COVID-19 Vaccine Willingness and Hesitancy Among Marshallese Pacific Islanders

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Abstract
COVID-19 has disproportionally burdened racial and ethnic minorities. Minority populations report greater COVID-19 vaccine hesitancy; however, no studies document COVID-19 vaccine willingness among Marshallese or any Pacific Islander group, who are often underrepresented in research. This study documents United States (US) Marshallese Pacific Islanders’ willingness to get the COVID-19 vaccine, willingness to participate in vaccine trials, and sociodemographic factors associated with willingness. From July 27, 2020-November 22, 2020, a convenience sample of US Marshallese adults were recruited through e-mail, phone calls, and a Marshallese community Facebook page to participate in an online survey. Of those surveyed (n = 120), 32.5% were extremely likely to get the COVID-19 vaccine; 20.8% were somewhat likely; 14.2% were unlikely or very unlikely; and 26.7% stated they did not know or were not sure. Only 16.7% stated they were willing to participate in a COVID-19 vaccine trial. Vaccine willingness was positively associated with older age, higher income, and longer US residence. Health insurance status and having a primary care provider were positively associated with vaccine willingness. Findings demonstrate within-group variation in COVID-19 vaccine willingness.

Keywords
SARS-CoV-2 vaccine, pandemic, health disparities, hesitancy, Marshallese, Native Hawaiian and Pacific Islanders

Introduction
COVID-19 has disproportionally burdened racial and ethnic minorities in the United States (US) (1–7). Marshallese Pacific Islanders bear a disparate burden of COVID-19 infection, hospitalization, and death, with rates 4 to 25 times higher than those of other racial and ethnic groups in the US (1,2). Benton and Washington Counties in Arkansas have the largest Marshallese population in the continental US with approximately 12,000–15,000 Marshallese residents. Marshallese Pacific Islanders represent approximately 2.5% of the total population in Washington and Benton Counties and 19% of COVID-19 cases (1). Equally alarming, between March 15 and June 15, 2020, 9% of COVID-19 positive Marshallese in Benton and Washington Counties were hospitalized for COVID-related complications compared to just 1% of cases nationally, and Marshallese community members accounted for 38% of COVID-19 deaths (1).
Similarly, Marshallese represent just 1% of the population in Spokane County, Washington but accounted for nearly 30% of COVID-19 cases between March and May, 2020 (8). Eight percent of Marshallese COVID-19 cases in Spokane County were hospitalized, and the Marshallese accounted for 5% of reported COVID-19 deaths in the county. Marshallese experienced widespread health care disparities before the COVID-19 pandemic, including higher prevalence of chronic diseases that are risk factors for COVID-19 morbidity and mortality (9–15). In particular, the prevalence of type 2 diabetes (38%) and tuberculosis (19%) is 4 and 8 times higher, respectively, in Marshallese people than in other groups in the US (16–21).

Willingness or hesitancy to get the COVID-19 vaccine will be critical in narrowing the long-term COVID-19 disparities between Marshallese and the general population. Minority populations have reported greater hesitancy to get the COVID-19 vaccine, with some communities of color half as likely to get the COVID-19 vaccine compared to Whites (7,22–26). However, no studies have documented the willingness of Marshallese or any Pacific Islander group to get the COVID-19 vaccine. Documenting the Marshallese community members’ willingness to get the COVID-19 vaccine is critical to efforts aimed at increasing vaccine uptake in this population.

This study aims to document US Marshallese community members’: (1) willingness to get the COVID-19 vaccine, (2) willingness to participate in COVID-19 vaccine trials, (3) sociodemographic factors associated with willingness to get the COVID-19 vaccine, and (4) sociodemographic factors associated with willingness to participate in COVID-19 vaccine trials.

