Situation assessment of small scale water supply systems in the Dusheti and Marneuli districts of Georgia

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Introduction

- Water resources, including groundwater, are the **main national wealth** of Georgia
- Due to **unequal distribution**, part of the population, especially in East Georgia, has a lack to access to the safe drinking water
- Water safety of **small scale supplies** and associated the negative health outcomes identified as a priority concern in Georgia

Background

- **Disparity** between urban and rural areas for water piped into premises:
  - 92 % in urban areas
  - 51 % in rural areas
- People **collect water** also from individual wells and from natural springs
- National **non-compliance** for bacteriological for 2009: **52 %**
- Little **routine monitoring** in rural areas

Water collection

Project objectives

- **Systematic baseline analysis** of situation of small scale water supplies in two exemplary districts - **Dusheti and Marneuli**
  - Problem sensitization on rural areas
  - Support to Protocol target setting in Georgia
  - Enforcement of water protection zones in rural areas
  - Introduction of water safety plans in the small scale water supply systems
  - Improving health of the local population by bettering water resource management
- **Rapid (one-off) assessment**

Project objectives

- Technical and financial **support**:
  - Federal Environment Agency (UBA), Germany
  - WHO Regional Office for Europe
- Project **stages** (2010-2012):
  - Preparatory stage
  - Field activities
  - Analytical work
  - Training workshops for local authorities
  - Outreach programme to the local population

Survey design

- Field work carried out during May and June 2011
- Survey included **water quality testing** and **sanitary inspections**
- **Total sample size** (260) based on resources available
- Population-based **proportional weighing**:
  - Total population Dusheti = 33,800 (= 21 %)
    → 55 samples
  - Total population Marneuli = 126,300 (= 79 %)
    → 205 samples

Summary survey design

Technologies covered in survey			Population covered in survey		Samples/inspections included in survey	
Type	*No.*	*%*	*No.*	*%*	*Location*	*No.*
Borehole	26	20.6 %	39,000	65.5 %	Source	122
Spring	23	18.3 %	10,837	18.2 %	Storage reservoir	33
Dug well	71	56.3 %	2,770	4.7 %	Distribution system	79
Unknown	6	4.8 %	6,910	11.6 %	Household container	26
Total	**126**	**100 %**	**59,517**	**100 %**	**Total**	**260**

Parameters

Microbiological parameters	Physico-chemical parameters	Organoleptic/appearance parameters
Total coliforms	Nitrate (NO_3^-)	Turbidity
Escherichia coli	Ammonia (NH_4^+)	Temperature
Faecal streptococci	Iron (Fe)	Taste and odour
	Fluoride (F)	Total dissolved solids (TDS)
	Copper (Cu)	
	pH	
	Free chlorine residual	

