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Integrated Surveillance for Lymphatic Filariasis and other Infectious Diseases with a Nationwide Non-Communicable Disease STEPwise Survey in the small Pacific Island Nation of Niue, 2025

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Abstract

The small Pacific island nation of Niue was validated by the WHO in 2016 as having eliminated lymphatic filariasis (LF) as a public health problem; however, no post-validation surveillance (PVS) has been conducted since. In 2025, LF-PVS was integrated into a near-census national WHO STEPwise non-communicable disease (NCD) risk factor survey, a cost-effective approach for estimating LF prevalence and assessing whether elimination had been sustained. Finger-prick blood samples were tested for LF antigen and antibodies; antigen-positive samples were screened for microfilariae. One participant was antigen-positive (0.1%, 95% CI 0.02–0.88), and no microfilariae were detected, indicating sustained elimination. Ten participants were antibody-positive (five *Wb123*, four *Bm14*, one dual-positive). Semi-structured interviews provided operational insights, indicating that integrating LF-PVS into the programme was resource-efficient, logistically feasible, and acceptable to both health workers and the community. This study is the first to demonstrate integrated NCD–communicable disease surveillance in the Pacific.

Introduction

Lymphatic filariasis (LF) is an infection spread by mosquitoes and caused by three filarial worm species: *Wuchereria bancrofti*, *Brugia malayi* and *B. timori* [1,2]. Around 90% of global LF cases are due to *W. bancrofti*, which is also the only species present in Pacific Island countries and territories [3]. Transmission occurs when an infected mosquito bites a person, introducing larvae that travel to the lymphatic vessels. There, the parasites develop into adult worms and, if fertilised, produce large numbers of microfilariae (Mf) that circulate in the blood. Most infections begin with no noticeable symptoms [4], though people may experience episodes of acute inflammation such as dermatolymphangioadenitis or filarial lymphangitis [5]. If left untreated, chronic immune responses to the adult worms can lead to bacterial superinfection and long-term lymphatic dysfunction, resulting in conditions such as lymphoedema, elephantiasis and scrotal hydrocele [5]. LF remains a public health issue in 72 countries [6], and in 2019 it was estimated to account for 1.63 million disability-adjusted life-years [7,8].

The 1997 World Health Assembly called for the global elimination of LF as a public health problem, prompting the establishment of the Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000 [9]. The programme set a target to achieve global elimination by 2020 through surveillance, Mass Drug Administration (MDA), and Morbidity Management and Disability Prevention (MMDP). Although this goal was not met, momentum has continued. In 2021, the World Health Organization released the updated Roadmap for Neglected Tropical Diseases for 2021–2030, which sets out the expectation that by 2030 all 72 LF-endemic countries will have stopped MDA and will be conducting either post-validation (PVS) or post-MDA surveillance activities [10].

At the country level, elimination of LF as a public health problem is validated by the World Health Organisation (WHO). Countries that achieve validation are encouraged to implement PVS to ensure early detection of any resurgence. Guidance on PVS design, frequency, and duration has been limited, leading

to inconsistent implementation and, in many countries, inactivity following validation of elimination. This gap has, in part, been addressed in the 2025 WHO publication entitled *Monitoring and epidemiological assessment of mass drug administration in the global programme to eliminate lymphatic filariasis: a manual for national elimination programmes, 2nd ed* [11].

Niue is a small (261 km^2) self-governing island in the South Pacific, located approximately 660 km southeast of Samoa and 2,400 km northeast of New Zealand (19°S, 169°W). The island has a population of ~ 1,600 people (about 1,300 of whom are on the island at any one time, though this fluctuates) (Fig. 1) [2,12].

LF surveys have been conducted in Niue since 1954. In the 1954 population-wide survey, Mf prevalence was found to be 22.2% [13]. Between 1955 and 2005, eight rounds of MDA were implemented, resulting in a reduction in antigen (Ag)-positive prevalence to 0.5% by 2009 [2,14] (Fig. 2). In October 2016, Niue was validated by WHO as having eliminated LF as a public health problem [15] and the country officially moved into a post-validation phase. Until the present study, no PVS or community surveillance for LF had been conducted.

In 2025, an integrated approach to LF-PVS was undertaken, where PVS was embedded into a planned and funded national WHO STEPwise non-communicable disease (NCD) risk factor (STEPS) survey that, in addition to asking NCD-related lifestyle, diet, and behavioural questions, collected finger-prick blood samples from participants to test for blood glucose and blood cholesterol levels [2].

Here, we present the results of the LF-PVS survey and discuss the benefits, enablers, challenges, and adaptive practices required to successfully integrate LF-PVS into a routine national public health program.

