

*e-ASIA Joint Research Program  
Final Report*

1. Project title : Collaborative fever etiology research in South East Asia

2. Joint Research period : 1 Nov 2016 – 31 Oct 2018

3. Research Team :

■ **New Zealand team** (up to 6 people including the Principal Investigator)

Funding period: Month, Day, Year - Month, Day, Year

Total Funded Amount (in Local Currency):

	Name	Position	Affiliation	Role in the project
PI	John A. Crump	Professor	University of Otago	Lead PI
Collaborator	David R. Murdoch	Professor	University of Otago	Co-I
Collaborator	James E. Ussher	Senior Lecturer	University of Otago	Co-I
Collaborator	Sam Carr	Student	University of Otago	Masters student
Collaborator				
Collaborator				
Total number of participants including students: 4				

■ **Myanmar team** (up to 6 people including the Principal Investigator)

Funding period: Month, Day, Year - Month, Day, Year

Total Funded Amount (in Local Currency):

	Name	Position	Affiliation	Role in the project
PI	Wah Win Htike	Professor	University of Medicine 1	Myanmar Leader
Collaborator	Min Zaw Oo	Associate Professor	University of Medicine 1	Co-I
Collaborator	Tin Ohn Myat	Lecturer	University of Medicine 1	Doctoral student
Collaborator	Win Thandar Oo	Lecturer	University of Medicine 1	Doctoral student
Collaborator				
Collaborator				
Total number of participants including students: 4				

■ **Lao PDR team** (up to 6 people including the Principal Investigator)

Funding period: Month, Day, Year - Month, Day, Year

Total Funded Amount (in Local Currency):

	Name	Position	Affiliation	Role in the project

PI	Paul N. Newton	Professor	University of Oxford	Lao PDR Leader
Collaborator	Mayfong Mayxay	Associate Professor	University of Health Sciences	Co-I
Collaborator				
Total number of participants including students: 2				

#### 4. Summary of the joint research

1. Collaborate to conduct Myanmar's first comprehensive severe febrile illness etiology study to improve patient management and target disease prevention efforts.]
2. Understand community patterns of healthcare utilization in Lao PDR and Myanmar to inform health system planning for febrile patients.
3. Strengthen research and capacity building collaboration across a network of researchers in Lao PDR, Myanmar, and New Zealand.

#### 5. Outputs and Anticipated Outcomes of Joint Research

##### 5-1 Scientific achievements and implemented activities of the joint research

Completed a one year study of severe febrile illness etiology in Myanmar.

- Characterized blood stream isolates including identification, phenotypic antimicrobial susceptibility testing, and whole genome sequencing to understand molecular mechanisms of resistance and phylogenetic relationships.
- Undertook diagnostic tests for leptospirosis, rickettsioses, and scrub typhus.

Completed healthcare utilization studies in Yangon, Myanmar, and Vientiane, Lao PDR, to describe patterns of health seeking for febrile illness among persons living in the catchment areas of Yangon General Hospital, Yangon, and Mahosot Hospital, Vientiane.

- Described health seeking behavior and sources of antimicrobials.
- Calculated disease incidence by combining sentinel surveillance with adjustments for under-ascertainment based on the healthcare utilization survey.

##### 5-2 Synergistic effects of the international joint research

Two Myanmar PhD students trained.

One New Zealand MPH student trained.

Myanmar researchers trained in reference methods for diagnosis of leptospirosis, rickettsioses, and scrub typhus in Vientiane, Lao PDR, and Bangkok, Thailand.

Lao PDR team trained in healthcare utilization study methodology and hybrid surveillance methods for estimating incidence.

New Zealand researchers were able to work with bloodstream isolates with antimicrobial resistance patterns and resistance mechanisms rarely encountered in New Zealand.

### 5-3 Broader impacts including contribution to society

Contributed to policy discussions about typhoid conjugate vaccine introduction in Lao PDR and Myanmar.

Stimulated further work on antimicrobial access and overuse in Myanmar.

