9TH SOUTHEAST ASIA AND WESTERN PACIFIC BI-REGIONAL TEPHINET SCIENTIFIC CONFERENCE

PROGRAM AND ABSTRACT BOOK

INVESTING IN FIELD EPIDEMIOLOGY TRAINING PROGRAMS IN THE ERA OF THE SUSTAINABLE DEVELOPMENT GOALS

November 5-9, 2018
Vientiane, Lao PDR
Don Chan Palace Hotel & Convention Center

#TEPHINET
The 9th Southeast Asia and Western Pacific Bi-regional TEPHINET Scientific Conference

Investing in Field Epidemiology Training Programs in the Era of the Sustainable Development Goals

Vientiane, Lao PDR
5 to 9 November 2018

Program and Abstract Book
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This conference is sponsored by

Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) – www.tephinet.org

South Asia Field Epidemiology and Technology Network (SAFETynet) - www.safetynet-web.org
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Welcome Messages

From TEPHINET

Dear Colleagues,

I am honored to welcome all participants to the 9th Southeast Asia and Western Pacific Bi-regional TEPHINET Scientific Conference with the theme of “investing in field epidemiology training programs in the era of the Sustainable Development Goals.”

Our gathering here in Vientiane is a realization of TEPHINET’s priority to strengthen international public health capacity by supporting field-based training programs in applied epidemiology. Each of our twenty member programs across the two regions provides graduates with a solid foundation in the science of epidemiology as well as the capacity to manage the resources of our public health systems. We will see the fruits of this effort and learn how our graduates (and current residents) are applying their knowledge and abilities through a total of more than 140 oral and poster presentations over the course of the conference.

As you attend the presentations of your peers and colleagues who are working around the world, I encourage you to discuss how our new generation of public health professionals can harness the tremendous array of tools and information available today to demonstrate to policymakers and funders the continual value of investing in field epidemiology training programs. I encourage participants to make connections with experts in different divisions, sectors and countries to share resources and find innovative ways to collaborate. This is how we can ensure that our programs will remain important components of our nations’ public health services.

Your participation in our conferences encourages us and provides the momentum to continue building our global network, which now consists of 71 field epidemiology training programs and more than 12,000 graduates. I would like to thank you for your attendance, and I would also like to recognize and thank the Lao Ministry of Health and Field Epidemiology training program as well as the South Asia Field Epidemiology and Technology Network (SAFETYNET) for their tireless efforts in organizing this conference.

I hope you have a wonderful, enriching and productive week.

Sincerely,

Professor Dionisio Herrera Guibert, MD, FMS, MAE, PhD
Director of TEPHINET
“...the shield that guards the realms of men”
Oath of the Night's Watch, Game of Thrones

This may as well be the oath of field epidemiologists. In the practice of this public health specialty, we learn, or rather, many of us choose to be selfless, many times sacrificing quality time with family, societal obligations, and the pursuit of more financially rewarding jobs in order to dedicate ourselves to the task ahead.

The 9th TEPHINET Bi-Regional Scientific Conference is a meeting of this special group of people who save lives directly and indirectly, quietly but surely identifying culprits and killer microbes, predicting outbreaks through reliable surveillance systems, preventing and controlling disease transmission so that morbidity and mortality in the aftermath of epidemics and disasters are mitigated. It is important to share experiences and have lively and productive discussions so that new, innovative, and successful methods and ways are learnt by field epidemiologists in the South East Asia and Western Pacific Regions. Such is the opportunity that is provided in this conference.

We hope that governments invest in FETP, the secret weapon, in keeping nations safe and secure.

Welcome, Mabuhay, and thank you for continuing the watch.

Maria Consorcia Lim-Quizon, MD
Executive Director
SAFETYNET
From Ministry of Health, Lao P.D.R.

Dear colleagues,

On behalf of the conference organizers, I would like to welcome all of you to the 9th TEPHINET Bi-Regional Scientific Conference.

The Training programs in Epidemiology and Public Health Interventions Network (TEPHINET) is a network of field or applied epidemiology training programs (FETPs) that seek to foster the development of field-trained epidemiologists who are competent in the practical application of epidemiologic methods to a wide range of public health problems in their respective areas. Lao's Field Epidemiology Training (FET) program is a member of TEPHINET.

This conference provides an excellent opportunity for sharing of information, new technologies in disease prevention, detection and control. FETP trainees benefit from the experience of presenting their work to an international audience of experts among field epidemiologists in the two regions (Western Pacific and South East Asia). It is also the showcase for outbreak investigations and other public health practice/research activities done by current trainees and recent graduates of the FET/AET programs. Equally important is the opportunity for the participants to get to know their counterparts in the different countries, forge alliances, and strengthen the network.

We’re looking forward to an excellent meeting with great scientists and epidemiologists from different countries around the two regions to sharing and exchanging new and exciting experiences on scientific investigations and reporting.

Again, I welcome you to Lao PDR, “LAOS SIMPLY BEAUTIFUL,” and wish you a successful conference.

Sincerely,

Rattanaxay Phetsouvanh, MD, MSc, PhD
Director General of Department of Communicable Disease Control
Director of Field Epidemiology Program, Lao PDR
# Conference Steering Committee

<table>
<thead>
<tr>
<th>Role</th>
<th>Name and Title</th>
</tr>
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<tbody>
<tr>
<td><strong>Chair</strong></td>
<td>Assoc. Prof. Dr. Bounkong Syhavong, Ministry of Health</td>
</tr>
<tr>
<td><strong>Vice Chairs</strong></td>
<td>Dr. Rattanaxay Phetsouvanh, Department of Communicable Disease Control (DCDC)</td>
</tr>
<tr>
<td></td>
<td>Dr. Nao Bouthta, Ministry of Health Cabinet</td>
</tr>
<tr>
<td><strong>Members</strong></td>
<td>Assoc. Prof. Dr. Bounnak Saysanasongkham, Department of Health and Rehabilitation</td>
</tr>
<tr>
<td></td>
<td>Dr. Sibounhome Archkhawong, Department of Communicable Disease Control (DCDC)</td>
</tr>
<tr>
<td></td>
<td>Dr. Sysavath Southanilaxay, Department of Communicable Disease Control (DCDC)</td>
</tr>
<tr>
<td></td>
<td>Dr. Onechanh Keosavanh, National Center for Laboratory and Epidemiology (NCLE)</td>
</tr>
<tr>
<td></td>
<td>Dr. Phonepraseuth Ounaphon, Vientiane Capital Health Department</td>
</tr>
<tr>
<td></td>
<td>Dr. Dionisio Herrera Guibert, Representative from TEPHINET</td>
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<tr>
<td></td>
<td>Dr. Maria Consorcia Lim-Quizon, Representative from SAFETYNET</td>
</tr>
<tr>
<td></td>
<td>Dr. Reiko Tsuyuoka, World Health Organization (WHO) Lao PDR</td>
</tr>
<tr>
<td></td>
<td>Dr. Manoj Murhekar, South Asia TEPHINET Advisory Board Representative</td>
</tr>
<tr>
<td></td>
<td>Dr. Martyn Kirk, Western Pacific TEPHINET Advisory Board Representative</td>
</tr>
</tbody>
</table>
Abstract Reviewers

