FETPNG

FIELD EPIDEMIOLOGY TRAINING PROGRAMME – PAPUA NEW GUINEA

Advanced Field Epidemiology Training Program of Papua New Guinea – Final Report

Accelerating the development of evidence based policy and practice (ADEPPt) in Papua New Guinea

Field Epidemiology IN ACTION

Papua New Guinea
National Department of Health

Australian Government

INDO-PACIFIC CENTRE FOR HEALTH SECURITY

Contents

Acknowledgments

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Photo: Advanced Field Epidemiology Cohort at Graduation Day and Intensive Workshop 3, September 2022.

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

NSW GOVERNMENT Health Hunter New England Local Health District

Executive Summary

The Accelerating the Development of Evidence Based Policy and Practice (ADEPPt) project in Papua New Guinea seeks to strengthen health systems in Papua New Guinea using innovative approaches to address local problems while undertaking operational research to assess their utility.

An initial workshop conducted in 2019 identified national priority areas and key focus areas for operational research, which was then undertaken by fellows completing the Advanced Field Epidemiology Training Program in Papua New Guinea (aFETPNG) between 2019 and 2022. Operational research is defined as the search for knowledge on interventions, strategies or tools that can enhance the quality, coverage, effectiveness or performance of the health system or program. The generation of high quality, policy-relevant knowledge is a necessary first step in enabling evidence-informed decision making to strengthen health systems in Papua New Guinea.

Through stakeholder engagement utilizing a ranking exercise and key informant interviews, four national key priority areas (KPAs) were identified: vaccine preventable diseases and immunization, health systems strengthening, maternal and reproductive health and communicable disease control. When the COVID-19 pandemic emerged in 2020, fellows were immersed in the public health emergency response in Papua New Guinea, with many fulfilling leadership roles. Four fellows opted to change their projects to focus on COVID-19 due to the need for operational research in this area in their location.

This report summarises the aFETPNG fellows' journey through aFETPNG program including their accomplishments in three intensive two week workshops and operational research projects in the field. Throughout the program, fellows demonstrated specified learning outcomes and skills across ten competency domains as assessed by faculty and mentors. Graduating fellows completed five outputs with support from mentors in Papua New Guinea and Australia: outbreak investigation, surveillance system evaluation, operational research (epidemiological study) report and presentation, public health intervention and presentation, and a policy brief based on findings and recommendations from their projects.

Advanced Field Epidemiology Training Competency Domains:

Surveillance	Outbreak Investigation
Operational Research	Public Health Intervention
Data analysis and Data Management	Leadership and Project Management
Communication	Evidence Based Practice
Epidemiological Concepts	Public Health Policy

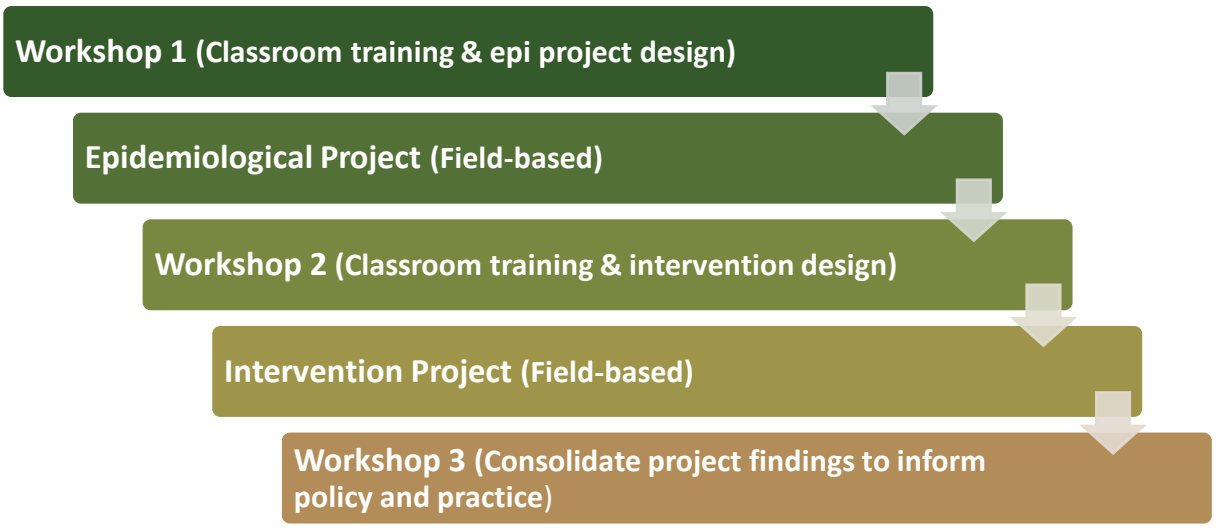
ADDEPt Vision

The Field Epidemiology Training Program of Papua New Guinea (FETPNG) commenced in April 2013. The 9-month intermediate field epidemiology training program (FETP) sought to build field epidemiology capacity in Papua New Guinea (PNG), particularly at the provincial and district levels. The unique, intervention-based FETP model led to a number of tangible public health improvements in PNG (Ropa, 2019). A total of 96 fellows graduated from FETPNG from 2013–2018 (including 2 from Solomon Islands). While the short-term outcomes of FETPNG have been impressive, key stakeholder discussions undertaken in 2016 as part of the 5-year review identified a need to further consolidate the skills of graduates and to scale up successful interventions to maximise their impact.

A subsequent project was designed with key stakeholders to re-engage FETPNG graduates to Accelerate the Development of Evidence based Policy and Practice (ADEPPt) in PNG. The ADEPPt Project aimed to deliver co-produced research focused on locally-identified strategic health security priorities. The Project brought together national level policymakers and experienced frontline public health practitioners in a structured research partnership, guided by expert mentors. The ADEPPt Project consisted of four phases:

1. Priority setting (completed in 2018)
2. Capacity building and training (completed in 2022)
3. The design and implementation of operational research projects (completed in 2022)
4. Evaluation (Post-workshop evaluations conducted, impact evaluation scheduled for 2023

The Advanced Field Epidemiology Training Program of Papua New Guinea (aFETPNG) formed the key capacity building and training mechanism of the ADEPPt Project. This longer term program was designed to further build the capacity of FETPNG graduates. The program comprised of 5 phases incorporating training in advanced epidemiological concepts, as well as the design and implementation of field-based research projects in key priority areas.



Prioritisation Exercise and Findings

A prioritisation exercise was conducted in 2018 to identify national priority areas and key focus areas for operational research in PNG. Through stakeholder engagement utilising a ranking exercise and key informant interviews, four national key priority areas (KPAs) were identified: vaccine preventable diseases and immunisation, health systems strengthening, maternal and reproductive health, and communicable disease control (with a focus on tuberculosis).

Each priority was workshopped with stakeholders to generate key operational research areas that have the potential to improve current health systems, contribute to policy and practice, have potential for impact and will contribute to evidence-informed decision making.[1] When the COVID-19 pandemic emerged in 2020, fellows were immersed in the public health emergency response in Papua New Guinea, with many fulfilling leadership roles. Some fellows opted to change their projects to focus on COVID-19 due to the need for operational research in this new key priority area in their location.

The key priority areas, and subsequent key operational research areas, were used to inform and develop the field-based projects undertaken by fellows throughout their aFETPNG training. Unlike FETPNG, which focusses on individual priority setting and operational research projects, the aFETPNG program required fellows to work together in teams to develop a body of evidence around one of the key priority areas identified.