Highlighted the importance of international research collaboration on antimicrobial resistance.

### 5-4 Development and sustainability of the cooperation

The e-ASIA Joint Research Program grant generated preliminary data to support other successful external grant applications and additional projects involving country teams.

The involvement of doctoral students fostered opportunities for research into the long-term future.

## 6. Future Goals and Plan of Activities after the project period

Complete analyses and publication of additional manuscripts.

Develop new grant applications focusing on key findings from the initial grant.

## 7. Scientific Achievements and Implemented Activities (Publication, Research Exchange, Workshop, etc.)

*\*For this item, please fill in the attached Excel file.*

See attached Excel file.

## 8. Recommendations and Comments to the Program

The e-ASIA Joint Research Program is an outstanding platform to support regional collaborative research and should be sustained and grown.

The requirement to report to each national funder as well as to the e-ASIA Joint Research Program is extremely inefficient and needs to be addressed and eliminated.

## 9. Others (agenda of workshop, photos of research teams, meetings, and etc.)

**Collaborative fever etiology research in South East Asia team photograph outside University of Medicine 1, Yangon, Myanmar, August 2017**



**e-ASIA JOINT RESEARCH PROGRAM MEETING AGENDA**  
**'Collaborative fever etiology research in South East Asia'**  
**Kick-off meeting**

**Tuesday 1 November 2016**  
**1pm to 5pm NZDT**

**Theomin Balcony, H.D. Skinner Annex, Museum Reserve**  
**361 Great King Street (corner of Great King Street and Albany Street), North**  
**Dunedin, Dunedin 9016**

- 1pm Welcomes and introductions (John)
- Review of funded proposal activities and timelines (John)
- Status of contracts and sub-contracts (Diana)
- Status of ethics approvals in Myanmar (Wah, Min Zaw)
- Status of ethics approvals in Laos (Paul)
- Status of Yangon adult fever cohort, samples, and isolates (Ohn)
- Yangon adult fever cohort sample testing plan (Paul, Ohn, David, John)
- Yangon adult fever isolate testing plan (James, David, Ohn)
- 3pm: Coffee break
- 3.30pm Healthcare utilization survey (HCUS) planning (all)
- HCUS aims and objectives (all)
- HCUS methods (all)
- Review of action items (John)
- 5pm End

**e-ASIA JOINT RESEARCH PROGRAM MEETING AGENDA**  
**'Collaborative fever etiology research in South East Asia'**

**Presentation Room, University of Medicine 1, 245 Myoma Myaung Road,  
Lanmadaw, Yangon 11131, MYANMAR**

**TUESDAY 1 AUGUST 2017**

***Session 1: Welcome, introductions, timelines and progress, aetiology results***

0900-0915	Welcome and introductions	TBD
0915-0930	Grant timelines and progress	John Crump
0930-1000	Blood stream isolates, including AMR	James Ussher/Tin Ohn Myat
1000-1030	Leptospirosis, rickettsioses, scrub typhus	Paul Newton/Tin Ohn Myat

**1030-1100 Coffee break**

***Session 2: Healthcare utilization survey planning I***

1100-1130	Yangon General Hospital catchment area	John Crump
1130-1200	Mahosot Hospital catchment area	Mayfong Mayxay
1200-1230	Myanmar census data for catchment	Hla Hla Win
1230-1300	Lao PDR census data for catchment	Mayfong Mayxay

**1300-1400 Lunch**

***Session 3: Healthcare utilization survey planning II***

1400-1430	Review of cluster survey principles	John Crump
1430-1530	Sampling units and sampling strategy	Crump/Hla Hla Win

**1530-1600 Coffee break**

***Session 4: Healthcare utilization survey planning III***

1600-1700	Sample size calculations, considerations	John Crump
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**1900-2100 Meeting dinner**

**WEDNESDAY 2 AUGUST 2017**

***Session 5: HCUS questionnaire I***

0900-1000	Discussion on HCUS research goals	David Murdoch
1000-1030	Review of draft questionnaire	John Crump
<b>1030-1100</b>	<b>Coffee break</b>	

