

QUANTITATIVE ASSESSMENT OF PREVENTIVE BEHAVIORS IN FRANCE DURING THE FUKUSHIMA NUCLEAR CRISIS.

P. Crépey^{1,2}, M. Pivette^{1,3,4}, A. Bar-Hen³

¹Department of Epidemiology and Biostatistics, Ecole des Hautes Etudes en Santé Publique, Paris, France

²UMR 190, Aix-Marseille Univ - IRD - EHESP French School of Public Health, Paris, France

³MAP5, Université René Descartes-Paris5, Paris, France

⁴Celtipharm, Vannes, France

contact: pascal.crepey@ehesp.fr

BACKGROUND

The Fukushima nuclear disaster has generated a worldwide concern on the risk of exposure to nuclear radiations. In Europe, health authorities had to issue statements about the lack of utility of iodine based preventive treatments within their borders. However a lack of confidence in official messages has developed in various European countries due to recent perceived failures in managing public health crisis. Population lay preventive behaviors in this context are largely unknown.

OBJECTIVES

To analyze retrospectively lay preventive behaviors in France by studying sales of iodine-based products in the aftermath of the disaster.

METHODS

We focused our study on 58 iodine-based drugs available with and without a physician prescription. Our data come from a sample of 3004 pharmacies homogeneously distributed in metropolitan France. Our study period lasts from January 2010 to April 2012, with a focus on March-April 2011. We differentiate sales prescribed by physicians from sales obtained without a prescription.

We use a CUSUM method to detect abnormal increases in sales activity and cross-correlations to assess shifts in sales timing.