Methods

This study had two aims. First, it sought to conduct the first PVS in Niue nine years after the country was validated as having eliminated LF as a public health problem and thereby assess whether the elimination status had been maintained. Second, it aimed to explore critical operational dynamics that support or hinder integrated approaches to LF-PVS in a Pacific Island setting, with the intention of generating practical guidance for other countries and regions seeking cost- and labour-efficient models for PVS implementation.

Lymphatic filariasis Post-Validation Surveillance (Aim 1)

Pre-survey community engagement

In the weeks prior to the survey, the Niue Department of Health (DoH) Public Health Unit undertook community awareness activities, including village talks, radio broadcasts and talk-back sessions, and social media messaging. These activities raised awareness of the STEPS and LF-PVS surveys, explained the procedures, and clarified how the collected data would be used and reported.

Participant recruitment

The LF-PVS was conducted as a population census of individuals aged >3 years. To achieve this, two recruitment methods were used.

First, LF-PVS was integrated with a planned national population-based WHO STEPS survey. Integration between the LF-PVS and STEPS occurred at multiple points in the workflow, including during pre-survey community engagement, when obtaining informed consent, during the collection of survey-based data, and during the collection of finger-prick blood samples to test for cholesterol, glucose, and LF Ag and antibodies (Ab) to multiple pathogens. The STEPS survey's target population were all people aged 16 to 69 years, and the survey was conducted from 24 February to 4 April 2025. STEPS surveying was conducted in community halls and churches across the 14 villages in Niue. This approach is outlined in a published methods paper [2].

Second, to expand the age range of PVS participants to include younger (3 to 16 years) and older (> 69 years) participants, convenience community-based sampling was used. Community-based sampling was conducted at the country's only primary and high school, the morning market, the bank waiting area, workplaces, churches, and the outpatient clinic at Niue Foou Hospital.

Each participant was allocated a unique QR-coded identifier, which was affixed to all study materials (consent forms, questionnaires, blood collection tubes, Bioline^{TM} Filariasis Test Strip (FTS) (Abbott, Scarborough, ME), slides, and dried blood spots (DBS) [see below] to support linkage and tracking.

Field logistics, demographic, and travel history data collection

At each STEPS survey site, participants moved through three 'stations.' First, at a dedicated 'registration and consent station,' participants provided demographic information (age, sex, country of birth, village of residence, occupation) and gave written consent to participate in both the STEPS and/or LF-PVS studies (participants could opt in/out of either study). Second, participants proceeded to 'blood collection stations,' where at least 300µL of finger-prick blood was collected into heparin-coated BD Microtainers® Blood Collection Tubes and stored in a cooler box for later LF testing and DBS preparation (as part of LF-PVS) at a field laboratory. Third, participants attended an 'interview station' where questions on international travel history were embedded in the standard STEPS questionnaire to collect data on participants' travel to LF-endemic countries. Data were captured in a standardized from developed by WHO and collected through a purpose-built ODK platform

For samples collected through community-based sampling, consent, blood collection, and LF-related risk questions were completed at a single station.

EpiCollect5 software (v76.1.0; https://five.epicollect.net/) was used to collect and to link STEPS and community sampling data.

Lymphatic filariasis laboratory testing

For each participant, blood samples were tested for LF Ag using FTS. For any Ag-positive samples, Mf slides were prepared using methods described previously [16] and read independently by two trained microscopists in Australia. Household members and those residing within 100m of any Ag-positive person were followed up and, if not already done, LF Ag testing was offered.

For all participants, DBS were collected onto Cellabs Tropbio Filter Paper Blood Collection Disks™ (up to 6 x 10 µL spots) for multiplex bead assay (MBA) analysis using Luminex® technology to detect Ab for a panel of infectious diseases, including two Abs for LF (*Wb123* and *Bm14*) [17].

Statistical analysis

Data were analysed using Stata (Version 19.0; StataCorp, College Station, TX). Descriptive statistics were generated for Ag and Ab results, and 95% confidence intervals were computed for relevant demographic variables, including age, sex, and village of residence.

Dynamics that support integrated approaches to LF-PVS (Aim 2)

Data collection

Three sources of data related to the dynamics that supported integrated PVS were collected. First, field observations of the LF-PVS team were collected through daily and end-of-survey debriefing sessions. Second, key informant interviews were conducted with purposefully selected Niue DoH staff directly involved in implementing the integrated STEPS/LF-PVS approach. And third, a micro-costing analysis (which has been published elsewhere [18]) was performed to estimate the cost savings of the integrated approach.

All key informant interviews and focus group discussions were semi-structured and flexible. An interview guide that posed broad, open-ended questions was used to guide the conversations without stifling them.

