Drinking water supply in Slovakia

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Drinking water supply

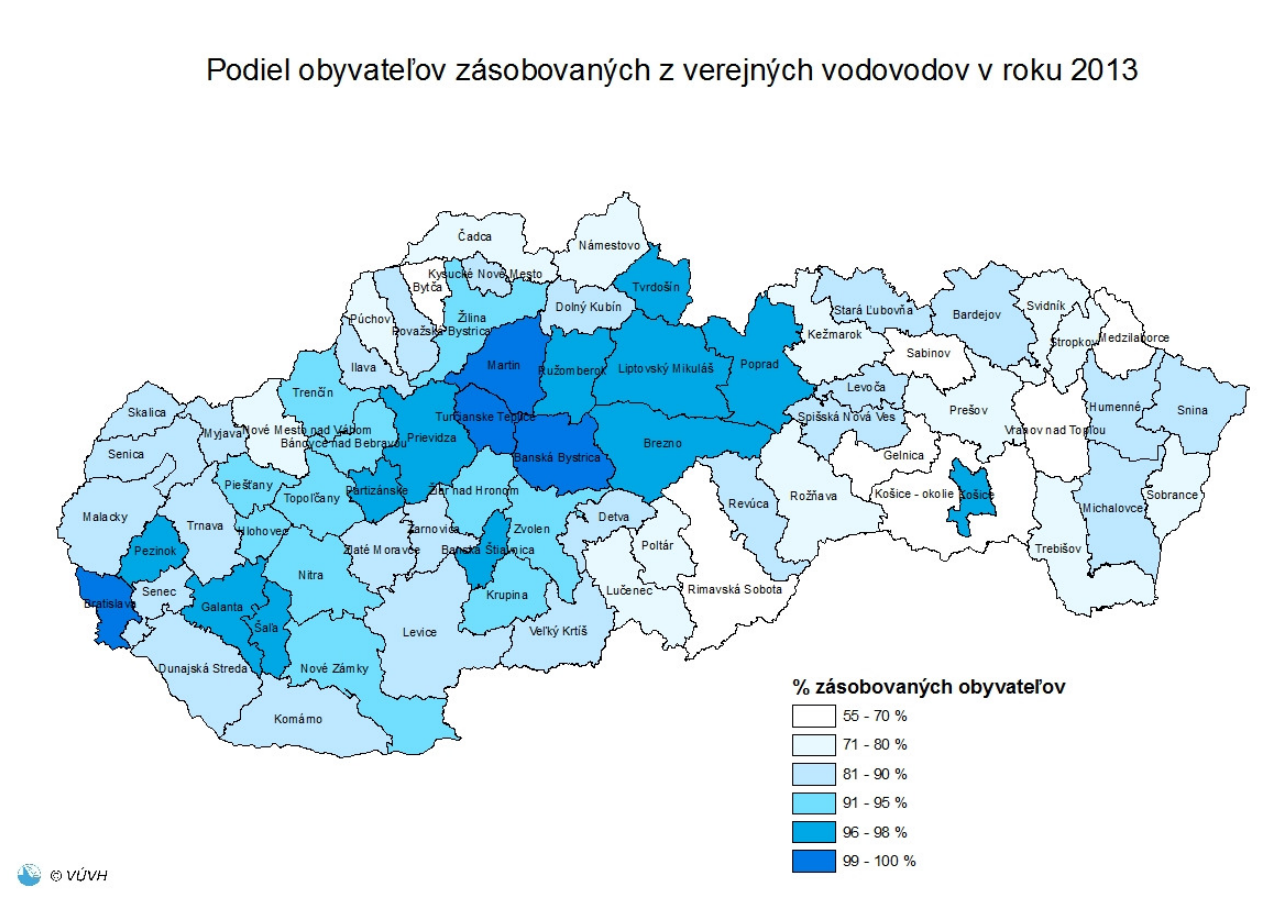
Sources of water (raw water)

