

How safe are our streets for social distancing?: A national scale analysis of pavement space during COVID-19

Robson C^{*1} and Ford A^{†1}

¹School of Engineering, Newcastle University

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Summary

Social distancing measures were introduced across the UK in March 2020 as a response to the increasing infection rate of COVID-19. The UK government also issued statutory guidance for local authorities to investigate the potential for reallocation of road space to provide safer walking and cycling spaces for those making essential journeys or taking part in daily exercise. Identifying priority areas for the introduction of measures to ensure safer spaces was essential, and thus this study has analysed pavement space (widths) across GB, concluding that in many cities over 50% of pavements would not allow for the recommended social distancing of 2m.

KEYWORDS: COVID-19, social distancing, pavement space, accessibility, spatial analysis

1. Introduction

On March 24th 2020 the UK entered a national lockdown in an attempt to control the spread of the COVID-19 virus, instructing all citizens to stay at home. A number of exceptions were included, however; travel was allowed only for essential purposes, including essential shopping (food or medical supplies etc), and those who were still required to travel to work where their workplaces remained open. Additionally, citizens were also permitted to leave home once a day for daily exercise within their local area. These ‘lockdown’ measures were enacted on top of previously announced guidance on social distancing, advising all non-essential contact should stop, from March 16th (Mahase, 2020), with guidance recommending people to stay 2 metres from people not part of their household (BBC, 2020; UK Government, 2020b).

As a response to the interventions imposed on daily life by the UK government, and guidance to only use public transport where absolutely necessary, travel and movement patterns have changed significantly. In some places there was a 70% rise in the use of bikes by those exercising or making essential journeys (UK Government, 2020c), a significant decrease in motor vehicle traffic, with rush hour volumes down by ~60% in Newcastle (Newcastle Chronicle, 2020), and use of public transport well below normal levels (UK Government, 2020a).

Active travel, ‘travel via means of walking or cycling for the purpose of making everyday journeys’ (UK Government, 2016), was actively encouraged, with evidence linking greater fitness to recovery from COVID-19 (UK Government, 2020c). It was also widely acknowledged, however, that there is a lack of space in many places to allow for active travel to be a safe and attractive option, with more space needed to allow people to make essential trips and exercise (Sustrans, 2020; UK Government, 2020c).

In response, a fund accessible to local authorities was created to bid for money to implement new measures to provide more space for active travel (UK Government, 2020d), supporting safer walking

* craig.robson1@ncl.ac.uk

† a.c.ford@ncl.ac.uk

and cycling, and reducing the potential spread of the COVID-19 virus. Applicable measures included, but weren't limited to: converting traffic lanes (or parking bays) to space for pedestrians or cyclists, reducing speed limits to make environments safer and more welcoming, introducing pedestrian and cycle zones (restring access to vehicles), creating more space at bus stops and changes to junction design to better accommodate cycling (UK Government, 2020c). Similar measures were successfully introduced in other cities across the globe, such as Berlin (The Guardian, 2020a), Toronto (CTV News, 2020) and Mexico City (CNET, 2020).

There have been limited previous studies examining the provision of pavement space for users. One alternative study calculated pavement widths across New York, USA, in a project driven by the introduction of social distancing measures (Meli Harvey, 2020; The New Yorker, 2020), concluding that in many places the widths are inadequate to maintain social distancing, even in locations which traditionally would have seen a high footfall (results accessible: <https://www.sidewalkwidths.nyc/#13.75/40.71622/-73.99875>). No comparisons were undertaken between cities, and access to facilities regarded as essential, schools, hospitals (and similar) and essential shops was not examined.

The aim of the work presented in the following was to examine if (a) it was possible to develop a national scale methodology to measure and asses pavement space with reference to the 2m social distancing requirement, and (b) examine at a local scale the availability of space to aid the identification of locations where potential changes to road space to improve accessibility and safety are needed. This paper introduces the implemented methodology (Section 2), followed by a summary of some results (Section 3) and a discussion (Section 4).

2. Methodology

To undertake a national scale assessment of pavement space, a Python-based framework was developed. This built on the work for New York by Meli Harvey (2020), with the existing code base (<https://github.com/meliharvey/sidewalkwidths-nyc>) adapted and the data processing flow line updated (Figure 1) to accommodate the data available in the UK setting. Further analysis capabilities were added to provide more detailed information on the data being analysed, including methods to form statistical outputs on the widths and lengths of path segments to allow distributions to be examined.

