



European Monitoring Centre
for Drugs and Drug Addiction

Wastewater based epidemiology

Introduction

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In this presentation...

- Wastewater based epidemiology - a new tool to rapidly report on new trends
- WBE:
 - Its potential for monitoring drug use
 - Challenges for and limitations of WBE
- EMCDDA publications on WBE

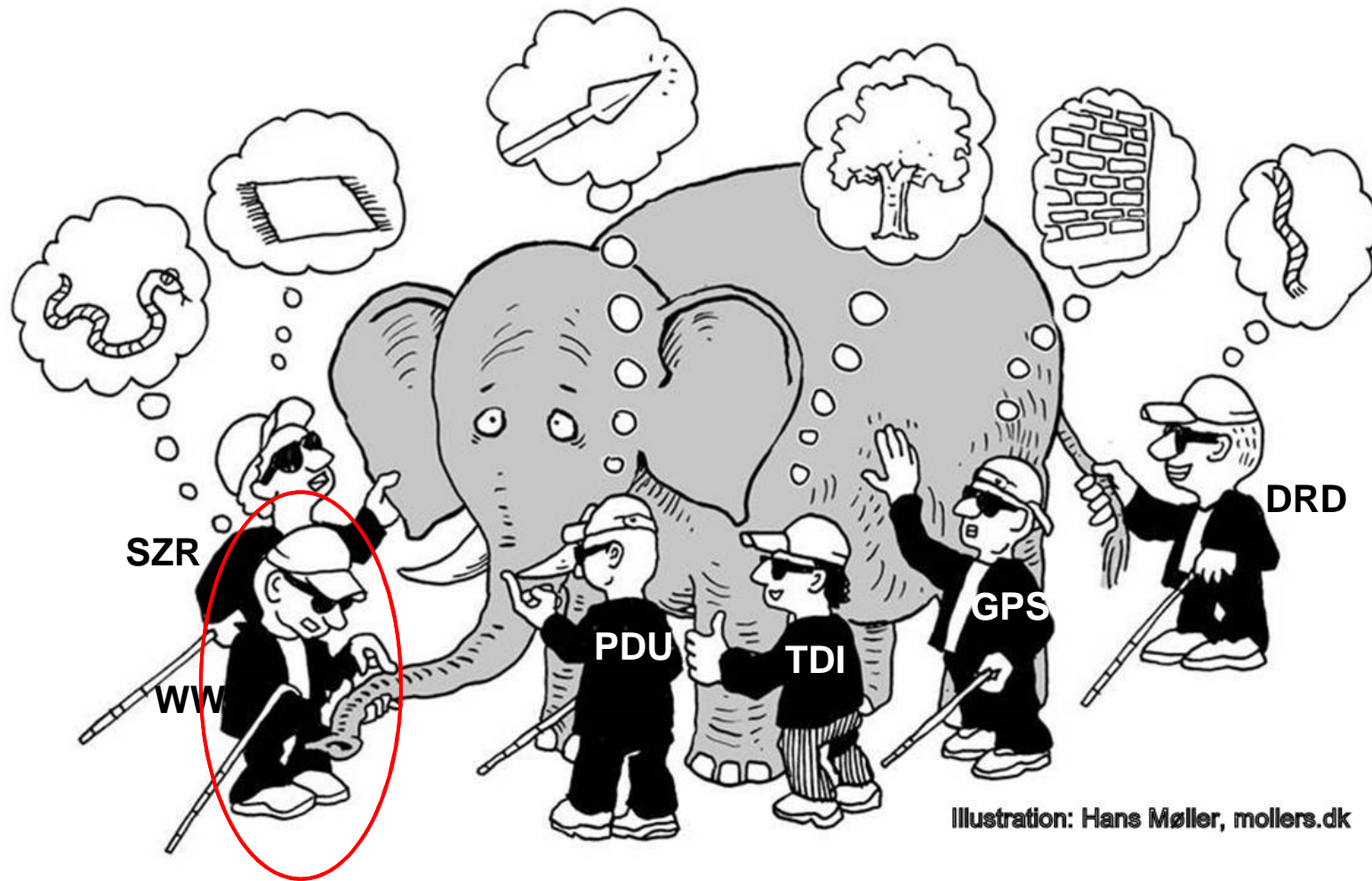


WBE — how does it work?