**Methods**

The study was approved by the institutional review board (IRB) at the University of Arkansas for Medical Sciences (UAMS) (IRB#261131). This study used our long-standing community-based participatory research (CBPR) partnership to gain stakeholder input on the best methods to employ for rapid recruitment. The CBPR partnership with the Marshallese community is described elsewhere (27,28). Stakeholders recommended recruiting participants through e-mail and phone calls from Marshallese community health workers and posting the survey on a US Marshallese

| Table 1. Sociodemographic Characteristics (N = 120). |
|-----------------------------------------------------|
| N (%) or Mean ± SD | | |
| **Age** | 35.5 ± 8.8 |
| **Sex** | | |
| Female | 77 (64.2) |
| Male | 43 (35.8) |
| **Education** | | |
| Never attended school or only attended kindergarten | 0 (0) |
| Grades 1 through 8 (Elementary) | 1 (0.8) |
| Grades 9 through 11 (Some high school) | 8 (6.7) |
| Grade 12 or GED (High school graduate) | 37 (30.8) |
| College 1 year to 3 years (Some college or technical school) | 47 (39.2) |
| College 4 years or more (College graduate) | 26 (21.7) |
| Prefer not to answer | 1 (0.8) |
| **Income** | | |
| $0 to $999 per month ($0 to $1,999 per year) | 18 (15) |
| $1,000 to $1,499 per month ($12,000 to $17,999 per year) | 13 (10.8) |
| $1,500 to $1,999 per month ($18,000 to $23,999 per year) | 18 (15) |
| $2,000 to $2,499 per month ($24,000 to $29,999 per year) | 19 (15.8) |
| $2,500 to $2,999 per month ($30,000 to $35,999 per year) | 12 (10) |
| $3,000 to $3,499 per month ($36,000 to $41,999 per year) | 13 (10.8) |
| $3,500 and over per month ($42,000 and over per year) | 17 (14.2) |
| Don’t know/Not sure | 6 (5) |
| Prefer not to answer | 3 (2.5) |
| Missing | 1 (0.8) |
| **How well do you speak English?** | | |
| Very well | 50 (41.7) |
| Well | 56 (46.7) |
| Not well | 14 (11.7) |
| Not at all | 0 (0) |
| **Birthplace** | | |
| US or Other | 17 (14.2) |
| Marshall Islands | 101 (84.2) |
| Other | 2 (1.7) |
| **About how long have you been in the United States?** | | |
| Since birth | 12 (10) |
| 15 years or more | 49 (40.8) |
| 10 years to less than 15 years | 17 (14.2) |
| 5 years to less than 10 years | 27 (22.5) |
| 1 year to less than 5 years | 10 (8.3) |
| Less than 1 year | 3 (2.5) |
| Don’t know | 2 (1.7) |
| **Do you currently have health insurance?** | | |
| Yes | 70 (58.3) |
| No | 41 (34.2) |
| Don’t know/Not sure | 4 (3.3) |
| Prefer not to answer | 2 (1.7) |
| Missing | 3 (2.5) |
| **Do you have a primary care provider?** | | |
| Yes | 60 (50) |

(continued)

Note: Percentages may not total to 100 due to rounding.
community Facebook page. Facebook recruitment used a ‘Completely Automated Public Turing test to tell Computers and Humans Apart’ (CAPTCHA) feature to prevent fraudulent responses. Recruitment took place from July 27, 2020 to November 22, 2020. Inclusion criteria specified participants be self-reported Marshallese living in the US and at least 18 years of age. Screening questions (first and last name, date of birth, email address) were used to eliminate duplicates, and identifiers were removed prior to analysis. Consent and survey questions were provided in both English and Marshallese language, with both languages side by side in the survey. Consent and survey questions were documented in Research Electronic Data Capture (REDCap), which is a web-based software designed for research and data management (29,30). Participants received a $20 gift card if they completed the survey.

Questions from the Behavioral Risk Factor Surveillance System captured sociodemographic information (31). Age was calculated as a continuous variable; all other sociodemographic information was provided from fixed choice response options. Questions from the PhenX toolkit were used to ask COVID-19 vaccine questions (32). Participants were asked: ‘If a vaccine for COVID-19 were available today, what is the likelihood that you would get vaccinated?’ Response options included: extremely likely, somewhat likely, unlikely, very unlikely, don’t know/not sure, and prefer not to answer. Participants were asked: ‘Where would you prefer to receive a vaccine for COVID-19,’ with an open-ended response option. Participants were also asked: ‘Would you be willing to participate in a COVID-19 vaccine clinical study or trial?’ Response options included: yes, maybe, no, don’t know/not sure, and prefer not to answer.