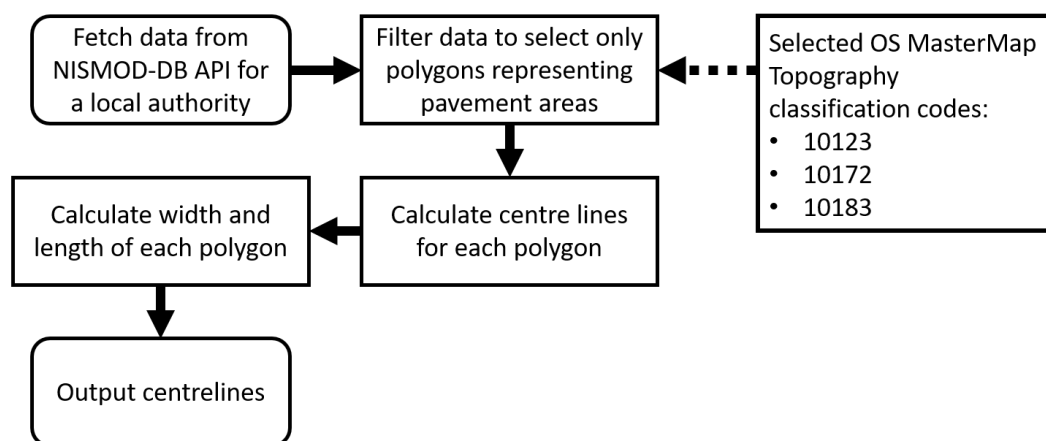


Figure 1: Analysis flow line.

Data from Ordnance Survey MasterMap (Ordnance Survey, 2020) was used to identify areas that could

be classed as pavements (Figure 1). Using the previously developed NISMOD-DB API (Robson. C *et al.*, 2018; ITRC and Robson. C, 2021), data was retrieved per-local authority to allow for an automated flowline and multi-process computing framework to be employed, facilitating the ability to undertake a national scale assessment. Where cities have been analysed, the extent of the city is defined by that city's primary local authority district boundary.

3. Results

3.1. UK Cities

A variation between cities can be observed (Figure 2), as would be expected given the organic way in which cities develop and evolve independently over time. Traditionally historic cities, such as York, has a significant proportion (62.22%) of pavements which are less than 2m wide, compared to the average (of those shown) of 53.74%. Meanwhile Liverpool and Glasgow have just 44.34% and 44.54% of paths with a width <2m. More maps for a small number of cities are available online - https://craig-robson.github.io/pavement_maps/

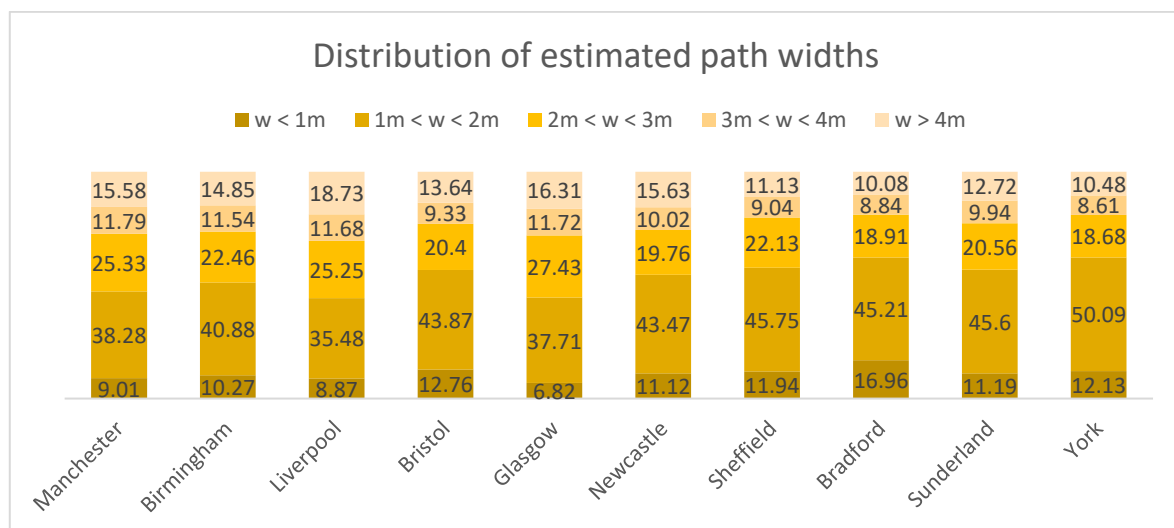


Figure 2: Distribution of estimated pavement widths for selected GB cities.