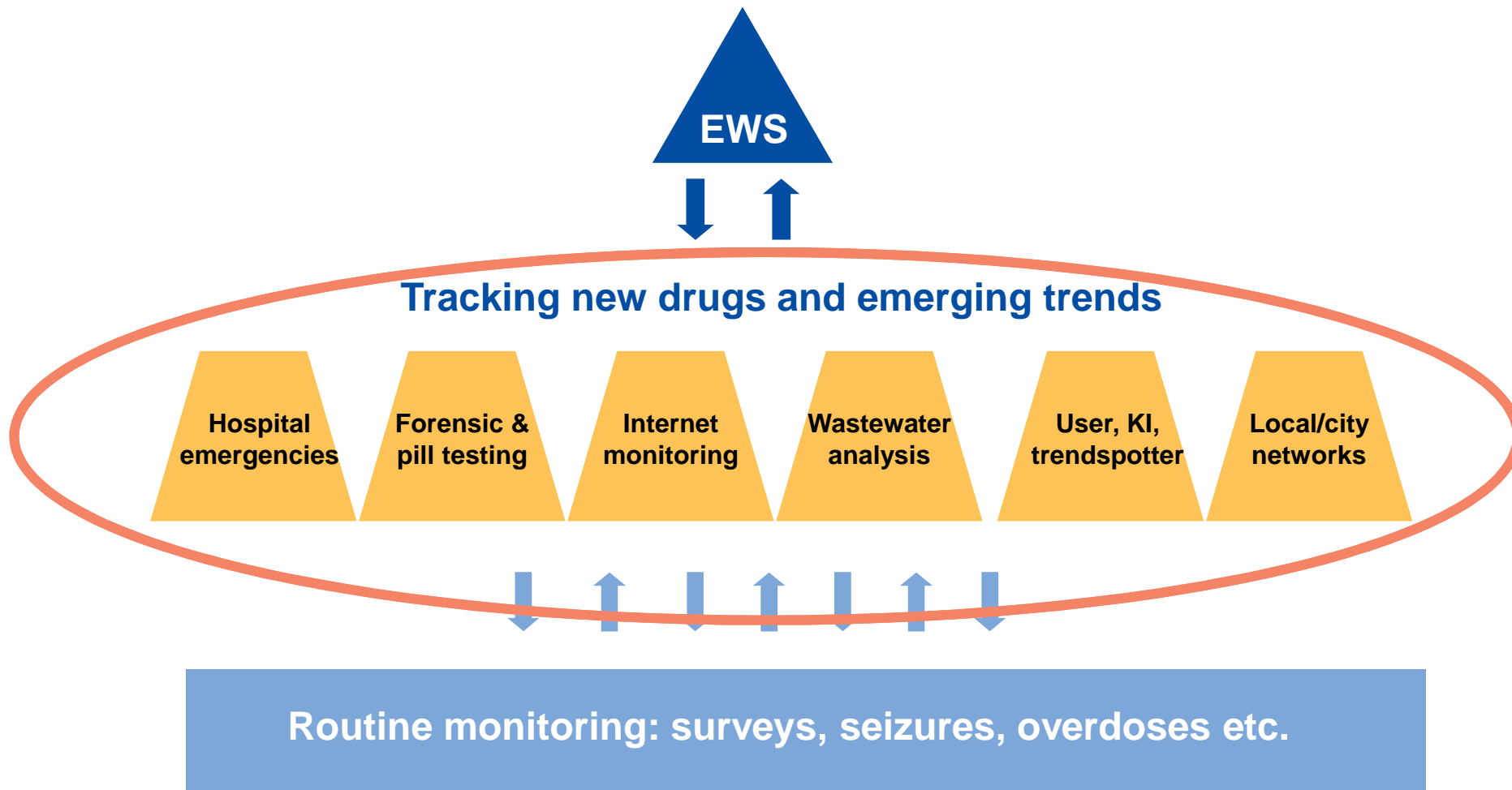




WBE — a new tool in the epidemiological toolkit



WBE – a new tool to rapidly report on new trends



Wastewater analysis — its potential for drug use monitoring

- Not subject to response and non-response bias
- It can better identify the true spectrum of drugs being consumed
- Timely information
- Information on geographical and temporal trends
- Relatively inexpensive

- Independent estimate of total consumption



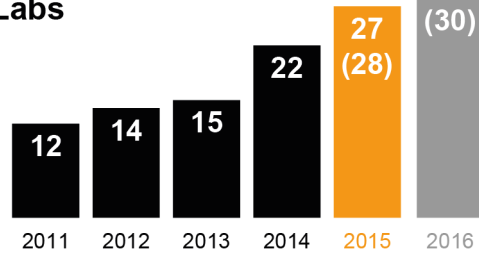
Wastewater analysis — challenges and limitations

- No information on prevalence of use
- Recreational versus heavy drug users – complexity in patterns of use
 - Frequency of use
 - Which users
 - Routes of administration
 - Purity
- City data versus national data
- Wide range of uncertainties: sampling of wastewater, different back-calculation methods, behaviour of biomarkers in the sewer, etc.
- Ethical issues?

