

# Is there a transport equivalent of energy poverty? Car-related economic stress and vulnerability to motor fuel price increases in the UK

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# Why transport (energy) matters - EU figures

- 33% of final energy consumption (vs. 26% for households)
- 21% of greenhouse gas emissions (up from 14% in 1990) – vs. 13% for residential sector (same as in 1990)
- 79% of petroleum consumption
  
- 13% of household expenditure (second only to housing)
- 6.5% of household expenditure goes in the ‘operation of personal transport equipment’ - higher than for ‘electricity, gas and other fuels’ within the home (3.9%) – same in most member states
  
- essential for access to services and opportunities and thus social inclusion (Lucas et al., 2016)

# A burning topic

tu | 50 Jahre

Fachgebiet  
VPL Verkehrswesen und Verkehrsplanung

## Why Drivers Are Leading a Protest Movement Across France

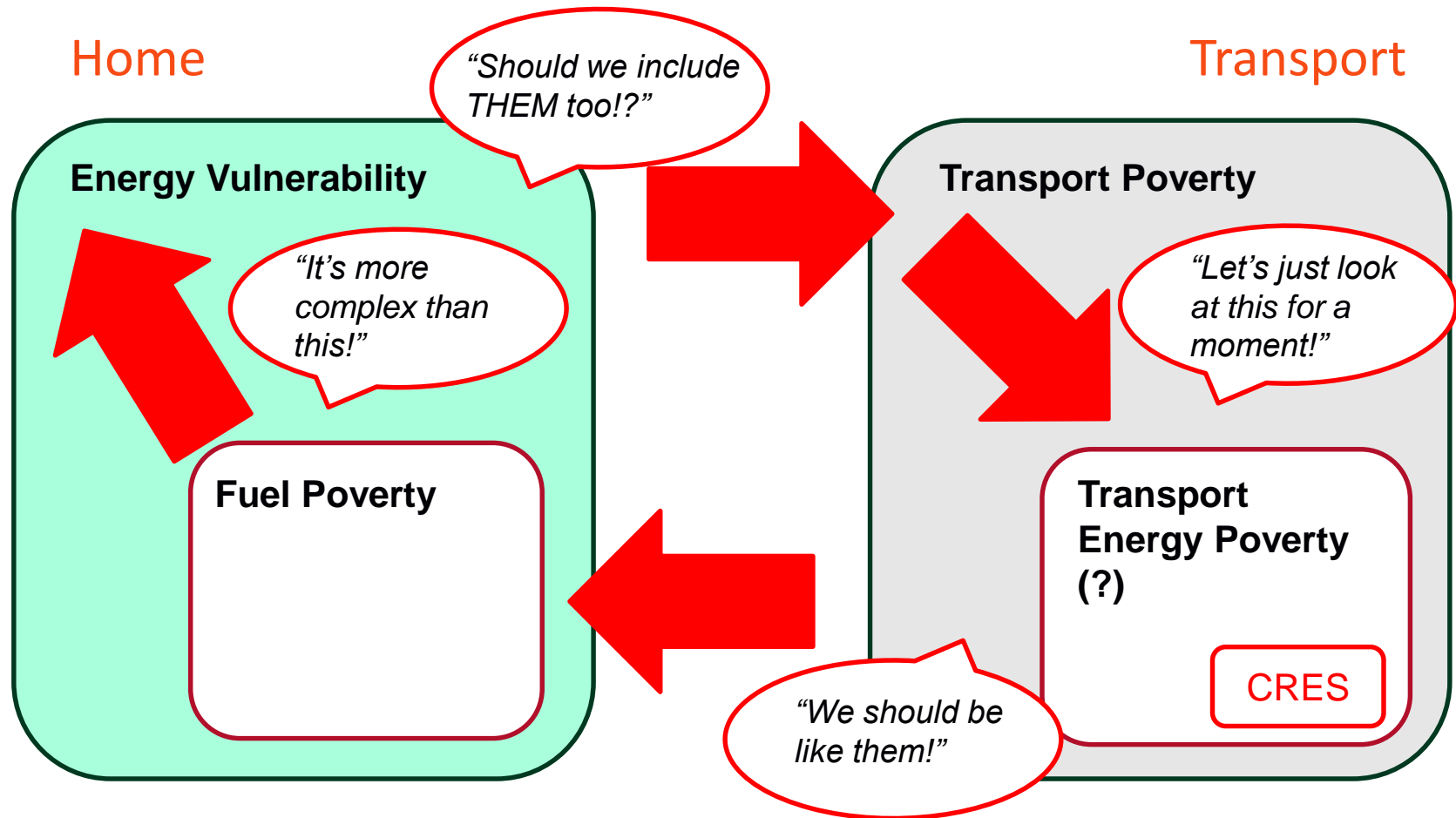
FEARGUS O'SULLIVAN NOVEMBER 19, 2018

The rapidly developing “Yellow Vest” movement took over streets and highways to oppose rising gas and diesel taxes. It might also be a proxy for frustrations about rising costs and falling living standards.



