MAPPING HUNGER

NEW TECHNOLOGY TO HELP TACKLE UK POVERTY

New Economic Models in the Digital Economy Group, University of Hull

In partnership with The Trussell Trust

INTRODUCTION

Foodbank use has been central to the recent debate about poverty in the UK. Now UK foodbank charity The Trussell Trust is working with data scientists in the University of Hull to gain a richer understanding of foodbank use. The research compared data on foodbank use in England and Wales with open data including 2011 Census data, with some important findings and correlations. Most prominently, researchers found that foodbank use was highest in areas where there are more people who are unable to work due to long term sickness or disability; or in skilled manual work. This summary report outlines some emergent findings and the methodology of the work of the group.

CONTENTS

1. BACKGROUND

Five years of foodbank data from The Trussell Trust foodbank network in England and Wales, the UK's biggest network of foodbanks, has been analysed by data scientists in the University of Hull. As well as conducting data exploration, the team has created the UK's first dynamic visualisation tool of foodbank use. This report provides a summary of an academic paper being presented at the OR Society's Analytics Forum National Conference on June 21st.

The project was delivered with the full involvement of the Trussell Trust and followed a process of technology innovation developed by Dr Giles Hindle and Professor Richard Vidgen at the University of Hull (Hindle and Vidgen 2015). The project was funded by the 'New Economic Models in the Digital Economy' group (NEMODE, part of RCUK) and managed by the University of Hull. Andy Hamflett from third sector specialists AAM Associates and data scientists Simon Raper, Simeon Duckworth, and Duncan Stoddard from the consultancy Coppelia were consultants for the project.
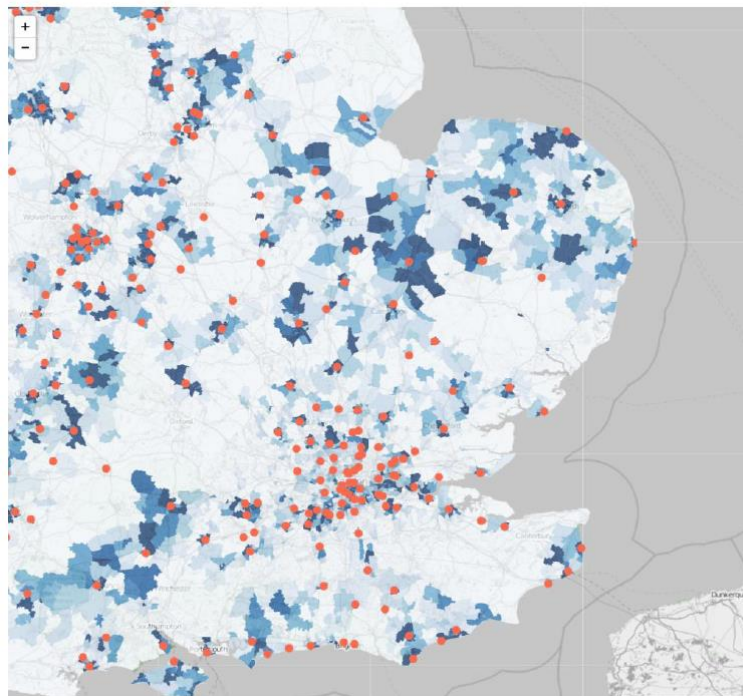

Figure 1 Actual Trussell Trust foodbank use. Orange dots denote a foodbank, darker patches show heavier use

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1.1 TRUSSELL TRUST FOODBANK DATA

Foodbanks in the Trussell Trust network distribute three-day emergency food parcels to people in crisis who are referred by frontline care professionals such as social workers, health visitors, or school liaison officers. Trussell Trust statistics are collected using an online data collection system into which foodbanks enter the data from each foodbank referral voucher. The system records numbers of three day emergency food supplies given out, as well as the reason for the referral.

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Trussell Trust foodbanks alone gave over one million three day emergency food supplies to people in crisis in the 2014/15 financial year. This is a measure of volume – the number of people to whom Trussell Trust foodbanks have given a three day food supply (containing enough food for 10 meals). The number does not necessarily indicate unique users. On average people needed help from the foodbank twice during this period.