Descriptive statistics, including means with standard deviation, frequencies, and percentages, were calculated for willingness to get a COVID-19 vaccination, willingness to participate in a COVID-19 vaccination clinical trial, and sociodemographic and health-related variables. The relationships between these sociodemographic and health-related variables and willingness to get a COVID-19 vaccination and willingness to participate in a COVID-19 vaccination clinical trial were examined using Spearman’s correlations or Wilcoxon-Mann-Whitney U tests in the R environment (33) with an a priori alpha set at 0.05. Missing data were handled with pairwise deletion.

Results
A total of 120 individuals living in 12 states responded to the survey. Table 1 presents their sociodemographic characteristics. The majority of the participants had one or more years of college education, spoke English well or very well, were born in the Republic of the Marshall Islands, and reported currently having insurance.

Table 2 provides a summary of participants’ willingness to receive the COVID-19 vaccine and their willingness to participate in a COVID-19 vaccine clinical trial. For vaccine willingness, 32.5% percent of participants reported being extremely likely to get the COVID-19 vaccine; 20.8% reported being somewhat likely to get the COVID-19 vaccine; and 26.7% stated they did not know or were not sure if they would get the COVID-19 vaccine. Only 16.7% stated they would be willing to participate in a COVID-19 vaccine trial, and 5.8% preferred not to answer or did not provide a response.

Results of correlational analyses and Wilcoxon-Mann-Whitney U tests are shown in Table 3. ‘Don’t know/not sure’ and ‘prefer not to answer’ responses were excluded from analyses. Willingness to get the COVID-19 vaccine was positively associated with age ($\rho = .33, P < .01$), income level ($\rho = .26, P < .05$), and duration lived in the US ($\rho = .32, P < .01$). Additionally, current health insurance status ($U = 482, P < .01$) and primary care provider status ($U = 555, P < .05$) were positively associated with willingness to get the COVID-19 vaccine.

No associations were observed between participants’ willingness to be vaccinated and education level, English proficiency, sex, or birthplace. There was a positive association between participants’ willingness to get the COVID-19 vaccine and willingness to participate in a COVID-19 vaccine clinical trial ($\rho = .34, P < .01$). No associations were observed between participants’ willingness to participate in a COVID-19 clinical trial and age, education level, income, English proficiency, duration lived in the US, sex, birthplace, current health insurance status, or having a primary care provider.

Discussion
This is the first study to document willingness to get the COVID-19 vaccine among Marshallese Pacific Islanders.

| Table 2. Self-Reported Willingness to Receive the COVID-19 Vaccine and to Participate in a COVID-19 Vaccine Clinical Trial (N = 120). |
|---------------------------------------------------------------|
| If a vaccine for COVID-19 were available today, what is the likelihood that you would get vaccinated? |
| Extremely likely | 39 (32.5) |
| Somewhat likely | 25 (20.8) |
| Unlikely | 8 (6.7) |
| Very unlikely | 9 (7.5) |
| Don’t know/Not sure | 32 (26.7) |
| Prefer not to answer | 4 (3.3) |
| Missing | 3 (2.5) |
| Would you be willing to participate in a COVID-19 vaccine clinical study or trial? |
| Yes | 20 (16.7) |
| Maybe | 29 (24.2) |
| No | 50 (41.7) |
| Don’t know/Not sure | 14 (11.7) |
| Prefer not to answer | 4 (3.3) |
| Missing | 3 (2.5) |

Note: Percentages may not total to 100 due to rounding.
Approximately one third (32.5%) of Marshallese report they are extremely likely to get the COVID-19 vaccine. This is a lower proportion than in the general population and lower than other minority groups which has ranged from approximately 35–60% (25,34). However, only 14.2% are unlikely or very unlikely to get the COVID-19 vaccine (25,34). Half of the sample are either somewhat likely (20.8%) or not sure (26.7%); the proportions of participants reporting somewhat likely or not sure is much higher than other populations (25,34). The results show older age and higher income were positively associated with willingness to get the COVID-19 vaccine. These results are consistent with findings in other populations (25,34). In contrast with prior studies, education and English proficiency were not associated with willingness to vaccinate against COVID-19 (25,34).

