

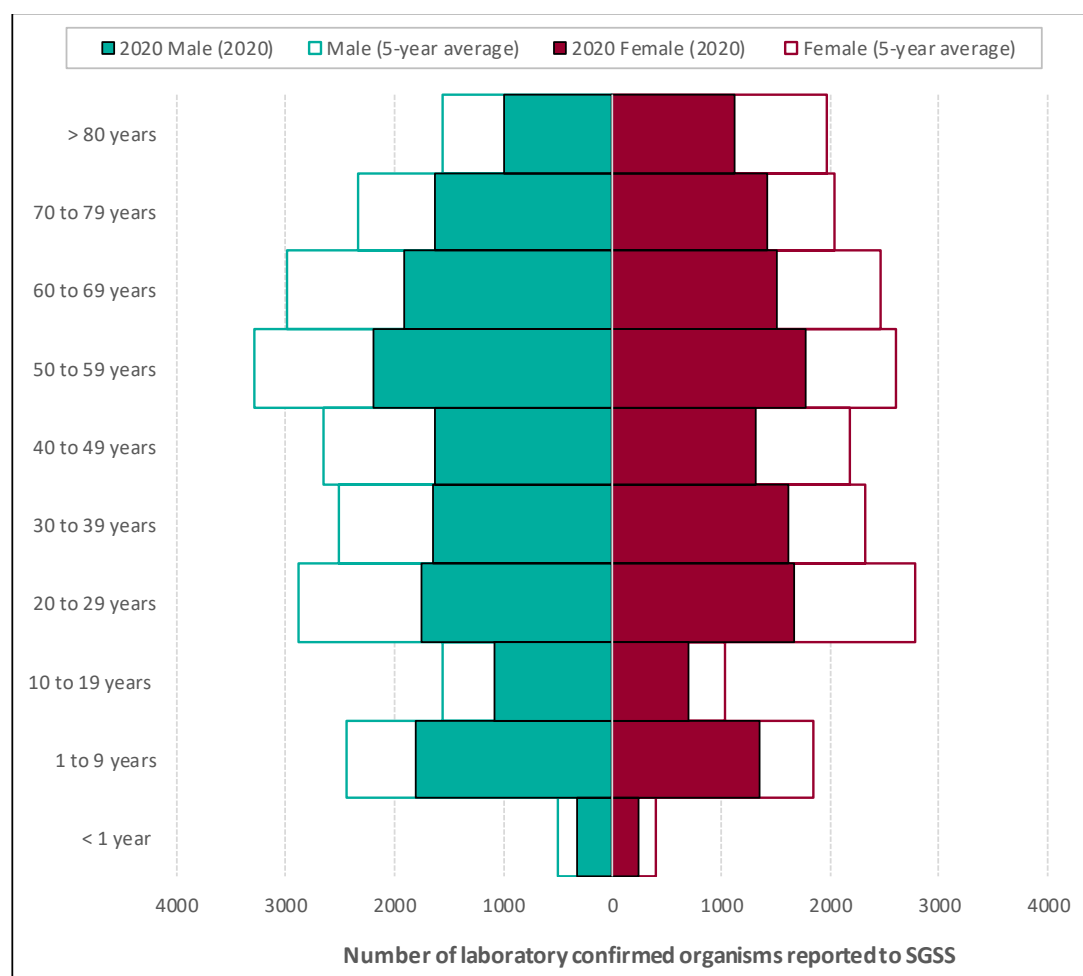
Supplementary Figures

Supplementary Table 1 – Gastrointestinal outbreaks and GI pathogens* reported to Public Health England between Week 1 and Week 31 2020 and the 5-year weekly average (95% confidence interval), by COVID-19 outbreak Phase