Qualitative analysis

An inductive thematic analysis, guided by the frameworks of Braun and Clarke [19] and Terry [20], was used to identify recurrent patterns and develop themes from interview and observational data. This method was chosen because it enables themes to emerge directly from participants' accounts, making it well suited to exploratory research on evolving surveillance practices. Theme development was iterative, with academic, field team and DoH co-authors jointly reviewing and refining the analysis to ensure it accurately represented shared observations and experiences.

Ethics statement

The study was approved by the Research Committee of the Niue Department of Health (5 August 2024) and ratified by the UQ Human Research Ethics Committee (approval reference 2024/HE001375; 8 August 2024) and the Alfred Hospital Ethics Committee (approval reference 317/25). Written informed consent was obtained from all participants, with parent or guardian consent for participants aged <18 years. All personal identifiers were removed prior to analysis in accordance with the United States Department of Health and Human Services' Health Insurance Portability and Accountability Act Privacy Rule. Where applicable, participants provided specific consent for the verbatim reporting of de-identified quotations. The study was conducted in accordance with relevant ethical guidelines and regulations, including the Declaration of Helsinki issued by the World Medical Association and the International Ethical Guidelines for Health-related Research Involving Humans published by the Council for International Organizations of Medical Sciences.

Results

Lymphatic Filariasis Post-Validation Surveillance

Characteristics of participants

A total of 898 individuals participated in the survey. Participants from all villages were represented with median coverage across villages of 71.9% (IQR: 59.9-78.1%) and ranging from 28.6% (in Namukulu, a hamlet of ~7 people) to 86.1% (in Hakupu). Coverage in Alofi North and Alofi South (the capital and most populated area) was 74.7% and 56.8%, respectively. 176 participants were aged 3-15 years (~54% of the estimated on-island population in this age group), 628 were aged 15–69 years (~63%), and 47 were >69 years (~35%). A breakdown by age group and village is provided in Table 1.

Table 1. Count and age group of participants in the Niue lymphatic filariasis post-validation surveillance survey, 2025.

Village	Age groups (year olds)				Total	Est. on-island pop'n	Est. percentage surveyed
	3-15	15-69	>69	No record			
Alofi North	27	76	7	2	112	150	74.7%
Alofi South	33	134	11	14	192	338	56.8%
Avatele	20	46	3	5	74	102	72.5%
Hakupu	26	83	4	11	124	144	86.1%
Hikutavake	3	20	2	0	25	31	80.6%
Lakepa	10	40	4	2	56	76	73.7%
Liku	4	36	2	0	42	59	71.2%
Makefu	11	33	1	1	46	58	79.3%
Mutulau	8	32	3	1	44	62	71.0%
Namukulu	0	2	0	0	2	7	28.6%
Tamakautoga	10	37	4	1	52	144	36.1%
Toi	5	10	1	2	18	26	69.2%
Tuapa	16	48	4	2	70	82	85.4%
Vaiea	3	30	0	2	35	65	53.8%
No record	0	1	1	4	6		
Total	**176**	**628**	**47**	**47**	**898**	**1,344**	**66.8%**

Of these, 557 (62.0%) were recruited through STEPS and 341 (38.0%) through community-based collection activities. Of community-based collections, 116 (34.0%) were recruited through the primary school, 84 (24.6%) through the high school, 55 (16.1%) through the hospital, and 72 (22.1%) at other community locations, including the morning market, the bank, and churches. The location of community sampling was not recorded for 14 participants.

Antigen and microfilariae testing

Of the 898 participants, 845 had blood collected for FTS testing. Of these, 23 did not have sufficient blood to perform FTS, and 14 tests were invalid (10 because the test did not flow, four because the control line did not appear). Insufficient blood was available for retesting. Thus, 808 valid LF FTS tests (95.6% of those provided for FTS testing) were performed.

Of the 808 valid tests, only one LF Ag-positive result was detected (0.1% [95% confidence interval: 0.02-0.88] prevalence), and no Mf were observed on thick blood smears (Fig 3). Follow-up testing of

household members and those who resided within 100m of the Ag-positive person yielded no further Ag-positive results. This finding suggests that LF Ag prevalence remains well below the WHO threshold of 1% Ag-positive [11] and hence Niue continues to meet the criteria for LF elimination.

Antibody testing

Ab testing for LF is still an emerging tool and results should be interpreted with a high degree of caution. WHO's monitoring and epidemiological evaluation guidelines for LF [11] state:

"…. exposure to filarial parasites may induce Abs in people, even if a true infection does not occur. Infected people, both microfilaraemic and amicrofilaraemic, have elevated levels of Abs, but the results of Ab testing do not distinguish between current and past infection. Nevertheless, detection of Abs in children demonstrates recent exposure to filarial parasites [11]."