> *'Doing health system strengthening [is my choice], if you do that then it will cover all the areas, even including my program, HIV or TB or malaria or communicable disease, that covers everything, so … even disability will benefit from health system strengthening that's why I choose it.'*
>
> *'Research is the key part that we can [explore or find out] and then give the right form of advice to the policymakers. This is the idea that we found out, that this can be done to address this or … it is a form of research that … we will greatly improve the policymakers, especially the decision making… Because you just fund money to do a TB program and you don't know what key areas to [to target], the impact areas - you just do things, then you cannot [do it successfully] – achieve the goal of [decreasing] the burden of TB. So … I think research plays a very important part in – giving the right form of information to decision makers to address the problem.'*

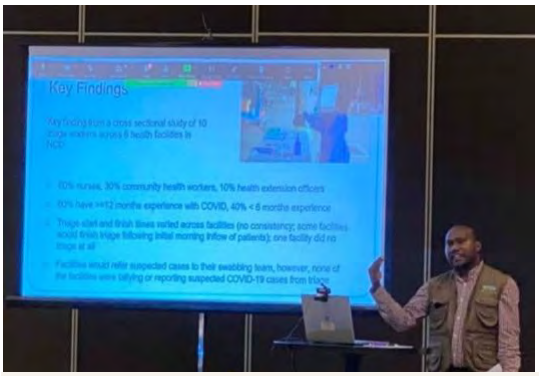
[1] *You can read more about the prioritisation exercise and findings here.*

COVID-19 Reflections

Thirty advanced fellows were initially recruited into the program and attended the first workshop. Unfortunately, 13 (43%) fellows dropped-out during 2020-2021 to other work commitments, especially the COVID-19 response. The 17 fellows that completed the program currently work in 13 of PNGs 22 provinces (59%). They represent all levels of the governments public health workforce, with fellows working at district (n=7), provincial (n=9) and national levels (n=1). The substantive roles of fellows included Surveillance Officers, Health Extension Officers, District Health Managers, Disease Program Managers, Provincial Disease Control Officers, the FETP Program Convenor and a Provincial Deputy Director of Public Health.

When the COVID-19 pandemic emerged in early 2020, fellows and faculty were requested to support the emergency outbreak response in PNG and Australia. Workshops 2 and 3 were postponed in 2020 given that travel into and within PNG was restricted and fellows were heavily involved in suppressing COVID-19 in their provinces. As for most FETPs globally, the pandemic provided a chance for fellows to apply skills they had learned from FETPNG and to boost the profile of the program on a national level. Aside from fellows leading outbreaks, trainings of other responders, surveillance reports, data presentations and key operational research projects, high profile leaders such as the PNG prime minister mentioned FETP graduates' efforts on the front line.

A survey was conducted with 15 (88%) aFETPNG fellows in 2022 to summarise fellows' contribution to the pandemic response. All 15 (100%) were involved in the COVID-19 response in PNG. When asked about their involvement in COVID-19 throughout 2021, just over half (53%, n=8) reported working full time on the response. Of those not in a full-time role, 13% (n=2) worked on the response 3-4 days/week and 33% (n=5) 1-2 days per week. The most common COVID-19 response roles undertaken included leading surveillance activities, providing advice to stakeholders, leading RRTs, contract tracing, and conducting training. The majority (80%, n=12) of fellows received specific training to support them in their COVID-19 response roles. Almost all (93%, n=14) fellows were involved in training others in support of the COVID-19 response.[2]



Photo's: aFETPNG graduate Israel Naruman presents on his operational research assessing respiratory triage processes in 6 health facilities across National Capital district.

[2] *You can read more about fellows' role in the COVID-19 response and fellows' reflections on their experience with COVID-19 in our blogs here.*

Advanced FETPNG Intensive Workshops

Workshop 1

The first workshop of the aFETPNG was held at Dream Inn, Port Moresby from 14 – 25 October 2019. A primary focus of workshop 1 was on introducing the health priority teams and operational research projects. Most of the schedule was still dedicated however to core content concerning foundational principles of epidemiology and outbreak response. During this workshop fellows worked in their thematic groups to review the research questions proposed during the prioritization exercise. Fellows worked together to select a research question that they could feasibly address in the context in which they work. Program managers from the NDoH were invited to join the thematic groups during the selection of the research question, to provide insight into where the evidence gaps were for policy and programmatic decision making. *You can read the full workshop 1 report here.*

Workshop 2

Due to fellows and faculty being seconded to the COVID-19 pandemic response in 2020, workshop 2 was postponed. In 2021, fellows and faculty re-engaged via Zoom sessions to complete 6 training sessions (including outbreak response, surveillance system evaluation and public health interventions). Fellows also formally presented their operational research field projects to the cohort and faculty and received feedback. The second face-to-face workshop was held at Dixie's Bungalows, Port Moresby from 14-25 March 2022. Fellows were required to design their public health intervention project based on findings from their operational research field project and write and an ethics proposal for the intervention. Four fellows were selected to present their intervention project proposal to stakeholders representing WHO, NDOH, and DFAT on the last day of the workshop. *You can read the full workshop 2 report here.*

Workshop 3

The final face-to-face workshop took place at the Koitaki Country Club, Sogeri from 19-30 October 2022. All fellows were required to present their intervention project findings as well as develop a policy brief. FETPNG partnered with the Vital Strategies Data2Policy program to provide a week of intensive policy training, consisting of seven modules. Fellows applied exercises from each module to the findings of their operational research and intervention projects to contribute to a final, concise policy brief summarising the policy options they had considered and their recommendations for public health action. Most fellows recommended the intervention that they had trialled in the field as a feasible and cost effective policy option. Four fellows were selected to present their intervention results and recommendations at the graduation ceremony on the last day of the workshop. Representatives from WHO, the NDoH and DFAT attended the graduation with keynote speeches from Mr Barry Ropa (FETPNG director) and Dr Sibauk Bieb (NDoH Executive Health Manager of Public Health). *The recording from graduation can be viewed here.*

Fellows' Projects and Outputs

All fellows were actively involved in outbreak response, surveillance, and operational research during the program. In order to graduate, fellows were required to submit written reports and conduct an oral presentation of their findings to a public health audience. The fellows' profiles, including key priority area and project titles are in Appendix 2.

Outbreak investigation

Fellows completed multiple full-day outbreak scenario exercises during workshops, and were required to investigate a disease outbreak in the field and write a detailed report. Diseases investigated included pertussis, COVID-19, methanol poisoning, influenza-like illness, waterborne illness and yaws. Some fellows submitted more than one detailed report – one fellow (Bob Bomai) even submitted three comprehensive outbreak reports. Collectively the cohort investigated 55 outbreaks, with 42 of these in lead roles. Fellows reflected that outbreak reports and situation reports were important not only for documentation but to highlight lessons learned and public health recommendations.

Photo: Stanley Masi investigated a dysentery outbreak in a remote village

Surveillance system evaluation

Fellows were required to evaluate a surveillance system according to at least three key attributes, to engage stakeholders regarding barriers and potential solutions to improve surveillance processes, and to write a detailed report. Systems evaluated included syndromic or indicator based (including COVID-19, HIV, TB and AEFI).

Given the issues identified in many fellows' reports, a structured full-day reflection on infectious disease surveillance in PNG was conducted during workshop 3. Fellows represented all levels within PNG's public health system, from health centres to district, provincial and national health departments. Their collective experience as data providers and users was substantial. The Fellows divided into three groups focusing on event based surveillance, syndromic surveillance and indicator based surveillance. Drawing on prior training on surveillance, the experience conducting surveillance evaluation as part of aFETPNG, Fellows contributed to a meaningful critique and discussion of the current state of surveillance in PNG.

The Fellows first described the objectives and data flow of the surveillance system. From their experience, they identified what was working well and not working well. Using sticky notes and flip charts, each groups captured key points and then rotated to the other two surveillance stations to contribute their input into each of the surveillance systems. The fellows then prioritized the final list of challenges and identified the top ones impacting the ability of the system to meet its objectives. Once the key surveillance challenges were identified, the groups conducted a root cause analysis to progressively unpack the reasons contributing to the specific challenges. For the final phase of the surveillance system reflection, the groups worked together to identify practical solutions for their key challenges. Each group presented their finding to the larger group for discussion.

The surveillance system reflection facilitated a valuable and energetic discussion between Fellows and Faculty. The reflection promoted critical thinking about the performance of surveillance systems in relation to their objectives and complemented the individual surveillance evaluation reports. Assumptions were challenged and hard questions asked. It was acknowledged that this was the start of the conversation, more time is needed to analyse and evaluate in more detail the key challenged and identify solutions with a broader cross section of users and decision makers. A summary of the feedback from the teams is shown in Appendix 4.

Photo: Fellows together reflected on the major surveillance systems in PNG at workshop 3, discussing in detail findings from their individual surveillance evaluation projects

Operational research (field project)

Operational research is defined as the search for knowledge on interventions, strategies or tools that can enhance the quality, coverage, effectiveness or performance of the health system or program. The generation of high quality, policy relevant knowledge is a necessary first step in enabling evidence-informed decision making to strengthen health systems in PNG. As described earlier, fellows worked within five key priority areas to address operational research questions identified during the ADEPPt prioritisation exercise.