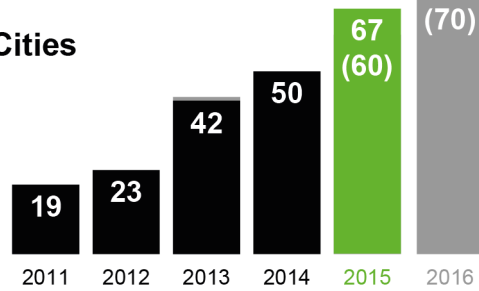


SCORE as data provider

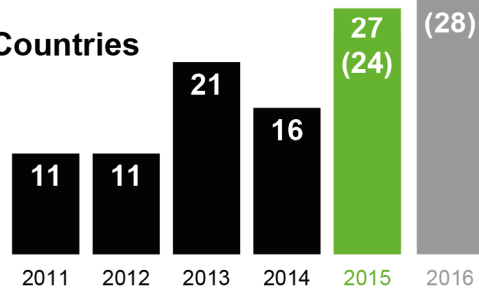
Labs



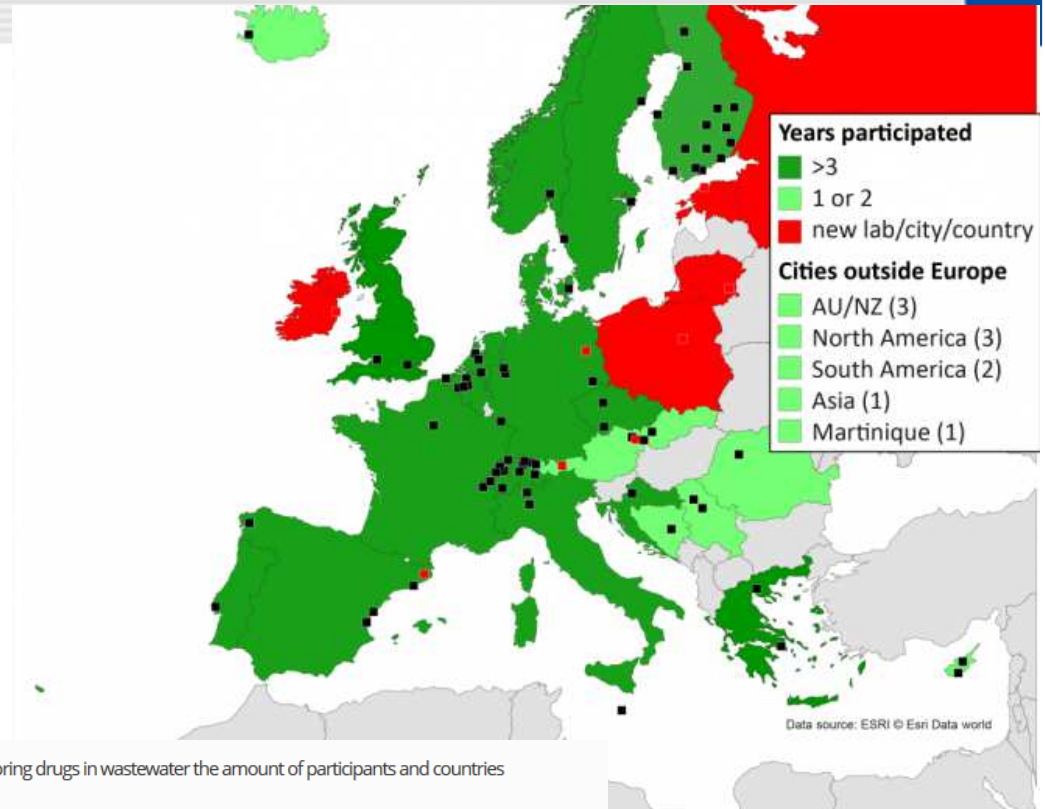
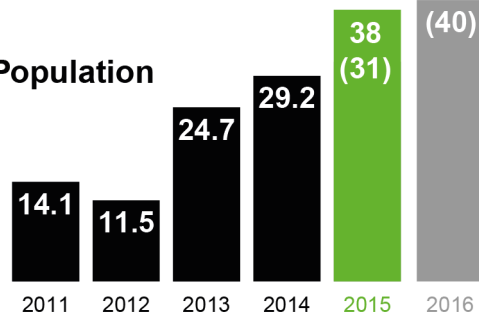
Cities



Countries



Population



Since 2011 when we started with monitoring drugs in wastewater the amount of participants and countries has been growing rapidly

Year	Countries	Cities
2011(1)	11	19
2012(2)	11	23
2013(2)	21	42
2014	19	50
2015	27	67
2016	>28	>70

2016: More information about the 2016 campaign [can be found here](#)

2015: The results of the 2015 monitoring campaign will be available 31st May 2016, [here on the EMCDDA website](#) together with the release of the [European Drug Report \(EDR\) 2016](#).

