

## Leverhulme Doctoral Scholarships Programme for Interdisciplinary Resilience Studies (PIRS) University of Southampton

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**RECRUITMENT CYCLE for studentships starting: October 2024**

### **SUPERVISORY TEAM**

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### **STUDENTSHIP PROJECT TITLE**

**Diet quality, health inequities, and supply chain disruptions: toward resilient food supply chains**

### **OVERVIEW**

Vulnerability of supply chains worsen inequalities in diets. This project employs mixed methods to portrait the supply chains of fruit and veg and their crucial impact on healthy diets. Collaboration with stakeholders will identify operational strategies to boost resilience of diets across UK through better conceived supply chains.

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### **SUMMARY**

The project explores the resilience of diets, in terms of fruit and veg consumption, across geographies—particularly in food deserts (areas with poor access to healthy food—to supply chain disruptions caused by factors such as COVID-19, Brexit, and geopolitical tensions. The objective is to assess the vulnerability of diet quality in the most disadvantaged populations, and formulate co-developed strategies to enhance resilience in the face of supply chain disruptions. These strategies point to improved diet quality and health inequalities through a better conceived supply chain. A critical aspect of this initiative involves adopting an interdisciplinary approach, drawing insights from fields including geography, economics, supply chain management, and public health. In addition, working closely with local government will facilitate implementation of feasible solutions. The project draws on empirical and modelling tools including spatial microsimulation, network optimization and consumer behaviour to analyze the relationship between fruit and vegetable consumption in identified food deserts and supply chain disruptions. The repercussions on food availability and prices will be noted, and strategies identified in collaboration with local government and third sector for boosting resilience of diets. In the quest for resilience, the project aims to identify strategies ranging from local food production initiatives to collaborative distribution channels and existing community-based solutions; this builds on ongoing research by the supervisory team. The findings will inform policy recommendations, tailored to local, regional, or national levels, with due consideration for the socio-economic and cultural context of widening inequalities in access to healthy and affordable food.

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## **PROJECT CONCEPT**

In recent years, the vulnerability of societal diets to supply chain disruptions has become increasingly apparent, particularly in socially disadvantaged areas where healthy food is less accessible (food deserts). Factors such as the COVID-19 pandemic, Brexit, and geo-political tensions have led to supply chain issues, resulting in shortages and higher prices of essential food items. This project aims to analyze the diet enrichment of society, with a specific focus on fruit and vegetable consumption, against the backdrop of supply chain disruptions. Throughout, there is awareness of actions already in place such as community initiatives and policies to support diet interventions.

By utilizing interdisciplinary methods, our goal is to compare and contrast the dietary quality and health inequalities in different geographical areas against the production and supply volumes and costs to calculate the sensitivity of the system to disruptions in order to identify strategies to enhance resilience in diet quality and food security in the face of supply chain disruptions. Our research contributes to achieving the UN SDG goals in terms of Zero Hunger (SDG2), and Responsible Consumption and Production (SDG 12).

The overarching aim of this project is to obtain a baseline measure of resilience of UK diets, in terms of security and quality, in various geographical locations in the event of supply chain disruptions. By focusing on fruit and veg consumption data, we seek to model the supply chain which matches production and consumption, quantify the regional food security, and assess the impact of different form of disruptions on diets, and explore options to build resilience locally. We will use case studies to understand the specific dynamics and challenges within a local context. Here, the focus will be in Southampton with potential to extend across Wessex, where the research team have established relationships with local government, public health, and third sector organisations who already address diet interventions. There is a strong component of co-development around new strategies, to identify feasible opportunities for successful interventions.

The specific objectives of this project include:

- a. Modelling the Supply Chain of Fruit and Vegetables (F&V): Utilize quantitative methods to map the production and distribution of F&V from farm to fork, identifying key stakeholders, distribution channels, bottlenecks, and vulnerable points.
- b. Modelling the Diet in Terms of Price and Supply of F&V: Employ quantitative analysis to model the diet, considering the price and supply dynamics, as well as consumption of F&V consumption. (Spatial microsimulation; see Smith et al 2021)
- c. Modelling the Impact of Supply Chain Shocks: Utilize a combination of qualitative and quantitative methods to model and assess the impact of systematic shocks on the supply chains and subsequently their contributions to disruption of fruit and veg consumption.
- d. Identifying Options to Build Resilience Locally: Focus on Southampton as a case study to understand local dynamics, challenges, and potential solutions for building resilience in the face of supply chain disruptions. A series of semi-structured interviews with local government and third sector groups will identify the current challenges and feasible strategies (see Smith et al 2022 for an example of such mixed methods approaches).

