Environmental Indicators of Life Quality
and
Methodology for calculating Composite Index characterizing the ecological condition of the Yerevan city and RA regions

Statistical Committee of RA
Division of Environmental Statistics

16-17 October, 2023
Geneva

Twinning Partnership with the Statistical Committee of the Republic of Armenia for the Project Implementation within the World Bank's Implementation of the National Strategy Program for Strengthening of the National Statistical System

Activity 2.8.1 "Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics"

Activity 2 8.2 "Developing methodology and instruments for emergency situations and disasters statistics, developing a relevant reporting system"

Activity 2.8.3 "Conducting trainings on life quality statistics, emergency situations and disasters, using of GIS system"

Environmental Performance Index
Yale University

Using 32 performance indicators across 11 issue categories, the EPI ranks 180 countries on environmental health and ecosystem vitality

Scores and rankings for Armenia

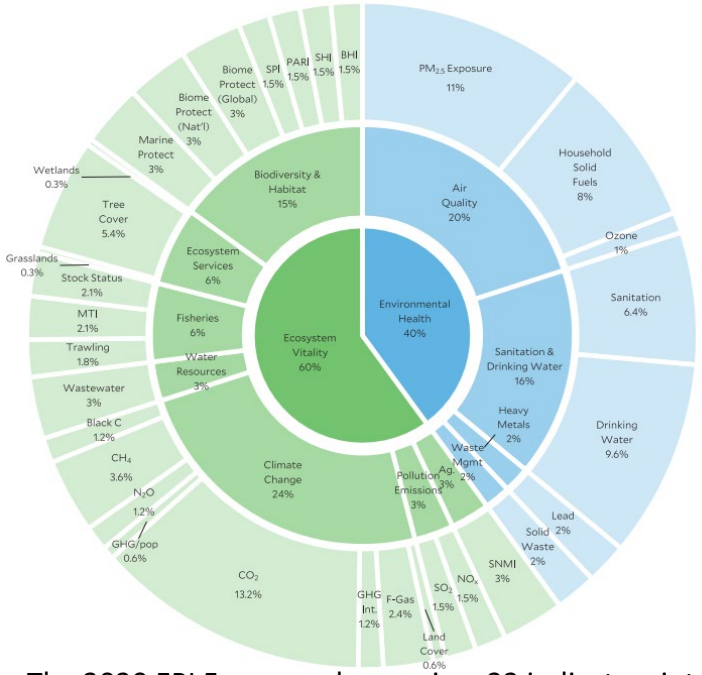
Regional rankings, EPI scores, and global ranking
score – 52.3, global ranking - 53

Environmental Health scores, and global ranking
score – 43.5, global ranking - 91

Regional rankings, Ecosystem Vitality scores, and global ranking
score – 58.1, global ranking - 36

Global rankings, scores, and regional rankings (REG) on Air Quality.
score – 36.3, global ranking - 97

Global rankings, scores, and regional rankings (REG) on Sanitation & Drinking Water
score – 57.2, global ranking - 60



The 2020 EPI Framework organizes 32 indicators into 11 issue categories and two policy objectives, with weights shown at each level as a percentage of the total score.

Reg Rank	Country	Score	Global Rank
20	Jamaica	45.5	83
21	Peru	45.1	84
22	St. Vincent and Grenadines	44.1	87
23	El Salvador	42.5	93
24	Belize	40.3	99
25	Nicaragua	40.2	100
26	Suriname	36.6	103
27	Dominican Republic	36.1	104
28	Bolivia	35.9	105
29	Guyana	33.5	110
30	Honduras	33.4	111
31	Guatemala	30.8	116
32	Haiti	21.8	147

EASTERN EUROPE

Reg Rank	Country	Score	Global Rank
1	Cyprus	81.5	26
2	Greece	80.6	28
3	Estonia	73.0	30
4	Slovenia	68.9	31
5	Czech Republic	68.3	32
6	Slovakia	64.3	34
7	Lithuania	63.2	36
8	Croatia	61.2	37
9	Poland	58.9	43
10	Latvia	58.0	45
11	Hungary	54.1	54
12	Turkey	51.3	58
13	Bulgaria	50.3	63
14	Romania	50.0	65
15	Serbia	47.8	73
16	Montenegro	46.7	79
17	Albania	44.5	86
18	Bosnia and Herzegovina	43.9	88

Reg Rank	Country	Score	Global Rank
20	Italy	85.5	21
21	Portugal	83.4	24
22	United States of America	82.8	25

FORMER SOVIET STATES

Reg Rank	Country	Score	Global Rank
1	Belarus	55.9	43
2	Russia	53.0	57
3	Ukraine	49.0	69
4	Moldova	45.6	82
5	Turkmenistan	45.0	85
6	Armenia	43.5	91
7	Kazakhstan	40.8	97
8	Georgia	38.7	102
9	Kyrgyzstan	33.7	109
10	Azerbaijan	32.7	113
11	Uzbekistan	29.7	121
12	Tajikistan	20.7	153

ASIA-PACIFIC

Reg Rank	Country	Score	Global Rank
1	Japan	90.3	14
2	Singapore	85.0	22
3	South Korea	81.4	27
4	Brunei Darussalam	74.0	29
5	Taiwan	59.2	42
6	Malaysia	55.4	50
7	Thailand	48.4	70
8	Tonga	43.6	89
9	Samoa	42.4	94
10	China	41.8	96
11	Viet Nam	40.6	98

