Data Analytics Insights to Date

Not for Circulation

November 2020

Building a better working world

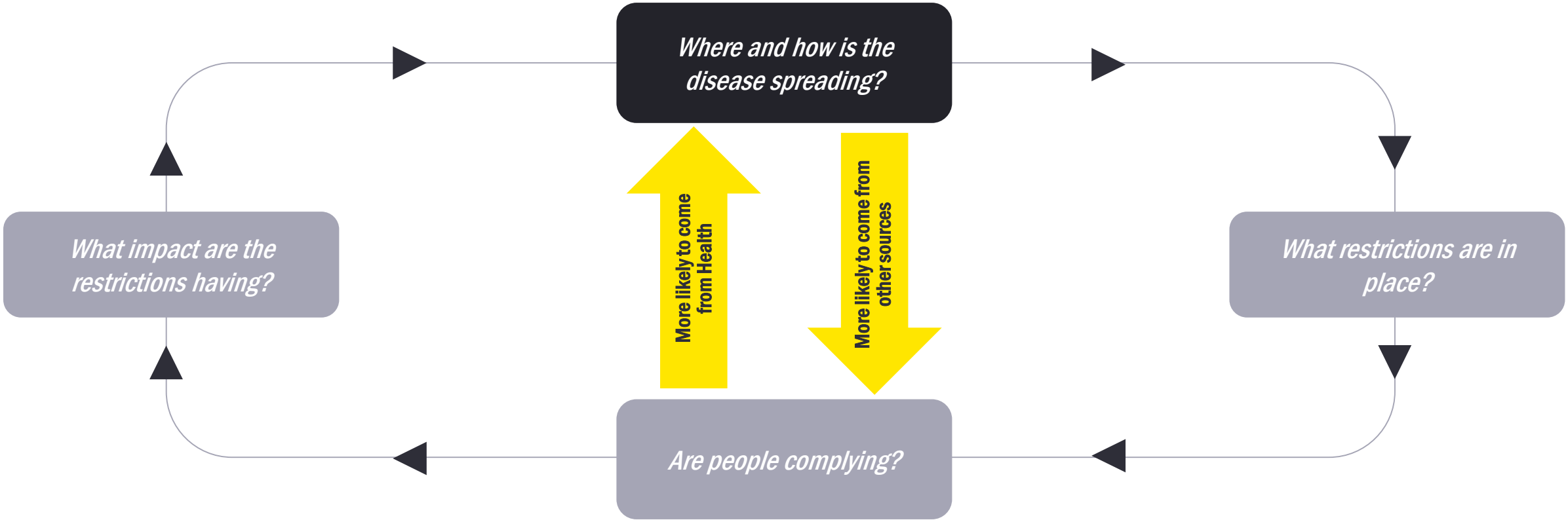
Update – Week 6

Agenda

- Introduction
- County Specific Analysis
- Restrictions Impact Analysis
- International Analysis

Providing data analysis to support Government decision making

EY Data Analytics team was engaged to analyse certain aggregated data available to the State as part of the State's Covid 19 management strategy. EY's role was to analyse the available data and to present it back to Government officials to consider as part of its on-going deliberations and decision making with regard to Covid 19 restrictions. The focus is situating disease incidence rates in the context of other data (e.g. restriction changes) to produce insights, rather than performing epidemiology.



Summary of initial findings

- Extending county analysis to Local Electoral Areas (LEA) helps provide a more specific understanding of what is happening in each county. These profiles can broadly be categorised as follows:
    1. Significant known outbreak event(s)
    2. Proximity to the border
    3. Following the national profile
    4. Proximity to and scale of Dublin
- We now have a far more expansive testing criteria. This means that it is difficult to directly compare Wave 1 and Wave 2. While accepting that, it is worth noting the shift in recorded outbreaks from being led by Nursing Homes in Wave 1 to Private Households in Wave 2. This contributes to a reduction of 15 years in the median age of identified cases from Wave 1 to Wave 2 (Source: CSO)
- Social gatherings, citizen congregations and specific local events all appeared to have contributed to Wave 2 outbreaks
- The introduction of Level 3 nationally did not reduce the 14 day incidence rate per 100k for majority of counties. The introduction of further household restrictions (Level 3 Max) from mid-October drove a reduction across most counties
- Wet pubs opened in all counties except Dublin in late September. This also coincided with universities opening together with specific sporting events. The 14 day disease incidence rate per 100k started to increase ten days later in every county. This increase was not seen to the same extent in Dublin
- The LEAs containing University College Cork (UCC) and National University of Ireland Galway (NUIG) both saw higher increases than the rest of their county when the universities opened. This difference was reduced when the universities went online. Wet pubs also opened in both cities on the same week that universities opened
- The northern counties, and especially LEAs on the border, do appear to be impacted by proximity to the border. Donegal is not seeing significant reductions with Level 4 that was seen in other border counties
- The reopening of construction, non-essential retail and the wider Phase 3 changes during the summer do not appear to have had a material impact on the 14 day disease incidence rate per 100k nationally or in larger counties. It should however be noted that the disease rate was low at this time

Source: Median Age June 5th: 48 (CSO COVID-19 Deaths and Cases Series 4) - https://www.cso.ie/en/releasesandpublications/br/b-cdc/covid-19deathsandcasesseries4/
Median Age for week ending 30th October: 33 (CSO COVID-19 Deaths and Cases Series 15) - https://www.cso.ie/en/releasesandpublications/br/b-cdc/covid-19deathsandcasesseries15/

County specific analysis

County Analysis Summary

County	Border county	Known outbreaks	Dublin and surrounding area	Following national restrictions trend	Wave One – main outbreak sources	Wave Two – main outbreak sources	14 day Incidence rate per 100k (26/07 – 17/11)
Kerry		✓		✓	Private Houses, Residential Institutions, Hospital	Private House, Community Outbreak, Nursing Home	
Limerick		✓		✓	Nursing Home, Private Houses, Residential Institution	Extended Family, Community Outbreak, Private House	
Mayo				✓	Nursing Home, Hospital, Community Hospital/Long-Stay Unit	Private House, Nursing Home, School, Workplace	
Meath		✓	✓	✓	Nursing Home, Private Houses, Workplace	Private Houses, Nursing Homes, Community Outbreak	
Sligo*				✓	Nursing Home, Private House, Travel Related	Private House, Extended Family, Religious/Other Ceremony	
Westmeath*				✓	Workplace, Nursing Home, Hospital	Private House, Nursing Homes, Workplace	
Wexford				✓	Hospital, Nursing Home, Private House	Private House, Social Gathering, Nursing Home	
Kilkenny*		✓			Hospital, Private House, Community Hospital/Long-Stay Unit	Private House, Workplace, Hospital	
Carlow*		✓			Hospital, Nursing Home, Private Houses	Private House, Workplace, Hospital	
Clare		✓			Nursing Home, Private Houses, Extended Family	Private House, Extended Family, Community Outbreaks	
Cork		✓		✓	Workplace, Private Houses, Nursing Homes	Private House, Community Outbreak, Nursing Home	
Galway		✓		✓	Hospital, Nursing Home, Private Houses	Private House, Community Outbreak, Nursing Home	
Longford*		✓			Workplace, Nursing Homes, Hospital	Private House, Nursing Home, Workplace	
Roscommon		✓			Workplace, Nursing Homes, Hospital	Private House, Nursing Home, Extended Family	
Offaly*		✓			Workplace, Hospital, Community Hospital/Long-Stay Unit	Private House, Workplace, Nursing Home	
Laois*		✓			Workplace, Hospital, Community Hospital/Long-Stay Unit	Private House, Workplace, Nursing Home	
Waterford		✓			Workplace, Private House, Nursing Home	Private House, Workplace, Community Outbreaks	
Tipperary		✓			Workplace, Private Houses, Nursing Homes	Private House, Workplace, Nursing Home	
Kildare**		✓	✓		Nursing Home, Private Houses, Residential Institution	Priate House, Workplace, Nursing Homes	
Louth	✓	✓		✓	Nursing Home, Private House, Hospital	Private Houses, Hospitals, Residential Institutions	
Cavan	✓	✓		✓	Nursing Home, Private House, Workplace	Private Houses, Nursing Homes, School	
Leitrim*	✓				Nursing Home, Private House, Travel Related	Private Houses, Extended Family, Religious/Other Ceremony	
Monaghan	✓	✓			Nursing Home, Workplace, Residential Institution	Private Houses, Workplaces, Residential Institutions	
Donegal	✓	✓			Travel Related, Nursing Home, Community Hospital/Long-Stay Unit	Private Houses, Hospitals, Extended Family	
Wicklow**			✓	✓	Workplace, Private House, Residential Institution	Private House, Nursing Home, Workplace	
Dublin		✓	✓		Nursing Home, Private Houses, Residential Institution	Private Houses, Extended Family, Nursing Home	

Source: Outbreak sources – CIDR, Incidence rate –based on daily cumulative case data published on GeoHive to 17 November 2020.
This data is published daily. Note: Wave one defined as 03/03-25/07; Wave 2 is 26/07-20/11
*Carlow-Kilkenny, Laois-Offaly, Longford-Westmeath and Sligo-Leitrim are combined in CIDR
**Due to Kildare outbreak data including West-Wicklow, any outbreak cases in that area have been included with Kildare, not Wicklow

Summary of county-level 14 day incidence rate per 100k

The heatmap below shows the 14 day incidence rate per 100k population for each county over the last two months. The overall reduction in cases has levelled to 17/11, with some county incidence rates increasing.

Two Weekly Incidence Rate Per 100k	Population	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	04-Oct	05-Oct	06-Oct	07-Oct	08-Oct	09-Oct	10-Oct	11-Oct	12-Oct	13-Oct	14-Oct	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct	20-Oct	21-Oct
Kerry	147,707	22	24	25	22	20	21	26	40	46	52	62	64	73	91	106	110	113	144	153	177	174	197	215	240	246	263	269
Limerick	194,899	35	33	33	34	39	37	45	58	69	90	96	107	114	119	145	160	167	182	189	207	208	231	246	248	277	280	290
Mayo	130,507	31	32	30	28	26	28	24	26	30	33	32	36	42	42	54	67	75	80	90	107	123	131	150	167	185	208	228
Meath	195,044	42	47	44	47	51	62	67	71	68	85	90	96	115	129	164	183	199	213	306	357	403	452	490	488	591	629	657
Sligo	65,535	18	24	32	27	27	31	27	38	55	64	75	90	107	137	150	163	175	186	208	241	291	304	294	325	356	366	395
Westmeath	88,770	55	54	55	47	48	52	62	66	64	68	80	88	96	100	105	115	148	167	171	217	211	251	294	324	337	425	435
Wexford	149,722	28	27	27	35	33	33	35	40	41	48	57	73	80	85	98	112	130	160	173	188	202	250	271	272	297	298	301
Kilkenny	99,232	24	26	26	26	26	29	38	40	45	42	43	51	51	59	61	73	87	98	105	109	123	142	146	154	165	165	177
Carlow	56,932	42	40	39	39	26	33	35	44	44	44	42	42	40	42	54	61	74	77	83	84	119	116	149	167	198	204	242
Clare	118,817	41	47	50	53	63	76	76	87	96	121	144	158	183	199	246	261	268	304	310	306	309	322	326	327	322	313	304
Cork	542,868	52	62	66	71	81	88	97	102	105	110	111	119	127	140	155	159	181	199	209	232	237	256	275	308	322	336	340
Galway	258,058	46	54	62	65	74	81	79	85	89	93	92	97	107	113	137	153	155	165	173	203	228	262	273	288	314	326	355
Longford	40,873	37	39	49	59	73	98	120	127	132	147	152	154	169	169	176	208	193	196	181	193	176	213	240	254	279	291	281
Roscommon	64,544	64	76	84	99	102	121	133	143	161	155	155	170	166	166	192	184	200	181	187	201	198	201	223	232	228	239	260
Offaly	77,961	59	56	63	62	65	67	74	77	77	99	103	104	110	123	130	136	140	145	141	151	140	177	201	195	210	224	222
Laois	84,697	34	31	32	32	35	43	43	76	76	89	87	96	105	123	124	133	135	139	136	161	169	151	174	185	201	214	222
Waterford	116,176	86	67	67	59	53	44	38	35	34	28	31	32	40	46	56	64	61	66	70	83	109	131	132	143	155	160	173
Tipperary	159,553	18	21	24	24	25	31	32	36	40	48	53	55	58	58	66	70	71	78	83	79	88	93	110	113	115	118	120
Kildare	222,504	76	75	78	77	85	82	80	97	95	94	87	98	99	108	125	146	154	168	188	198	204	208	244	257	278	293	305
Louth	128,884	95	104	92	80	76	75	74	79	77	88	90	85	85	89	116	109	116	115	152	161	181	185	188	178	221	261	293
Cavan	76,176	37	49	51	47	56	67	79	84	88	114	134	144	164	200	303	339	386	412	571	641	735	760	811	824	910	1012	1058
Leitrim	32,044	34	37	37	25	19	25	25	28	31	31	28	34	34	53	81	97	125	137	147	162	218	218	225	240	253	262	272
Monaghan	61,386	68	93	116	135	134	166	173	189	178	207	226	257	257	270	303	319	331	313	362	350	368	350	375	365	402	389	406
Donegal	159,192	178	185	191	204	211	219	233	258	265	273	293	312	319	326	324	345	355	355	354	367	365	356	344	347	329	320	320
Wicklow	142,425	69	65	67	70	73	65	72	74	77	78	78	77	76	76	80	84	88	91	87	89	91	103	119	120	124	124	129
Dublin	1,347,359	148	152	160	154	159	163	168	172	161	166	162	171	165	163	173	174	177	180	184	193	197	201	223	231	238	241	252
National	4,761,865	80	84	88	88	92	96	101	108	107	114	116	124	128	134	150	158	167	177	190	207	217	231	251	261	279	290	302

