Written evidence submitted by the Geographic Data Science Lab (GDSL)

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Introduction

1. We are part of the Geographic Data Science Lab within the Department of Geography and Planning at the University of Liverpool. We work at the intersection of data science and geography to understand social human behaviours and generate empirical evidence to support decision making. A core area of research in the past year has been understanding the relationship COVID-19 and different forms of inequality, particularly how COVID-19 has exacerbated existing inequalities and resulted in new forms of inequality.
2. This document aims to highlight some of the evidence of our research, specifically it provides an executive summary of four different projects on: 1) establishing the extent of social and spatial inequalities in COVID-19 testing; 2) demonstrating how the geography of COVID-19 has been associated with deprivation levels; 3) identifying key considerations to develop effective COVID-19 exit strategies; and, 4) identifying key issues relating to inequalities during data science and AI emergency response efforts against COVID-19 in the UK. Below we provide the reference to individual relevant research outputs and an executive summary which highlights the key findings of the research for policy consideration.

Executive Summary - Establishing the extent of social and spatial inequalities in COVID-19 testing

3. Provision of free lateral flow testing may have contributed to social inequalities linked to COVID-19, with those populations experiencing the greatest social and health harms of COVID-19 less engaged with testing.
4. Uptake was lower in deprived areas, males, areas located further from test sites, among some ethnic groups, in areas characterised by being less confident with using the internet (i.e., digitally excluded).
5. Groups with lower uptake – especially people residing in deprived areas, from some ethnic groups and males were also more likely – we more likely to have tested positive for COVID-19.
6. Rolling-out testing needs to be aligned with support for low income populations to encourage them to get tested and isolate (including financial incentives to offset lost earnings), for non-digital means of accessing testing (as well as promoting locally and not just focusing on social media), and test sites need to be accessible (i.e., walkable).

Reference

- Green MA, García-Fiñana M, Barr B, et al. 2021. Evaluating social and spatial inequalities of large scale rapid lateral flow SARS-CoV-2 antigen testing in COVID-19 management: An observational study of Liverpool, UK (November 2020 to January 2021). The Lancet Regional Health – Europe 6: 100107. https://www.thelancet.com/journals/lanepe/article/PIIS2666-7762(21)00084-3/fulltext

Executive Summary - Demonstrating how the geography of COVID-19 has been associated with deprivation levels

7. As the pandemic has progressed, high numbers of COVID-19 cases have concentrated in post-industrial communities characterised by historically and geographically embedded forms of

inequality, especially in the North of England (e.g. Liverpool City Region; Greater Manchester; Tees Valley and North of Tyne).

8. A range of structural inequalities can explain the uneven distribution of COVID-19 cases across upper tier local authorities in England.
9. At the start of Wave 1, COVID-19 cases concentrated in areas characterised by a high population density, and high proportion of private renting, overcrowding, public transport use and ethnic minority populations. Meanwhile, strong negative relationships are identifiable with variables of older persons, unpaid caring and poor health.
10. As the pandemic progressed (Wave 2), increasingly strong positive relationships emerge between high numbers of COVID-19 cases and poor health, unpaid care, multiple deprivation, inequality in life expectancy, and routine occupations. Meanwhile, a strong negative relationship emerges with the ability to work from home.
11. Spatially-explicit policies and funding mechanisms are necessary to address these inequalities, which have widened during the pandemic. These should be developed and led in partnership with local actors and communities. Areas with high levels of deprivation should be better insulated from COVID-19 with high levels of social care, health and educational spend.

Reference

- Robinson, C., Rowe, F., Patias. N., (2020) The Geography of the COVID-19 Pandemic in England. Heseltine Institute for Public Policy, Practice and Place. https://www.liverpool.ac.uk/media/livacuk/publicpolicyamppractice/covid-19/PB034.pdf
- Robinson, C., Rowe, F., Patias. N., Wray, I. (2021) Socio-economic Inequality and Geographic Spread of the COVID-19 Pandemic in England. The Working Papers Series of the UK2070 Commission – Series 4. http://uk2070.org.uk/wp-content/uploads/2021/05/FINAL-V3-UK-papers-Series-4-210519-WITH-COVER-compressed.pdf

Executive Summary - identifying key elements to develop effective COVID-19 exit strategies

12. Raised importance early in the pandemic of non-pharmaceutical interventions and mathematical modelling in helping envision exit strategies from full lockdown
13. Proposed a roadmap for better models that aid envisioning exit strategies
14. Three key aspects were identified in this respect:
    - Improve estimation of key epidemiological parameters
    - Understand sources of heterogeneity in populations (including geographic disparities)
    - Focus on requirements for data collection, particularly in low and middle income countries

Reference

- Thompson, R. N.; Hollingsworth, T. D; Isham, V.; Arribas-Bel, D.; Ashby, B.; Britton, T.; Challenor, P.; Chappell, L. H. K.; Clapham, H.; Cunniffe, N. J.; Dawid, A. P.; Donnelly, C. A.; Eggo, R. M.; Funk, S.; Gilbert, N.; Glendinning, P.; Gog, J. R.; Hart, W. S.; Heesterbeek, H.; House, T.; Keeling, M.; Kiss, I. Z.; Kretzschmar, M. E.; Lloyd, A. L.; McBryde, E. S.; McCaw, J. M.; McKinley, T. J.; Miller, J. C.; Morris, M.; O'Neill, P. D.; Parag, K. V.; Pearson, C. A. B.; Pellis, L.; Pulliam, J. R. C.; Ross, J. V.; Tomba, G. S.; Silverman, B. W.; Struchiner, C. J.; Tildesley, M. J.; Trapman, P.; Webb, C. R.; Mollison, D.; Restif, O. (2020) "Key questions for modelling COVID-

19 exit strategies". Proceedings of the Royal Society B: Biological Sciences. 287(1932), 20201405. 10.1098/rspb.2020.1405

Executive Summary - Demonstrating how the geography of COVID-19 has been associated with deprivation levels

Report & workshops

Von Borzyskowski, I., Mazumber, A., Mateen, B., Wooldridge, M., Rowe, F. et al. 2021, Data science and AI in the age of COVID-19. Reflections on the response of the UK's data science and AI community to the COVID-19 pandemic. Workshops. The Alan Turing Institute. https://www.turing.ac.uk/research/publications/data-science-and-ai-age-covid-19-report.

Executive Summary - identifying key issues relating to inequalities during data science and AI emergency response efforts against COVID-19 in the UK

15. A series of workshops during two weeks in December 7-11th 2020 brought together leading data scientists from across the UK working on different response efforts against COVID-19;
16. The aim was to capture the successes and challenges experienced by the UK's data science and AI community during the COVID-19 pandemic, and the community's suggestions for how these challenges might be tackled.
17. Two key issues relating to inequalities were identified:
    - Large inequalities in terms of data availability, access and standardisation;
    - Low representation of minority groups in data playing an exclusionary role in data analysis

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