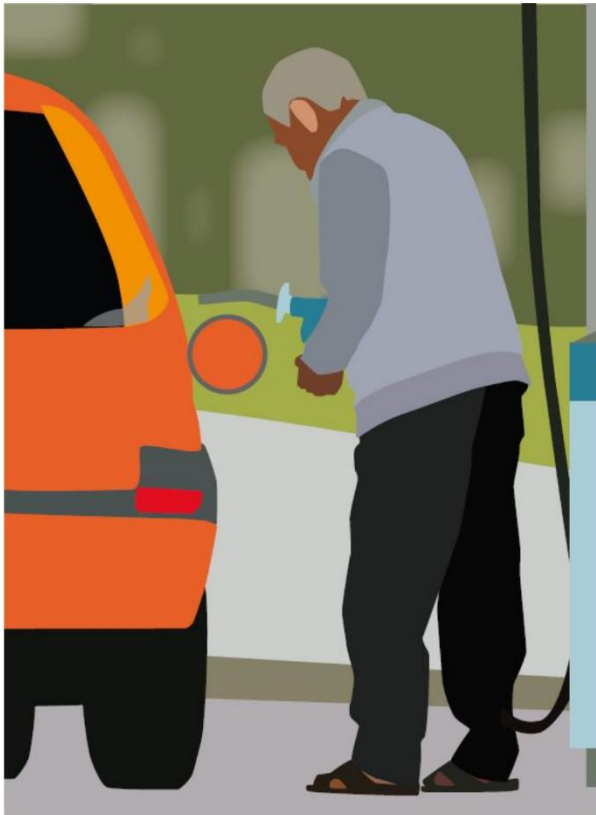
Image: Patrice CATALAYU

# Energy poverty vs. Transport poverty



## RESEARCH INSIGHT

### CAR RELATED ECONOMIC STRESS IS THERE A TRANSPORT EQUIVALENT OF FUEL POVERTY?



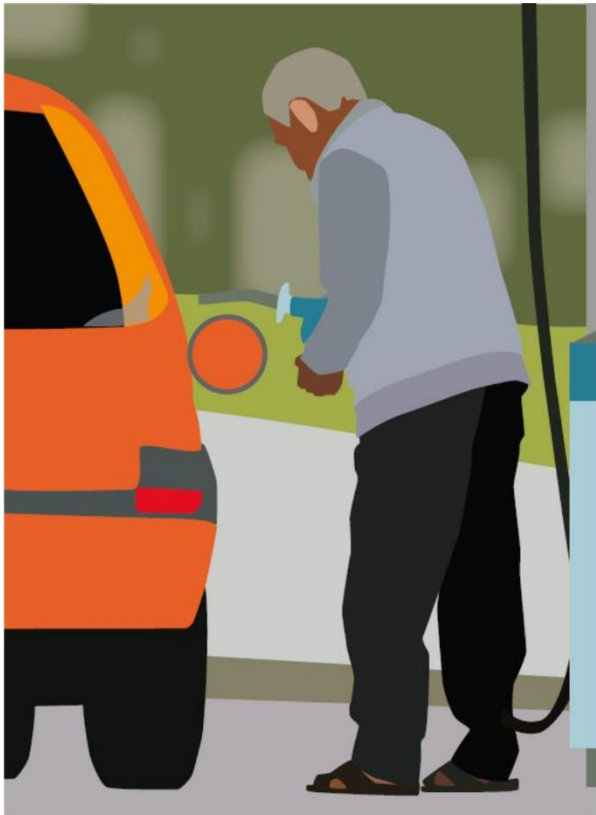
- Car-owning households..
- ..who need to spend a disproportionately high share of their income on mobility..
- ..with negative consequences in terms of:
  - restricted activity spaces and/or
  - spending cuts in other essential areas

≈ 'forced car ownership', 'transport poverty'...

## RESEARCH INSIGHT

### CAR RELATED ECONOMIC STRESS

IS THERE A TRANSPORT  
EQUIVALENT OF FUEL POVERTY?



## Goals:

1. **Quantify:** how many households are in Car-Related Economic Stress (CRES)?
2. **Identify:** who are they?
3. **Explore** overlaps / trade-offs with other forms of economic stress and social exclusion
4. **Assess vulnerability** to motor fuel price increases



Contents lists available at ScienceDirect

## Transport Policy

journal homepage: [www.elsevier.com/locate/tranpol](http://www.elsevier.com/locate/tranpol)



### Transport poverty and fuel poverty in the UK: From analogy to comparison



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#### ARTICLE INFO

##### Keywords:

Fuel poverty  
Transport affordability  
UK  
Energy  
Social exclusion  
Indicators

#### ABSTRACT

The notion of 'fuel poverty', referring to affordable warmth, underpins established research and policy agendas in the UK and has been extremely influential worldwide. In this context, British researchers, official policymaking bodies and NGOs have put forward the notion of 'transport poverty', building on an implicit analogy between (recognised) fuel poverty and (neglected) transport affordability issues. However, the conceptual similarities and differences between 'fuel' and 'transport' poverty remain largely unaddressed in the UK. This paper systematically compares and contrasts the two concepts, examining critically the assumption of a simple equivalence between them. We illustrate similarities and differences under four headings: (i) negative consequences of lack of warmth and lack of access; (ii) drivers of fuel and transport poverty; (iii) definition and measurement; (iv) policy interventions. Our review suggests that there are important conceptual and practical differences between transport and domestic energy consumption, with crucial consequences for how affordability problems amongst households are to be conceptualised and addressed. In a context where transport and energy exhibit two parallel policy worlds, the analysis in the paper and these conclusions reinforce how and why these differences matter. As we embark on an ever closer union between our domestic energy and transport energy systems the importance of these contradictions will become increasingly evident and problematic. This work contributes to the long-term debate about how best to manage these issues in a radical energy transition that properly pays attention to issues of equity and affordability.

## Indicators

## Data

1. A 'low-income high-costs' indicator of CRES

1. *Living Costs and Food Survey (LCFS) 2006-2014 (UK)*

2. A material deprivation-based indicator of CRES

2. *EU-SILC 2005-2014 (UK)*

3. A spatial index of vulnerability to fuel price increases

3. Anonymised MOT tests and results data, income data and accessibility statistics (England)



# Study 1. Reference

Transportation Research Part A 113 (2018) 227–242



Contents lists available at [ScienceDirect](#)

## Transportation Research Part A

journal homepage: [www.elsevier.com/locate/tra](http://www.elsevier.com/locate/tra)



## Vulnerability to fuel price increases in the UK: A household level analysis



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### ARTICLE INFO

#### Keywords:

Oil vulnerability  
Price elasticities  
Distributional impacts  
Fuel demand  
Transport affordability  
Low-income households

