# Pacific Island Countries demonstrate the sustained success of a coordinated measles mass vaccination campaign 

David N. Durrheim, ${ }^{a, *}$ Ilisapeci Vereti Tuibeqa, ${ }^{b}$ George Siaosi Aho, ${ }^{c}$ Jean-Paul Grangeon, ${ }^{d}$ Divinal Ogaoga, ${ }^{e}$ Andre Wattiaux, ${ }^{f}$ Kayla Mae Mariano, ${ }^{g}$ Roger Evans, ${ }^{g}$ Shafiqul Hossain, ${ }^{g}$ and Syeda Kanwal Aslam ${ }^{g}$<br>${ }^{\text {a }}$ University of Newcastle, Wallsend, New South Wales, Australia<br>${ }^{\text {b }}$ Colonial War Memorial Hospital, Fiji<br>${ }^{\text {c }}$ Vaoial Hospital, Tonga<br>${ }^{\text {d }}$ Pasteur Institute of New Caledonia, New Caledonia<br>${ }^{\mathrm{e}}$ Solomon Islands Ministry of Health and Medical Services, Solomon Islands<br>${ }^{\text {f }}$ Office of Health Surveillance and Response, French Polynesia<br>${ }^{9}$ World Health Organization Regional Office for the Western Pacific, Philippines

While the world procrastinates on whether to commit to a measles eradication goal, unvaccinated children continue to needlessly die due to this vaccinepreventable viral infection. ${ }^{1}$ More than a decade has passed since an expert assessment unequivocally concluded the feasibility of the eradication ambition, but epidemiological, ethical and economic costs of delaying eradication continue to accrue. ${ }^{2,3}$ There is increased urgency to accelerate eradication efforts as the dual pandemic impacts of weakened surveillance and decreased childhood immunisation coverage threaten to unleash a global measles resurgence. ${ }^{4}$

There is downside to tackling measles elimination on a country-by-country basis rather than closely coordinating activities, particularly mass immunisation campaigns and surveillance, across epidemiological blocks of countries that share travel, trade, tourism and family connections. In the Western Pacific Region (WPR), since 2014, eight higher-income-countries and areas \{HICs-Australia, Brunei Darussalam, Hong Kong SAR (China), Japan, Macao SAR (China), New Zealand, Republic of Korea, Singapore\} have been verified to have achieved and maintained measles elimination, while two low-middle income countries (Cambodia and Mongolia) achieved elimination but endemic transmission was re-established within a couple of years. ${ }^{5}$ These latter countries border endemic countries with cross-border population flows, providing pathways for recurrent viral introduction.

The 21 Pacific Island Countries and Areas (PICs)-of which five are lower-middle-income and five upper-middle-income-countries-provide a promising casestudy of what can be achieved when strongly linked countries coordinate their measles elimination efforts, particularly mass immunisation campaigns. The WPR Measles Elimination Verification Commission and Sub-Regional Verification Committee for Measles and

[^0]Rubella Elimination for the PICs agree that there is no evidence of ongoing endemic measles transmission since 2019 in PICs, and have encouraged the PICs to aim for verification of measles elimination by $2025 .{ }^{5}$

Historically, measles had a devastating impact on Pacific Island communities. For example, the 1875 outbreak in Fiji resulted in more than 20,000 deaths during a four-month period; over a quarter of the Fijian population! ${ }^{6}$ The PICs continued to experience large regular measles outbreaks, despite the introduction of measles-containing vaccine into all PICs by 1982, and thus they collectively decided to interrupt the cycle of measles transmission. A Pacific-wide coordinated measles vaccination campaign was conducted in 1997/1998, targeting all children up to 14 years of age. As a block the PICs also progressively strengthened routine infant immunization and those with lower coverage conducted periodic vaccination campaigns targeting children 1-4 years of age, mirroring the coordinated approach adopted by the Pan-American Health Organisation.?