Two Weekly Incidence Rate Per 100k	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct	31-Oct	01-Nov	02-Nov	03-Nov	04-Nov	05-Nov	06-Nov	07-Nov	08-Nov	09-Nov	10-Nov	11-Nov	12-Nov	13-Nov	14-Nov	15-Nov	16-Nov	17-Nov	18-Nov	19-Nov	20-Nov	21-Nov	22-Nov	Change Last 5 Days
Kerry	257	269	291	299	279	281	269	271	236	220	198	183	178	194	190	177	162	153	139	139	129	128	128	127	123	122	115	86	83	71	60	60	-48%
Limerick	301	288	293	306	299	310	306	312	277	269	262	228	227	229	221	216	218	211	207	198	195	195	211	201	222	238	236	221	216	217	205	194	-18%
Mayo	243	250	246	256	266	259	248	242	261	246	232	216	198	183	184	185	176	162	147	151	145	141	118	113	110	110	109	103	93	77	79	87	-20%
Meath	656	648	649	661	651	590	558	531	481	450	448	352	314	282	272	249	232	204	201	172	154	141	140	133	139	128	134	127	131	131	126	124	-7%
Sligo	406	409	423	438	438	423	397	359	354	356	333	304	285	259	220	211	189	159	154	154	154	140	128	114	104	95	93	76	85	84	73	76	-18%
Westmeath	453	455	460	453	461	465	415	440	402	369	372	354	266	255	229	216	208	184	158	151	162	133	150	150	113	117	113	106	103	100	92	88	-22%
Wexford	322	318	313	301	268	257	258	242	192	174	172	141	124	126	96	89	83	74	67	67	48	49	49	49	47	45	46	37	42	39	37	36	-22%
Kilkenny	174	180	175	176	173	171	168	150	133	131	139	134	136	134	134	141	141	133	128	130	125	126	129	126	118	116	116	113	110	98	92	106	-9%
Carlow	242	270	292	306	311	327	327	293	299	270	278	249	242	214	213	177	160	137	126	105	95	98	91	88	72	77	81	86	88	84	76	72	-11%
Clare	311	272	264	281	252	248	253	255	235	229	209	189	186	181	173	171	160	139	132	122	109	104	104	93	109	111	112	104	93	91	89	86	-23%
Cork	327	334	347	337	335	333	331	334	318	305	276	258	242	233	239	216	195	179	158	143	119	108	102	89	83	86	82	81	73	77	78	81	-1%
Galway	372	368	373	382	384	370	354	341	313	296	282	255	243	211	187	171	144	126	109	108	97	86	83	86	80	84	78	71	66	62	62	63	-19%
Longford	308	296	281	289	291	306	279	294	259	245	223	193	181	193	166	164	157	152	142	132	127	115	115	103	103	100	100	83	88	88	81	83	-17%
Roscommon	271	260	276	263	263	259	231	240	229	203	225	229	218	195	189	174	153	152	175	170	175	163	166	169	141	169	161	167	161	160	166	161	0%
Offaly	224	214	224	217	222	227	218	236	191	162	153	130	112	106	100	96	97	99	85	99	94	87	95	114	112	117	122	126	119	123	103	100	-18%
Laois	220	220	233	242	251	256	231	235	227	208	204	197	179	170	174	175	174	163	157	155	149	136	136	137	116	107	104	99	86	83	63	59	-43%
Waterford	176	194	205	215	226	225	228	210	205	201	201	195	194	187	176	163	146	136	128	134	114	142	141	156	163	163	164	155	161	157	156	154	-6%
Tipperary	126	124	134	139	133	139	145	133	139	131	130	130	130	132	130	128	122	117	123	118	113	117	114	101	105	110	107	106	100	97	92	86	-19%
Kildare	303	298	301	306	298	289	290	292	270	242	231	210	186	177	169	156	143	121	118	103	94	85	93	89	88	85	86	87	86	87	84	87	1%
Louth	283	272	286	299	311	289	296	293	285	297	297	257	219	193	202	189	177	159	155	157	156	147	151	151	160	157	168	174	186	202	206	213	27%
Cavan	1058	983	966	967	964	810	752	668	645	589	562	474	365	295	263	232	206	159	143	133	119	112	102	108	98	87	95	97	95	101	100	98	4%
Leitrim	278	259	247	222	209	200	178	125	122	109	97	84	69	56	31	28	34	37	37	47	56	81	81	87	94	94	100	106	106	97	84	78	-22%
Monaghan	409	384	375	349	363	323	310	305	303	288	269	218	205	171	176	166	142	137	121	122	116	117	124	112	114	104	104	112	94	101	101	106	2%
Donegal	312	324	322	329	318	313	317	322	310	320	309	305	286	300	297	290	293	275	285	273	281	271	272	275	269	281	293	263	266	254	231	227	-23%
Wicklow	145	145	149	149	145	147	149	141	130	117	116	107	104	106	91	88	89	82	77	89	86	84	85	85	82	86	83	78	88	91	80	84	2%
Dublin	257	253	255	255	258	255	252	252	237	220	226	217	209	200	199	191	185	172	161	151	142	134	139	136	119	118	115	119	114	118	114	114	-1%
National	305	302	307	309	307	298	291	286	268	253	247	226	211	201	195	184	173	159	150	142	133	127	128	124	117	118	117	114	111	111	106	107	-9%

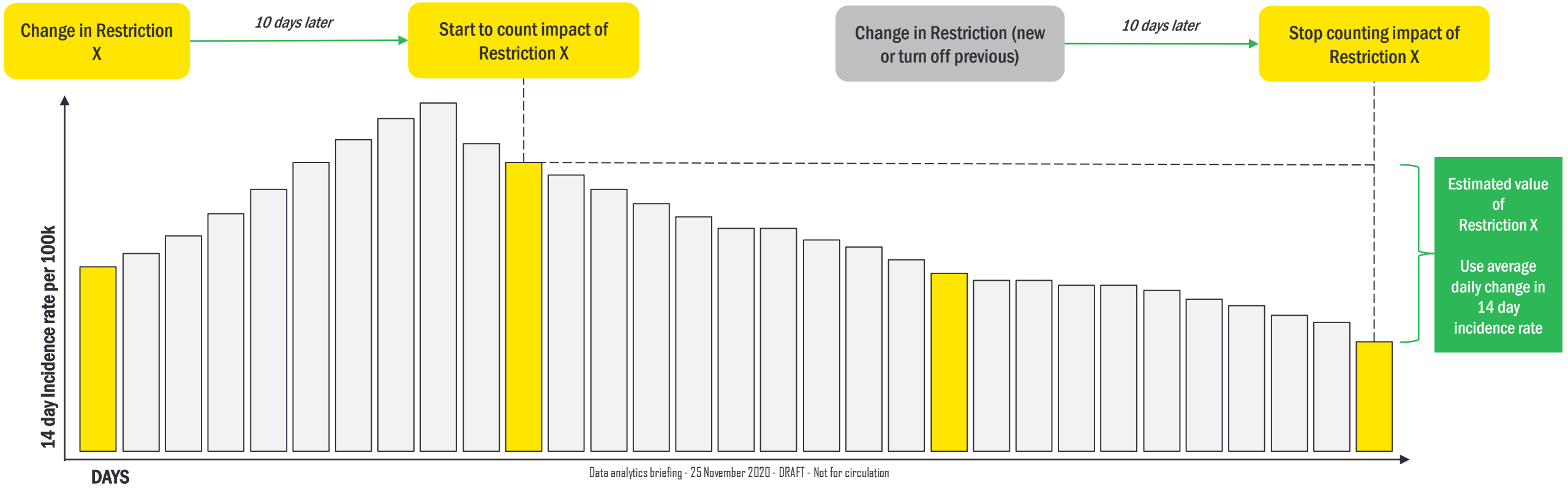
Source: Based on daily cumulative case data published on GeoHive to 22 November 2020. This data is published daily; Population: Census 2016, CSO

Overview of Restriction Analysis Methodology

It is not easy to quantify the value of restrictions. There have been relatively few changes in restrictions, which generally combine more than one change at a time, therefore hiding the unit value per restriction. There is also a time lag between a restriction change and the impact being seen, and the incidence rate can clearly be impacted by significant outbreaks. We have used the below methodology to initially quantify the impact of changes in restrictions. This calculation has been applied across counties. The outputs should be seen as directionally useful, rather than precise statistical outputs. A sensitivity analysis has also been completed looking at a reduced 7 day and rolling average incidence rate over 3 days per 100k especially for periods where there were more frequent restriction changes.

It should be noted that this does not measure compliance or behavioural aspects related to restrictions.

They are also presented alongside international academic research to provide a broad view to support decision-making. Further analysis has commenced to enhance the measurement of correlation between restrictions and their impact.



Summary of Restriction Impact

The below heatmap shows the average daily change in 14 day incidence rate per 100k per restriction. The impact is calculated using the approach described in Slide 8.

