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Fentanyl concentration in drug checking samples and risk of drug-related mortality during an illicit drug toxicity crisis in Vancouver, Canada: A time series analysis

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Disclosure of interest

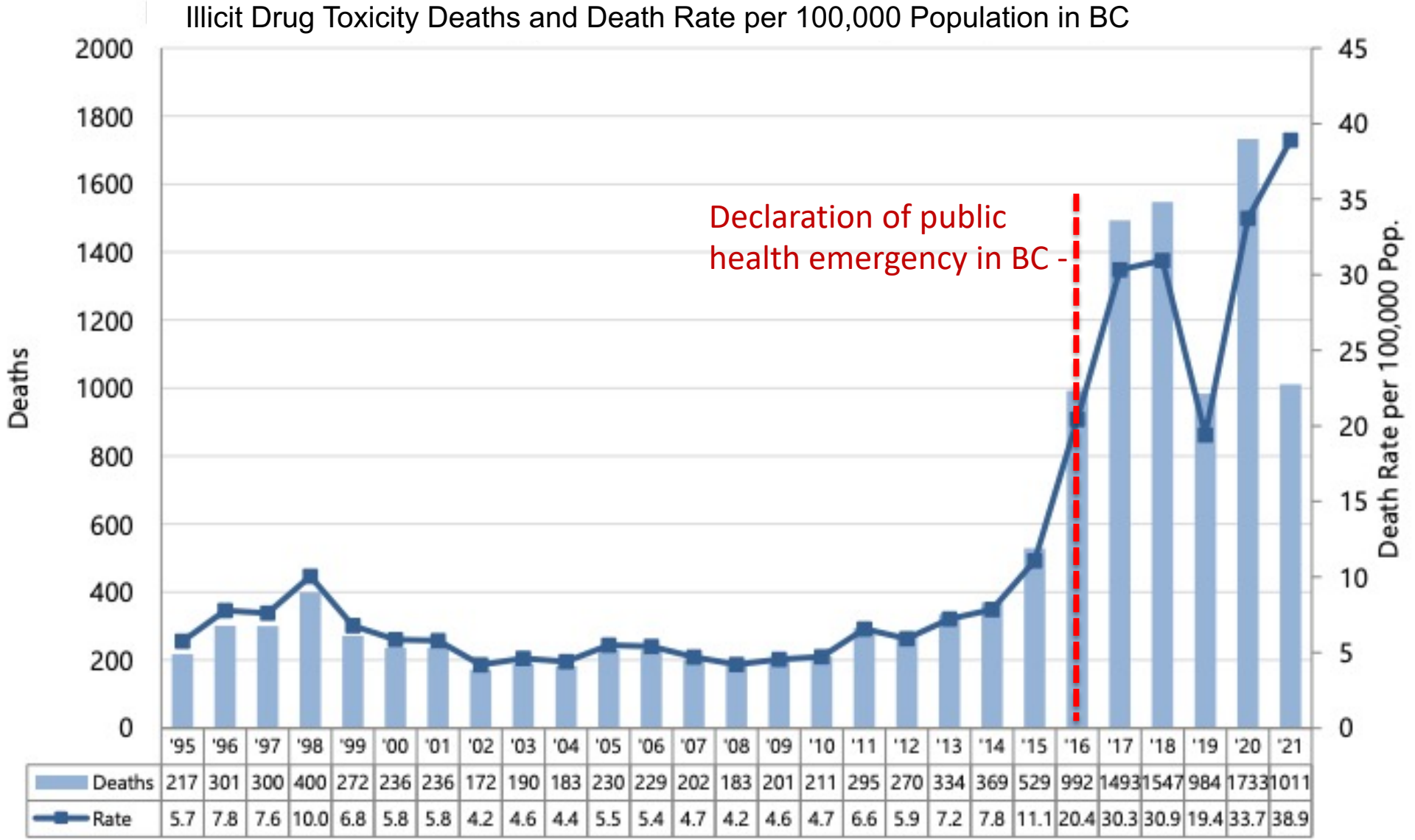
- No conflicts to declare

Background

- 93,000+ drug overdose deaths in the United States in 2020.[1]
  - 29% increase from 2019.[1]
  - 75% involved an opioid (n = ~70,000 deaths).[1]
- 6200+ apparent opioid toxicity deaths in Canada in 2020.[2]
  - 62% increase from 2019.[2]
  - 82% involved non-pharmaceutical fentanyl (n = ~5000 deaths).[2]

[1]National Center for Health Statistics., 2021. Provincial Drug Overdose Death Counts. Centers for Disease Control.
[2] Health Canada, 2021. Opioid and stimulant-related harms in Canada.