Most fellows used a mixed methods approach for their operational research project, conducting cross sectional surveys to quantify potential contributors to their nominated public health problem as well as obtain nuanced insights through qualitative analysis of survey responses. Fellows' operational research project were conducted between November 2019-September 2021. Fellows formally presented their findings to a public health audience (aFETPNG cohort, faculty and invited National Department of Health Program managers) in September 2021 and submitted a written report.

Public health intervention (including research ethics proposal)

The intervention project is unique to FETPNG, with few FETPs moving beyond description of the public health issue to implementing and evaluating public health recommendations. The aFETPNG cohort designed intervention projects based on the findings from their operational research projects with careful consideration of study design and ethical considerations. All fellows obtained ethics approval for their projects through the Medical Research Advisory Committee.

Fellows formally presented their findings to a public health audience (aFETPNG cohort, faculty and invited National Department of Health Program managers).

Photo: John Landime conducts infection, prevention and control training for healthcare workers in one of four respiratory clinics established as part of his intervention project

Policy brief

The FETPNG team partnered with Vital Strategies Data2Health program experts Dr Gilbert Hialwyer, Dr Nidhi Chaudhary and Dr Tay Za Kyi Win to dedicate a week of workshop 3 to intensive training on policy and development of a policy brief based on their operational research and intervention project findings. Fellows submitted concise and impactful policy briefs that summarised the public health problem, root causes, analysis of policy options and key recommendations including an action plan for next steps for advocacy of their public health recommendation.

The policy recommendations were included in their final presentation.

Photo: Dr Mary Kaevakore receiving the best policy brief prize from FETPNG Director Barry Ropa on graduation day for her analysis of policy options to improve COVID-19 case investigation, including her new COVID-app piloted in National Capital District.

All fellows have been encouraged to draft at least one conference abstract and article for publication based on the above outputs. Mentors continue to support fellows with drafts and all are expected to submit an abstract to the 2023 Regional South Asia Field Epidemiology and Technology Network (SAFETYNET) conference.

Additional Activities and Operational Research

Fellows and faculty collaborated with WHO, NDoH and National Control Centre (NCC) on priority operational research projects to support evidence-based decision making during the national COVID-19 response. These research activities were developed, implemented, and presented widely by aFETPNG fellows, providing additional valuable learning experiences and opportunities. They highlighted the importance of rapid operational research during public health emergencies.

Healthcare worker survey: Barriers and enablers to COVID–19 swabbing in PNG

In October 2020, on request of the surveillance lead at the NCC (an FETPNG graduate and faculty member), FETPNG led the development and implementation of a health care workers survey to explore barriers and enablers experienced in collecting specimens for COVID-19. This was a collaboration between the NDoH, NCC, St Johns Ambulance, and the WHO. The findings contributed to the National Control Centre's strategy for improving sample collection and testing for COVID-19.

The study was key to understanding low sample collection rates in PNG at the time. There was a push to provide incentives to health workers to swab for COVID-19, however, the study highlighted many important barriers to swabbing and testing for COVID-19 that incentives would not have solved.
The results of this survey continued to have impacts in 2021, with aFETPNG fellow, Bernnedine Smaghi, presenting the results widely at international forums including the virtual regional SAFETYNET conference, virtual COVID-19 session held by the Training Programs . The study was selected for a special issue of the International Journal of Infectious Diseases (published in September 2021) and PNG Field Epidemiology fellow (now FETPNG program convenor) Bernadine Smaghi was invited by TEPHINET to participate in a panel discussion on World Field Epidemiology Day in September 2021 to discuss the study.[3]

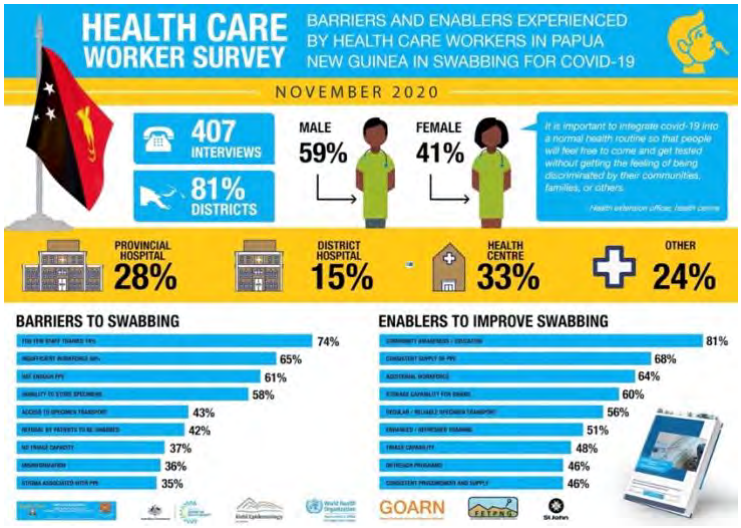


Image: Infographic summarising key findings from the healthcare worker swabbing study

[3] *You can read more about the Healthcare Worker Survey and read the reports here.*

COVID-19 vaccine hesitancy in healthcare workers and the community

Photo: Bernnie Smaghi (FETPNG convenor) leading the interview training of aFETPNG fellows

As the roll out of a COVID-19 vaccine was launched among essential workers in May 2021, there was an urgent need to investigate reasons for vaccine hesitancy in PNG, especially in light of the SARS-CoV-2 transmission occurring in PNG at the time, and anecdotal evidence of widespread vaccine hesitancy toward the COVID-19 vaccine fuled by social media. FETPNG collaborated with NDoH, WHO, St Johns Ambulance and UReport to conduct a survey among 957 essential workers and community members across all 22 provinces during April-May 2021. Aside from highlighting that safety of the vaccine was the predominant concern expressed among survey responders, the study also demonstrated that healthcare workers are the most trusted source of information for the PNG public.

The findings from this survey led to key recommendations to prioritise information, education and communication materials for healthcare workers and that educational resources should address vaccine safety and development concerns. The results were presented in a report that was circulated among PHAs and infographics summarising the results were disseminated on social media. The study findings were presented widely by Ms Martha Pogo, lead of the Expanded Immunisation Program and Bernnie Smaghi, FETPNG convenor including at four high profile international meetings.

The findings of this study were also presented by the Minister of Health in Papua New Guinea at a media briefing on communication associated with COVID-19 vaccination and at the Indo-Pacific Centre for Health Security's Partners Forum 8th September 2021. The presentations were received extremely well by health authorities in PNG and the pacific with commendations for the impact of the work.[4]

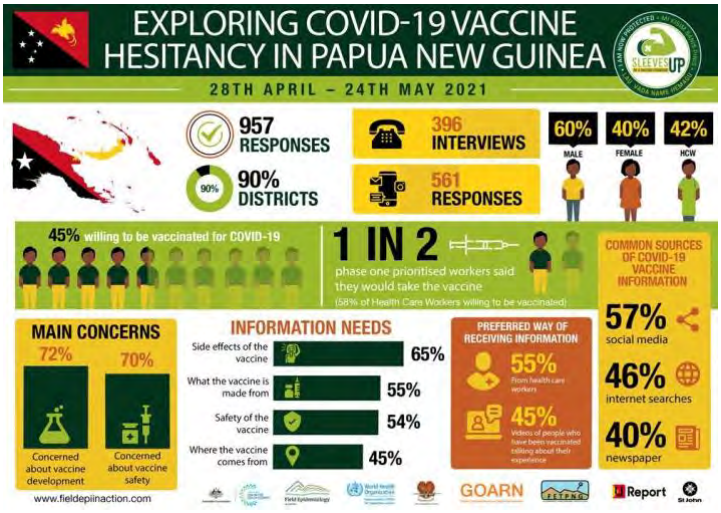


Image: Infographic summarising key findings from the FETPNG national vaccine hesitancy study in April/May 2021