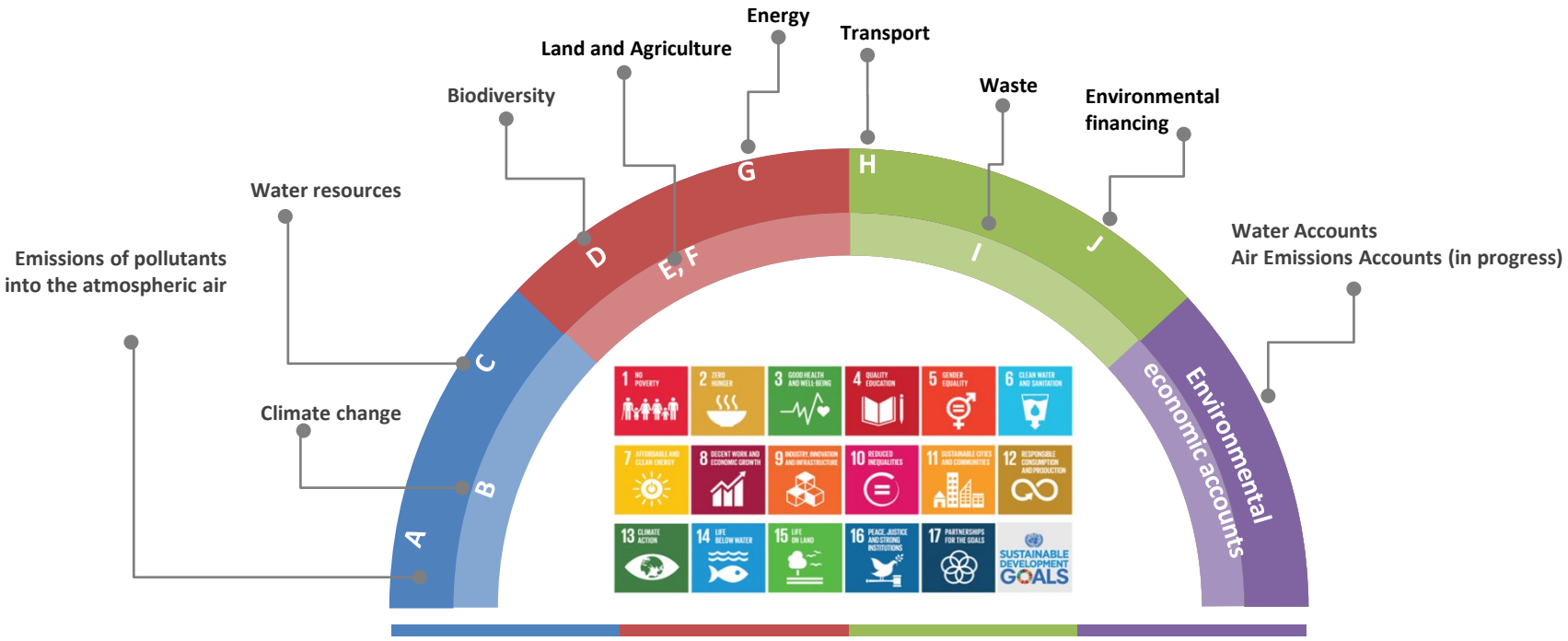
Reg Rank	Country	Score	Global Rank
20	Burundi	21.9	146
21	Gambia	21.4	148
22	Liberia	21.3	149
23	Zambia	21.0	150
24	Angola	20.4	154
	Senegal	20.4	154
26	Benin	20.3	157
27	Botswana	20.2	158
28	Djibouti	20.1	159
	Ghana	20.1	159
30	Mauritania	20.0	161
31	Burkina Faso	19.6	163
32	Mali	19.5	164
33	Côte d'Ivoire	19.4	165
34	Sierra Leone	19.1	166
35	Guinea	18.6	167
36	Republic of Congo	18.1	168
37	Eswatini	17.6	169
38	Niger	17.1	170
39	Togo	16.4	171
40	Eritrea	15.5	173
41	Guinea-Bissau	15.1	174
42	Chad	14.9	175
43	Nigeria	13.9	177
44	Cameroon	13.6	178
45	Central African Republic	12.2	179
46	Lesotho	11.8	180

GREATER MIDDLE EAST

Reg Rank	Country	Score	Global Rank
1	Israel	83.6	23
2	Jordan	58.6	44

Aligning with UNECE Indicators

(36+7) assessed UNECE environmental indicators of Armenia (2023)

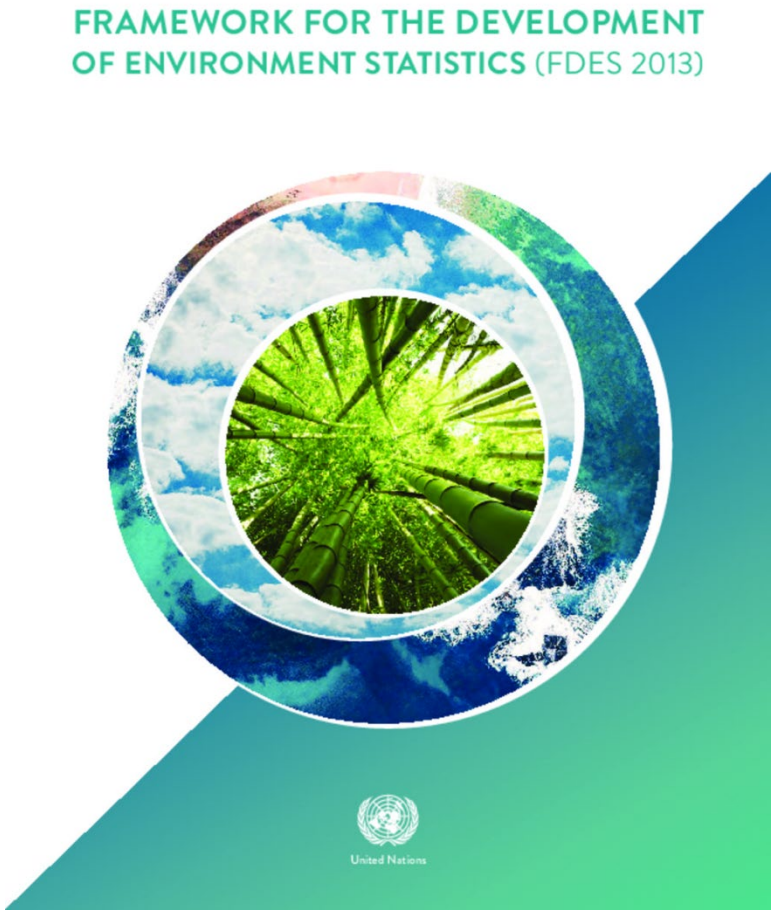


Activity 2.8.1 "Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics"

Pre-selected environmental quality of life indicators list

Target concept	Indicator
Impact of environmental hazards on human health:	
Environmental health	1. Mortality rate attributed to household and ambient air pollution 2. Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services) 3. Mortality rate attributed to unintentional poisoning
Natural disasters impact	4. Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
Access to environmental services and amenities	
Intangible services and amenities	5. Terrestrial protected areas (% of total land area) 6. Forest area as a proportion of total land area
Objective services and amenities	7. Proportion of population using safely managed drinking water services 8. Exceedance of air quality standards in urban areas 9. Proportion of population using safely managed sanitation services 10. Green area per 100,000 inhabitants
Subjective services and amenities	11. Satisfaction with the quality of water supply 12. Satisfaction with the level of pollution 13. Satisfaction with the level of noise 14. Satisfaction with the quality of waste management 15. Satisfaction with the level of traffic 16. Satisfaction with the availability of green areas
Quality of the environment	17. Proportion of bodies of water with good ambient water quality 18. Level of water stress: freshwater withdrawal as a proportion of available freshwater resources 19. Annual mean levels of fine particulate matter in cities