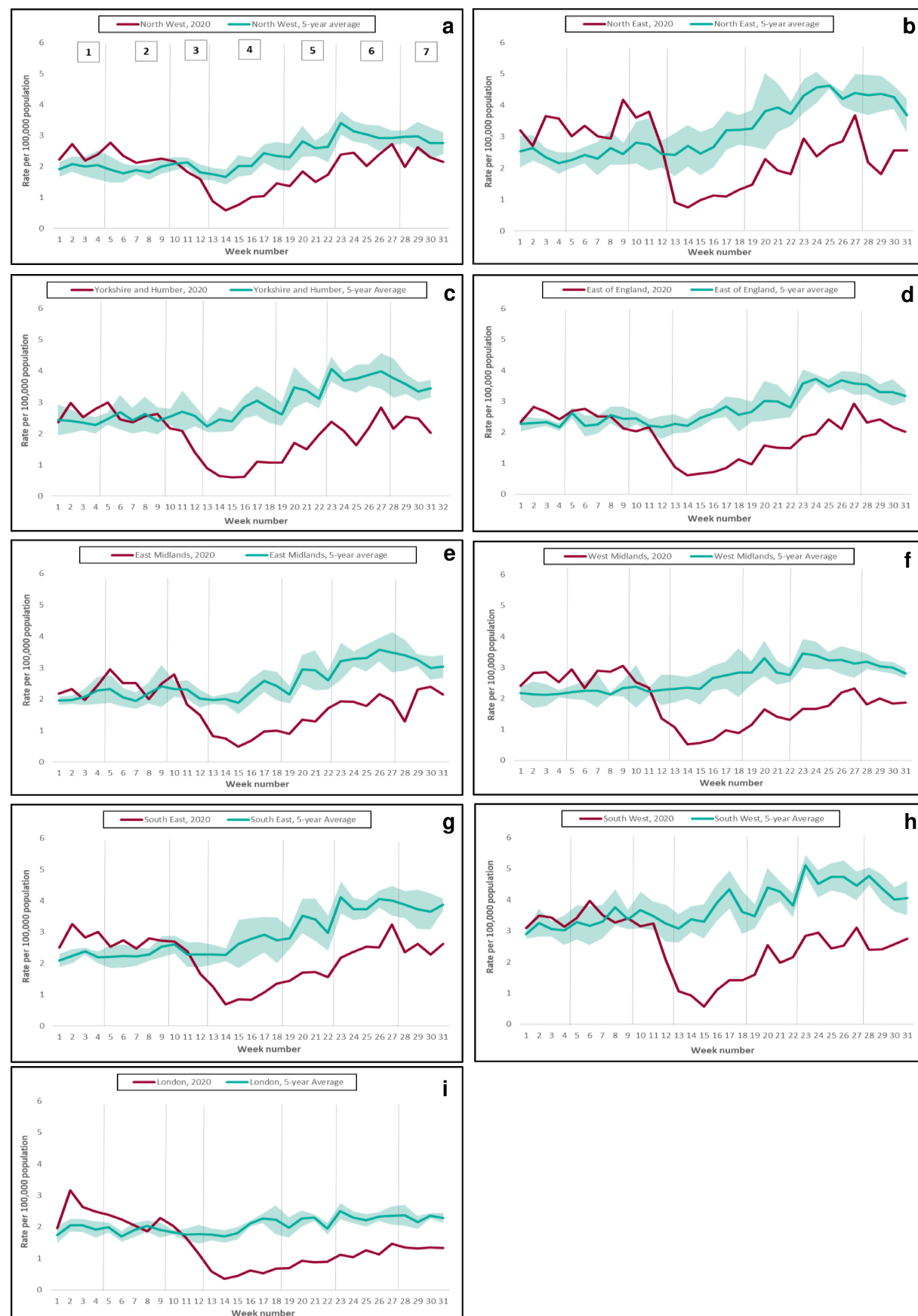
Phase		1	2	3	4	5	6	7
Week		1-4	5-9	10-12	13-18	19-22	23-27	28-31
		Pre-outbreak phase	Early outbreak	Pre-lockdown	Early Lockdown	Late Lockdown	Lockdown Easing	Further Easing
Gastrointestinal outbreaks	2020	465	510	273	109	46	50	91
	2019	545	684	383	752	443	326	314
	5 year average (95% CI)	489 (444 - 534)	651 (605 - 697)	454 (357 - 551)	667 (554 - 780)	350 (294 - 406)	292 (226 - 358)	305 (273 - 337)
	% Change	-5%	-22%	-40%	-84%	-87%	-83%	-70%
Viral outbreaks	2020	390	441	224	80	27	36	54
	5-year average (95% CI)	417 (377-457)	558 (512-604)	391 (305-477)	555 (449-660)	281 (239-324)	225 (174-276)	229 (203-256)
Bacterial outbreaks	2020	9	9	4	8	9	7	14
	5-year average (95% CI)	11 (7-14)	12 (8-15)	7 (4-10)	18 (16-19)	18 (14-22)	18 (15-22)	24 (20-27)
Parasitic outbreaks	2020	2	1	0	1	0	0	0
	5-year average (95% CI)	4 (2-5)	3 (1-6)	4 (2-5)	12 (9-14)	7 (5-10)	3 (2-5)	3 (2-4)
Care home Setting	2020	301	318	169	98	30	37	55
	5-year average (95% CI)	324 (283-364)	402 (355-448)	273 (216-329)	429 (360-497)	205 (167-243)	156 (121-190)	167 (153-182)
Healthcare Setting	2020	54	45	34	3	1	4	7
	5-year average (95% CI)	62 (51-73)	89 (75-103)	55 (29-80)	85 (54-116)	32 (24-40)	28 (18-38)	25 (21-29)
Educational Setting	2020	58	102	53	0	2	3	10
	5-year average (95% CI)	66 (45-87)	107 (85-130)	86 (70-102)	77 (57-98)	62 (51-73)	61 (37-84)	51 (39-64)
Food outlet Setting	2020	29	14	3	1	1	1	6
	5-year average (95% CI)	10 (8-12)	18 (11-25)	13 (9-17)	23 (16-30)	14 (10-17)	8 (6-11)	13 (9-17)
Custodial Setting	2020	6	28	1	0	0	1	1
	5-year average (95% CI)	2 (1-3)	2 (0-3)	2 (1-3)	3 (1-4)	2 (0-3)	1 (1-2)	3 (2-5)
Other Settings	2020	17	28	13	7	12	4	12
	5-year average (95% CI)	25 (19-32)	34 (27-41)	25 (20-31)	51 (44-57)	36 (31-41)	38 (34-42)	45 (40-50)
Laboratory confirmed GI organisms	2020	6023	7374	3520	2859	3284	4617	6205
	2019	5041	6499	4180	8561	6967	8117	9877
	5 year average (95% CI)	5016 (4721-5311)	6471 (5969-6973)	3943 (3591-4295)	8345 (7602-9088)	6553 (5829-7277)	7879 (7539-8219)	9303 (8746-9860)
	% Change	20%	14%	-11%	-66%	-50%	-41%	-33%