Dried blood spots from 755 participants were prepared and tested using MBA. Five samples were positive for *Wb123* Ab, four for *Bm14* Ab, and one sample was dual-positive (Fig 3). Ab-positive people were identified in eight of Niue's 14 administrative areas. Ab-positive individuals ranged from 9 to 66 years old, including two children under 19 years of age, born post-MDA cessation. Three of the Ab-positive people migrants from LF-endemic countries to Niue within the 5 years preceding the survey; one had been in an LF-endemic country for 4 years; and two had epidemiological links to LF-positive people identified during the 2009 survey. A public health investigation is ongoing.

Dynamics that support integrated approaches to LF-PVS

Field observation data were collected on all collection days, and all senior Niue MoH staff members responsible for implementing the integrated STEPS/LF-PVS surveys were interviewed. This included the lead and deputy lead of the integrated survey, as well as two other senior officers responsible for field implementation, logistics, workflow, and data management.

Benefits and enablers of integration

Clear operational gains

Interviews with Niue DoH staff consistently highlighted that integrating LF-PVS within the STEPS survey generated clear operational gains. Staff reported that shared transport, venue preparation, and data entry processes reduced duplication and improved field efficiency. Core functions, such as community engagement, production of information materials, and consent procedures, were streamlined, strengthening coordination between the two programmes. These efficiencies were particularly valued in Niue, where the health workforce is small and lacks the capacity to implement multiple, similar community-based survey activities simultaneously.

National leadership

Strong and visible DoH leadership emerged as a central enabler. Both junior and LF-PVS staff recognised the role senior DoH officials played in advocating for trialling the integrated model, and their stewardship throughout planning and implementation were cited as essential to the approach's success. Beyond the logistical task of aligning two programme workflows, DoH leaders' willingness to champion integration helped secure staff buy-in, supported rapid problem-solving, and reassured teams that the model was both feasible and aligned with national priorities.

Integration with a high-profile and supported programme

Through integration, LF-PVS also benefited substantially from being linked to the STEPS survey, a well-known, well-funded, and highly valued NCD initiative. Public interest in NCDs, which represent a major burden of disease in the Pacific, combined with strong promotional efforts by the DoH, helped engage and motivate community members to participate in the survey. LF-PVS, typically attracting less interest, benefited from this momentum; several participants described it as a "low cost" additional activity that made sense to include.

Clear points of integration

Clear points of integration within the STEPS workflow further supported implementation. Staff emphasised the logical alignment of activities, particularly at blood collection stations, as "making good sense." Importantly, the LF-PVS team assumed responsibility for glucose and cholesterol testing within the STEPS process, reducing complexity, saving STEPS team labour, and helping all understand where and how LF-PVS added value to the overall workflow.

Reduced impost on the public

The integrated model also reduced the burden on the public. Community members appreciated contributing to both NCD and infectious disease surveillance during a single visit, avoiding multiple appointments or repeated finger-pricks. The "one prick, many tests" approach was frequently cited as a meaningful benefit, reducing discomfort and reinforcing the sense that the survey respected participants' time and convenience. This simplicity became a point of discussion within communities and was seen to strengthen trust in the health system.

Staff from both the STEPS and LF-PVS study understood the importance of effective, transparent communication. The co-location of both survey programs' staff at field sites enabled daily joint planning and real-time troubleshooting by mixed teams. The LF-PVS team provided practical support with transport, set-up, and logistics, bringing additional capacity to the STEPS workflow. As one official noted, "integration didn't mean extra work, it meant more hands to help out."

Cost and labour saving

Conceptually clear savings in cost and effort were widely recognised as being a major motivator for senior program leaders' interest and willingness to trial an integrated model. Staff noted that shared infrastructure and personnel reduced overall requirements. This is consistent with the micro-costing analysis (reported elsewhere [18]) which showed a 44% reduction in financial costs and nearly 50% labour savings compared with a stand-alone LF-PVS survey. Respondents considered these efficiencies to make an integrated LF-PVS model more realistic and sustainable in the future.

Challenges and adaptive practices

Despite the overall success, several early challenges were noted. The integrated consent process initially caused confusion for both staff and participants, requiring refinements to wording and workflow. Differences in target age groups between STEPS and LF-PVS also required negotiation. Supplementary community-based data collection activities were added to ensure coverage of individuals (aged <16 and >69 years) falling outside the STEPS eligibility criteria.