Water treatment

Distribution system (drinking water)

Public water supply in Slovakia

Share of inhabitants supplied with public water in 2013 (total 87,4%)



The decrease in specific water consumption in the households:

1990: **192,2 l/pers./day**

2013: **78,7 l/pers./day**

Water sources

Groundwater sources

- infiltration of atmospheric and surface water, condensation of water vapour in the soil and from the magma
- share of groundwater sources (springs, wells) in Slovakia (2013): 82,6 %

Surface water sources

- surface water means inland waters except for groundwater; transitional waters and coastal waters (flow water - rivers, standing water - lakes)
- share of surface water sources (water reservoirs, watercourses) in Slovakia (2013): 17,4 %

Categories of standard methods of surface water and groundwater treatment for drinking water

Basic classification of raw water quality

- physical, chemical, microbiological, biological and radiochemical parameters (total 40 parameters)

Based on the Decree of the Ministry of Environment of the Slovak Republic no. 636/2004 Coll.

raw water is classified to categories:

- A1 – treatment by disinfection or simple physical treatment and disinfection
- A2 – physical and chemical treatment and disinfection
- A3 – intensive physical and chemical treatment, enhanced treatment and disinfection

Raw water quality

Groundwater (year 2013)

assessment for 1 005 groundwater sources or their localities

Based on the Decree no. 636/2004 Coll.

Number of sources		Category
921	91,6 %	A1
57	5,7 %	A1/A2
11	1,1 %	A2
4	0,4 %	A2/A3
12	1,2	A3

Raw water quality

Surface water (year 2013)

assessment for 17 watercourses

Based on the Decree no. 636/2004 Coll.

No of sources		Category
11	64,7 %	A1
2	11,8 %	A1/A2
4	23,5 %	A2
0	0,0 %	A2/A3
0	0,0 %	A3

Raw water quality

Surface water (year 2013)

assessment for 5 water reservoirs

Based on the Decree no. 636/2004 Coll.

No of sources		Category
0	0,0 %	A1
3	60,0 %	A1/A2
2	40,0 %	A2
0	0,0 %	A2/A3
0	0,0 %	A3

Raw water quality

Water quality parameters due to it was necessary raw water categorized differently like A1:

coliform bacteria, *Escherichia coli*, living organisms,

iron, manganese,

turbidity, absorbance, colour,

ammonia, nitrate,

arsenic, antimony,

gross alpha activity, gross beta activity, Radon-222,

oxidisability, conductivity, sulphates

Water treatment

Designing the technological processes depends on

- raw water quality
- drinking water quality requirements
- modelling and pilot plant verification of the proposed and operated water treatment technology

Objectives of water treatment

to achieve the required quality of drinking water by the Slovak Government Regulation no 496/2010 (removal of iron, manganese, microbiological and biological recovery, natural organic matter, inorganic and organic specific micro-pollution)

Water treatment

Technological processes used for water treatment in Slovakia

- aeration
- mechanical (direct) filtration
- deacidification
- slow biological filtration
- single stage treatment
- two stage treatment
- water treatment in-situ
- only disinfection (groundwater)

Water treatment

Technological lines for groundwater treatment

One stage treatment	Two stage treatment
Aeration	Aeration
Homogenisation (coagulant and raw water)	Homogenisation (coagulant and raw water)
Fast mixing	Fast mixing
Slow mixing	Slow mixing
-	Sedimentation
Filtration	Filtration
Disinfection	Disinfection

Water treatment

Technological lines for surface water treatment

One stage treatment	Two stage treatment
Water pre-treatment	Water pre-treatment
Homogenisation (coagulant and raw water)	Homogenisation (coagulant and raw water)
Fast mixing	Fast mixing
Slow mixing	Slow mixing
-	Sedimentation
Filtration	Filtration
Disinfection	Disinfection

