Virus Watch
Findings so far

Public Activities and Non-Household Contacts by Local Area Deprivation during Second English National Lockdown and December Holiday Period

This paper describes in further detail the methods and a-priori analysis plan behind results presented publicly by the Virus Watch study on 28/01/2021.

More deprived communities have been disproportionately impacted by COVID-19 and by the social and economic effects of the pandemic. Greater exposure to other people during daily activities, e.g. lesser ability to work from home and greater reliance on public transport, may contribute to low income communities having more infections, hospitalisations and deaths. We investigated whether Virus Watch participants' activities during the final week of the second English national lockdown (24 Nov 2020 – 01 Dec 2020) and the December holiday period (23 Dec 2020- 27 Dec 2020) differed by their local area deprivation.

Research Question:

Compared to the least deprived areas, did individuals in more deprived areas exhibit different levels of public activities/reported contacts during the final week of the English national lockdown and the December holiday period?

Methods:

Survey Procedure

Participants in the Virus Watch community cohort study were prompted on 01 Dec 20 and 04 Jan 2020 to complete an online questionnaire regarding their social activities and contacts during the preceding week (24 Nov 20 - 01 Dec 20 and 23 Dec 20 - 27 Dec 20 respectively). The first survey week corresponded to the final week of the second English national lockdown, and the second survey week to the December holiday period. Survey respondents reported the number of days during each period on which they undertook a range of social activities, and their number of non-household/support bubble close contacts (face-to-face contact with someone less than a metre away, even if a face-covering or mask was worn, or

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within 2 metres for 15 minutes or more). The wording of questions in the second survey was edited to specifically refer to non-household or support bubble members (vs non-household members) for clarity.

Exposure

The exposure of interest was local area-level deprivation quantified using English or Welsh Office for National Statistics' (ONS) Index of Multiple Deprivation (IMD) quintiles (1=most deprived, 5= least deprived). Participants provided household postcodes on study registration, which was used to derive IMD score from the May 2020 ONS National Statistics Postcode Lookup file and divided into quintiles using the *ntile* function in R version 3.6.2. Consequently, only survey respondents who provided a valid postcode at baseline were included in these analyses.

Outcome

The following activities were classified as binary outcomes of interest (yes/no during given period): driving or riding in a car/taxi with a non-household member, taking public transport (underground trains, overground trains, buses, or trams), going to work or education outside the household, social/entertainment activities (defined as any of: attending the theatre, cinema, concert or sports event; eating in a restaurant, café or canteen; going to a bar, pub or club; going to a party), going to essential shops, going to non-essential shops or personal care services, and close contact with one or more non-household/support bubble members.

Covariates

Age, sex, and geographic region were considered relevant a-priori possible confounders due to plausible relationships with both IMD and activities. Age and sex were derived from participants' responses to demographic questions at study baseline. Age was classified as child (0-15), adult (16-64), and older adult (65+). Geographic region was derived from linking participants' postcode to ONS national region information using the May 2020 ONS National Statistics Postcode Lookup file. For the current analyses, regions were classified into the following three categories based on varied rates of COVID-19 and differing activity-related legislation during the periods under consideration: London/South-East/ East of England (areas heavily affected by COVID-19 during both periods and which comprised the first Tier 4 regions), Wales (not under national lockdown during the first period and with distinct legislation during the holiday period), and other national regions.

Statistical Analyses

We used robust Poisson mixed-effect models (*mepoisson* command in Stata version 16) to assess the age-, sex-, and region-adjusted risk of reporting each activity by IMD quintile. The least deprived quintile (IMD 5) was used as the reference category. We included a random term to account for household-level clustering. We applied the Benjamini-Hochberg Procedure (false discovery rate = 0.05) to correct for multiplicity, though adjusted *p*-values are not presented on dashboard figures.

Proportions were calculated for each question and for each monthly survey, with denominators only including participants who responded to that specific question. These proportions were then stratified according to age categories (0 - 15, 16 - 64 and >64). As those who reported using public transport were predominantly in London, participants from all other regions were excluded for this question. This was then disaggregated by the IMD quintile to show observational trends by quintile.

Table 1. Proportion of participants reporting each activity and total number of respondents by deprivation quintile (24 Nov 2020 – 01 Dec 2020)

IMD Quintile	Sharing a Car		Public Transport		Work or Education		Social/Entertainment		Essential Shops		Non-Essential Shops/Services		Healthcare Setting		Non-Household Contacts	
	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n
1 (Most Deprived)	19.5	1766	16.5	1766	38.5	1767	4.2	1766	72	1767	17.5	1767	24.5	1766	65	1764
2	15.6	3189	14.2	3187	36.6	3188	4.8	3185	74.9	3190	17.9	3186	23.1	3185	62.8	3192
3	14.4	4271	9.5	4269	33.5	4271	3.9	4269	72.5	4271	17.7	4270	23.6	4268	60.9	4265
4	14.3	5500	7.9	5496	32.9	5496	4.6	5495	73.7	5496	18.4	5494	23.6	5498	61.8	5498
5 (Least Deprived)	11.6	6274	6.3	6273	31.1	6275	4.1	6275	71.7	6275	18.7	6273	23.9	6275	59.9	6269

Table 2. Proportion of participants reporting each activity and total number of respondents by deprivation quintile (23 Dec 2020 – 27 Dec 2020)

IMD Quintile	Sharing a Car		Public Transport		Work or Education		Social/Entertainment		Essential Shops		Non-Essential Shops/Services		Healthcare Setting		Non-Household Contacts	
	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n	%	total n
1 (Most Deprived)	16.2	1632	12.3	1632	22.4	1632	2.3	1632	67.8	1632	11.6	1632	16.2	1632	40.9	1632
2	12.1	2958	8.9	2958	21.2	2958	1.5	2958	67.0	2958	10.2	2958	14.9	2958	37.2	2958
3	10.7	4095	5.8	4095	18.9	4095	2.3	4095	63.2	4095	10.7	4095	14.9	4095	34.4	4095
4	10.5	5268	5.0	5268	18.2	5268	1.9	5268	64.6	5268	10.7	5268	15.2	5268	33.7	5268
5 (Least Deprived)	8.7	6187	2.8	6187	16.5	6187	1.7	6187	63.4	6187	11.0	6187	14.6	6187	33.0	6187