Characterising changing travel patterns during COVID-19 and beyond

Dr Fiona Crawford
Lecturer in Transport Planning
Urban Big Data Centre at the University of Glasgow
(fiona.crawford.2@glasgow.ac.uk)
Transport and the Pandemic
Characterising changing travel patterns during and beyond COVID-19

Aim: To explore the impact of the pandemic on travel behaviour in Bristol to inform policies related to air quality and decarbonisation

Approach: Examined travel behaviour at an aggregate level and at an individual level using Automatic Number Plate Recognition (ANPR) data from Bristol alongside the associated vehicle type and fuel type data
Data from 101 cameras within the Bristol City Council area was obtained for the period from 28/2/2019 to 30/09/2021.

After cleaning, 64 cameras in 29 locations remained.
Overall process

Raw data
(505,026,585 observations)

Cleaned data
(364,161,519 observations)

Trip data
(74,978,179 trips)

Clusters of spatially similar trips
(47 clusters plus some trips unclassified)

Vehicle information
(DVLA look-ups for over 3 million number plates)

Trips from regular travellers only

Clusters of vehicles based on trips in April-June 2019
(regular travellers only)

Clusters of vehicles based on trips in April-June 2020
(regular travellers only)

Clusters of vehicles based on trips in April-June 2021
(regular travellers only)

Clusters of trip volume time series from each spatial cluster
(2 types of profile identified)
Data overview

Figure 15: Percentage of trips each month according to the total number of trips recorded by the vehicle

Figure 11: Trips per month in the cleaned data
Vehicle types

- Over 80% of trips made by cars
- 14% of trips made by light goods vehicles (N1 type)

Of the trips for which a fuel type could be identified:
- Vast majority (96%) were made in petrol or diesel vehicles
- 53% of trips were made in diesel-only vehicles (i.e. excluding diesel hybrids)
Clusters of regular travellers

- Data for a panel of frequently observed vehicles during a consistent time period (April to June) was compared for 2019, 2020 and 2021.
- Clustering was undertaken independently in each year based on trip frequency, spatial coverage and time-of-day variability.
- The optimal number of clusters was 5 for each of the years and the clusters had similar characteristics across years.

Figure 20: Cluster membership for trips made in April to June in 2019, 2020 and 2021 (consistent panel of 495,483 travellers/vehicles)
Impact of pandemic (2019 to 2020)

- Increase in light goods vehicles travelling frequently or very frequently in 2020 (but 2021 data similar to 2019)
- 88% of LGVs travelling *more* in 2020 were Euro VI compared with 86% of LGVs travelling *less* in 2020
- 31% of cars travelling *more* in 2020 were Euro 6 compared with 35% of cars travelling *less* in 2020

Table 6: Percentage of cluster members which are light goods vehicles (N1)

<table>
<thead>
<tr>
<th>Cluster</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>No trips</td>
<td>18%</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>Few trips</td>
<td>15%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>Weekly trips</td>
<td>10%</td>
<td>15%</td>
<td>12%</td>
</tr>
<tr>
<td>Frequent</td>
<td>21%</td>
<td>27%</td>
<td>23%</td>
</tr>
<tr>
<td>Very frequent</td>
<td>4%</td>
<td>11%</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
</tr>
</tbody>
</table>
Change in behaviour between 2019 and 2021

- Of the vehicles observed in both 2019 and 2021:
  - 50% now in same cluster as pre-pandemic
  - 23% are in a more frequent cluster
  - 26% are in a less frequent cluster

Complex collection of behavioural responses!
Mean manufacture year was 2012 for all three groups
Key findings

• Traffic in Bristol had returned to pre-pandemic levels by mid-2021 at an aggregate level, BUT this masked more complex changes in behaviour.

• This project identified differences in the effects of the pandemic based on:
  o the spatial characteristics of the trips,
  o the type of vehicle used and
  o individual traveller characteristics

• Fewer ‘cleaner’ cars and more LGVs during lockdowns? Little change longer term?
Thank you for listening!

fiona.crawford.2@glasgow.ac.uk