Ancha, Ansariadi
Andrews, Ross
Araffin, Rosemawati
Archkhawongs, Sibounhom
Asri, Muhammad
Aye, Tin Tin
Aye, Yin Myo
Bhatnagar, Tarun
Chanachai, Karoon
Cheng, Ka Yeung
Chin, Wan
Chinnaya, Thilaka
Choudhary, Sushma
Denny, Justin
Do, Hien
Fontaine, Robert
Garfin, Anna Marie Celina
Guzman, Alethea De
Has, Phalmony
Herrera, Dionisio
Hidajah, Atik Choirul
Housen, Tambri
Huang, Angela
Jayme, Sarah
Kamaludin, Fadzilah
Kennedy, Erin
Khampahphongpha, Bouaphanh
Kirk, Martyn
Kitthiphong, Viengsavanh
Kounnavong, Bouneuang
Lai, Jana
Leuangvilay, Phetdavanh
Lewis Winter, Hannah
Long, Vu Ngoc
Machingaidze, Chiedza
Maes, Ed
Miyakawa, Masami
Moore, Matthew
Namwat, Chawetsan
Nolan, Leisha
Oishi, Kazunori
Pabellon, Joy Althea
Padungtod, Pawin
Parry, Amy
Patil, Amol
Phengxay, Manilay
Quizon, Maria Consorcia
Reyes, Vikki De los
Roces, Maria Concepcion
Roper, Katrina
Sawitri, Anak Agung Sagung
Sidharta, Yuwono
Soutthaniraxay, Sisavath
Su, Chia-ping
Sucalldito, Maria Nemia
Tayag, Eric
Ujang, Noorhaida
Ungchusak, Kumnuan
Villareal, Ma. Elaine Joy
Viola, Grace Abad
Vu, Anh Le
White, Mark
Winter, Christian
Xayaseng, Vilavanh
Yamba, Abel
Zhao, Pengfei
Zuasula, Juanito
Information about the Lao People’s Democratic Republic

About the Lao People’s Democratic Republic (or Lao PDR)

Lao PDR is a Southeast Asian country traversed by the Mekong River and known for mountainous terrain, French colonial architecture, hill tribe settlements and Buddhist monasteries.

Vientiane, the capital, is the site of the That Luang monument, where a reliquary reportedly houses the Buddha’s breastbone, plus the Patuxai war memorial and Talat Sao (Morning Market), a complex jammed with food, clothes and craft stalls.

Travel Advisory

Climate

On average, the temperatures are always high. A lot of rain (rainy season) falls in the months of May, June, July, August and September. Vientiane has dry periods in January, February, November and December.

Local Time

Lao runs at GMT +7 hours, the same time zone as its neighbors Thailand, Vietnam and Cambodia.

Currency

The local currency in Lao is the Kip which is issued in denominations of 500, 1000, 2000, 5000, 10000, 20000, 50000 & 100000 Kip notes. The exchange rate is about 1 USD = 8000 to 8500 LAK. In Vientiane you can also use Thai baht and USD, but if you do use these currencies you’ll always get change in Lao Kip.

Dress Code

Dress neatly when visiting religious shrines or temples.

It is OK to wear shoes if you just walk around a temple compound, but don’t forget to remove them before entering the chapel.

At some temples, women in shorts or short skirts are required to put on a Lao skirt as a top layer before entering the place. Lao skirts are available for rent or lent on the spot.

Despite the heat, Lao/Laotians dress conservatively. If you don’t want to be a “black sheep” dress neatly and moderately (don’t show too much skin) or you’ll get strange looks from the locals.
Most Lao people swim in rivers or waterfalls with at least shorts and a T-shirt. It is more polite to do this rather than walk around in swimsuits or bikinis. Also if you are in the country and have to bathe in the river, women should wear a sarong.

**Transportation**

A shuttle bus service operates between Vientiane Wattay airport and the Central Bus Station with stops at several hotels in the city center. One way fare is 15,000 kip.

Public taxi and minibus services are available at the domestic and international terminals. At both terminals the taxi counter is located near the arrivals exit.

Taxi rate to the center of Vientiane is USD 7 or 56-60,000 kip for a sedan car and USD 8 or 64-68,000 kip for a van. Buy a taxi coupon from the Airport Taxi counter before leaving the airport.

**For any assistance, please contact the following liaison officers:**

Dr. Viengsavanh Kitthiphong  
Tel. no.: 020 58254846  
Email address: fcformai@gmail.com

Dr. Malyvanh Vongphanhya  
Tel. no.: 020 22348160  
Email address: vmalyvanh@gmail.com

Dr. Latdavanh Mouanchanh  
Tel. no.: 020 55335953  
Email address: latdavanh_mch@yahoo.com

Dr. Daovieng Vanthadee  
Tel. no.: 020 55876992  
Email address: daovieng.dao9@gmail.com
Registration and Information

Registration and Conference Secretariat

The registration desk will be open the whole day on Monday (November 5) and on the morning of Tuesday (November 6).

The conference secretariat, located in the second floor VIP II room, will be open during the conference days from 8:00 AM to 5:30 PM.

Participants may register, pay for conference fees and hotel accommodations, and receive their name badges, conference booklets and souvenirs at the registration desk located at the lobby of the venue on the first day and on the second floor on the second day.

Lunch will be served at Riverland Restaurant and Yue Yuan Chinese Restaurant.

The Welcome Ceremony Dinner (November 5) will be in Convention Hall A, located on the second floor.

International Night (November 7) will be in Convention Hall A, located on the second floor.

Participants can also register for field visits during the afternoon of November 8 (Thursday). Buses will take the participants to the sites for free, but they must pay entrance fees. Entrance fees will be posted during the conference.

Mobile App

Download the conference mobile app to view and customize your agenda, interact with other attendees, receive important announcements and alerts, vote in the photo contest, and more!

The app is available for iOS and Android devices. To download the app, follow these instructions:

- Download the AttendeeHub app from your app store.
- Open the app and search the event directory for TEPHINET.
- Install the event (9th Southeast Asia & Western Pacific Bi-regional TEPHINET Scientific Conference).

**Tip:** Follow the prompts within the app in order to log in and unlock the app’s full functionality.
## Program-at-a-Glance

