Supporting Information

Supplementary results

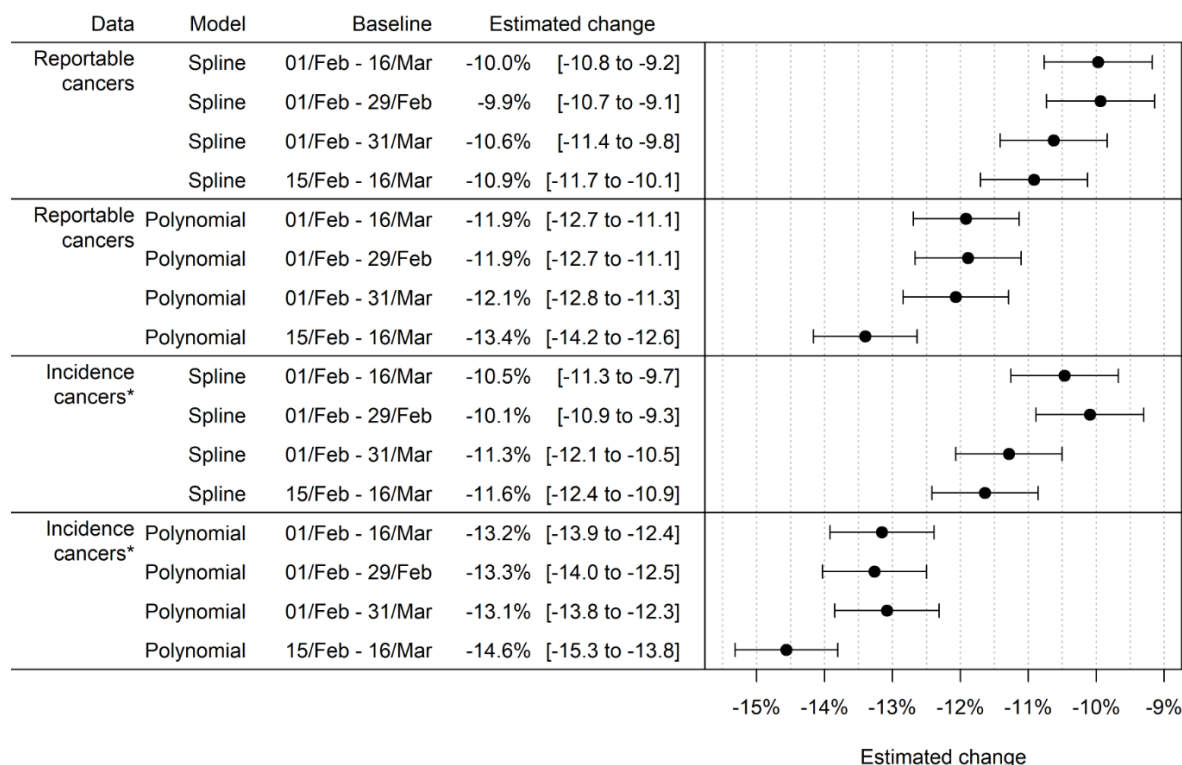**This appendix was part of the submitted manuscript and has been peer reviewed. It is posted as supplied by the authors.**