2014: The results of the 2014 monitoring campaign [can be found here](#)

score

EMCDDA publication of wastewater findings

<http://home.emcdda.europa.eu/topics/pods/waste-water-analysis>

Map-based tool | Charting tool

Select a year: 2011 2012 2013 2014 **2015**

Select target drug: cocaine amphetamine methamphetamine MDMA

Means: Mean Weekday Weekend

Explore daily patterns: Mo Tu We Th

Click on a location to zoom in

Map-based tool | Charting tool

How to use the charting tool? To explore the findings of the study, select the 'city' of choice and the 'target drug'. You can compare sites or explore daily and yearly trends. Weekend means refer to the mean loads detected on Friday, Saturday, Sunday and Monday. Weekday means refer to mean loads detected on the other days of the week. The findings from 2011-2015 are included in this tool.

Select target drug: cocaine amphetamine methamphetamine MDMA

Select something to visualise: Compare sites Daily trends Yearly trends

Year: 2011 2012 2013 **2014** 2015

Means: Daily Weekday Weekend

Cocaine: overall mean, 2015 (mg/1000 people/day)

City	Mean (mg/1000p/day)
London (United Kingdom)	909.4
Amsterdam (Netherlands)	641.7
Antwerp Z. (Belgium)	621.1
Zurich (Switzerland)	529.3
Brussels (Belgium)	472.4
Antwerp D. (Belgium)	466.1
Barcelona (Spain)	443.6
Geneva (Switzerland)	442.7
St. Gallen (Switzerland)	427.7
Copenhagen (Denmark)	337.2
Valencia (Spain)	336.7
Eindhoven (Netherlands)	323
Lausanne (Switzerland)	313.9
Bristol (United Kingdom)	306.3
Dortmund (Germany)	275.5
Lisbon (Portugal)	264.3
Molina de Segura (Spain)	232.8

