Implementing an Adaptive Survey Design (ASD) for the Transformed Labour Force Survey (TLFS)

Michalina Siemiatkowska
Senior Research Officer
Survey Design Team
Michalina.Siemiatkowska@ons.gov.uk

UNECE Expert Meeting on Statistical Data Collection and Sources
22-24 May 2024

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Context

Transformed Labour Force Survey (TLFS):
- Transformation of the original Labour Force Survey (LFS)
- Focusing on the re-design of the survey for online data collection

Position in 2022
- TLFS response rate of **38%** from online/telephone modes = great start!
- BUT experiencing differential non-response bias (despite respondent centred re-design)
  - Responding sample biased towards **white, male, home-owners, aged 45+**
  - Unequal response distribution across Region, Index of Deprivation and Output Area Classification

Natural next step was to introduce face-to-face data collection

- With a survey of 500,000 a year… how can we increase the quality of the data collection but keep costs down?
- Exploring innovative mixed mode design
- Implement Knock-to-Nudge and Adaptive Survey Design
Knock-to-Nudge and Adaptive Survey Design

What is **Knock-to-Nudge (KtN)**?
• Interviewers visit addresses (remain on doorstep) to encourage response via a remote method (telephone or online survey mode)
  o interviewer can build rapport
  o less expensive
  o can leave a ‘called today’ card

What is **Adaptive Survey Design (ASD)**?
• “Data-driven tailoring of data collection procedures to different sample members, often for cost and bias reduction” (Schouten, Peytchev & Wagner, 2018)*
  o divide your sample into smaller groups/strata that have similar characteristics
  o apply alternative survey design features to different groups
  o objective is to improve targeted survey outcomes

*Schouten, Peytchev & Wagner, 2018
**ASD Strategy and Methodology**

- **Structured trial & error approach** using R-indicators** (Schouten and Shlomo, 2015)***

**Methodology**

- Used logistic regression, **CVs, R-Indicators and Partial R-Indicators** to identify the variables and categories of variables driving variation in response propensities.

- **Strongest predictors of response**
  - ✓ Age (<45)
  - ✓ Urban/Rural Classification (Urban)
  - ✓ Index of Multiple Deprivation (IMD deciles 1-4)

*constructed 8 strata* based on these variables that were attached to the sampling frame.
Overall response rate

Average Response Rate across the 28 day field period
Aug23-Feb24

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# R-indicators and CVs

<table>
<thead>
<tr>
<th></th>
<th>Pre-KtN</th>
<th>Post-KtN</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-indicator</td>
<td>0.85</td>
<td>0.89</td>
</tr>
<tr>
<td>CV</td>
<td>0.20</td>
<td>0.14</td>
</tr>
</tbody>
</table>

To see an improvement in the representativity of the data:

- ✓ Increase in Representativity indicator (R-indicator)
- ✓ Decrease in Coefficient of Variation (CV)
## Sample composition

<table>
<thead>
<tr>
<th></th>
<th>TLFS Pre-ASD</th>
<th>TLFS Post-ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 45</td>
<td>40.28% *****</td>
<td>42.63%</td>
</tr>
<tr>
<td>45 and over</td>
<td>59.72%</td>
<td>57.37%</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>88.74%</td>
<td>87.69%</td>
</tr>
<tr>
<td>All Other</td>
<td>11.26% *****</td>
<td>12.31%</td>
</tr>
<tr>
<td><strong>Tenure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Owner</td>
<td>77.67%</td>
<td>74.65%</td>
</tr>
<tr>
<td>All Other</td>
<td>22.33% *****</td>
<td>25.35%</td>
</tr>
</tbody>
</table>

* Significant at p < .05  
** Significant at p < .01  
*** Significant at p < .001
Field operations

% of cases with response only

Visit number

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Learnings

• Easy to under-estimate the operational challenges of implementing an ASD
  o Issues with recruiting/retaining interviewers – under capacity
  o New way of operating for ONS and interviewers – culture change
    • No in-home interviewing – just a 'nudge'
    • Only visiting 'hard-to-reach' cases – greater ability to persuade/overcome objections

• Improvements in TLFS survey quality
  o Increase in representativity
  o Reduction in non-response bias
  o Improved granularity of data – helps to meet external stakeholder expectations

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Next steps

• Continue **working with field operational colleagues** to optimise ASD
  
  ◦ Revisit interviewer guidance, communications, performance targets, allocation process, management information (MI)

• Begin work on the **next iteration of the ASD**
  
  ◦ Explore alternative auxiliary data (e.g., admin data)
  ◦ Explore additional design features (e.g., incentives, materials)

• Continue to **build expertise and knowledge** within the ONS
  
  ◦ Working collaboratively with other teams

• Continue to **promote research**
  
  ◦ Publish working papers, blogs, conferences
References


*** RISQ - Representative Indicators for Survey Quality - Cathie Marsh Institute for Social Research (CMI) - The University of Manchester
Thank you for listening!