* Organisms: Campylobacter, STEC O157, STEC Non-O157, Listeria, non-typhoidal Salmonella, typhoidal Salmonella, Shigella, Norovirus, Cryptosporidium and Giardia

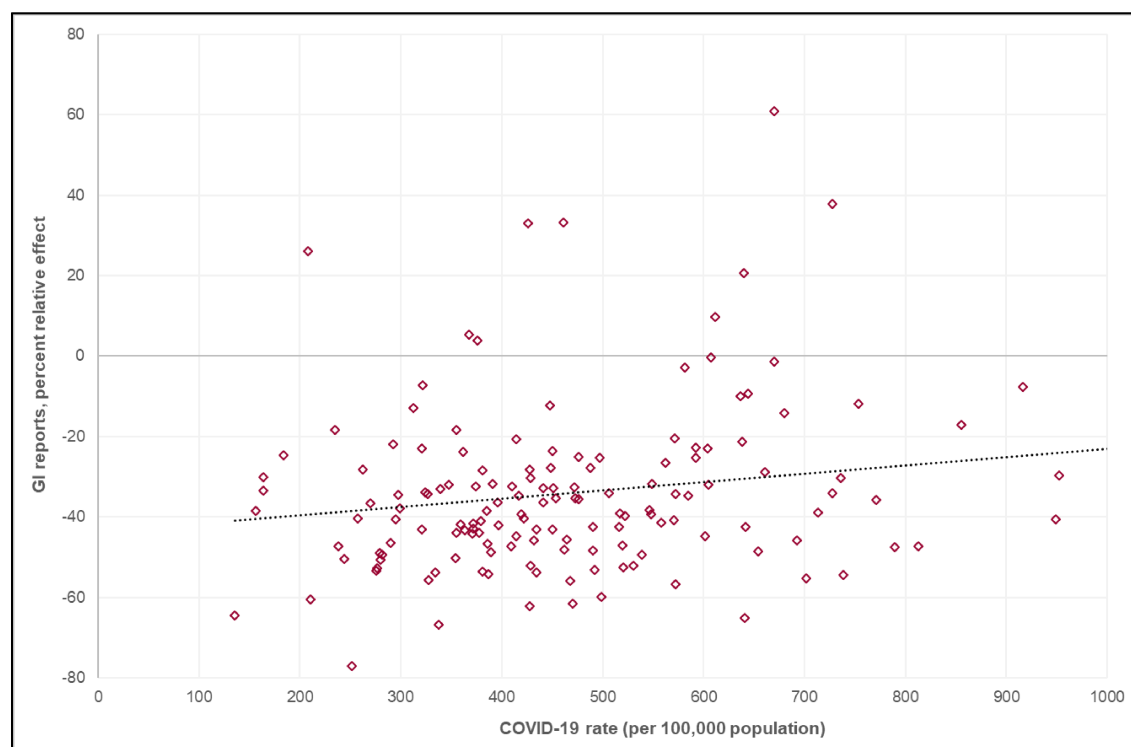
Supplementary Figure 1 – Laboratory confirmed GI pathogens reported to Public Health England between Week 1 and Week 31 2020 and the 5-year weekly average, by age group and sex