Water treatment

Technological lines for surface water treatment

Slow biological filtration

- pretreatment (microsieve, aeration)
- slow filter
- disinfection

Deacidification

- deacidification filter (e.g. marble)
- disinfection

Water treatment plants in Slovakia

90 Water treatment plants

- groundwater (31)
- surface water (59)

  (except for water treatment plants with disinfection step only)

Water treatment

The technological audit of water treatment plant

assessment of the current state of water treatment plant operation and the drafting of optimization measures

Development in water treatment depends on

- new harmful substances polluting sources of water
- strengthening the requirements for water quality
- the costs of treatment

Trends and perspective procedures of water treatment in SR

- flotation with dissolved air (one step separation)
- progressive oxidation
- membrane processes
- re-carbonisation of water
- treatment of water with cyanobacteria and their toxins in water reservoirs
- UV radiation and UV radiation in combination with chloramonium as disinfectant agents
- adsorption on active carbon
- in situ technologies
- biological methods

Quality of drinking water in Slovakia

Based on **Drinking Water Directive 98/83/EC** on water quality intended for human consumption

Slovak Government Regulation no. 496/2010 Coll.

Radiochemical parameters: **Decree of the Ministry of Health SR no. 528/2007 Coll.**

Overview of drinking water quality parameter according to DWD 98/83/EC

Part A. Microbiological parameters: 2 (for bottled drinking water 5)

Part B. Chemical parameters: 26

Part C. Indicator parameters: 18

Radioactivity: 2

48 parameters together

Overview of drinking water quality parameter according to 496/2010 Coll. And 528/2007 Coll.

A. Microbiological and biological parameters: 14
B. Physical and chemical parameters
   a. Inorganic parameters: 16
   b. Organic parameters: 19
   c. Disinfectants and their by-products: 9
   d. Parameters that may adversely affect sensory quality of drinking water: 20
   e. Substances, which content in water is desired: 3
   f. Radiochemical parameters: 2

83 parameters together

Water supply zones

Large water supply zones (VZO) = Number of supplied inhabitants from 5 000 to 500 000