[4] *You can read more about vaccine hesitancy and read the study reports here.*

COVID-19 surveillance evaluations in 11 PNG Provinces, October 2020–January 2021

The first cases of COVID-19 were reported in PNG in March 2020. By September 2020, 200 cases had been reported in half of the 22 provinces. Eleven advanced Field Epidemiology Training Program fellows used a standardised questionnaire to describe the COVID-19 surveillance system, conduct structured interviews, and document a COVID-19 data review for their province. In brief, this exercise provided valuable recommendations to improve case definition application, testing and reporting procedures at the provincial level in PNG. A report was compiled and circulated among provincial health authorities, and an infographic generated to highlight the key findings.[5]

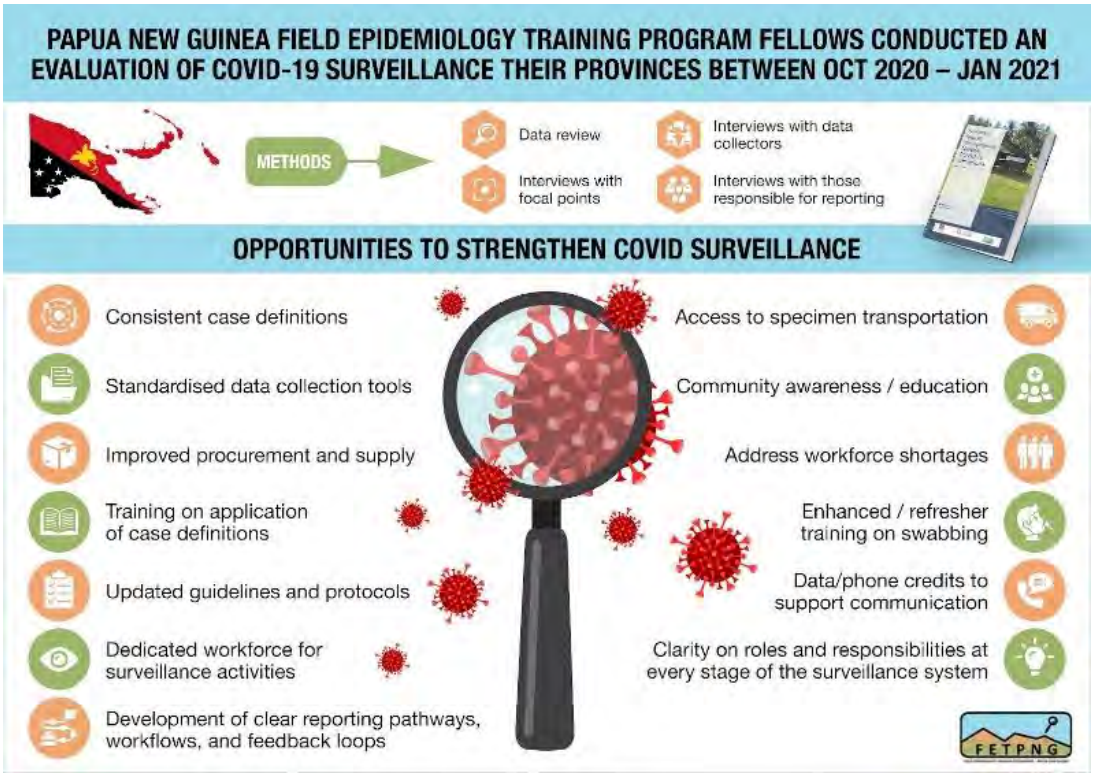


Image: Infographic summarising key findings from COVID-19 surveillance evaluations conducted by 11 aFETPNG fellows in December 2020-January 2021

[5] *You can read the November 2020 COVID-19 surveillance evaluation findings here.*

Emergency response preparedness: COVID-19 Intra action review

Given that aFETPNG fellows played a critical role in the COVID-19 emergency response in PNG, a COVID-19 review was conducted to better understand the scope of activities undertaken by FETP fellows, identify challenges experienced, and provide targeted recommendation to address root causes of issues within the emergency response.

A one-day review was held with advanced FETPNG fellows during the second intensive workshop. The World Health Organization's (WHO) COVID-19 intra-action review methodology was adapted to tailor discussions to FETP fellows with a focus on the following emergency response pillars:

- Risk communications and community engagement (Pillar 2)
- Surveillance, case investigation, laboratory (Pillar 3 & 5)
- Case management and Infection Prevention and Control (Pillar 6 & 7)
- Operational support and logistics (Pillar 8)

Facilitated discussions reviewed what went well and what did not go well during the COVID-19 response. A root cause analysis was conducted to explore why something did or did not go well using the principle of "5 why's". Findings from the root cause analysis were used to develop specific recommendations for action. The specific role of fellows in the response was explored, as well as how prepared fellows felt and how FETP training could be improved to better prepare them for future public health emergencies.

Photo: Fellows prioritised issues within WHO emergency response pillar themes and brainstormed challenges, root causes and targeted recommendations to report back to the National Control Centre.

A report summarising the priority emergency problems, root causes and proposed recommendations that were workshopped by fellows during the intra-action review was shared with the National Department of Health, and submitted for peer review publication.[6]

[6] *You can read the COVID-19 intra-action review findings here.*

Development of resources: Risk communication and community engagement

Risk communication and community engagement are critical skills used on a daily basis by health workers in PNG; without these it is impossible to improve public health outcomes in PNG. The aFETPNG program emphasized training and reflection throughout workshops and field work. Fellows often reported the importance of targeted, effective communication and community engagement, with anecdotes of encountering dangerous situations when entering a community (for example to respond to an outbreak, deliver routine vaccinations or conduct operational research). These dangerous situations often related to distrust and misinformation in the community, and beliefs that disease in the community was due to sorcery. FETPNG were fortunate to host William Kapiongi from the PNG National Research Institute as a guest facilitator at the final workshop. William is an expert in sorcery accusation related violence (SARV) in PNG, and led a session with fellows where he provided an overview of the issue and communication strategies that he and other experts have developed based on their research experience.

SARV in a community is typically triggered by death or sickness (about 87% of the time) and there have been over 1000 known cases in PNG – this is likely an underestimate of the number of people that are accused as often several people are accused following an event. The impacts are especially greatest on women, who are usually accused, and 30% of violent incident cases affect children. A review of the issue and experiences of SARV in PNG has demonstrated that healthcare workers are key influencers in the community and are almost always involved since accusations are related to medical conditions or deaths. Two strategies that may help to diffuse tension when presented with conflict due to sorcery beliefs include doubt based advocacy, where the healthcare worker does not argue but presents other explanations to try to balance the belief or to make the sorcery explanation less attractive (such as by talking about the law and consequences if someone is accused of sorcery).

Fellows greatly appreciated the session and opportunity to learn more about the issue and potential communication strategies. Many fellows shared their confronting experiences with SARV, and moments when a healthcare worker was indeed a key influencer to redirect tensions in the community. Fellows requested resources to help them train others about SARV and to apply communication strategies when presented with situations relating to sorcery beliefs.

The FETPNG hopes to continue to work with William and his team to develop resources tailored for healthcare workers to support them with this difficult but unfortunately common experience in their public health work.[7]

Photo: Stanley Masi discussed risk communication and community engagement were important to gain community trust during his outbreak response in a remote village

[7] *You can read a report summarising the sorcery accusation related violence session with fellows here.*