3.2. City scale

Exploring the results within a city, we have used the city of Newcastle upon Tyne, in North East England, as a case study. Footpath widths vary across the city (Figure 3 and Table 1), are shown for four chosen areas; (a) the city centre (including the main shopping district, the main hospital and two universities); (b) the suburb of Gosforth centred on Gosforth High Street, both a busy district shopping centre and a main, but narrow, public transport corridor into the city centre; (c) the suburb of Heaton, a densely populated area with Chillingham Road (centre of map) home to schools and local shops; (d) popular student suburb of Jesmond, again including schools, and shopping streets as well as a vibrant area for nightlife.

It is clear that in the City Centre (Figure 3 (a)) there are, to a large extent, wide pavements and open spaces which facilitate the potential for safe social distancing with many paths more than 2m wide, with an average width over the area of 3.4m (Table 1). Conversely, the residential suburbs show a greater tendency for narrow pavements, all with average widths below 2m, (Table 1, Figure 3 (b-d)).

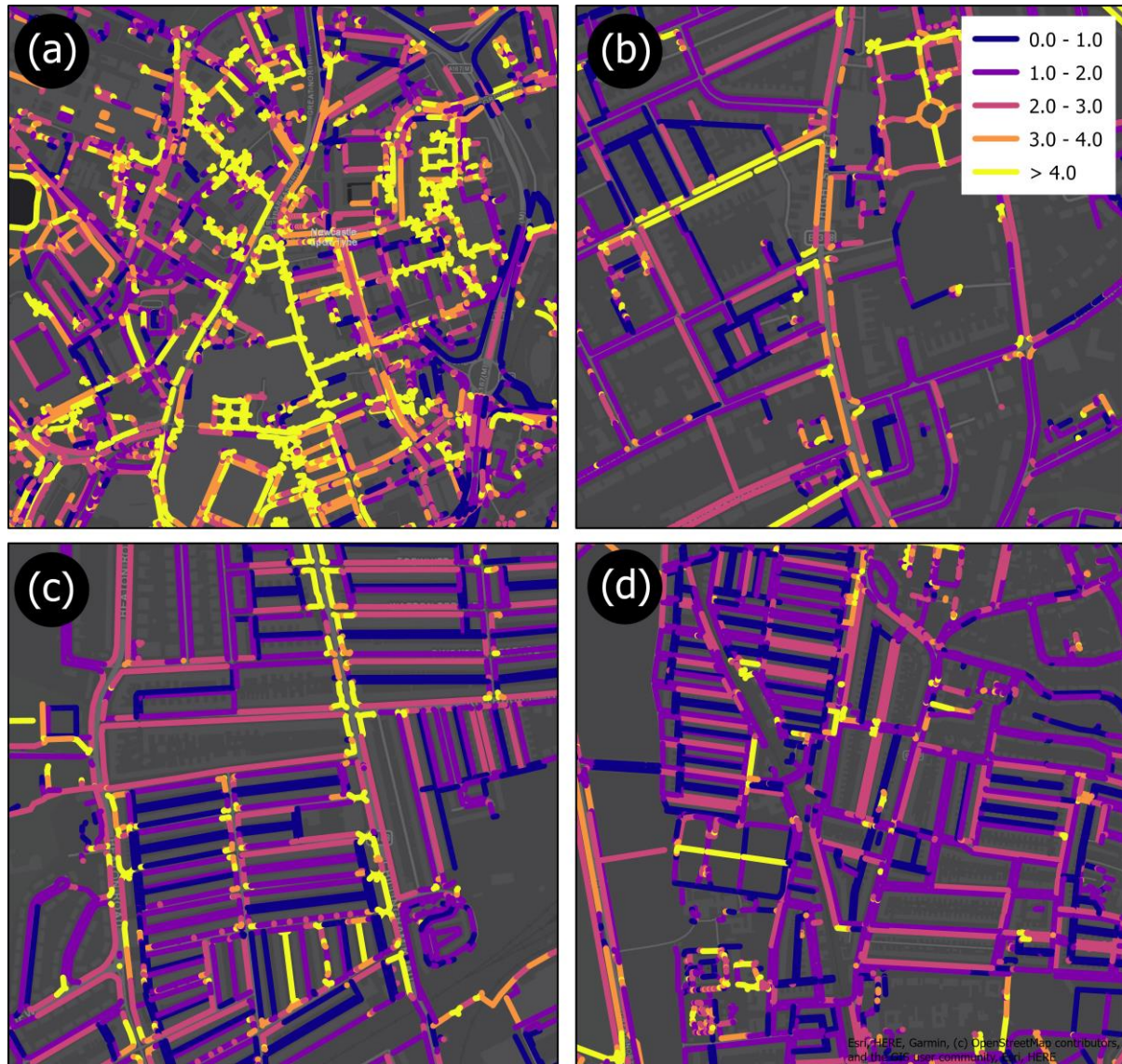


Figure 3: Footpath widths across Newcastle; (a) City Centre, (b) Gosforth, (c) Heaton, (d) Jesmond.

Table 1: Average path width across the four selected areas (mapped in Figure 3).

| | Average path width (m) |
|-----------------|------------------------|
| (a) City Centre | 3.4 |
| (b) Gosforth | 1.9 |
| (c) Heaton | 1.7 |
| (d) Jesmond | 1.6 |

4. Discussion and Conclusion

The analysis has highlighted the variation in built potential pavement space across cities and their suburbs. Our case study of Newcastle has shown that pavement space could be sufficient in existing city centre locations, particularly as footfall in such areas has decreased significantly due to home working and the closure of non-essential shops and entertainment venues. In addition, it is expected that, as consumers become more aware of environmental issues and wish to support local business, city centre shopping areas will become less popular, with consumers wanting to support their local business closer to home (Centre for Cities, 2020; The Gaurdian, 2020b). District shopping centres, such as Gosforth and Heaton, are therefore likely to see a higher footfall from those shopping local, exercising,

and making cycle trips. This analysis shows, however, that pavement space is limited in these areas, making safe movement more difficult, and a potential for greater conflicts between the demands of different road and pavement users.

The results demonstrate the need for greater consideration of the local environments where people are increasingly spending more time and more likely to cross-paths with one another. It is expected that the trend for home working will continue in the future (Global Workplace Analytics, 2020; The Guardian, 2020a), with some companies, such as Google (The Guardian, 2020b) and Unilever (The Guardian, 2021), already planning for this. Consumers are expected to continue the new trend of shopping local (Accenture, 2020; YouGov, 2020). Therefore improving the provision of pavement space around district shopping centres, and support for a greater propensity of active travel among those making journeys, is required. This will have multiple benefits beyond COVID, supporting local economies, reducing air pollution, and reducing our impact on the climate (Sustrans, 2020).