The results demonstrate a positive association between living in the US for longer periods of time and willingness to get the COVID-19 vaccine, as well as a positive association between health insurance status, having a primary care provider, and willingness to get the COVID-19 vaccine for Marshallese participants. This is the first study to document the relationship between length of time in the US, insurance status, or having a primary care provider, and willingness to get a COVID-19 vaccination in any population. These findings may contribute to a better understanding of willingness to receive a COVID-19 vaccine among other immigrant and migrant groups and those who have barriers to health care access.

Less than one in five responded they would participate in a COVID-19 vaccine clinical trial. This is lower than many other minority groups (35). The hesitancy to participate in a vaccine clinical trial may be due to the historical trauma experienced by Marshallese when the US conducted extensive nuclear tests in the Marshall Islands. As the primary location for the US military’s nuclear testing program, the Marshall Islands were exposed to the equivalent of 7,200 Hiroshima-sized bombs from 1946 to 1958 (36,37). In the decades following, Project 4.1 was conducted by the US to study the health effects of nuclear radiation exposure. Marshallese were studied as part of Project 4.1 without their informed consent and without study information being provided in the native Marshallese language (36,38–40). The nuclear testing and subsequent research has created significant distrust between the Marshallese community and the US health care system and US researchers (41,42). In addition to historical trauma, several studies have documented ongoing distrust, exclusion, and discrimination within the US healthcare system (39,43).

Reporting racial disparities in health outcomes can inappropriately reinforce biological views of race and racial essentialism (44). Reporting COVID-19 predictors without historical context may exacerbate inappropriate biological and essentialist views of minority populations. In the context of historical trauma, however, racial differences in COVID-19 vaccine attitudes highlight the need for ‘trustworthiness before trust’ (45,46). Marshallese have experienced overwhelming disparities related to COVID-19 infection, hospitalization, and death (1,8), and, without an increased willingness among Marshallese to get the COVID-19 vaccination, the disparities in infections, hospitalizations, and deaths may continue to be devastating. Dedicated effort is needed to encourage those who report they are somewhat likely to receive a vaccination or not sure of their willingness to receive the vaccine. Prior research suggests partnerships between healthcare systems and Marshallese leaders, pastors, and community health workers could be effective in communicating health messages and vaccine uptake (27,47–50). The current crisis is urgent and requires immediate actions; however, it is also necessary to consider the need for sustained efforts among government and medical institutions to earn the trust of communities who have faced historical and/or contemporary harms (45).

**Limitations**

This article should be interpreted with consideration for its limitations. The study used a convenience sample of 120

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**Table 3. Variables Associated With Willingness to Receive a COVID-19 Vaccine and Willingness to Participate in a COVID-19 Vaccine Clinical Trial.**

| Measures                                      | Willingness to receive a COVID-19 vaccine | Willingness to participate in a COVID-19 vaccine clinical trial |
|-----------------------------------------------|------------------------------------------|---------------------------------------------------------------|
| Predictor                                     | N  | \( \rho \) | U  | P-value  | N  | \( \rho \) | U  | P-value  |
| Age (in years)                                | 81  | 0.33      | .003 |          | 99  | 0.09      | .382 |          |
| Education                                     | 80  | −0.11     | .346 |          | 98  | 0.14      | .165 |          |
| Income                                        | 76  | 0.26      | .024 |          | 93  | 0.08      | .466 |          |
| English proficiency                           | 81  | −0.05     | .678 |          | 99  | 0.04      | .681 |          |
| Duration lived in US                          | 80  | 0.32      | .004 |          | 98  | 0.1       | .318 |          |
| Sex                                           | 81  | 724       | .596 |          | 99  | 1238      | .411 |          |
| Birthplace                                    | 81  | 277       | .804 |          | 99  | 527.5     | .726 |          |
| Current health insurance status               | 77  | 482       | .009 |          | 95  | 1015.5    | .952 |          |
| Have a primary care provider                  | 79  | 555       | .017 |          | 96  | 998       | .273 |          |