Supplementary Figure 2 – Laboratory confirmed GI pathogens reported between Week 1 and Week 31 2020 and 5-year weekly average, by COVID-19 outbreak Phase and PHE region

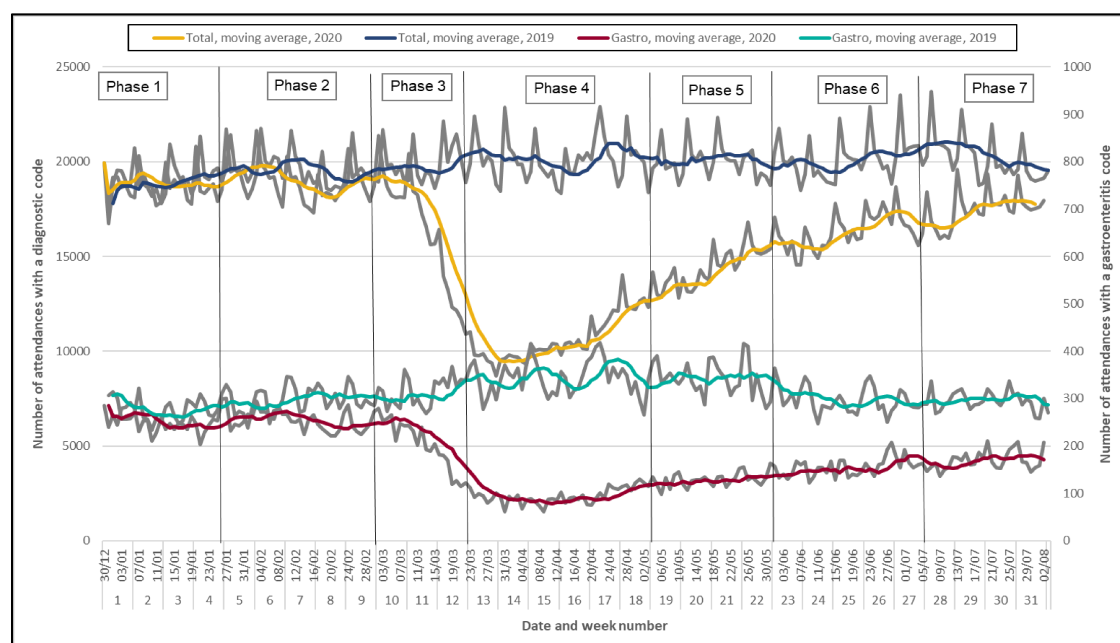


Supplementary Figure 3 – Correlation between cumulative laboratory confirmed GI diagnoses (percentage relative effect between 2020 and the 5-year average) and cumulative COVID-19 rate for English Upper Tier Local Authorities*, Phase 2 to Phase 7 of the COVID response