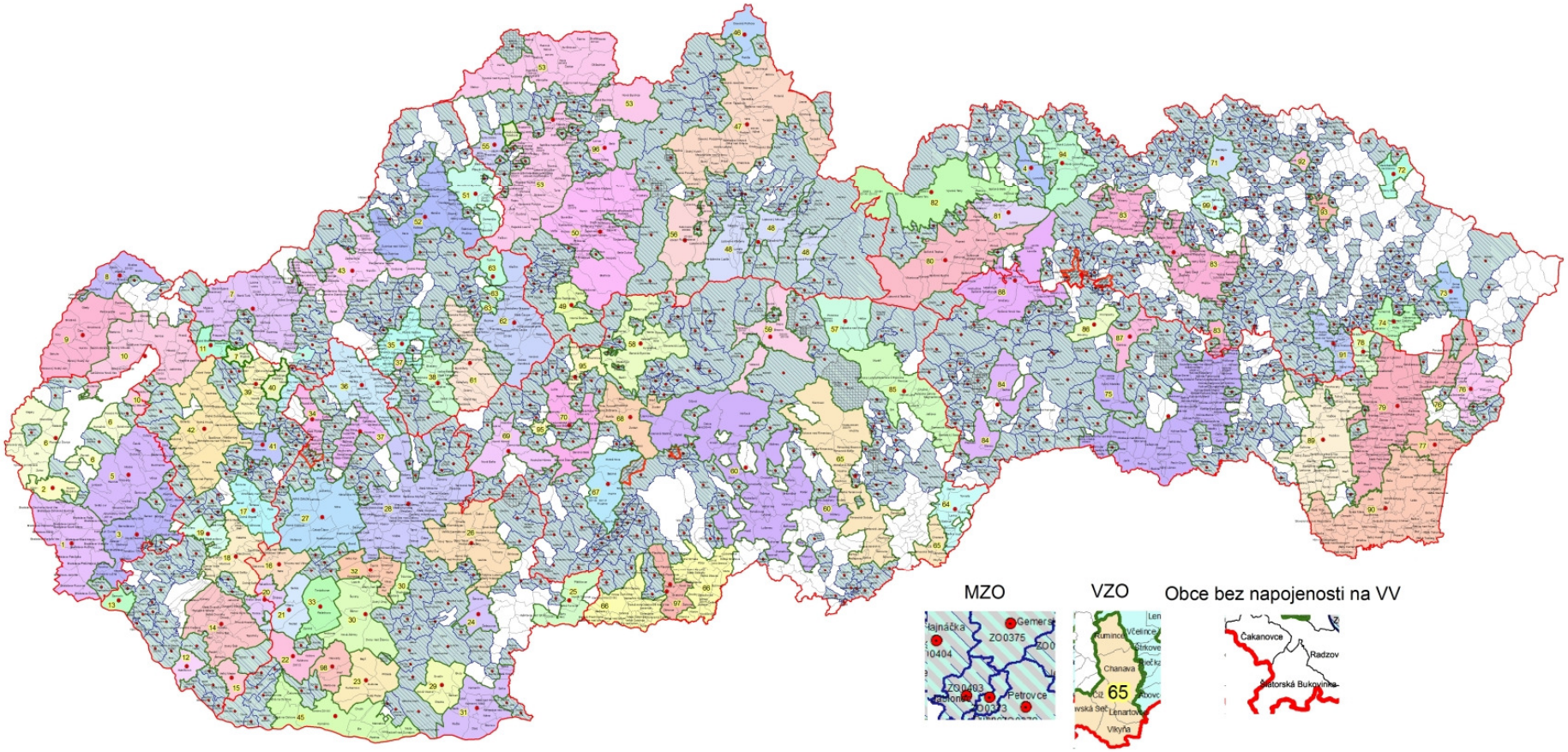
Small water supply zones (MZO) = Number of supplied inhabitants from 50 to 5 000

Supply of the population with drinking water from large and small supply zones (2012)

Supply zones	No. of supply zones	No. of supplied inhabitants	Percentage in supplying
Small supply zones	944	790 962	16,8 %
Large supply zones	97	3 918 800	83,2 %

Situation is similar like in 2010

Veľké a malé zásobované oblasti v roku 2012



MZO

VZO

Obce bez napojenosti na VV

Dvojité MZO (úplný prekryv -
jedna obec s dvomi rôznymi vodovodmi
s rôznymi zdrojmi vody v dvoch rôznych MZO)

Dvojité MZO (čiastočný prekryv -
jedna obec vo viacerých MZO aj s inými obcami)

Drinking water quality in large water supply zones

Year	No. of VZO	No. of inhabitants in SR	No. of supplied inhabitants	No. of assessed analysis	% analyses in compliance
2008	94	5 412 300	3 747 500	108 989	**99,46**
2009	96	5 424 900	3 791 900	124 832	**99,20**
2010	95	5 435 300	3 900 500	123 019	**99,47**
2011	96	5 435 300	3 919 400	158 053	**99,59**
2012	97	5 410 800	3 918 800	168 263	**99,65**
2013	97	5 415 900	3 941 500	217 990	**99,77**

Drinking water quality in small water supply zones (2012)

Category of MZO	No. of supplied inhabitants	No. MZO	No. of MZO Drinking water quality is in accordance with the Directive 98/83/ES
1st category	50 – 500	443	265
2nd category	500 – 2 000	412	272
3rd category	2 000 – 5 000	89	55
Total		944	592
63 % MZO meets the requirements of 98/83/ES			

Overview of the European Commission (2010)