Note: \( p \) values below the a priori threshold of .05 are found in bold.
Marshallese living in the US, and the education and income levels of the sample are higher than other published demographics for Marshallese (19,51). Given the associations between education and likelihood to accept the COVID-19 vaccine found in other studies, the results may show an over-estimation of those likely to accept the COVID-19 vaccine, which may in fact be even lower than reported. Therefore, the data distribution may have led to the lack of association with outcomes. Additionally, the data is cross-sectional; therefore, no causal conclusions are possible, and there may be possible confounders. Furthermore, attitudes regarding COVID-19 vaccines appear to be changing over time (52). This study did not examine information about reasons for low vaccination willingness beyond sociodemographic variables, and additional research is needed to better understand vaccine hesitancy among Pacific Islander communities.

Conclusion

Despite these limitations, the study makes several significant contributions to the literature. This article is the first to document willingness to get the COVID-19 vaccine among Marshallese or any other Pacific Islander group, who are often underrepresented in research or obscured through aggregation with other populations (53–57). This documentation is particularly important given the extreme COVID-19 health disparities experienced by Marshallese and other Pacific Islander groups (1,4,8). Moreover, the findings demonstrate some within-group variation in willingness to receive a COVID-19 vaccine. For example, this study is the first in any population to document an association between the length of time in the US, insurance status, and having a primary care provider as important factors in the likelihood of getting the COVID-19 vaccination.

This article documents Marshallese likelihood to get the COVID-19 vaccine and willingness to participate in clinical trials. This information will be essential in efforts to increase COVID-19 vaccine uptake and reduce disparities among Marshallese and other Pacific Islanders.

Declaration of Conflicting Interests

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Ethical Approval

Ethical approval to report this case was obtained from the institutional review board (IRB) at the University of Arkansas for Medical Sciences (UAMS) (IRB#261131).

Statement of Human and Animal Rights

All procedures in this study were conducted in accordance with the institutional review board (IRB) at the University of Arkansas for Medical Sciences (UAMS) (IRB#261131).

Statement of Informed Consent

Written informed consent was obtained from the patients for their anonymized information to be published in this article.

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References

1. Centers for Disease Control and Prevention. Summary Report CDC AR-3 Field Team COVID-19 among Hispanic and Marshallese communities in Benton and Washington Counties, Arkansas, https://arkansascovid.com/2020/07/cdc-report-why-focus-on-hispanic-and-marshallese-populations/ (2020, accessed 1 September 2020).
2. Centers for Disease Control and Prevention. COVID-19 in RACIAL AND ETHNIC MINORITY GROUPS, https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/racial-ethnic-minorities.html (2020, accessed 16 July 2020).
3. Dorn AV, Cooney RE, Sabin ML. COVID-19 exacerbating inequalities in the US. Lancet. 2020;395(10232):1243-4. doi:10.1016/S0140-6736(20)30893-X
4. Kaholokula JK, Samoa RA, Miyamoto RES, Palafox N, Daniels S. COVID-19 Special column: COVID-19 hits native Hawaiian and pacific islander communities the hardest. Hawaii J Health Soc Welf. 2020;79(5):144-6.
5. Perry A, Harshbarger D, Romer C. Mapping racial inequity amid COVID-19 underscores policy discrimination against Black Americans, https://www.brookings.edu/blog/the-avenue/2020/04/16/mapping-racial-inequity-amid-the-spread-of-covid-19/ (2020, accessed 16 April 2020).
6. Thebault R, Tran A, Williams V. The coronavirus is infecting and killing black Americans at an alarmingly high rate, https://www.washingtonpost.com/nation/2020/04/07/coronavirus-is-infecting-killing-black-americans-an-alarmingly-high-rate-post-analysis-shows/ (2020, accessed 7 April 2020).
7. Yancy CW. COVID-19 and African Americans. JAMA. 2020;323(19):1891-2. doi:10.1001/jama.2020.6548
8. Dreher A. Marshallese people represent 1% of Spokane County’s population and nearly a third of its COVID-19 cases, https://www.spokesman.com/stories/2020/jun/28/marshallese-people-represent-1-of-spokane-countyss/ (2020, accessed 6 September 2020).
9. Hosey G, Aitaoto N, Satterfield D, Kelly J, Apaisam CJ, Belyeu-Camacho T, et al. The culture, community, and science of type 2 diabetes prevention in the US associated Pacific Islands. Prev Chronic Dis. 2009;6(3):A104.