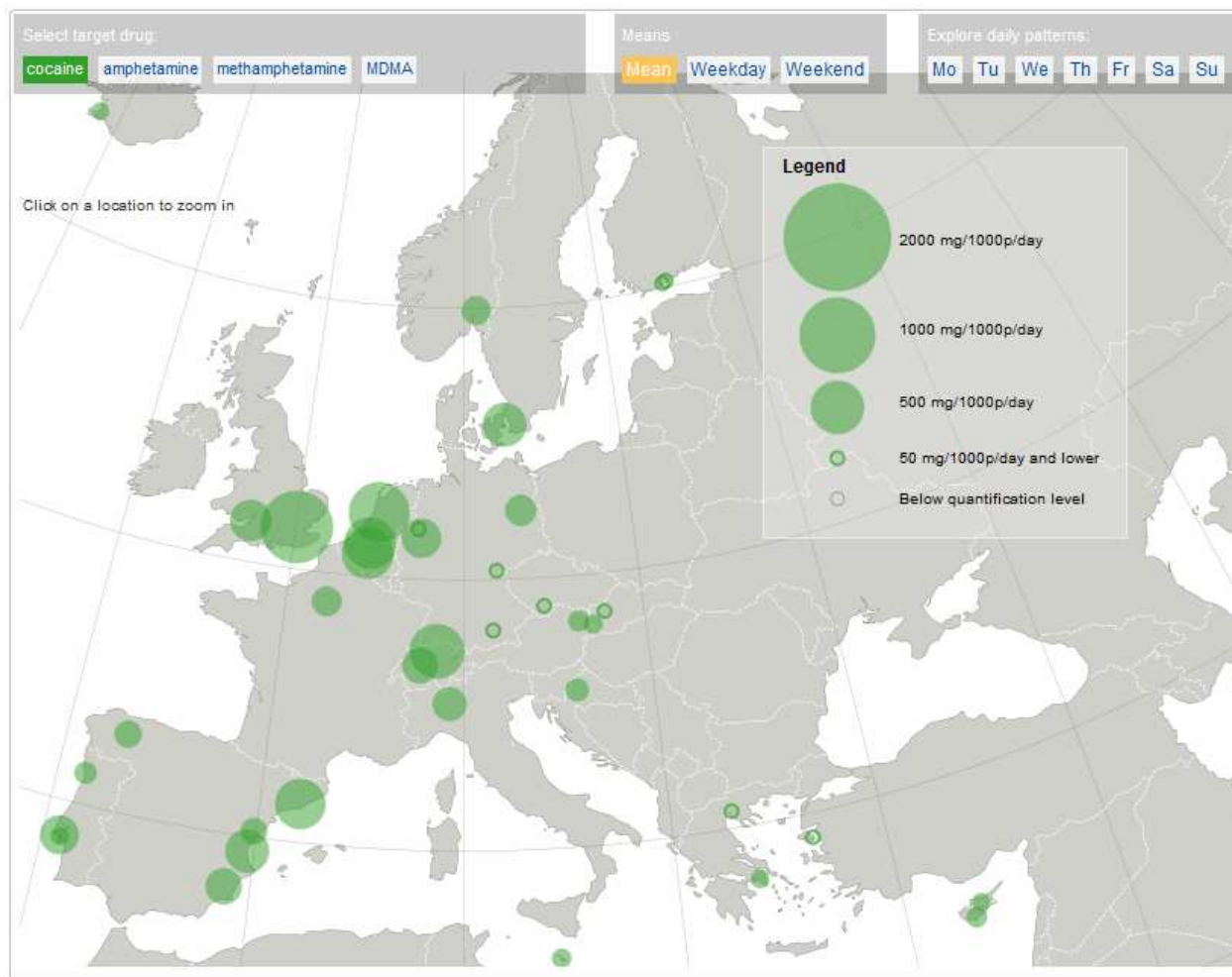
Country	Site	Population	Checked
Austria	Klosterneuburg	30000	<input checked="" type="checkbox"/>
Belgium	Antwerp D.	213876	<input checked="" type="checkbox"/>
Belgium	Antwerp Z.	130218	<input checked="" type="checkbox"/>
Belgium	Brussels	953987	<input checked="" type="checkbox"/>
Belgium	Geraardsbergen	29047	<input checked="" type="checkbox"/>
Belgium	Koksijde	78441	<input checked="" type="checkbox"/>
Belgium	Ninove	36179	<input checked="" type="checkbox"/>
Belgium	Oostende	159000	<input checked="" type="checkbox"/>
Bosnia and Herzegovina	Sarajevo	130000	<input checked="" type="checkbox"/>
Croatia	Zagreb	650000	<input checked="" type="checkbox"/>
Cyprus	Nicosia	28000	<input checked="" type="checkbox"/>
Cyprus	Limassol	272000	<input checked="" type="checkbox"/>
Czech Republic	Budweis	110300	<input checked="" type="checkbox"/>
Czech Republic	Prague	1300000	<input checked="" type="checkbox"/>
Denmark	Copenhagen	531000	<input checked="" type="checkbox"/>
Finland	Helsinki	78000	<input checked="" type="checkbox"/>
Finland	Turku	275000	<input checked="" type="checkbox"/>
Finland	Espoo	300000	<input checked="" type="checkbox"/>
Finland	Joensuu	75000	<input checked="" type="checkbox"/>
Finland	Jyväskylä	135000	<input checked="" type="checkbox"/>
Finland	Kotka	72500	<input checked="" type="checkbox"/>



An overview of key results – geographical variation

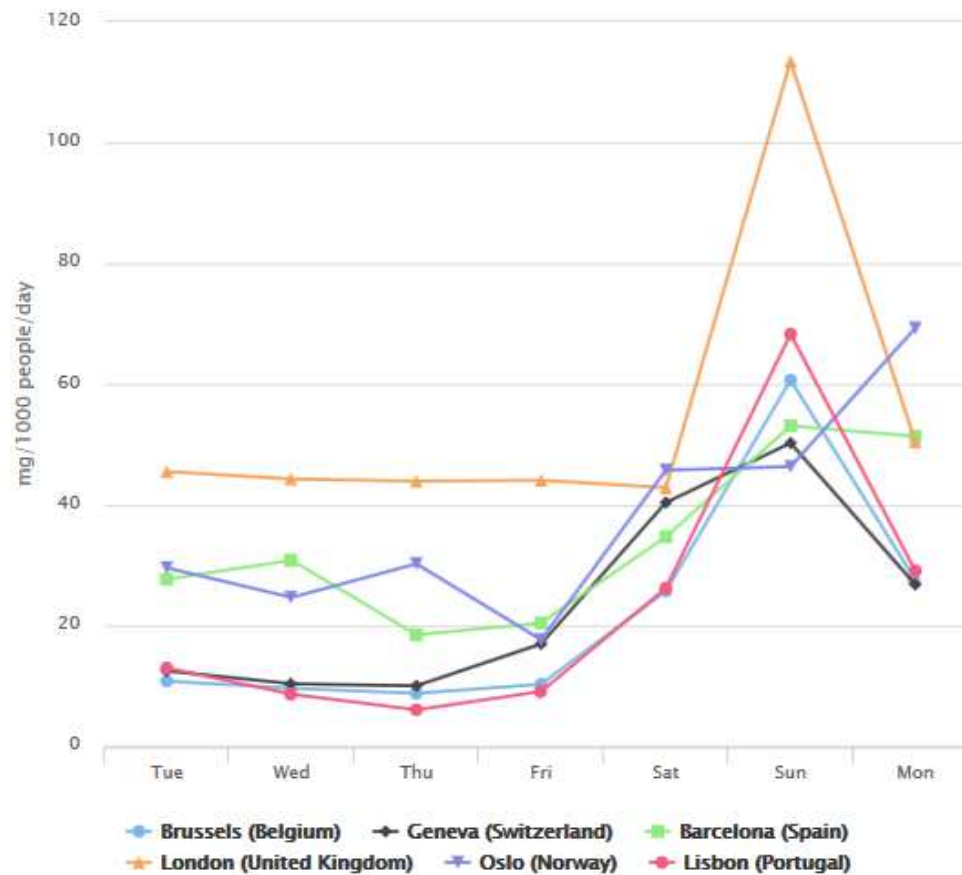
Select a year:

2011 2012 2013 2014 2015



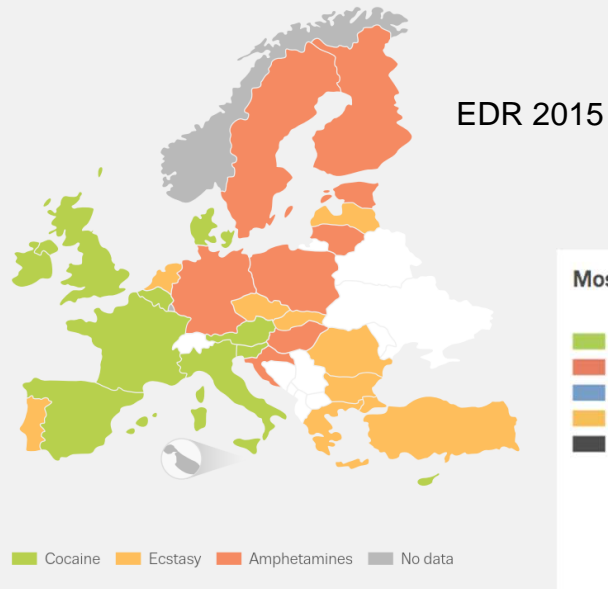
An overview of key results – temporal variation

Ecstasy (MDMA): daily trends, 2015



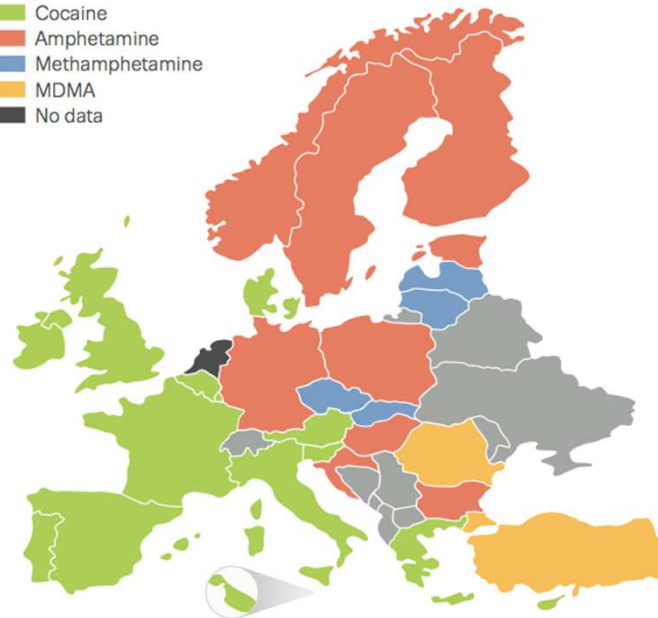
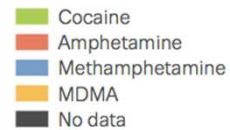
Comparison with other monitoring tools?