1.2 HOW DOES THE DATA VISUALISATION TOOL WORK?

The prototype application tool (app) created by the NEMODE group uses anonymised postcode data taken from foodbank vouchers between 1 January 2014 – 15 September 2015 to map actual foodbank use per head of the population down to electoral ward level, creating a visualisation tool that gives the Trussell Trust and local food bank managers a detailed understanding of how their users are distributed geographically. This tool also enables the mapping of crisis causes at ward level, identifying areas where particular crisis causes – such as benefit delays or benefit changes - are more prevalent.

The app also predicts the possible need for a foodbank in certain areas. Researchers took various Census variables (e.g. levels of deprivation, unemployment, etc.) at a ward level and found that many of these were highly correlated with food bank usage per head of population. They used these statistics to build a model that predicts the level of food bank usage at a ward level. When the model predicted high foodbank usage but usage was in fact low, the ward was considered a possible area where the foodbank is not meeting the entire need. This could be used by foodbank managers to identify any gaps in provision or where independent food banks may operate and are already meeting need.

Researchers also carried out time series analyses of five years of foodbank data, showing patterns of foodbank use and a life-cycle model of foodbank use at an average foodbank.

This video demonstrates how the visualisation tool works.

1.3 FUTURE USES AND DEVELOPMENT OF THE TOOL

Although currently in early stages of development, the potential applications for this tool are extensive and can complement work being done by the Trussell Trust to offer our data system under licence to similar independent foodbanks. Currently, only Trussell Trust foodbank data is included, but it could become a shared platform where other agencies and food charities giving out emergency food and crisis services can add their own data to open data and foodbank data.

This would enable us to track the use of local support services (including those outside of The Trussell Trust network), work out where there is unmet need, and evaluate the root causes and effectiveness of interventions. Other open data like weather data could be inputted to track the impact of cold weather on foodbank use. For the next phase, the researchers aim to make this an open-source tool, available on GitHub for coders to edit and develop.

2. KEY INSIGHTS

2.1 Strong correlation between high foodbank usage and areas with people in skilled manual work, or unable to work due to long term health issues or disability. Deprivation indices were also strongly correlated with foodbank usage.

Researchers compared foodbank use per head to a variety of Census variables in each ward to identify any correlations that emerged. They found that foodbank use is higher in wards where there are more people who are:

- unable to work due to long term sickness or disability;
- in skilled manual work;
- or deprived*.

Source: 2011 Census
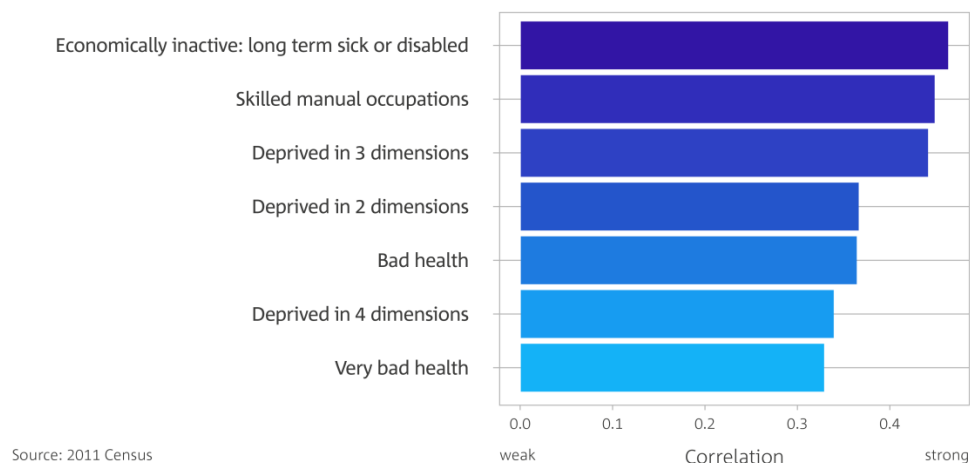
This is an important emergent finding that could provide some interesting new insights into foodbank use and its causes. A correlation of 0.4 is generally considered strong, and we are keen to further investigate the links between these groups and foodbank use, but we must be careful to acknowledge that these are early results and further research is needed before firm conclusions can be drawn.

Anecdotally, many foodbank managers report seeing people from each of the above categories referred to their foodbanks for emergency food. For example, people coming to foodbanks who are waiting weeks for Personal Independence Payments (PIP), and people on low wages or in insecure work being referred to foodbanks, often because a seemingly small crisis, like the boiler breaking down or a delayed paycheque, has tipped them over the edge.