Flexibility was repeatedly identified as essential. Teams adapted daily to weather disruptions, staff availability, community events, and transport issues, often reorganising plans at short notice. The small size of the field team, combined with a positive, pragmatic "can-do" attitude and a highly professional, respected leadership team, supported this agility. Clear communication with the public was reported by interviewees to have contributed to high levels of acceptance and overall, the integrated approach appeared acceptable, well understood, and strongly supported by community members.

Discussion

We report the findings of the first LF-PVS study conducted in Niue, undertaken nine years after the country was validated as having eliminated the disease as a public health problem. From a near-census survey, only one individual tested Ag-positive, corresponding to a population Ag prevalence of < 0.2%, indicating that Niue has maintained its elimination status.

Although Ab testing for LF remains an emerging tool and is not yet used for programmatic decision-making in areas where *W. bancrofti* is endemic [11], the detection of 10 Ab-positive individuals, including three young people born after cessation of MDA, may represent an early signal of recent exposure. These findings warrant further scrutiny and follow up. Periodic Ag/Mf testing of Ab-positive individuals may be justified. This "test and watch" approach is consistent with WHO guidance for post-elimination settings and supports early detection of possible resurgence. Additional investigation is needed to understand potential exposure pathways, both within Niue and through international travel. Taken together, the Ab results reinforce the need for ongoing PVS to ensure that any resurgence is detected promptly and addressed before sustained transmission can be re-established.

While Ab markers show promise for detecting early exposure to LF and identifying potential resurgence, key questions remain regarding how best to interpret Ab kinetics across the infection trajectory and

defining benchmarks for public health action [21–23]. Advancing this evidence is essential to ensure that Ab tools are applied appropriately and that the resulting information aligns with the needs of public health decision-makers.

The integration of LF-PVS into the STEPS survey generated substantial cost and operational efficiencies. Shared logistics, streamlined consent and community engagement processes, and coordinated field activities reduced duplication and staff workload. These benefits were particularly important in Niue, where the health workforce is small and any additional tasks carry significant opportunity costs. Embedding supplementary surveillance activities within existing, well-supported survey or health service delivery workflows allowed the health system to broaden its public health monitoring capacity without proportionally increasing operational demands. For Pacific Island settings, where parallel campaigns are often impractical due to workforce constraints and geographic dispersion, these findings indicate that integration represents a pragmatic and sustainable strategy for fulfilling LF-PVS requirements. The benefit of integration would likely extend to other disease programmes with examples available from across the world including from Togo where malaria thick blood smears have been screened for *W. bancrofti* Mf [24], in Cambodia where MBA for parasitic diseases were integrated into a national serosurvey of women aged 15–39 years of age [25], in Sudan, integrated serosurveillance for onchoceriasis, LF, and schistosomiasis [26], in Samoa LF and scabies surveys were integrated [27,28], and in Tonga where LF-PVS was integrated with clinical service provision [29].

The success of the integrated model in Niue was underpinned by effective DoH leadership. Senior officials actively advocated for the approach, helping to secure support from the STEPS programme and frontline staff. Integration also benefited from being attached to the respected, well-promoted, high-profile STEPS survey, which enjoyed strong community interest and acceptance. These findings highlight that successful integration is not solely a technical exercise; it depends heavily on governance, leadership, and programme reputation. This aligns with broader implementation science evidence that leadership engagement and programme visibility are key determinants of effective system change, particularly in settings where programme success relies on community participation [30–32]. In places where leadership is limited or the programme is not well known, development partners can use their credibility to help raise community awareness, understanding, and demand for PVS.

We note that Niue's small population (~ 1,300 residents on the island at any given time) enabled the STEPS survey to be conducted as a census of all people aged 15–69 years, with data collected from every village. Because all communities are located on a single, easily accessible island, it was also relatively straightforward to include additional participants outside the STEPS target age range, resulting in an overall survey coverage of roughly 65% of the eligible population across all villages. In larger or more complex settings, and where the sampling frames of 'host' programmes do not align neatly with LF-PVS requirements, integration might be more challenging. In these contexts, achieving strong alignment between programme objectives becomes essential, as does building flexibility in the co-design of participating programmes. International agencies, including WHO, that champion integration

as a cost-efficient strategy are well placed to identify, promote and help design cross-programme surveillance models that maximise financial, workforce, and logistical gains.

Community members consistently valued the “one prick, many tests” model and the convenience of contributing to multiple surveillance activities during a single encounter. The integrated approach was viewed as respectful of participants’ time and was highly acceptable. Minimising participant burden is especially important in small populations, where repeated surveys risk generating fatigue and reduced participation over time. By reducing inconvenience and adding perceived value, the integrated model helped reinforce trust in the health system, an essential foundation for maintaining long-term surveillance in post-elimination settings. These findings suggest that community acceptability should be a core design consideration when developing integrated PVS models for PICTs.