<table>
<thead>
<tr>
<th>Time</th>
<th>MON (5 Nov)</th>
<th>TUE (6 Nov)</th>
<th>WED (7 Nov)</th>
<th>THU (8 Nov)</th>
<th>FRI (9 Nov)</th>
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<tbody>
<tr>
<td>08:00-08:30</td>
<td>REGISTRATION</td>
<td>One Health Collaboration</td>
<td>Australia’s Health Security Initiative: strengthening regional response capabilities for infectious disease outbreaks</td>
<td>Overview of Lao Field Epidemiology Training</td>
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<tr>
<td>08:30-09:00</td>
<td>Opening Session</td>
<td>Pilot Surveillance Study on Extended Spectrum Beta Lactamase (ESBL)-Producing <em>E. coli</em> in Broiler Farms in Central Luzon, Philippines</td>
<td>Role of Epidemiologists during natural disasters and health emergencies</td>
<td>SHIP Programme in the Pacific</td>
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<tr>
<td>09:00-09:30</td>
<td>Plenary Session on Polio Eradication</td>
<td>Veterinary Epidemiology Training (FETPV and AVET)</td>
<td>Plenary Session on JEE results for countries in SEA and WP regions</td>
<td>Plenary Session on Investing in and Institutionalising FETPs (perspectives of MOHs and partner agencies)</td>
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<tr>
<td>09:30-10:00</td>
<td>WS 1: TEPHICconnect (TEPHINET)</td>
<td>Role of Supervisors or Mentors in Field Epidemiology Training</td>
<td>Coffee/Tea Break</td>
<td>Awarding and Closing Ceremony</td>
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<tr>
<td>10:00-10:30</td>
<td>WS 2: Bridging the Gap between Research and Policy (SAFETYNET)</td>
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<td>Latebreakers</td>
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<tr>
<td>10:30-11:30</td>
<td>WS 3: Scientific Writing (WHO WPRO)</td>
<td>Oral Presentations (Vaccine Preventable Diseases 1)</td>
<td>Oral Presentations (Vaccine Preventable Diseases 2)</td>
<td>Oral Presentations (Vaccine Preventable Diseases 3)</td>
<td>Oral Presentations (Vaccine Preventable Diseases 4)</td>
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<tr>
<td>11:30-12:00</td>
<td>WS 4: NCD (US CDC)</td>
<td>Oral Presentations (Foodborne Diseases)</td>
<td>Oral Presentations (Foodborne Diseases)</td>
<td>Oral Presentations (Foodborne Diseases)</td>
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<td>12:00-13:00</td>
<td>Oral Presentations (Infectious Diseases)</td>
<td>Oral Presentations (Infectious Diseases)</td>
<td>Oral Presentations (Vectorborne Diseases &amp; Zoonoses)</td>
<td>Oral Presentations (Vectorborne Diseases &amp; Zoonoses)</td>
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<tr>
<td>14:00-15:00</td>
<td>Oral Presentations (Reproductive Health &amp; STDs)</td>
<td>Oral Presentations (Reproductive Health &amp; STDs)</td>
<td>Oral Presentations (Reproductive Health &amp; STDs)</td>
<td>Oral Presentations (Reproductive Health &amp; STDs)</td>
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<tr>
<td>15:00-15:30</td>
<td>Oral Presentations (Non-communicable Diseases)</td>
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<td>Oral Presentations (Non-communicable Diseases)</td>
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<tr>
<td>15:30-17:00</td>
<td>Oral Presentations (Outbreak Investigations)</td>
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<td>17:00-18:00</td>
<td>Oral Presentations (Respiratory Diseases)</td>
<td>Oral Presentations (Respiratory Diseases)</td>
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<tr>
<td>08:00-08:30</td>
<td>Welcome Ceremony &amp; Dinner</td>
<td>International Night</td>
<td>FETP Directors’ Dinner Meeting</td>
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<td>08:30-09:00</td>
<td>Coffee/Tea Break</td>
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<td>Coffee/Tea Break</td>
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<tr>
<td>18:30-20:30</td>
<td>Coffee/Tea Break</td>
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### Locations of Oral and Poster Presentations

**Tuesday, 6th November**

| Time   | Oral Presentations: Vaccine Preventable Diseases 1
<table>
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<tbody>
<tr>
<td></td>
<td>Convention Hall A, 2nd Floor</td>
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</tbody>
</table>
|        | Oral Presentations: Vaccine Preventable Diseases 2
|        | Convention Hall B, 2nd Floor                                |
|        | Oral Presentations: Vaccine Preventable Diseases 3
|        | Multifunction Hall, 14th Floor                              |
|        | Oral Presentations: Vaccine Preventable Diseases 4
|        | Conference Hall, 14th Floor                                 |

**Wednesday, 7th November**

| Time   | Oral Presentations: Infectious Diseases 1
<table>
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<tr>
<td></td>
<td>Convention Hall A, 2nd Floor</td>
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</tbody>
</table>
|        | Oral Presentations: Food and Waterborne Diseases 5
|        | Convention Hall A, 2nd Floor                    |
|        | Oral Presentations: Food and Waterborne Diseases 6
|        | Convention Hall B, 2nd Floor                    |
|        | Oral Presentations: Zoonoses and Vector Borne Diseases 1
|        | Multifunction Hall, 14th Floor                   |
|        | Oral Presentations: Zoonoses and Vector Borne Diseases 2
|        | Conference Hall, 14th Floor                      |

**Thursday, 8th November**

| Time   | Poster Presentations: Zoonoses (Group E)
<table>
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<tr>
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<td>Outside of Convention Hall A, 2nd Floor</td>
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</table>
|        | Poster Presentations: Infectious Diseases (Group F)
|        | Convention Hall A, 2nd Floor                                       |
|        | Poster Presentations: Surveillance Systems (Group G)
|        | Convention Hall A, 2nd Floor                                       |
|        | Poster Presentations: Other Topics (Group H)
|        | Convention Hall A, 2nd Floor                                       |

**Friday, 9th November**

| Time   | Oral Presentations: Late-breakers
<table>
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<td>Convention Hall A, 2nd Floor</td>
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</table>

**3:30pm**

**1:30pm**
Locations of Other Sessions

**Monday, November 5**
Conference registration: Hotel lobby
Pre-conference workshops (see below):

- **TEPHICConnect**: Savannakhet Room, 1st floor
- **Translating Research into Policy Recommendations**: Savannakhet Room, 1st floor
- **Scientific Writing**: Khammouang Room, 1st Floor
- **Non-communicable Diseases**: Convention Hall B, 2nd Floor
- **Finding Our Way through the Data Forest**: Multifunction Hall, 14th floor

Welcome dinner and opening ceremony: Convention Hall A, 2nd floor

**Tuesday, November 6**
Conference registration: Outside of Convention Hall A, 2nd floor
Plenary sessions: Convention Hall A, 2nd floor

**Wednesday, November 7**
Plenary sessions: Convention Hall A, 2nd floor
International Night: Convention Hall A, 2nd floor

**Thursday, November 8**
Plenary sessions: Convention Hall A, 2nd floor
FETP directors’ meeting/FETP accreditation workshop: Multifunction Hall, 14th floor

**Friday, November 9**
Plenary sessions: Convention Hall A, 2nd floor

Note: The **conference secretariat office** is located on the second floor in room **VIP II**.
Pre-conference Workshops

After registering for the conference, participants are entitled to attend one workshop of their choice. Participants will be accommodated on a “first come, first served” basis until the slots for a particular workshop have filled up.

**Workshop: TEPHIConnect and FETP Alumni Engagement (TEPHINET)**
8:30 a.m. - 12:00 noon
Savannakhet Room, 1st Floor

TEPHIConnect is TEPHINET's free online networking platform for FETP alumni. Participants will be introduced to the TEPHIConnect platform and its functions. The second half of the workshop will be used to teach participants how to sign up, develop and improve their profiles on TEPHIConnect and practice engaging with the platform. This will be a participatory workshop and participants should bring their laptops.

Maximum number of participants: **25**

**Workshop: Measuring the Impact of Sustainable Development Goal 3, Non-communicable Disease (NCD) Target: Planning a Cardiovascular Health Investigation (U.S. CDC, Center for Global Health, Division of Global Health Protection)**
8:30 a.m. - 5:00 p.m.
Convention Hall B, 2nd Floor

This interactive training aims to enhance participants’ skills on proposal development for NCD epidemiology surveillance and studies, specifically cardiovascular disease (CVD) and associated risk factors like hypertension. It will introduce participants to the key components of a proposal, including project aims and study methodology. Topic areas include 1) Real-world application/potential impact: Introduction to evidence-based CVD management and prevention strategies (i.e., WHO Best Buys and HEARTS Technical Package); 2) Data sources: Showcase how best to identify publicly available CVD/HTN data; and 3) Communications: Craft a proposal that will attract resources. Taking the information learned, participants will then spend time practicing by drafting a proposal that can be submitted for funding via TEPHINET mini-grants. Subject matter experts will be available to answer questions and provide real-time feedback.

Maximum number of participants: **50***

*Note: 45 slots are reserved for participants from China, India and Thailand invited by the U.S. CDC. Five slots are available for participants from other programs who are interested in doing studies related to non-communicable diseases.

**Workshop: Scientific Writing (WPSAR/WHO WPRO)**
8:30 a.m. - 5:00 p.m.
Khammouang Room, 1st Floor
This workshop is designed to introduce participants to a structured approach to writing scientific papers for publication in peer-reviewed journals. During the workshop, the writing process will be broken down into a series of smaller steps and activities conducted to improve technical writing skills and the analysis of data. The workshop will be run by staff of the Western Pacific Surveillance and Response Journal—a journal that publishes field epidemiology studies including surveillance analyses, outbreak investigations and risk assessments.