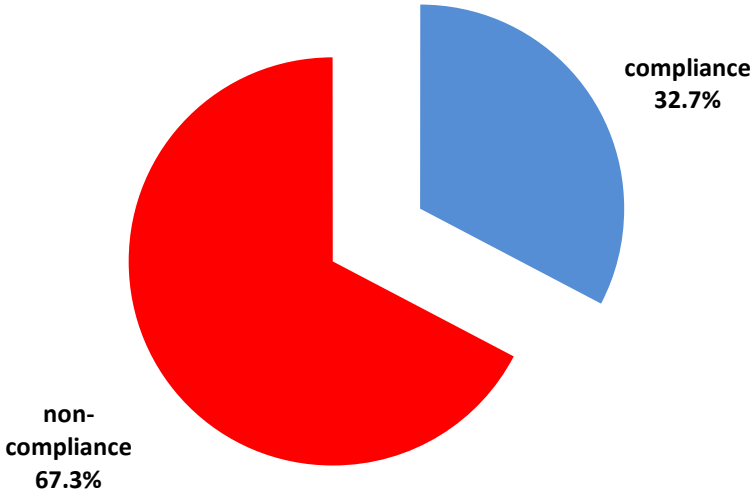
Sample collection

Sanitary inspections

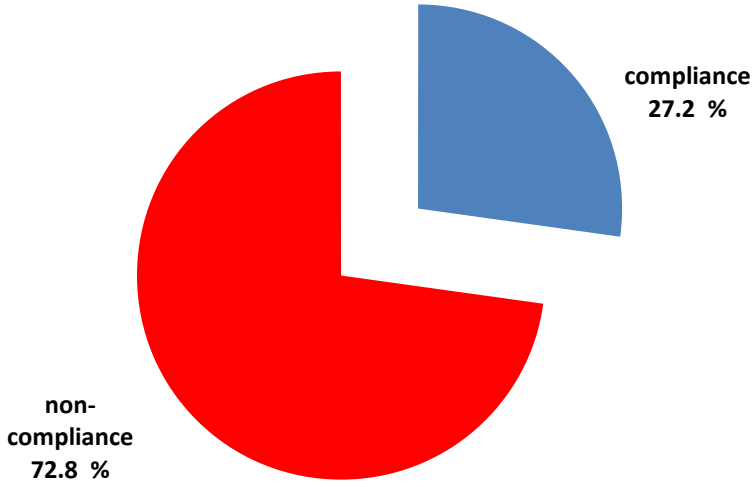
- Major **sanitary risk factors** identified:
  - Cracks or breaks in the infrastructure
  - Old and leaking pipes (potential for secondary contamination)
  - Unsanitary conditions around the source
  - Latrines / sewers near to source
  - Animal access to source

