

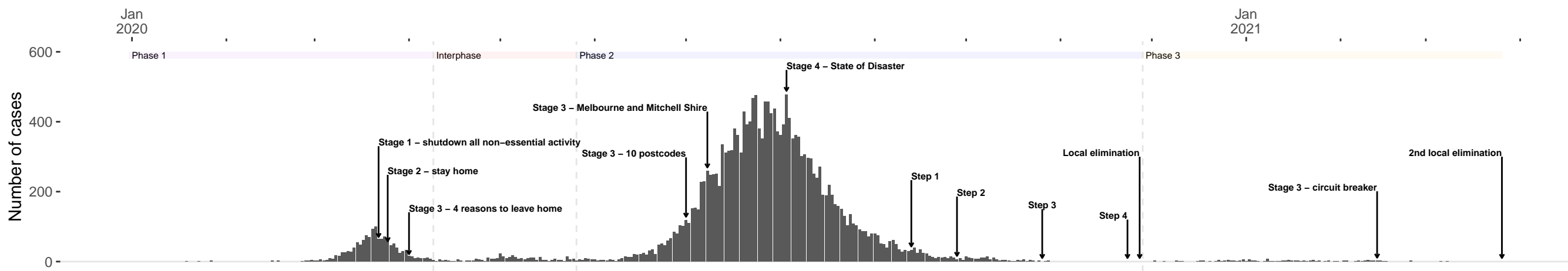
## **Supplementary Data.**

### **Calculation of effective reproduction number:**

The effective reproduction number ( $R_{\text{eff}}$ ) was estimated using the EpiNow R package (now deprecated, <https://github.com/epiforecasts/EpiNow>). Cases noted as “Travel overseas” in the department’s database were assumed to be imports, and all other cases (including unknown acquisition cases) were assumed to be locally acquired. EpiNow estimates the effective reproduction number using a modified form of the renewal equation, which includes delays due to the incubation period and reporting that are associated with the case numbers. The serial interval was assumed to be log-normally distributed with logmean 1.25 and logsd of 0.87, taken from early internal estimates based on the distribution of time between symptoms onset of primary and secondary cases within households ( $n$  households = 272). The prior for  $R_{\text{eff}}$  was set as a truncated normal distribution with mean 2 and standard deviation of 1. 1000 posterior samples were drawn, and the 95% credible interval was calculated for each day (Figure 2B). The data presented here are based on data as of November 2020. Estimates were not updated during subsequent epidemics due to high uncertainty around estimates when case numbers are very low.

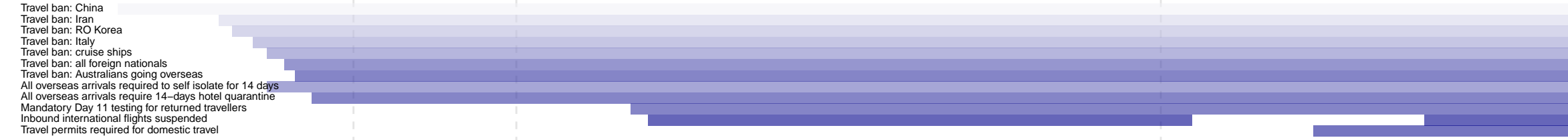
***Supplementary Figure S1: Detailed timeline of pandemic mitigation measures, Victoria 17 January 2020 to 26 March 2021. Panel A shows the epidemic curve with the key public health intervention stages and steps. Panel B shows a detailed timeline of key restrictions. Darker colouring is indicative of more stringent restrictions.***

Notes: Steps 1-4 referred to in Panel A September to November 2020 were part of the government's roadmap to recovery. The restrictions listed principally refer to those imposed in the Melbourne Metropolitan area. Additional restrictions were imposed that are not shown, including limitations on real-estate, entertainment and sport. Early learning refers to child care. Cat 1, Cat 2, Cat 3 are the urgency categories for elective surgeries with recommended wait times of 30 days, 90 days, and 365 days, respectively.