Restriction Effective Date	29/02/2020	12/03/2020	15/03/2020	24/03/2020	27/03/2020	01/05/2020	15/05/2020	28/05/2020	08/06/2020	29/06/2020	13/07/2020	21/07/2020	08/08/2020	19/08/2020	21/08/2020	31/08/2020	19/09/2020	21/09/2020	26/09/2020	07/10/2020	16/10/2020		22/10/2020
Restriction Estimated Start of Impact	10/03/2020	22/03/2020	25/03/2020	03/04/2020	06/04/2020	11/05/2020	25/05/2020	07/06/2020	18/06/2020	09/07/2020	23/07/2020	31/07/2020	18/08/2020	29/08/2020	31/08/2020	10/09/2020	29/09/2020	01/10/2020	06/10/2020	17/10/2020	26/10/2020		01/11/2020
Avg daily change in 14 day incidence rate per 100k	No restrictions	Childcare closed, School Closed	Bars closed	Retail, restaurants etc closed	Stay at home order (2km)	Stay at home increased to 5km	Construction Opened	Mandatory PLF	Phase 2 reopening	Phase 3 reopening	Face masks on public transport	Green List	Lockdown Laois, Offaly Kildare	Face masks in shops	Lockdown lifted for Laois, Offaly, extended for Kildare	Schools + childcare opened	Level 3 Dublin	Wet Bars* Opened except Dublin	Level 3 Donegal	Level 3 National**	Level 3 Max National**	Level 4 Donegal, Cavan, Monaghan	Level 5 National (to 22 Nov)**
Carlow	0	0	1	-2	2	-5	1	-2	-1	0	0	2		-4		1		5		17	-7		-9
Cavan	0	0	8	18	0	-6	-3	-3	0	0	0	0		0		3		43		17		-62	-21
Clare	1	4	3	0	1	-4	2	-4	0	0	2	0		0		2		15		-5	-4		-6
Cork	2	2	3	-3	-1	1	-2	-1	0	0	0	0		0		4		10		7	-5		-9
Donegal	0	0	5	5	-2	-1	0	0	0	0	0	1		0		9		12	1			0	-4
Dublin	3	6	11	1	-2	-4	-3	-1	0	0	0	1		2		4	4				-6		-5
Galway	1	1	2	-2	0	0	-1	-1	0	0	0	0		1		3		11		12	-15		-10
Kerry	1	5	3	4	-1	0	0	0	0	0	0	0		1		0		11		9	-10		-6
Kildare	1	2	5	3	0	-4	-1	0	0	0	3	9	-7	-5	-2	1		8		7	-9		-7
Kilkenny	1	1	4	-3	-1	0	-3	0	0	0	0	1		0		0		6		3	-7		-2
Laois	1	0	1	0	0	-2	0	0	0	0	2	2	-2	-2	0	1		7		8	-7		-7
Leitrim	1	0	3	2	0	-1	-1	0	1	-1	0	0		4		-1		12		0	-17		-1
Limerick	1	1	5	-1	-1	-2	-1	0	0	0	1	1		2		-1		12		7	-5		-3
Longford	1	1	3	4	7	-20	-1	-1	0	0	0	0		2		2		6		5	-8		-6
Louth	1	1	3	1	0	-3	0	-1	0	0	0	1		1		2		7		12	-2		-4
Mayo	0	1	4	10	-1	-2	-2	0	0	0	0	0		0		1		7		12	-3		-7
Meath	1	2	3	8	0	-3	-1	0	0	0	0	0		1		2		24		19	-34		-15
Monaghan	0	0	3	17	0	-2	-2	-3	0	0	0	1		1		7		11		-3		-12	-7
Offaly	1	1	6	-2	2	2	-12	0	0	0	0	7	-9	-1	2	1		6		2	-10		-2
Roscommon	0	1	1	2	6	-14	0	-2	0	0	0	1		0		5		4		4	-10		-3
Sligo	1	0	3	-4	0	-2	0	0	2	-2	0	0		0		1		17		16	-14		-12
Tipperary	1	1	5	-1	1	-5	0	-1	0	0	0	3		-4		0		4		3	0		-2
Waterford	1	3	2	-3	-1	0	0	0	0	0	0	1		1		1		6		9	-4		-2
Westmeath	2	3	7	2	3	-13	-1	-1	0	0	0	0		1		1		12		18	-15		-13
Wexford	0	0	1	-1	0	-1	0	0	0	0	0	1		0		0		13		3	-16		-6
Wicklow	1	5	5	3	-1	-3	-1	0	0	0	-1	1		1		1		2		3	-5		-1

Note:

The outputs should be seen as directionally useful, rather than precise statistical outputs

* The reopening of wet bars coincided with universities opening together with specific sporting events

** Care required when interpreting restriction changes in quick succession. Specifically. the more recent restriction changes (Level 3, Level 3 Max and Level 5) happened within a 15 day period

The absolute number of weekly tests has significantly increased since Wave 1

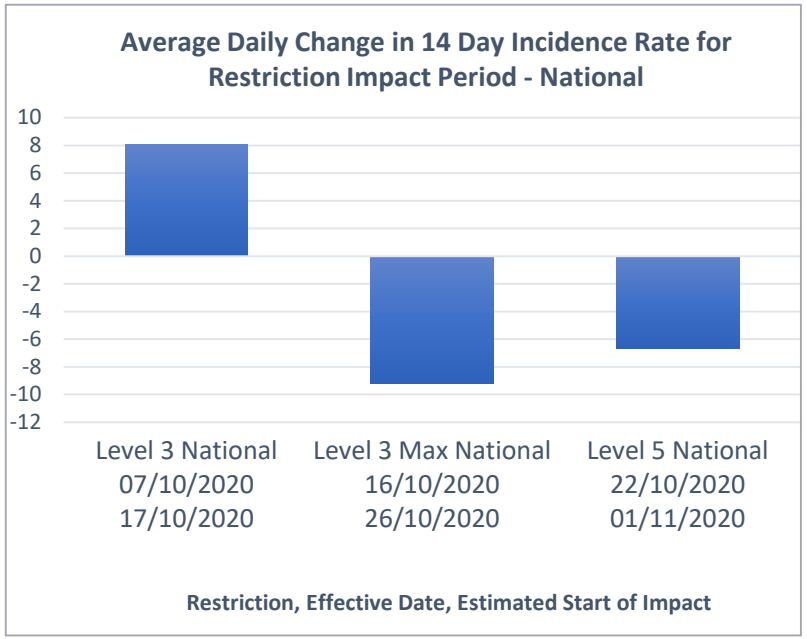
This analysis does not also consider potential behavioural changes beyond the restrictions

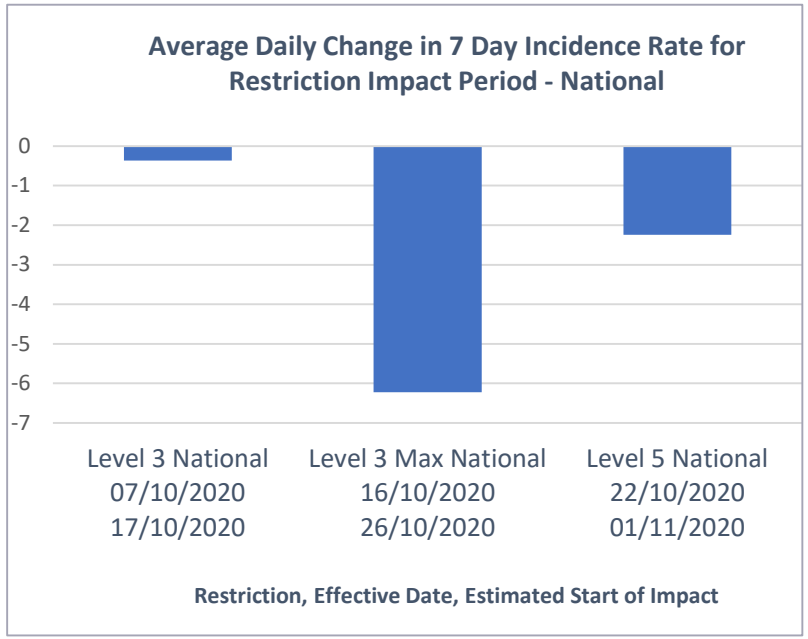
Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. Measures the average daily change in the 14 day incidence rate per 100k for the period of time that the restriction was in place for that county. Does not measure compliance with restrictions or other behavioural aspects

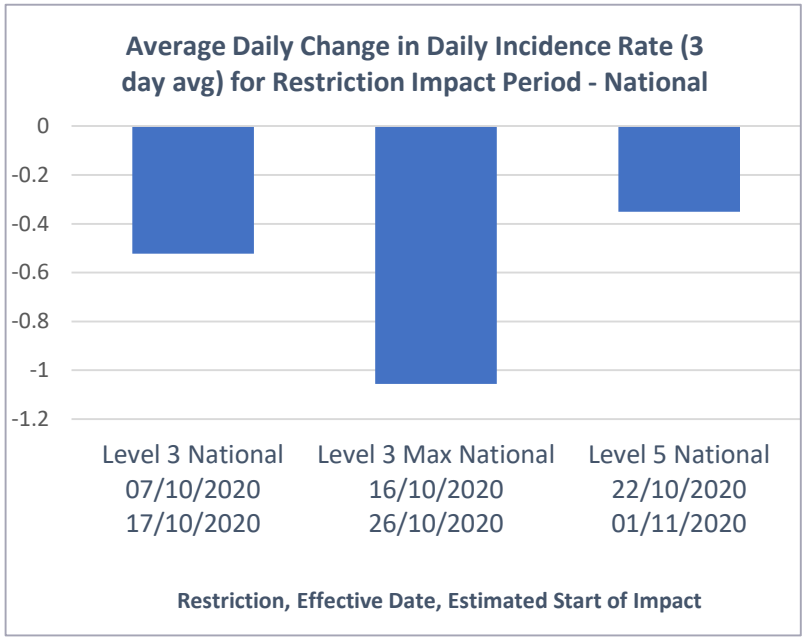
The introduction of Level 3 Max and Level 5 both coincide with a reduction incidence rates

The introduction of Level 3 saw the 14 day incidence rate per 100k decrease in four counties only. However, incidence did start to reduce in all counties with the introduction of further household restrictions (Level 3 Max) and then Level 5. These three restriction changes happened within a 15 day period, with Level 3 Max only active for 6 days.

For completeness, this analysis has also been repeated for a 7 day and a daily incidence rate average over three days. All three are shown below and follow a not identical, but very similar pattern.







Note:

- Care required when interpreting restriction changes in quick succession. This analysis does not also consider potential behavioural changes beyond the restrictions
- Each measure in the above three graphs quantify the impact over a different time period; 14 days, 7 days and 1 day respective. Hence, it is expected that the size of their impact is different. That is also why they are shown to different scales on the y axis
- National measure excludes Dublin, Donegal, Cavan and Monaghan as they were under different restriction changes
- The Level 5 reductions should be seen as additive to the reduction in Level 3 Max

Cavan's three LEAs follow a different path. One is being driven by outbreaks, one impacted by the border and one more aligned with the national trend

Cavan profile:

- Cavan has experienced a higher 14 day disease incidence rate per 100k during the second wave than the national average
- Part of Cavan borders with NI where different restrictions are in place

Summary analysis:

- Cavan-Belturbet LEA is the only part of Cavan with a NI border. This LEA is experiencing a higher disease incidence than the national average
- Ballyjamesduff LEA had the highest incidence rate throughout October. The timing of the acceleration of growth rate in this LEA appears to correlate with the GAA county final (winners are in this LEA)
- Travel along the N03 between Belturbet and George Mitchell Bridge at the NI Border fell 33% during October (Source TII Road Travel data)

Restriction impact:

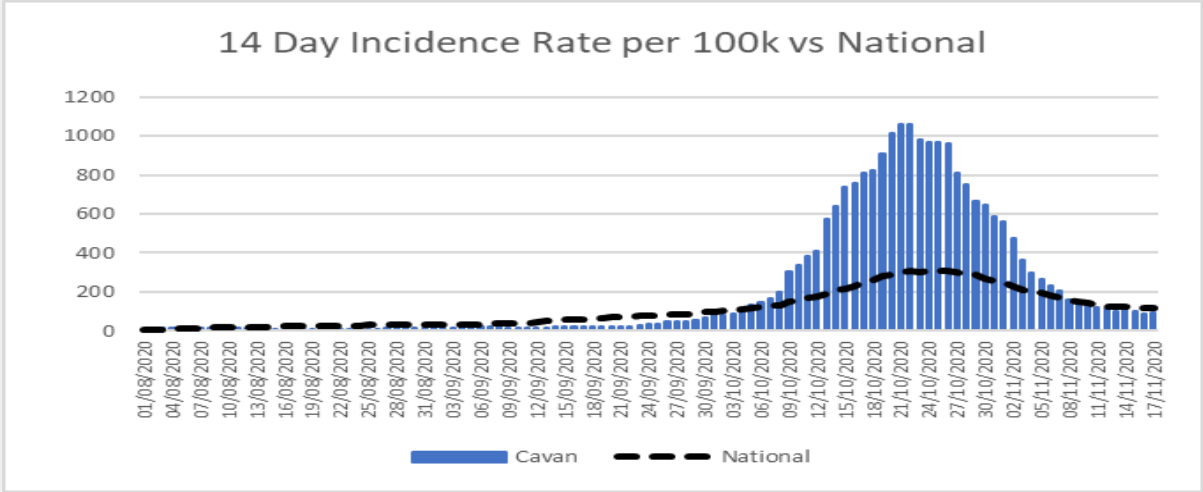
- The timing of the growth of cases appears to correlate with the events listed above and changes to restrictions in wet pubs
- Level 4 restrictions imposed for the border counties appears to have desired impact of reducing incidence level in Cavan
- Level 5 restrictions continue to drive incidence level further