Table 1. Study methodology, using all pooled data as example

Part I: Estimating the number of "missing" pathology notifications	
Step 1 Model the temporal pattern from the cancer incidence data by Poisson regression	Sums daily new cancers diagnoses (including non-reportable cancers) during 2014–2018, assessing working and non-working days (using 2014–2018 Victorian public holidays) glm(incidence ~ spline(week, df = *) + working day + year, family = 'poisson') * Models with 2, 3 or 4 degrees of freedom were run and the best selected based on the lowest Akaike information criterion (AIC) value
Step 2 Predict cancer incidence using the Poisson regression model, taking into account the distribution of 2020 public holidays	Using the predict function in R 3.6.3 and providing the 2020 public holidays, a temporal pattern for 2020 can be extracted from the model in Step 1.
Step 3 The model predicts incidence, whereas there is often more than one notification of a single new cancer diagnosis. The incidence prediction is therefore scaled to match the notification data, by multiplying the predicted incidence by a scaling factor, calculated as the ratio of daily notifications and daily new cancer diagnoses. The scaled predicted number is deemed to be the expected number of notifications	Baseline: 1 February – 16 March 2020 Mean notifications per day (working days): 404 Mean new diagnoses per day (working days): 236 Scaling factor: 404/236 = 1.71 Multiply each predicted new diagnosis per day by 1.71. This is the expected temporal pattern extracted from the incidence data scaled to the notification data
Step 4 For the period 1 April – 15 October 2020, calculate the difference between the observed and expected number of notifications	Expected (E): 54,609 notifications Observed (O): 49,163 notifications E − O = 5446 fewer pathology notifications
Step 5 A Poisson model was used to calculate the 95% confidence interval (95% CI) in relative reduction using the expected number of notifications as an offset.	glm(formula = Observed ~ 1, family = "poisson", offset = log(Expected), data) Relative change = -10.0% [95% CI-10.8% to -9.2%]
Part II: Estimating the number of undiagnosed cancers	
Step 6 Select all pathology notifications related to procedures in 2018 (excludes tumours without pathology notifications)	104,735 pathology notifications (including pathology for new diagnoses and follow-up care, recurrences etc.)
Step 7 Identify the tumours to which each pathology notification relates (ie, could be tumours diagnosed prior to 2018)	Tumours diagnosed 2014–2017: 14,944 Tumours diagnosed in 2018: 48,652
Step 8 New tumour to notification ratio = number of 2018 cancer diagnoses in 2018 pathology data divided by the total number of pathology notifications	New tumour to notification ratio: 48,652/104,735 = 0.464525 (ie, 1000 pathology notifications refer to 464.5 new cancer diagnoses)
Step 9 Number of undiagnosed cancers = number of expected pathology notifications – number of observed pathology notifications, multiplied by the new tumour-to-notification ratio	0.464525 × 5446 = 2530 undiagnosed cancers
Step 10 A 95% confidence interval for number of undiagnosed cases was based on the number of missing notifications using the CI of the Poisson model multiplied with the notification to tumour ratio.	Lower limit: (9.2% of 54609) * 0.464525 = 2327 Upper limit: (10.8% of 54609) * 0.464525 = 2731

Figure 1. Estimated relative changes in notification numbers (with 95% confidence intervals), by model, baseline period and cancer diagnoses included*

Data	Model	Baseline	Estimated change	
Reportable cancers	Spline	01/Feb - 16/Mar	-10.0%	[-10.8 to -9.2]
	Spline	01/Feb - 29/Feb	-9.9%	[-10.7 to -9.1]
	Spline	01/Feb - 31/Mar	-10.6%	[-11.4 to -9.8]
	Spline	15/Feb - 16/Mar	-10.9%	[-11.7 to -10.1]
Reportable cancers	Polynomial	01/Feb - 16/Mar	-11.9%	[-12.7 to -11.1]
	Polynomial	01/Feb - 29/Feb	-11.9%	[-12.7 to -11.1]
	Polynomial	01/Feb - 31/Mar	-12.1%	[-12.8 to -11.3]
	Polynomial	15/Feb - 16/Mar	-13.4%	[-14.2 to -12.6]
Incidence cancers*	Spline	01/Feb - 16/Mar	-10.5%	[-11.3 to -9.7]
	Spline	01/Feb - 29/Feb	-10.1%	[-10.9 to -9.3]
	Spline	01/Feb - 31/Mar	-11.3%	[-12.1 to -10.5]
	Spline	15/Feb - 16/Mar	-11.6%	[-12.4 to -10.9]
Incidence cancers*	Polynomial	01/Feb - 16/Mar	-13.2%	[-13.9 to -12.4]
	Polynomial	01/Feb - 29/Feb	-13.3%	[-14.0 to -12.5]
	Polynomial	01/Feb - 31/Mar	-13.1%	[-13.8 to -12.3]
	Polynomial	15/Feb - 16/Mar	-14.6%	[-15.3 to -13.8]

Estimated change

* Incidence cancers are invasive cancers as defined by the International Agency of Cancer Registries (IARC) rules,[1] but exclude basal cell carcinomas (BCC) and squamous cell carcinomas (SCC) of the skin. Reportable cancers include incidence cancers and those reported by screening services (in situ breast carcinoma and cervical high grade squamous intra-epithelial lesions, and adenocarcinoma in situ) and in situ melanoma (stage 0), as well as tumours of uncertain behaviour of the female reproductive organs, urinary system, and lympho-haematopoietic system.[2]

1 Working Group Report. International rules for multiple primary cancers (ICD-0 third edition). *Eur J Cancer Prev* 2005; 14: 307-308.
2 Victorian Department of Health. Reportable cancers: guide to identification of cancers reportable to the Secretary. Aug 2015. https://www2.health.vic.gov.au/about/publications/policiesandguidelines/reportable-cancers-guide (viewed Feb 2021).