B

**Travel**



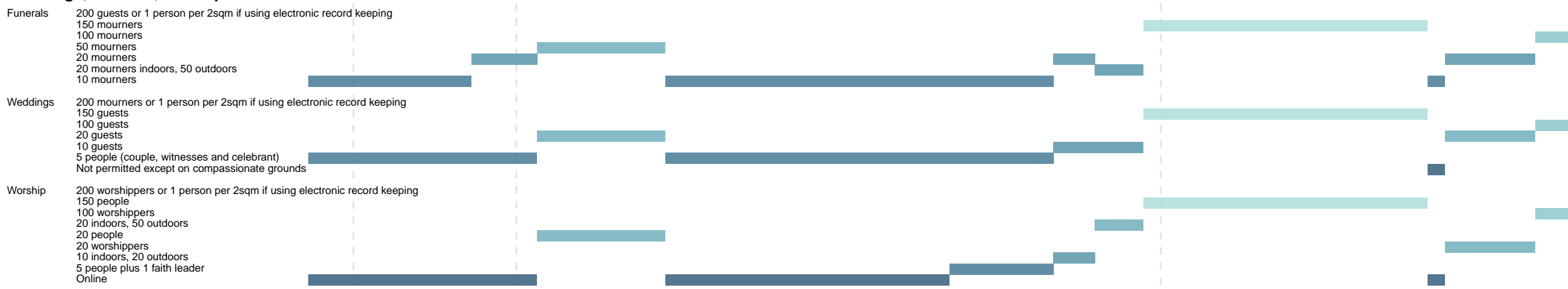
**Movement outside home**



**Gatherings**



**Weddings, funerals, worship**



**Dining**



**Retail and services**



**Work**



**School and early learning closures**



**Healthcare**



**Masks**



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr

### **Mapping risk surfaces:**

To map the geographic distribution of COVID-19 prevalence (Figure 3), two density surfaces representing the number individuals per square kilometre were constructed using a Gaussian kernel smoothing function: the first (numerator) was based on all individuals identified as COVID-19-positive for each phase; and the second (denominator) on all individuals estimated to be present at the start of the period and considered at risk. Cases included in the numerator excluded individuals identified in hotel quarantine. Details of the population at risk comprised counts of individuals resident at the meshblock level from the 2016 Census of Population and Dwellings (Australian Bureau of Statistics, 2018). Location details for COVID-19 cases were obtained by geocoding the listed home address for each confirmed COVID-19 case. The ratio of the density surface of COVID-19 positive individuals to the density surface of the population of individuals at risk provided a relief map of the prevalence of COVID-19 expressed as the number of individuals COVID-19 positive per 100,000 per square kilometre (Bithell, 1990; Lawson and Williams, 1994). These maps provided a means to identify areas of relatively high COVID-19 risk, corrected for the irregular geographic distribution of the population at risk. Bandwidth parameters for the kernel functions (used to control the amount of smoothing applied to each of the estimated density surfaces) were calculated by cross validation (Bowman and Azzalini, 1997).

### **References:**

Australian Bureau of Statistics. 2011.0- Census of Population and Housing: Reflecting Australia- Stories from the Census, 2016. In: Australian Bureau of Statistics, editor. Canberra: Government of Australia; 2018

Bithell, J., 1990. An application of density estimation to geographical epidemiology.  
Statistics in Medicine 9, 691 - 701.

Bowman, A., Azzalini, A., 1997. Applied Smoothing Techniques for Data Analysis: The  
Kernel Approach with S-PLUS Illustrations. Oxford University Press London.

Lawson, A., Williams, F., 1994. Armadale: A case study in environmental epidemiology.  
Journal of the Royal Statistical Society Series A 157, 285 - 298.