Employment Summary:

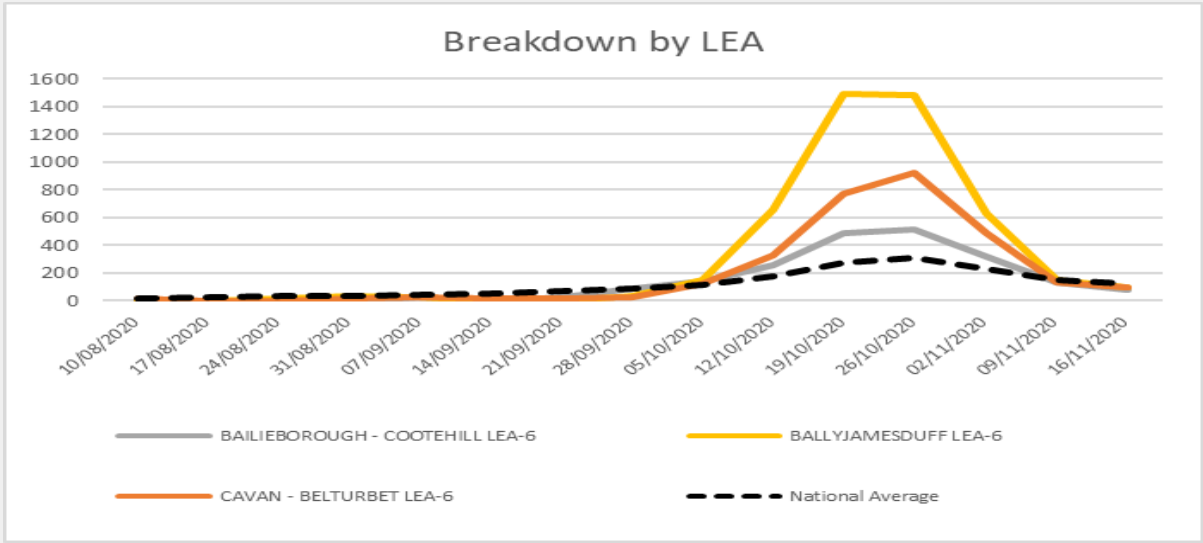
- Cavan had c.47% of its workforce on PUP or TWSS (c.15k) at the peak in early May (EY 2019 employment estimates). There are currently 4.7k on PUP (17 Nov) which is down from 9.7k in May (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Meath is seeing a higher incidence rate than the national average. This is influenced by proximity to Dublin and specific outbreak events

Meath profile:

- Meath has experienced a higher 14 day disease incidence rate per 100k during second wave than the national average
- Dublin borders including a significant commuter population

Summary analysis:

- Ratoath LEA has the highest incidence rate. The timing of this acceleration of growth rate appears to correlate with GAA county final win (Source: GAA.ie)

Restriction impact:

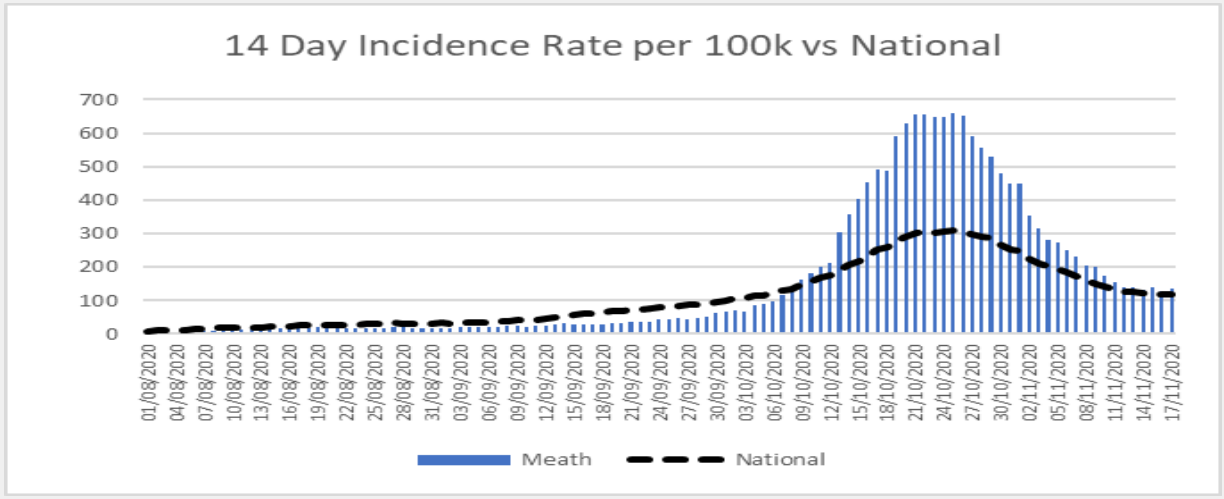
- The timing of the growth of cases appears to correlate with the events listed above and the changes to restrictions in wet pubs
- Incidence level continued to rise post initial Level 3 restrictions imposed nationally
- Level 3 (max) restrictions imposed nationally appear to have desired impact of reducing incidence levels
- Level 5 restrictions continue to drive incidence level down further

Employment summary:

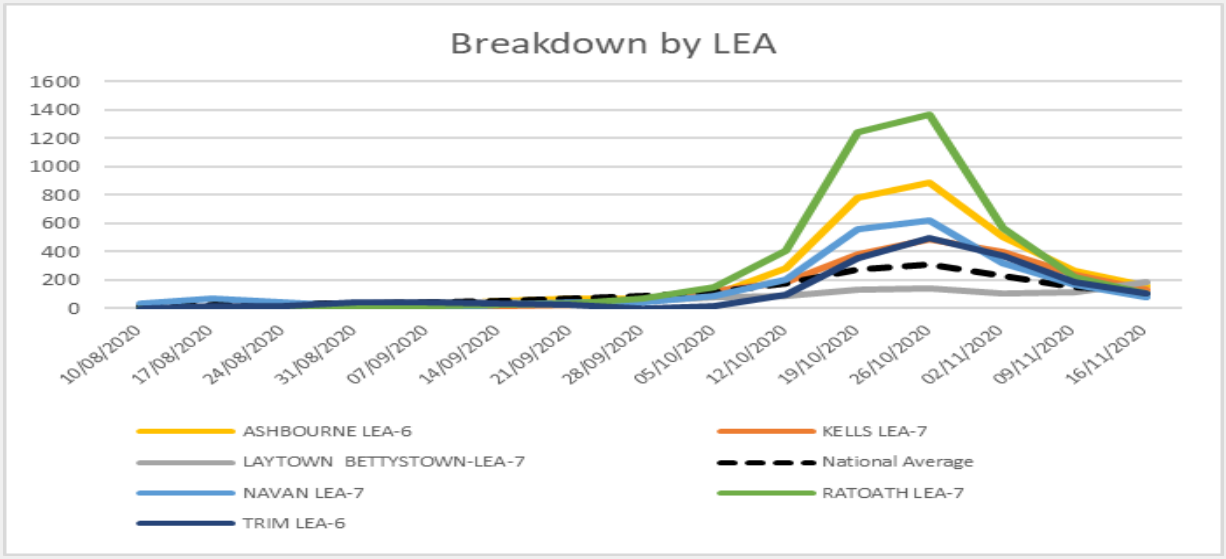
- Meath had c.42% of its workforce on PUP or TWSS (c.40k) at the peak in early May (EY 2019 employment estimates). The numbers currently on PUP (17 Nov) remain lower than peak (13k versus 25k) levels (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

The border is contributing to Donegal's higher rate of cases. Donegal is not seeing the benefit of recent Level 4 increases seen in other border counties

Donegal profile:

- Donegal has experienced a higher 14 day disease incidence rate per 100k during second wave than the national average
- Disease incidence higher and earlier versus national average, and reducing at a slower rate
- Eastern Donegal borders with NI where different restrictions are in place

Summary analysis:

- Lifford and Stranolar LEA close to the NI border with Derry, experienced an earlier and higher disease incidence
- Other eastern parts of Donegal (Buncrana, Letterkenny and Carndonagh) have the next highest incidence rates
- A large hospital outbreak in Letterkenny resulted in 99 cases in November alone (Source: Donegal Daily)
- Private Household attributable to 67% of outbreaks in the county from September to October, but only 30% in November

Restriction impact:

- Disease incidence continued to rise after level 3 Donegal announcement
- Specific restrictions in NI (1/10) on pubs and restaurants appeared to have helped reduce rate in Donegal
- Despite level 3 max and level 5 being effective in other counties, cases in Donegal fell at a lower rate compared to national levels
- Similarly, Level 4 reduced the cases in Monaghan and Cavan, but not Donegal. Mask compliance in Donegal also reduced (against national and previous Donegal trend) with Level 4 restrictions (Facebook survey data)

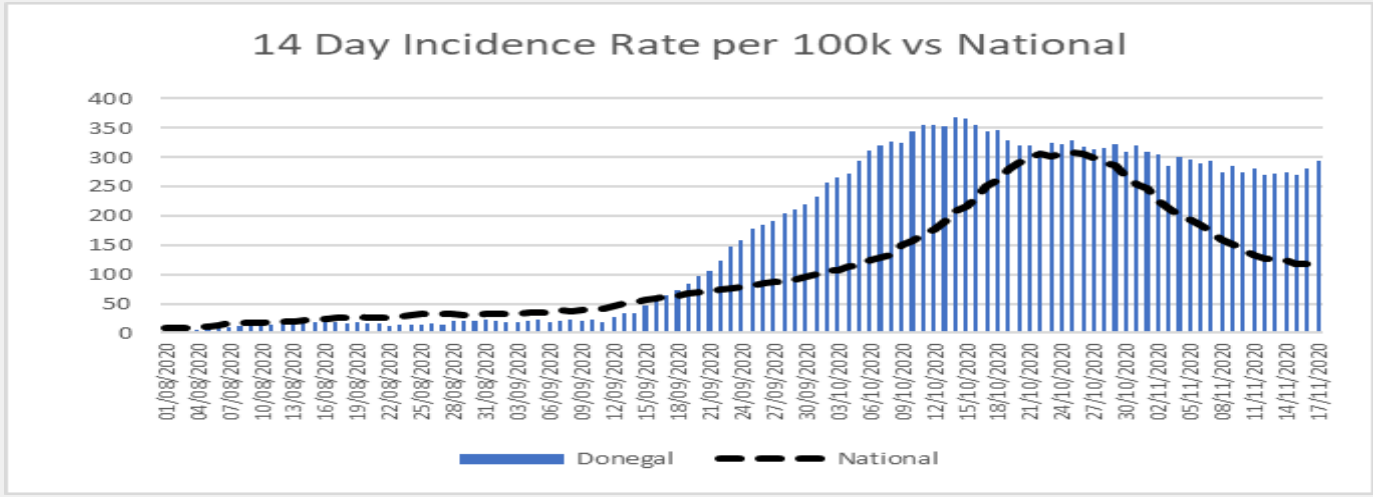
Employment summary:

- Donegal had c.49% of its workforce on PUP or TWSS (c.30k) at the peak in early May (EY 2019 employment estimates). The numbers currently on PUP (17 Nov) remain lower than peak (12k versus 23k) (CSO, DSP)

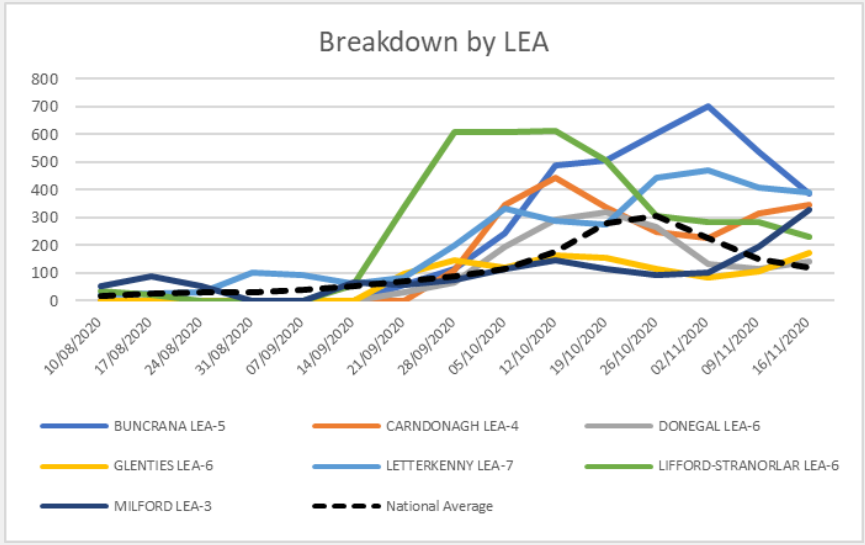
Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration

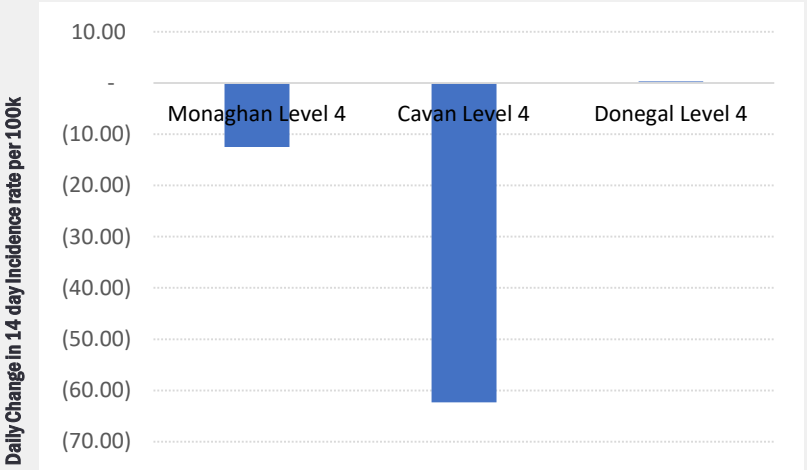
The Facebook survey is a voluntary survey, managed by the University of Maryland. The mask question reads "In the last 7 days, how often did you wear a mask in public?".



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.



Cork is broadly aligned with the national trend. Cork City is driving up the incidence rates across the county

Cork profile:

- Cork is broadly aligned with the national average for the 14 day disease incidence rate per 100k during second wave

Summary analysis:

- Cork City is the most impacted area, with the rest of the county following with a reduced incident rate
- Cases in Cork City South Central, the LEA containing UCC (started returning on 21 Sept), were twice as high as other LEAs in Cork city during mid October. This gap declines in November as the universities went online

Restriction impact:

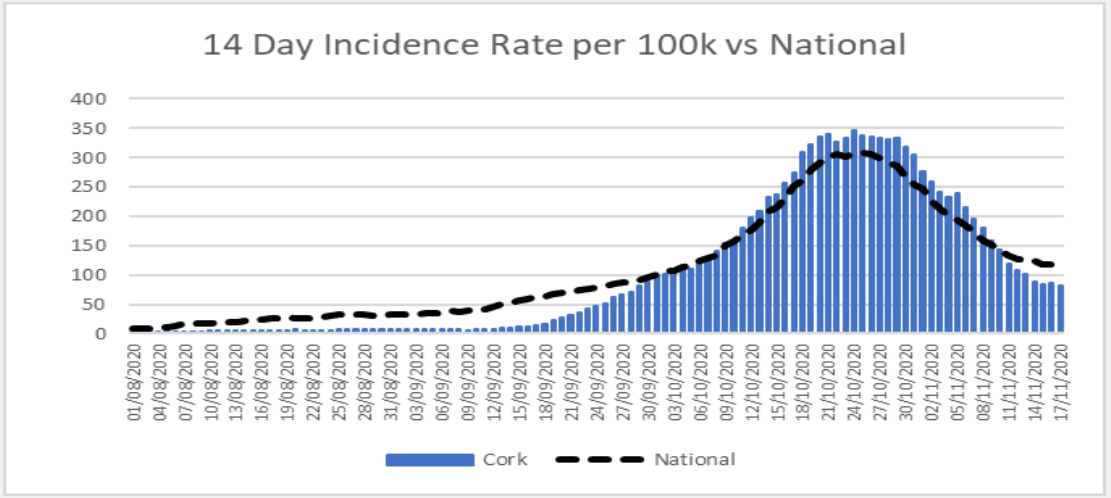
- Cases in Cork city rose as wet pubs reopened (21 Sept). Cases around the rest of the county followed shortly after
- There were a number of GAA games in early October, which coincides with rate increases. No matches occurred after this, with level 3 restrictions being applied around this time (6 Oct). Cases throughout Cork began to fall 10 days later

Employment summary:

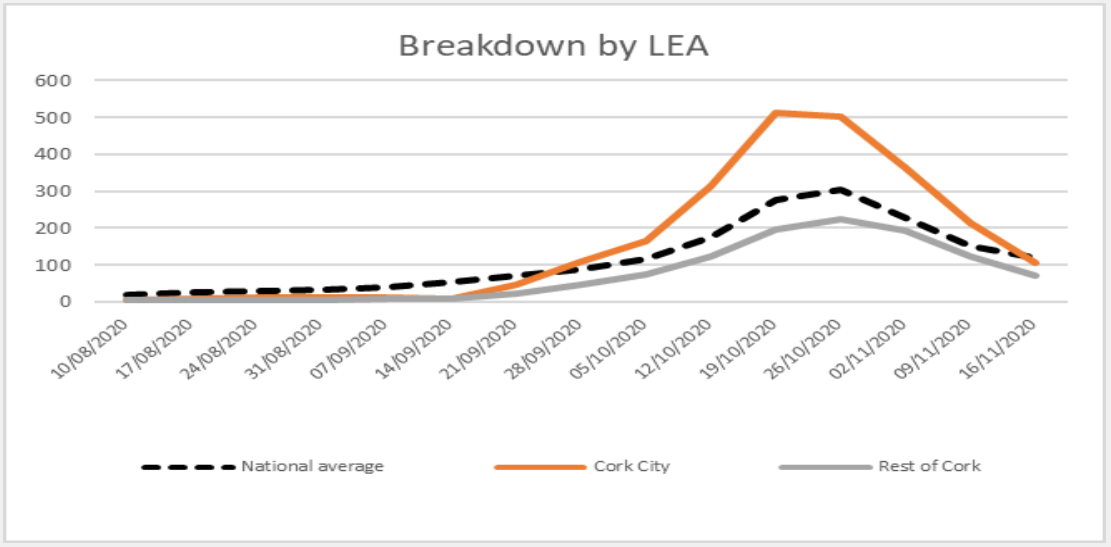
- At peak, c.39% of Cork's workforce were on PUP or TWSS (c.96k) (EY 2019 employment estimates). Current PUP levels (17 Nov) are lower than the previous peak (35k versus 62k in May) (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Galway rose above the national average during the second wave, driven by Galway City Central and Connemara South LEAs

Galway profile:

- Galway experienced a higher 14 day disease incidence rate per 100k during second wave than the national average
- It has now come back down below national average levels since early November

Summary analysis:

- Galway City Central, Connemara South and Galway City East have had the highest 14-day incidence rates throughout October
- GAA senior championship football semi-finals and finals also occurred in the last week of September and first week of October. Connemara South rates increased 10 days later

Restriction impact:

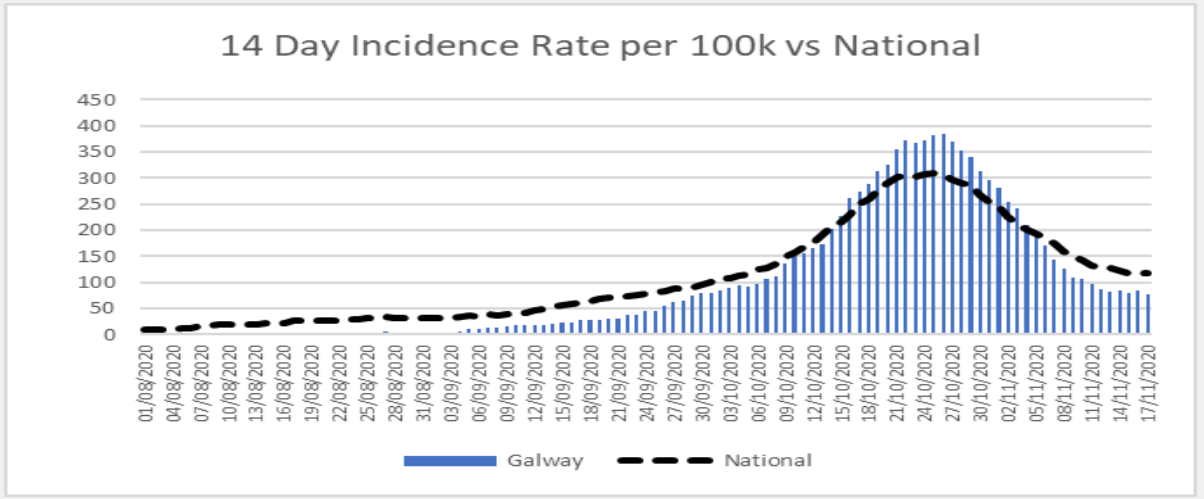
- Cases begin to decline ten days after the national level 3 lockdown came into effect (17/10), falling below national levels in November
- An exception to this is Gort-Kinvara, which saw cases continue to rise into early November

Employment summary:

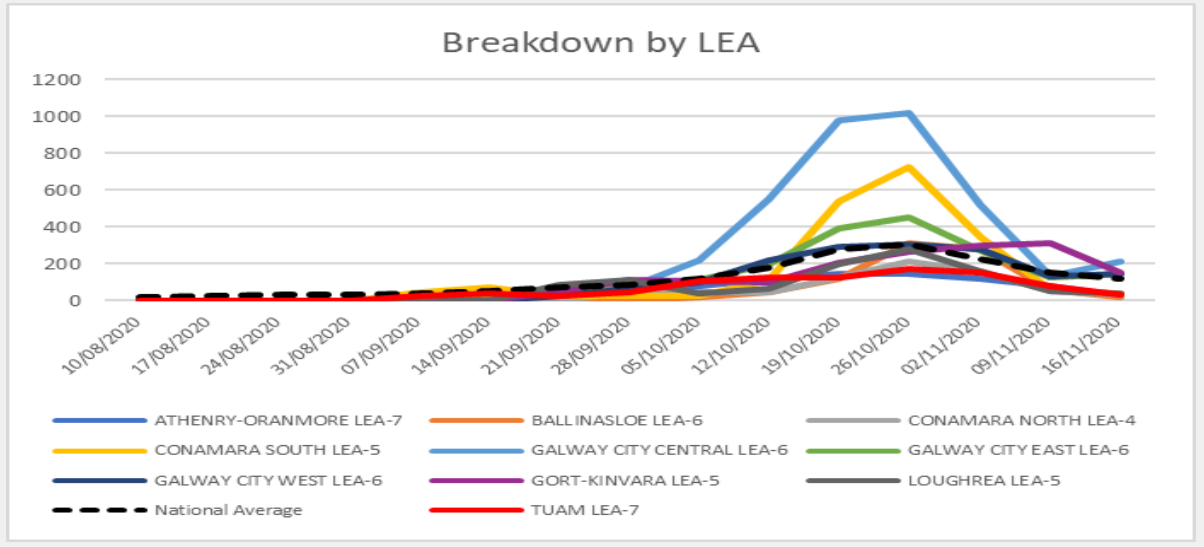
- Galway had c.39% of its workforce on PUP or TWSS (c.49k) at the peak in early May (EY 2019 employment estimates). There are currently 19.5k on PUP (17 Nov) which is down from 32.5k in May (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Dublin LEA Analysis

The below heatmap shows the Dublin LEA 14 day incidence rate per 100k population since early August. Some areas are seeing higher incidence rates.

