Building the Links between Campaigns and PHC: Evaluating Serosurveillance and PHC Referral during Integrated NTD Campaigns in Vanuatu

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Key Messages
1. MDA campaigns can be used as a platform to deliver other campaign-based interventions and link to other PHC services and to create a better connection between routine health care and campaigns.
2. Integrating campaigns with PHC requires effective training and an in-depth analysis of the health system capacity such as availability of health staff, availability of tools for diagnosis treatment, and access to training and resources.
3. Implementing new communication strategies and being aware of different campaigns happening in the country can reduce hesitancy and increase the number of participants in the MDA campaign.

Introduction and Background
Campaigns targeting individual Neglected Tropical Diseases (NTDs) are routinely implemented using mass drug administration (MDA). The cost, and opportunity cost, of such single disease MDAs is substantial and, as a result, there has been a call to move towards integrated campaigns targeting multiple NTDs.1–3 In addition, the costs of delivering MDA are even more significant when targeting hard to reach and underserved populations, as found in Pacific Island nations.4 In these settings, it is important not only to target multiple NTDs, but also to seek opportunities to leverage the campaign platform to integrate other interventions and build a stronger link between campaigns and the primary health care system (PHC).5

As part of a larger implementation project, the Vanuatu Ministry of Health (MoH) piloted, in Tafea province (fig 1), integrating an MDA campaign targeting yaws, scabies, and soil-transmitted helminths (STH), with skin exams and referral to the primary health care system. In addition, in a subset of villages, the project also integrated the collection of dried blood spots (DBS) for multi-disease serosurveillance and stool samples to assess prevalence of STH. Therefore, the goal of the research reported here was to evaluate the feasibility of the fully integrated campaign including: multi diseases MDA; skin examinations and referral to the primary health care system for further treatment; and sample...
collection for serosurveillance and monitoring and evaluation (M&E). The report documents lessons learned, challenges, and implications for policy both in Vanuatu and other countries interested in building stronger connections between community-based campaigns and the health system.

Vanuatu is historically co-endemic for multiple NTDs, including lymphatic filariasis (LF), yaws, trachoma, scabies, STH and leprosy and has challenging geographical settings with limited infrastructure; many outer islands; and rural, hard-to-reach communities with traditional customs. However, with a strong commitment of the MoH supported by the World Health Organization (WHO), Vanuatu was one of the first countries that achieved elimination of LF in the world, with the shortest duration of time since the launch of the national LF elimination program. Vanuatu also achieved the target for elimination of trachoma as a public health problem (the national dossier for validation of such status is currently under review by the WHO) the elimination of malaria in some provinces, and is accelerating efforts to eliminate the disease nationwide. Encouraged by this success, Vanuatu is looking to eliminate yaws and leprosy and achieve public health control of scabies. For elimination of yaws, Vanuatu implemented MDA in 2013 (in the highest-burden province) and 2016 (nationwide) with over 80% coverage, which significantly reduced the reported number of cases. Another round of MDA was implemented in October-November 2019 in two provinces that continue to have persistent transmission of yaws (Shefa and Tafea province). The 2019 MDA campaign was integrated with other public health outreach activities such as deworming, scabies treatment and non-communicable disease (NCD) screening.

Considering Vanuatu's historical experience and capacity in delivering high-quality MDA campaigns and eliminating various neglected tropical diseases, the country was well-positioned to pilot this new integrated approach, combining MDA with albendazole, ivermectin, and azithromycin for scabies, yaws, and STH, skin exams, and surveillance.

**Objectives**

1. Test feasibility of integrating skin exams and creating a referral pathway between the community-based MDA campaigns and the PHC system in a pilot study in Tafea province.
2. Test feasibility of leveraging routine M&E for MDA campaigns to collect samples for integrated serosurveillance targeting multiple cross-program and emerging health priorities to help inform country-level decision making on health priorities and where disease interventions are needed.

**Methods**

This project was added to the National MoH's community-based, MDA campaign targeting scabies, yaws, and soil-transmitted helminths.