Basic Set of Environment Statistics (BSES) of the Framework for the Development of Environment Statistics (FDES 2013)



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Armstat, Population Census and Demography Division

Ministry of Justice

Civil Status Acts Registration Agency

Armstat, Division of Environmental Statistics

Ministry of Emergency Situations

Armstat, Division of Environmental Statistics

Ministry of Environment

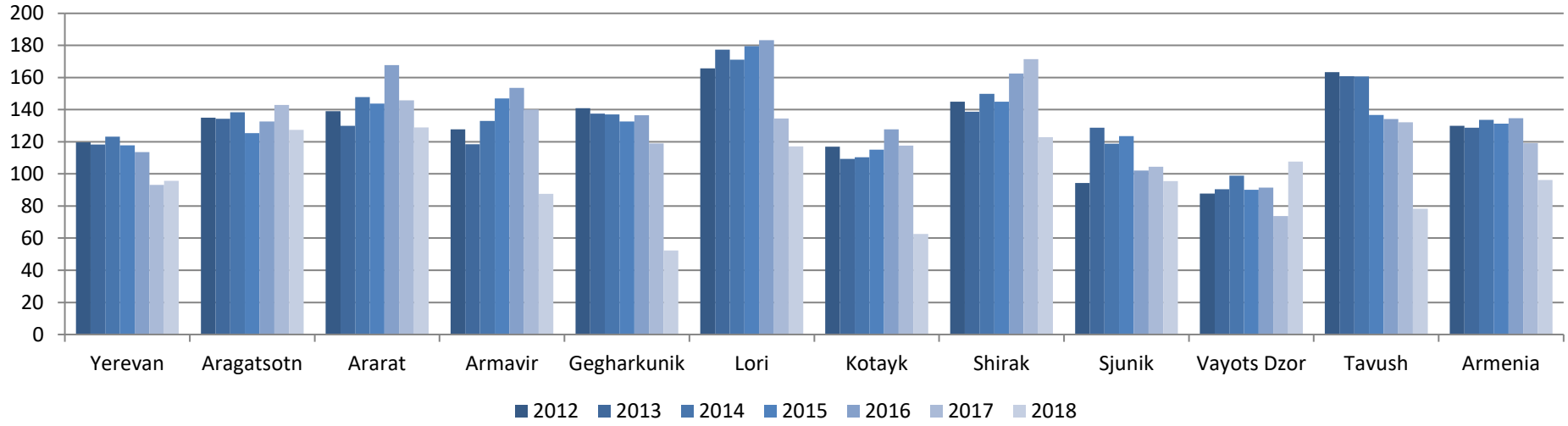
Armstat, Household Statistics Division

Activity 2.8.1 "Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics"

1. Mortality rate attributed to household and ambient air pollution (SDG 3.9.1)

- Acute respiratory infections in young children (estimated under 5 years of age);
- Cerebrovascular diseases (stroke) in adults (estimated above 25 years);
- Ischemic heart diseases (IHD) in adults (estimated above 25 years);
- Chronic obstructive pulmonary disease (COPD) in adults (estimated above 25 years);
- Lung cancer in adults (estimated above 25 years).

Rate per 100 000	2012	2013	2014	2015	2016	2017	2018
Yerevan	119.5	118.3	123.2	117.8	113.6	93.1	95.7
Aragatsotn	135.0	134.3	138.3	125.4	132.7	142.9	127.4
Ararat	139.0	130.0	147.9	143.8	167.7	145.8	128.8
Armavir	127.8	118.5	133.0	147.0	153.5	140.0	87.6
Gegharkunik	140.9	137.6	137.0	132.6	136.5	118.9	52.2
Lori	165.7	177.3	171.1	179.5	183.2	134.4	117.1
Kotayk	117.0	109.4	110.4	115.0	127.7	117.6	62.6
Shirak	145.0	138.6	149.8	144.9	162.4	171.4	122.8
Sjunik	94.3	128.8	118.8	123.6	102.1	104.4	95.6
Vayots Dzor	87.7	90.4	98.8	90.1	91.4	73.7	107.6
Tavush	163.3	160.9	160.7	136.7	134.1	132.1	78.3
Armenia	**129.9**	**128.8**	**133.7**	**131.3**	**134.7**	**119.2**	**96.2**



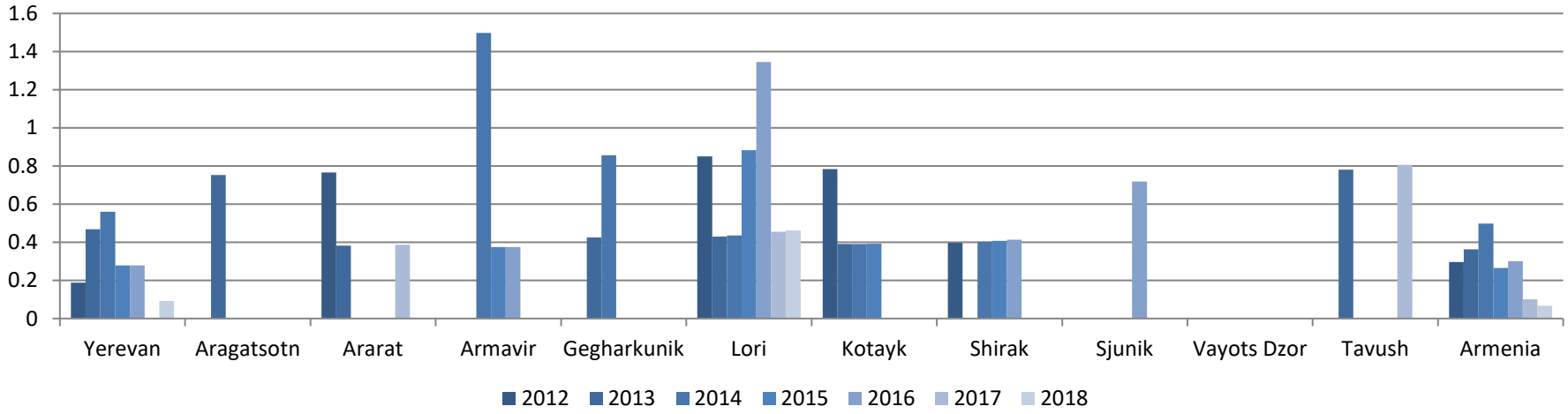
Activity 2.8.1 "Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics"

2. Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services) (SDG Indicator 3.9.2)

The included diseases are the WASH attributable fractions of:

- diarrhea (ICD-10 code A00, A01, A03, A04, A06-A09),
- intestinal nematode infections (ICD-10 code B76- B77, B79) and
- protein-energy malnutrition (ICD-10 code E40-E46).