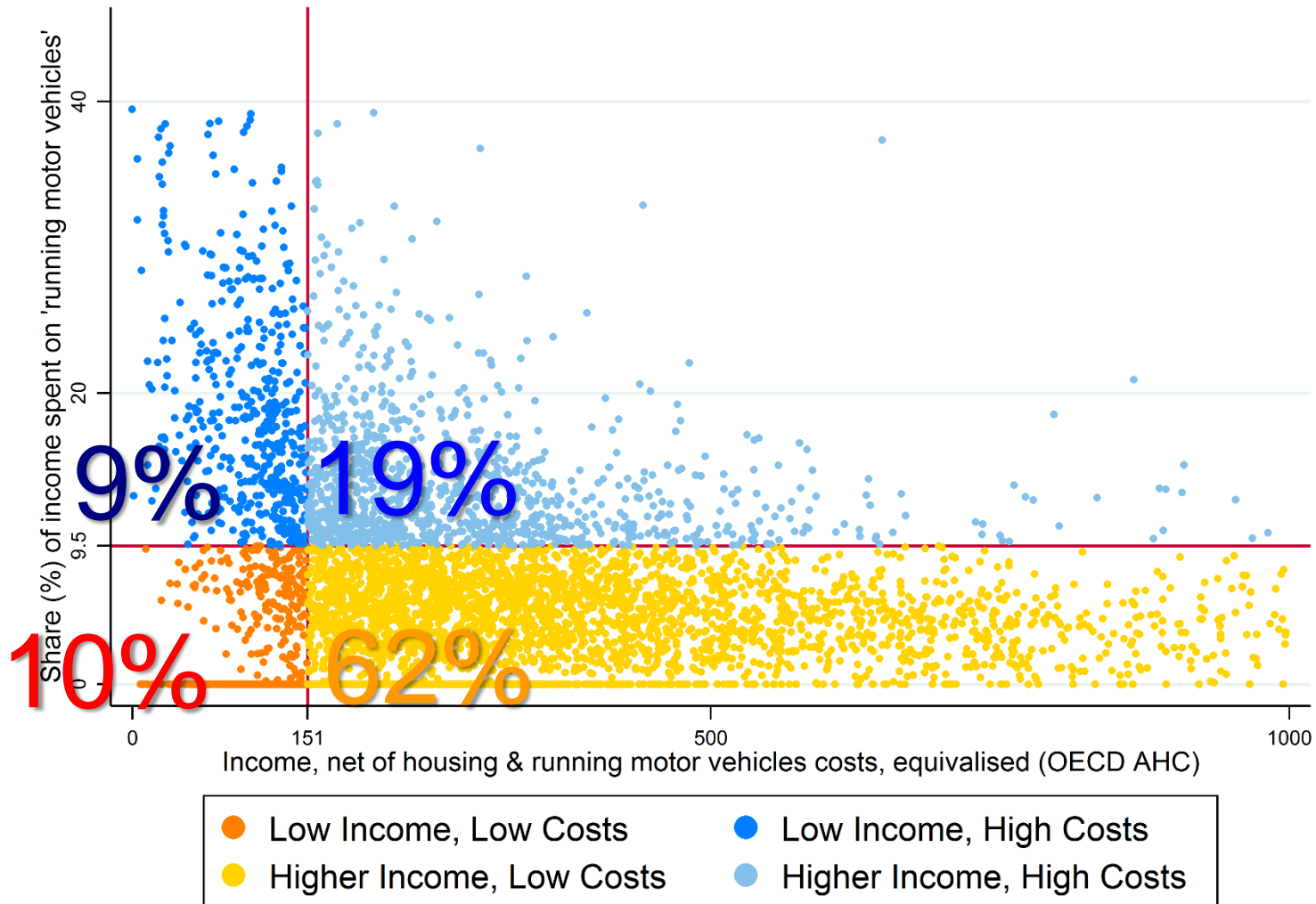
### ABSTRACT

In highly motorised countries, some sectors of the population own and use cars despite struggling to afford their running costs, and so may be particularly vulnerable to motor fuel prices increases, whether market-led or policy-driven. This paper proposes a novel, disaggregated approach to investigating vulnerability to such increases at the household level. We propose a set of indicators of 'car-related economic stress' (CRES), based on individual household level expenditure data for the UK, to identify which low-income households spend disproportionately on running motor vehicles, and to assess the depth of their economic stress. By subsequently linking the dataset to local fuel price data, we are able to model the disaggregated price elasticities of car fuel demand. This provides us with an indicator of each household's adaptive capacity to fuel price increases. The findings show that 'Low Income, High Cost' households (LIHC) account for 9% of UK households and have distinct socio-demographic characteristics. Interestingly, they are characterised by very low responses to fuel price increases, which may cause them to compromise on other important areas of their household expenditures. Simulations suggest that a 20% increase in fuel prices would substantially increase the depth, but not the incidence of CRES. Overall, the study sheds light on a sector of the population with high levels of vulnerability to fuel price increases, owing to high exposure, high sensitivity and low adaptive capacity. This raises challenges for social, environmental and resilience policy in the transport sector.

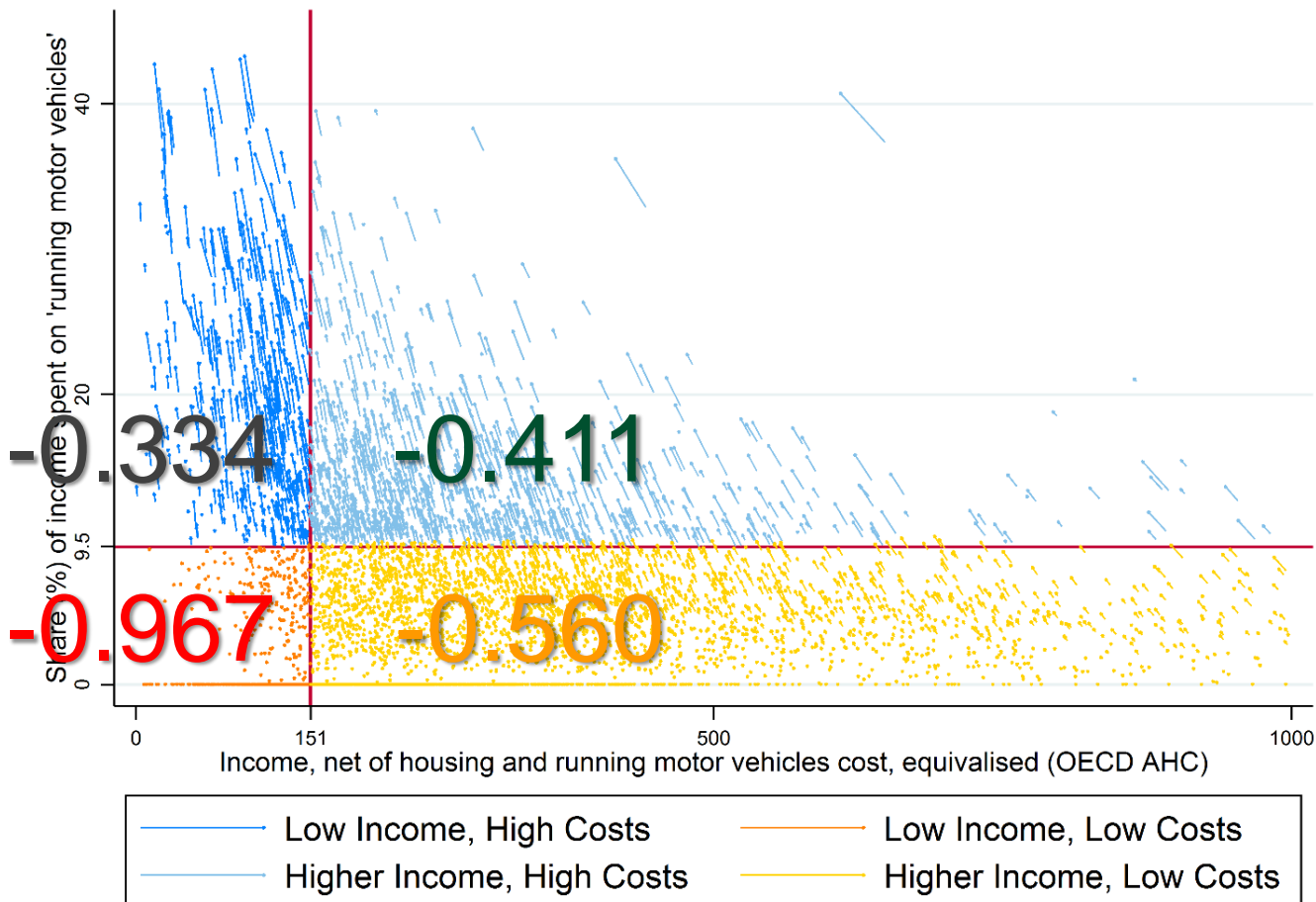
# Study 1. Criteria for adapting fuel poverty metrics for use in the transport sector