MARCELLA'S STORY

"It's so hard to pay rent and survive at the moment. People should not just be surviving though, they should be able to live and have a life."

For nine years, Marcella, 32, a trained veterinary nurse from Chelmsford, has suffered from a chronic spinal condition. Unfortunately, when her health deteriorated, she was forced to stop working to undergo a spinal operation and began to struggle. When her ESA payments were switched to JSA, the payment that she so desperately relies on was delayed and was referred to The Trussell Trust for help.

The Trussell Trust separately surveyed foodbank managers in April 2016. **81% of foodbank managers** reported that **'administrative delays in benefit payments'** was a **major cause** of foodbank referral. **67%** of managers saying that problems accessing **Employment and Support Allowance (ESA)** were a problem for people and **51%** stating that **problems accessing PIP** were causing people to be referred to their foodbank. 75% of foodbank managers also said that for working people, low wages were a significant problem in their foodbank.

AMANDA'S STORY

"I want to stay positive but it is stressful. Just because my disability isn't visible, that doesn't mean it has less of an impact on my life."

Amanda is a mum whose heart condition meant she was signed off work. When Amanda was assessed for PIP recently she was refused the payment, and her case worker is trying to appeal. Amanda had to use the foodbank last year when her partner – a refuse collector - was the victim of a hit and run accident and was off work for 15 weeks, which caused the family to fall into crisis. Stress and money issues have worsened her health condition and she regularly gets heart palpitations as a result.

Severe mental health issues can also leave people unable to work or disabled and in our survey of foodbank managers, 40% reported that mental health issues were a **major issue** amongst the people who used the foodbank.

*The dimensions of deprivation used to classify households in the Census are indicators based on the four selected household characteristics:

1. Employment – any member of a household not a full-time student is either unemployed or long-term sick.
2. Education - no person in the household has at least level 2 education (see highest level of qualification) and no person aged 16-18 is a fulltime student.
3. Health and disability - any person in the household has general health 'bad or very bad' or has a long term health problem.
4. Household - household's accommodation is either overcrowded with an occupancy ration -1 or less or is in a shared dwelling, or has no central heating.
   A household is classified as being deprived in none, or one to four of these dimensions in any combination.

2.2 Data visualisation tool can map foodbank use and referral reason down to ward level to identify areas of need

The tool can map foodbank locations and levels of foodbank use down to ward level and produce a heat map, like the one pictured below. These visualisations could be used by foodbank managers to identify gaps in emergency food provision and guide decisions as to where new foodbank centres could be located.

Further development of the tool could include plotting the locations of individual foodbank centres (some foodbanks have as many as 20 distribution centres across a large geographical area), as currently only the main foodbank centre is included in the visualisation. It could also include plotting what additional services (by Trussell Trust foodbanks, and other community organisations) are being provided.

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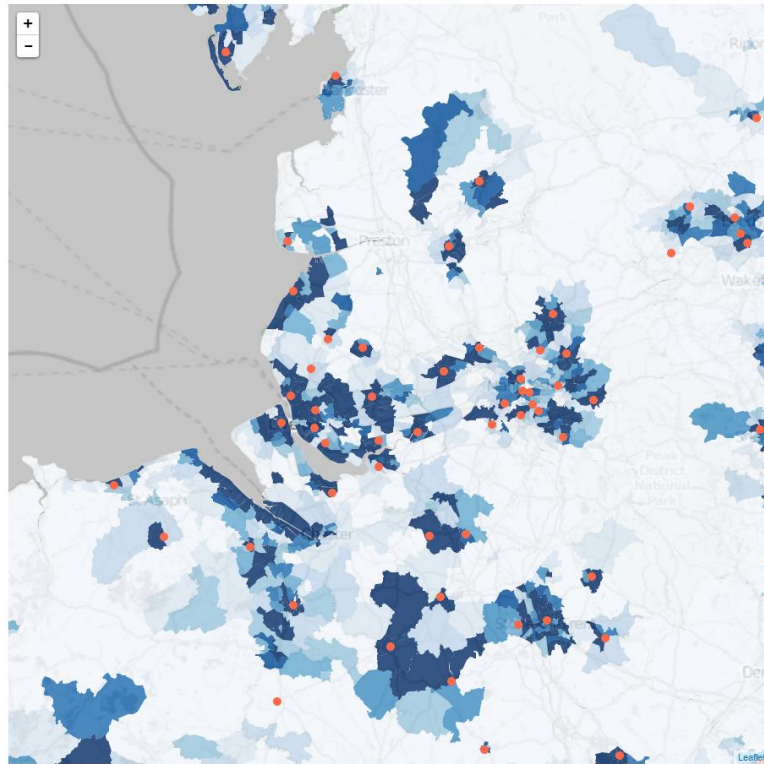
Figure 2 North Wales and North West: Actual Trussell Trust foodbank use, mapped to ward level

