Wastewater analysis and its potential for monitoring illicit drugs, in combination with other drug monitoring approaches

Tibor Brunt

Trimbos-institute, research associate program Drug Monitoring
The Trimbos Institute

National institute for knowledge on mental health and addiction care.

Program **Drug Monitoring**: focuses on the national prevalence figures of drug use and drug-related problems. Intended to provide reliable figures to aid Dutch policy. And provide Dutch figures to the EMCDDA through its Focal Point function.
Cannabis

Vanaf het begin van 2000 werd de cannabisconsumptie in Nederland in toenemende mate een thema. Tegenwoordig wordt cannabis als eenalthervoorkeurig middel genoemd. Er wordt al lang gebezigd over de negatieve gevolgen van cannabisgebruik. Maar de ernst van deze problemen is nog niet goed onderzocht.

Gebruik in Nederland

Cannabisconsumptie is hoog in Nederland. De meeste consumenten zijn ouder dan 15 jaar en de meeste consumenten gebruiken cannabis in hun eigen huis. De meeste consumenten gebruiken cannabis om te ontspannen.

Gesproken incidenten na dronk gebruik

Gebruikers van cannabis worden vaak getroffen door gesproken incidenten na het gebruik van cannabis. Deze incidenten kunnen leiden tot ongevallen en slechts van verre vooruitziende gezondheidsproblemen.

Zicht op de trends

In Nederland is er een tendens naar een toename van cannabisgebruik. Dit wordt geadviseerd om de gekonstiteerde problemen beter te begrijpen en te bestrijden.

Netwerk als schakel in preventie en schoolbelangrijk

Het netwerk is een belangrijke schakel in de preventie en schoolbelangrijk. Het netwerk biedt een plek waar gezondheidszorg en schoolbelangrijk samenkomen.

Monitoring drugsincidenten

Monitoring drugsincidenten is een belangrijke taak voor de gezondheidszorg. Het monitor de verschillende trends in drugsgebruik en kan hiervan gebruik maken om preventie en bestrijding te ontwikkelen.
Drug Monitoring

Ways of estimating drug use at present:

- General population surveys
- Surveys among specific populations of drug users, at party's etc.
Drug Monitoring

Other information sources of drug use:

• Registration systems at emergency care units of hospitals
• Registration systems at institutes for addiction care
• Test facilities, such as the drugs information and monitoring system (DIMS)
• National forensic institute, mainly seizures of drugs done by the police
Drug Monitoring

Major limitations of current ways of estimating drug use:

- No **timely** reports: many population surveys are done once every 4 years or so

- Population surveys are costly and time-consuming

- Uncertainty about the reliability of results, drugs with low/ specific prevalence are missed
Major limitations of current ways of estimating drug use:

- International validation and comparison of surveys is difficult, because of different methodologies

- Information is not quantitative, exact figures are mostly guestimated (e.g. extrapolations)
Drug Monitoring

Wastewater analysis in sewage systems
Wastewater analysis

Countries were illicit drugs are or have been already monitored in wastewater.
Wastewater analysis

Main advantages:

• Objectivity of the method

• Validity of the method (international)

• High accuracy

• Rapid temporal and spatial data-collection

• Random sampling on population level
Wastewater analysis

Main advantages:

• Relatively cost-effective and time-effective

• Near to complete reach through the (closed) national sewer systems

• Estimation of the bulk drug load used per country/region

• Difference between import and export of drugs could be possible
Wastewater analysis

Main advantages:

• In theory it is possible to directly measure the effectiveness of a drug intervention campaign, by monitoring drug use preceding, during and following an intervention
Wastewater analysis

Major pitfalls:

• Loss of sewage volume due to leakages, etc. leads to incorrect estimation

• Population fluctuations in time as result of migration or commuting

• Biotransformation of the drug metabolites occurring in the sewage systems
Wastewater analysis

Current limitations:

• Back-calculating results to population level. Assumptions were used, correct or incorrect. Exact calculation per unit of population is difficult! Load of drugs per head of population seems to be the best attainable outcome measure.

• Any information about the drug users themselves is missed*

• No details concerning individual drug use patterns (e.g. route of administration, dose or frequency)*

*only available from qualitative and population surveys
Wastewater analysis compared to the current monitoring methodology
Wastewater analysis

Text summation:

Added values!

- Replicability
- Validity
- Rapid analysis and reporting
- Objectivity
- Temporal and spatial drug use data
- Low variability
- Seasonability
- Near complete population sample
- Assessing bulk use of population
- Measuring effectiveness intervention
Conclusions:

• It is NOT a substitute for every part of the traditional survey methodology for estimating drug use, but complement it to answer some of the major questions

• It may therefore offer a considerable downsize of the exhaustive work put into surveys
Wastewater analysis

Conclusions:

• Considerably more pros and new added values can be envisaged by utilizing this technique than cons

• Main pros: rapidness of results, timely reports, trend-analyses of spatial and temporal use patterns, objectivity, validity and high level of international comparison (EMCDDA)
Wastewater analysis

Recommendation for future propositions:

• Combining the wastewater method with a downsized population survey (among the whole range of regular drug users) may provide most answers relevant for drug monitoring:
  - How much used per region/country;
  - How much used per person during;
  - How much used per time (weekday and weekend);
  - What was the bulk used compared to estimated import/production;
  - What is intervention effectiveness;
  - International comparison stats