79308 (48.2%)	238272 (44.1%)
Ischaemic heart diseases (I20-I25)	2 (0.2%)	82483 (22.0%)	51623 (31.3%)	134108 (24.8%)
Cerebrovascular diseases (I60-I69)	417 (50.7%)	53002 (14.1%)	21029 (12.8%)	74448 (13.8%)
Diseases of arteries, veins and lymphatic vessels (I70-I99)	196 (23.8%)	36000 (9.6%)	6458 (3.9%)	42654 (7.9%)
Total	822	375239	164673	540734

Pneumonia admission in relative risk (RR) and 95% confidence interval for 10 $\mu\text{g}/\text{m}^3$ (mg/m^3) change in concentration of pollutants at mean lag 0-3, significance with temperature and wind velocity adjusted in all age

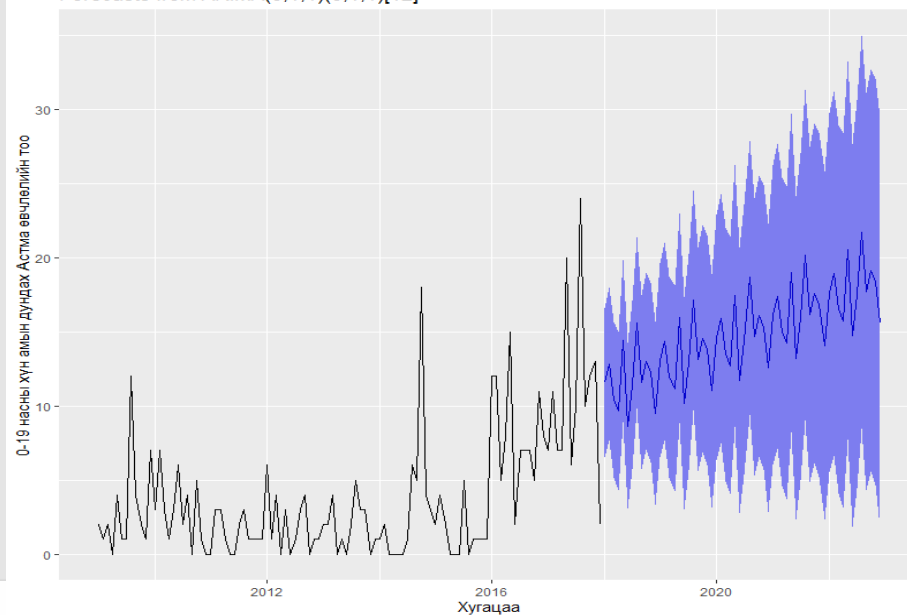


According to the time series analyses all Lags of NO₂, SO₂ and Lag 2 of PM₁₀, Lag2-3 of PM_{2.5} were observed significant correlation. If reduce 10 unit of those pollutants hospital admission of pneumonia children under 4 will be declined by 0.06-3.66 percent.

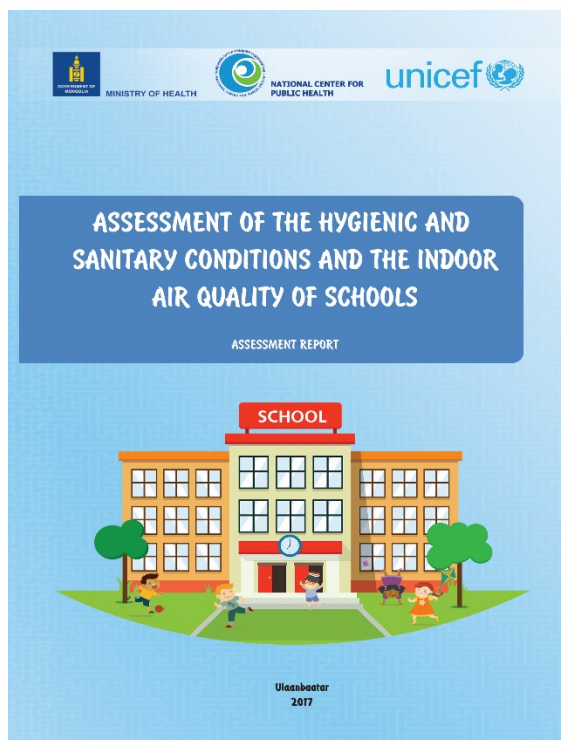
Astma



Forecasts from ARIMA(0,1,1)(0,1,1)[12]



School indoor air quality



Indoor air class room PM2.5 concentration:

- Connected to the central heating system:
272.25 (95%CI: 11.86-532.64)
- Local heating system: **635.96** (95%CI: 471.26-800.65)