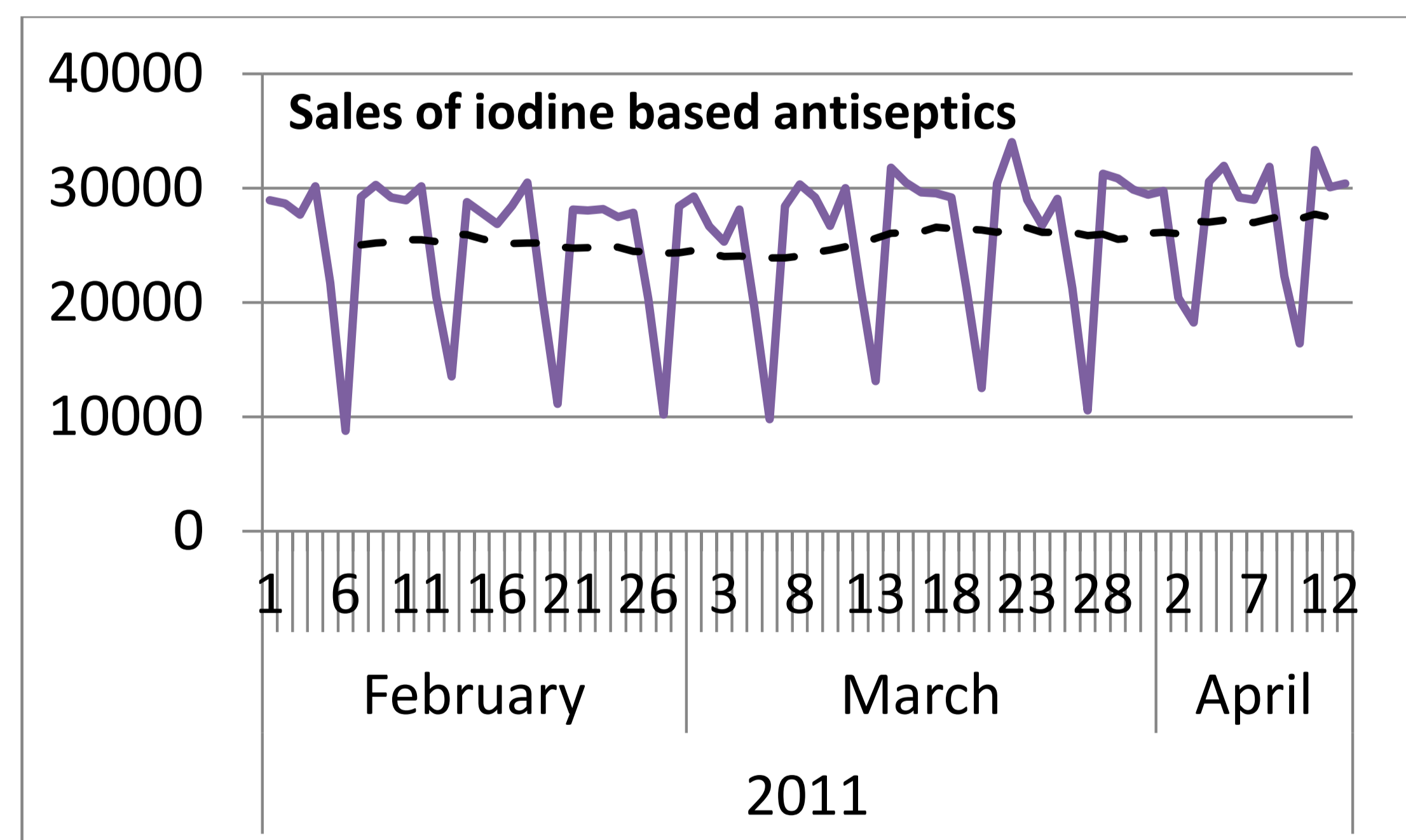