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The tool can also map referral reason by ward, e.g. benefit delay, to point to area-specific needs. For example, areas with particularly high levels of foodbank use due to benefit delays may be an indication of specific localised problems with welfare delivery in the area.

FOCUS ON LONDON:

Using the app to focus on a region such as London is a way to see where particular crisis causes are especially prevalent. For example, this heat map shows North London foodbanks are seeing more people because of benefit delays than other areas. Further investigation can point to whether particular problems with local benefit delivery, or other factors, are the cause.

London

Legend:
- 0 to 0.01
- 0.01 to 0.01
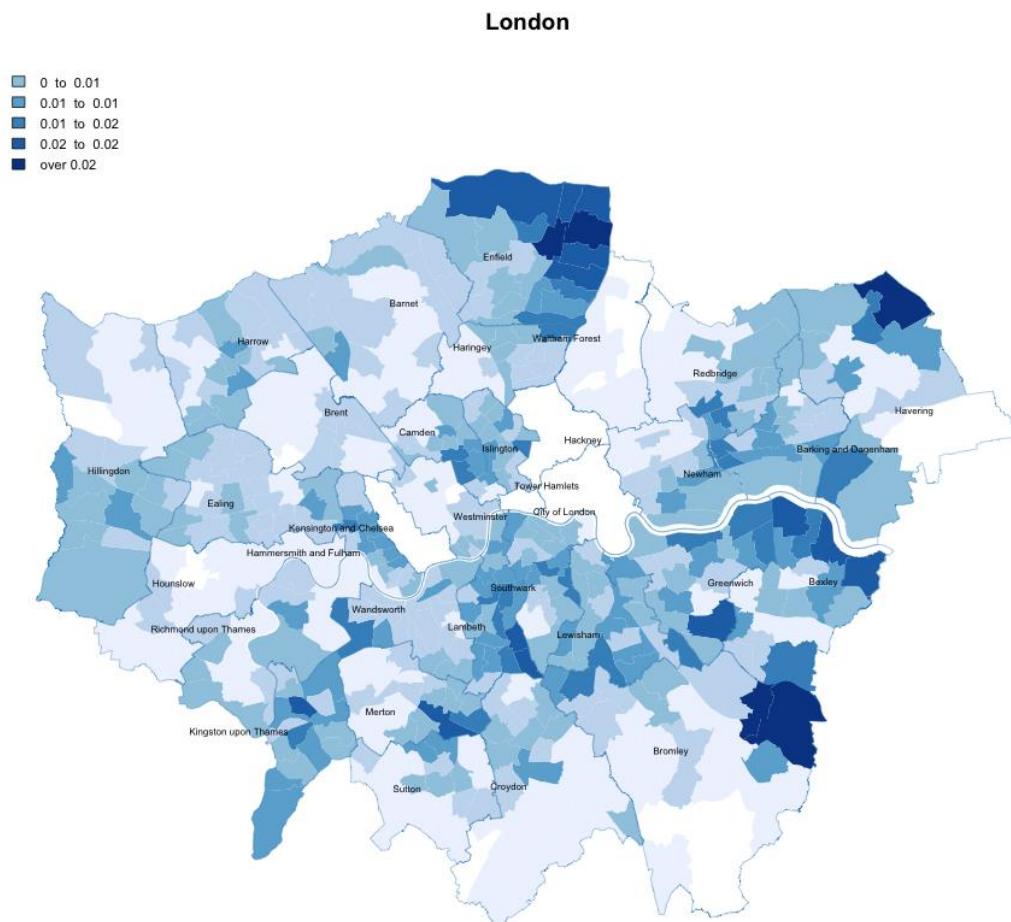- 0.01 to 0.02
- 0.02 to 0.02
- over 0.02

Figure 3 London: Foodbank referrals due to benefit delays, mapped down to ward level in London.