Background



	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21
Deaths	217	301	300	400	272	236	236	172	190	183	230	229	202	183	201	211	295	270	334	369	529	992	1493	1547	984	1733	1011
Rate	5.7	7.8	7.6	10.0	6.8	5.8	5.8	4.2	4.6	4.4	5.5	5.4	4.7	4.2	4.6	4.7	6.6	5.9	7.2	7.8	11.1	20.4	30.3	30.9	19.4	33.7	38.9

Source: BC Coroners Service, 2021. Illicit drug toxicity deaths in BC.

Background

- Expansion of drug checking services as a harm reduction strategy to address the illicit drug toxicity crisis.
- Emerging evidence to suggest may be effective in changing drug use behaviours.[1]
- Studies have also explored using drug checking data to monitor regional and temporal trends in unregulated drug markets, including concentration of fentanyl.[2]
- Little known about the potential utility of drug checking as a mechanism for monitoring population-level risk of overdose stemming from time-varying fentanyl adulteration of unregulated drug supplies.

[1]Karamouzian et al., 2018. Evaluation of a fentanyl drug checking service for clients of a supervised injection facility. *Hard Reduction J.*
[2]Tobias et al., 2019. Time series analysis of fentanyl concentration in the unregulated opioid drug supply in a Canadian setting. *Amer J of Epidemiology.*

Objective

- To assess the relationship between temporal fluctuations in fentanyl concentration in point-of-care drug checking samples and the illicit drug-related mortality rate in Vancouver Canada.

Methods – Data sources

- **BC Coroners Service records**
  - All unintentional illicit drug toxicity deaths (accidental and undetermined) in British Columbia
    - Definition includes deaths involving: (1) street drugs; (2) medications not prescribed to the decedent; (3) combination of above with prescribed medications.
- **Point-of-care drug checking data in Vancouver**
  - BTNX fentanyl immunoassay strips
  - Fourier-transform infrared (FTIR) spectrometry
- **Study period:**
  - January 2019 to October 2020

Methods – Outcome

- **Monthly rate of illicit drug toxicity deaths per 100,000 population in Vancouver:**
  - Illicit drug toxicity deaths in the Vancouver Health Service Delivery Area[1]
  - Population (aged 15+) for the Vancouver Health Service Delivery Area in 2019 and 2020

Source: BC Coroners Service, 2021. Illicit drug toxicity deaths in BC.

Methods – Exposure measure

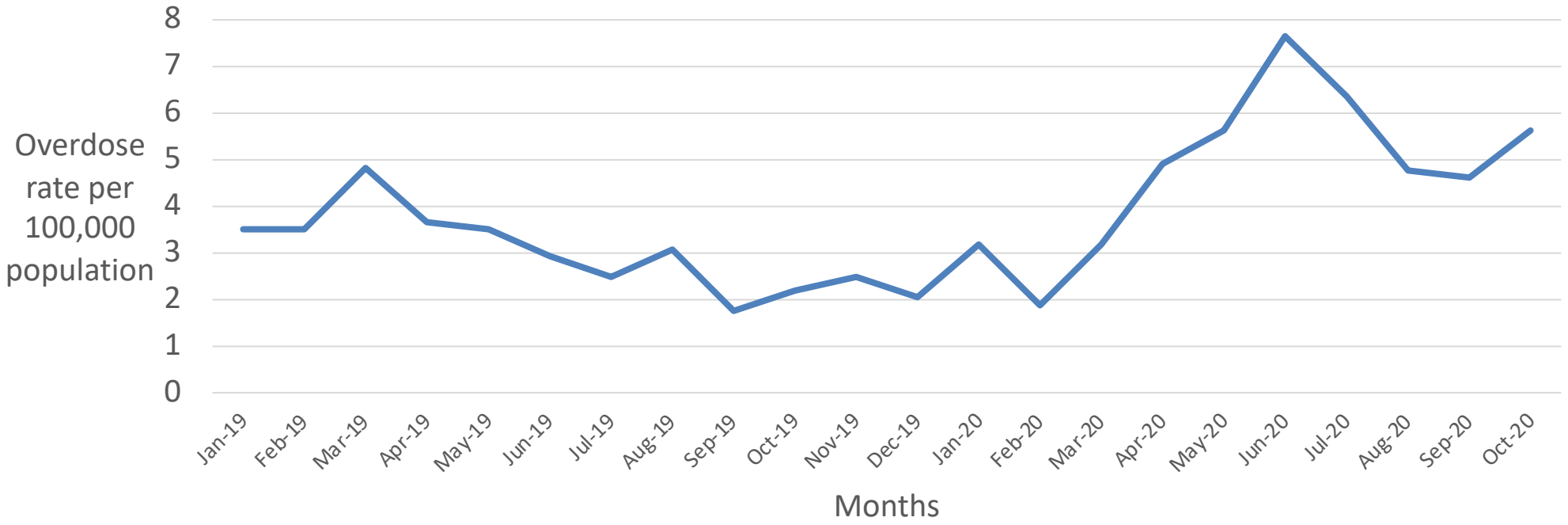
- **Monthly median % concentration in fentanyl-positive drug checking samples in Vancouver:**
  - Quantification model for fentanyl hydrochloride used to analyze Fourier-transform infrared spectra (FTIR) from fentanyl-positive opioid drug checking samples