10. Finiu S, Wainiçqo I, Cuboni G. Health transition among Pacificans: unpacking imperialism. Pac Health Dialog. 2002;9(2):254-62.

11. Hezel F. Health in Micronesia over the years. Micronesian Counselor. 2004;53:2-15.

12. Hezel F. The New Shape of Old Island Cultures: A half century of social change in Micronesia. Honolulu: University of Hawaii Press, 2001.

13. McLennan A, Ulijaszek S. Obesity emergence in the pacific islands: why understanding colonial history and social change is important. Public Health Nutr. 2015;18(8):1499-505. doi: 10.1017/s136898001400175x

14. Palafax N. Health consequences of the pacific U.S. Nuclear weapons testing program in the Marshall Islands: inequity in protection, policy, regulation. Rev Environ Health. 2010;25(1):81-5. doi: 10.1515/reveh.2010.25.1.81

15. Ahlgren I, Yamada S, Wong A. Rising oceans, climate change, food Aid, and human rights in the Marshall Islands. Health Hum Rights. 2014;16(1):69-80.

16. American Diabetes Association. Statistics about diabetes, https://www.diabetes.org/resources/statistics/statistics-about-diabetes (2020, accessed 22 September 2020).

17. Cardenas VM, Orloff MS, Kaminaga J, Cardenas IC, Brown J, Hainline-Williams S, et al. Tuberculosis and leprosy infections in the Marshallse population of Arkansas, USA. Lepr Rev. 2016;87(1):109-12.

18. Centers for Disease Control and Prevention. Tuberculosis (TB), https://www.cdc.gov/tb/statistics/tbcases.htm (2018, accessed 15 September 2020).

19. McLellish P, Rowland B, Long C, Hudson J, Piel M, Buron B, et al. Diabetes and hypertension in Marshallse adults: results from faith-based health screenings. J Racial Ethn Health Disparities. 2017;4(6):1042-50. doi: 10.1016/j.rjehd.2016.09.012

20. Woodall P, Scollard D, Rajan L. Hansen disease among Micronesians and Marshallse persons living in the United States. Emerg Infect Dis. 2011;17(7):1202-8. doi:10.3201/eid1707.102036

21. World Health Organization. Tuberculosis Profile: Marshall Islands. Geneva, Switzerland: World Health Organization, 2020.

22. Guidry JPD, Laestadius LL, Vraga EK, Miller CA, Perrin PB, Burton CW, et al. Willingness to get the COVID-19 vaccine with and without emergency use authorization. Am J Infect Control. 2020;49(2):137-142. doi:10.1016/j.ajic.2020.11.018

23. Kreps S, Prasad S, Brownstein JS, Hswen Y, Garibaldi BT, Zhang B, et al. Factors associated With US Adults’ likelihood of accepting COVID-19 vaccination. JAMA Network Open. 2020;3(10):e2025594. doi:10.1001/jamanetworkopen.2020.25594

24. Daly M, Robinson E. Willingness to vaccinate against COVID-19 in the US: longitudinal evidence from a nationally representative sample of adults from April-October 2020. medRxiv. 2020. doi:10.1101/2020.11.27.20239970