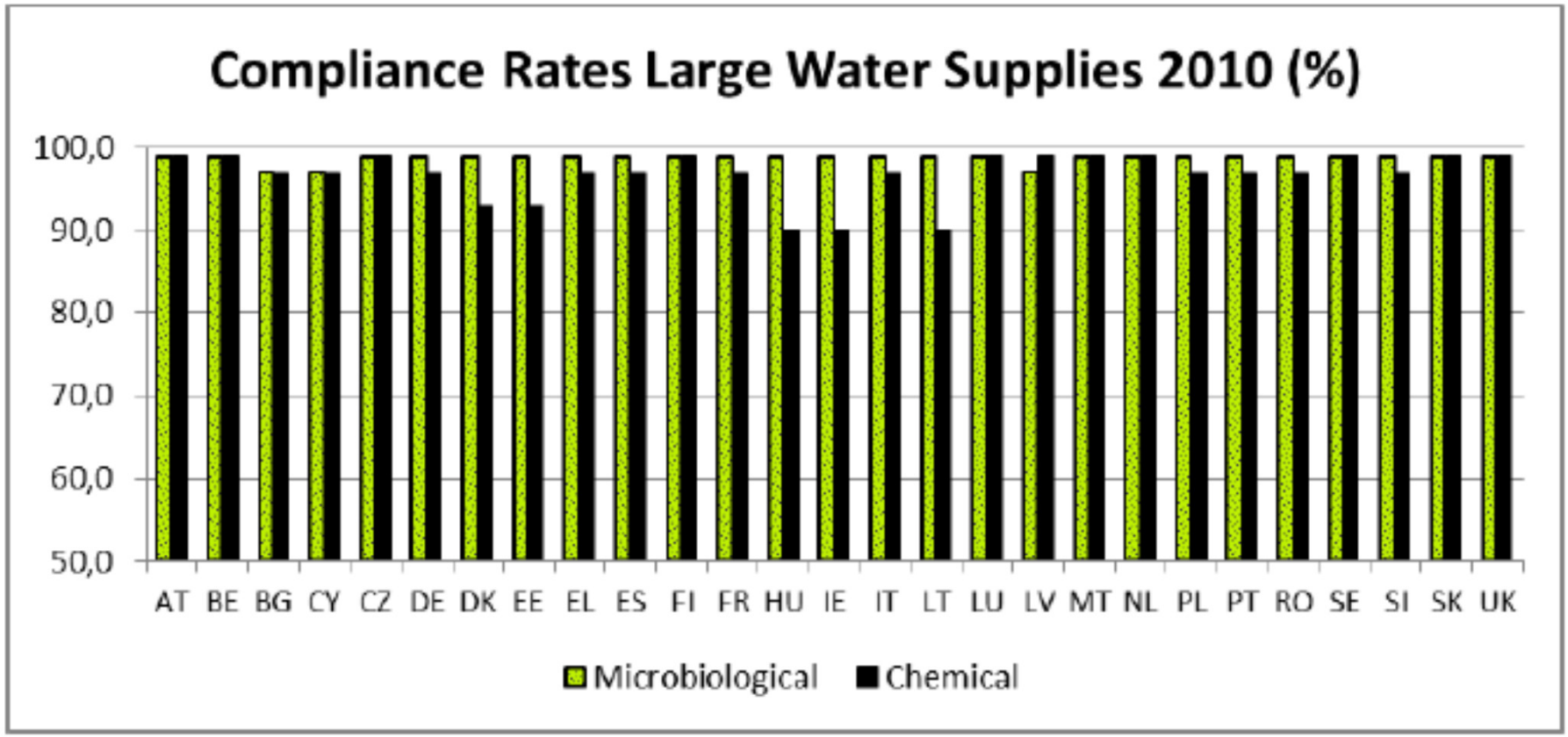


Figure 1: Summary overview - compliance rates microbiological and chemical parameters in Member States

Slovakia has 99 - 100% sample compliance

Overview of the European Commission (2010)