Maximum number of participants: 30

**Workshop: Translating Research Into Policy Recommendations (SAFETYNET)**  
1:30 p.m. - 5:00 p.m.  
Savannakhet Room, 1st Floor

The general objective of the seminar-workshop is to enhance the expertise of current or future research leaders in bridging the research-policy divide with a better understanding and application of integrative methods, thus, allowing them to better support agencies in their respective countries in adopting evidence-based approaches to policy making. It will provide a platform for co-formulating policy-relevant research questions and for exploring and evaluating one health policy options. Participants will be required to develop a Policy Brief on one priority health issue for consideration by their respective local governments. They are expected to demonstrate understanding of policy systems, and knowledge about a range of methods for systematic planning including problem tree analysis, stakeholder analysis, influence mapping and policy entrepreneurship.

Participants should bring a laptop during the workshop for developing and writing up of policy briefs from their own research studies.

Maximum number of participants: 30

**Workshop: Finding Our Way through the Data Forest; How Advances in Data Analytics Can Strengthen Operational Responses and How the FETPs Could Lead in This Joint Effort (RECON/Australia MAE)**  
1:30 p.m. – 5:00 p.m.  
Multifunction Hall, 14th floor

*This workshop is sponsored by the Indo-Pacific Centre for Health Security, DFAT, Australia. Target participants are FETP Directors and training staff.*

Outbreak and emergency responses rely heavily on the timely acquisition of data from the field, subsequent analyses and presentation of results to guide and justify the operational response. The path from data acquisition towards presentation is hampered by many bottlenecks that lead to significant delays which have been identified as a priority area of action by many stakeholders who routinely work on the operational sides of outbreak responses.

The R-Epidemics Consortium (RECON) was founded to face this challenge in the wake of the 2014-2015 Ebola outbreak in West-Africa and to date includes over 70 individuals from more than 35 institutes worldwide. Members have different relevant
backgrounds, ranging from field epidemiologists, public health microbiologists to software developers, programmers, mathematical modelers and health policy makers. Jointly its goal is to develop tools for data analytics in emergency situations which are available for free and are all open source. All tools are developed in the statistical software package R which is free and open source.

Using more standardized methodologies will increase consistency in data analytics as well as producing data that is better understandable for relevant stakeholders with limited knowledge in epidemiological analyses. Further it will save valuable time on the side of the field epidemiologist allowing them to focus more on the implementation of appropriate interventions to mitigate the effects of the outbreak and advocate based on scientific results to other stakeholders. Furthermore, increasing consistence in collecting and analyzing data will allow us to use it more efficiently for research purposes.

During this workshop we would like to discuss what the current challenges are in the arena of data analytics for field-epidemiologists and microbiologists in the region are and how we can incorporate this in a global development agenda for data analytics in outbreaks and other medical emergencies. Furthermore, RECON also heavily focusses on developing training. Also, here, all training modules and case-studies are made available online on RECON Learn, free of costs under an open-source license. We would like to discuss with the participants in an interactive way, what they perceive as current needs in training on data analytics and what the general pool of participants think that Field epidemiology programs should be focusing on in the coming years.

The workshop will be a combination of interactive lectures and discussions in smaller groups (to facilitate more open discussion) and plenary discussions. At the end recommendations will be formulated which will be used in the development of priority guidelines of RECON.

Maximum No. of Participants: 30
Field Site Visits: Thursday, November 8

Participants will have a choice of joining one of three tours offered on Thursday afternoon (November 8). These tours will combine sightseeing and visiting a local health organization.

>> Option 1 (Group 1): Vientiane Half Day City Tour

Enjoy a half-day guided tour to discover the hidden charms of Vientiane, which means the “city of sandalwood.” Vientiane is one of the quietest capital cities in the world, far away from the hustle and bustle of other Asian capitals. Visit some of the most popular attractions including the Wat Sisaket and Wat Phra Keo.

14:00-14:30: Afternoon departure. Tour begins at the National Center of Laboratory and Epidemiology to observe routine surveillance systems, field epidemiology training and the national influenza center.

14:30-15:00: Continue on to visit serene Wat Sisaket, one of the most beautiful temples in the capital. Its breezy, teak-covered hallways are filled with thousands of miniature Buddha statues. Continue on to the nearby Wat Phra Keo. Used as a religious museum, Wat Phra Keo displays a collection of both Lao and Khmer works of art. Also nearby is the Presidential Palace. Although you are not allowed to visit inside, it provides a good glimpse into the town’s colonial past as this building formerly served as the French governor’s palace.

15:00-16:00: Continue to the Patuxay monument, Laos’ version of the Arc de Triomphe, where you can climb the stairs to the roof for sweeping panoramic views of the city. Next, your tour takes you to That Luang, the holiest site in Laos. Constructed by King Setthethirat in the 16th century, the temple is resplendent as the sun shines upon its towering golden spire.

17:00-18:00: Ending tour of the capital along the banks of the Mekong River. Stroll along the river, stop to enjoy a cold drink, or sample a snack from one of the many local food stalls.

19:00: Transfer back to the hotel.
Option 2 (Group 2): Health Facility Field Visit in Vientiane Capital

This tour will bring you to the semi-remote area of District Hospital (Hadsayfong District Hospital) and Thapha Health Center in Vientiane Capital, including Buddha Park. Buddha Park (a.k.a. Xieng Khuan) is a famous sculpture park with more than 200 religious statues, including a huge 40-meter high reclining Buddha.

14:00-15:30: Depart hotel to visit Hadsayfong District Hospital.

15:30-16:30: Visit Thapha Health Center.

16:30-18:00: Ending tour of the Thai-Lao Friendship Bridge and visit to Buddha Park/Xieng Khuan.

19:00: Return to the hotel.
Option 3 (Group 3): Vientiane Half Day City Tour – COPE Visitor Center, Museum and Wat Si Meuang Temple

14:00-15:00: Begin at the COPE Visitor Center. COPE’s mission is to help people with mobility-related disabilities move on by supporting access to physical rehabilitation services in the Lao PDR. As part of the exhibition, watch a number of excellent documentary films about UXO (unexploded ordnance, or explosive weapons that did not explode when they were employed and still pose a risk of detonation) and COPE. Inside the COPE Visitor Center, you will find our gift shop where you can purchase t-shirts, postcards, and other items or simply make a donation.

15:00-16:00: Visit the Lao People’s Army Museum

Established in 1976, the museum is situated within the Defense Ministry on Phomvihane road. It houses important weapons and ancient tools and also contains photographs of the Lao People’s Army. These pictures were taken during the period starting from 1950 until the place was liberated and the people got independence leading to the establishment of their democracy in 1975.

An exhibition on various vehicles and planes used in the war is located right outside the main building. A statue of a Lao leader is an important figure in the museum. The gallery consists of many stories of different soldiers.

16:30-17:30: Visit Wat Si Meuang temple

Wat Si Muang is one of Vientiane’s most popular sites of worship and offers a fascinating insight into how old animist beliefs have blended seamlessly with Theravada Buddhism. According to local legend, when the temple was being built in 1563, a young pregnant woman named Si Muang volunteered to sacrifice herself to appease the angry spirits.

17:30 -18:30: Ending tour of the capital along the banks of the Mekong River. Stroll along the river, stop to enjoy a cold drink, or sample a snack from one of the many local food stalls.

19:00: Return to the hotel.
Schedule of Oral and Poster Presentations

On the next 11 pages, you will find the detailed schedule of oral and poster presentations.