Figure 2. Cancer pathology notifications to the Victorian Cancer Registry, January–October 2020: observed (red) and predicted numbers (green), by day type and tumour group*
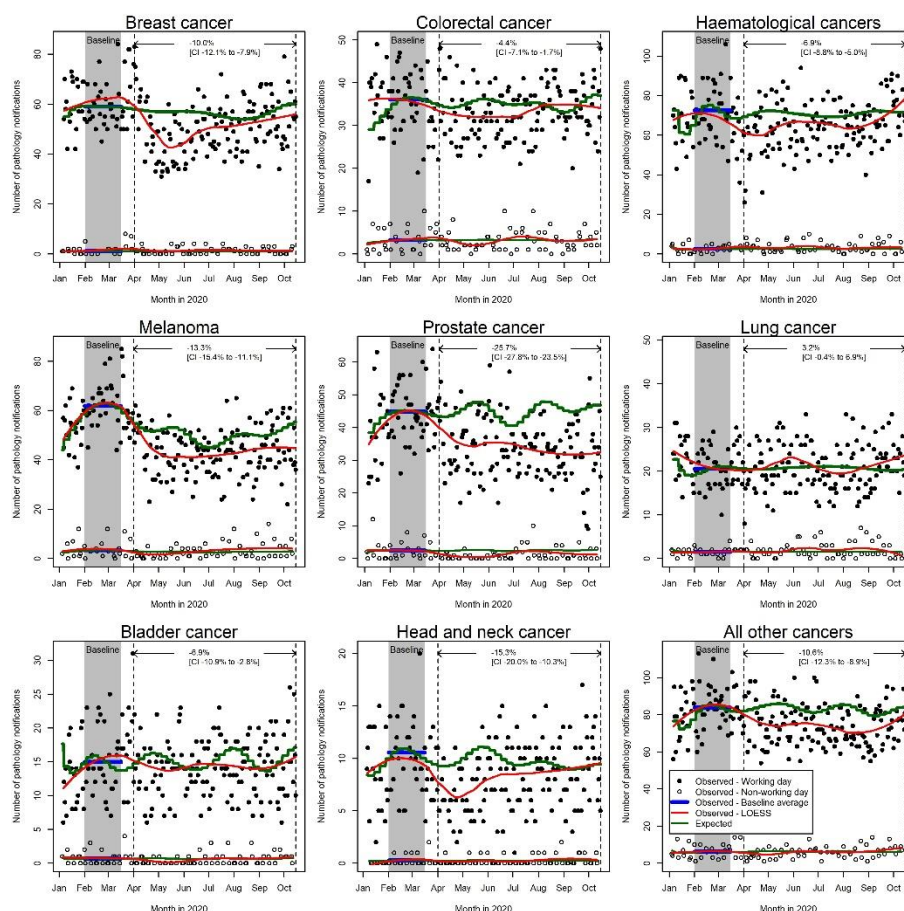
LOESS = locally estimated scatterplot smoothing.

* LOESS smoothing on observed data for illustrational purposes only. The grey area marks the baseline period, the vertical dotted lines the analysis period for predicted notifications.

COVID-19 restrictions timeline:

16 March 2020: Victoria declares state of emergency.

30 March 2020: Stage 3 restrictions applied, allowing only four reasons for leaving the home (food and supplies, medical care, exercise, work or education). Gatherings restricted to two people, except for members of immediate household and for work and education. Playgrounds, gyms and skate parks closed.

13 May 2020: Easing of stage 3 restrictions. Five friends or family members may congregate indoors and ten may gather outdoors.

8 July 2020: Stage 3 restrictions re-applied.

2 August 2020: Stage 4 restrictions applied to metropolitan Melbourne. Curfew from 8 pm to 5 am and travel beyond 5 km from residence banned (with some exceptions). State of emergency renewed.

19 October 2020: Stage 4 restrictions eased. Curfew lifted, travel permitted to 25 km from residence.