Future work will explore how to better incorporate other local features (such as bus stops), locations of likely high footfall (supermarket queues), and complex pavement geometries. Understanding movement behaviours, including common cycling/commuting routes, facilitating more in-depth analysis of space for cycling provision and accessibility analysis, will help inform planning for improved active travel planning.

References

- Accenture (2020) *COVID-19 is Reshaping the Consumer Goods Industry*. [Online]. Available at: <https://www.accenture.com/acnmedia/PDF-127/Accenture-COVID-19-CGS-Pulse-Survey-Research-Wave-4.pdf#zoom=40>.
- BBC (2020) *Coronavirus: What are the rules for social distancing?* Available at: <https://www.bbc.co.uk/news/av/health-51966112> (Accessed: 3rd February).
- Centre for Cities (2020) *How are local centres in Greater Manchester recovering from lockdown?* Available at: <https://www.centreforcities.org/blog/how-are-local-centres-in-greater-manchester-recovering-from-lockdown/> (Accessed: 3rd February).
- CNET (2020) *How might Mexico City fight coronavirus? Bike paths*. Available at: <https://www.cnet.com/show/news/covid-19-coronavirus-mexico-city-bike-paths/> (Accessed: 3rd February).
- CTV News (2020) *Road closures and 'one-way sidewalks': Cities adapt to physical distancing*. Available at: <https://www.ctvnews.ca/health/coronavirus/road-closures-and-one-way-sidewalks-cities-adapt-to-physical-distancing-1.4894067> (Accessed: 3rd February).
- Global Workplace Analytics (2020) *Work-at-Home After Covid-19—Our Forecast*. Available at: <https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast> (Accessed: 7th February).
- ITRC and Robson. C (2021) *NISMODOB*. Available at: <https://www.itrc.org.uk/themes/databases/> (Accessed: 3rd February).
- Mahase, E. (2020) 'Covid-19: UK starts social distancing after new model points to 260 000 potential deaths', *BMJ*, 368, p. m1089.
- Meli Harvey (2020) *Sidewalk Widths NYC*. Available at: <https://www.sidewalkwidths.nyc/#13.75/40.71622/-73.99875>.
- Newcastle Chronicle (2020) *Huge fall in visitors to Newcastle and 600,000 fewer Metro journeys in coronavirus lockdown*. Available at: <https://www.chroniclelive.co.uk/news/north-east-news/coronavirus-lockdown-newcastle-footfall-metro-18008197> (Accessed: 3rd February).
- Ordnance Survey (2020) *OS MasterMap Topography Layer*. Available at: <https://www.ordnancesurvey.co.uk/business-government/products/mastermap-topography> (Accessed: 6th May).
- Robson. C, Barr S.L. and Pregolato, M. (2018) *GISRUK*. Leicester, UK.
- Sustrans (2020) *Re-allocating road space to make walking and cycling safer*. Available at: <https://www.sustrans.org.uk/for-professionals/urban-design-and-planning/re-allocating-road-space-to->

