Temporal monitoring of stimulants during the first COVID-19 wave in Belgium from a wastewater-based epidemiologic perspective.

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Background and aims

- SARS-CoV-2 countermeasures could potentially **limit consumption or access to stimulants**
- In this study, wastewater-based epidemiology (WBE) was used to **temporally estimate stimulant consumption** during the first wave of the COVID-19 pandemic (Mar – Jun 2020)
- The aims were to (i) **evaluate intra- and inter-year** changes in consumption of stimulant use; and (ii) measure the **effect of governmental restrictions** on stimulant use during the first wave of the COVID-19 pandemic

Wastewater-based epidemiology

- **Influent wastewater** contains a wealth of information about the population attached to a wastewater treatment plant (WWTP)

- After exposure to xenobiotics, **metabolic excretion products** (biomarkers) are released, transported, and pooled in the **sewer system**
- Daily, 24-h composite, influent wastewater samples are analysed for these biomarkers, and measured concentrations are back-calculated to **population-normalised mass loads** (PNML) by considering the total volume of wastewater and population covered by the WWTP:

$$PNML = \frac{[concentration\ sample] * [total\ wastewater\ volume]}{[population\ covered\ by\ WWTP]}$$

Governmental measures

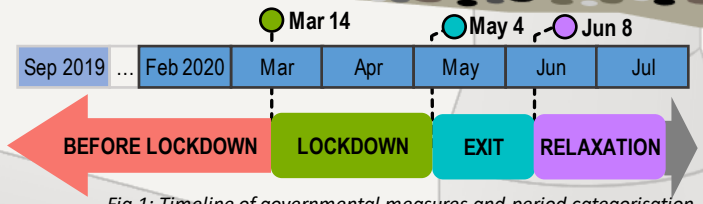

Fig 1: Timeline of governmental measures and period categorisation.

- **Lockdown**: closing of all non-essential activities, stay-at-home measures
- **Exit**: allowed to see 2 people outside of household
- **Relaxation**: reopening catering industry, allowed to see 10 people outside of household

Materials and methods

- **4** WWTP sampled = **4** cities
- **12%** of Belgian population
- **341** composite 24-h influent samples analysed

Sampled period

- Sep **2019**
- Mar – Jun **2020**

Wastewater analysed (LC-MS/MS) for

- Amphetamine
- Benzoylecgonine (*metabolite of cocaine*)
- MDMA
- Methamphetamine (*negligible consumption*)

Statistical analysis

- **Multiple linear regression model** was fitted for PNML of each stimulant, simplified in a stepwise backward way

Results

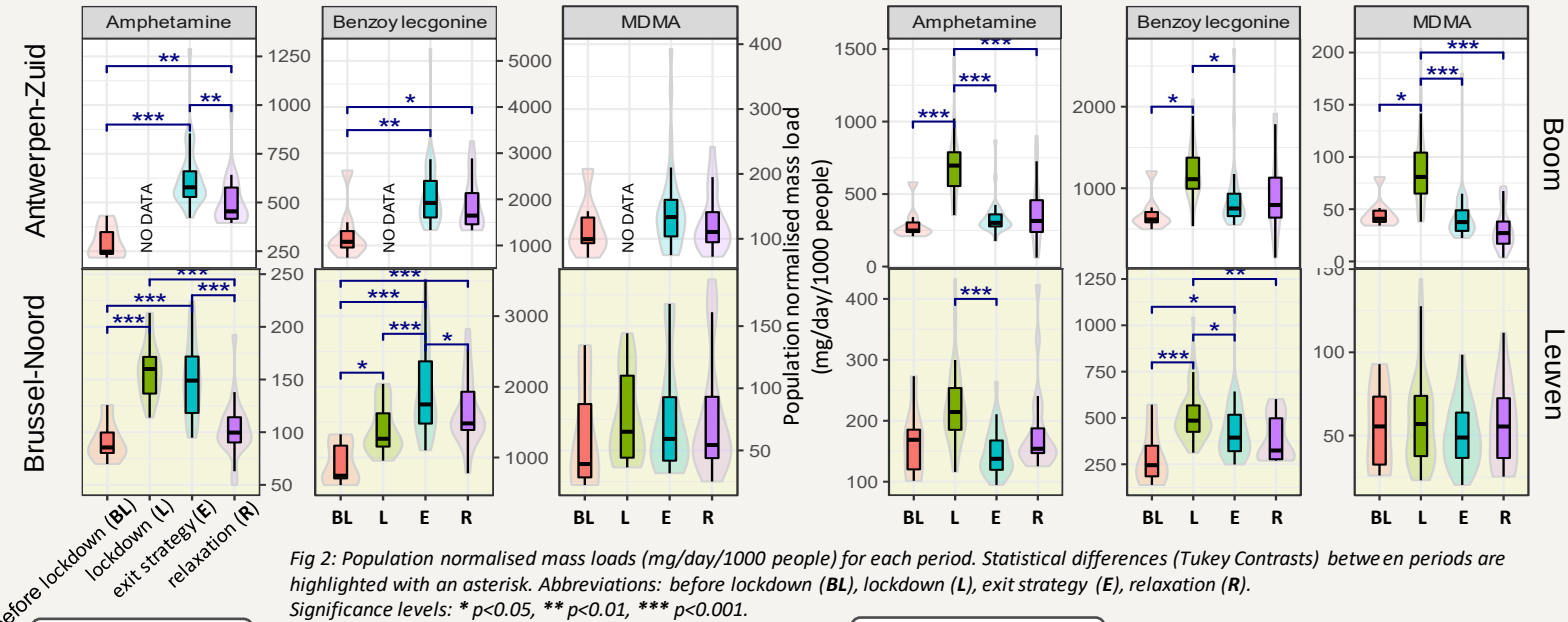

*Fig 2: Population normalised mass loads (mg/day/1000 people) for each period. Statistical differences (Tukey Contrasts) between periods are highlighted with an asterisk. Abbreviations: before lockdown (**BL**), lockdown (**L**), exit strategy (**E**), relaxation (**R**). Significance levels: * p<0.05, ** p<0.01, *** p<0.001.*

Discussion

- Limited impact of **governmental restrictions** on stimulant consumption during first wave
- People continue to use stimulants during home confinement
- **Stable or increased consumption** compared to 2019
- Findings not fully in agreement with survey reports, surveyed in population of known drug users, from Sciensano and EMCDDA

Conclusions

- WBE is a **complementary data source** on stimulant use
- It can be used to evaluate the **impact of COVID-19 measures** on stimulant consumption
- **Triangulation** between different information sources on stimulant use is needed, as inconsistencies were found

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