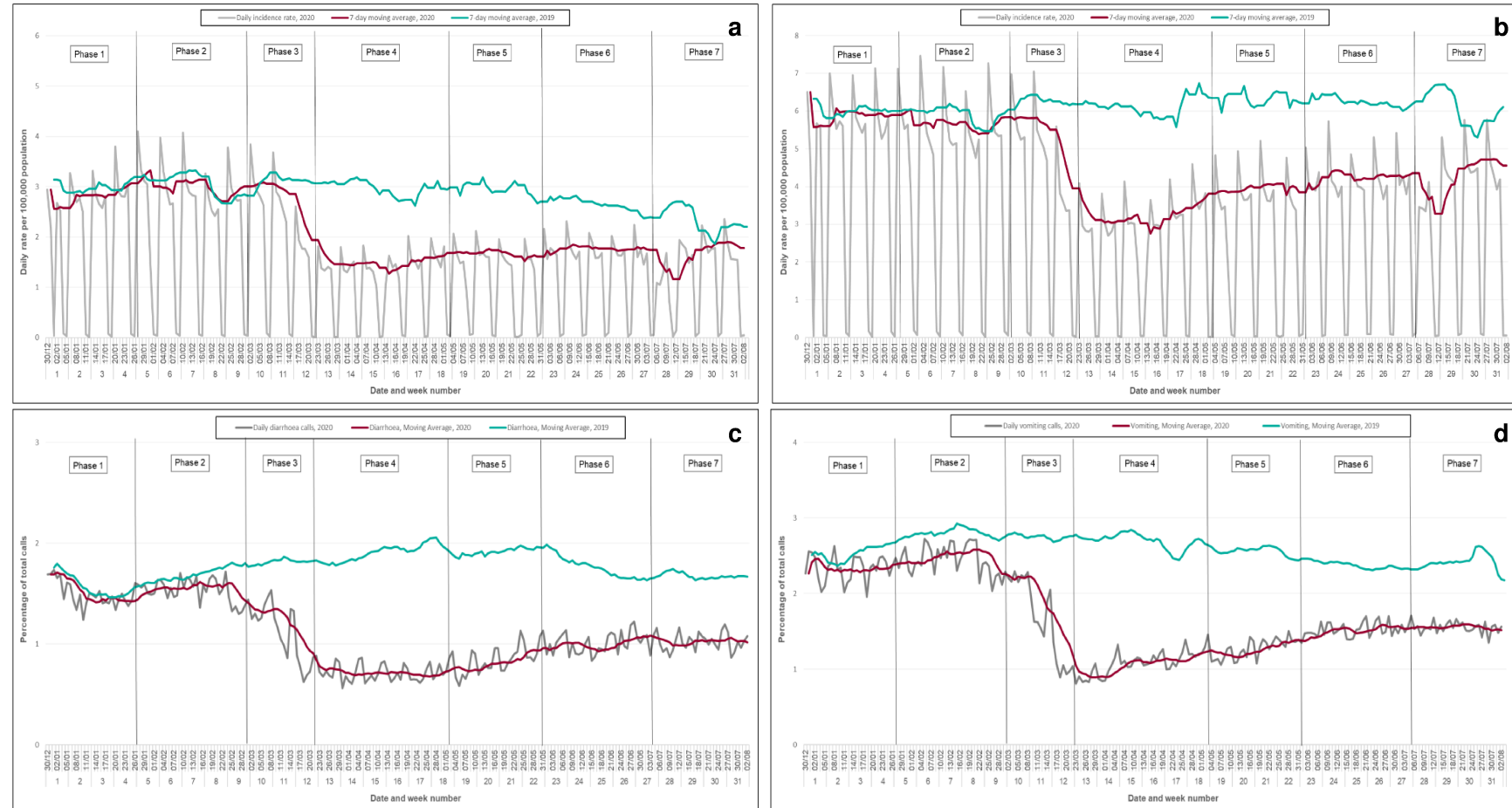


*Graph excludes the Leicester Upper Tier Local Authority due to higher cumulative COVID-19 rate than other local authority areas up to 02 August 2020. Leicester was included in the Pearson's correlation analysis.