Poster abstracts are numbered P1 through P40 as posters will be hanging in their respectively numbered spots.

This schedule is also available on the conference website and mobile app.
9th Southeast Asia & Western Pacific Bi-regional TEPHINET Scientific Conference - 5th to 9th November 2018

Tuesday, 6th November

10:30am  Oral Presentations: Vaccine Preventable Diseases 1
Convention Hall A, 2nd Floor

10:30am  The Elimination of Measles in Malaysia by 2018- How Close are We?
» Dr Thilaka Chinnayah

10:48am  A Pertussis Outbreak among Adolescents, Thailand, 2018: from Home to School
» Nichakul Pisitpayat, Pantila Taweewigyakarn, Pantasak Boonrak, Nuttapon Jaiwong, Chawakit Deeooum

11:06am  An Outbreak of Varicella in a Primary School - Fujian, China, 2017
» Keqing Tian, Guoqing Shi, Jianming Ou

11:24am  Outbreak Investigation of Re-Emerging Diphtheria Infection - Telangana state, India, 2017
» Kiran Kumar Maramraj, Kavitha Latha ML, Rukma Reddy, Sukrutha Reddy, Samir V Sudha, Suneet Kaur, CS Aggarwal, Sujeet Kumar Singh

11:42am  Using dried blood samples of universal newborn screening for detection of congenital rubella syndrome—Taiwan, 2016–2017
» Pei-Yuan Wu, Chia-ping Su, En-tzu Wang, Fu-tien Lin

10:30am  Oral Presentations: Vaccine Preventable Diseases 2
Convention Hall B, 2nd Floor

10:30am  Outbreak Investigation of Measles - Longding District, Arunachal Pradesh, India, June 2017
» Kevisetuo Anthony Dzeeyie, Dipu Lowang, Tanszin Dikid, Wangnai Wangsu, Tapak Tamir, Rajesh Yadav, Samir V Sudha, CS Aggarwal, A.C. Dharwal

10:48am  Investigation on re-emergence of Pertussis among adolescents and role of complete vaccination in School P, Chiang Mai, Thailand, September 2017
» Chawakit Deeooum, Patcharin Tantiworrawit

11:06am  An intervention to measure and improve immunization coverage of one year old children in Kieta district, Central Bougainville - Papua New Guinea, 2016
» Roselyn Gatana, Alois Pukienei, Tony Merritt

11:24am  Investigation on the Accuracy of Viral Hepatitis B Reporting in Gannan Tibetan Autonomous Prefecture of China, 2017
» Wang Pinggui, Lijie Zhang, Guomin Zhang, Jian He, Yuan Ma, Weimin Lv

11:42am  The re-emergence of rotavirus - New South Wales, Australia, 2017
» Julia Maguire, Helen Quinn, Keira Glasgow, Kathryn Glass, Susie Roczo-Farkas, Julie Bines, Vicky Sheppeard

10:30am  Oral Presentations: Vaccine Preventable Diseases 3
Multifunction Hall, 14th Floor

10:30am  Children overdue for immunisation: a question of coverage or reporting? An audit of the Australian Immunisation Register
» Charlee Law, Rhydwyn McGuire, Mark Ferson, Su Reid, Colleen Gately, Jody Stephenson, Sue Campbell-Lloyd, Salwa Gabriel, TA Housen, Vicky Sheppeard, Paul Corben, David Durrheim

10:48am  Identifying and addressing barriers to immunization for young children in Gazelle District, East New Britain Province, Papua New Guinea, 2017
» Elsie Stanley, Alois Pukienei, Tony Merritt

11:06am  Outbreak investigation of measles among a migrant population, Shram Vihar, Delhi, India, February 2018
» Syed Qadri, Kevisetuo Anthony Dzeeyie, Meera Dhuria, Samir V Sudha, Ekta Saroha, Suneet Kaur, Rajesh Yadav, Charu Prakash, Purva Sarkate, Nidhi Bhatnagar, Davendra Kumar, Ashok Talyan, Akhileshwar Singh, Rakesh Guptä, Preeti Madan, Ginisha Gupta, CS Aggarwal, Sujeet Singh

Powered by Ex Ordo all-in-one abstract management software.
11:24am Pertussis outbreak in Saravan Province, Lao PDR, 2018

» Souny Keobouns, Bounthanom Sengkeopraseuth, Pinkham Phanthavong, Manlay Phengxay, Bouaphanh Khamphaphongphane

11:42am An Outbreak of Epidemic Cerebrospinal Meningitis in an Unvaccinated Population in a County of Northwest China, 2017

» Liu Tiecheng, Zundong Yin, Yixing Li, Lijie Zhang

10:30am Oral Presentations: Vaccine Preventable Diseases 4

Conference Hall, 14th Floor

10:30am Knowledge about Hand, Foot, and Mouth Disease and Acceptability of Enterovirus 71 Vaccine among Parents of under-five year old children in Chongqing, China

» Li Qi, Tao Shen

10:48am Influenza A Outbreak among Inmates of a Rehabilitation Centre--Pahang, Malaysia, 2017

» Sahrol Azmi Termizi, Rohani Ismail

11:06am Measles outbreak in the villages near Myanmar-China border, Eastern Shan State, April 2018

» Ba Soe Thet, Witaya Swaddiwudhipong, Zaw Lin, Sithu Tun

11:24am Mixed Rubella-Measles Outbreak in a Rural Community in Temanggung District, Central Java, Indonesia, 2016

» Putri Tiara Rosha, Khabib Mualim, Dibyo Pramono

11:42am Investigation and response to Measles outbreak in Vietnam National Children's Hospital, September-December 2017

» Thi Hong Nhungh Pham, Minh Dien Tran, Kien Ngai Le, Phuong Thuy Nguyen, Thanh Hai Le, Thi Hong Hien Do

1:30pm Poster Presentations: Food and Waterborne Diseases (Group B)

Outside of Convention Hall A, 2nd Floor

P23. An outbreak of diarrhea attributed to consumption of street-foods- Bangladesh, March 2018

» Nawroz Afreen, Abdullahel Maruf, Manjur Hossen Khan, Michael Friedman, Meerjady Sabrina Flora

P34. A Food borne Outbreak among funeral attendees associated with Staphylococcus aureus, Kampong Province, Cambodia – September 2017

» Chhunlong Sun, Tek Bunchhoeung

P15. Salmonellosis Outbreak associated with a Chicken Stall in Purbalingga District, 2017

» Fitri Kusuma Dewi, Theodola Baning Rahayujati, Semedi Santoso

P12. Food Poisoning Outbreak Following Sachet Drink Consumption — Sleman District, Indonesia, 2018

» Menikha Maulida, Iffa Karina Permatasari, Suprio Heryanto, Trisno Agung Wibowo

P13. Investigation of a Food Poisoning Outbreak from Beef Stew with Coconut Milk Sauce Consumption — Kulon Progo District, Indonesia, 2018

» Iffa Karina Permatasari, Nurjanna Nurjanna, Sugiaro _, Titiek Hidayati, Sarmini Sarmini, Sulistyorini Sulistyorini

11:24am Mixed Rubella-Measles Outbreak in a Rural Community in Temanggung District, Central Java, Indonesia, 2016

» Putri Tiara Rosha, Khabib Mualim, Dibyo Pramono

11:42am Investigation and response to Measles outbreak in Vietnam National Children's Hospital, September-December 2017

» Thi Hong Nhungh Pham, Minh Dien Tran, Kien Ngai Le, Phuong Thuy Nguyen, Thanh Hai Le, Thi Hong Hien Do

1:30pm Poster Presentations: Foodborne Diseases (Group A)