Fuel poverty (UK)	Transport	
	Factors of complexity	Implications / solutions
<i>Required energy expenditure</i> – includes <i>underspending</i> and excludes <i>overspending</i>	Too complex	Use <i>actual</i> expenditure
Affordability threshold	Using 10% is not appropriate	Should be derived by transport data
Income threshold	Transport costs not regressively distributed	Income threshold is necessary

# Study 1. A 'Low Income High Costs' indicator of Car-Related Economic Stress (UK, 2012)

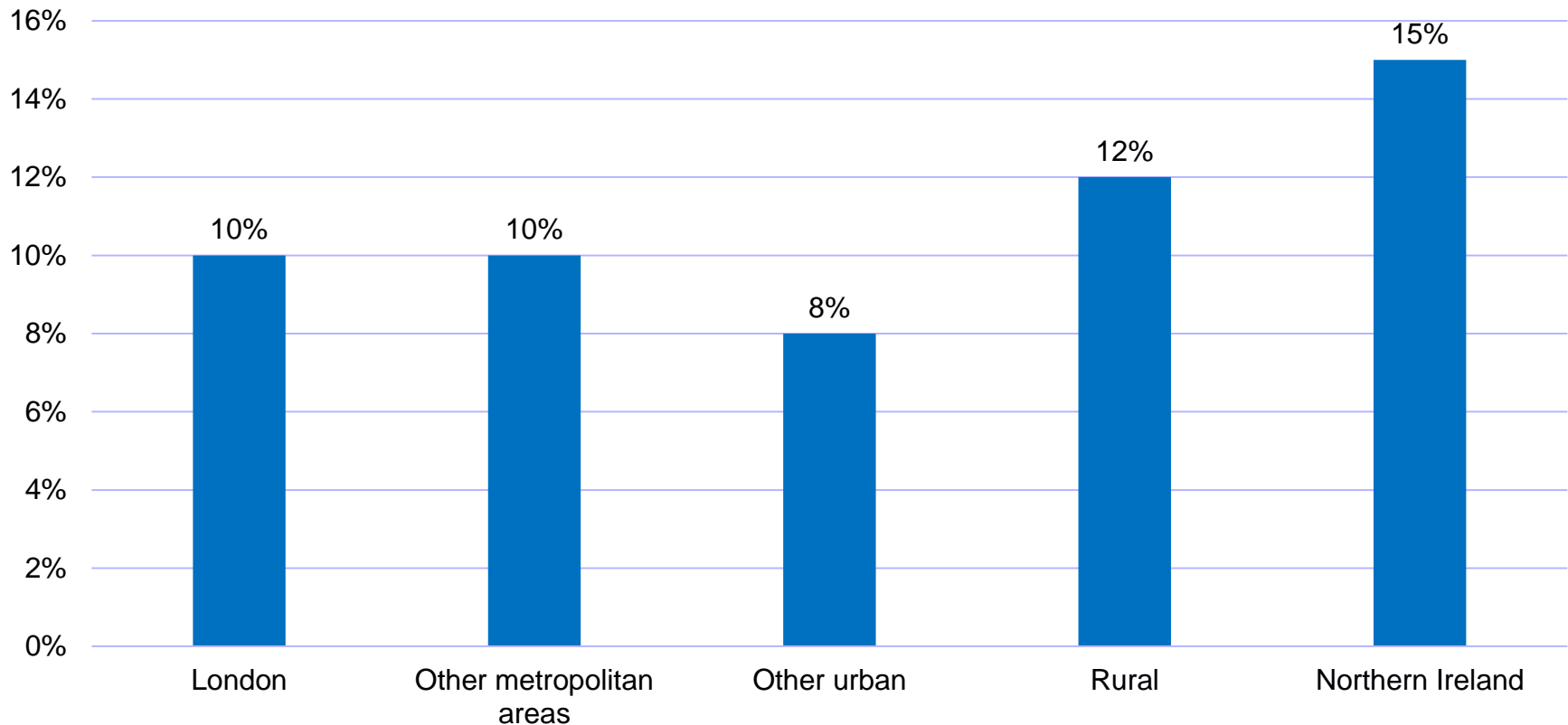


# Study 1. Disaggregated price elasticities of car fuel demand (modelled, 2006-2012)



# Not just a rural / periurban problem

## Low Income High Cost households



Data: Living Costs and Food Survey 2012

## Indicators

1. A 'low-income high-costs' indicator of CRES
- 2. A material deprivation-based indicator of CRES**
3. A spatial index of vulnerability to fuel price increases