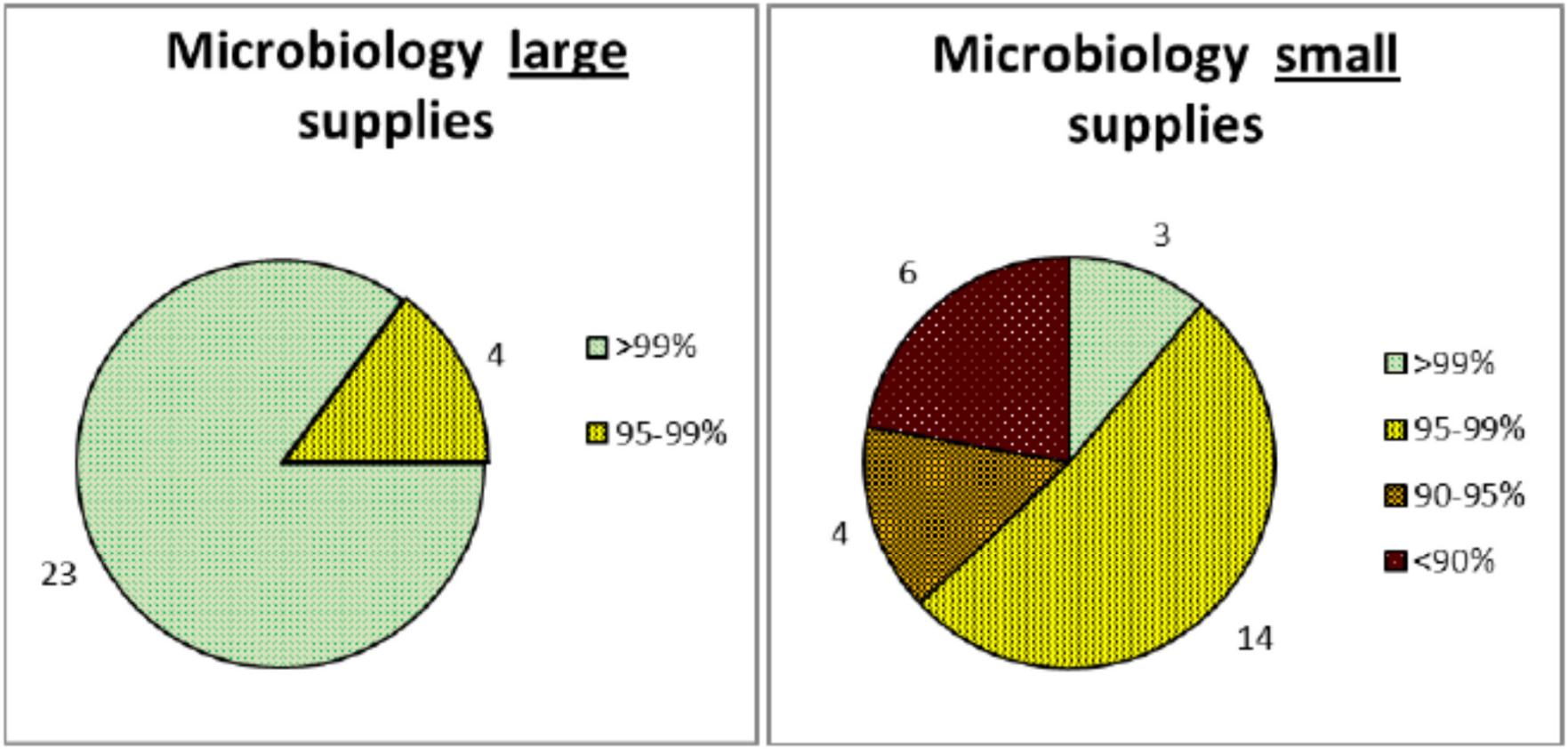