Faculty Development

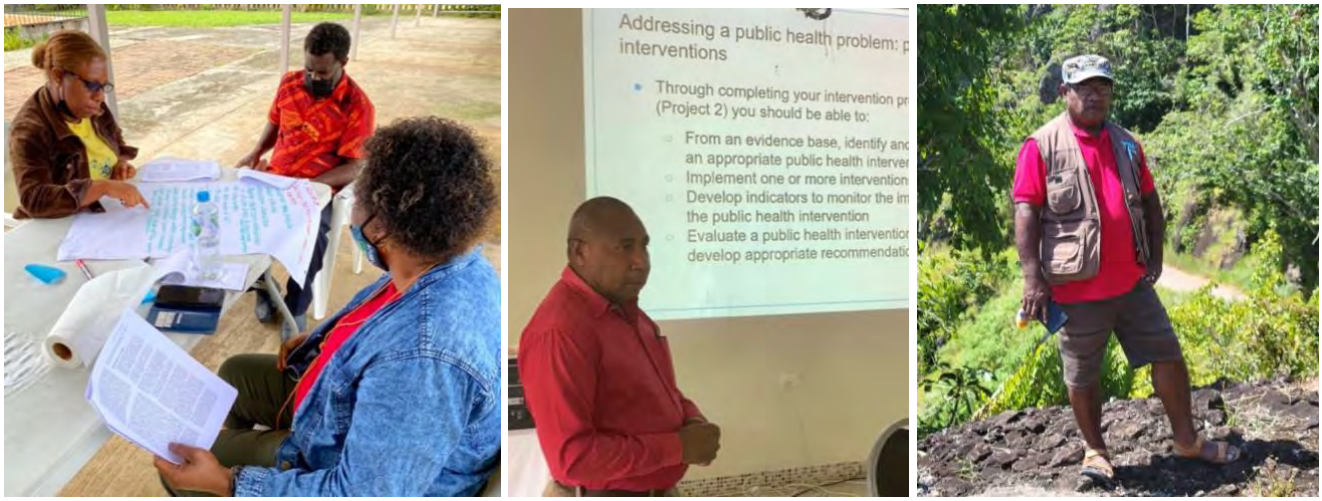
The aFETPNG provided an opportunity for senior FETPNG faculty to mentor fellows through their projects, co-develop training materials, and to facilitate at each of the intensive workshops.

As part of this critical sustainability objective for FETPNG, faculty also took part in numerous development opportunities. A summary of initiatives is provided below:

- Bethseba Peni: World Health Organization Infodemics Course.
- Dr Gilbert Hiawalyer and Bernnedine Smaghi: Thailand FETP Mentorship training.
- Dr Abel Yamba and Alois Pukienei: One Health introductory course at the human-environment-wildlife-livestock-(HEWILI) interface for the Pacific.
- 6 Faculty: Transformational Leadership Program (ten virtual sessions) run by the Krysalis Group.

Faculty have provided positive feedback from these training and development opportunities. Follow-up virtual sessions are planned where those attending professional development are asked to reflect on their learnings and share these with the wider faculty. Dr Gilbert delivered the first reflection session with a presentation to faculty in November reflecting on learnings from the Thailand FETP mentoring series.

Junior faculty were selected from the aFETPNG cohort to become facilitators and mentors for the intermediate FETPNG cohort of 2022. Faculty will continue to lead the frontline and intermediate field epidemiology training program, rapid response team training activities, and provide ongoing mentorship to new junior faculty.



Top left and middle photos: Bethseba Peni and Alois Pukienei were key senior faculty and mentors during the aFETPNG program. Bottom right of photo 1 and right photo: Bernnie Smaghi and Symphorian Sumun were selected as junior FETPNG faculty and are now lead facilitators for the intermediate and frontline FETPNG programs.

End of Program Evaluation

An evaluation was conducted at the end of each workshop which informed content and delivery of materials at subsequent virtual and in-person training. Generally, feedback from fellows was positive in terms of the workshop experience, relevance of content and improvement in knowledge and confidence in core epidemiological skills.

At the end of workshop 3, aFETPNG fellows were invited to provide feedback via two surveys. The first was designed to assess knowledge and skills gained during the program, and the second focused on the application of knowledge and skills in their workplace during their training period. A summary of the evaluation results is provided below.[8]

Feedback on aFETPNG training content

Over the course of aFETPNG there were 3 classroom based workshops, each two weeks in length. A number of field epidemiology competencies were covered during these workshops. When asked what content they required more time to cover, over half of the fellows mentioned data analysis, statistics and/or interpretation.

The fellows were asked if any content or activities were unhelpful and should be removed or delivered in a different way. Fellows indicated that all the content was relevant; there were no suggestions to remove content. There was one comment suggesting further contextualization of the content to the PNG setting.

Self-assessed confidence level for key field epidemiology competencies

Each fellow was asked to assess their confidence across a range of field epidemiology competencies. Fellows felt most confident about creating a linelists and investigating outbreaks and least confident analysing and interpreting data and writing abstracts.

Knowledge retention

To assess knowledge retention over the aFEPTNG program, a short pre-test was conducted at the start of workshop 1 and the same test re-administered as a post-test at the end of workshop 3. The test consisted of 13 questions covering key field epidemiology competencies. The pre and post-test results are shown in Table 2. The pre-test was completed by the original 30 fellows who started the program; The post-test was completed by 16/17 of those who completed the program. On average item pre and post-test scores increased from 69% to 81%.

[8] You can read the full evaluation results, including more quotes from fellows, here.

There was an increase in the mean scores for 11 of the 13 questions in the test, and no change for the remaining 2 questions. The pre post-tests highlight several areas requiring more work to enable proficiency, especially around analysis and interpretation of data, as indicated by the low scores for calculating relative risks and interpreting 95% confidence intervals.

Table 2. Mean scores for each of the questions in the pre and post-test administered to aFETPNG fellows at the start of workshop 1 (n=30) and end of workshop 3 (n=16)

No.	Question	Max score	Mean Score - pre-test (N=30)	Mean Score - post-test (n=16)	% change
1	List the three questions to always ask in epidemiology. A: Who (person), where (place), when (time).	3	2.5	3.0	20.0%
2	Select the options that are NOT attributes of a surveillance system.	8	6.3	6.7	6.2%
3	Draw an epidemic curve of a point source outbreak and to label the axes appropriately.	4	2.1	3.2	51.8%
4	Mark 3 statements as True or False: ▪ For an outbreak, you should develop your own case definition ▪ You should never change a case definition during an outbreak ▪ You should frequently change a surveillance case definition	3	1.9	2.3	21.7%
5	Match terms and definitions for: ▪ Risk ▪ Prevalence ▪ Incidence ▪ Mortality rate ▪ Case fatality rate	5	4.4	4.6	5.1%
6	Calculate an attack rate from a scenario	1	0.9	0.9	0.0%
7	Identify errors in an example linelist.	6	4.6	5.0	8.7%
8	Identify which options were not steps in an outbreak investigation.	8	7.1	7.1	0.0%
9	State the first step in an outbreak investigation	1	0.6	0.8	25.0%
10	Mark 5 statements as True or False: ▪ Analytic epidemiology uses a comparison group to assess associations ▪ Descriptive epidemiology describes the data by person, place and time ▪ A case series must always have a comparison group ▪ An ecological study collects data at the population level ▪ A case control study uses a relative risk measure to assess association	5	3.0	3.6	18.8%
11	Calculate a relative risk using a 2x2 table	1	0.0	0.4	n/a
12	Identify whether results were statistically significant or not. ▪ OR 7.2, 95% C.I. 0.7 – 14.2 ▪ OR 4.2, 95% C.I. 2.1-9.3 ▪ RR 2.3, 95% C.I. 1.5-5.4 ▪ RR 4.5, 95% C.I. 0.2 – 20.3	4	1.0	1.9	93.8%
13	Complete the epidemiological triangle	2	0.8	1.8	118.8%

Application of knowledge and skills

Of the 17 fellows who completed the aFETPNG program, all 17 completed the online survey focused on application of knowledge and skills. The 17 fellows responding represented 11 provinces, with 11 working at the provincial level and 6 at the district level. Most (94%, n=16) of the fellows worked in the government system; 1 (6%) worked for church health services at the district level.

When asked to identify 3 skills gained in aFETPNG that have been most relevant to their current role, half of the fellows indicated operational research and/or interventions. Other skills mentioned by fellows were data collection, management, analysis and/or interpretation. The most frequently reported skills gained by fellows is summarised in Table 1.

Table 1. Most frequently reported skills gained by aFETPNG fellows throughout their training (n=16)*

Skills	Number of fellows	Percentage of fellows
Operational research / intervention	8	50%
Data collection, management, analysis and/or interpretation	8	50%
Outbreak investigation	7	44%
Communication (risk communication, public speaking, presentation skills and/or advocacy)	7	44%
Report writing	6	38%
Excel	5	31%
Policy, including writing a policy brief	4	25%
Surveillance evaluation	2	13%
Problem solving skills	1	6%
Leadership and mentoring	1	6%
Monitoring and evaluation	1	6%

*Fellows were asked, 'what 3 skills gained in aFETPNG have been most relevant to your job'; open text responses were grouped as per table above.