In November and December 2021, the National MoH and Provincial Health Authority in Tafea Province conducted an integrated MDA campaign co-administering ivermectin, albendazole, and azithromycin to treat and prevent scabies, yaws, and STH. Tubes of permethrin cream were also distributed to treat active scabies cases. The MDA campaign targeted all 5 islands in Tafea Province, consisting of 11 area councils, 431 villages and 36,799 people, according to a recent census. There were six categories of people who are ineligible to receive one or more of the MDA drugs. The six categories are described in table 1.
Integration of screening and referral of skin diseases:

To integrate skin exams and referral into the campaign, as part of the registration process for MDA, community-members were asked a set of questions on skin diseases to prompt self-reporting of severe skin lesions or disease following the job aides shown in figure A2. Community members who self-reported with severe skin lesions were referred to the skin exam table staffed by a public health nurse who performed a skin exam, specifically looking for cases of suspected yaws and leprosy, but also severe scabies or other severe skin lesions or infections that require medical care. For suspected yaws lesions, the Dual-Path Platform (DPP) yaws assay (Chembio Diagnostics, USA) was used for confirmation. Job aides were provided to aid in the identification of yaws and leprosy (fig 3). Cases of suspected yaws, leprosy or other severe skin lesions were given a referral (fig 4) to visit the local PHC center for follow-up or additional care. This referral was recorded in a ‘follow-up’ book (fig 5) which, after MDA, was kept at the local PHC center in order to complete follow-up with referred community members. If referred community members did not appear at the PHC center, health workers were instructed to visit the communities to find the patients for follow-up. See figure B6 (left side) for a flowchart of the protocol followed by MDA teams.

Integrated Surveillance:

Prior to campaign launch, 17 villages were randomly selected as survey villages where active surveillance would take place alongside the MDA. In these villages, 1462 individuals (1 year of age and above) were recruited to participate in the survey which included completing a consent form, household questionnaire, collection of dried blood spots for serosurveillance, and stool samples for testing for ascariasis, trichuriasis, and hookworm. All participants recruited for the survey also received MDA and, if self-referred with a skin lesion, a skin exam by a public health nurse. See figure B6 (right side) for a flowchart of the survey team protocols. Stool samples were tested for STH via the flotation method and microscopy. Dried blood spots were collected and stored for later analysis against a set of targets of interest to the MoH including: NTDs, malaria, vaccine-preventable diseases, enterics, and flaviviruses. The analysis of the samples was not part of this project.

All protocols were reviewed and granted ethics approval by the Vanuatu Ministry of Health and the University of New South Wales, Australia. Participants were asked to complete a consent form prior to activities.

Evaluation of Feasibility and Acceptability of integrated approaches:

The survey was created in May 2022, 6 months after the integrated campaign, in an online platform (SurveyMonkey) and was kept open for 40 days. The survey was disseminated online, with the help of the MoH and WHO staff who shared it in multiple social media platforms heavily used by the MoH NTD team in the country, such as an NTD Facebook Messenger group, NTD Facebook groups and email. Those who participated in the campaign and had no access to technology or internet were encouraged to visit the local health center where they could participate in the survey through available tablets with guidance from trained MoH staff. This evaluation targeted groups who were part of the implementation of the integration campaign, including MDA supervisors, nurses (MDA team leader and survey team
leader), village health workers, lab officers, microscopists, and community health volunteers. The goal of the survey was to 1) analyze the feasibility of the integrated MDA campaign 2) determine the quality of the training provided on skin diseases prior to the integrated campaign 3) learn about vaccine and MDA hesitancy in the province to inform planning for the next round of MDA.

There were several limitations to the study including a few related to the impact of the COVID-19 pandemic. Vanuatu suffered its first outbreak starting in March 2022 which severely disrupted the health system pulling almost all health personnel to the COVID response and limiting travel through national lockdowns. As a result, health workers in Tafea were not able to travel to the communities to follow up on referred patients during the time frame of this study, as originally planned. Recall bias is also a limitation, as the survey was conducted 6 months after the implementation of the integrated campaign and during the COVID response when most professionals were redirected to COVID teams. The feasibility study which had been designed to include in-person data collection through one-on-one interviews and focus groups had to be re-designed to collect data via an online survey tool only. A knock-on effect of this change was the limitation related to access to technology and internet connectivity and computer literacy. To address this limitation, Provincial NTD Officers were trained to administer the survey to those with limited computer literacy and respondents without access to technology were encouraged to go to their local health center where tablets were available to fill out the survey.