[make-walking-and-cycling-safer-during-covid-19-and-beyond](#) (Accessed: 3rd February).

The Guardian (2020a) *Pop-up bike lanes help with coronavirus physical distancing in Germany*. Available at: <https://www.theguardian.com/world/2020/apr/13/pop-up-bike-lanes-help-with-coronavirus-social-distancing-in-germany> (Accessed: 3rd February).

The Guardian (2020b) *UK shoppers choose local grocers and online stores in Covid-19 crisis*. Available at: <https://www.theguardian.com/business/2020/jun/23/britons-local-food-shops-online-stores-covid-19-supermarket> (Accessed: 3rd February).

The Guardian (2020a) *Covid-19 could cause permanent shift towards home working*. Available at: <https://www.theguardian.com/technology/2020/mar/13/covid-19-could-cause-permanent-shift-towards-home-working> (Accessed: 7th February).

The Guardian (2020b) *Many Google staff may never return to office full-time post-Covid*. Available at: <https://www.theguardian.com/business/2020/sep/24/google-staff-return-office-full-time-homeworking-sundar-pichai> (Accessed: 7th February).

The Guardian (2021) *Unilever workers will never return to desks full-time, says boss*. Available at: <https://www.theguardian.com/business/2021/jan/13/unilever-workers-will-never-return-to-desks-full-time-says-boss> (Accessed: 7th February).

The New Yorker (2020) *Mapping the Sidewalks of New York City for Social Distancing*. Available at: <https://www.newyorker.com/culture/culture-desk/mapping-the-sidewalks-of-new-york-city-for-social-distancing>.

UK Government (2016) *Working Together to Promote Active Travel: A briefing for local authorities*. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf.

UK Government (2020a) *Government extends coronavirus support for buses and trams, total funding tops £700 million*. [Online]. Available at: <https://www.gov.uk/government/news/government-extends-coronavirus-support-for-buses-and-trams-total-funding-tops-700-million>.

UK Government (2020b) *Guidance on social distancing for everyone in the UK*. [Online]. Available at: <https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-people-and-vulnerable-adults>.

UK Government (2020c) *Statutory guidance - Traffic Management Act 2004: network management in response to COVID-19*. [Online]. Available at: <https://www.gov.uk/government/publications/reallocating-road-space-in-response-to-covid-19-statutory-guidance-for-local-authorities/traffic-management-act-2004-network-management-in-response-to-covid-19>.

UK Government (2020d) *Transport Secretary announces new measures to “keep passengers safe now and level up for the future”*. [Online]. Available at: <https://www.gov.uk/government/news/transport-secretary-announces-new-measures-to-keep-passengers-safe-now-and-level-up-for-the-future>.

YouGov (2020) *Could COVID-19 ultimately save the high street?* [Online]. Available at: <https://yougov.co.uk/topics/consumer/articles-reports/2020/07/10/-covid-19-coronavirus-UK-high-street-local-effect>.

Biographies

Craig Robson is a research associate at Newcastle University in geospatial data science with an interest in spatial data management, real-time data, and the resilience of critical infrastructure to hazards.

Alistair Ford is a Lecturer in Geospatial Data, School of Engineering, Newcastle University.