Rate per 100 000	2012	2013	2014	2015	2016	2017	2018
Yerevan	0.1880	0.5	0.6	0.3	0.3	-	0.1
Aragatsotn	-	0.8	-	-	-	-	-
Ararat	0.8	0.4	-	-	-	0.4	-
Armavir	-	-	1.5	0.4	0.4	-	-
Gegharkunik	-	0.4	0.9	-	-	-	-
Lori	0.9	0.4	0.4	0.9	1.3	0.5	0.5
Kotayk	0.8	0.4	0.4	0.4	-	-	-
Shirak	0.4	-	0.4	0.4	0.4	-	-
Sjunik	-	-	-	-	0.7	-	-
Vayots Dzor	-	-	-	-	-	-	-
Tavush	-	0.8	-	-	-	0.8	-
Armenia	**0.30**	**0.36**	**0.50**	**0.27**	**0.30**	**0.10**	**0.07**



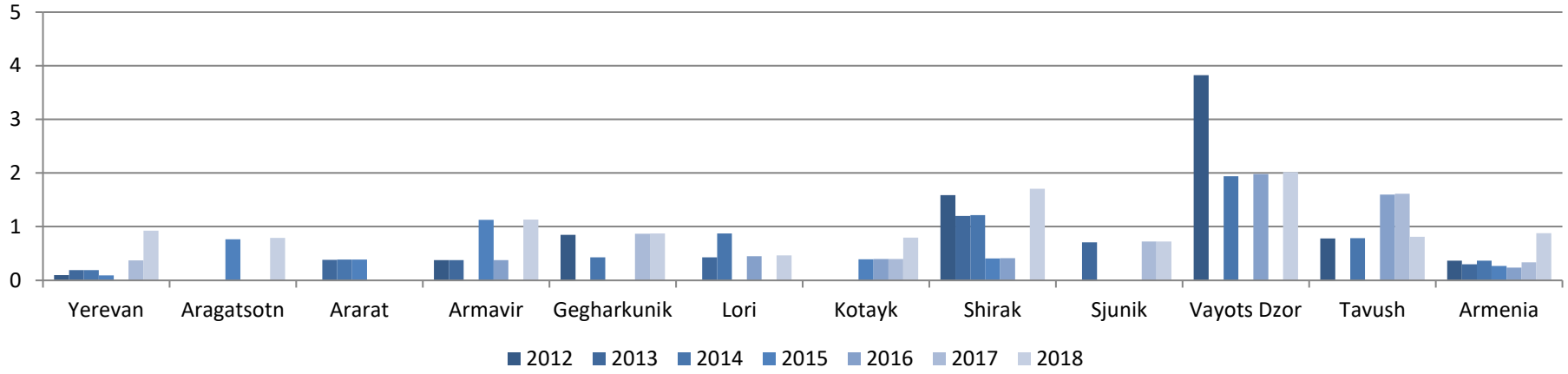
Activity 2.8.1 "Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics"

3. Mortality rate attributed to unintentional poisoning (SDG Indicator 3.9.3)

The ICD-10 codes corresponding to the indicator includes:

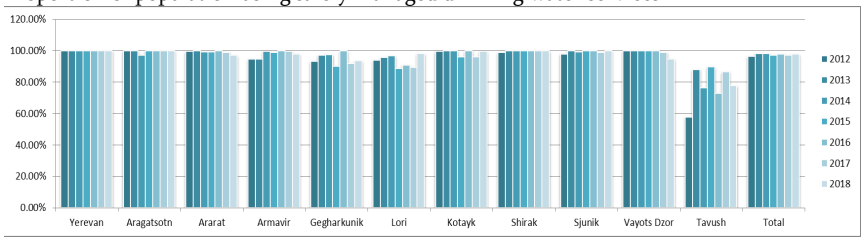
- X40 Accidental poisoning by and exposure to nonopioid analgesics, antipyretics and antirheumatics
- X43 Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system
- X44 Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances
- X46 Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours
- X47 Accidental poisoning by and exposure to other gases and vapours
- X48 Accidental poisoning by and exposure to pesticides
- X49 Accidental poisoning by and exposure to other and unspecified chemicals and noxious substances

Rate per 100 000	2012	2013	2014	2015	2016	2017	2018
Yerevan	0.1	0.2	0.2	0.1	-	0.4	0.9
Aragatsotn	-	-	-	0.8	-	-	0.8
Ararat	-	0.4	0.4	0.4	-	-	-
Armavir	0.4	0.4	-	1.1	0.4	-	1.1
Gegharkunik	0.8	-	0.4	-	-	0.9	0.9
Lori	-	0.4	0.9	-	0.4	-	0.5
Kotayk	-	-	-	0.39	0.4	0.4	0.8
Shirak	1.6	1.2	1.2	0.4	0.4	-	1.7
Sjunik	-	0.7	-	-	-	0.7	0.7
Vayots Dzor	3.8	-	1.9	-	2.0	-	2.0
Tavush	0.8	-	0.8	-	1.6	1.6	0.8
Armenia	0.36	0.30	0.36	0.27	0.23	0.34	0.88

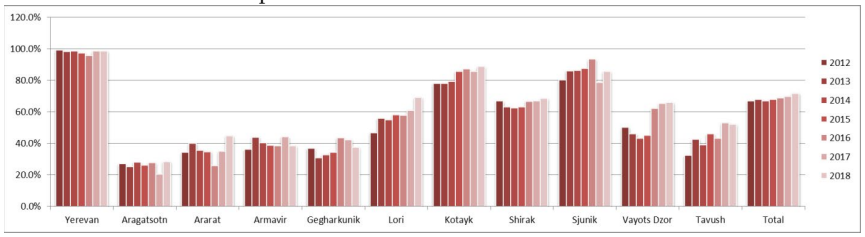


Activity 2.8.1 “Conducting assessment of indicators on the impact of ecological conditions, providing recommendations and developing a Reporting System on Life Quality Statistics”

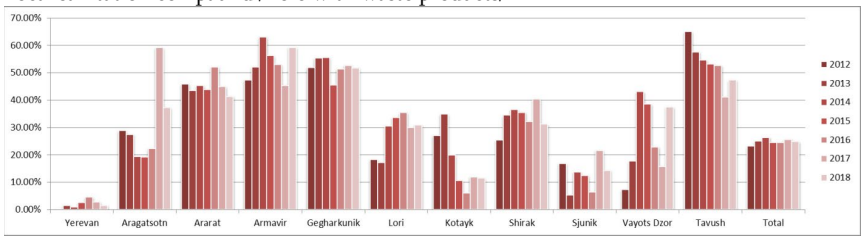
Proportion of population using safely managed drinking water services



