

## Letter to the Editor

# Has the effectiveness of Australia's travel bans against China on the importation of COVID-19 been overestimated?

Angus McLure, PhD, Colleen L. Lau, PhD<sup>†,\*</sup>, and Luis Furuya-Kanamori, PhD<sup>†</sup>

Research School of Population Health, College of Health and Medicine, Australian National University, Canberra, Australia

\*To whom correspondence should be addressed. Email: colleen.lau@anu.edu.au

<sup>†</sup>These authors contributed equally to this work

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We read with interest a model by Costantino *et al.*,<sup>1</sup> which found that Australia's complete travel ban on China (during its epidemic peak) was highly effective in limiting the introduction of SARS-CoV-2 into Australia and reduced Australia's COVID-19 cases by 87%. The authors verified their model by predicting the number of cases in Australia by the 7 March; however, in the model all 57 predicted cases were due to importation from China or subsequent domestic transmission, whereas the majority of the reported 66 cases were actually linked with travel from countries other than China.<sup>2</sup> Their model consisted of four components: (i) the number of cases in China (using the World Health Organization data up to 23 February 2020 and forecasted cases thereafter); (ii) a constant ratio of reported versus actual cases; (iii) importation assuming that infection status and probability of travel to Australia were independent and (iv) transmission within Australia.

We believe the assumptions used in the third component led to a substantial overestimate of the impact of Australia's early travel ban on China. Their model considered China as a single location, i.e. did not consider the severe lockdown of Hubei starting on the 23 January, the significantly lower incidence in other provinces or the population distribution. Though Hubei residents account for ~4% of the Chinese population<sup>3</sup> and <3% of Chinese travellers to Australia in 2019,<sup>4</sup> 85.2% of all Chinese cases reported between 1 February (the start of the travel ban) and 4 April were from this province.<sup>5</sup> Travel bans have been widely implemented during the pandemic. Their impact depends on incidence in the source country and likelihood of an infected person travelling to the destination country.<sup>6</sup> In the case of Australia's travel ban on China, even though incidence was high in Hubei, the likelihood of a Hubei resident travelling to Australia at that time was extremely low.

We re-estimated the number of cases that would have been imported under each travel ban scenario. Mathematically, the

only change was to component 1, for which we excluded all cases reported in Hubei after 23 January. This was equivalent to assuming that (i) Hubei residents were unable to travel to Australia after 23 January, regardless of travel ban scenarios and (ii) the volume of travellers to Australia from Hubei and the rest of China was population proportionate.<sup>3,4</sup> The full description of the model and the R code are presented in the supplementary material.

With the adjusted assumptions, the number of infected Chinese travellers arriving in Australia between 26 January and 4 April without any travel ban (scenario 1), with ban followed by a full lift (scenario 2) and ban followed by a partial lift (scenario 3) were 84%, 69% and 57% lower than the original estimates (Table 1). The revised estimates predict that between 1 February and 4 April, Australia's travel ban on China prevented the importation of ~17 cases; whereas over the same time period, the large majority (>75%) of the 3174 overseas-acquired cases were imported from Europe, the USA and cruise ships.<sup>2</sup>

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## Author Contribution

Conception and design of the study: All authors.

Collection and assembly of the dataset: A.M., C.L.L.

Analysis of the dataset and interpretation of results: All authors.

Manuscript writing: All authors.

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**Table 1.** Imported cases in Australia from China under no, partial and full travel bans on travel from China per each 2-week period assuming no travel from Hubei province to Australia under all scenarios (Costantino and colleagues' original estimates in parantheses)

Time travelling	Infected entering Australia without ban (scenario 1)	Infected entering Australia with ban from 1 February to 7 March followed by full lifting of ban (scenario 2)	Infected entering Australia with a ban from 1 February to 7 March followed by partial lifting of ban (scenario 3)
26 January to 8 February	7 (39)	2 (7)	2 (7)
9 February to 22 February	9 (43)	0 (0)	0 (0)
23 February to 7 March	2 (36)	0 (0)	0 (0)
8 March to 21 March	0 (3)	1 (5)	0 (0)
22 March to 4 April	1 (1)	1 (1)	1 (0)
Total	19 (122)	4 (13)	3 (7)
Difference between adjusted estimates and those reported by Costantino and colleagues	84% less	69% less	57% less

## Supplementary Data

Supplementary data are available at *JTM* online.

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