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## LETTERS

## ROGUE ONLINE PHARMACY

## Success of rogue online pharmacies: sewage study of sildenafil in the Netherlands

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The internet continues to harbour thousands of rogue online pharmacies.<sup>1</sup> We investigated the success of their practice by measuring the sewage load of the erectile dysfunction drug sildenafil in three cities in the Netherlands.

We measured concentrations of sildenafil and two metabolites at the three main sewage treatment plants serving Amsterdam, Eindhoven, and Utrecht for seven consecutive days.<sup>2</sup> Total sewage load was back calculated to original sildenafil consumption.<sup>3</sup> For a conservative estimate, we assumed that there were no losses in sewage due to degradation.<sup>4</sup> We found no indication of dumping of unused drugs.

We estimated the consumption of legitimately dispensed sildenafil from the national dispensary database from 12 months before the study to three months after. We used the repetitive dispensing behaviour for each patient in the sampled area to estimate consumption during the seven days of sampling. About a quarter of the dispensed sildenafil was prescribed to treat pulmonary hypertension.

The figure<sup>↓</sup> shows that at least 60% of the sewage loads of sildenafil were not explained by legitimately prescribed sildenafil. The illicit fraction was similar for each city, despite major differences in tourism and commuting.

We conclude that the unexplained fraction of sildenafil in sewage is primarily illicit. If our results are representative of other communities, the consumption of illicit erectile dysfunction drugs might dwarf the consumption of the legitimately dispensed versions. The apparent success of rogue online pharmacies would be an important area of further inquiry.

Competing interest: None declared.

Pim de Voogt is also professor of environmental chemistry at the Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Amsterdam, Netherlands.

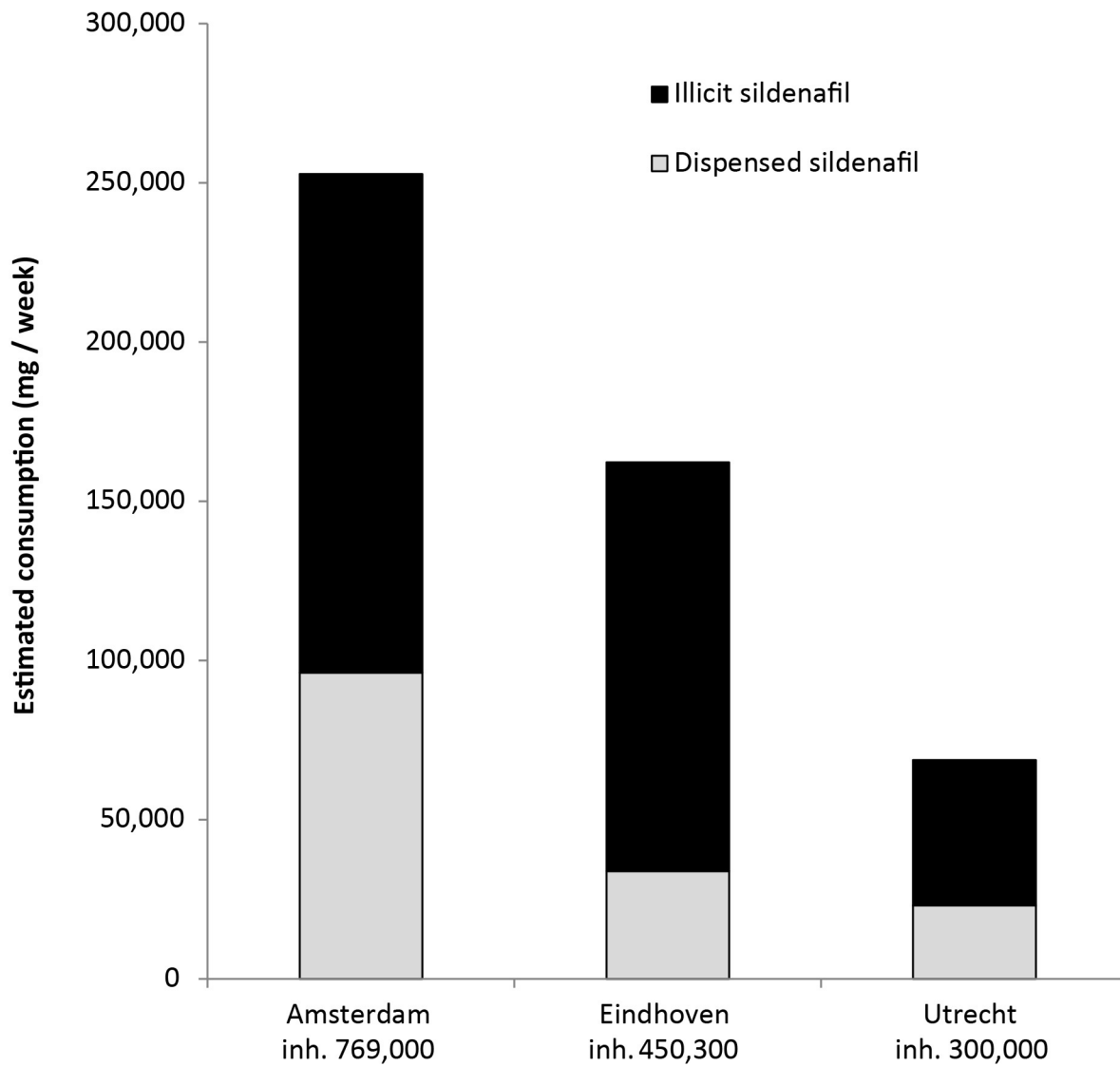
Full response at: [www.bmj.com/content/346/bmj.f4204](http://www.bmj.com/content/346/bmj.f4204).

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## Figures



Estimated sildenafil consumption in three cities in the Netherlands by type of prescription (illicit and dispensed)