Outside of Convention Hall A, 2nd Floor

P11. Bacillus cereus contamination of Donated Food for an Orphanage in Gunung Kidul District, Indonesia, 2017

» Meliana Depo, Fovilia Dewi, Samsu Aryanto

P27. Acute Gastroenteritis Outbreak in the District of Pusai Betong, Sarawak, 2017

» Ai Chia Ho, Rosemawati Ariffin

P1. Shigella flexneri Food Poisoning Outbreak in a School in Orkhon Province, Mongolia, May 2018

» Oyuna Tumurbaatar, Baigalmaa Jantsansengee, Batdorj Batjargal
P22. Foodborne outbreak following an Engagement Party, Prey Veng Province, Cambodia, July 2017
   » Tonh Prin

   » Alethea De Guzman, Karen Lonogan, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

P20. A Cohort Study of a Capillariasis Outbreak in a Rural village, Mindanao, Philippines, 2017
   » Alethea De Guzman, Jasper Kent Ola, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

P37. Staphylococcal Food Poisoning among Police Personnel Deployed at the Association of Southeast Asian Nations (ASEAN) Summit – Hotel X, Pasay City, Philippines, August 2017
   » Alethea De Guzman, Precious May Gabalfin, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

P4. Waterborne Norovirus Outbreak in Nanchong City likely Originating from Municipal Water Contamination
   » Shuhua Ren

P6. A Large Outbreak of Norovirus Infection among Students from 4 Schools on a Spring Outing, Wenzhou, China, 2018
   » Bin Lv, Tiecheng Liu, Jian Cai, He Fan, Zhaorong Ni, Lu Ran, Huihui Liu

P26. Outbreak of Foodborne Gastroenteritis in a School, Kohima District, Nagaland, India, September 2017
   » Takjurungla Jamir, John Kemp, Nyanthung Kikon, Asenla Lemtur, Alhunuo Khezhie, Nyanbeni Murry

P39. Fatal puffer fish poisoning reported in Northwest Cambodia, 2017
   » Khay Say, Sophanith Ung

P18. Methanol poisoning and illness associated with consumption of contaminated water - North Eastern Province, Cambodia, 2018
   » Sengdoeurn Yi, Sovann Ly, Rotha Pen, Sophanith Ung

P17. Epidemiological Investigation of Illnesses Following Suspected Chemical Spill, District Shamli, Uttar-Pradesh, India, October-November, 2017
   » Ashok Talyan, Syed Qadri, Meera Dhuria, P Khasnobis, Pavana Murthy, Sudhir Jain, CS Aggarwal, A.C. Dhariwal, Sujeet Singh

   » Tassana Thammaros

P10. Premature Mortality from Coronary Heart Disease - Regional Health Service 4 of Thailand, 2014-2015
   » Kittiphan Chalom, Phanthanee Thitichai

P38. An outbreak of gastroenteritis caused by Escherichia coli EPEC in a children's shelter in Ben Tre, Vietnam, 2017
   » Uyen Thi Ngoc Phan, Hung Cong Phan, Lan Trong Phan

   » Yeshambel Worku, Melaku Kindie

P36. Acute diarrheal disease outbreak investigation, Muzaffarpur village, Chandauli district, Uttar Pradesh, India, September 2017
   » Ginisha Gupta, Akhileshwar Singh, Neelam Ojha, Tanzin Dikid, Ekta Saroha, Saurabh Goel, P Khasnobis, Samir V Sadha, CS Aggarwal, Sujeet Singh
3:30pm  Oral Presentations: Food and Waterborne Diseases 2
Convention Hall B, 2nd Floor

3:30pm  An outbreak of acute diarrheal disease - Thiruper, Tiruvalur district, Tamil Nadu, India, 2016
» Mohan Anandan, VS Saraswathi, Manickam Ponnaiah

3:48pm  A Cohort Study of a Shigella flexneri 2a Outbreak during a Village Foundation Anniversary Celebration, Samar, Philippines, 2017
» Alethea De Guzman, Jasper Kent Ola, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

4:06pm  Food poisoning outbreak possibly caused by Staphylococcal enterotoxin A in Sagaing Region, Myanmar, April 2018
» Yamin Thaung, Nyi Nyi Lwin, Kyaw Thu Swe, Htun Tin, Ko Ko Zaw, Win Lwin, Witaya Swaddiwudhipong

4:24pm  Staphylococcal Food Poisoning Outbreak during a Traditional Ceremony In a Rural Area, Temanggung District, Central Java, 2017
» Faridatun Khasanah, Juliante Jeanette Sabono, Khabib Mualim, Dibyo Pramono

4:42pm  Outbreak investigation of infectious diarrhea associated with eating unheated smelly bean curd, Anhui Province, China – June 2017
» Ming Yang, Jiabing Wu, Sai Hou, Fang Chen, Xiaomin Wu, Jian Chen, DaFang Ge, Liangliang Jiang, Tao Shen, Huilai Ma, Wenwu Yin, Lijie Zhang

3:30pm  Oral Presentations: Food and Waterborne Diseases 3
Multifunction Hall, 14th Floor

3:30pm  Epidemiological Investigation of a Hepatitis A Outbreak - Sabah, 2017
» Muhammad Jikal, Ismail Ali, Michal Christina Steven, Esther Barnad, Soong Du Er, A.I. Liza Latip, Ahmad Faudzi Mohd Yusoff

3:48pm  An Outbreak of Hepatitis A associated with Contaminated Water Sources – Sabang Village, Suroiga del Sur, Philippines, August – December 2017
» Alethea De Guzman, Denisse Lou Manalili, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

4:06pm  Outbreak of food poisoning in a rural boarding school - Aurangabad, Maharashtra, India, 2017
» Vijaykumar Wagh, Tarun Bhatnagar, Manoj Murhekar

4:24pm  An Outbreak of Acute Diarrhea caused by Astrovirus in a school–Guangxi, China, 2017
» Jianfeng Liu, Weitao Song, Jing Zhang, Bo Li, Huihui Liu, Xiaoqing Fu

4:42pm  An investigation of enterovirus outbreak with probable enterovirus-related death in a child development center, Tak Province, Thailand, 2017
» Nichakul Pisitpayat, Thanit Rattanathumsakul, Pipaporn Morarach, Thanachol Wonghirundecha, Chamnan Pinna

3:30pm  Oral Presentations: Food and Waterborne Diseases 4
Conference Hall, 14th Floor

3:30pm  Cholera Outbreak in Sub-village Megbadiang, Pangantucan, Southern Mindanao, Philippines, 2017
» Alethea De Guzman, Alireza Faiyaz, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

3:48pm  A Waterborne Outbreak of Paratyphoid A Transmitted from Community to School - Yunnan Province, China, 2017
» FENG Qiwen, Wentao Song, Jing Zhang, Bo Li, Huihui Liu, Xiaoqing Fu
### 9th Southeast Asia & Western Pacific Bi-regional TEPHINET Scientific Conference - 5th to 9th November 2018

**Wednesday, 7th November**

**10:30am**  **Oral Presentations: Food and Waterborne Diseases 5**  
*Convention Hall A, 2nd Floor*

- **A Foodborne Gastroenteritis Outbreak in a Primary School Caused by Asymptomatic Norovirus-excreting Kitchen Staff in Hubei Province, China, 2017**  
  » Xiaomin Wu, Rui Wang, Huihui Ma

- **Outbreak Investigation of Foodborne Illness among guests at a Wedding Ceremony, Makunsar Village, Paigah District, Maharashtra, India - February 2018**  
  » Vaishali Varshney, Tannaz Diksh, Rajesh Yadav, Samir V Sodha, RP Patil, A Khandare, P Awate, CS Aggarwal, Sujet Kumar Singh, P Khasnobis