Compliance with standard for total coliforms

Dusheti district

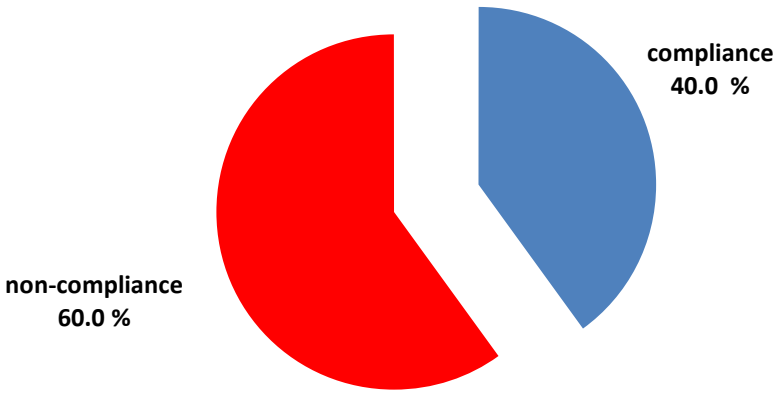


Marneuli district

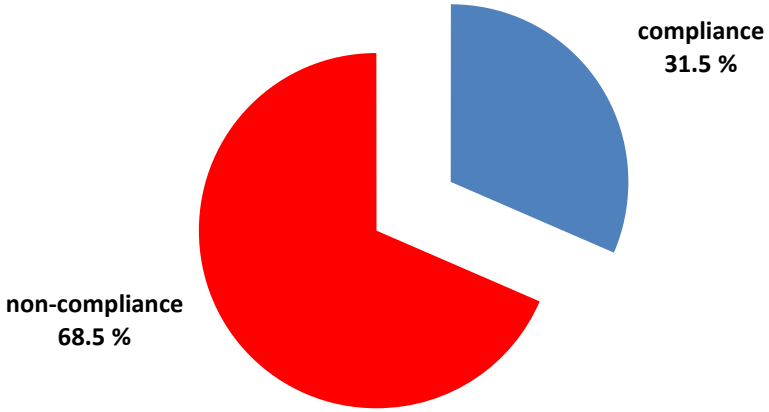


Compliance with standard for *E. coli*

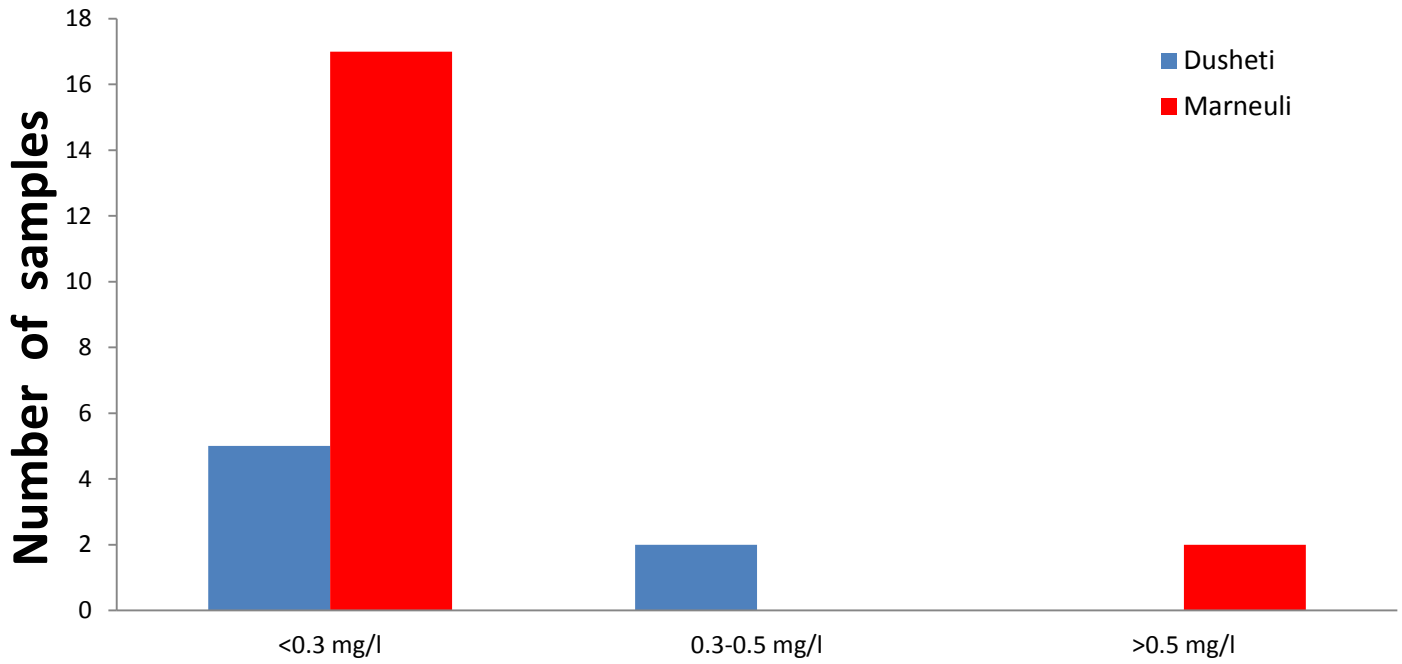
Dusheti district



Marneuli district



Distribution of free chlorine concentrations



Residual chlorine concentration (mg/l)

Compliance levels

Parameter	Dusheti	Marneuli
Microbiological parameters		
Total coliforms	32.7 %	27.2 %
E. coli	40.0 %	31.5 %
Faecal streptococci	66.0 %	78.8 %
Physico-chemical and organoleptic parameters		
NO_3, NH_4, Fe, Cu, F , Turbidity	100.0 %	100.0 %
Chlorine residuals	22.2 %	0.0 %
TDS	98.0 %	91.3 %
Overall compliance		
All parameters	26.0 %	20.1 %

Comparative risk analysis Dusheti

E. coli count (1/100 ml)	Sanitary inspection score (SIS)			
	0-2	3-5	6-8	9-10
>100	0	0	0	0
11-100	8	3	0	0
1-10	10	9	0	0
<1	10	9	1	0

Risk level	Low	Intermediate	High	Very high
Priority action level	No action required	Low action priority	Higher action priority	Urgent action required
Proportion of samples	20.0 %	56.0 %	24.0 %	0.0 %

Comparative risk analysis Marneuli

E. coli count (1/100 ml)	Sanitary inspection score (SIS)			
	0-2	3-5	6-8	9-10
>100	2	2	1	0
11-100	15	34	8	0
1-10	30	25	9	0
<1	23	32	3	0

Risk level	Low	Intermediate	High	Very high
Priority action level	No action required	Low action priority	Higher action priority	Urgent action required
Proportion of samples	12.5 %	47.3 %	37.5 %	2.7 %

Conclusions /1

- **Microbial contamination** is significant:
  high potential for faecal pollution
- **Chemical contamination** is currently not of concern
- **Low overall compliance** with the national standards
  (26.0 % in Dusheti and 20.1 % in Marneuli)
- **Disinfection** (i.e. chlorination) is absent or, where in place, practices are inadequate

Conclusions /2

- Significant number of **sanitary risk factors** compromise the provision of safe drinking-water
- Significant portion of investigated sites can be categorized as at **“high” or “very high” risk**, requiring “urgent” attention (40 % in Marneuli and 24 % Dusheti)
- Lack of **routine surveillance** on drinking water quality
- **Limited public awareness** on water hygiene and risk-factors for water-related diseases

Recommendations at national level

- Small-scale water supplies to be considered in **national target setting**
- Regulatory framework and an effective mechanism for ensuring the **protection of water sources**
- Promote application of the **WSP approach**
- Establishment of systematic and routine **drinking-water quality surveillance**
- Increase number, the knowledge and skills of **specialists** working in water supply system
- Improve communication to raise **public awareness**

Final project workshop

Ongoing work on helminths

- Strategic action plan for the elimination of soil-transmitted helminthes (STH) in children
- Country assessment by WHO expert mission (20-24 May 2013, Mr. Peter Steinmann and Ms Margriet Samwel)

Thank you for your attention!