		10/08/2020	17/08/2020	24/08/2020	31/08/2020	07/09/2020	14/09/2020	21/09/2020	28/09/2020	05/10/2020	12/10/2020	19/10/2020	26/10/2020	02/11/2020	09/11/2020	16/11/2020
Dublin City	ARTANE-WHITEHALL LEA-6	15.6	13.7	33.2	35.2	64.5	88	107.5	140.7	170.1	271.7	383.1	377.3	265.9	177.9	111.4
	BALLYFERMOT-DRIMNAGH LEA-5	3	3	32.6	43.4	60.8	112.9	165	184.5	245.3	310.4	321.3	332.1	277.9	191	143.3
	BALLYMUN-FINGLAS LEA-6	3	12.7	32.7	43.6	56.4	110.9	267.2	270.9	174.5	263.6	463.6	492.6	345.4	272.7	221.8
	CABRA-GLASNEVIN LEA-7	13.6	22.2	30.7	44.3	52.9	85.2	126.2	134.7	146.6	191	252.3	264.3	185.8	160.3	138.1
	CLONTARF LEA-6	3	9.2	57.2	60.9	38.8	83.1	140.3	153.2	134.7	107	138.4	169.8	142.1	114.4	73.8
	DONAGHMEDE LEA-5	16.8	12	21.6	31.3	40.9	57.7	134.6	173.1	163.5	151.5	163.5	233.2	240.4	170.7	89
	KIMMAGE-RATHMINES LEA-6	3	21.5	35.8	50.1	75.2	111	162.9	282.8	306.1	250.6	245.3	211.2	223.8	188	123.5
	NORTH INNER CITY LEA-7	22	28.3	40.9	50.3	62.9	92.7	130.5	179.2	221.7	213.8	205.9	238.9	205.9	121	84.9
	PEMBROKE LEA-5	15.4	22	13.2	33	70.4	74.8	57.2	57.2	81.4	116.6	189.1	173.7	90.2	88	59.4
	SOUTH EAST INNER CITY LEA-5	3	12.3	32	46.8	91.1	113.3	130.5	169.9	169.9	145.3	187.2	209.3	160.1	120.7	133
	SOUTH WEST INNER CITY LEA-5	3	16.5	40.1	101.5	146.4	151.1	196	188.9	151.1	184.2	233.8	240.9	177.1	151.1	186.6
Dun Laoghaire - Rathdown	BLACKROCK LEA-6	3	3	3	41.5	50.4	32.6	47.4	65.2	77.1	59.3	112.7	195.7	145.3	68.2	68.2
	DUN LAOGHAIRE LEA-7	3	3	33.6	64.9	60.1	57.7	72.1	88.9	124.9	103.3	88.9	110.5	100.9	76.9	72.1
	DUNDRUM LEA-7	3	3	3	29.4	69.4	58.7	50.7	88.1	125.5	114.8	101.5	112.1	96.1	66.8	80.1
	GLENCULLEN-SANDYFORD LEA-7	3	19.1	24.6	13.7	19.1	60.1	79.2	101	122.9	98.3	76.5	87.4	106.5	98.3	68.3
	KILLINEY-SHANKILL LEA-7	3	3	3	13.1	23.6	49.9	65.6	68.3	115.5	120.8	105	107.7	70.9	44.6	52.5
	STILLORGAN LEA-6	3	3	22.9	36.1	39.3	36.1	55.7	108.2	121.3	85.2	137.7	183.6	104.9	91.8	101.6
Fingal	BALBRIGGAN LEA-5	3	19.1	16.4	52	123.1	155.9	172.3	134	76.6	95.7	158.6	191.4	227	183.2	109.4
	BLANCHARDSTOWN-MULHUDDART LEA-5	3	25.5	76.5	93.5	138.8	169.9	124.6	136	175.6	229.4	351.2	402.2	371	266.2	147.3
	CASTLEKNOCK LEA-6	10.8	43.4	54.2	43.4	95.4	110.6	104.1	125.7	143.1	162.6	253.7	297	199.5	130.1	114.9
	HOWTH-MALAHIDE LEA-7	23.2	30.3	26.7	19.6	41	65.9	110.4	147.8	153.2	165.7	204.8	235.1	217.3	163.9	92.6
	ONGAR LEA-5	3	3	36.3	67	80.9	106	147.9	175.8	223.3	256.7	281.9	307	245.6	150.7	134
	RUSH-LUSK LEA-5	3	20.2	31.7	28.8	75	86.5	98.1	150	115.4	83.6	158.6	187.5	190.3	144.2	43.3
	SWORDS LEA-7	3	27.3	33.1	31.1	85.7	109	89.5	169.4	200.5	194.7	245.3	295.9	371.8	288.1	140.2
South Dublin	CLONDALKIN LEA-7	30.1	19.3	53.7	81.7	68.8	70.9	152.6	197.8	184.9	242.9	367.6	384.8	285.9	212.8	180.6
	FIRHOUSE-BOHERNABREENA LEA-5	20.5	17.5	43.9	73.1	67.2	55.6	73.1	78.9	99.4	181.3	242.7	231	190	122.8	102.3
	LUCAN LEA-5	3	3	38.9	62.8	80.8	83.8	71.8	137.6	188.5	227.4	341.1	380	278.3	134.6	122.7
	PALMERSTOWN-FONTHILL LEA-5	3	23.7	65.7	107.8	94.6	84.1	142	184	123.6	194.6	386.5	331.3	260.3	226.1	165.6
	RATHFARNHAM-TEMPLEOGUE LEA-7	3	3	12.5	35.5	48	75.1	127.3	160.7	146.1	133.6	181.6	196.2	160.7	112.7	112.7
	TALLAGHT CENTRAL LEA-6	3	20.8	41.7	53.2	85.6	157.4	166.6	136.5	138.8	145.8	182.8	224.5	231.4	168.9	134.2
	TALLAGHT SOUTH LEA-5	36.7	28.2	36.7	93	124.1	124.1	166.4	183.3	160.7	203	290.4	267.9	279.1	304.5	251

There appears to be a correlation between areas hit hard in Wave 1 and Wave 2 (acknowledging differences in testing criteria), with areas hit hard across both waves including areas such as Blanchardstown-Mulhuddart, Ongar, Lucan, Clondalkin and Artane-Whitehall.

Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Dublin includes over a quarter of Ireland's population. It therefore includes many stories and strongly aligns with national case levels

Dublin profile:

- Not surprisingly, Dublin's 14 day disease incidence rate per 100k during second wave is in line with the national average
- Significant differences exists within each of the four county council areas of Dublin with Dún Laoghaire–Rathdown seeing lower overall incidence

Summary analysis:

- Highest incidence rates in areas such as Lucan, Ballymun and Swords. Largest outbreaks also focused in the corresponding CCAs; Dublin North, Dublin North West, Dublin North Central
- Tallaght South is the only LEA within Dublin where cases have continued to climb in November

Restriction analysis:

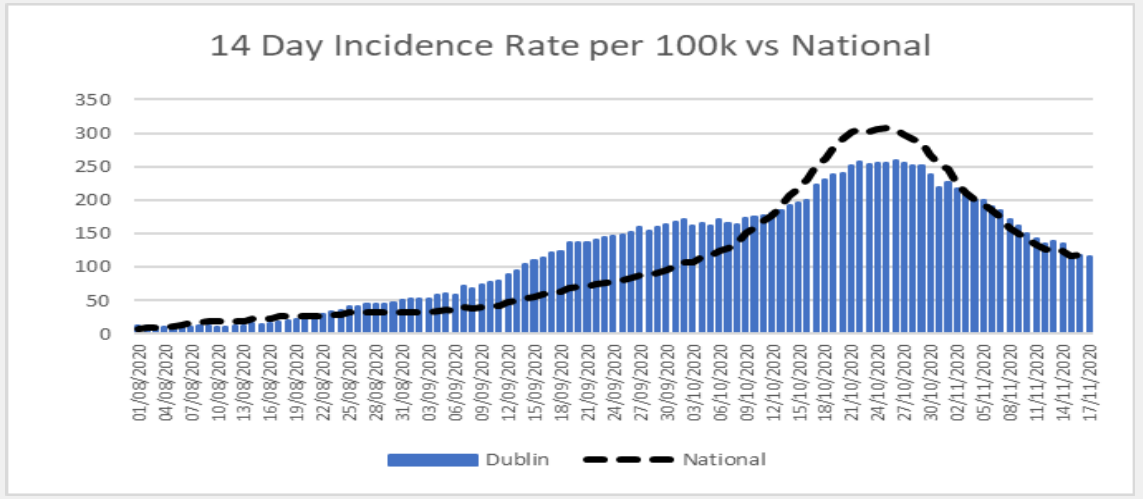
- Cases in Dublin took longer to decline after Level 3, indicating Level 5 was needed here to control cases
- Not opening the wet pubs does appear to have helped Dublin with the subsequent increase in cases being slower than the national average

Employment summary:

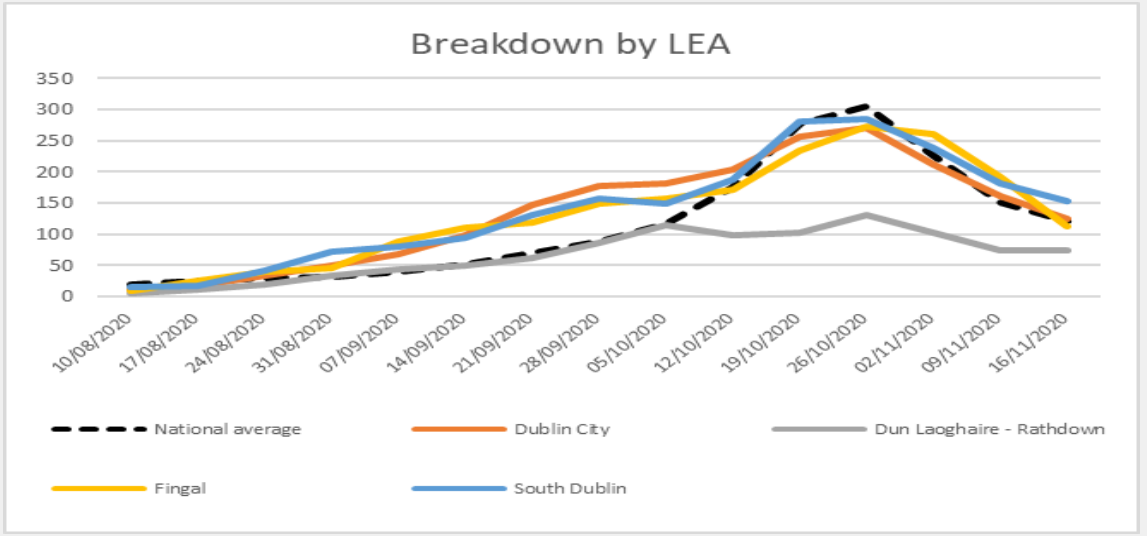
- At peak, Dublin had c.40% of workers on either PUP or TWSS (c. 270k) (EY 2019 employment estimates). Current PUP levels are at 114k (17 Nov) , compared to a peak of 176k in May (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Cases in Limerick during Sept and Oct were driven by very large extended family and community outbreaks

Limerick profile:

- Limerick has experienced a higher 14 day disease incidence rate per 100k during second wave than the national average.
- This is a result of the cases in Limerick not declining to the same extend in the rest of the country

Summary analysis:

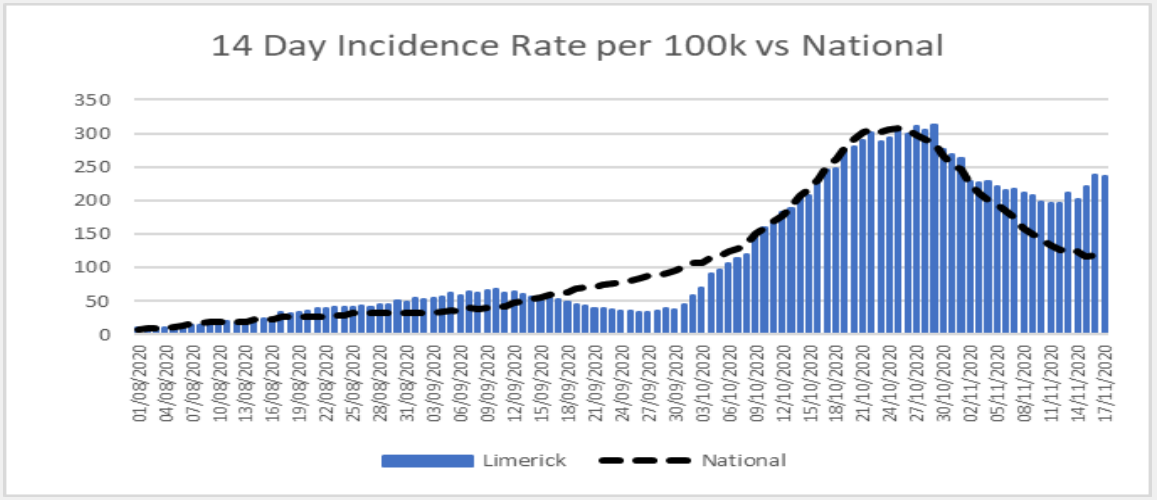
- Two southernmost LEAs were hardest hit at different points; Adare-Rathkeale during October, then Newcastle West in November.
- Limerick City East was the worst performing area within Limerick City, and within the county on 2nd November
- No region performs notably better than others – the remaining LEAs each exceed an incidence rate of 200 cases per 100k population