## Data

1. *Living Costs and Food Survey (LCFS) 2006-2014 (UK)*
- 2. *EU-SILC 2005-2014 (UK)***
3. Anonymised MOT tests and results data, income data and accessibility statistics (England)

Article

## 'Forced Car Ownership' in the UK and Germany: Socio-Spatial Patterns and Potential Economic Stress Impacts

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### Abstract

The notion of 'forced car ownership' (FCO), born out of transport research on UK rural areas, is used to define households who own cars despite limited economic resources. FCO is thought to result in households cutting expenditure on other necessities and/or reducing travel activity to the bare minimum, both of which may result in social exclusion. Social exclusion research, on the other hand, has paid much attention to 'material deprivation', i.e., the economic strain and enforced lack of durable goods arising from low income. However, the FCO phenomenon suggests that, among households with limited resources, the *enforced possession* and use of a durable good can be the cause of material deprivation, economic stress and vulnerability to fuel price increases. In this study, we use 2012 EU 'Income and Living Conditions' data (EU-SILC) to shed light on FCO in two European countries (UK and Germany). Through secondary data analysis we are able to show: the social and spatial patterns of FCO; key differences between FCO and 'car deprived' households; the intensity of social exclusion, material deprivation, and economic strain among FCO households; and overlaps between FCO and economic stress in other life domains (domestic fuel poverty, housing cost overburden). The results also show contrasting spatial patterns of FCO in Germany (higher incidence in rural areas) and UK (similar incidence in urban and rural areas), which can be explained in light of the different socio-spatial configurations prevalent in the two countries. We conclude by discussing implications for future research and policy-making.

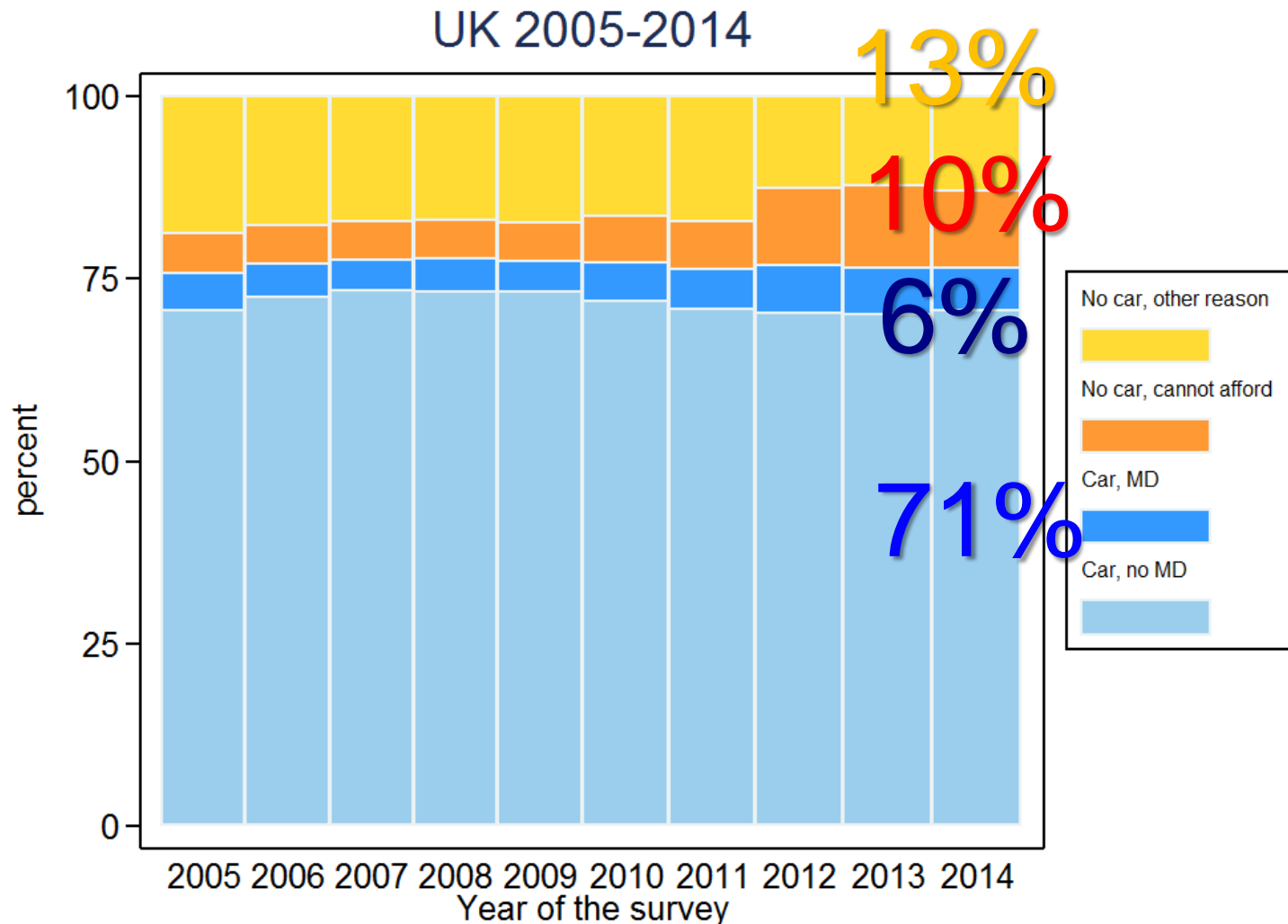
## Study 2. Material deprivation (EU-SILC definition)

Households who **cannot afford at least 3** of the following:

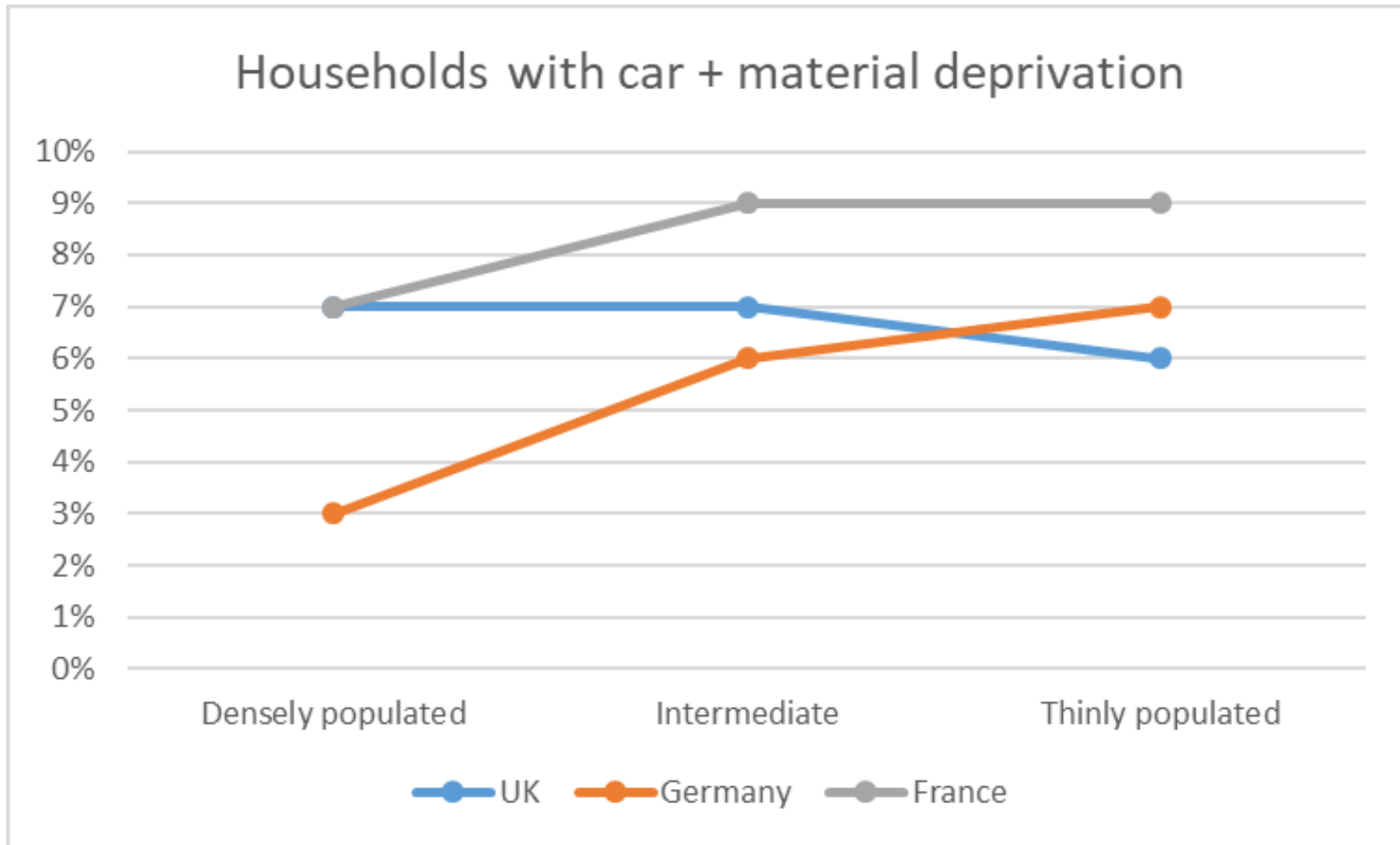
1. to face unexpected expenses;
  2. one week annual holiday away from home;
  3. to pay for arrears (mortgage or rent, utility bills or hire purchase instalments);
  4. a meal with meat, chicken or fish every second day;
  5. to keep home adequately warm
- Economic strain**
6. to have a washing machine
  7. to have a colour TV
  8. to have a telephone
  - 9. to have a personal car**
- Enforced lack of durables**



# Study 2. A material deprivation-based indicator of Car-Related Economic Stress



# Not just a rural / periurban problem



Data: EU-SILC 2012

## Study 2. Deprivation profile of households in Car-Related Economic Stress (2012)

- **Precarity:**
  - 99% “unable to face unexpected financial expenses”
  - 95% “difficult to make ends meet”
- **Fuel poverty:**
  - 46% “cannot afford to keep home adequately warm”
  - 79% fuel poor
- **(Under-)employment:**
  - 19% are “working poor”
  - 16% have “low work intensity”
- **Debt:**
  - arrears on utility bills (51%), hire purchase instalments / other loan payments (19%); repayment of debts is ‘a burden’ (49%)

# Study 1+2. Who are the households in Car-Related Economic Stress?

## Study 1

**Low Income High Cost**  
(vs. Low Income Low Cost) (2012)

- **30s-50s**
- **Employed (full/part time)**
  - (Small employers and own account workers)
- **Male-headed**
- **(semi)detached housing**
- House owners / with **mortgage**
- **Rural areas**

## Study 2

**“Own car + material deprivation”**  
(vs. “cannot afford car”) (2012)

- **40-60 years old**
- **Medium-high work intensity**
- **Male-headed**
- Large household size
- Mobility difficulties
- **House mortgage**
- **(Semi-)detached housing**
- **Thinly populated area**

## Indicators

1. A 'low-income high-costs' indicator of CRES
2. A material deprivation-based indicator of CRES
3. A spatial index of vulnerability to fuel price increases

## Data

1. *Living Costs and Food Survey (LCFS) 2006-2014 (UK)*
2. *EU-SILC 2005-2014 (UK)*
3. Anonymised MOT tests and results data, income data and accessibility statistics (England)

# Study 3. Spatial index of vulnerability to fuel price increases (England, 2011)

Journal of Transport Geography 78 (2019) 98–114



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Journal of Transport Geography

journal homepage: [www.elsevier.com/locate/jtrangeo](http://www.elsevier.com/locate/jtrangeo)



## Vulnerability to motor fuel price increases: Socio-spatial patterns in England



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### ABSTRACT

In high-motorisation, car-dependent countries, transport affordability is intimately linked to the price of oil derived motor fuels, which may become increasingly volatile in the future due to global oil price movements and environmental taxation. The negative impacts of fuel price spikes in terms of increased household expenditure and economic stress are unevenly spatially and socially distributed. Previous research has found that vulnerability to fuel price increases is higher in peripheral, peri-urban and rural areas, and that low income tends to be co-located with high car dependence and low vehicle fuel efficiency, with a compounding effect on vulnerability. The goal of this article is to test these hypotheses for England, providing new evidence on spatial patterns of vulnerability to fuel price increases at the small-area level. We propose a composite vulnerability indicator combining data on income, accessibility, vehicle inspection and vehicle registration for 2011. *Within English city-regions*, we find little evidence of the socially regressive patterns previously identified in the literature. This is explained by the persistent concentration of poverty in urban cores, as well as by the poor fuel economy of the vehicle fleet in wealthier areas, due to the prevalence of powerful vehicles there. On the other hand, our analysis suggests that the impacts of fuel price increases would be very unequal *between city-regions*, as the least sensitive metropolitan area (Greater London) is also characterised by high levels of adaptive capacity. We conclude by setting out an agenda for future research on spatial vulnerability to fuel price increases.