Results

Of a total population of 36,799 people, 26,895 people participated and were treated in the MDA campaign yielding an overall coverage of 73%; the WHO and country target were 80%. As part of the registration process, 7,212 people self-reported suspected yaws, leprosy or other severe skin disease and were referred to and examined by a nurse. Upon examination by a nurse, 342 people were clinically confirmed as having a severe skin disease and received a referral form to visit a primary health care center for follow-up care. During this process, 164 suspected cases of yaws were identified with 12 confirmed with the DPP assay. As part of the monitoring and evaluation activities, 243 DBS were collected out of a target of 293 (83% of target). However, only 149 out of a target of 731 stool samples were collected (20% of target) demonstrating a higher resistance from the community to providing stool samples. Despite the low number of samples collected, STH prevalence was determined to be quite high in the communities: 46.9% for ascariasis; 43.4% for trichuriasis; and 25.2% for hookworm.

Feasibility survey results

The field team in Vanuatu was composed of 84 health workers and volunteers. Thirty-one (36.90%) of those participated in the feasibility survey. When asked if they agreed with the statement that conducting skin exams in the community and referring cases of severe diseases to the health centers for care is a valuable health service for the community, 100% of respondents either agreed (50%) or strongly agreed (50%). Furthermore, 66.7% of respondents strongly agreed and 33.3% agreed that integrating skin exams and referral with the MDA campaign is a valuable health service to the community. Participants commented that it is valuable as it allows "to identify an early outbreak and treat immediately", "Treatment on the spot", "Improve community lifestyle, prevent further
complications and restore confidence between nurses and community”, “Save lives and prevent community transmission”, “to reduce diseases”.

When analyzing the training provided to the health workers who were part of the integrated campaign:

- 55.6% of participants strongly agreed and 44.4% agreed that the training on skin diseases helped them understand when a community member should be referred to the health center for additional care for a skin lesion;
- 100% agreed that the MDA leaflet was helpful and that the job aids helped them determine if a nurse consultation was needed;
- 100% of participants said they felt very prepared to respond when community members report having skin diseases;
- However, when it comes to how prepared they felt to evaluate which community members should be referred to the health center for additional care or follow up, 55.6% felt very prepared, 22.2% felt somewhat prepared and 22.2% felt like they were not prepared. Those who did not feel prepared suggested that better time management for proper examination, follow up and referral was needed and that they needed assistance from a health worker;
- 55.56% of the participants felt very prepared to perform skin examinations, 33.3% felt somewhat prepared and 11.11% did not feel prepared. Comments on what could have helped them feel more prepared included: “good training in skin diseases”, “There is a need to advance knowledge through research on skin diseases”, “population coverage is too big, team members are limited and there is only 1 nurse in a team” and “training”.
- 86.9% of the participants felt somewhat prepared to act as per their role during the campaign, while 8.7% felt very prepared and 4.4% did not feel prepared. One respondent felt prepared but indicated that “There are too many things to do, and I cannot get a hold of everyone”. When asked what would help them feel more prepared to act as per their role, many participants answered “training”.

We also asked questions regarding the feasibility and community concern of the dry blood and stool collection that happened during the MDA campaign. It was reported that 60% of the professionals in charge of the stool collection found it difficult, while 20% found it very difficult. Furthermore, 80% of respondents believed community members were concerned about providing stool samples. Comments received from the professionals in charge of the stool sample collection include “Due to cultural barriers, people were ashamed to provide stool samples and to not have the urge to pass stool in the morning” as well as “The community was not comfortable with exposing stool samples in public”. All together, these results may provide some explanation for why the survey teams fell far short of their stool sample collection target. Respondents indicated that the collection of DBS was easier and more acceptable in the communities as 40% found DBS very easy to collect, 20% found it easy, 40% found it difficult, and none found it was very difficult. Furthermore, only 40% of respondents noted that they believed there was concern in the community for providing a blood sample for DBS collection.

All of the results of the feasibility survey are included in Appendix B.
Promising Practices
Upon completion of the integrated MDA campaign with skin exams, referral to primary health care system and serosurveillance activities; as well as reflecting on lessons learned and feedback received from participants in the feasibility survey, three promising practices were developed and should be pursued in future health campaigns and integration research.