Michalina.Siemiatkowska@ons.gov.uk
Annex
Background on the transformation of the Labour Force Survey

• Purpose:
  • Labour Force Survey (LFS) = survey of **households** living at private addresses in the **UK**
  • Provides information on the UK **labour market** to help develop, manage, evaluate and report on labour market policies

• Transformed Labour Force Survey (TLFS):
  • **Transformation** of the Labour Force Survey (LFS) – in response to the COVID-19 pandemic
  • Focusing on the re-design of the survey for online data collection
  • Underlying principles:
    • **Digital by default**
    • **Statistical redesign and rationalisation** – not ‘lift and shift’
    • ‘**Respondent Centred Design**’ – putting the respondent back at the heart of the design (see Wilson, L & Dickinson, E (2021) Respondent Centred Surveys)
Key aspects of the TLFS design

- **Large W1**: Issued sample size 140,000 addresses per quarter
- Sample **residents in GB in private households**. No communal establishments
- Sample drawn from **AddressBase Premium** – database comprised of local authority data, Royal Mail data, and Ordnance Survey data
- **Systematic random sample**: sample ordered by geography and addresses are selected at regular intervals
- **Longitudinal** survey element – 5 waves
- **Mixed mode**: online first (2020), telephone (Feb 2022), face-to-face (Nov 2022)
- **Adaptive Survey Design** (2022)
- **TLFS User Guidance**
The transformation journey so far...

- **2017**
  - Tests 1 & 2: Online response rates and Engagement strategies

- **2018**
  - Test 3: Mixed mode (online & F2F) Statistical outcomes

- **2019**
  - Test 4: Online attrition test – response rates across 3 waves

- **2020**
  - TLFS Beta: Online only in response to pandemic

- **2022**
  - Addition of Telephone: Online & telephone collection

- **2022/23**
  - Knock-to-nudge: Using an Adaptive Survey Design

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The transformation journey so far...(papers)

Test 1
Test 2

Publications from the mixed mode (online and F2F) in 2018:
• Technical report
• Characteristics report
• Comparative estimates report

Attrition test

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TLFS Wave 1 Respondent Timeline

**Week 0**
- Pre-notification letter (1)

**Week 1**
- Invitation letter (2)
- Online data collection starts
- Respondents can request a telephone interview via SEL

**Week 2**
- Reminder letter (3)
- Online data collection
- Telephone interview by request

**Week 3**
- Knock-to-nudge starts
- Respondents can still complete online

**Week 4**
- 'Hard' completion deadline (Sunday)
What does the TLFS Adaptive Survey Design look like?

- TLFS data collection strategy was the same for all sampled addresses
  - Experiencing differential non-response bias
  - One size does not fit all!
- Introduced ASD and KtN in Nov 2022
- ASD strategy based on Statistics Netherlands work
  - Structured trial and error approach using R-indicators
- 4 week data collection
  - If no response from web/telephone in first 2 weeks KtN data collection begins
- KtN is only targeted at non-respondents most likely to reduce bias
ASD Methodology

Step 1. Create sample strata using auxiliary data:

- Logistic regression model was applied to historical TLFS data to identify auxiliary variables strongly associated with response in order to formulate the ASD strata.

- Variables considered were **Index of Multiple Deprivation, Urban/Rural Classification, Country of Birth, Age & Ethnicity** (limited by available data).

- Derived and examined **CVs, R-Indicators and Partial R-Indicators** to identify the variables and categories of variables driving variation in response propensities.

- Strongest predictors of response:
  - Age (<45)
  - Urban/Rural Classification (Urban)
  - Index of Multiple Deprivation (IMD deciles 1-4)

  Constructed 8 strata based on these variables that were attached to the sampling frame
**ASD Strata**

- Ran simulations to assess the effect of improving response across these strata.
- Simulations showed we could reduce the CV and increase the R-indicator by focussing our efforts on **strata 2-5**.