Employment summary:

- Limerick had c.43% of its workforce on PUP or TWSS (c.34k) at the peak in early May (EY 2019 employment estimates). There are currently 14k on PUP (17 Nov) which is down from 22k in May (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



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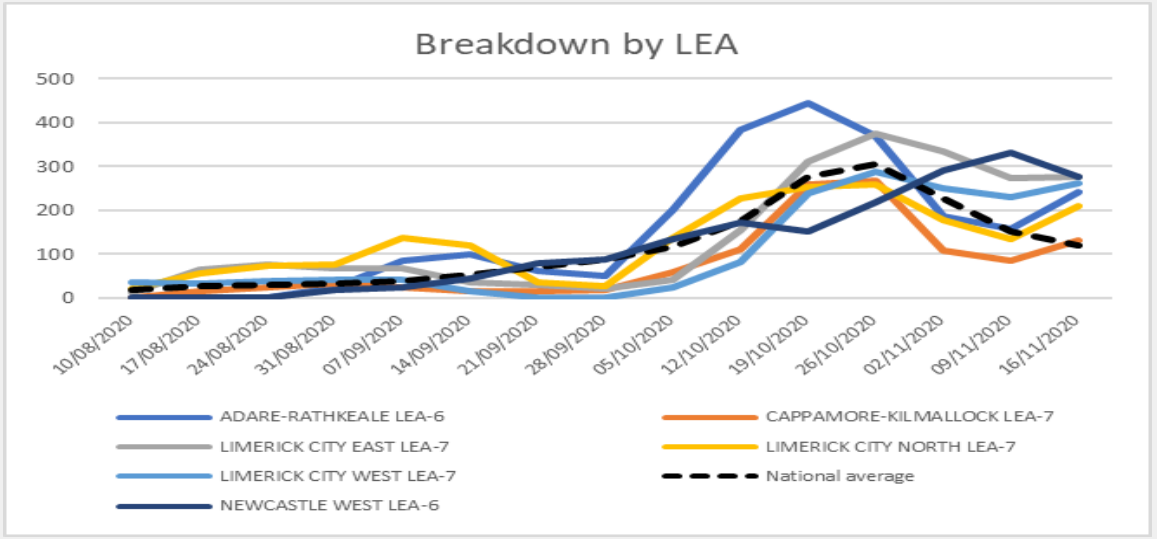


Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Kerry is seeing lower cases than the national average, with Listowel bordering Limerick having the highest number of recent cases

Kerry profile:

- Kerry has experienced a similar 14 day disease incidence rate per 100k during second wave to the national average. However, Listowel LEA has seen a sharp increase in its rate since early October

Summary analysis:

- North Kerry (Listowel) is most severely affected. This coincides with increased rates in southern parts of Limerick such as Newcastle West and Adare-Rathkeale, as well as Limerick city
- Killarney and Tralee LEAs are both next in terms of severity of impact, containing two major Kerry towns
- The remainder of the county (further south, smaller towns) is generally less affected
- Listowel's incidence levels were three times higher than the next worst-afflicted LEA. Note the small population of ~29,000 people meant 182 cases over a 2-week period prior to 26 Oct created a very high incidence rate

Restriction impact:

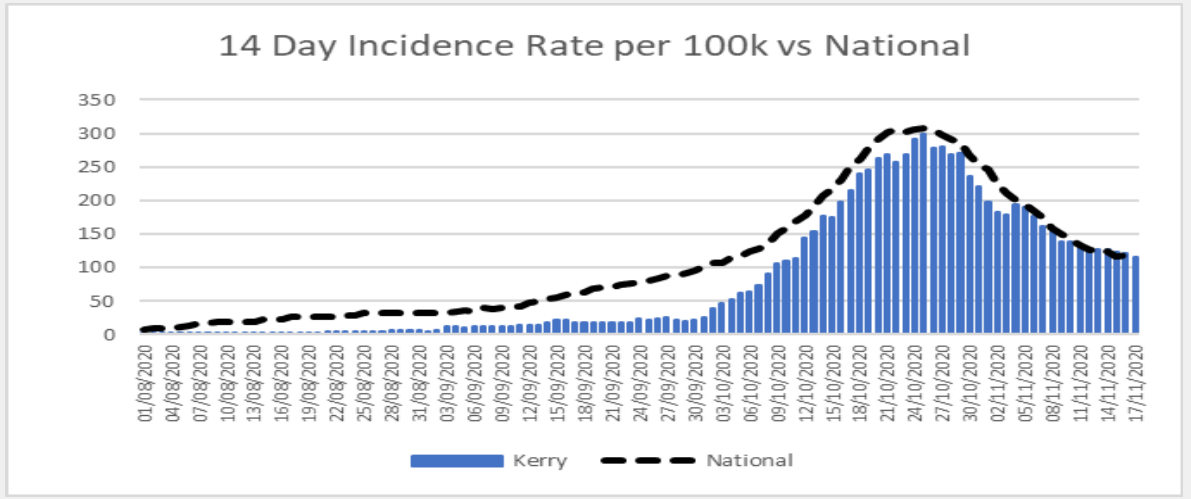
- The number of cases in Kerry started to grow around the time level 3 was introduced – two weeks later, this high growth rate had largely ceased
- Improvements have levelled off somewhat across LEAs such as Tralee, Killarney and Listowel

Employment summary:

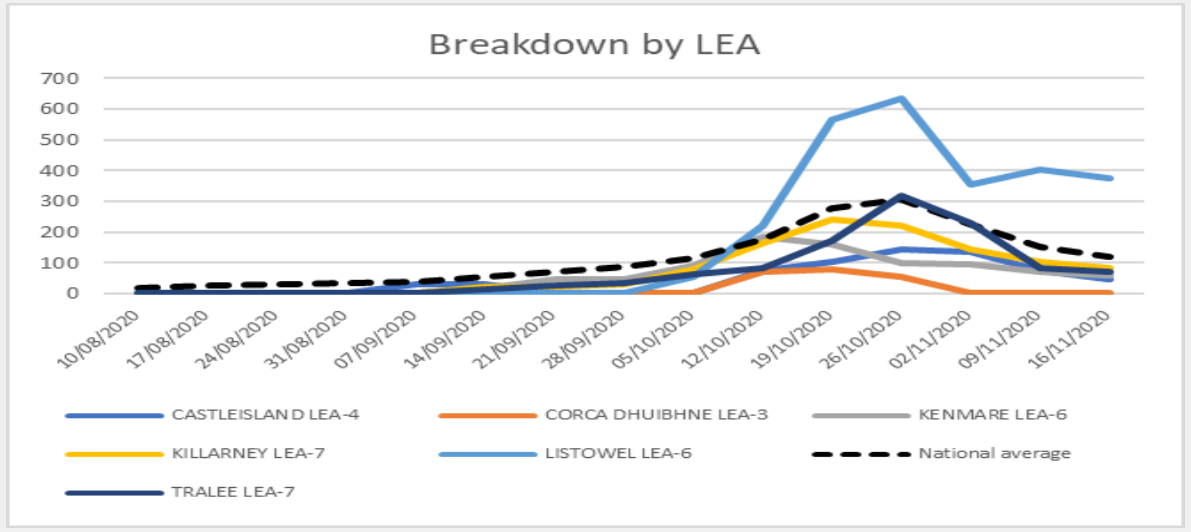
- Kerry had c.49% of its workforce on PUP or TWSS (c.32k) at the peak in early May (EY 2019 employment estimates). There are currently 14k on PUP (17 Nov) which is down from 22k in May (CSO, DSP)

Notes

The restriction impact is based on disease incidence combined with the dates the restrictions are imposed. It is not a measure of compliance or does not take behavioural aspects into consideration



Source: Based on daily cumulative case data published on GeoHive to 17 November 2020. This data is published daily.



Source: Based on weekly OpenHive data to 16 November 2020, Government Open Data initiative. This data is published weekly.

Restrictions impact analysis

We have been looking to quantify restrictions in three ways

Ireland restriction analysis

A detailed analysis of restriction measures and impacts on incidence rates across the 26 counties – highlighting the most and least effective restrictions based on changes to incidence rates over an extended period. Expanded to include university opening and NI restrictions for border counties and presented today

International restriction analysis

A detailed analysis of restriction measures and impacts across EU peer countries to quantify the impact of restrictions post-implementation. Currently completing detailed analysis for initial 10 EU countries

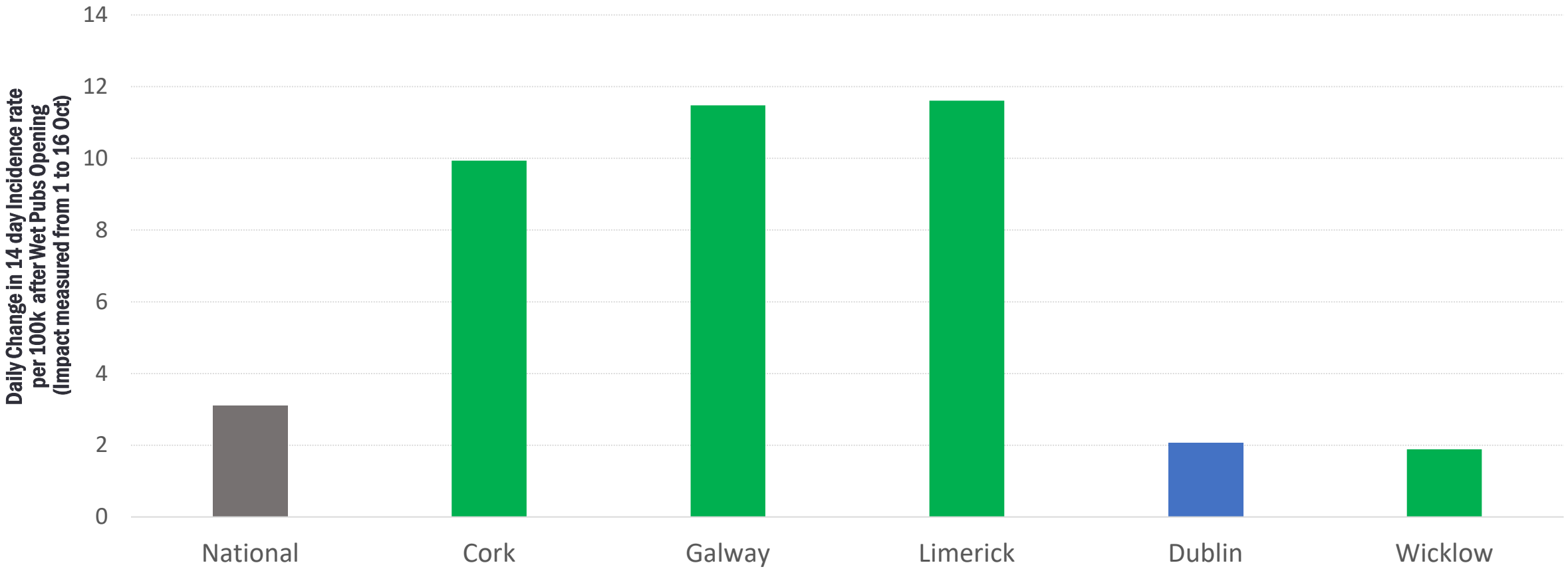
International desktop research

Desktop research was undertaken looking at the impacts of restrictions across the world, leveraging peer research to understand risk of certain settings and restrictions. Key points summarized in regular COVID-19 insights publication and with new research included today

Ireland – restrictions analysis

Wet Pubs opened across the country, but not Dublin, on 21 September. The increase in Dublin's incidence rate was then lower than the national average and for larger counties

Wet pubs opened in all counties except Dublin in late September. This coincided with universities opening together with specific sporting events. The 14 day disease incidence rate per 100k started to increase ten days later in every county. The subsequent incidence rate growth in Dublin was 33% lower than the national average and 79% to 82% lower than other counties with larger cities. Wicklow was the only county that performed better than Dublin, with a 10% lower growth rate than Dublin.