**Supplementary Table 1. COVID-19 outbreaks in key settings in Victoria, 17 Jan 2020-26 Mar 2021, by epidemic phase**

Category	Subcategory	Phase I 17 Jan – 9 Apr 2020			Phase II 10 Apr – 25 May 2020			Phase III 26 May – 27 Nov 2020			Phase IV 28 Nov 2020 – 26 Mar 2021		
		Number of outbreaks	Total cases	Cases per outbreak (median, IQR)	Number of outbreaks	Total cases	Cases per outbreak (median, IQR)	Outbreaks	Total cases	Cases per outbreak (median, IQR)	Outbreaks	Total cases	Cases per outbreak (median, IQR)
Health care	Acute Hospital	5 (10%)	61 (12%)	10 (4,31)	1 (6.7%)	4 (2.1%)	-	52 (7.0%)	856 (7.2%)	9 (1,182)	0	0	0
	Allied health services	1 (2.1%)	28 (5.4%)	-	0	0	-	3 (0.40%)	11 (0.09%)	4 (2,5)	0	0	0
	Laboratory	0	0	-	0	0	-	2 (0.27%)	12 (0.10%)	6 (5,7)	0	0	0
	Other Healthcare	0	0	-	0	0	-	6 (0.80%)	15 (0.13%)	2 (1,4)	0	0	0
	Primary Care services Sub-Acute Hospital, Transitional Care and Other hospital	0	0	-	0	0	-	11 (1.5%)	46 (0.39%)	4 (2,7)	0	0	0
Accommodation and Housing	Accommodation and Housing	1 (2.1%)	18 (3.4%)	-	1 (6.7%)	1 (0.52%)	-	13 (1.7%)	165 (1.4%)	8 (2,40)	0	0	0
	High density housing	2 (4.2%)	11 (2.1%)	6 (5,6)	0	0	-	2 (0.27%)	7 (0.06%)	4 (2,5)	0	0	0
	Hotel quarantine Temporary accommodation	0	0	-	0	0	-	29 (3.9%)	541 (4.6%)	14 (3,91)	0	0	0
	Hotel quarantine Temporary accommodation	0	0	-	0	0	-	3 (0.40%)	73 (0.62%)	17 (7,49)	1 (33%)	32 (46%)	-
Aged care	Other aged care	0	0	-	1 (6.7%)	5 (2.6%)	-	4 (0.54%)	6 (0.05%)	2 (1,2)	0	0	0
	Residential aged care	0	0	-	6 (40%)	11 (5.8%)	2 (1,3)	168 (22%)	5233 (44%)	3 (1,301)	0	0	0
Disability Services	Community care	1 (2.1%)	7 (1.3%)	-	0	0	-	20 (2.7%)	77 (0.65%)	3 (1,16)	0	0	0
	Residential care	1 (2.1%)	3 (0.57%)	-	0	0	-	28 (3.7%)	263 (2.2%)	7 (1,45)	0	0	0
Education	Early learning	0	0	-	0	0	-	33 (4.4%)	289 (2.4%)	5 (1,48)	0	0	0
	Other education/training	0	0	-	0	0	-	11 (1.5%)	69 (0.58%)	5 (2,20)	0	0	0
	Primary School Primary/Secondary combined school	1 (2.1%)	2 (0.38%)	-	0	0	-	26 (3.5%)	179 (1.5%)	6 (2,19)	0	0	0
	Primary School Primary/Secondary combined school	1 (2.1%)	7 (1.3%)	-	0	0	-	17 (2.3%)	339 (2.9%)	7 (1,209)	0	0	0
	Secondary school	1 (2.1%)	9 (1.7%)	-	0	0	-	51 (6.8%)	474 (4.0%)	7 (1,53)	0	0	0
Food Industry	Tertiary education	0	0	-	0	0	-	7 (0.94%)	26 (0.22%)	5 (1,6)	0	0	0
	Food Distribution	0	0	-	0	0	-	12 (1.6%)	204 (1.7%)	9 (3,69)	0	0	0
	Food production	0	0	-	0	0	-	12 (1.6%)	113 (0.96%)	5 (2,40)	0	0	0
	Meat processing	0	0	-	1 (6.7%)	111 (58%)	-	20 (2.7%)	904 (7.7%)	11 (3,212)	0	0	0

Hospitality and Entertainment	5 (10%)	111 (21%)	14 (6,59)	1 (6.7%)	13 (6.8%)	-	17 (2.3%)	114 (0.97%)	7 (2,14)	2 (67%)	38 (54%)	19 (11,27)
Correctional facilities	0	0	-	1 (6.7%)	4 (2.1%)	-	6 (0.80%)	58 (0.49%)	10 (4,17)	0	0	0
Emergency services	0	0	-	0	0	-	8 (1.1%)	69 (0.58%)	7 (2,19)	0	0	0
Workplace/Industry												
Construction	0	0	-	0	0	-	16 (2.1%)	106 (0.90%)	3 (2,27)	0	0	0
Logistics	0	0	-	0	0	-	18 (2.4%)	162 (1.4%)	4 (1,67)	0	0	0
Manufacturing (not food)	0	0	-	0	0	-	26 (3.5%)	228 (1.9%)	6 (2,64)	0	0	0
Office or call centre	2 (4.2%)	9 (1.7%)	4 (4,5)	0	0	-	25 (3.3%)	194 (1.6%)	6 (2,29)	0	0	0
Other workplace	0	0	-	0	0	-	24 (3.2%)	176 (1.5%)	5 (2,30)	0	0	0
Retail (not supermarket)	0	0	-	0	0	-	21 (2.8%)	101 (0.86%)	4 (2,15)	0	0	0
Supermarket	1 (2.1%)	7 (1.3%)	-	0	0	-	17 (2.3%)	151 (1.3%)	3 (2,39)	0	0	0
Warehouse (not food)	0	0	-	0	0	-	11 (1.5%)	86 (0.73%)	5 (2,17)	0	0	0
Other												
Cruise ships	6 (12%)	89 (17%)	12 (2,34)	3 (20%)	42 (22%)	15 (11,16)	0	0	-	0	0	0
Family and Social Gathering	16 (33%)	142 (27%)	7 (2,23)	0	0	-	20 (2.7%)	346 (2.9%)	14 (4,45)	0	0	0
Other travel	3 (6.2%)	14 (2.7%)	6 (2,6)	0	0	-	0	0	-	0	0	0
Places of worship	0	0	-	0	0	-	1 (0.13%)	24 (0.20%)	-	0	0	0
Sports and Recreation venues	1 (2.1%)	4 (0.77%)	-	0	0	-	4 (0.54%)	74 (0.63%)	19 (2,34)	0	0	0

Notes: allocation to phase is based on the date an outbreak was declared, and many cases in Phase I would have had symptoms onset in the Phase II period. Cases may be counted more than once if linked to more than one type of outbreak; \*includes in-home care services and retirement villages.