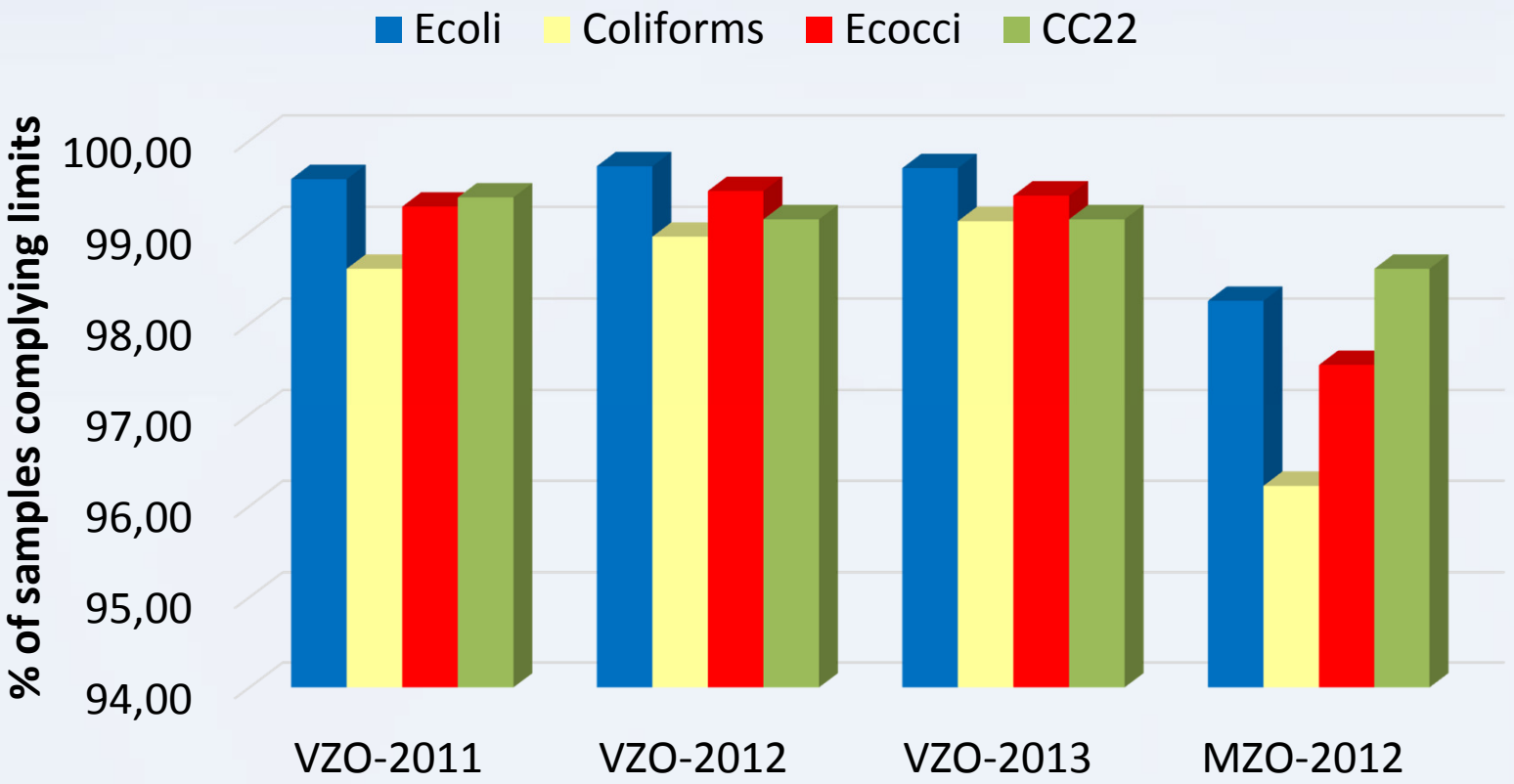