To accomplish the outlined objectives, a comprehensive methodology will be employed:

- a. Quantitative Supply Chain Modelling: Utilize quantitative methods to map the entire supply chain of F&V, calculate the capacities and risks, and identifying critical nodes and vulnerabilities.
- b. Quantitative Diet Modelling: Employ statistical techniques to model the diets in terms of consumption of fruit and veg, considering factors such as price fluctuations, local production, and supply variations of F&V. (after Smith et al 2021)
- c. Qualitative and Quantitative Impact Assessment: Combine qualitative insights and quantitative data to assess the impact of supply chain shocks on dietary patterns. (Smith and Thompson 2023)
- d. Case Study in Southampton: Conduct in-depth qualitative research in Southampton, considering local supply chain dynamics, socio-economic factors, and community resilience. (Smith et al 2022)

- e. **Stakeholder Engagement:** Engage with key stakeholders, including local authorities, businesses, and communities, to gather insights and validate findings. This work is already underway in Southampton, and the relationships are strong through previous successful collaboration and the UoS policy think tank, Centre for the South.

This project holds significant importance for the UK's public health, economic stability, and food security. Understanding the impact of the supply chain vulnerabilities and dynamics on nutrient content of the populations, especially those in food deserts, will provide valuable insights for policymakers and local communities to implement appropriate strategies for boosting resilience, especially through identifying locally implementable options which would pave the way for more scalable measures. This study aims to contribute to the development of robust strategies to safeguard the nation's diets against supply chain disruptions. Successful examples of improving fruit and vegetable consumption are represented in the Wessex DIET study, where local government (Southampton City Council) has worked with researchers and third sector (Southampton City Mission, Southampton Social Aid) to assess the impact of food aid interventions in vulnerable populations, identifying the improvement in diet. This project will explore further proposed interventions, such as community growing or food redistribution schemes; all strategies will be co-developed with the local stakeholders across Wessex, where there are relationships in place.

#### *Expected Outcomes*

Upon completion of the project, we anticipate the following outcomes:

- a. **A Comprehensive Supply Chain Map:** A detailed map of the supply chain for F&V, highlighting vulnerable points and critical stakeholders.
- b. **Quantitative Diet Models:** Statistical models representing the impact of supply chain disruptions on the price and supply of F&V in the diet.
- c. **Qualitative Insights:** In-depth qualitative insights into the impact of supply chain shocks on dietary patterns, gathered through case studies and stakeholder engagement.
- d. **Local Resilience Strategies:** Options and recommendations for building resilience locally, with a focus on the case study in Southampton.
- e. **Scalability Assessment:** Evaluation of the scalability of identified resilience measures, providing insights for broader policy implications, using simulation and data analytics methods.

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#### **Contribution to interdisciplinary resilience studies:**

This project significantly contributes to resilience studies by employing an innovative and interdisciplinary approach to analyze the resilience of UK diets in the face of supply chain disruptions, specifically fruit and vegetable consumption. The integration of quantitative supply chain and diet modelling, and qualitative co-development of case studies represents a novel methodology in resilience research, providing a holistic understanding of the complex interplay between diet and supply chain disruptions.

Key contributions include development of a comprehensive supply chain map for fruits and vegetables, identifying critical nodes and vulnerabilities. The quantitative modelling of the impact of shocks on diet, particularly price and supply of fruits and vegetables, enhances the quantitative foundation of resilience studies. The selection of Southampton/Wessex as a case study contributes localized insights into the challenges and opportunities for building resilience at the community level.

Furthermore, the consideration of scalability in resilience measures addresses a critical gap in the literature, providing valuable insights into the broader applicability of identified strategies. The project's focus on developing actionable policy recommendations enhances its practical implications, fostering the translation of research findings into tangible measures for enhancing societal resilience.

Beyond the academic realm, the project's emphasis on understanding how disruptions affect access to fresh and nutritious food directly contributes to public health research, mitigating health risks associated with inadequate diets. Overall, this research serves as a methodologically innovative and practically relevant contribution to resilience studies, advancing the understanding of resilience dynamics within the context of food supply chains and societal dietary patterns.

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**Please list and describe any specific/additional technical training or support to undertake and successfully deliver this project. Note that students recruited into this programme will undertake a bespoke training curriculum. Students and their supervisory teams will also identify generic skills gaps to address through training courses offered by the University's Doctoral College.**

N/A

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