Evaluating the use of longitudinal over-the-counter healthcare sales data as a source of syndromic surveillance for community-based infections

UK Health Security Agency and Nottingham University Business School

The mission of the United Kingdom Health Security Agency (UKHSA) is to provide health security for England by protecting the population from infectious diseases and other hazards. UKHSA does this by monitoring infectious disease trends and outbreaks using systems that collect information over time and allow unusual changes to be detected. While these normally count laboratory test results for particular pathogens, UKHSA also has also invested in national "syndromic surveillance" systems (managed by the UKHSA Real-time Syndromic Surveillance Team) that collect information on symptoms reported daily to the NHS (including to NHS111, general practitioners and emergency departments). While UKHSA's existing syndromic surveillance systems have previously relied on use of NHS healthcare services, citizens are increasingly using self -funded services via pharmacies, getting both medicines and health advice to treat common infections *without* seeing a doctor. The vast "smart data" that these interactions are producing offers much potential to improve detection of future outbreaks, and augment traditional NHS data sources.

As a result, UKHSA's Real-time Syndromic Surveillance Team are working with N/LAB at the Nottingham University Business School to explore whether we can use anonymised sales of pharmacy over the counter (OTC) medicines as a source of syndromic surveillance for diseases in the community. N/LAB is a centre of excellence, developing and applying innovative research in Artificial Intelligence (AI) and Human Behaviour in projects targeting social good. Research at N/LAB focuses on the development and application of innovative computational methods using Big Data, Behavioural Science and Machine Learning to understand behaviour through the lens of digital footprint/"smart data" datasets, cutting across sectors ranging through health, retail, mobility, energy, and communications.

This exciting PhD programme will first use qualitative methods to investigate how the public access and use OTC medications for a range of common infectious diseases such as gastrointestinal (GI) infections, respiratory infections, and sore throats. Using GI infections as a case study, the project will compare trends in OTC medication sales to other UKHSA surveillance datasets to see if OTC sales can be used to monitor GI infection activity and better predict outbreaks. The PhD offers the unique opportunity to develop skills in analytical, statistical and data science techniques, working with real world data to provide recommendations for UKHSA on how pharmacy OTC data could be used for surveillance in the future.

The project will be supported by interdisciplinary supervision team at the Nottingham University Business School and UKHSA. The successful candidate will spend around 75% of their time working at UKHSA (Birmingham) and 25% at the Nottingham University Business School. The successful candidate will be registered as a post-graduate student at the Nottingham University Business School, but they will hold an academic honorary contract at UKHSA. The student will be supervised by Prof James Goulding (Nottingham University Business School) and Prof Tracey Thornley (University of Nottingham), Dr Alex Elliot, Dr Nicola Love and Prof Charles Beck (UKHSA).

Qualifications:

Applicants must hold or expect to hold a first or upper second-class honours degree (or equivalent), or a master's degree from a relevant discipline with a substantial quantitative component (such as medical/biomedical sciences, epidemiology, public health, health data science). Experience or interest in working in public health or epidemiology or similar is desirable. Knowledge and evidenced experience of data science analytical packages and R or Python would be advantageous.

Funding

The project is funded by the UKHSA and Nottingham University Business School. As a UK public body, UKHSA can only accept applications from UK students. The funding covers the tuition fees and provides an annual stipend for three years (currently at £25,439 for 2025-2026).

Applications and interviews:

For more information or questions about this PhD please contact nicola.love@ukhsa.gov.uk.

To be considered for this PhD please send a copy of your CV and a personal statement up to 500 words explaining your suitability and experience to-date to nicola.love@ukhsa.gov.uk.

The application deadline is 23:59 hours on Monday 14 July 2025. Please note we may close this opportunity early if we fill the position.

Interviews will be held after the application deadline. In-person interviews are preferred and will be held at the UKHSA offices in central Birmingham (23 Stephenson Street B2 4BH). To determine suitability of candidates an analytical test may be undertaken.