- **A protracted outbreak of Salmonella Hessarek infection associated with one brand of eggs - South Australia, March 2017-May 2018**  
  » Bernadette Kenny, Megge Miller, TA Housen

**11:24am**  **An outbreak of dual bacterial contaminated lunch boxes during a Vesak celebration in Yasothon Province, 2018**  
*Thanachol Wonghirundecha, Darin Areechokchai, Panithee Thammawijaya*

**11:42am**  **A neighborhood picnic ended in a neighborhood food poisoning in Yogyakarta, Indonesia, 2017**  
*Fovilia Dewi, Dahlan Napitupulu, Susilawati Susilawati, Riris Andono Ahmad*

**10:30am**  **Oral Presentations: Food and Waterborne Diseases 6**  
*Convention Hall B, 2nd Floor*

- **Norovirus GII.2 foodborne outbreak in three schools — Hualien, Taiwan, June 2017**  
  » Hsin-I Huang, Wan Chin, Wan-Ting Huang, I-chen Cheng, Fang-tzy Wu

- **Foodborne outbreak investigation in a rural pagoda, Kampong Cham Province, Cambodia, August 2016**  
  » Buntha So, Phalmony Has, Phat So, Tek Bunchhoeung, Puthik Long Hay, Sokdaro Soy, Savuth Thai, Sengdeourn Yi

- **An Outbreak of Acute Gastroenteritis Caused by Cold Dishes Contaminated with Enteroaggregative Escherichia coli (EAEC) in a Senior High School, Suzhou, China, 2017**  
  » Hongjun Zhou, Mengjiao Zhao, Hui Liu, Risheng Zha, Jun Zhang, Lixin Hao, Lijie Zhang

**11:24am**  **Hepatitis outbreak in Halishahor, Chattagram, Bangladesh, 2018**  
*Husam Muhammad Alam, Abdurahman Maruf, Manjur Hosen Khan, Mallick Masum Billah, M. Salim Uzzaman, Meerjady Sabrina Flora*

**11:42am**  **An outbreak of hepatitis E caused by contaminated drinking water from a bore well in an urban slum, Bhubaneswar, Odisha, India, 2017**  
*Anna Salomi Kerketta, Manickam Ponnaiah*
10:30am A Case-Control Study of a Chikungunya Outbreak in an Island – Busuanga, Palawan, Philippines, May 8 to August 10, 2017
   » Alethea De Guzman, Precious May Gabalfin, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

10:48am Knowledge and Practices on Malaria in Ngaputaw township, Ayeyawady Region, Myanmar, 2016
   » Thet Su Mon, Krongthong Thimasarn, Waraluk Tangkanakul, Tun Myint

11:06am Microcephaly and other congenital abnormalities in Vientiane, Lao PDR: a review of medical records in central hospitals (2011-2016)
   » Anoukone Bouphasyli, Bouaphanh Khamphaphongphane, Amphai Khamsing, Latdavanh Mouanchanh, Jennie Musto, Khonesavanh Bounma, Manilay Phengxay, Dapeng Luo, Bounlay Phommasack

11:24am Lyme borreliosis in Mongolia, 2005-2016
   » Ganbileg Gansukh, Batdorj Batjargal, Munkhzul Battsend, Baigalmaa Jantsansengee, Uyangaa Baaandagva, Battsetseg Jigjav, Tsogbadrakh Nyamdorj, Nyamkhuu Khuslen

11:42am Evaluation of Leptospirosis Surveillance System – Tapi District, Gujarat, India, June 2017
   » Davendra Kumar, Ajit Shewale, Monil Singhai, Simmi., P Khasnobis, Naveen Gupta, Sujeet Kumar Singh

10:30am Oral Presentations: Zoonoses and Vector Borne Diseases 2
   Conference Hall, 14th Floor

10:30am The spatial-temporal dynamics of Avian Influenza A (H7N9) in China: 2013-2017
   » Jian Zhao, Qun Li, Huilai Ma, Daxin Ni, Lianmei Jin, Lei Zhou, Ruiqi Ren

10:48am An Outbreak of Leptospirosis After a Tropical Storm – Davao City, Philippines, January 2018
   » Alethea De Guzman, Denisse Lou Manalili, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

11:06am Brucellosis Infection Rate and Risk Factors among Mutton Restaurant Workers in Zigong, 2017
   » Jie Zhang, Zhengdong Zhang, Xi Chen

11:24am Kyasanur Forest Disease Surveillance System Evaluation, Shivamogga, Karnataka and Sindhudurg, Maharashtra, India – 2016-2017
   » Ashok Talvan, Nataraju Mariyappa, P Khasnobis, Pavana Murthy, Sanket Kulkarni, CS Aggarwal, Ruchi Jain, Ekta Saroha, Rajesh Yadv, Arun Chauhan, Samir V. Sudha, Sudhir Jain, Sujeet Singh

11:42am Ownership and Usage of Long-lasting Insecticidal Nets (LLINs) Six Months after a Mass Distribution Campaign in Five Townships, Rakhine State, Myanmar, 2016
   » San Kyawt Khine

1:30pm Poster Presentations: Zoonoses (Group E)
   Outside of Convention Hall A, 2nd Floor

P38. Public Health Response to the Avian Influenza Outbreak Among Poultry – Pampanga and Nueva Ecija, Philippines, August – September 2017
   » Alethea De Guzman, Denisse Lou Manalili, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

P32. Public Health Response to a Poultry Outbreak of Highly Pathogenic Avian Influenza (H5N1) in Kelantan, 2017
   » Intan Din, Suhaiza Sulaiman

P7. Poultry supply chains for Avian Influenza (AI) outbreak in poultry, October 2016 - Luangprabang, Lao PDR
   » Korlakot Latsaphong, Phetdavanh Leuangvilay, Bouaphanh Khamphaphongphane, Latdavanh Mouanchanh, Viengsavanh Kitthiphong, Bounheuang Khounnavong

P8. Investigation of a Family Cluster of H7N9 Avian Influenza in Inner Mongolia, China, 2017
   » Xiaofeng Jiang, Weidong Guo, Yingxin Pei, Junling Sun
P2. Outbreak Investigation of Anthrax, H County, Ningxia Hui Autonomous Region, China – April 2018
» Ming Yang, Enmin Zhang, Wei Li, Wenwu Yin, Tao Shen

1:30pm Poster Presentations: Infectious Diseases (Group F)
Outside of Convention Hall A, 2nd Floor

P33. Measles Outbreak in a Community, Why did it Happen?
» Nur Aishah Buang, Noorhaida Ujang, Shazelin Ali Pitchay, Hazlinda Hamzah, Amirulhah Mohd Arshad

P35. Rubella Outbreak in a Public Secondary School, Northern Samar, Philippines, March 2017
» Alethea De Guzman, Mariz Zheila Blanco, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

P29. Burden of Influenza-Associated Hospitalisations, Cambodia, 2016
» M Ximena Tolosa, Vanra Ieng, Sovantha Om, Sokdary Soy, Miliya Thyl, Chan Dara, Moniborin Mey, Borann Sar, Seng Heng, Sovann Ly, Rebekah Stewart, Erica Dueger, Sheena Sullivan

P36. The First Outbreak of Autochthonous Zika Virus in Sabah, Malaysian Borneo, 2016
» Mohammad Saffree Jeffree

P5. Effects of a School-based Hand Hygiene Intervention on Student Hand-washing Practices - Shanghai, China, 2016-2017
» Dongling Yang, Chunyan Luo, Zhe Zhang, Yuefang Zhou, Lijing Sun, Shuangxiao Qu, Xiaogang Feng

