The growing complexity of the global food trade network means contamination spreads more efficiently and is more difficult to trace. Increased data capture and sharing is recommended by a new study to help prevent food poisoning outbreaks and allow sources of contamination to be quickly identified.

By 2030, food demand is expected to increase by 50% and so ensuring a safe, sustainable global food supply is of critical importance. Between 1998 and 2008, the total amount of food moving between countries through import and export increased 2.3 fold—a much faster rate than total food production which grew only 1.4 fold. This web of trade is described by the study as the ‘international agro-food trade network’ (IFTN). A growing number of countries rely on the IFTN and, with an increasing amount of processed and branded products being traded, the IFTN is an ever more complex web of interaction.

The seven countries that form the core of the IFTN are the US, Germany, France, the UK, the Netherlands, Italy and China. Each of these countries trades with over 77% of all other countries in the world and, in combination, they are responsible for 30% of the total trade flux (the movement of food between countries). Flux modelling indicates that food-borne chemical or microbiological contaminants spread most efficiently through these countries owing to the high number of network paths running through each country. Tracing the source of contaminants is difficult for the same reason.

Using UN trade data, the researchers constructed a computer model of the IFTN and analysed its structure and food flows during the last ten years. From this, they estimated the global impact of contamination originating in countries with high trade activity, in terms of quantity of contaminated food exported. It appears that the US exported the greatest amount of contaminated food, followed by the Netherlands.

The study also assessed how vulnerable each country was to receiving contaminated food that was either consumed locally or passed to other countries. The US, the Netherlands and Germany emerged as hotspots, corresponding with their role in recorded large food poisoning outbreaks in the last 15 years. These include the 2011 Listeria outbreak in the US, the 2011 E. coli outbreak in Germany and the 2005 Salmonella outbreak in the Netherlands.

The study does not predict an increase in the number of food poisoning outbreaks. Instead, it demonstrates that tracing the source of contamination during outbreaks will be more difficult owing to the increasingly interwoven nature of the IFTN. Delays in identifying sources of contamination can have severe consequences for public health and be socially, politically and economically damaging.

The researchers argue an interdisciplinary approach to monitoring, understanding and controlling food flows is needed, to help protect against outbreaks and improve traceability methods - as well as allowing for better distribution of food. They recommend that state and interstate organisations, including the EU, incentivise data collection and sharing between the private and public sectors. A better understanding of food flows through the international trade network would also allow for less food wastage through better distribution and help reduce negative environmental impacts of food production and distribution.