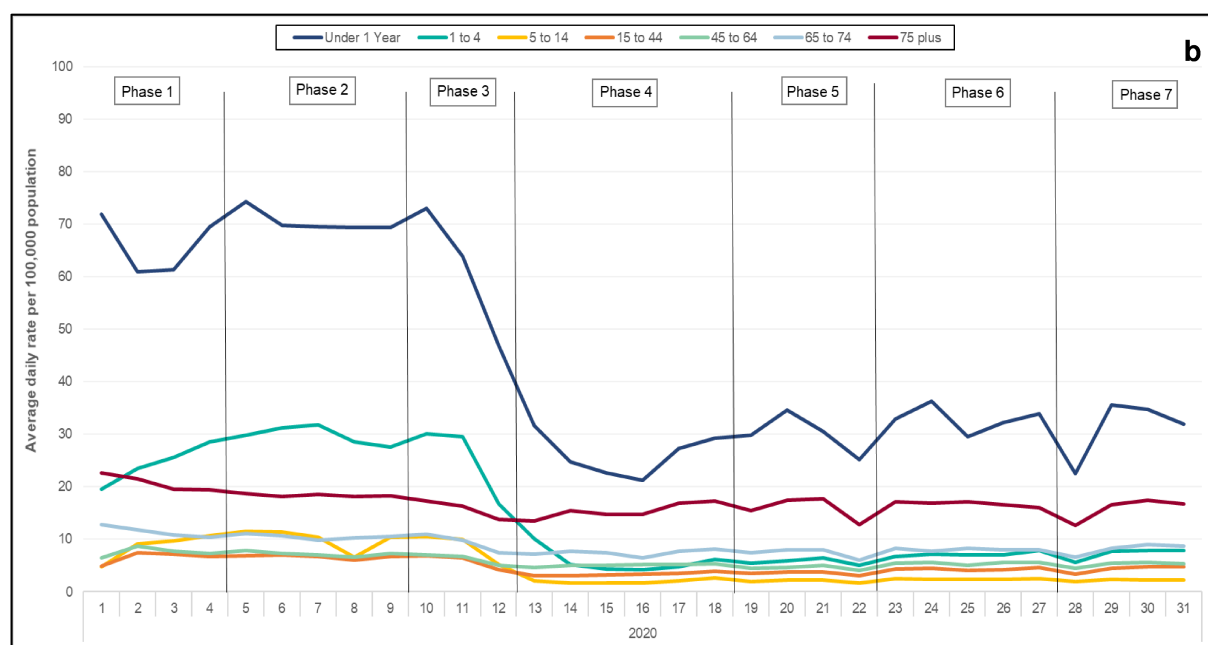
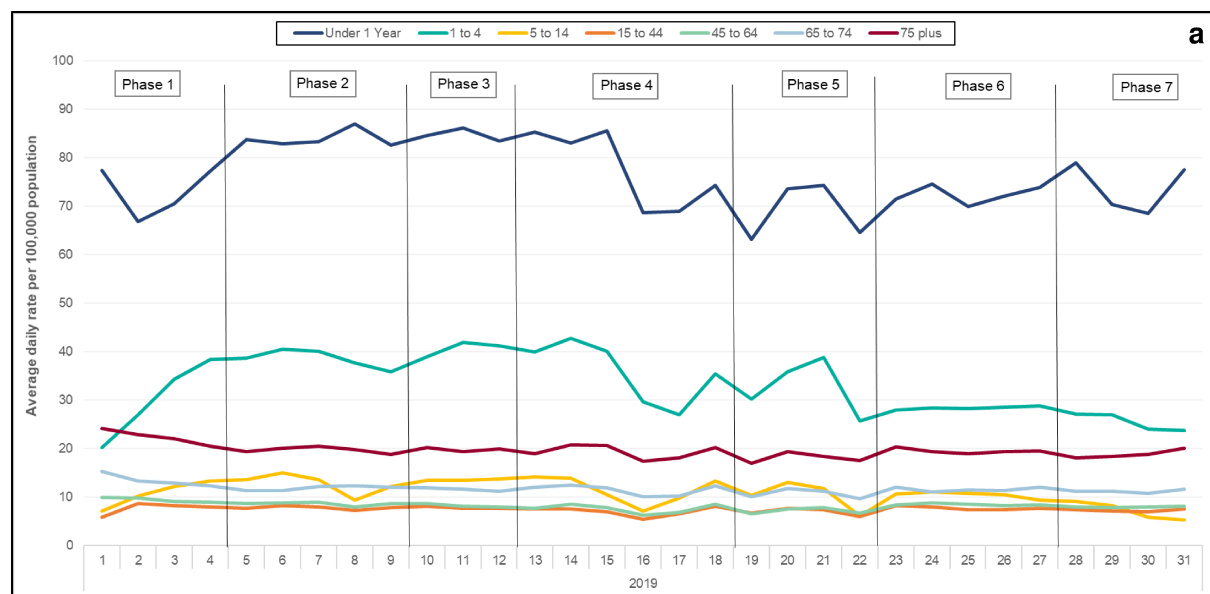
Supplementary Figure 4 – Daily number of total attendances with a diagnostic code recorded across the Emergency Department Syndromic Surveillance network indicating the seven-day moving average, Phase 1 – 7 of the COVID-19 outbreak response, 2019 and 2020.