By demonstrating that a Small Island Developing State, such as Niue, can deliver LF-PVS effectively by leveraging an existing survey platform, this study shows that integrated surveillance can be both feasible and resource-efficient. Niue’s experience provides a practical model for other countries seeking to protect population health while advancing global development targets outlined in the Sustainable Development Goals (SDGs). In particular, the ability to implement PVS supports progress towards SDG target 3.3, which aims to end NTDs as a public health problem by 2030. The operational efficiencies and community-centred design observed in this study also align with broader SDG priorities, including universal health coverage (SDG target 3.8) and strengthened national health risk management capacities (SDG 3.d).

Conclusion

This study provides evidence that Niue has maintained LF elimination nine years after validation of elimination as a public health problem, while also signalling, through low Ab prevalence, the need for ongoing vigilance and repeated PVS. By embedding LF-PVS within a national STEPS NCD risk factor survey, we demonstrate that integrated surveillance is both operationally feasible and efficient, delivering substantial cost and labour savings in a health system with constrained capacity. The experience from Niue underscores that successful integration depends not only on technical design but also on strong health authority leadership, alignment with high-profile, trusted programmes, and a deliberate focus on minimising participant burden through approaches such as “one prick, many tests.” Taken together, these findings suggest that programmatically integrated LF-PVS offers a pragmatic, acceptable, and sustainable pathway for PICTs and other countries seeking to protect hard-won elimination gains while advancing broader goals for health system efficiency, person-centred care, and progress towards achievement of the SDGs.

Declarations

Declaration of interest

All authors declare no competing interests.

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Author Contribution

Conceptualisation: ATC, HLSL GM, and CLL. Investigation: ATC, HLSL, GM, PT, MN, AM, TM, LJR, and FA. Data curation: ATC, HLSL. Project administration: ATC. Analysis: ATC, HLSL, LJR, and FA. Supervision: CLL. Writing - original draft: ATC. Writing - review and editing: all authors. All authors had access to the raw data. All authors reviewed the final manuscript. ATC had responsibility for the decision to submit for publication.

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Data Availability

Communities in Niue are small (some with fewer than 10 inhabitants), and sharing individual-level data could enable the identification of individual participants, violating the conditions of the study's ethics approval. For requests related to data access, please contact the Niue Department of Health Human Ethics Committee via the Niue Public Health Unit's focal point (grizelda.mokoia@gov.nu).