Map created by Coppelia using the geoukr package. Contains National Statistics data © Crown copyright and database right 2013; Contains Ordnance Survey data © Crown copyright and database right 2013; Contains Openstreetmap data © Openstreetmap.

2.3 Mapping using Census deprivation indices shows predicted foodbank demand and any gaps in provision. These could either mean Trussell Trust crisis provision is not meeting the whole need, or that there are independent agencies providing food

Researchers have compared foodbank use to Census variables specifically relating to deprivation, such as bad health and economic inactivity, to see where emergency food provision may be needed but is currently not available.

FOCUS ON LONDON:

A heat map of deprivation can emphasise particularly deprived areas where foodbanks may be of use, guiding where new Trussell Trust foodbank centres could be opened. However, as data from independent foodbanks is not yet included in the tool, areas which appear not to have any emergency food provision may actually have them – for example the East End does have independent foodbank provision.
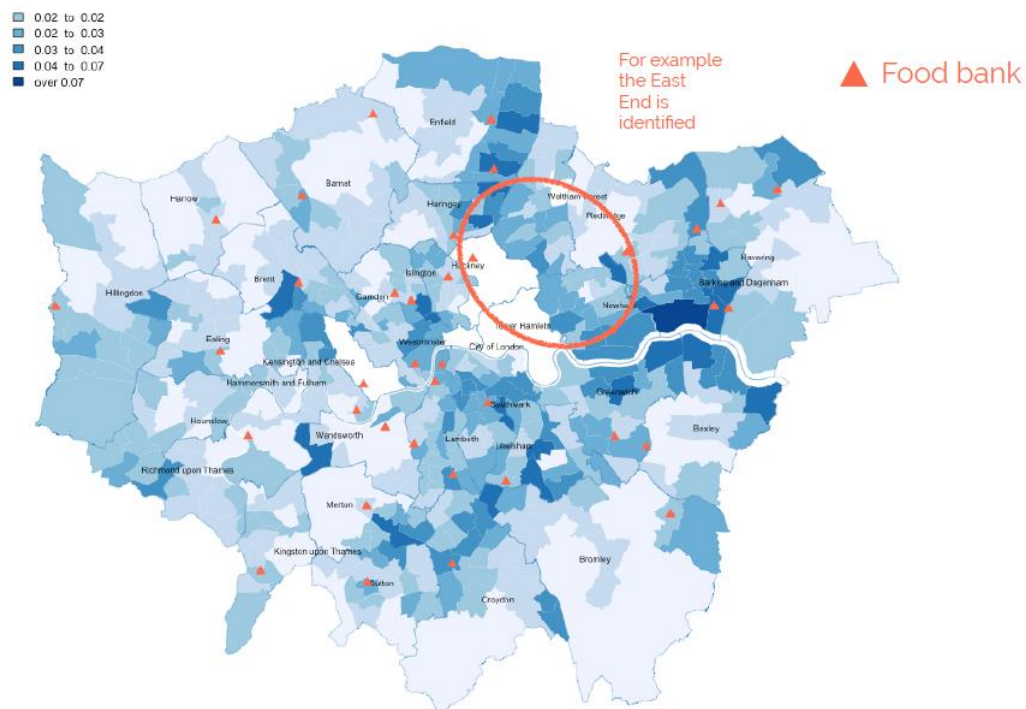

Figure 4 Greater London: Predicted need based on Census deprivation indices

Map created by Coppelia using the geoukr package. Contains National Statistics data © Crown copyright and database right 2013; Contains Ordnance Survey data © Crown copyright and database right 2013