The incidence rate did not materially increase after the three phases of re-opening during late May to early July

The reopening of construction, non-essential retail and the wider Phase 3 openings did not appear to have a material impact on the cases nationally or in larger counties. Note that disease incidence rates were low at this time

Restriction Effective Date	29/02/2020	12/03/2020	15/03/2020	24/03/2020	27/03/2020	01/05/2020	15/05/2020	28/05/2020	08/06/2020	29/06/2020	13/07/2020	21/07/2020	08/08/2020	19/08/2020	21/08/2020	31/08/2020	19/09/2020	21/09/2020	26/09/2020	07/10/2020	16/10/2020		22/10/2020
Restriction Estimated Start of Impact	10/03/2020	22/03/2020	25/03/2020	03/04/2020	06/04/2020	11/05/2020	25/05/2020	07/06/2020	18/06/2020	09/07/2020	23/07/2020	31/07/2020	18/08/2020	29/08/2020	31/08/2020	10/09/2020	29/09/2020	01/10/2020	06/10/2020	17/10/2020	26/10/2020		01/11/2020
Avg daily change in 14 day incidence rate per 100k	No restrictions	Childcare closed, School Closed	Bars closed	Retail, restaurants etc closed	Stay at home order (2km)	Stay at home increased to 5km	Construction Opened	Mandatory PLF	Phase 2 reopening	Phase 3 reopening	Face masks on public transport	Green List	Lockdown Laois, Offaly Kildare	Face masks in shops	Lockdown lifted for Laois, Offaly, extended for Kildare	Schools + childcare opened	Level 3 Dublin	Wet Bars Opened except Dublin	Level 3 Donegal	Level 3 National	Level 3 Max National	Level 4 Donegal, Cavan, Monaghan	Level 5 National (to 22 Nov)
Carlow	0	0	1	-2	2	-5	1	-2	-1	0	0	2		-4		1		5		17	-7		-9
Cavan	0	0	8	18	0	-6	-3	-3	0	0	0	0		0		3		43		17		-62	-21
Clare	1	4	3	0	1	-4	2	-4	0	0	2	0		0		2		15		-5	-4		-6
Cork	2	2	3	-3	-1	1	-2	-1	0	0	0	0		0		4		10		7	-5		-9
Donegal	0	0	5	5	-2	-1	0	0	0	0	0	1		0		9		12	1			0	-4
Dublin	3	6	11	1	-2	-4	-3	-1	0	0	0	1		2		4	4				-6		-5
Galway	1	1	2	-2	0	0	-1	-1	0	0	0	0		1		3		11		12	-15		-10
Kerry	1	5	3	4	-1	0	0	0	0	0	0	0		1		0		11		9	-10		-6
Kildare	1	2	5	3	0	-4	-1	0	0	0	3	9	-7	-5	-2	1		8		7	-9		-7
Kilkenny	1	1	4	-3	-1	0	-3	0	0	0	0	1		0		0		6		3	-7		-2
Laois	1	0	1	0	0	-2	0	0	0	0	2	2	-2	-2	0	1		7		8	-7		-7
Leitrim	1	0	3	2	0	-1	-1	0	1	-1	0	0		4		-1		12		0	-17		-1
Limerick	1	1	5	-1	-1	-2	-1	0	0	0	1	1		2		-1		12		7	-5		-3
Longford	1	1	3	4	7	-20	-1	-1	0	0	0	0		2		2		6		5	-8		-6
Louth	1	1	3	1	0	-3	0	-1	0	0	0	1		1		2		7		12	-2		-4
Mayo	0	1	4	10	-1	-2	-2	0	0	0	0	0		0		1		7		12	-3		-7
Meath	1	2	3	8	0	-3	-1	0	0	0	0	0		1		2		24		19	-34		-15
Monaghan	0	0	3	17	0	-2	-2	-3	0	0	0	1		1		7		11		-3		-12	-7
Offaly	1	1	6	-2	2	2	-12	0	0	0	0	7	-9	-1	2	1		6		2	-10		-2
Roscommon	0	1	1	2	6	-14	0	-2	0	0	0	1		0		5		4		4	-10		-3
Sligo	1	0	3	-4	0	-2	0	0	2	-2	0	0		0		1		17		16	-14		-12
Tipperary	1	1	5	-1	1	-5	0	-1	0	0	0	3		-4		0		4		3	0		-2
Waterford	1	3	2	-3	-1	0	0	0	0	0	0	1		1		1		6		9	-4		-2
Westmeath	2	3	7	2	3	-13	-1	-1	0	0	0	0		1		1		12		18	-15		-13
Wexford	0	0	1	-1	0	-1	0	0	0	0	0	1		0		0		13		3	-16		-6
Wicklow	1	5	5	3	-1	-3	-1	0	0	0	-1	1		1		1		2		3	-5		-1

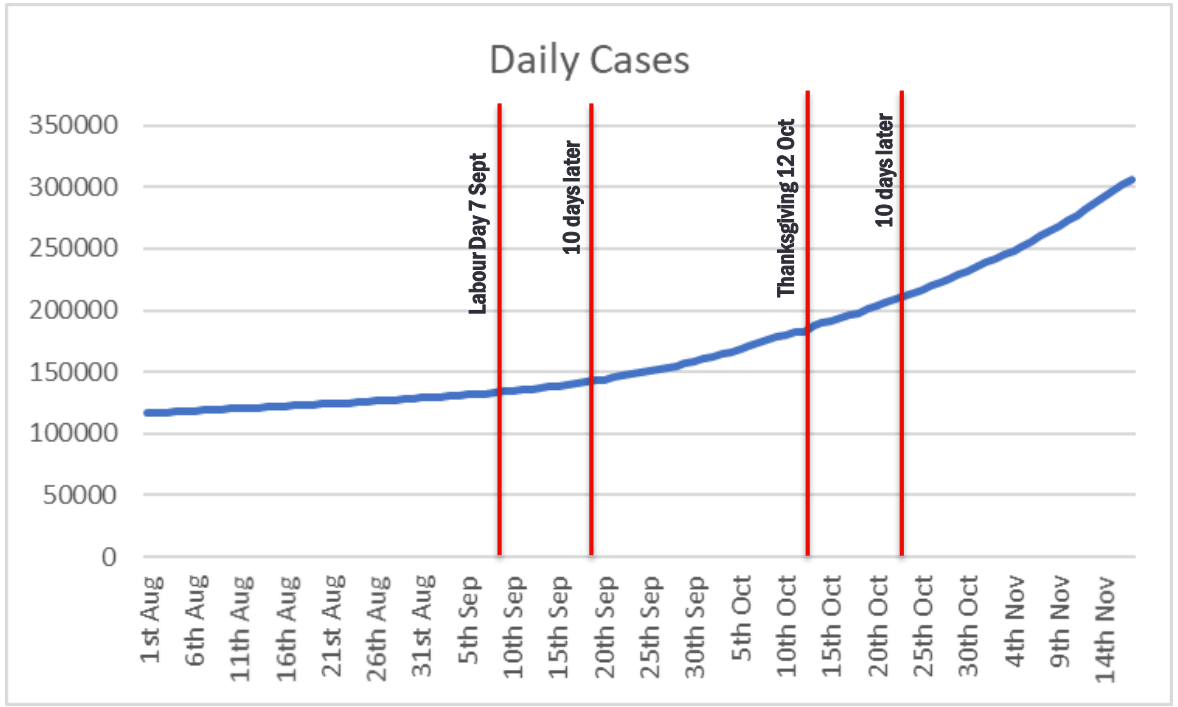
* Phase 3 re-opening included places of worship, gyms, cinemas, theatres, leisure facilities, personal services, sports, public transport 50% capacity & face coverings), mass gatherings (50 indoors, 200 outdoors), adult education and community facilities, health and well being related services, restaurants and cafes (on site food service), hotels and other accommodation facilities, driving schools and tests

Select International Desktop Research

Canadian Thanksgiving: Testing & Tracing data and case numbers show an increase in confirmed cases post Canadian Thanksgiving on 12 October

Background

Canadian Thanksgiving took place on 12 October 2020. While Prime Minister Justin Trudeau made an informal request for Canadians to cancel gatherings to focus on 'having a shot at Christmas', post Thanksgiving saw an increase in cases with the highest rates since the first wave in Spring.



Key findings:

- Canada saw an increase in COVID-19 cases in the days and weeks that followed Thanksgiving, the highest rates since the first wave in the spring
- On October 12, the day Canada celebrated Thanksgiving, the country had recorded almost 183k total cases, according to data from the Canadian Government
- The number of total cases, which was already increasing, continued to climb; 4,109 new daily cases were recorded exactly two weeks later on 26 October. At this point, Canada's total number of cases had risen to around 220k
- Canadian Testing and Tracing records show that Thanksgiving gatherings directly resulted in the increase in incidence rates
- "Cases were indeed increasing already, but we definitely saw an increase in the rate of transmission after Thanksgiving." The percentage increase in cases increased after Thanksgiving, with a 14% increase in positive cases between 12 and 22 October
- Total number of positive cases has doubled from 155,000 on 28 September to over 310,000 on 18th November
- A similar increase is noticed on 17th September, 10 days after Canadian Labour day was celebrated

Source: https://health-infobase.canada.ca/covid-19/
https://www.thestar.com/news/canada/2020/09/23/wont-be-gathering-for-thanksgiving-trudeau-says-covid-19-second-wave-underway.html

US research: Full-service restaurants, fitness centres and religious organisations generating highest risk of infection

Approach

Stanford University analysis of potential spread of C-19 in the 10 largest US metropolitan areas, using hourly mobility data across different points of interest (restaurants, gyms, stores etc.)

Calculates potential visits and infections over two months generated by the re-opening of certain locations.

POI categories ranked in decreasing order of associated additional infections that would occur if the location is opened

- Full-service restaurants
- Fitness centres
- Religious organisations
- Take-out restaurants
- Grocery stores
- Department stores
- Pharmacies

Results

- The Stanford Mobility Network Model Simulation concluded that on average across metro areas, reopening full-service restaurants, fitness centres and religious organisations produces the largest predicted increase in infections.
- Take-out restaurants, grocery stores, department stores and pharmacies resulted in low positivity rates.
- This pattern was seen in the 3 US cities studied.

Key findings

- The model calculates the additional cases that would occur if each location is opened, using the COVID_19 Mobility Modelling Simulation over time (between 1st March and 10th May) and the associated positivity rate of the population who visit the location.
- Small fraction of POIs accounted for majority of infections at POIs, e.g. 10% of POIs in Chicago accounted for 85% of infections at POIs and almost 60% of all cases. These riskier places come from multiple categories, but tend to have higher densities of visitors, and visitors who stay longer. Model predicts POIs are 70% of all infections.
- Restricting maximum occupancy at certain locations can be an effective alternative to closure
- Higher infection rates among disadvantaged racial and socioeconomic groups solely from differences in mobility. This aligns to Irish data where a higher proportion of C-19 cases have been attributed to disadvantaged areas (40% of cases versus 37% of population) (CSO, cases to 30/10).
- As seen in the Mobility Model, religious organisations led to high levels of cases in the US cities studied. However, it is important to note that the median church in the U.S. has 75 regular participants in worship on Sunday mornings. All but five states have congregations with more than 2,000 people in attendance on a Sunday morning. As of 2012, there were roughly 1,600 Protestant churches in the United States with a weekly attendance of 2,000 people or more.

Source: Mobility network models of COVID-19 explain inequities and inform reopening, Published November 2020, Stanford University: *COVID-19 Mobility Network Modeling*, http://covid-mobility.stanford.edu/
http://hirr.hartsem.edu/research/fastfacts/fast_facts.html

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