Rapid assessment of indoor air quality, 2018



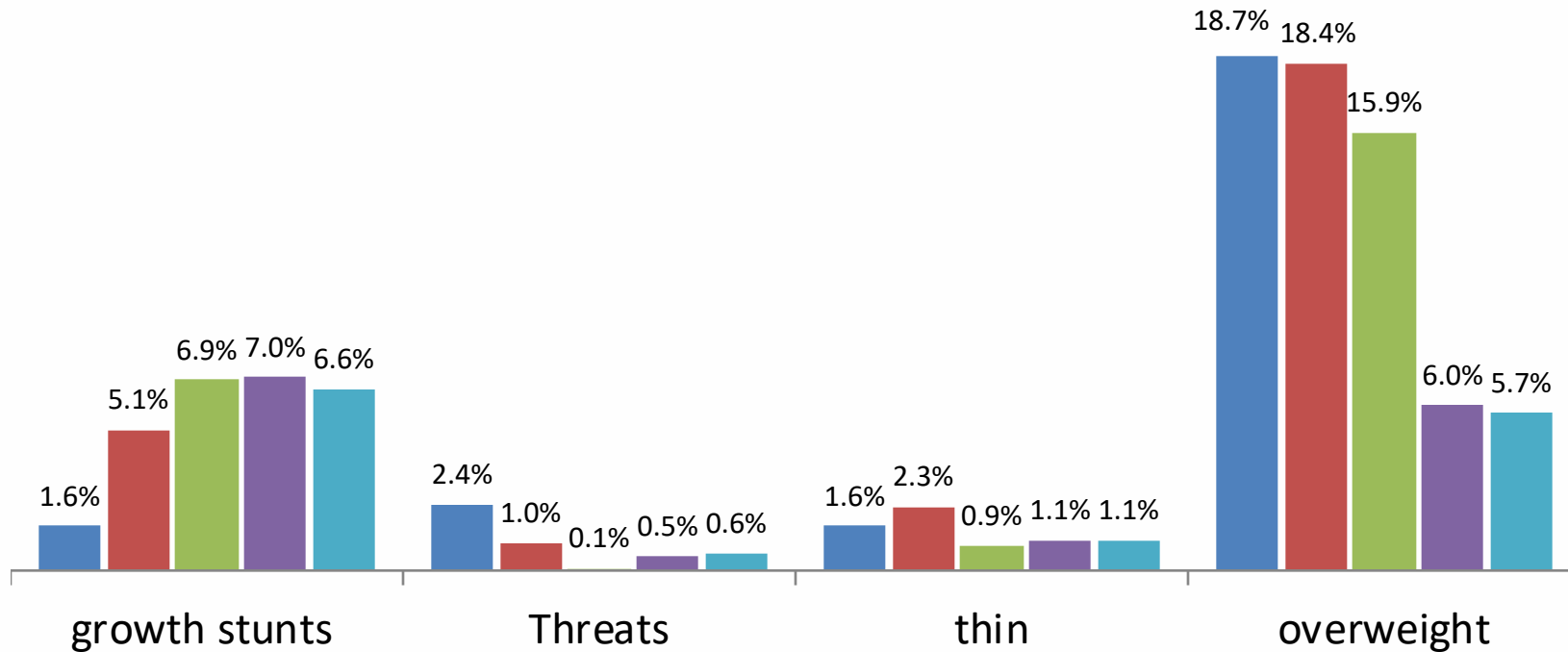
The average concentration of PM_{2.5} in class room with air-purifying devices was less than 58.42 $\mu\text{g}/\text{m}^3$ ordinary room. The effectiveness of air purifier was 29%.