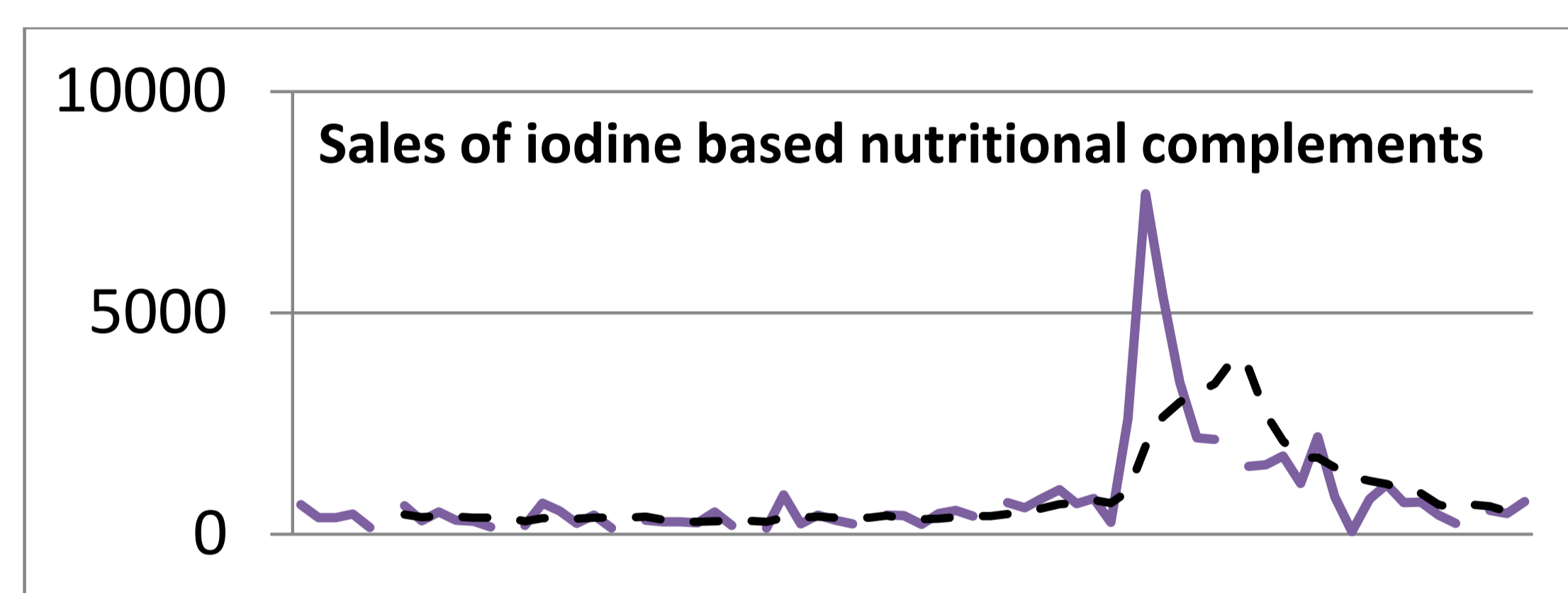
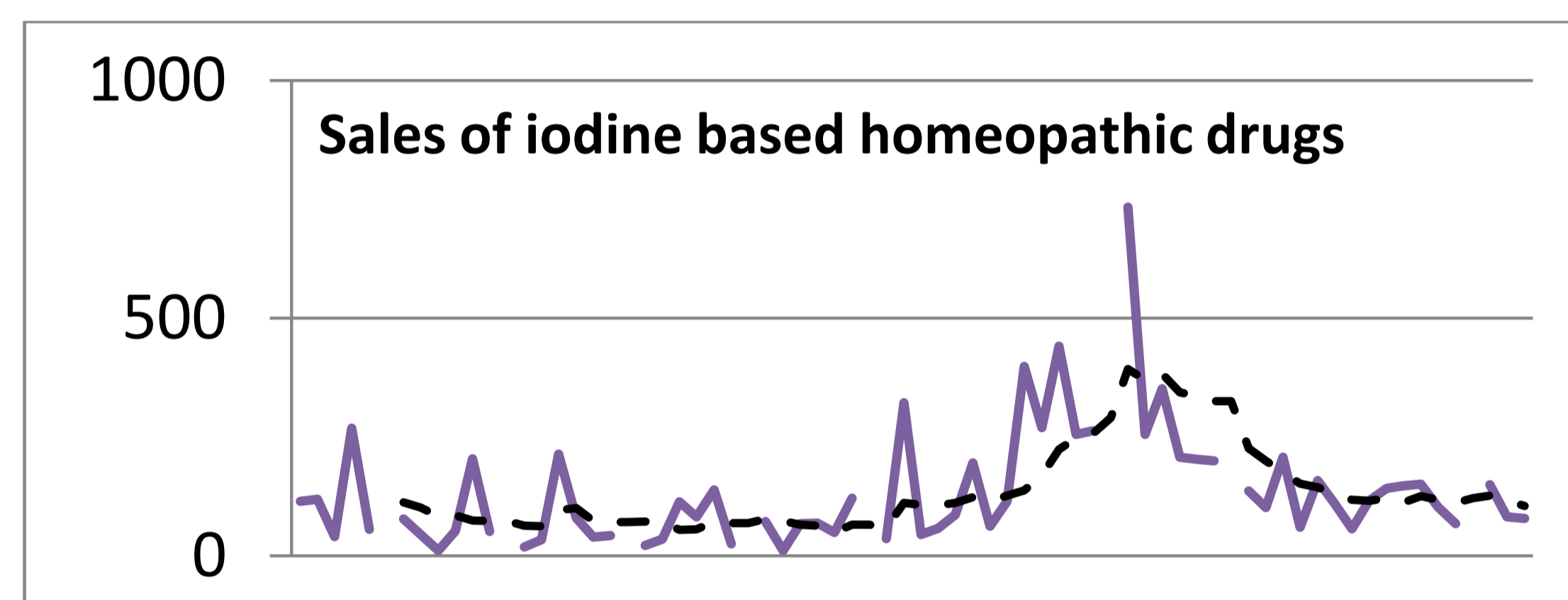