Methods - Analysis

- Time series analysis using generalized additive modelling was used to examine the association between the monthly median fentanyl concentration in drug checking samples and the monthly illicit drug mortality rate in Vancouver, controlling for calendar month.

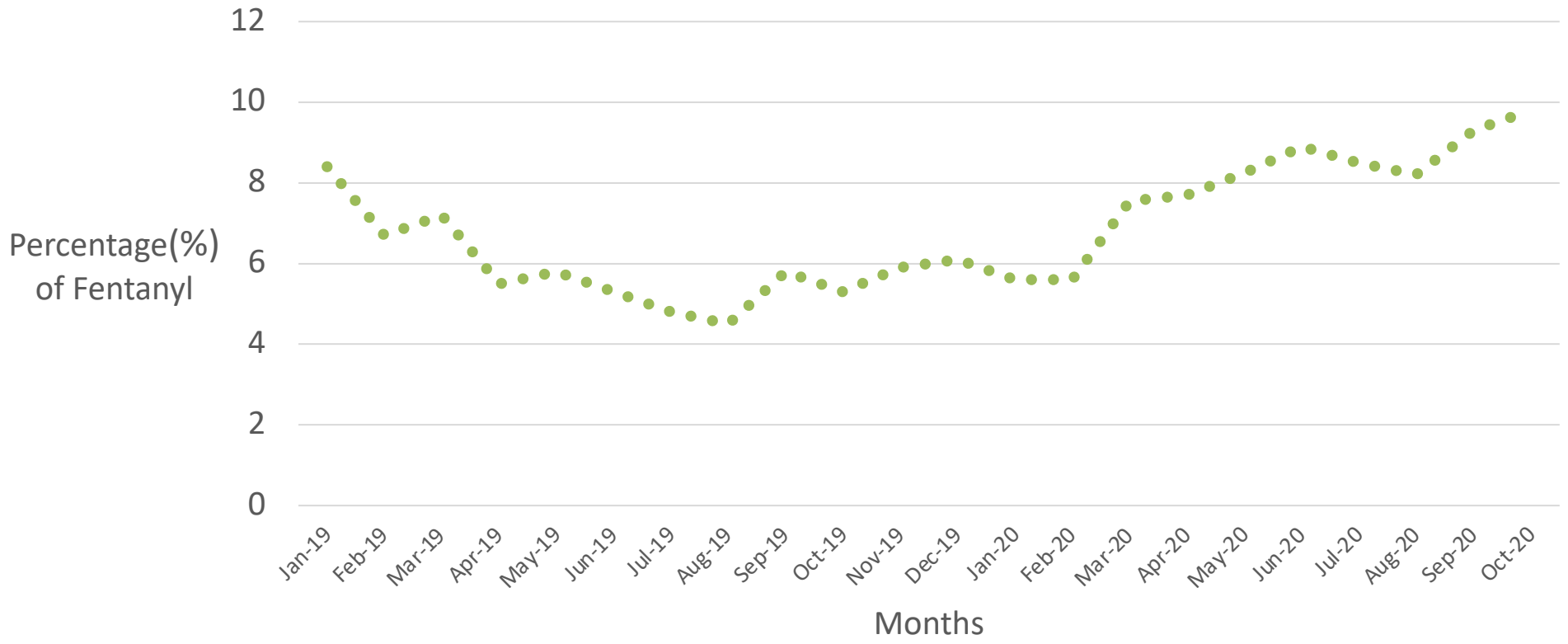
Results

- Between January 2019 and October 2020, there were a total of 577 illicit drug toxicity deaths in Vancouver.
  - Observed monthly illicit drug toxicity death rate ranged from 1.8 to 7.7 per 100,000 population.