Nutrition status by age group

■ < 6 months

■ 6-11 months

■ 12-23 months



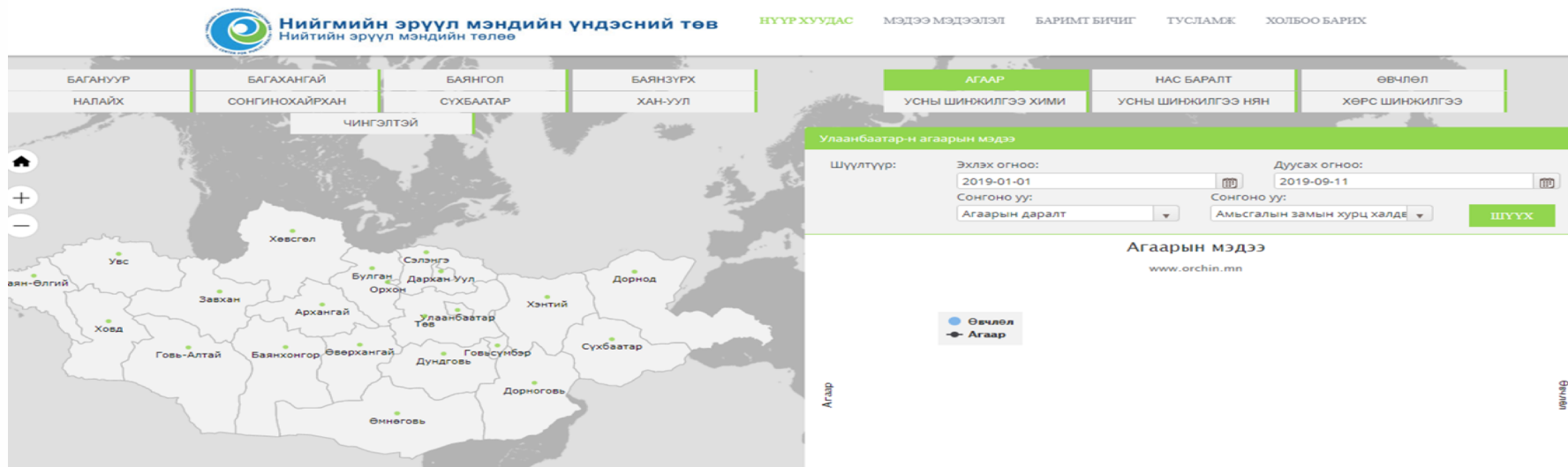
KAP survey on air pollution, 2019



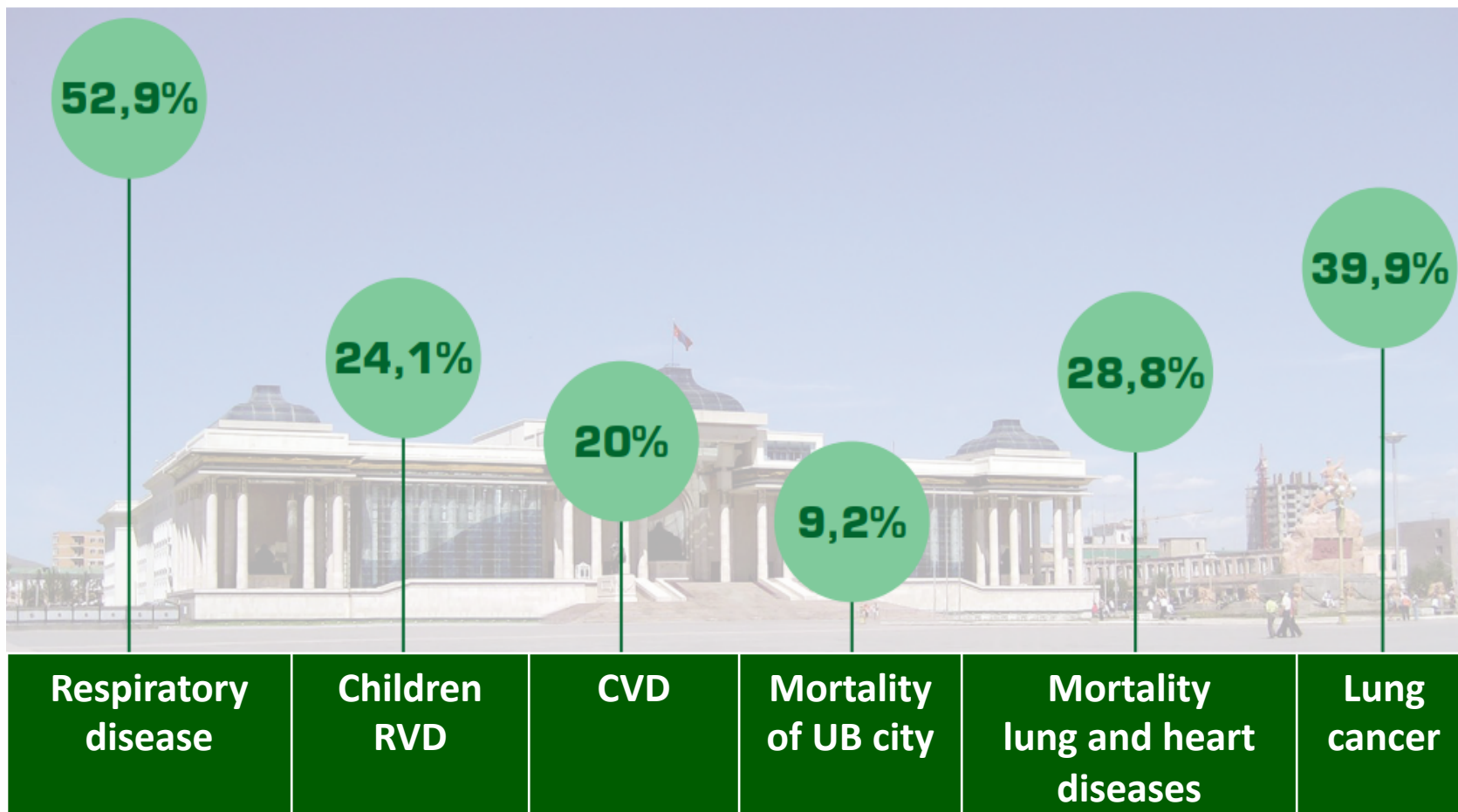
- 13.2% Health professionals participated training on air pollution and health
- Lack of ability to provide counselling on prevention of air pollution exposure

Environmental health surveillance program

- The website was developed at the official website of NCPH: orchin.ncph.gov.mn.
- All data RSD, CVD, meteorological, air pollutant since 2018 is uploaded in UB and aimag.
- **Health-info program and X10 premium** programs were connected



Summary





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**Thank you for kind
consideration**