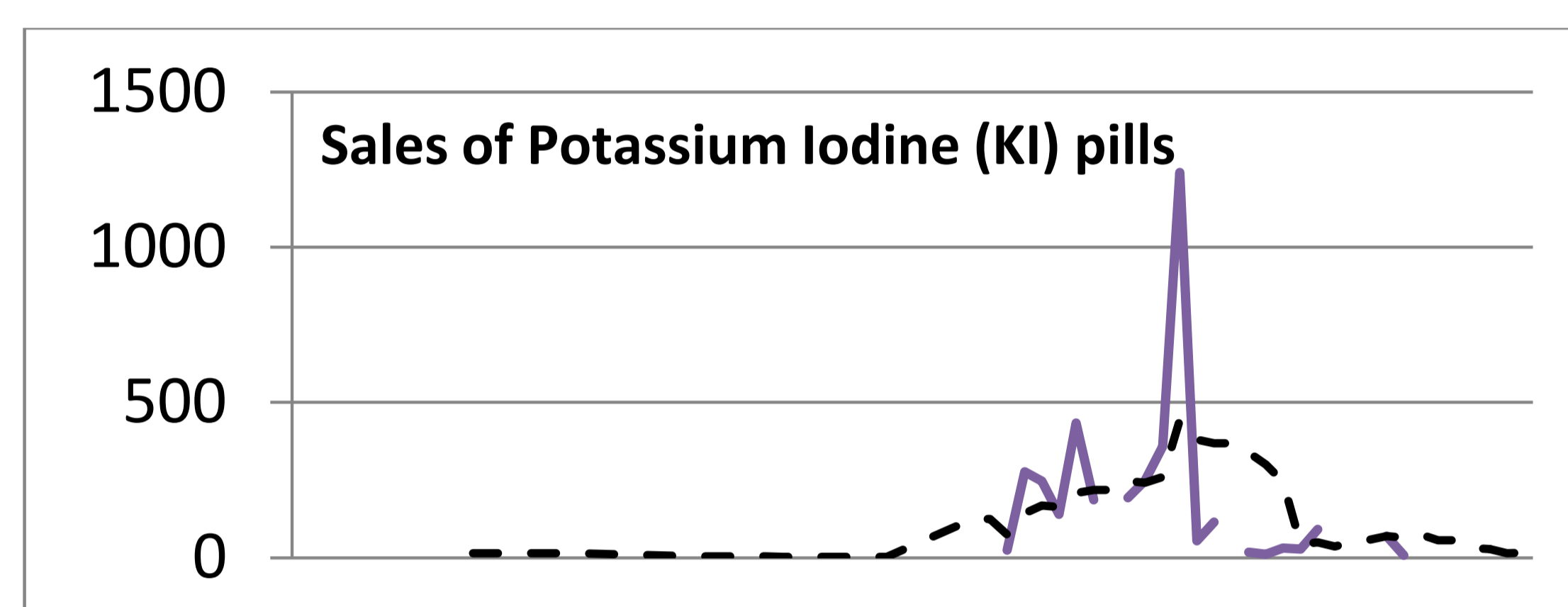