1. Provide health workers and nurses practical and in-depth training on conducting screening and exams for skin diseases, like yaws and leprosy, that require follow up in the healthcare system to allow for effective integration into MDA campaigns.
2. Expand the reach of M&E activities for MDA by integrating sample collection (i.e. DBS and/or stool) for serosurveillance to gather data on disease targets of interest to the MoH including and beyond NTDs, after assessing and preparing for acceptability of sample collection in the population.
3. Incorporate participatory and peer-to-peer approaches to learning into health worker training to enable dialogue between NTD/MDA programs and clinics, ground the training in health worker experience, and highlight key needs of clinics

Lessons Learned

Lack of skin specialists in Vanuatu: One of the key, novel aspects of the PINE project was to connect the MDA campaigns with the primary health care system. During the Tafea MDA, nurses performed skin examinations and referred all community members with severe skin disease, yaws, or leprosy to the local primary health care center. However, there are no dermatologists or dermatology clinics in Vanuatu. Therefore, health care workers at the health centers were trained to diagnose and treat skin diseases in preparation for receiving the referred patients. However, a post-training evaluation found the training to be ineffective. In addition, more preparation was needed to ensure that health workers were available at the health centers to see the referred patients. In particular, a pediatrician from the capital was meant to come to the provincial hospital to help with the referred scabies cases. The pediatrician was unable to travel, and the project team received reports of patients being turned away as the hospital was not able to attend to the referred patients. For example, one respondent to the feasibility survey reported “The Dr responsible was not present at the hospital to consult our referred patients”. In an effort to mitigate this risk during the next MDAs, the integrated skin disease training for health workers was re-imagined. Traditional, passive, information-transfer style training was replaced by a new participatory, scenario-based modules which were developed using a peer-to-peer approach leveraging the experiences of the health workers. The theory that underpinned the development of this learning approach is the Freirean Model. Its participatory and bottoms-up process has been successfully implemented in several health education interventions, especially across Latin America.\textsuperscript{11,12} The technical content was retrieved from WHO guidelines and adapted to the local context.\textsuperscript{13,14} The new training was piloted in June 2021 with health workers from Tafea. A detailed account of the training and evaluation is included as Appendix A.

Over-referral of skin diseases during campaign: A contributing factor to the above-described issue was the over-referral for skin diseases for follow-up at the PHC during the campaign. The skin exams were
meant to identify yaws and leprosy; two skin diseases that require follow-up to properly manage. All other skin lesions, including cases of scabies, should not have been referred as community members would have received the MDA treatments and, in the case of active scabies, permethrin cream, during the campaign. These interventions should alleviate cases of scabies and, therefore, additional care at the health center should not be required. However, during the Tafea MDA, over 300 cases of skin diseases were referred to the PHC system, most of which were cases of scabies that did not require a referral. The over-referral of cases contributed to the health centers’ inability to attend to all cases. As a result of this finding, the project has narrowed down the job aide for self-reporting skin diseases to just yaws and leprosy lesions. This change eliminated the question that asks community members to self-report any ‘severe skin disease’, a term which is too vague and non-specific to be an effective triage question. Nurses conducting skin exams will then only be asked to report cases of clinically confirmed yaws and leprosy lesions, again, decreasing the probability that scabies cases, which should not be referred, will be reported. In addition, a new scenario-based training module will be developed specifically for the public health nurses performing skin exams.

**Spill-over Effect of Vaccine Hesitancy:** The COVID-19 vaccine campaigns around the world have raised awareness about vaccine hesitancy. In Vanuatu, there was a concern that high levels of vaccine hesitancy in Tafea could cause a spill-over effect to the MDA campaign and other health programs. To investigate this possible spill-over effect, the feasibility survey, which was conducted 6 months after the integration campaign, had questions related to COVID-19 vaccine hesitancy, MDA hesitancy, and health professionals had a chance to comment on how they think one impacted the other. 40% of participants did not know the level of COVID-19 vaccine hesitancy in their province, however, 40% believed it was very high (20%) or high (20%). When asked about the impact that the vaccine hesitancy had in the acceptability of the MDA intervention, majority (46.67%) believed it had a major negative impact on MDA acceptability. The level of MDA hesitancy in the province was indicated to be very high, high, or moderate (26.67%, 26.67% and 20%, respectively). While the COVID-19 vaccine campaign happened a month prior to the MDA, some professionals suggested that having the MDA during/close to the COVID-19 campaign has caused the public some level of confusion, where the public believed that MDA was a way to deliver the COVID-19 vaccine. Working on MDA awareness and the differentiation from MDA to vaccines is essential to get a higher MDA coverage in the next round.