2.4 Foodbanks in England and Wales see higher demand in the winter months, especially at Christmas
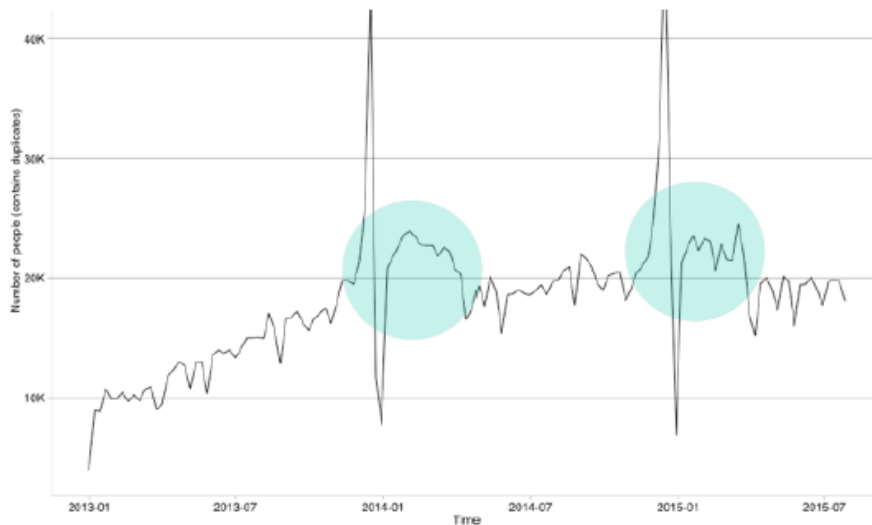

Figure 5 Trussell Trust foodbank use over time

Historically, foodbanks have reported higher demand during the winter months, especially in the lead up to Christmas, which is supported by the time series analysis. This yearly spike could be due to a number of factors, including; multiple pressures hitting families; cold weather and high energy bills, particularly for customers on pre-payment meters; or foodbanks and referral agencies ensuring that people who are likely to hit crisis have food ahead of Christmas Day - especially if the foodbank is likely to operate reduced hours between Christmas and New Year.

Foodbanks and referral agencies make a concerted effort to make sure that anyone likely to face hunger over Christmas is helped *before* Christmas and can receive additional festive food or Christmas hampers, to reduce the risk of crisis over the Christmas period.

Additionally, foodbanks are increasingly offering more services to help people coming to foodbanks in winter. TheTrussell Trust has a partnership with npower, the npower Fuelbank, where foodbanks can now give people a voucher to top up their pre-payment meters as well as an emergency three-day supply of food. Research from Citizens Advice last year found people on pre-payment meters are more likely to be struggling to heat their homes and keep the lights on[1]. Other foodbanks operate independent fuel voucher schemes, and many have 'clothes banks' where people can donate or pick up winter coats to help people battling the cold.

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[1] 2015, Citizens Advice. https://www.citizensadvice.org.uk/about-us/how-citizens-advice-works/media/press-releases/prepay-energy-customers-paying-226-a-year-more/

LYDIA'S STORY (name changed)

"When I went to the food bank they were welcoming and kind. I didn't know help like that was out there."

Lydia needed a foodbank parcel after she was made redundant. A mum of three, she's worked all her life – first in a bank, then in a doctor's surgery, then in an solicitor's office. Her foodbank was also providing Fuelbank vouchers as part of the npower Fuelbank scheme, and so with her three-day emergency food supply she was also given £49 worth of energy and gas to put on her pre-payment meter. She is now volunteering at the foodbank whilst she looks for work.

3. NOTES

How Trussell Trust foodbanks work:

- Trussell Trust foodbanks provide three days' nutritionally balanced food and support to people in crisis in the UK. We also signpost people to other agencies and services able to help resolve the underlying cause of the crisis. As part of the charity's More Than Food approach, many foodbanks also host additional services like debt/financial advice, holiday lunch and breakfast clubs.
- Everyone who comes to a Trussell Trust foodbank is referred by a professional such as a social worker, health visitor or schools liaison officer. Over 30,000 frontline professionals refer people to Trussell Trust foodbanks, and 50 percent are statutory agencies.
- Over 90 percent of food given out by Trussell Trust foodbanks is donated by the public. In 2015-16, 10,570 tonnes of food was given out to people in crisis.
- The Trussell Trust is a charity motivated by Christian principles that runs the biggest network of foodbanks in the UK. For more on The Trussell Trust visit www.trusselltrust.org

Trussell Trust foodbank statistics:

The Trussell Trust statistics are a measure of volume – they show the number of people to whom Trussell Trust foodbanks have given three days' emergency food. These are not necessarily unique users.

Our data system is beginning to capture numbers of unique foodbank users on a national scale, and whilst it is too early to accurately use this figure, detailed evidence collected from a range of foodbanks indicates that on average, people needed 2 foodbank referrals in one year.