Predominant stimulant drug by last year prevalence among young adults (15–34)



EDR 2016:

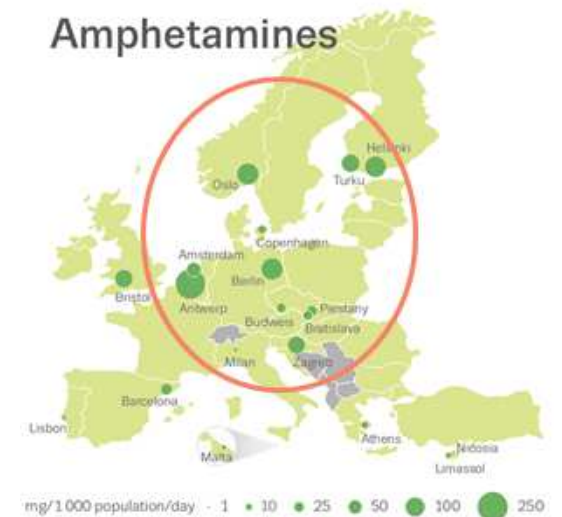
Most frequent stimulant seized in Europe, 2014 or most recent data



Cocaine

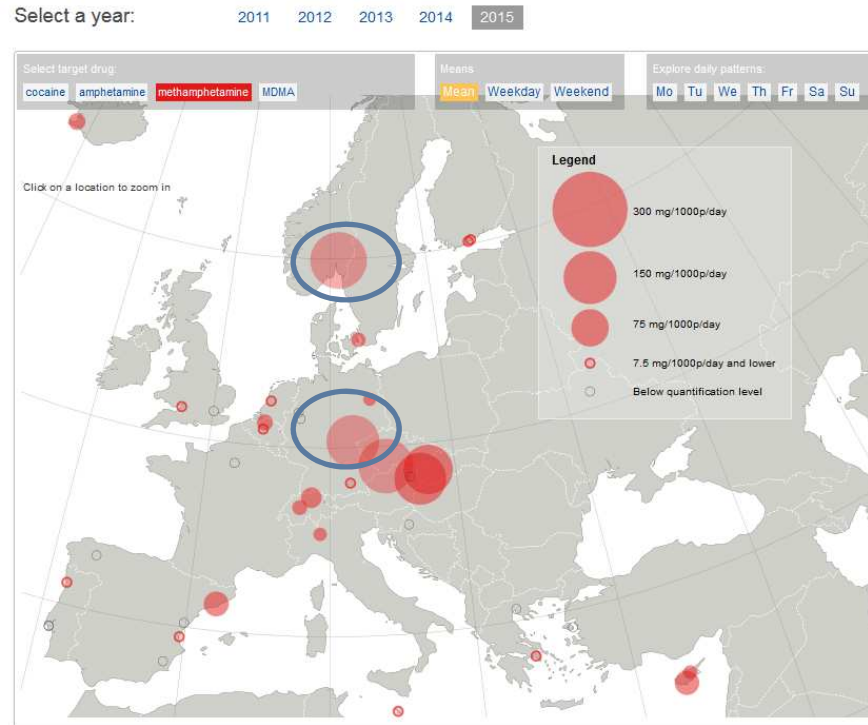


Amphetamines

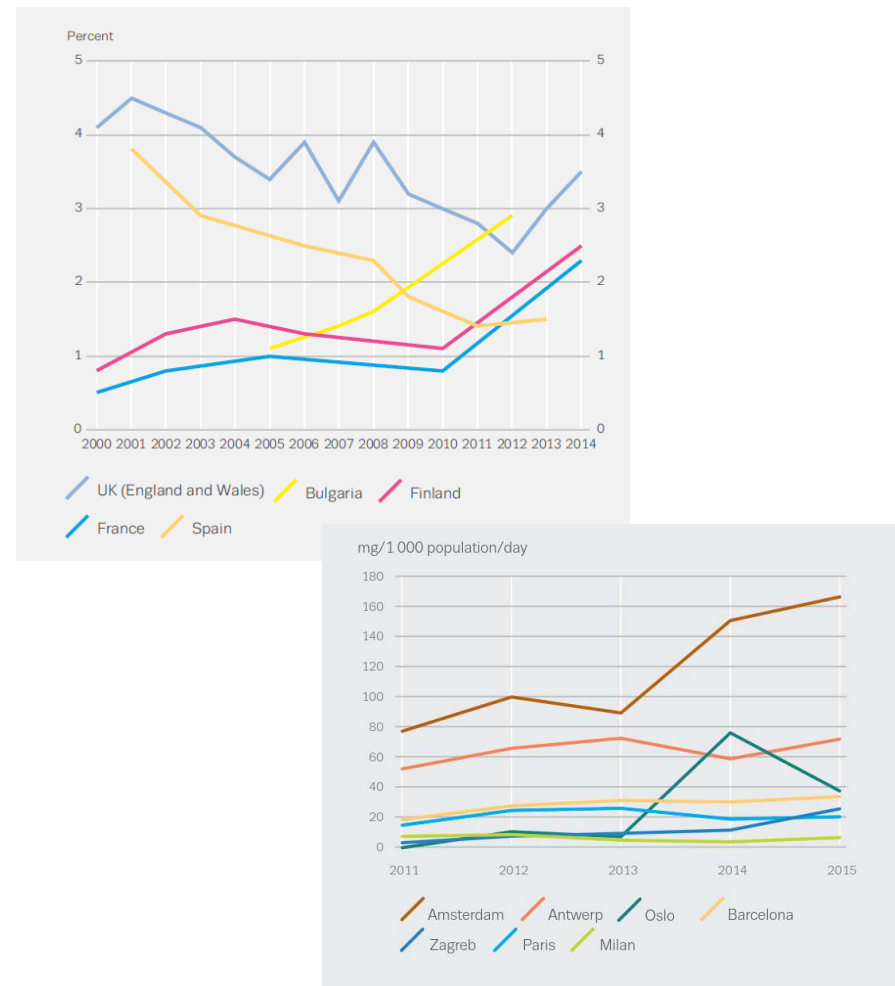


Comparison with other monitoring tools?

Methamphetamine changes



MDMA changes



Where do we go next?

- **WBE as a new tool in the epidemiological toolkit – integration in EDR and Statistical Bulletin**
- **Further comparisons are needed between wastewater and other data sets**
- WBE can provide information on illicit drugs, tobacco, misuse of medicines, health and illness indicators
- WBE as an outcome measurement tool?
- Total consumption estimates?



Find out more?

Wastewater analysis and drugs — a European multi-city study

[Intro](#) [1. Analysis](#) [2. Interactive](#) [3. Terms and definitions](#) [4. Methods and ethics](#) [Find out more](#)

Introduction

Last update: 31.05.2016

The findings of the largest European project to date in the emerging science of wastewater analysis are taken up in this 'Perspective on drugs'. The project in question analysed wastewater in over 60 European cities and towns (hereinafter referred to as 'cities') to explore the drug-taking habits of those who live in them. The results provide a valuable snapshot of the drug flow through the cities involved, revealing marked geographical variations*.

Part of the Perspectives on drugs (PODs) series, launched as part of the European Drug Report package, these designed-for-the-web interactive analyses provide deeper insights into a selection of important issues.

 [Download PDF version](#)

*In total, 67 cities in 27 countries worldwide participated in the 2015 SCORE wastewater monitoring campaign. For the purpose of this analysis data was analysed from 44 cities in 18 countries (EU and Norway). Additional data from other countries and cities can be found in the POD interactive element.