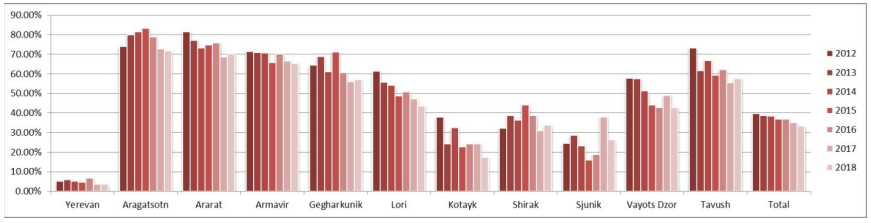
Proportion of population using safely managed sanitation services / Centralized sanitation compaund



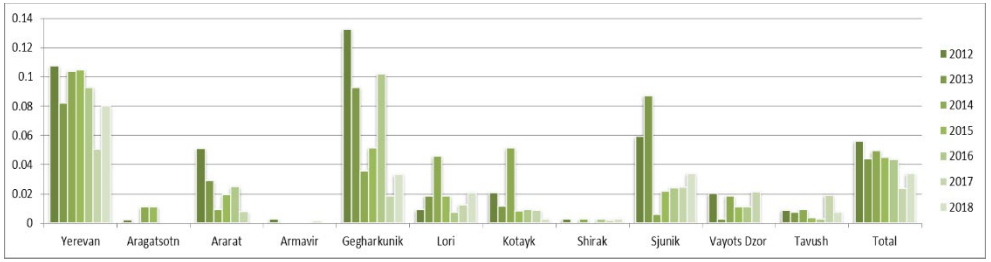
Proportion of population using safely managed sanitation services / Local sanitation compaund /hole with waste products/



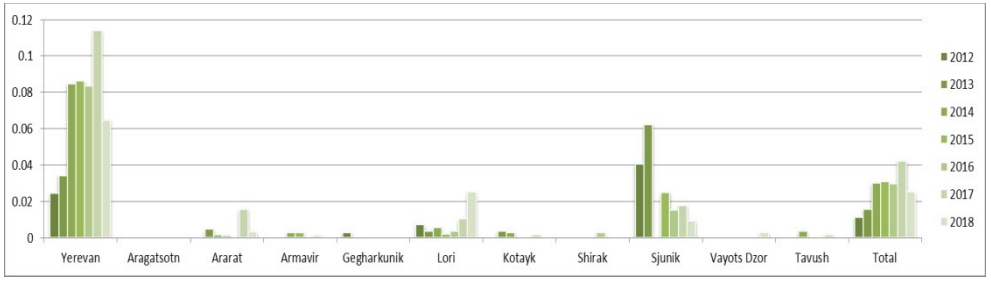
Proportion of population using safely managed sanitation services / Outside toilet



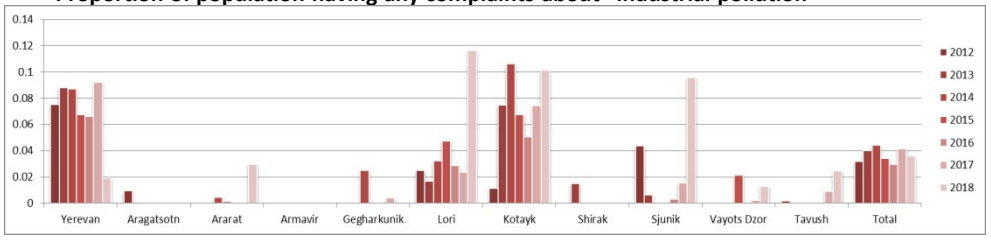
Proportion of population having any complaints about “Noise from neighbors and from outside”



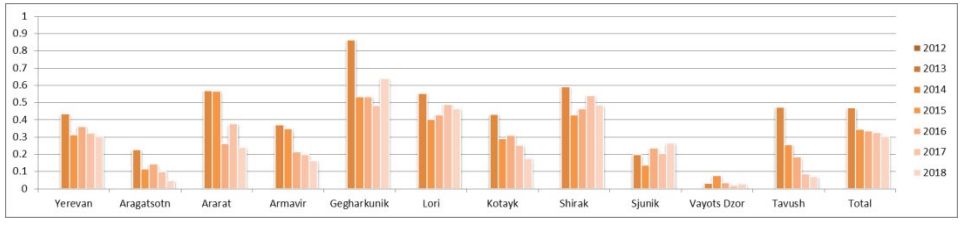
Proportion of population having any complaints about “Heavy traffic”



Proportion of population having any complaints about “industrial pollution”



Proportion of population having any complaints about “Lack of green areas”



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Pre-selected environmental quality of life indicators list

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Natural disasters impact	4. Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
Access to environmental services and amenities	
Intangible services and amenities	5. Terrestrial protected areas (% of total land area) 6. Forest area as a proportion of total land area
Objective services and amenities	7. Proportion of population using safely managed drinking water services 8. Exceedance of air quality standards in urban areas 9. Proportion of population using safely managed sanitation services 10. Green area per 100,000 inhabitants
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Quality of the environment	17. Proportion of bodies of water with good ambient water quality 18. Level of water stress: freshwater withdrawal as a proportion of available freshwater resources 19. Annual mean levels of fine particulate matter in cities

Disaggregation by Marzes (included in the Index calculation)

Country SDG platform

Information on 7 cities *(included in GIS analyzing)*

In process

Activity 2 8.2 "Developing methodology and instruments for emergency situations and disasters statistics, developing a relevant reporting system"

4. Number of deaths, missing persons and directly affected persons attributed to emergency situations per 100,000 population

1. Total number of deaths, missing persons and directly affected persons attributed to emergency situations
2. Number of deaths, missing persons and directly affected persons attributed to social-biological emergency situations
3. Number of deaths, missing persons and directly affected persons attributed to natural disasters
4. Number of deaths, missing persons and directly affected persons attributed to man-caused disasters
5. Number of road-traffic accidents (2019-2020)
6. Number of deaths attributed to road-traffic accidents (2019-2020)
7. Number of Injured person attributed to road-traffic accidents (2019-2020)