25. Fisher KA, Bloomstone SJ, Waldier J, Crawford S, Fouayzi H, Mazor KM. Attitudes toward a potential SARS-CoV-2 vaccine: a survey of U.S. Adults. Ann Intern Med. 2020;173(12):964-73. doi:10.7326/M20-3569

26. Tyson A, Johnson C, Funk C. U.S. public now divided over whether to get COVID-19 vaccine, https://www.pewresearch.org/science/2020/09/17/u-s-public-now-divided-over-whether-to-get-covid-19-vaccine/ (2020, accessed 17 September 2020).

27. McElfish PA, Moore R, Laelan M, Ayers BL. Using CBPR to address health disparities with the Marshallse community in Arkansas. Ann Hum Biol. 2018;45(3):264-71. doi:10.1080/03014460.2018.1461927

28. McElfish P, Kohler P, Smith C, Warmack S, Buron B, Hudson J, et al. Community-driven research agenda to reduce health disparities. Clin Transl Sci. 2015;8(6):690-5. doi:10.1111/cts.12350

29. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009;42(2):377-81. doi:10.1016/j.jbi.2008.08.010

30. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O’Neal L, et al. The REDCap consortium: building an international community of software platform partners. J Biomed Inform. 2019;95:103208. doi:10.1016/j.jbi.2019.103208

31. Centers for Disease Control and Prevention. 2019 BRFSS Questionnaire, https://www.cdc.gov/brfss/questionnaires/pdf-ques/2019-BRFSS-Questionnaire-508.pdf (2019, accessed 24 June 2020).

32. COVID-19 Protocol Library. COVID-19 Protocols, https://www.phenxtoolkit.org/covid19/source (accessed 16 December 2020).

33. Team RC. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing, 2021.

34. Dör AA, Eisenbach N, Taiber S, Morozov NG, Mizrachi M, Zigron A, et al. Vaccine hesitancy: the next challenge in the fight against COVID-19. Eur J Epidemiol. 2020;35(8):775-9. doi:10.1007/s10654-020-00671-y

35. Detoc M, Bruel S, Frappe P, Tardy B, Botelho-Nevers E, Gagneux-Brunon A. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. Vaccine. 2020;38(45):7002-6. doi:10.1016/j.vaccine.2020.09.041

36. Barker H. Bravo for the Marshallese: Regaining Control in a Post-Nuclear, Post-Colonial World. Belmont, CA: Cengage Learning, 2012.

37. Simon SL. A brief history of people and events related to atomic weapons testing in the Marshall Islands. Health Phys. 1997;73(1):5-20. doi:10.1097/00004032-199707000-00001

38. Bond VP, Conard RA, Robertson JS, Weden EA Jr. Medical examination of Rongelap people six months after exposure to
fallout. Report no. WT-937, April 1955. Bethesda, MD and San Francisco, CA: Naval Medical Research Institute; U.S. Naval Radiological Defense Laboratory, 1955.

39. Conard RA. Fallout: The experiences of a medical team in the care of a Marshallese population accidentally exposed to fallout radiation. Upton, NY: Brookhaven National Laboratory, 1992.

40. Cronkite EP, Bond VP, Browning WH, Cohn SH, Conard RA, et al. Study of response of human beings accidentally exposed to significant fallout radiation. Bethesda, MD and San Francisco, CA: Naval Medical Research Institute; U.S. Naval Radiological Defense Laboratory, 1954.