Outbreak investigations

All but two of the fellows were involved in investigating one or more outbreaks during their training period. The 16 aFETPNG fellows investigated a total of 55 outbreaks, 42 of which they were lead investigators. Two fellows investigated 10 outbreaks each. The majority (n=14, 82%) of fellows were involved in the COVID-19 response.

Surveillance system evaluations

Between October 2020 and January 2021, all 17 fellows conducted an assessment of surveillance for COVID-19 in their province with a focus on data reporting and quality. Fellows conducted a data review and interviewed key surveillance focal points and individuals responsible for data collection and reporting of COVID-19. A combined COVID-19 surveillance review report was prepared, listing 11 key recommendations. This report was disseminated to national stakeholders.

In addition to the joint COVID-19 surveillance review, fellows also conducted individual surveillance evaluations. The 17 aFETPNG fellows conducted a total of 34 surveillance evaluations. The topics of the individual surveillance evaluations are shown in Table 3.

Table 3. Surveillance evaluations undertaken by aFETPNG fellows during their training period

Surveillance Evaluation focus	Number of fellows (n=17)
COVID-19 surveillance review (joint project)	17
COVID-19 surveillance (individual projects)	2
COVID-19 Adverse Event Following Immunization (AEFI) surveillance	1
HIV surveillance	3
Syndromic surveillance	7
TB surveillance	4

Public health interventions

The intervention projects were a focus of the aFETPNG program, these are summarized in Appendix 2. Fellows use evidence from their operational research projects to design public health interventions. When asked more specifically how they planned to continue, expand or modify their intervention, the following themes emerged:

- Expanding intervention to include other diseases (integrated surveillance)
- Expanding intervention to include other facilities or district in the Province
- Developing operational procedures to support the sustainability of the intervention
- Advocating for ongoing managerial and financial support to maintain the intervention
- Advocating for support from the national level
- Integrating the intervention into larger existing systems and processes
- Continuing with evaluations and impact assessments to guide the interventions development

When asked how likely they would conduct further operational research and interventions, 8 (47%) said very likely and 9 (53%) said likely.

The most significant change experienced as a result of aFETPNG

All the fellows were asked to reflect on a story that best illustrates the most significant change they experienced as a result of participating in aFETPNG. The following are a selection of their responses.

> *""June of 2022 I was part of the team to put together a Monkey Pox response plan for [province]. This was a significant moment because we had new managers in office and they recognized the FETP graduates to take lead in putting together the response plan."*
>
> *"I was just a clinical HEO and VPD Surveillance Focal Person. Now I am Rapid Response Team Lead in the Provincial and COVID-19 Surveillance Cluster Lead. I am likely to be the next Provincial Disease Control Officer for [Province]. This is significant because the training is relevant to what I am doing and has had impact which [Province] PHA appreciates what I am doing now"*
>
> *"HIV testing among TB in [Province] was very low with only 35 percent but through the FETP project have reach 96 percent and now we are maintaining above 80 percent"*

Specific goals after aFETPNG

Each fellow was asked what specific goals they are hoping to achieve following graduation from aFETPNG. Five of the fellows made specific reference to formal ongoing professional development, such as pursuing a master's in public health degree. Many others mentioned continued improvement of programs and workforce capacity, including through training and mentoring others in their workplace, and continued support of FETP. Fellows were asked to rank a list of enablers that would help them meet their goals following graduation. The most common enabler mentioned was a supportive management.

> *"Continue supporting FETPNG in my current role in training of fellows with ongoing mentoring support; continue work on my intervention to strengthen the current syndromic surveillance system; continue to network with fellow FETP colleagues"*
>
> *"Mentor upcoming health workers on surveillance; sustain intervention project"*
>
> *"For my province, reduce lost-to-follow-up of TB cases to below 5% which is the national TB program target"*

Discussion

The aFETPNG was deemed successful, with the 17 fellows who completed the program incorporating core competencies into their day to day roles. All fellows successfully completed operational projects in the field to address priority health questions and presented the case for feasible and impactful interventions, based on their own consideration of the evidence. During this program fellows extended their knowledge in study design, data analysis and policy briefs. Importantly, all fellows produced written reports and presentations that showcased their understanding of outbreak response, surveillance and operational research. The end products formed a body of work addressing key priority areas identified at the start of the program and priorities that evolved throughout the COVID-19 panedmic. The aFETPNG further raised the profile of FETP in PNG among program leads in NDoH. opening doors for ongoing collaboration between NDoH experts and the FETPNG network throughout the provinces.

It should be noted that the success of the program was largely due to incredibly dedicated fellows who were nvested in their projects and willing to always go the extra mile to achieve the outputs required in this program. With the success of the aFETPNG program, there were many lessons learnt with two primary lessons summarised below:

Fellows worked full time jobs within provincial, district or local health centres. This meant that fellows were under time pressure to complete projects in addition to their day to day responsibilities. The COVID-19 response further exacerbated demands on fellows' time. With emergence of the COVID-19 pandemic, thirteen fellows unfortunately were not able to completed the program. Reasons cited included; enhanced work responsibility and personal reasons. It is likely the duration of the program and long term commitment to extra training and projects contributed to this.

While the COVID-19 pandemic is referred to as a once in a generation event, the reality is that PNG is likely to frequently experience natural disasters and outbreaks; indeed this was the case throughout the aFETPNG. While providing an opportunity for fellows to apply knowledge and skills obtained through the program and to benefit from mentorship, disruptions do take a toll and and can lead to stacking of projects to the end of the program which leads to increased stress on fellows to complete multiple projects simultaneously.

The feedback from the 17 fellows who completed the aFETPNG program and their contributions to key priority health areas in PNG and the COVID-19 pandemic response, highlights the importance of continued upskilling of FETPNG graduates. Aside from the many outputs and skills gained throughout the aFETPNG, the program contributed to sustainability of public health capacity in PNG through investment in select fellows as leaders and future faculty of the FETPNG program going forward.

The aFETPNG certainly served to highlight the expertise and influence of fellows in terms of surveillance and response capacity in FETPNG, not the least through being well-placed to partake in comprehensive intra action reviews conducted at workshops 2 and 3, the recommendations of which

have informed the NDoH for ongoing preparedness. Directors of disease specific programs as well as the programs for research and policy at the national level commented on the excellent outcomes produced by fellows and their importance at providing expert input to NDoH from on the ground.

Based on evaluations conducted at each workshop and end of program evaluation, fellows are well prepared for outbreak response and surveillance strengthening activities. Gaps continue in data analysis and interpretation skills and professional development opportunities should continue in these areas using a variety of case studies and scenario's to build skills working with different data sets and across a variety of study designs.

At this point in time PNG may not be able to sustain a lengthy FETP training model, shorter models such as the frontline and intermediate programs are likely to prove more cost effective. However, there is a need to extend and build on knowledge and skills gained during the intermediate program and support ongoing professional development of graduates. A more sustainable and practical approach where short-courses are offered on core competencies focussing one specific competency area may be a more acceptable approach for PNG and help to mitigate the need to complete multiple projects during the same time period. Such programs should continue to focus on strengthening surveillance, outbreak detection and response, and evidence based operational research.

Opportunities should be created for aFETPNG and other FETP alumni to complete short, intensive training that is specific to core epidemiological skills. Specific needs include analysis and use of data management programs- especially excel.

The momentum for ongoing collaboration between the FETPNG network, program managers at NDoH and other national institutes is high with the FETPNG program increasing visibility through demonstrable impact. We recommended that resources are directed to revisiting the health priority areas and associated operational research questions determined by the initial prioritisation exercise for this project. It is likely there are many opportunities to collaborate with optimally placed and skilled FETP graduates throughout PNG.