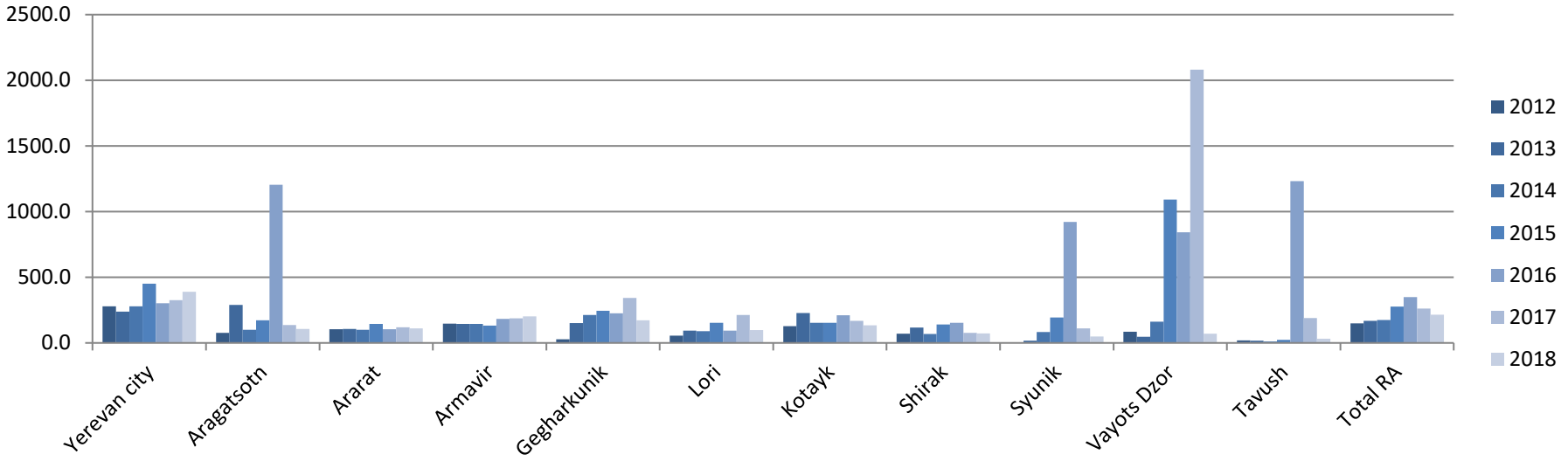
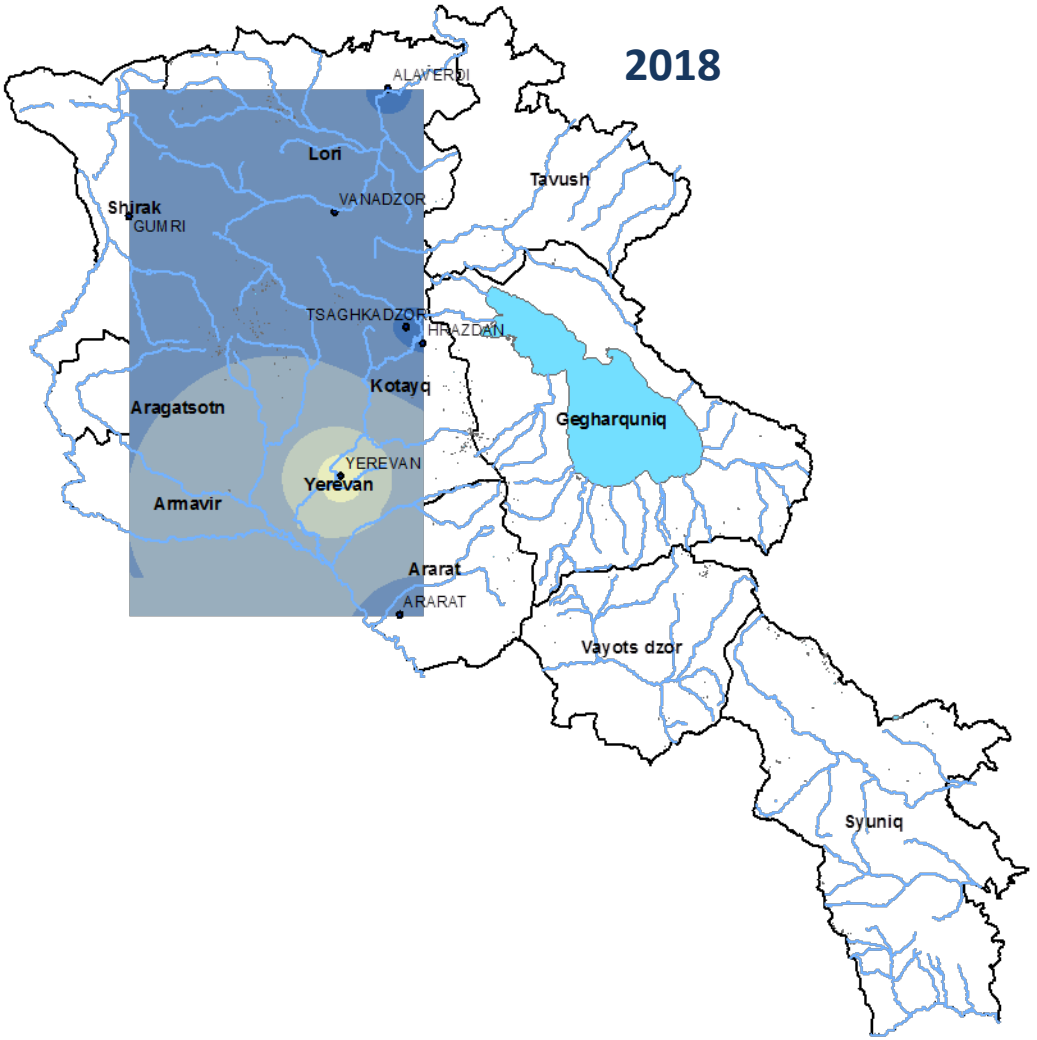


Fig. Total number of deaths, missing persons and directly affected persons attributed to emergency situations

Activity 2.8.3 "Conducting trainings on life quality statistics, emergency situations and disasters, using of GIS system"

GIS-CoKriging method for 2013 and 2018
Mortality rate attributed to household and ambient air pollution
Air Quality (mean value of Dust from monitoring stations of 7 cities)



Filled Contours
- 6 - 400
- 400 - 800
- 800 - 1 200
- 1 200 - 1 600
- 1 600 - 2 000
- 2 000 - 2 400
- 2 400 - 2 800
- 2 800 - 3 200
- 3 200 - 3 600
- 3 600 - 4 022