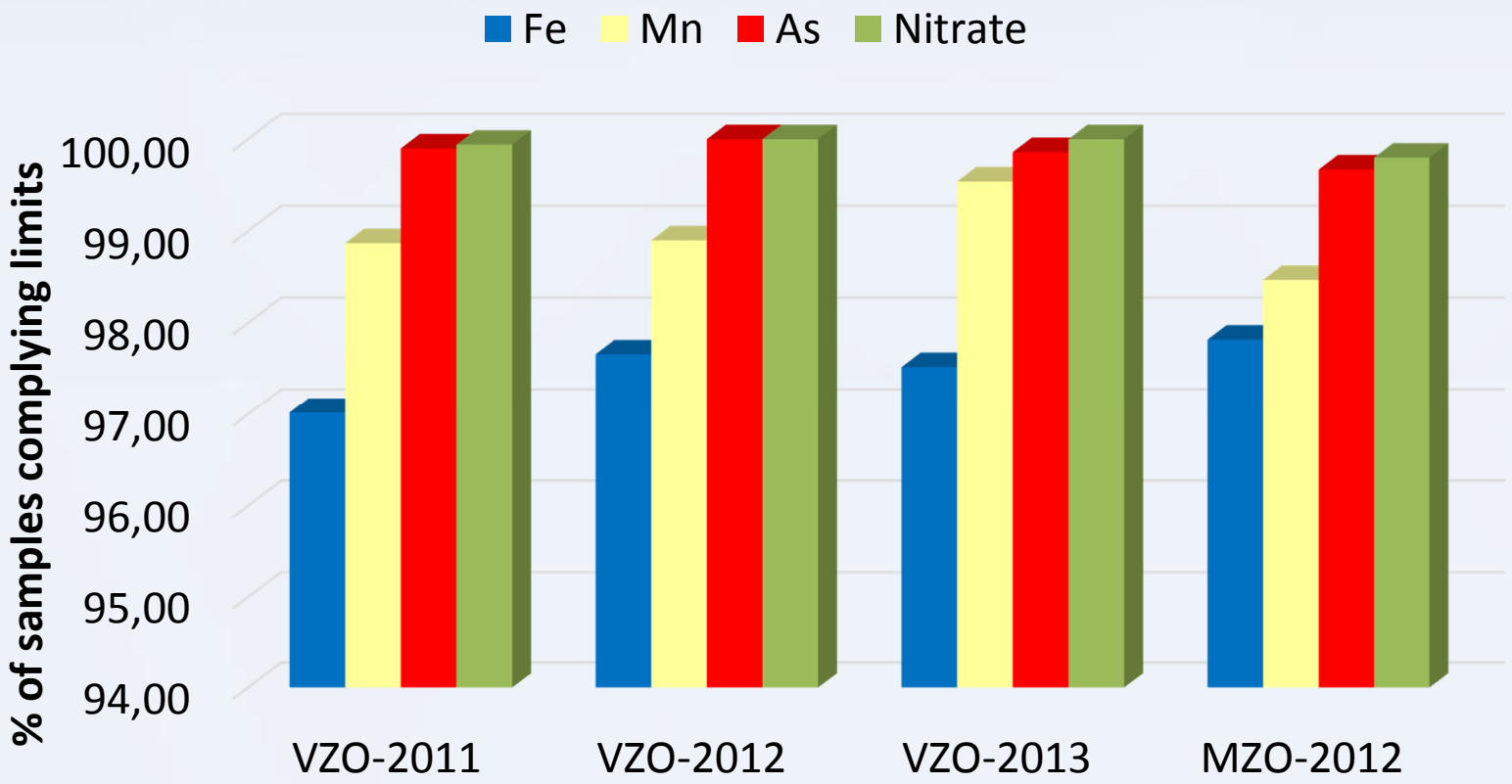
Figure 2: Compliance Rate Microbiology, Number of Member States

Slovakia has 99 – 100 % sample compliance in VZO and 95 – 99 % in MZO

Selected water quality parameters



Selected water quality parameters



Thank you for your attention!