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Figures

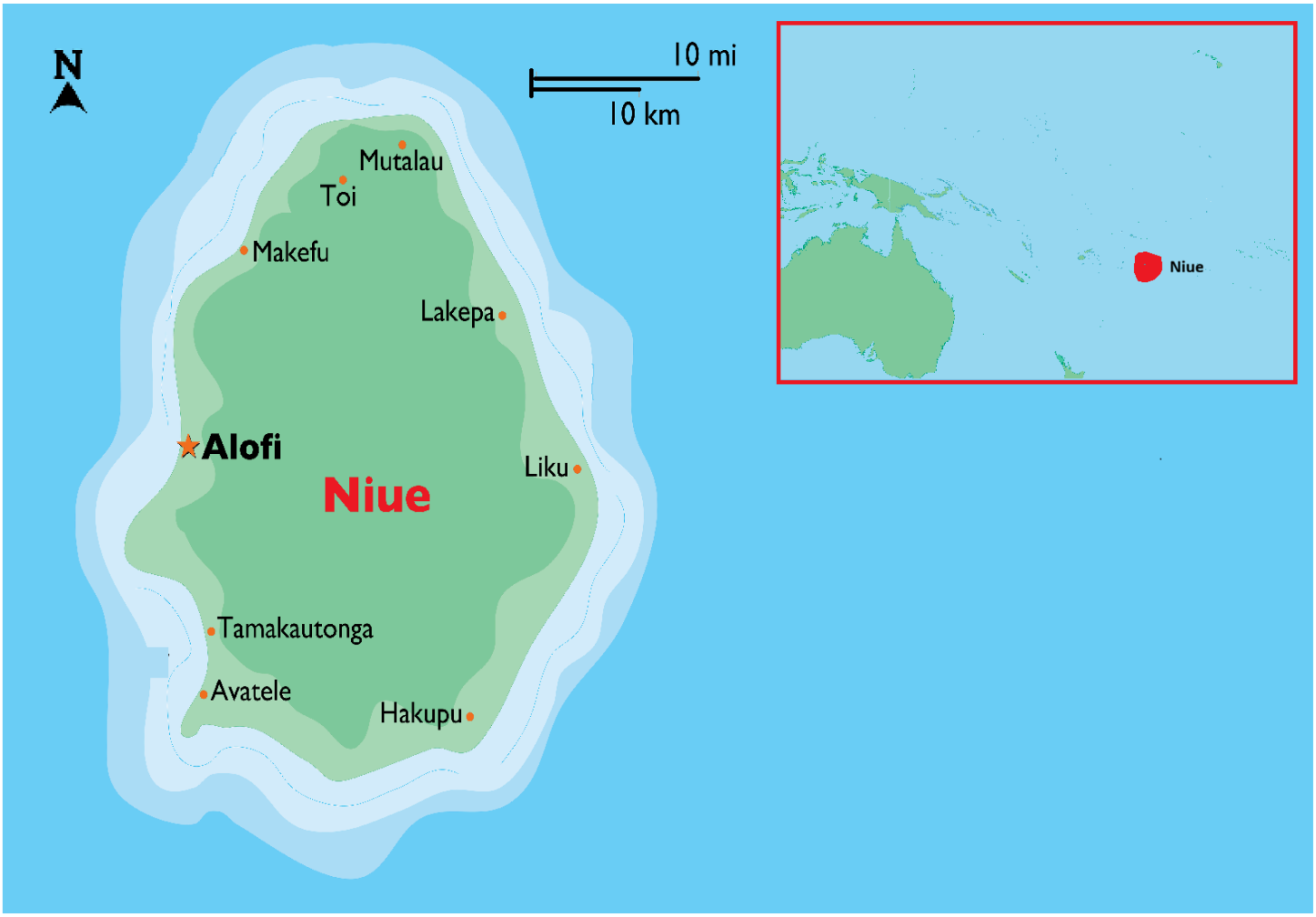

Figure 1

Niue and its villages, and Niue's location in the South Pacific Ocean (insert).