1. Alaverdi
2. Ararat
3. Gyumri
4. Hrazdan
5. Tcaghkadzor
6. Vanadzor
7. Yerevan

Composite indicator web application

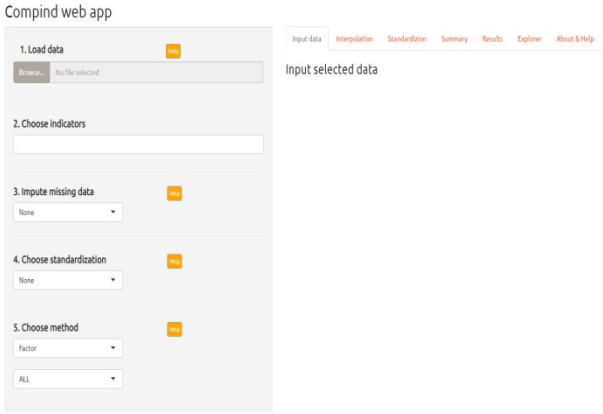
https://fvidoli.shinyapps.io/compind_app/

N	Indicators
1	Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene
2	Mortality rate attributed to household and ambient air pollution
3	Mortality rate attributed to unintentional poisoning
4	Number of deaths, missing persons and directly affected persons attributed to social-biological emergency situations
5	Number of deaths, missing persons and directly affected persons attributed to natural disasters
6	Number of deaths, missing persons and directly affected persons attributed to man-caused disasters
7	Proportion of population using safely managed drinking water services
8	Proportion of population using safely managed sanitation services / Centralized sanitation compound
9	Proportion of population using safely managed sanitation services /Local sanitation compound /hole with waste products/
10	Proportion of population using safely managed sanitation services /Outside toilet
11	Proportion of population using safely managed garbage evacuation services
12	Proportion of population having any complaints about “Noise from neighbors and from outside”
13	Proportion of population having any complaints about “Heavy traffic”
14	Proportion of population having any complaints about “industrial pollution”
15	Proportion of population having any complaints about “Bad water supply”
16	Proportion of population having any complaints about “Bad garbage evacuation”
17	Proportion of population having any complaints about “Lack of green areas” garbage evacuation

Standardization & Normalization

manual

ind 1	Rate per 100 000	2012	2013	2014	2015	2016	2017	2018
1	Yerevan	0.19	0.47	0.56	0.28	0.28	0.00	0.09
2	Aragatsotn	0.00	0.75	0.00	0.00	0.00	0.00	0.00
3	Ararat	0.77	0.38	0.00	0.00	0.00	0.39	0.00
4	Armavir	0.00	0.00	1.50	0.37	0.38	0.00	0.00
5	Gegharkunik	0.00	0.43	0.86	0.00	0.00	0.00	0.00
6	Lori	0.85	0.43	0.44	0.88	1.35	0.46	0.46
7	Kotayk	0.78	0.39	0.39	0.39	0.00	0.00	0.00
8	Shirak	0.40	0.00	0.40	0.41	0.41	0.00	0.00
9	Sjunik	0.00	0.00	0.00	0.00	0.72	0.00	0.00
10	Vayots Dzor	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Tavush	0.00	0.78	0.00	0.00	0.00	0.81	0.00

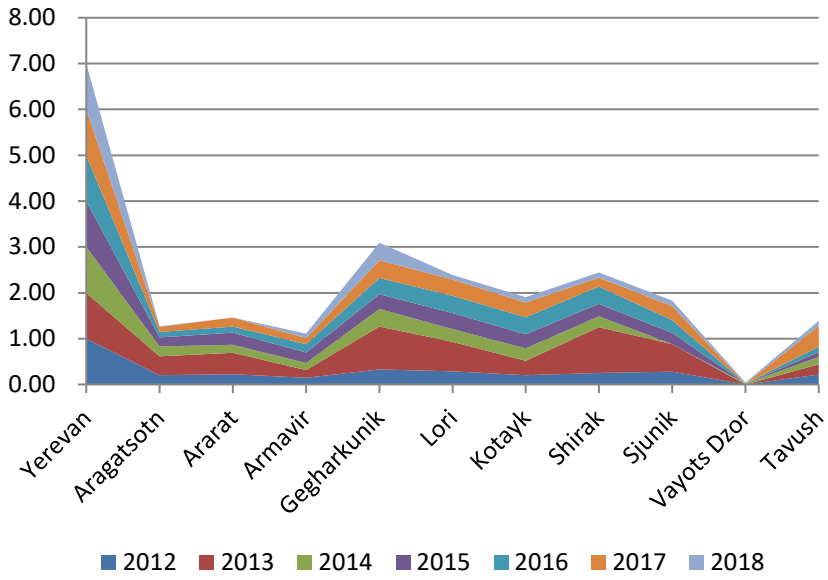


Factor Analysis / Normalization

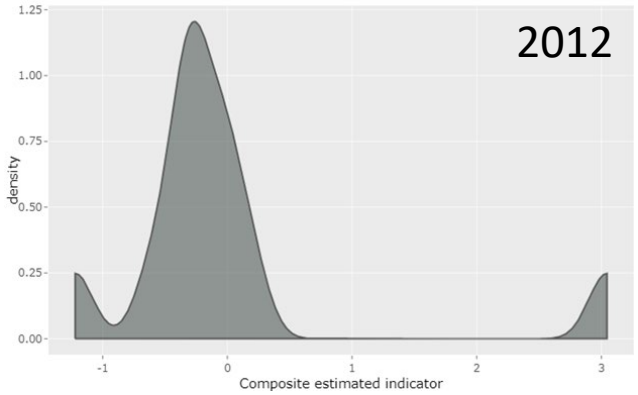
2012	ind1	ind2	ind3	ind4	ind5	ind6	ind7	ind8	ind9	ind10	ind11	ind12	ind13	ind14	ind15	ind16	ind17	Factor analysis_ CI	2012 Normalization
Yerevan	0.22	0.72	0.02	1	0	1	0.58	0.27	1	1	0.49	0.81	0.61	1	0.14	0.13	0.59	3.05	1.00
Aragatsotn	0	0.81	0	0.27	1	0.2	0.58	1	0.02	0.07	1	0.02	0	0.13	0.53	0.28	0.25	-0.34	0.21
Ararat	0.9	0.84	0	0.41	0	0.09	0.58	0.79	0.01	0.06	0.58	0.39	0	0	0.81	0.54	0.68	-0.26	0.22
Armavir	0	0.77	0.1	0.55	0	0.25	0.61	0.74	0.01	0.07	0.52	0.02	0	0	0.63	0.12	0.45	-0.60	0.15
Gegharkunik	0	0.85	0.22	0.07	0.19	0.4	0.62	0.73	0.01	0.08	0.65	1	0.07	0	0.94	0.56	1	0.19	0.33
Lori	1	1	0	0.2	0.19	0.11	0.62	0.58	0.03	0.09	0.67	0.07	0.18	0.33	0.49	0.05	0.78	0.01	0.29
Kotayk	0.92	0.71	0	0.49	0	0.14	0.58	0.35	0.02	0.14	0.5	0.16	0	0.15	0.37	0.17	0.51	-0.37	0.20
Shirak	0.47	0.87	0.42	0.25	0.18	0.27	0.58	0.4	0.02	0.16	0.66	0.02	0	0	1	1	0.83	-0.15	0.25
Sjunik	0	0.57	0	0.01	0	0.03	0.59	0.33	0.03	0.21	0.54	0.45	1	0.58	0.49	0.26	0.38	-0.02	0.28
Vayots Dzor	0	0.53	1	0.28	0	0.51	0.58	0.54	0.06	0.09	0.83	0.15	0	0	0.17	0.1	0.11	-1.22	0.00
Tavush	0	0.99	0.2	0.05	0	0.28	1	0.83	0.01	0.07	0.77	0.07	0	0.02	0.95	0.67	0.38	-0.29	0.22