# What is vulnerability (to fuel price increases)?

Vulnerability dimension	Definition	Indicators (for fuel price increases)
<b>Exposure</b>	“the nature and degree to which a system experiences (...) stress”	<ul style="list-style-type: none"> <li>• Cost burden of motor fuel</li> <li>• [proxy: car ownership / use]</li> </ul>
<b>Sensitivity</b>	“the degree to which a system is modified or affected by perturbations”	<ul style="list-style-type: none"> <li>• (Low) economic resources (income)</li> </ul>
<b>Adaptive capacity</b>	“the ability of a system to evolve in order to accommodate (stress) and to expand the range of variability with which it can cope”	<ul style="list-style-type: none"> <li>• Accessibility to (key services by) modes alternative to the car</li> <li>• Elasticity of fuel price demand</li> </ul>

(based on Adger, 2006; Leung et al., 2018; Mattioli, Philips, Chatterton & Anable, 2019)

# What is vulnerability (to fuel price increases)?

Vulnerability dimension	Definition (Adger, 2006, p.270)	Indicators (for fuel price increases)
Exposure	“the nature and degree to which a system experiences (...) stress”	<ul style="list-style-type: none"><li>• Cost burden of motor fuel</li><li>• [private car ownership / use]</li></ul>
Sensitivity	“the degree to which a system is modified or affected by perturbations”	<ul style="list-style-type: none"><li>• (Low) economic resources (income)</li></ul>
Adaptive capacity	“the ability of a system to evolve in order to accommodate (stress) and to expand the range of variability with which it can cope”	<ul style="list-style-type: none"><li>• Accessibility to (key services by) modes alternative to the car</li><li>• Elasticity of fuel price demand</li></ul>