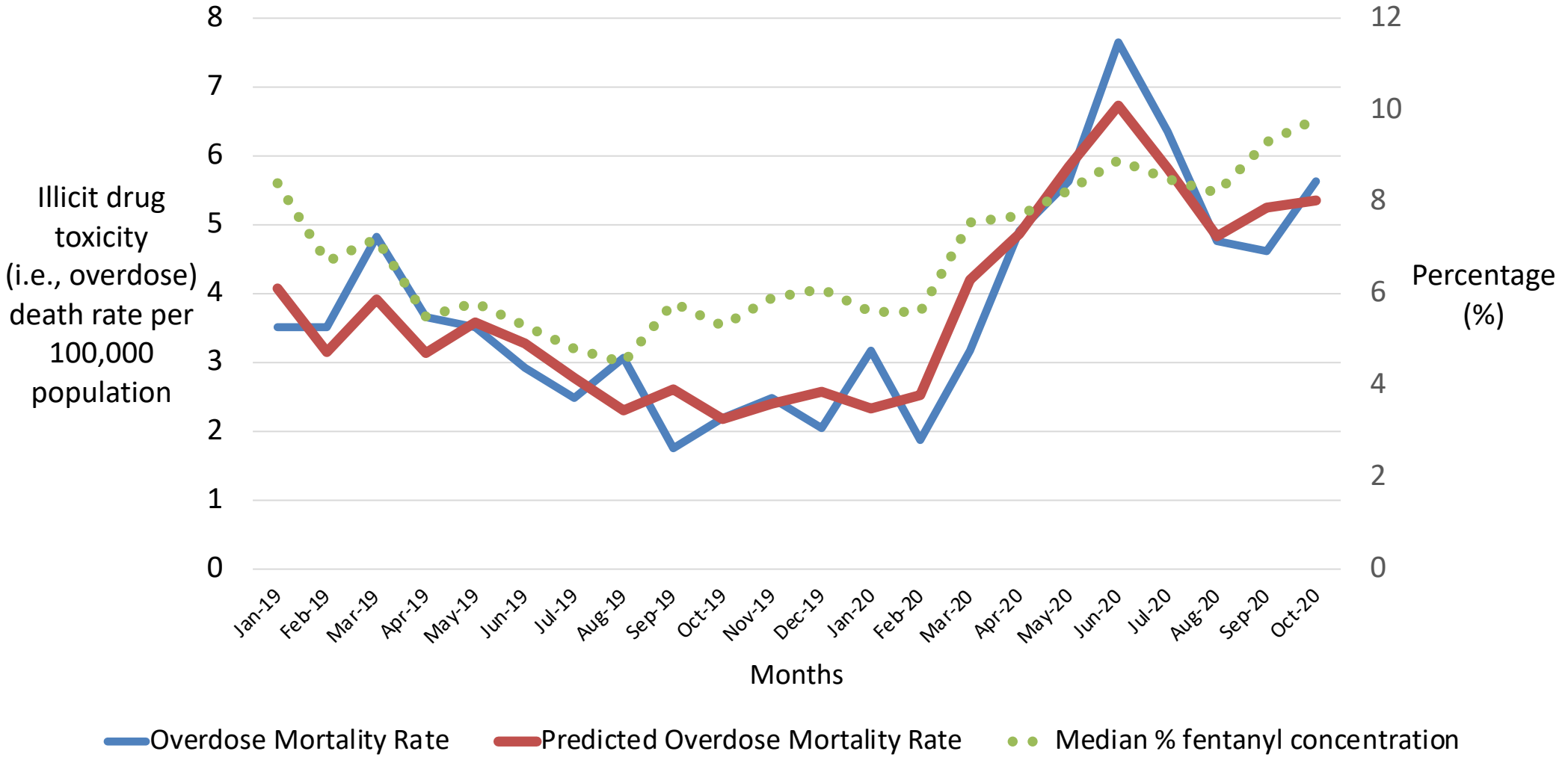


Results

- Of the 2433 fentanyl-positive samples, the monthly median fentanyl concentration ranged from 4.5 to 9.8%.



Results – Time series analysis using generalized additive modelling



Note: association between % fentanyl concentration and illicit drug toxicity death rate: $p<0.001$.

Discussion

- Strong evidence of positive association between fentanyl concentration in drug checking samples and illicit drug toxicity deaths.

- Point-of-care drug checking services may be useful for monitoring population-level risk of overdose in the context of the current fentanyl-driven illicit drug toxicity crisis.
  - Could inform surveillance, early warning, and public health response systems

Limitations

- Analysis restricted to Vancouver, which limits generalizability of findings
- Fentanyl concentration and illicit drug mortality measured at monthly level
- Unable to examine fentanyl-related deaths
- Analyses based on 22 months of data

Conclusions

- Illicit drug mortality rate increased with higher concentrations of fentanyl in drug checking samples

- Drug checking services = potential tool for monitoring and informing responses to the illicit drug toxicity crisis

Thank you

Questions?

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