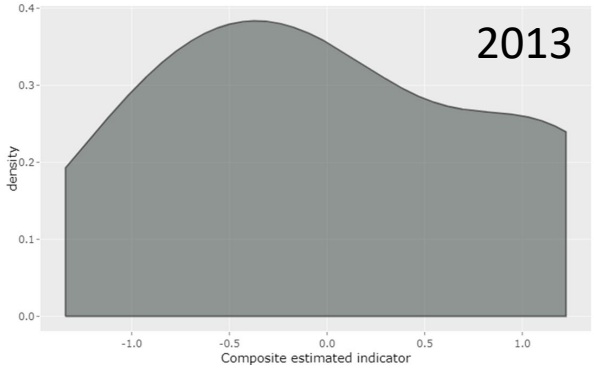
Composite indicator

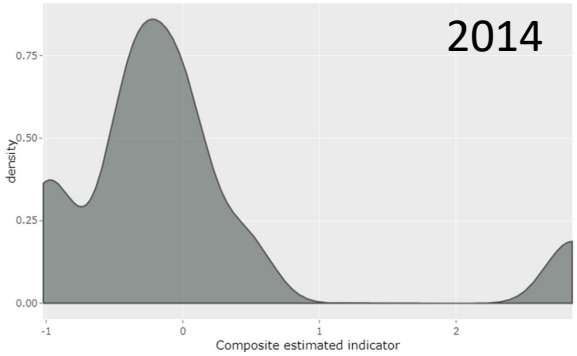
	2012	2013	2014	2015	2016	2017	2018
Yerevan	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Aragatsotn	0.21	0.41	0.22	0.20	0.12	0.11	0.01
Ararat	0.22	0.47	0.17	0.27	0.13	0.19	0.00
Armavir	0.15	0.17	0.15	0.23	0.18	0.13	0.09
Gegharkunik	0.33	0.93	0.38	0.32	0.36	0.38	0.38
Lori	0.29	0.64	0.28	0.35	0.38	0.36	0.10
Kotayk	0.20	0.32	0.27	0.30	0.37	0.32	0.12
Shirak	0.25	1.00	0.24	0.27	0.37	0.19	0.11
Sjunik	0.28	0.60	0.00	0.24	0.28	0.30	0.12
Vayots Dzor	0.00	0.00	0.02	0.00	0.00	0.00	0.02
Tavush	0.22	0.22	0.16	0.10	0.12	0.45	0.11

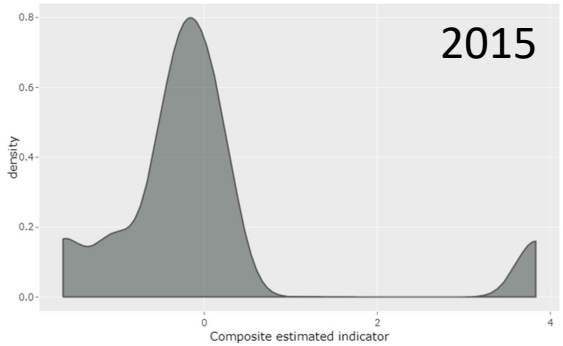


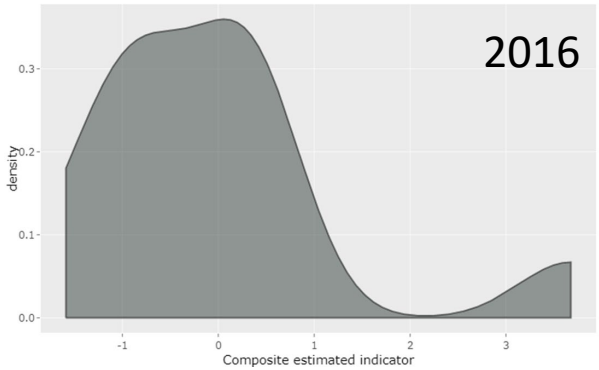
Distribution of the estimated Composite Indicators

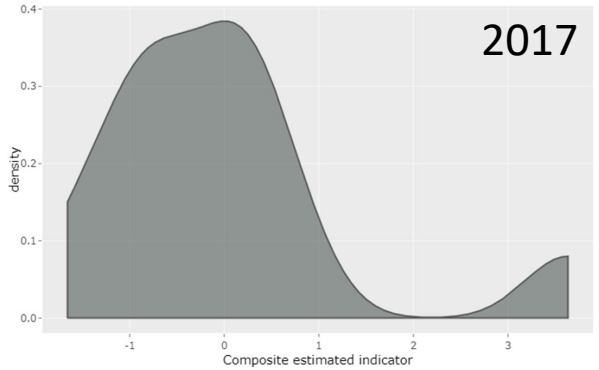


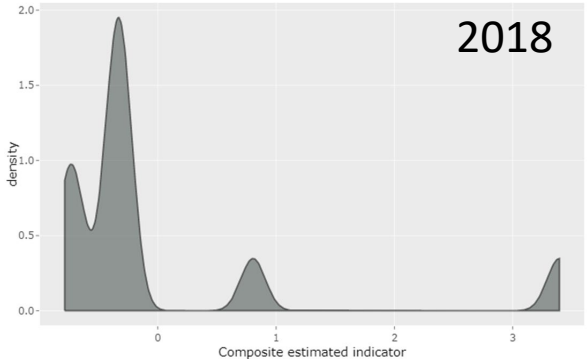












Thank you