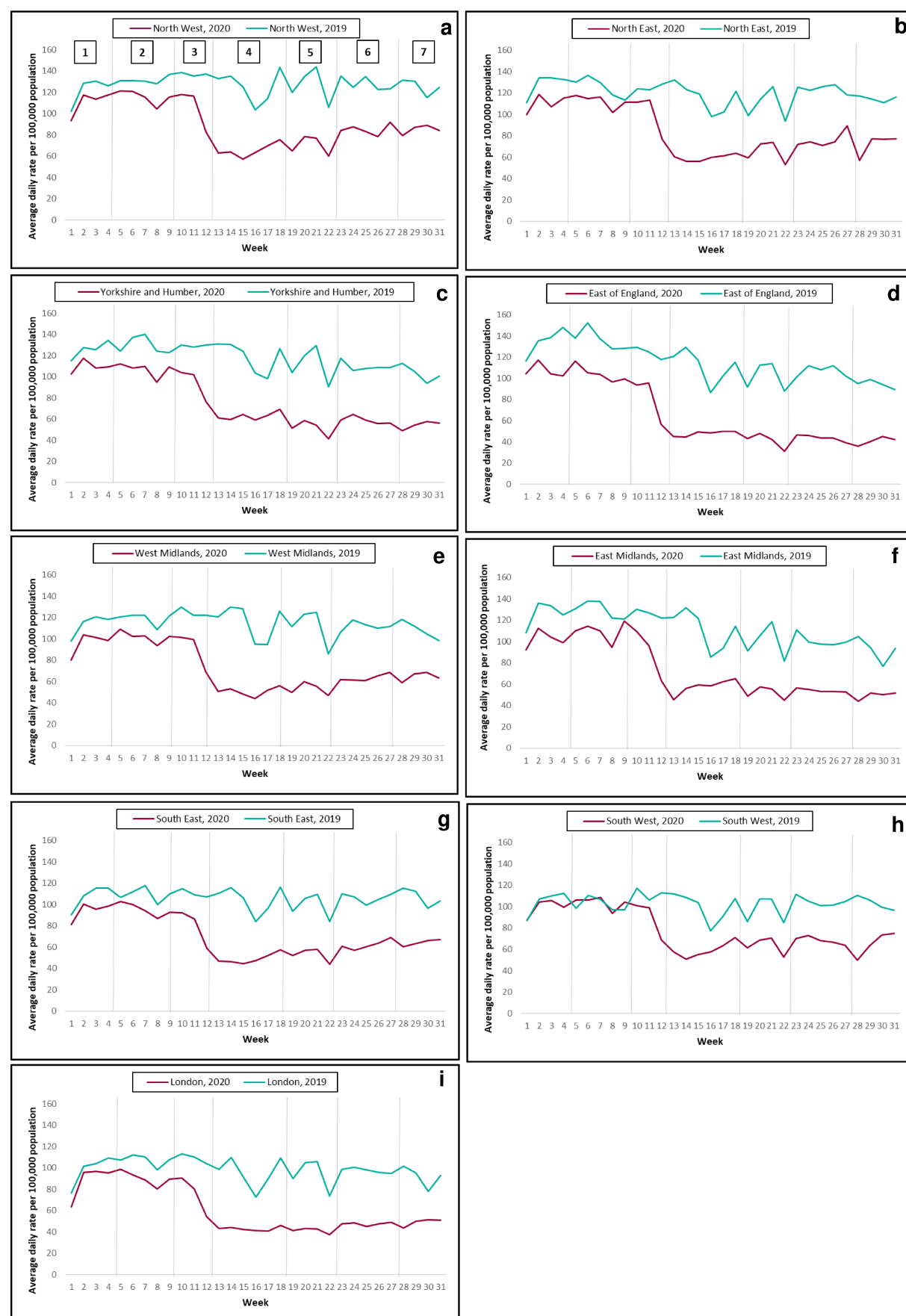
Supplementary Figure 5 – Daily GP-in hours incidence rate and 7-day moving average (adjusted for weekends and bank holidays) per 100,000 population for (a) vomiting and (b) diarrhoea and daily calls as a percentage of total calls and moving 7-day average for (c) ‘Diarrhoea’ calls and (d) ‘Vomiting’ calls



Supplementary Figure 6 -GP in hours average daily rate by week per 100,000 population for gastroenteritis consultations, COVID-19 outbreak Phase and age group, (a) 2019 and (b) 2020



Supplementary Figure 7 - GP in hours average daily rate by week per 100,000 population for gastroenteritis consultations, COVID-19 outbreak Phase and PHE region, 2019 and 2020



Supplementary Table 2 – Exposures reported in routine environmental health surveillance questionnaires* for GI pathogens, North East residents. Phase 2 – Phase 7 of the COVID-19 outbreak