Appendix 1: List of links to ADEPPt outputs

1. Accelerating the Development of Evidence Based Policy and Practice (ADEPPt) Operational Research Prioritisation Exercise, 2018
   https://drive.google.com/drive/folders/1AgqMVgOiQr9A0c04_esN3pDf7phdk0sC
2. Advanced Field Epidemiology Training Program of Papua New Guinea (FETPNG) Workshop 1 report, 2019
   https://drive.google.com/drive/folders/1AgqMVgOiQr9A0c04_esN3pDf7phdk0sC
3. Advanced Field Epidemiology Training Program of Papua New Guinea (FETPNG) Workshop 2 report, 2022
   https://drive.google.com/drive/folders/1AgqMVgOiQr9A0c04_esN3pDf7phdk0sC
4. Technical report: Barriers and Enablers experienced by Health Care Workers in Papua New Guinea in swabbing for COVID-19, 2020
   https://www.fieldepiinaction.com/specimen-collection
5. Peer reviewed publication: Smaghi, B. S., Collins, J., Dagina, R., Hiawalyer, G., Vaccher, S., Flint, J., & Housen, T. (2021). Barriers and enablers experienced by health care workers in swabbing for COVID-19 in Papua New Guinea: A multi-methods cross-sectional study. International Journal of Infectious Diseases, 110, S17-S24.
   https://www.sciencedirect.com/science/article/pii/S1201971221003908
6. Infographic: Barriers and enablers experienced by Papua New Guinean Health care Workers in swabbing for COVID-19
   https://www.fieldepiinaction.com/specimen-collection
7. Technical report: COVID-19 Vaccine hesitancy in essential workers and the community in Papua New Guinea: an exploratory mixed-methods study, April- June 2021
   https://www.fieldepiinaction.com/vaccine-hesitancy
8. Infographics and short videos: COVID-19 Vaccine hesitancy in essential workers and the community in Papua New Guinea
   https://www.fieldepiinaction.com/vaccine-hesitancy
9. Technical report: COVID-19 surveillance evaluations in 11 PNG Provinces, October 2020-January 2021
   https://drive.google.com/drive/folders/1ide2S3V3zf_8Klwtbgmx7oU8KMuA8gUH
10. Technical report: Intra-Action Review of the COVID-19 Response in Papua New Guinea, 2022
    https://www.fieldepiinaction.com/our-programs-blog/feia-impact-evaluation
11. Facilitator guide: Intra-Action Review of the COVID-19 Response in Papua New Guinea
    https://www.fieldepiinaction.com/our-programs-blog/feia-impact-evaluation
12. Facilitator guide: Review of surveillance in Papua New Guinea
    https://drive.google.com/drive/folders/1Ki6WpsiI9EApiZ6wgcLTPTYsX3Ih06cn
13. Technical report: Advanced Field Epidemiology Training Program fellows' and senior faculty experiences with sorcery accusation related violence in the line of public health and healthcare response work
    https://drive.google.com/drive/folders/1ide2S3V3zf_8Klwtbgmx7oU8KMuA8gUH
14. Advanced FETPNG program evaluation
    https://drive.google.com/drive/folders/1AgqMVgOiQr9A0c04_esN3pDf7phdk0sC

Appendix 2: Graduating fellows' profiles

Communicable diseases

Fellow's name: Mary Kaevakore

Province: National Capital District

Current Position: Physician, Gerehu Hospital

Intermediate FETP graduation year: 2017

Mentor: James Flint

Project titles:

- Factors affecting COVID-19 reporting and testing: a descriptive, cross- sectional study amongst health workers in National Capital District clinics, August to September 2021
- Investigation of COVID-19 outbreak (Omicron variant) amongst hotel staff in Port Moresby, January to February 2022
- An evaluation of adverse events following immunisation (AEFI) surveillance system for COVID-19 vaccination for National Capital District Provincial Health Authority, April to May 2022
- Evaluating the use of COVID-19 data collection application amongst health workers in National Capital District clinics
- Improving reporting of COVID-19 data in the National Capital District, Papua New Guinea

Fellow's name: Likas Lakain

Province: Enga

Current Position: Provincial Disease Control Officer

Intermediate FETP graduation year: 2013

Mentor: Megge Miller

Project titles:

- Factors affecting lost to follow up and effective case management of TB cases in Enga Province from January 2018 to September 2019
- Investigation of COVID-19 third wave (Omicron variant) in Enga Province, February 2022
- Resurge of COVID-19 third wave, Enga Province, 6th September to 31st November 2021
- Reducing the lost-to-follow-up of TB cases in Enga Province

Fellow's name: John Landime

Province: Morobe

Current Position: OIC Boana Health Centre, Nawaeb district

Intermediate FETP graduation year: 2017

Mentor: Tambri Housen

Project titles:

- Descriptive Epidemiology of people presenting with respiratory symptoms to health centres in a district, Morobe Province, from August 2020 to July 2021
- Investigation of cluster of waterborne illnesses and deaths in a village, Morobe Province, November 2021
- An evaluation of the use of case investigation forms for COVID-19 on respiratory cases in four respiratory clinics of a district, Morobe Province, 2020 to 2022
- Establishment of respiratory clinics to improve rapid diagnosis and reduce transmission risk within outpatient clinics in Nawaeb District

Fellow's name: Brian Manari

Province: Morobe

Current Position: OIC Mutzing Health Centre

Intermediate FETP graduation year: 2018

Mentor: James Flint

Project titles:

- Investigation of Pertussis Outbreak Infecting Children of Less than 12 Years in a Village, Morobe Province, August to September 2021
- Evaluation of Covid 19 Surveillance system reporting using Whatsapp platform in Markham District, April 2020-June 2022
- Identify hot spot areas and engage community leaders with health care workers to do regular health awareness on COVID-19 vaccine in Markham District, Morobe Province

Fellow's name: Stanley Masi

Province: East Sepik

Current Position: District Health Manager

Intermediate FETP graduation year: 2017

Mentor: Stephanie Wheeler

Project titles:

- Factors affecting loss-to-follow-up and effective management of tuberculosis cases in East Sepik Province from 2018 to 2019
- Investigation of a pertussis outbreak in a village, East Sepik Province, April 2022
- Evaluating public health events and syndromic surveillance system in East Sepik Province, December 2021 to February 2022
- Evaluating the impact of TB treatment supporters training in Gawi Health Centre

Fellow's name: Israel Naraman

Province: National Capital District

Current Position: TB Program Officer- National Capital District (NCD) PHA

Intermediate FETP graduation year: 2016

Mentor: Megge Miller

Project titles:

- Factors affecting the reporting of COVID-19 suspected cases at triage in health facilities in National Capital District, August - September 2021
- Evaluation of National Capital District TB program reporting system in a TB Clinic, Port Moresby, January to December 2021
- Addressing the factors affecting the reporting of COVID-19 suspected cases at triage in National Capital District health facilities

Maternal and Reproductive Health

Fellow's name: Clare Andawa

Province: Southern Highlands

Current Position: OIC at Det Health Centre

Intermediate FETP graduation year: 2017

Mentor: Julie Collins

Project titles:

- Increasing antenatal services uptake in pregnant women at a health centre, Southern Highlands Province, January 2018 to June 2021
- Investigation of COVID-19 outbreak amongst primary school teachers and community members, Southern Highlands Province, October 2021
- An evaluation of the syndromic surveillance system of Southern Highlands Province, October 2021
- Increasing the levels of awareness and knowledge on sexual reproductive health and antenatal care among pregnant women around Det Health Centre through a community-based participatory awareness program, Nipa Kutubu district, Southern Highlands Province

Fellow's name: Timen Apae

Province: Eastern Highlands

Current Position: District Health Manager

Intermediate FETP graduation year: 2018

Mentor: Tambri Housen

Project titles:

- A retrospective cohort study exploring antenatal care amongst adolescents in a district, Eastern Highlands Province, January 2018 to December 2019
- Investigation of a pertussis outbreak in children aged 1-10 years in a village, Eastern Highlands Province, April 2021
- Evaluating Quarter 1 2020 TB reporting for Eastern Highlands Province
- Strengthening uptake of antenatal care amongst adolescents in the catchment populations of Henganofi & Komperi Health Centres in Henganofi District, Eastern Highlands Province

Fellow's name: Elsie Stanley Buka

Province: East New Britain

Current Position: Family Health Services Manager

Intermediate FETP graduation year: 2018

Mentor: Tambri Housen

Project titles:

- Barriers and enablers to women aged 15 – 45 years accessing antenatal clinic at a rural hospital, East New Britain Province, January 2018 to June 2020
- Investigation of COVID-19 outbreak in East New Britain Province
- Evaluation of the Open Data Kit syndromic surveillance reporting platform, East New Britain, March 2022
- Increasing knowledge of sexual reproductive health in pregnant women aged 15 – 49 years through a community-based participatory intervention in Keravat Rural Hospital, Gazelle District, East New Britain Province