41. Cortes LM, Gittelsohn J, Alfred J, Palafox NA. Formative research to inform intervention development for diabetes prevention in the Republic of the Marshall Islands. Health Educ Behav. 2001;28(6):696-715. doi:10.1177/109019810102800604

42. Ayers BL, Hawley NL, Purvis RS, Moore SJ, McElfish PA. Providers’ perspectives of barriers experienced in maternal health care among Marshallese women. Women Birth. 2018;31(5):e294-301. doi:10.1016/j.wombi.2017.10.006

43. McElfish P, Purvis R, Maskarinec G, Bing WI, Jacob CJ, Ritok-Lakien M, et al. Interpretive policy analysis: Marshallese COFA migrants and the Affordable Care Act. Int J Equity in Health. 2016;15:91. doi:10.1186/s12939-016-0381-1

44. Chowkwanyun M, Reed AL. Racial health disparities and covid-19 - caution and context. N Engl J Med. 2020;383(3):201-3. doi:10.1056/NEJMp2030033

45. Warren RC, Forrow L, Hodge DA, Truong RD. Trustworthiness before trust — covid-19 vaccine trials and the black community. N Engl J Med. 2020;383(22):e121. doi:10.1056/NEJMp2030033

46. Larson HJ, Clarke RM, Jarrett C, Eckersberger E, Levine Z, Schulz WS, et al. Measuring trust in vaccination: a systematic review. Hum Vaccin Immunother. 2018;14(7):1599-609. doi:10.1080/21645515.2018.1459252

47. McElfish P, Bing W, Ayers BL, Smith L, Stephens M, Wilmot R, et al. Lessons learned through a partnership with Marshallese faith-based organizations to screen for hypertension and diabetes. J Reg Med Campuses. 2018;1(3). doi:10.24926/jrmc.v1i3.1044

48. Purvis RS, Bing W, I, Jacob CJ, Lang S, Mamis S, Ritok M, et al. Community health warriors: Marshallese community health workers’ perceptions and experiences with CBPR and community engagement. Prog Community Health Partnershi. 2017;11(3):315-20. doi:10.1353/cph.2017.0037

49. Fields VS, Safi H, Waters C, Dillaha J, Capelle L, Riklon S, et al. Mumps in a highly vaccinated Marshallese community in Arkansas, USA: an outbreak report. Lancet Infect Dis. 2019;19(2):185-92. doi:10.1016/s1473-3099(18)30607-8

50. Marx GE, Burakoff A, Barnes M, Hite D, Metz A, Miller K, et al. Mumps outbreak in a Marshallese community - Denver Metropolitan Area, Colorado, 2016-2017. MMWR Morb Mortal Wkly Rep. 2018;67(41):1143-6. doi:10.15585/mmwr.mm6741a2

51. Donoho G, McElfish P, Avants R, Hallgren E. A novel recruiting and surveying method: participatory research during a pacific islander community’s Traditional cultural event. Gateways Inte J Comm Res Engag. 2015;8(1):150-159. doi:10.5130/ijcre.v8i1.4227

52. Funk C, Tyson A. Intent to Get a COVID-19 Vaccine Rises to 60% as Confidence in Research and Development Process Increases, https://www.pewresearch.org/science/2020/12/03/intent-to-get-a-covid-19-vaccine-rises-to-60-as-confidence-in-research-and-development-process-increases/ (2020, accessed December 3 2020).

53. Working Group of the Applied Research Center and National Council of Asian Pacific Americans. Best Practices: Researching Asian Americans, Native Hawaiians and Pacific Islanders. New York, NY: Applied Research Center; National Council of Asian Pacific Americans, 2013.

54. Ro M, Yee A. Out of the shadows: Asian Americans, native Hawaiians, and Pacific Islanders. Am J Public Health. 2010;100(5):776-8. doi:10.2105/AJPH.2010.192229

55. Srinivasan S, Guillermo T. Toward improved health: disaggregating Asian American and native Hawaiian Pacific Islander data. Am J Public Health. 2000;90(11):1731-4.

56. Ahmad F, Weller C. Reading between the data: The incomplete story of Asian Americans, Native Hawaiians, and Pacific Islanders, https://www.americanprogress.org/issues/race/reports/2014/03/03/85055/reading-between-the-data/ (2014, accessed December 3 2020).

57. Chin KK. Improving public health surveillance about Asian Americans, native Hawaiians, and Pacific Islanders. Am J Public Health. 2017;107(6):827-8. doi:10.2105/ajph.2017.303802