Figure 1: Sales of iodine based products (per units) in French pharmacies between February and April 2011. Dashed lines show the weekly sliding average. Peak sales can be noticed for KI pills, homeopathic remedies and nutritional complements.

Figure 3: Cross-correlograms of sales of iodine based nutritional complements (INC), homeopathic drugs (H), and Potassium Iodine (KI) pills with lags from -5 to +5 days on the period from March 1st 2011 to April 10th 2011.

a) Cross-correlations show that sales of INC preceded sales of H. by 1 day. b) Cross-correlations show that sales of INC preceded sales of KI by 3 days. c) Cross-correlations show that sales of H. preceded sales of KI by 2 days.

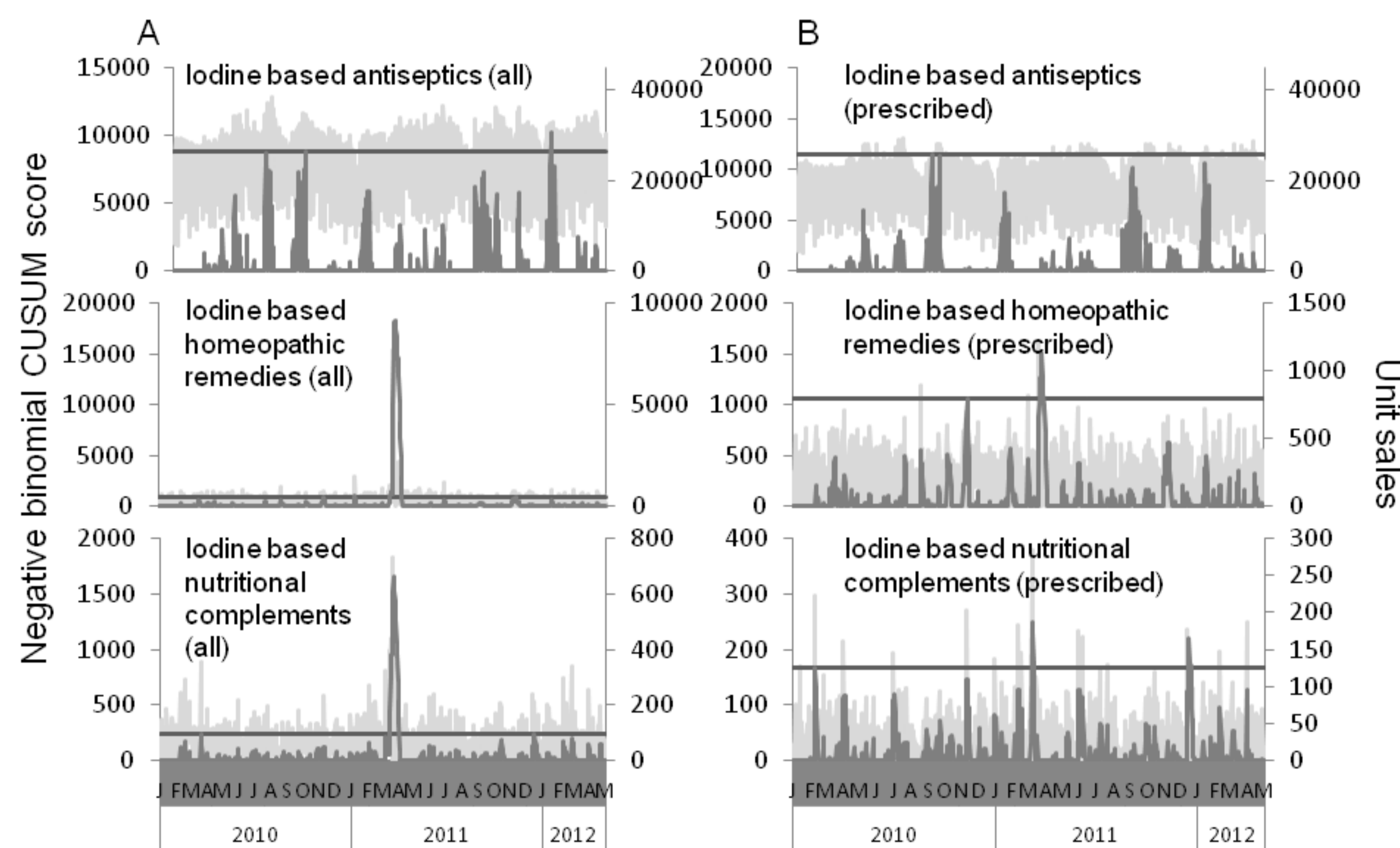
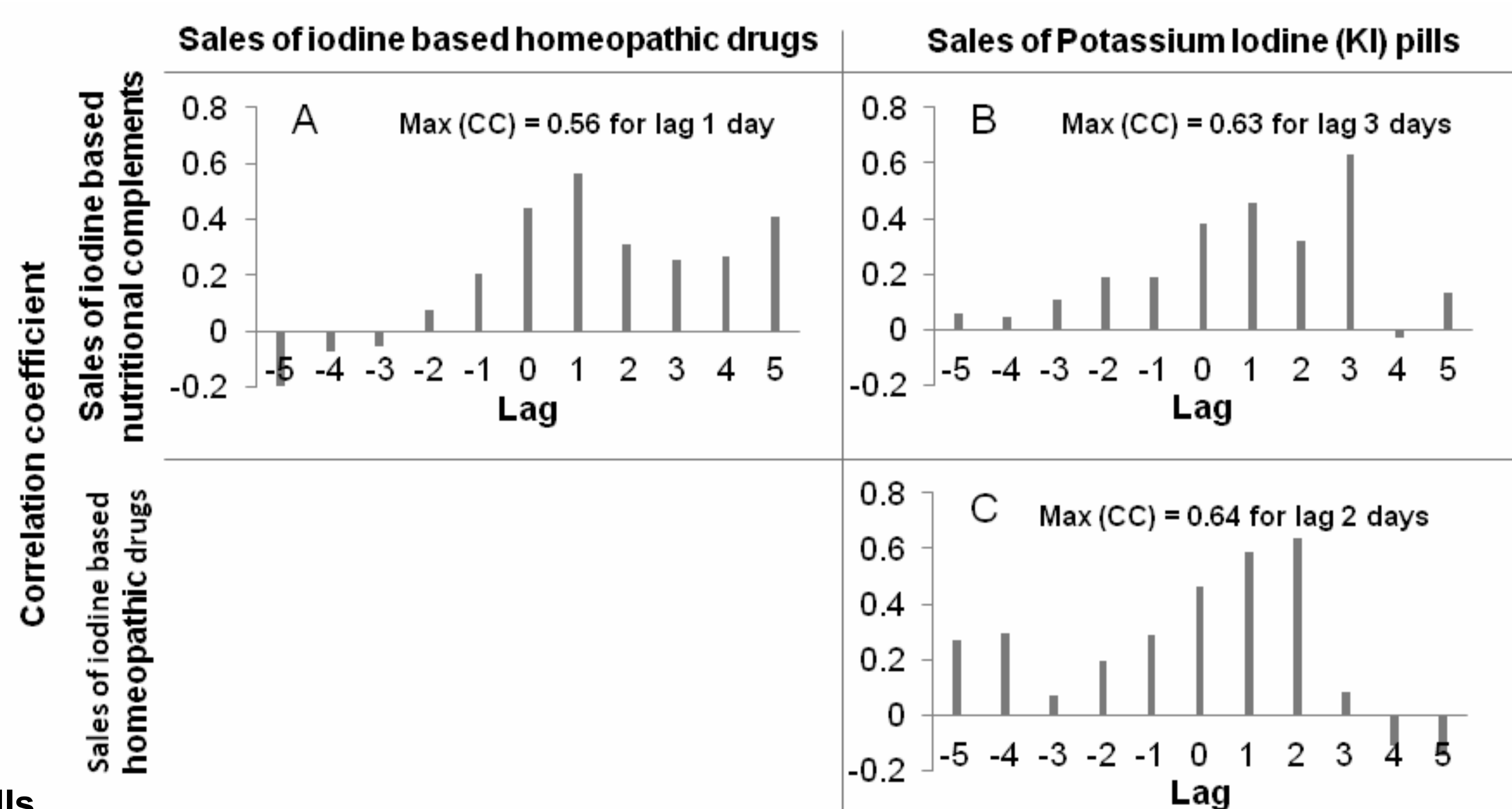


Figure 2: Dark gray lines stand for negative binomial CUSUM score for unit sales of iodine based antiseptics, homeopathic remedies and nutritional complements (from top to bottom). The straight lines on the plots illustrate the threshold for the CUSUM score, defined as the maximum value of the CUSUM score in 2010. Light gray lines represent unit sales volumes. Panel A shows results for all type of sales while panel B only show sales with a physician prescription.

RESULTS

Sales of iodine-based nutritional complements, and later sales of iodine-based homeopathic remedies, have substantially increased (up to 3-fold) during a period of 20 days. They were temporally correlated to specific events during the crisis. Prescriptions only increased for iodine-based homeopathy (up to 35% of all sales), the rest of the sales being mainly made without prescriptions. Army-regulated iodine pills have also been sold but at a very small scale.



CONCLUSIONS

These results show the existence of uncontrolled preventive behaviors involving the potential unjustified consumption of available drugs. They have implications in terms of public health policy and demonstrate the relevance of the surveillance of drug sales for instantaneous evaluation of population behavior during a global crisis.

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ACKNOWLEDGMENTS

The authors thank Celtipharm for graciously providing medication sales data. We declare that we have no conflict of interest.