Exposure category		Current cases (2020)		Historic cases (2015-2019)				
		Exposed	Unexposed	Exposed	Unexposed	Odds ratio	95% CI	P value
All GI organisms	Foreign Travel	25	133	590	1151	0.37	[0.23-0.57]	<0.001
	Visitor Attraction	3	130	106	1045	0.23	[0.05-0.70]	0.006
	Water Exposure	22	111	293	858	0.58	[0.34-0.94]	0.024
	Food Outlet	94	39	898	253	0.68	[0.45-1.04]	0.056
	Contact	24	109	269	882	0.72	[0.43-1.16]	0.166
	Rural Environment	12	121	84	1067	1.26	[0.61-2.40]	0.474
	Travel (UK)	17	116	173	978	0.83	[0.46-1.43]	0.489
	Animal Contact	82	51	744	407	0.88	[0.60-1.30]	0.496
	Social and Leisure	15	118	119	1032	1.10	[0.58-1.97]	0.737
	Sports and Leisure	2	131	14	1137	1.24	[0.14-5.49]	0.777
Cryptosporidium	Foreign Travel	23	0	384	71	0.00	[0.00-0.74]	0.023
	Food Outlet	23	13	313	239	0.40	[0.16-1.07]	0.034
	Contact	23	10	313	79	2.28	[0.86-5.86]	0.056
	Visitor Attraction	23	2	313	63	0.38	[0.04-1.62]	0.18
	Animal Contact	23	16	313	253	0.54	[0.20-1.63]	0.192
	Travel (UK)	23	6	313	52	1.77	[0.54-4.99]	0.246
	Sports and Leisure	23	0	313	6	0	[0.00-8.90]	0.503
	Water Exposure	23	9	313	141	0.78	[0.29-2.01]	0.582
	Rural Environment	23	4	313	45	1.25	[0.30-4.02]	0.693
	Social and Leisure	23	2	313	25	1.1	[0.12-4.94]	0.904
STEC	Visitor Attraction	21	0	70	10	0.00	[0.00-1.15]	0.066
	Social and Leisure	21	2	70	19	0.28	[0.03-1.38]	0.093
	Foreign Travel	23	2	92	22	0.30	[0.03-1.42]	0.108
	Contact	21	3	70	19	0.45	[0.08-1.81]	0.227
	Animal Contact	21	3	70	19	0.45	[0.08-1.81]	0.227
	Travel (UK)	21	3	70	16	0.56	[0.09-2.32]	0.397
	Water Exposure	21	6	70	25	0.72	[0.20-2.29]	0.545
	Rural Environment	21	3	70	8	1.29	[0.20-6.12]	0.725
	Food Outlet	21	18	70	58	1.24	[0.29-7.59]	0.757
Giardia	Water Exposure	29	6	318	113	35.53	[0.15-1.24]	0.107
	Foreign Travel	35	6	438	120	0.55	[0.18-1.39]	0.187
	Animal Contact	29	16	318	206	64.78	[0.29-1.57]	0.302
	Contact	29	3	318	53	16.67	[0.11-1.99]	0.376
	Travel (UK)	29	4	318	64	20.13	[0.16-1.94]	0.411
	Visitor Attraction	29	1	318	22	6.92	[0.01-3.22]	0.472
	Sports and Leisure	29	0	318	4	1.26	[0.00-10.77]	0.544
	Food Outlet	29	20	318	232	72.96	[0.34-2.14]	0.645
	Rural Environment	29	3	318	28	8.81	[0.22-4.29]	0.781
	Social and Leisure	29	1	318	11	3.46	[0.02-7.34]	0.998
Salmonella	Foreign Travel	65	14	739	335	45.33	[0.17-0.62]	<0.001
	Food Outlet	51	35	404	329	0.50	[0.25-1.02]	0.031
	Rural Environment	51	2	404	3	5.46	[0.44-48.53]	0.040
	Contact	51	7	404	99	0.49	[0.18-1.15]	0.086
	Visitor Attraction	51	0	404	7	0.00	[0.00-4.35]	0.343
	Animal Contact	51	33	404	234	1.33	[0.70-2.60]	0.354
	Water Exposure	51	0	404	5	0.00	[0.00-6.13]	0.424
	Travel (UK)	51	3	404	35	0.66	[0.13-2.22]	0.499
	Social and Leisure	51	9	404	61	1.2	[0.49-2.68]	0.635
Shigella	Contact	9	1	46	19	0.18	[0.00-1.55]	0.085
	Sports and Leisure	9	2	46	3	4.10	[0.28-41.60]	0.134
	Foreign Travel	12	3	88	42	47.73	[0.06-1.61]	0.138
	Visitor Attraction	9	0	46	4	0.00	[0.00-5.04]	0.358
	Water Exposure	9	1	46	9	0.51	[0.01-4.83]	0.548
	Social and Leisure	9	1	46	3	1.79	[0.03-25.55]	0.628
	Food Outlet	9	8	46	40	1.20	[0.12-62.00]	0.874
	Travel (UK)	9	1	46	6	0.83	[0.02-8.57]	0.874
	Animal Contact	9	1	46	5	1.02	[0.02-11.19]	0.983

*Questionnaires for *Cryptosporidium* sp, *Giardia lamblia*, giardia, STEC. *Salmonella* sp and *Shigella* sp

‡Cases reporting foreign travel exposure were excluded from the analysis of all other exposure categories

Supplementary Figure 8 – Google trend searches between 01/01/2017 and 02/08/2020 for (a) protective factors associated with GI illness and (b) key search phrases associated with GI illness, indicating the seven Phases of the COVID-19 response