***Session 6: HCUS questionnaire II***

1100-1200	Questionnaire working groups	All
1200-1230	Questionnaire working groups feedback	All
<b>1300-1400</b>	<b>Lunch</b>	

***Session 7: HCUS logistics and personnel***

1400-1415	WHO cluster survey guidance	John Crump
1415-1445	Lao PDR personnel plan	Paul Newton
1445-1515	Myanmar personnel plan	Hla Hla Win
<b>1515-1545</b>	<b>Coffee break</b>	

***Session 8: Ethics applications and approvals***

1545-1600	Myanmar ethics	Wah Win Htike
1600-1615	Lao PDR ethics	Mayfong Mayxay
<b>1615</b>	<b>End</b>	

## Lists of Achievements and Implemented Activities

### 1. Original Publication of Articles etc.

#### 1. 1 Original Publications (Articles co-authored among Research Teams)\*

All Authors' Names, Title, Journal Name, Volume, Edition, Page, Year of Publication	DOI Code	Publication Status	Remarks (e.g. publication in top level journals etc.)
Myat TO, Hannaway RF, Zin KN, Htike WW, Win KK, Crump JA, Murdoch DR, Ussher JE. ESBL- and carbapenemase-producing Enterobacteriaceae in patients with bacteremia, Yangon, Myanmar, 2014. <i>Emerg Infect Dis</i> 2017; 23: 857-8.	10.3201/eid2305.161100	published	
Shrestha P, Roberts T, Homsana A, Myat TO, Crump JA, Lubell Y, Newton PN. Febrile illness in Asia: gaps in epidemiology, diagnosis, management for informing health policy. <i>Clin Microbiol Infect</i> 2018; 24: 815-26.	10.1016/j.cmi.2018.03.020	published	
Oo WT, Myat TO, Htike WW, Ussher JE, Murdoch DR, Lwin KT, Oo MZ, Maze MJ, Win HH, Crump JA. Incidence of typhoid and paratyphoid fevers among adolescents and adults in Yangon, Myanmar. <i>Clin Infect Dis</i> 2019; 68 (suppl 2): S124-S129.	10.1093/cid/ciy1109	published	
Oo KM, Myat TO, Htike WW, Biswas A, Hannaway RF, Murdoch DR, Crump JA, Ussher JE. Molecular mechanisms of antimicrobial resistance and phylogenetic relationship of <i>Salmonella enterica</i> isolates from febrile patients in Yangon, Myanmar. <i>Trans R Soc Trop Med Hyg</i> 2019; in press.		in press	

4 Total

\*Multiple additional manuscript are in development.

#### 1. 2 Original Publications (Articles by Single Team only)

All Authors' Names, Title, Journal Name, Volume, Edition, Page, Year of Publication	DOI Code	Publication Status	Remarks (e.g. publication in top level journals etc.)	Country name of the team

0 Total

## Lists of Achievements and Implemented Activities

### 2. presentations at Academic Conferences etc. (Seminars, Workshops, Symposia)

#### 2. 1 Conference Presentations (Joint Presentations among Research Teams)

Date	Type of Presentation	Speaker, "Title", Conference Name, Location, etc.
March 27, 2019	Oral Presentation	Oo WT, Myat TO, Murdoch DR, Win HH, Crump JA. Incidence of typhoid and paratyphoid fevers among adolescents and adults in Yangon, Myanmar. 11th International Conference on Typhoid and Other Invasive Salmonellosis, Hanoi, Vietnam, 26-28 March 2019.
March 26, 2019	Oral Presentation	Myat TO, Oo KM, Biswas A, Htike WW, Murdoch DR, Crump JA, Ussher JE. Molecular mechanisms of antimicrobial resistance and phylogenetic relationship of <i>Salmonella enterica</i> from febrile patients in Yangon, Myanmar. 11th International Conference on Typhoid and Other Invasive Salmonellosis, Hanoi, Vietnam, 26-28 March 2019.