The synchronised 1997/1998 immunisation campaign achieved high coverage (median country coverage of target group $=94 \%$ ) and was extremely successful in accelerating elimination. Measles outbreaks declined from an average 11.7 outbreaks per annum between 1980 and 1998 to 1.9 outbreaks per annum between 1999 and 2023 (Fig. 1). There was a simultaneous profound impact on the size of outbreaks with 5.68 large disruptive outbreaks ( $\geq 20 /$ million incidence) per annum before the campaign compared to 0.67 per annum after the campaign.

The relatively small population sizes of individual PICs (ranging from 916,131 in Fiji to 35 in Pitcairn Island-see footnote ${ }^{h}$ ) make it extremely unlikely that measles transmission after importation could persist for $>12$ months ${ }^{8}$ but their close interconnectedness with

[^1]The Lancet Regional Health - Western Pacific 2024;42: 100998

Published Online xxx https://doi.org/10. 1016/j.lanwpc. 2023. 100998


Fig. 1: Measles outbreaks in Pacific Island Countries by year and attack rate (per million residents), 1980-2023.

Pacific rim countries means that no PIC can afford to drop its guard. During 2018 importation of measles virus from New Zealand into Samoa, where there had been an accumulation of a large pool of susceptible children, resulted in 83 measles deaths and 1868 children hospitalized. ${ }^{9}$

The PICs provide a compelling example of how interconnected or neighbouring countries should synchronise elimination efforts, particularly large-scale immunisation campaigns, to optimise progress toward eliminating the virus. We encourage other countries to collaborate closely with their neighbours to coordinate measles and rubella immunisation and surveillance activities. This solidarity of action will certainly accelerate measles and rubella elimination efforts, and protect gains made by countries to protect their children.

## Contributors

All authors conceptualised this commentary, contributed to the analysis and proposition development, and provided approval of the final version.

## Data sharing statement

The raw data underpinning this analysis is the sovereign property of each Island country.

## Declaration of interests

None of the authors have any competing interests to declare.

## References

1 Moss WJ, Shendale S, Lindstrand A, et al. Feasibility assessment of measles and rubella eradication. Vaccine. 2021;39:35443559.

2 World Health Organization. Proceedings of the Global Technical Consultation to assess the feasibility of measles eradication, 28-30 July 2010. J Infect Dis. 2011;204:S4-S13.
3 Durrheim DN, Crowcroft NS. The price of delaying measles eradication. Lancet Public Health. 2017;2:E101-E131.
4 Durrheim DN, Andrus JK, Tabassum S, et al. A dangerous measles future looms beyond the COVID-19 pandemic. Nat Med. 2021;27:360-361.
5 World Health Organization. Tenth annual meeting of the regional verification commission for measles and rubella elimination in the Western Pacific, Manila, Philippines, 12-16 September 2022. Available at: https://iris.who.int/handle/10665/365590.
6 Squire W. On measles in Fiji. Trans Epidemiol Soc Lond. 1879;4:7274.

7 Andrus JK, de Quadros CA, Solórzano CC, Periago MR, Henderson DR. Measles and rubella eradication in the Americas. Vaccine. 2011;29:D91-D96.
8 Gay NJ. The theory of measles elimination: implications for the design of elimination strategies. J Infect Dis. 2004;189(Suppl 1):S27-S35.

9 Thornton J. In the aftermath: the legacy of measles in Samoa. Lancet. 2020;395:1535-1536.


[^0]:    *Corresponding author.
    E-mail address: david.durrheim@newcastle.edu.au (D.N. Durrheim). © 2023 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/ licenses/by-nc-nd/4.0//).

[^1]:    ${ }^{\mathrm{h}}$ Two countries $>500,000$ population (Fiji, Solomon Islands); $>250,000$ (Vanuatu, New Caledonia, French Polynesia); >100,000 (Samoa, Guam, Kiribati, Federated States of Micronesia, Tonga); while the remainder have less than 100,000 population (Marshall Islands, Northern Mariana, American Samoa, Palau, Cook Islands, Tuvalu, Nauru, Wallis and Futuna Islands, Niue, Tokelau).