Health Systems Strengthening

Fellow's name: Roselyn Gatana

Province: Autonomous Region of Bougainville

Current Position: Executive Director Public Health, AROB Ministry of Health

Intermediate FETP graduation year: 2016

Mentor: Alois Pukienei

Project titles:

- Assessing barriers to availability and accessibility to frontline health care services in a District, Bougainville Region, 2018 to 2019
- Investigating an influenza like illness outbreak amongst secondary school students in Bougainville, May 2019
- Evaluation of the public health events syndromic surveillance system amongst health facilities in AROB, February 2020 to October 2020
- Assessing the benefits of supervision, monitoring and feedback to improve immunization coverage in Buka District, North Bougainville

Fellow's name: Bernnedine Smaghi

Province: National Capital District

Current Position: FETPNG Program Convener

Intermediate FETP graduation year: 2015

Mentor: Stephanie Wheeler

Project titles:

- Barriers and enablers around loss to follow-up tuberculosis patients and case management by health workers: a mixed methods cross-sectional study, West Sepik Province, 2020
- Investigation of a pertussis outbreak amongst children & community members in a district of West Sepik Province, November 2019
- An evaluation of syndromic surveillance system using Open Data Kit in selected provinces of Papua New Guinea, January to March 2021
- Improving Open Data Kit reporting through weekly reminders, training and data credit support: a mixed methods cross-sectional survey in selected provinces of Papua New Guinea

Fellow's name: Symphorian Sumun

Province: West Sepik

Current Position: Deputy Director Public Health, West Sepik PHA

Intermediate FETP graduation year: 2014

Mentor: James Flint

Project titles:

- Barriers and enablers to frontline healthcare access along the border communities: a cross sectional study, West Sepik Province, 2020
- Investigation of a yaws outbreak amongst children ages 5 – 12 years in two villages, West Sepik Province, September 2020
- An evaluation of the use of Open Data Kit surveillance reporting platform
- Improving health service accessibility through supervisory visits and integrated outreach patrol, West Sepik
- Impacting frontline health care service delivery and improving staff performance: a piloted team-based approach supervisory visit, Vanimo Green District, West Sepik Province

Fellow's name: Maggie Williams

Province: East Sepik

Current Position: OIC- HIV/STI, East Sepik Provincial Hospital, East Sepik PHA

Intermediate FETP graduation year: 2016

Mentor: Rachel Mather

Project titles:

- Barriers and enablers of COVID-19 case isolation in East Sepik Province: a cross-sectional study
- Investigation of a pertussis outbreak amongst residents of villages in East Sepik, July 2018
- An evaluation of the HIV surveillance system, East Sepik Province, 2022
- Interventions to improve HIV reporting practices in East Sepik

Vaccine Preventable Diseases

Fellow's name: Peter Ati

Province: New Ireland

Current Position: Acting Provincial Disease Control Officer

Intermediate FETP graduation year: 2015

Mentor: Alois Pukienei

Project titles:

- The barriers to effective routine immunisation of children under one year in a district: a cross sectional study, New Ireland Province, December 2021
- Investigation of an influenza like illness outbreak amongst community members in a district, New Ireland, March to April 2022
- Tuberculosis surveillance evaluation report, New Ireland Province
- An assessment of interventions for improving routine immunisation in under-performing health facilities in Namatanai District

Fellow's name: Bob Bomai

Province: Eastern Highlands

Current Position: Field Epidemiologist

Intermediate FETP graduation year: 2015

Mentor: Kirsten Williamson

Project titles:

- Assessment of at-birth vaccinations (Hepatitis B & BCG) and factors affecting immunisation coverage at Goroka Hospital, 2015 to 2019
- Investigation of Methanol Poisoning at in a village, Eastern Highlands Province, September 2021
- Evaluation of Prevention of Parent to Child Transmission of HIV Surveillance in a Hospital, Eastern Highlands Province, from 2014 to 2021
- Improving low birth vaccine coverage at Goroka Provincial Hospital by addressing health care worker capacity issues

Fellow's name: Stewart Sarieng Pau

Province: Morobe

Current Position: Angau Hospital Surveillance Officer

Intermediate FETP graduation year: 2015

Mentor: Kirsten Williamson

Project titles:

- At-birth dose vaccination coverage (Hepatitis B & BCG) at Angau Hospital, Morobe Province, from 2015 to 2019
- Outbreak of pertussis (whopping cough) in a district, Morobe Province, 2021
- Evaluation of district weekly syndromic surveillance system, Morobe Province, June to July 2022
- Training of immunisation staff at Angau Hospital, Morobe Province, to improve at-birth vaccine coverage (Hepatitis B & BCG)
- Evaluation of Public Health Intervention (PHI) to reduce the increasing number of unvaccinated birth doses (HepB and BCG) in infants that are delivered within twenty-four hours after the birth at Angau Memorial Hospital

Fellow's name: Diana Pololi

Province: Central

Current Position: OIC - Bereina Health Centre

Intermediate FETP graduation year: 2017

Mentor: Abel Yamda

Project titles:

- Barriers and enablers to routine immunization in children under one year of age at a district, 2019 to 2020
- Investigation of a cholera outbreak in Kupiano Health Centre, Abau District, Central Province, 2010
- Evaluation of HIV testing surveillance data (SURV 1) reporting in Kairuku District health facilities, Central Province, January 1st to December 31st 2021
- Addressing health care worker capacity issues and improving low Penta-3 and Measles-1 vaccine coverage in children under one year at Kairuku District

Appendix 3: Photos from the Field

Photo: **Clare Andawa** - administering COVID-19 Vaccination at her health facility

Photo: **Roseyln Gata** - Health Care Workers plotting the immunization coverage onto the monitoring chart






Photo: **John Landime** – four respiratory clinics build by John as part of his Intervention project; recipients of IPC training delivered by John

Photo: **Elsie Stanley Buka** – conducting training to pregnant women at arural hospital in East New Britain Province

Photo: **Maggie Williams** – providing training to improve HIV reporting practices in East Sepik

Photo: **Timen Apae** – strengthening uptake of antenatal care and contraceptive methods amongst adolescents in Eastern Highlands Province

Appendix 4: Summary of key feedback from surveillance reflection

Event based surveillance

Did not work well	Root Causes	Solutions
No standardised reporting processes for event based surveillance	No guidance from national level No established systems for capturing event based surveillance information at the Provincial level No documentation on processes for event based surveillance	Develop training package from the national level and roll out to the provincial level to establish the system Create standardised data collection forms for data documentation Create toll free number at the provincial level for reporting event based surveillance Establish a provincial system to manage event based surveillance information
No feedback reporting from national level to province	No standardised data platform to capture incoming data for analysis and feedback	Create database at national and provincial levels; train staff on data management and feedback

Syndromic surveillance

Did not work well	Root Causes	Solutions
Lack of technical capacity	No guidelines for standard operating procedures from NDOH Lack of planning and prioritizing of surveillance at PHA Lack of supervisory visits to reinforce importance of surveillance at district and health centre levels Lack of feedback and access to data at provincial and district levels Too many parallel surveillance systems	Develop clear syndromic surveillance guidelines; provide regular training PHA to focused in improving syndromic surveillance amongst sentinel health facilities (strategically selected) National and Provincial levels to analyse data on a timely basis to prompt action; provide ongoing and timely reports to data providers Empower health facilities and district to access and analyse their own data for decision making purposes PHA to review current supervisory approach – revert to integrated team approach – initiate solutions on the ground without delay Incorporate syndromic surveillance as part of eNHIS – open access to all line managers

Indicator based surveillance (measles used as example)

Did not work well	Root Causes	Solutions
No standardised database at PHA level for confirmed cases No specimen collection and/or delayed transport to CPHL	Lack of awareness of surveillance value at PHA Lack of surveillance strategy/plan PDCO skipped in surveillance data flow Accredited tests not conducted at provincial level	Development of common surveillance database at national and provincial levels for managing and analysing data Integrated database to capture both suspected and confirmed cases Develop disease specific surveillance protocols Accreditation of provincial laboratories to conduct wider range of diagnostic tests Ongoing training on specimen collection and transport