**Implications for Policy, Practice and Future Research**

This study showed that Integrating PHC activities such as screening for skin diseases or other routine health care into MDA campaigns is feasible and can extend the reach of PHC system into hard-to-reach communities. Feedback from the integrated skin disease training highlighted skin diseases as a high priority concern for health workers and their communities and the feasibility study showed that adding skin screening to the MDA campaigns was highly valued by local health workers. However, more research is needed to understand capacity-building needs (i.e., training) and resources (i.e., skin specialists, medicines to treat skin diseases, etc.) on the PHC side to ensure positive outcomes for integrating PHC activities into MDA campaigns. In other words, just adding routine health care activities into campaigns is not enough if the local health care workers and facilities are not equipped or prepared to follow up with the additional medical care that is needed. Therefore, it is critical that the capacity of
the local health facilities is assessed, gaps addressed, and proper training is implemented as complimentary activities to the integrated campaign.

Integrating the collection of dried blood spots for multi-disease serosurveillance is feasible based on teams nearly reaching their targets and teams not experiencing a high level of hesitancy or resistance to providing samples. The community did not present a high level of hesitancy and was willing to provide samples. However, more research is needed to increase the acceptability by community members of providing stool samples.

Social media has been gaining force in the public health sector, and while it can be used for awareness-raising campaigns, it has also been used to spread misinformation, especially during the COVID-19 pandemic. These platforms might have created a space for rumors and misinformation about any national and international campaigns to circulate, including MDA interventions. Therefore, MDA campaigns may need to incorporate a social media monitoring strategy to address circulating rumors and misinformation that could affect MDA acceptability. Providing accurate and understandable information to the population has the power to break the misinformation cycle, stopping the spread of rumors and rapidly reaching a large number of people. More research is needed on strategies to prevent and diminish hesitancy; and to adapt new communication and awareness strategies in MDA campaigns.
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The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.
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References


Appendix A

Figure A1: Map of Vanuatu focusing on Tafea Province, our study site. Yaws, soil-transmitted helminths, and scabies are endemic and the focus of the project.
**REGISTA TABLE**

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**Figure A2:** Job aides for skin screening at registration table. English version is available.
Figure A3: Job aides for nurses - skin exam. English version is available.
Appendix B

Form 6

Confirm Yaws APPOINMEN FORM

Appoinmen Deit: _____________________________ Taem: 8.00 - 12.00 / 1.00 - 4.00

Helt Fasiliti Nem:

Yaws Pesien Kod: Patient Nem:

Ofisa Nem: Saen:

Figure B4: Example of a patient referral form for yaws cases. Leprosy form is also available.

Figure B5: Follow-up book for recording severe skin disease cases requiring follow-up by the health system.

Tafea Integrated MDA Protocol

MDA w/ AZI, IVM and ALB for yaws, scabies and STH (ALB only for 2-19y age)
Active Surveillance: baseline prevalence survey for scabies and STH w/DBS for additional serology

MDA only

Survey & MDA

Assembly at central location

MDA

Serology (NTDs, VPDs, malaria, enterics, Tiavis)

Fingerpick >1

Skin exam >1 y

Stool >1 y

MDA

PCR

Flection

No

Question to self-report yaws/leprosy lesions

Suspected leprosy

Suspected yaws lesion:

swab

Refer to health facility

Fingerpick >1

Skin exam >1 y

Stool >1 y

MDA

Survey & MDA

Tafea Integrated MDA Protocol

MDA w/ AZI, IVM and ALB for yaws, scabies and STH (ALB only for 2-19y age)
Active Surveillance: baseline prevalence survey for scabies and STH w/DBS for additional serology

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