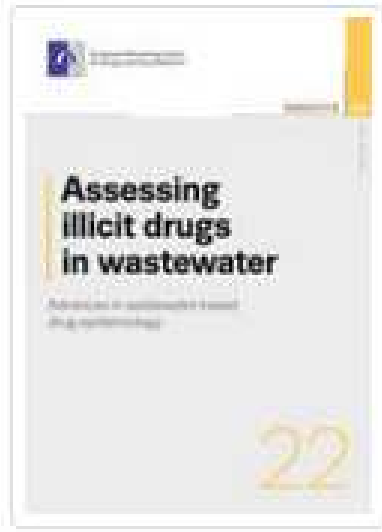


1. Analysis: results from a European multi-city study

2. Interactive: explore the data from the study

3. Terms and definitions

4. Understanding the wastewater method, and addressing ethical issues



Was

Activities in the area of wastewater analysis



Analysing communal wastewaters for drugs and their metabolic products in order to estimate their consumption in the community is a developing field, involving scientists working in different research areas, including analytical chemistry, physiology and biochemistry, sewage engineering, spatial epidemiology and statistics, and conventional drug epidemiology.

[News](#) [Data](#) [Meetings](#) [Key documents](#)

Key documents and related project studies

- Related projects
- SEWPROF Initial Training Network
 - Sewage Analysis CORE group Europe (SCORE)

- Guidelines
- Score-consensus protocol for sampling, analysis and report (October 2013)

- Key scientific articles
- Rodríguez-Álvarez, T., Racamonde, I., González-Mariño, I., Borsotti, A., Rodil, R., Rodríguez, I., Zuccato, E., Benito Qu J., Castiglioni, S., (2015), 'Alcohol and cocaine co-consumption in two European cities assessed by wastewater analysis', *Sci the Total Environment*, 536, pp. 91-98.
 - Mastroianni, N., Lopez de Alda, M., Barcelo, D., (2015), 'Comprehensive monitoring of the occurrence of 22 drugs of and transformation products in airborne particulate matter in city of Barcelona', *Science of the Total Environment*, 532, pp.344-352.
 - Been, F., Benaglia, L., Lucia, S., Gervasoni, J-P., Esseiva, Delémont, O., (2015), 'Data triangulation in the context of monitoring via wastewater analyses', *Drug and Alcohol Dependence*, 151, pp.203-210.





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Thank you!

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