2 Total

#### 2. 2 Conference Presentations (by Single Team)

Date	Type of Presentation	Speaker, "Title", Conference Name, Location etc.	Country name of the team

0 Total

## Lists of Achievements and Implemented Activities

### 3. Workshops, Seminars, Symposia and Other Events (Organized by the Project)

Event duration	Name of Organizer	Title of the Event	Location (Country, City, Venue)	Number of Participants (Including Team Members)	Overview
1 day (1 November 2016)	Prof. John A. Crump	Project kick-off meeting	Theomin Balcony, H.D. Skinner Annex, Dundee	12	Meeting to plan overall project 'Collaborative fever etiology research in South East Asia'
2 days (1-2 August 2017)	Prof. Wah Win Htike	Team meeting	Presentation Room, University of Medicine	30	Project progress meeting, focused on planning healthcare utilization surveys

2 Total

## Lists of Achievements and Implemented Activities

### 4. Record of Research Exchanges

Date of Departure	Date of Return	Last Name & First Name	Country of Affiliation	Affiliation	Position	Exchange Destination (Country, City, Research Organization etc)	Description of Exchange Content/Purpose	Duration of Exchange (autocompleted)
1 February 2017	31 March 2017	Myat, Tin Ohn	Myanmar	University of Medicine 1	Doctoral student	Vientiane, Laos PDR	Training in diagnostic techniques for	59
1 February 2017	31 March 2017	Oo, Win Thandar	Myanmar	University of Medicine 1	Doctoral student	Vientiane, Laos PDR	Training in diagnostic techniques for	59
1 November 2016	5 November 2016	Newton, Paul N.	Lao PDR	University of Oxford	Laos PDR Research	Dunedin, New	Kick-off meeting, and infectious diseases	5
1 November 2016	5 November 2016	Htike, Wah Win	Myanmar	University of Medicine 1	Myanmar Research	Dunedin, New	Kick-off meeting, and infectious diseases	5
1 November 2016	5 November 2016	Oo, Min Zaw	Myanmar	University of Medicine 1	Myanmar Co-I	Dunedin, New	Kick-off meeting, and infectious diseases	5
1 November 2016	5 November 2016	Myat, Tin Ohn	Myanmar	University of Medicine 1	Doctoral student	Dunedin, New	Kick-off meeting, and infectious diseases	5
1 August 2017	2 August 2017	Crump, John A.	New Zealand	University of Otago	PI	Yangon, Myanmar	Project meeting	2
1 August 2017	2 August 2017	Murdoch, David R.	New Zealand	University of Otago	Co-I	Yangon, Myanmar	Project meeting	2
1 August 2017	2 August 2017	Ussher, James E.	New Zealand	University of Otago	Co-I	Yangon, Myanmar	Project meeting	2
1 August 2017	2 August 2017	Newton, Paul N.	Lao PDR	University of Oxford	Laos PDR Research	Yangon, Myanmar	Project meeting	2
1 August 2017	2 August 2017	Mayxay, Mayfond	Lao PDR	University of Health	Co-I	Yangon, Myanmar	Project meeting	2

Total (Person)

Total (Person-day)

## Lists of Achievements and Implemented Activities

### 5. Patent Applications

#### 5.1 Independent Applications by Single Team

Application Number	Name of Patent/Patent Name	Application Date	Patent Applicants (Fill in All Members)	Publication Number (leave blank if unpublished)	Inventor	Country of Application	Registration Number (leave blank if unregistered)	Country Name of the Team
None.								

Total (Number of Application)

Total (Number of Registration)

#### 5.2 Joint Applications

Application Number	Name of Patent/Patent Name	Application Date	Patent Applicants (Fill in All Members)	Publication Number (leave blank if unpublished)	Inventor	Country of Application	Registration Number (leave blank if unregistered)

Total (Number of Application)

Total (Number of Registration)

## Lists of Achievements and Implemented Activities

### 6. Awards

Date of Award	Name of Award	Recipient	Remarks	Country Name of the Team
None.				

0 Total