## Car-Related Economic Stress (CRES)

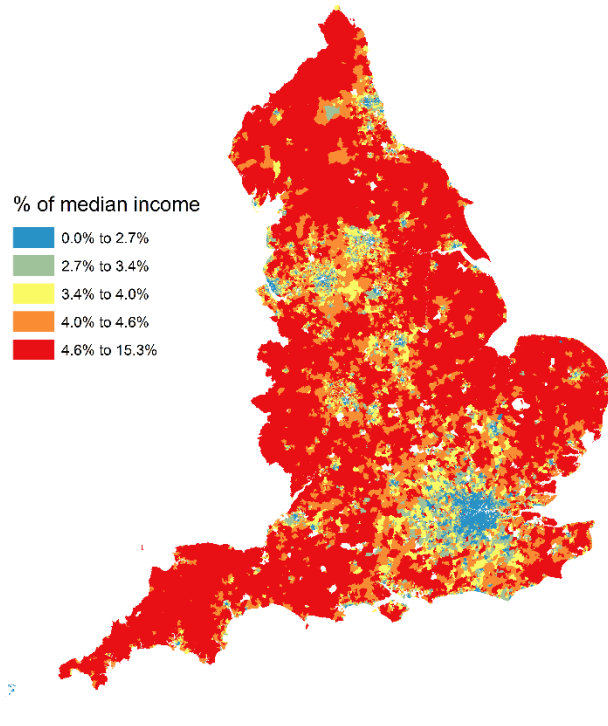
# Vulnerability



# Study 3. Spatial index of vulnerability to fuel price increases (England)

## 1. Exposure

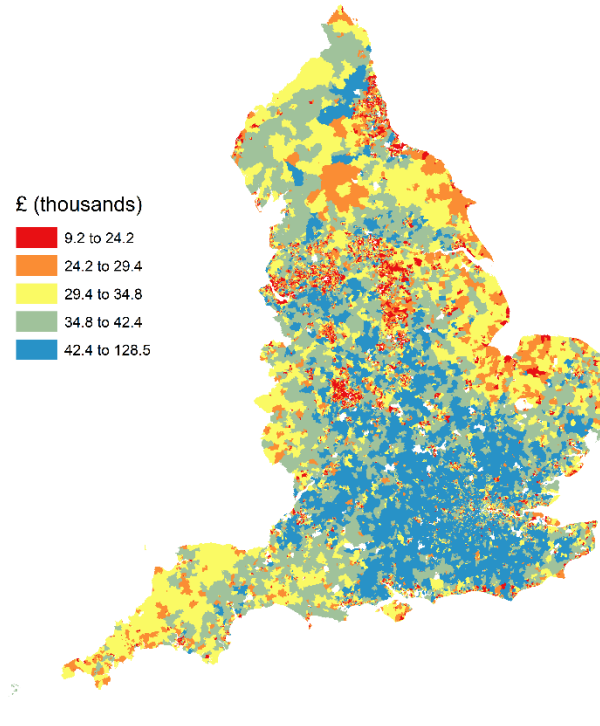
Average cost burden of motor fuel



*(Anonymised MOT tests and results)*

## 2. Sensitivity

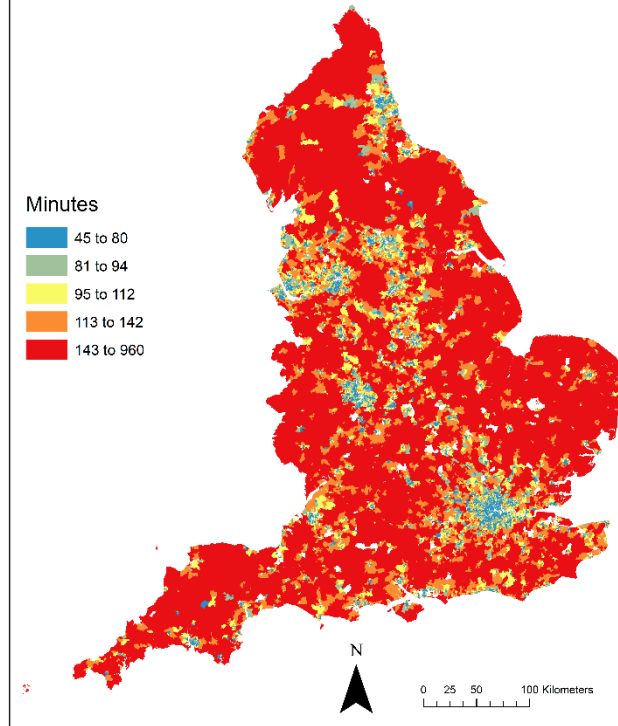
Median household income



*(Experian Median Income data)*

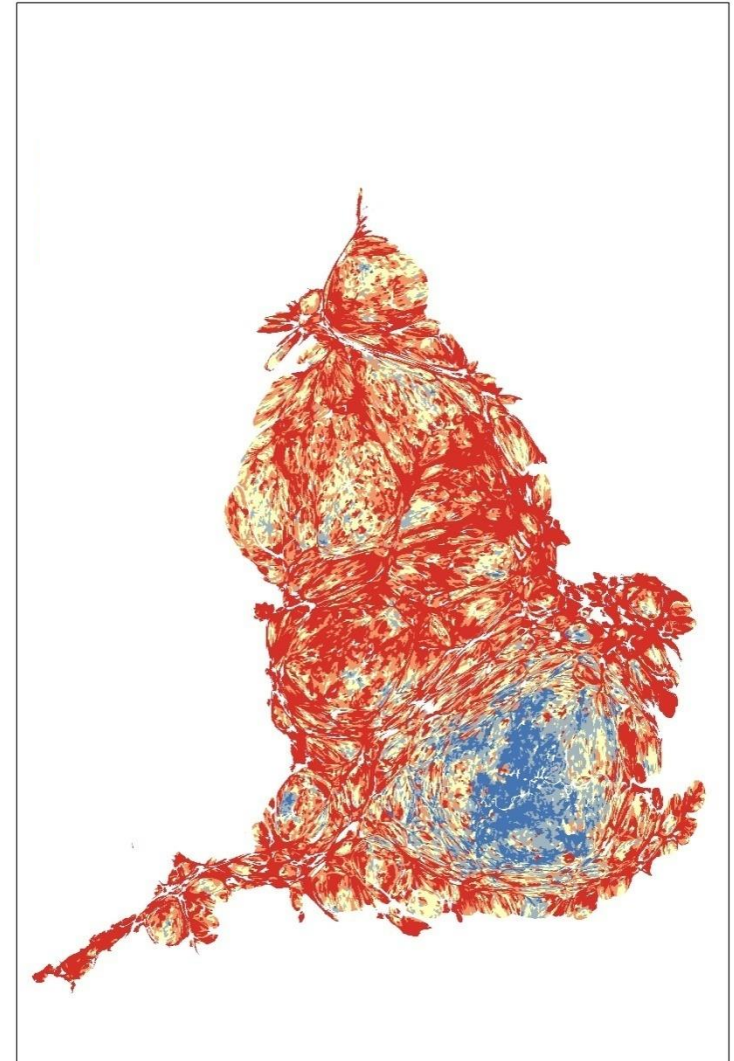
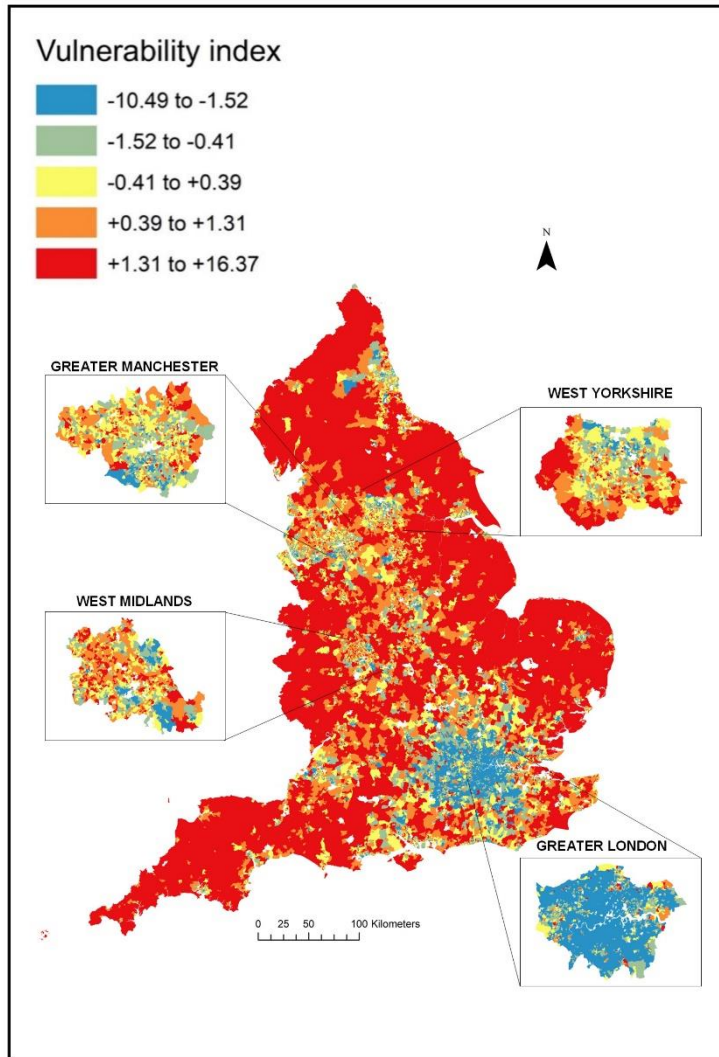
## 3. Adaptive capacity

Total time to access 8 services by public transport/walk



*(UK Government Accessibility Statistics)*

# Study 3. Spatial index of vulnerability to fuel price increases (England)



- There is something similar to energy poverty in the transport sector but... it is not entirely equivalent – careful with analogies!
- Car-Related Economic Stress and vulnerability to fuel price increases:
  - a non-negligible problem
  - creates a conundrum for environmental policy
  - complex socio-spatial patterns
  - variation both within and across countries
  - still not clear to what extent it overlaps with (domestic) energy poverty

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# Thank you for your attention!

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@DEMAND\_CENTRE

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