<table>
<thead>
<tr>
<th>Strata</th>
<th>Urbanicity</th>
<th>Deprivation</th>
<th>Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urban</td>
<td>Less deprived</td>
<td>45+</td>
</tr>
<tr>
<td>2</td>
<td>Urban</td>
<td>More deprived</td>
<td>16-44</td>
</tr>
<tr>
<td>3</td>
<td>Urban</td>
<td>Less deprived</td>
<td>16-44</td>
</tr>
<tr>
<td>4</td>
<td>Urban</td>
<td>More deprived</td>
<td>45+</td>
</tr>
<tr>
<td>5</td>
<td>Non-urban</td>
<td>More deprived</td>
<td>16-44</td>
</tr>
<tr>
<td>6</td>
<td>Non-urban</td>
<td>More deprived</td>
<td>45+</td>
</tr>
<tr>
<td>7</td>
<td>Non-urban</td>
<td>Less deprived</td>
<td>16-44</td>
</tr>
<tr>
<td>8</td>
<td>Non-urban</td>
<td>Less deprived</td>
<td>45+</td>
</tr>
</tbody>
</table>
ASD Methodology

Step 2. Identify design features to allocate to the strata:

- Potential to include numerous interventions in the ASD (e.g. mode, incentive, materials...)
- Keeping it simple
- 1 intervention = ‘Knock to Nudge’ follow up
- Our ASD targets KtN data collection at under-represented strata based on response propensities in order to reduce the variation in response propensities for a selected set of auxiliary variables.
- This will ensure that data collection resources are used in the most efficient way whilst increasing response from historically under-represented population groups.
ASD Methodology

Step 3. Identify quality and cost indicators to support decisions:

- Well-established in the survey literature that survey response rates as single indicators provide insufficient information about the quality of estimates based upon respondent data.
- There is a need for indicators that complement the response rate and measure the contrast between non-respondents and respondents.
- Therefore, we assess a number of quality indicators:
  - Response rate
  - Coefficient of Variation (CV) of response propensities and R-Indicators
  - Characteristic profile of responding sample
  - Survey estimates
Response rate by ASD strata

Response rate increase from weeks 3 & 4 is greater among the strata that received KtN visits.
## Variable level partial R-indicator

<table>
<thead>
<tr>
<th></th>
<th>Unconditional Partial Indicator</th>
<th>Conditional Partial Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>CI_LB</td>
</tr>
<tr>
<td>U/R</td>
<td>0.032587</td>
<td>0.032587</td>
</tr>
<tr>
<td>IMD</td>
<td>0.06489</td>
<td>0.062743</td>
</tr>
<tr>
<td>Age</td>
<td>0.054932</td>
<td>0.052701</td>
</tr>
</tbody>
</table>

**Unconditional partial R-indicator:**
- Reduced for all variables, meaning the variables impact on response has reduced.
- **Deprivation** had the greatest impact on response pre-KtN and post-KtN

**Conditional partial R-indicator:**
- Measures impact of a variable conditional on all other variables
- **Deprivation** had the greatest impact

**Recommendation:** deprived areas could receive more focus in future iterations of ASD
## Category level partial R-indicator

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>CI_LB</td>
<td>CI_UB</td>
<td>Estimate</td>
</tr>
<tr>
<td><strong>Urban</strong></td>
<td>-0.0141</td>
<td>-0.01481</td>
<td>-0.0134</td>
<td>-0.00975</td>
</tr>
<tr>
<td><strong>Rural</strong></td>
<td>0.029377</td>
<td>0.027914</td>
<td>0.03084</td>
<td>0.020222</td>
</tr>
<tr>
<td><strong>IMD 1-4</strong></td>
<td>-0.0501</td>
<td>-0.05093</td>
<td>-0.04927</td>
<td>-0.03947</td>
</tr>
<tr>
<td><strong>IMD 5-10</strong></td>
<td>0.04124</td>
<td>0.040556</td>
<td>0.041924</td>
<td>0.032436</td>
</tr>
<tr>
<td><strong>Age 16-44</strong></td>
<td>-0.03346</td>
<td>-0.03429</td>
<td>-0.03263</td>
<td>-0.02249</td>
</tr>
<tr>
<td><strong>Age 45+</strong></td>
<td>0.043565</td>
<td>0.042489</td>
<td>0.04464</td>
<td>0.02952</td>
</tr>
</tbody>
</table>

**Unconditional partial R-indicator:**
- Positive value = category is over-represented, negative value = category is under-represented

**Conditional partial R-indicator:**
- Impact of that category on the deviation from representative response after conditioning on the other variables

**Rural, IMD 1-4, Age 45+** has a greater impact on the deviation of response after conditioning on other variables
**IMD 1-4** has largest negative unconditional value and largest conditional value = more effort is needed here

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