The top three reasons for referral to a foodbank include:

- 'Benefit delays' refer to people not receiving benefits to which they are entitled on time, this category can also include problems with processing new claims, or any other time lags in people receiving their welfare payments.
- 'Benefit changes' refers to the problems resulting from a change in people's welfare payments, for example, people having their benefits stopped whilst they are reassessed. This can also include a sanction.
- 'Low income' refers to anyone who is struggling to get by on a low income. This could be people in work, or people on benefits, for whom a small crisis e.g. boiler breaking down or having to buy school uniform etc, can be enough to mean that they cannot afford food.

The tool was build using the open source Javascript packages d3 and leaflet.

4. APPENDIX A: 2011 CENSUS DATA

List of Census variables the researchers used to compare with foodbank data

Reference	Name
QS101EW	Residence type
QS102EW	Population density
QS103EW	Age by single year
QS104EW	Sex
QS105EW	Schoolchildren and full-time students at their non term-time address
QS106EW	Second address
QS108EW	Living arrangements
QS110EW	Adult lifestage (alternative adult definition)
QS111EW	Household lifestage
QS112EW	Household composition - People
QS113EW	Household composition - Households
QS114EW	Household composition (alternative child and adult definition) - People
QS115EW	Household composition (alternative child and adult definition) - Households
QS116EW	Household type
QS117EW	People aged 18 to 64 living in a one adult household
QS118EW	Families with dependent children
QS119EW	Households by deprivation dimensions
QS121EW	Armed Forces
QS201EW	Ethnic group
QS202EW	Multiple ethnic groups
QS203EW	Country of birth (detailed)
QS204EW	Main language (detailed)
QS205EW	Proficiency in English
QS206WA	Welsh language skills
QS207WA	Welsh language skills (detailed)
QS208EW	Religion
QS210EW	Religion (detailed)
QS211EW	Ethnic group (detailed)
QS212EW	Passports held
QS213EW	Country of birth (expanded)
QS301EW	Provision of unpaid care
QS302EW	General health
QS303EW	Long-term health problem or disability
QS401EW	Accommodation type - People
QS402EW	Accommodation type - Households
QS403EW	Tenure - People
QS404EW	Tenure - Household Reference Person aged 65 and over
QS405EW	Tenure - Households
QS406EW	Household size
QS407EW	Number of rooms
QS408EW	Occupancy rating (rooms)
QS409EW	Persons per room - Households
QS410EW	Persons per room - People
QS411EW	Number of bedrooms
QS412EW	Occupancy rating (bedrooms)
QS413EW	Persons per bedroom - Households
QS414EW	Persons per bedroom - People
QS415EW	Central heating
QS416EW	Car or van availability

QS417EW   Household spaces
QS418EW   Dwellings
QS419EW   Position in communal establishment
QS420EW   Communal establishment management and type - Communal establishments
QS421EW   Communal establishment management and type - People
QS501EW   Highest level of qualification
QS502EW   Qualifications gained
QS601EW   Economic activity
QS602EW   Economic activity of Household Reference Person
QS603EW   Economic activity - Full-time students
QS604EW   Hours worked
QS605EW   Industry
QS606EW   Occupation (Minor Groups)
QS607EW   NS-SeC
QS608EW   NS-SeC of Household Reference Person - People aged under 65

http://www.nomisweb.co.uk/census/2011/quick_statistics

APPENDIX B: FOODBANK DATA

The data used in the analysis is taken from the foodbank voucher database. Vouchers are issued by partner agencies and then redeemed by the foodbank user at a foodbank. Once redeemed, the voucher(s) is entered into a Web-based application by the local foodbank.

Field	Definition
voucherNo	Voucher unique identifier
referringAgency	Agency issuing the voucher
foodbankID	Food bank unique identifier
date	Date the food bank voucher is used by the user
userPostCode	Six digit post code of user (or no fixed address)
noAdults	Number of adults in the household to be fed by the food package
noChildren	Number of children in the household to be fed by the food package
crisisType	One of: Benefit changes, Benefit delays, Child holiday meals, Debt, Delayed wages, Domestic violence, Homeless, Low income, Sickness, Unemployed, Other
ethnicity	One of: White, Mixed, Asian, Black, Chinese, Other
ageGroup	16-24, 25-64, over 65
paidEmployment	Y/N

THE TRUSSELL TRUST

The Trussell Trust is a charity founded on Christian principles that partners with local communities to combat poverty in the UK.

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