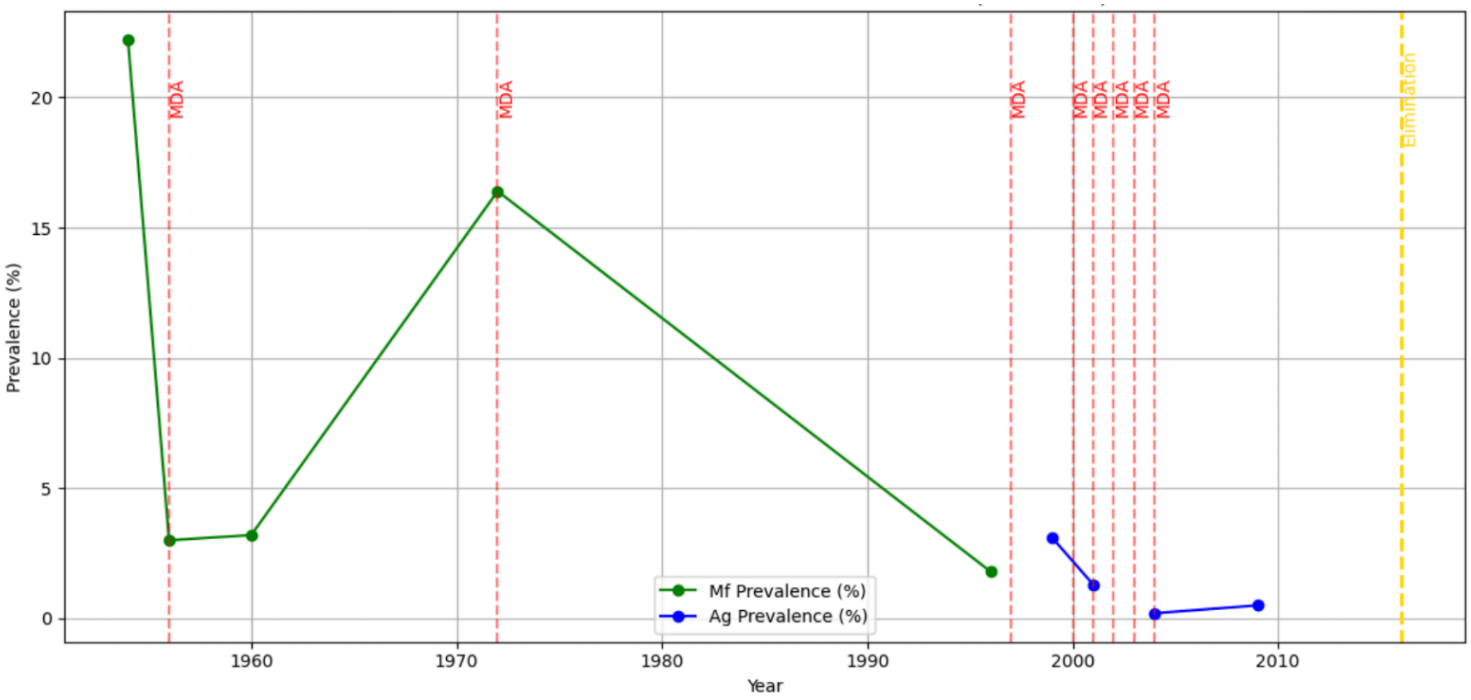

Figure 2

Timeline of significant milestones in lymphatic filariasis surveillance, treatment, and elimination in Niue, 1950-2020.

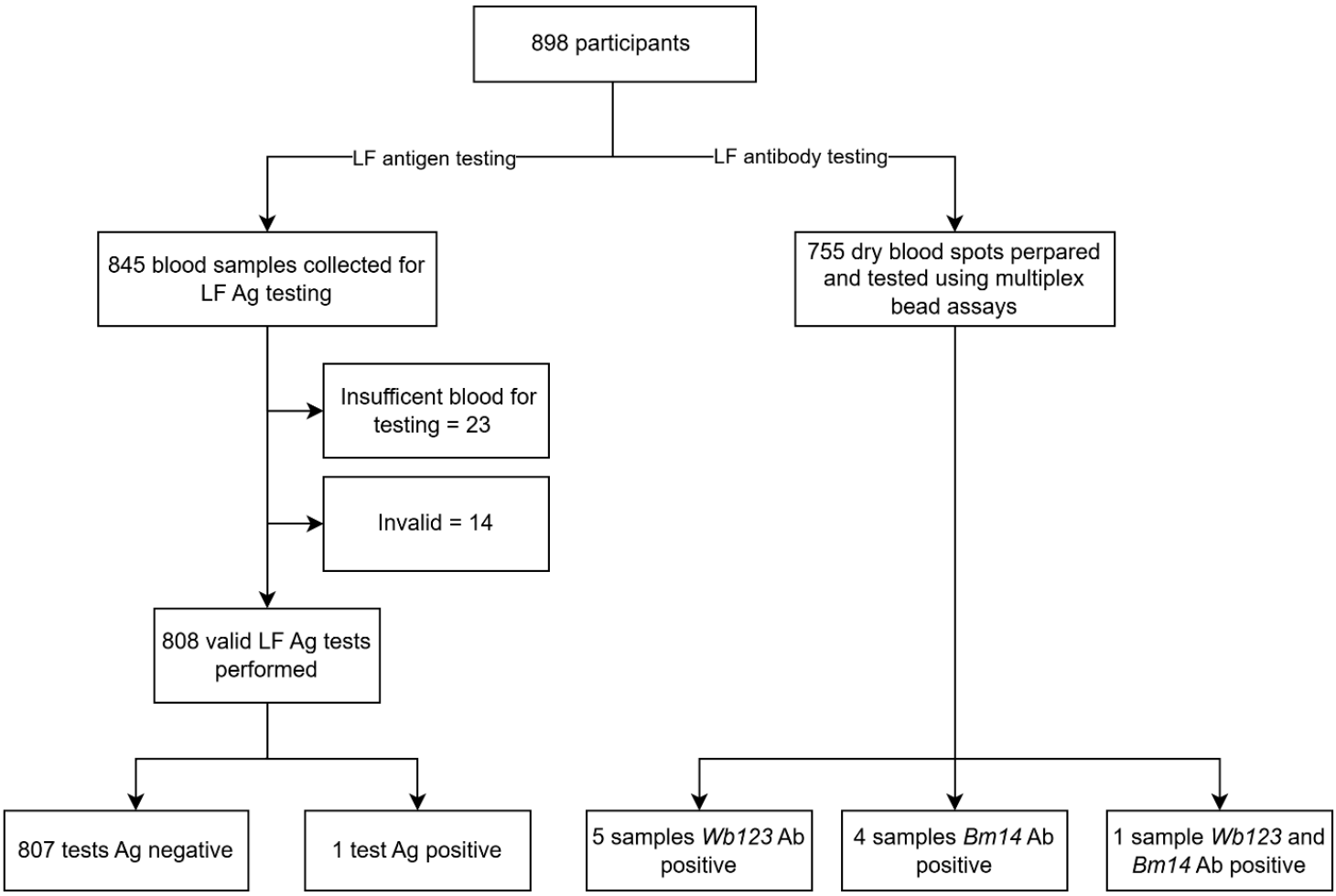

Figure 3

Lymphatic filariasis antigen and antibody testing flow and results.