1:30pm Poster Presentations: Surveillance Systems (Group G)
Outside of Convention Hall A, 2nd Floor

» Ai Chia Ho, Rosemawati Ariffin

P31. Evaluation of Severe Acute Respiratory Illness Surveillance System in Kirivong Referral Hospital Site, Cambodia, 2016
» Buntha So, Phalmony Has, Tek Bunchhoeung, Sopheap Tek

» Ginisha Gupta, D Somashekar, Ekta Saroha, Amol Patil, Samir V Sodha, CS Aggarwal, A.C. Dhariwal, Sujeet Singh

» Zulraini Jusof, Rusdi Abdul Rahman, Dr Siti Halimah Syed Shaikh, Amirullah Mohd Arshad, Hashimah Hassan

» Raveesh P M, Rudresh Revannavar, Shahi Hossain, Arunkumar Govindakarnavar, Shahin Sheik, CS Aggarwal, Sujeet Kumar Singh

P9. Survey on the Effect of the Beijing Smoking Control Regulations on Smoking Occurrence in Restaurants, 2018
» Li Xie, Yingxin Pei, Yuan Jiang, Jie Yang, Tao Shen

P3. A Study on Using SmartVA for Verbal Autopsy in China, 2017
» Yicheng Zhang, Peng Yin, Tao Shen
  » Faridha Almira, Atik Choirul Hidajah, Agung Nugroho, Anharul Qoni

P40. An Analysis of Interventions Presented at the 2015 CDC EIS Conference and the 2015 TEPHINET Conference
  » Abdul Rauf Shirzad

3:30pm Oral Presentations: Infectious Diseases 1
  Convention Hall A, 2nd Floor

3:30pm  Salmonellosis Outbreak among Tourists in a Popular Vacation Resort - Pahang, Malaysia, 2016
  » Sahrol Azmi Termizi, Rohani Ismail

3:48pm Water dispenser as possible source of infection in nosocomial Legionnaires' disease cases in Hong Kong
  » Ambrose Wong, Yiu Hong Leung, Carol Yau, Yonnie Lam, Shuk Kwan Chuang

4:06pm Prevalence of Subclinical Leprosy and Associated Factors among Children who Live with Leprosy Cases in Bangkalan District, Indonesia, 2017
  » Dian Muspitaloka Hikmayati, Atik Choirul Hidajah, Chatarina Umbul Wahyuni, Windhu Purnomo, Rachmat Hargono, Cita Rosita Sigit Prakoeswa

4:24pm Meningococcal meningitis: Public Health Response to a Single Case in Tien Phong village, Ba Vi District, Hanoi, Vietnam, April 2018
  » Nguyen Thi Bich Hue

4:42pm Japanese Encephalitis Outbreak in a Geographically Isolated Island, Calayan, Cagayan, Philippines, 2017
  » Alethea De Guzman, Farah May Clamor, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino

3:30pm Oral Presentations: Miscellaneous Studies 1
  Multifunction Hall, 14th Floor

3:30pm  Epidemiological Investigation of Chemical leak related illness at Tughlakabad, Southeast District Delhi, May-June 2017
  » Jayanti Singh, Sushma Choudhary, Samir V Sudha, CS Aggarwal, Meera Dhuria, Kapil Goel, Shikha Vardhan, A.C. Dhariwal, Ritu Yadav

3:48pm Strengthening diagnostic algorithms in support of Yaws elimination – East New Britain Province, Papua New Guinea, September–October 2016
  » Clare Pidik Tedor, Mathias Bauri, Julie Collins

4:06pm Factors associated with pasung (physical restraint and confinement) of schizophrenia patients in Bogor Regency, West Java province, Indonesia, 2017
  » Nenden H. Laila, Renti Mahkota, Tri Krianto, Siddharudha Shivalli

4:24pm Leisure-time Exercise, Sedentary Behavior and Sleeping Time and Their Relationships with Hypertension and Diabetes among Adult Residents in Shandong province, 2013
  » Yicheng Zhang, Xiaolei Guo, Peng Yin, Tao Shen

4:42pm Partograph utilization and its associated factors among obstetrics care givers in public health institutions - Aurangabad, Maharashtra, India, 2017
  » Vijaykumar Wagh, Tarun Bhatnagar, Prabhdeep Kaur, Manoj Murhekar

3:30pm Oral Presentations: Outbreak Investigations 1
  Convention Hall B, 2nd Floor

3:30pm  Outbreak of Vancomycin resistant enterococci in a Neonatal Intensive Care Unit – Canberra, Australia, January to May 2017
  » Patiyan Andersson, Ming Chen, Wendy Beckingham, Karina Kennedy, Kathryn Davesson, Katrina Roper, Nicholas Coatsworth

3:48pm Nosocomial outbreak of hepatitis C virus by invasive procedures at a single primary outpatient clinic
  » Insil Huh, Jungmee Kim, Seonju Yi, Seran Park, Hyungmin Lee, Siwon Choi, Minhee Sung, Jong-koo Lee, Ji Hwan Bang, Myoung-don Oh, Eung Soo Hwang, Sung-il Cho
4:06pm Outbreak Investigation of Acute Gastroenteritis, Pali district, Rajasthan, India, April 2018
» Ankit Mathur, Surendra Singh Shekhawat, Vikas Marwal, Satyanarayan Dholpuria, Deépa Meena

4:24pm Herpes Simplex Type-1 Outbreak in a Rural Primary School, Melaka, 2017
» Nur Aishah Buang, Noorhaida Ujang, Zulraini Jusof, Muhammad Hafiz Yusof, Rusdi Abdul Rahman, Nurmawati Ahmad, Amirullah Mohd Arshad

4:42pm An Outbreak of Acute Gastroenteritis caused by Astrovirus, China, 2017
» Luo Li, Yuan Li, Zhiyong Gao, Jinshui Zeng, Yiyou Lian, Wentao Song, Bin Lv, Qi Chen, Na Liu, Miao Jin, Guoqing Shi, Lu Ran

3:30pm Oral Presentations: Respiratory Diseases 1
Multifunction Hall, 14th Floor

3:30pm The Spatial-temporal Dynamics of Human Cases of Avian Influenza A (H7N9) in Mainland China from 2013 to 2017
» Ruoxi Sun, Lei Zhou, Chao Li, Jian Zhao, Ruiqi Ren, Huilai Ma, Qun Li, Daxin Ni

3:48pm Quantifying influenza severity - Australia, 2012-2017
» Kaitlyn Vette, Christina Bareja, Robert Clark, Aparna Lal

4:06pm Estimates of influenza-associated excess hospitalizations for pneumonia and influenza in Taiwan, 2009–2017
» Yi-Chen Tsai, Min-Hau Lin, Chia Wei, Hung-Wei Kuo

4:24pm Tuberculosis outbreak at the secondary school “A” in Ulaanbaatar city in 2015-2017
» Munkhjargal Doriravdan, Chinzorig Lamjav, Baigal Volodya, Ganbileg Gansukh, Erkhembayar Zorigbaatar, Khulsan Nyamkhuu, Nyamsuren Jiigidsuren, Munkhzul Battsend, Batdorj Batjargal, Bagalmaa Jantsansengee

4:42pm Tuberculosis Outbreak in a School, Thailand, 2017-2018
» BHURINUD SALAKIJ, Hataikarn Bunyaratavej, Bunyarat Pongphanitarak, Nipa Pansanae, Duangporn Churussamee, Somsri Charoepichitthan, Kritchavat Plodzi, Orathai Suwanchirob, Wanna Hanshaoworakul

Thursday, 8th November

10:30am Oral Presentations: Health Information Systems 1
Convention Hall B, 2nd Floor

10:30am Evaluation of the Revised National Tuberculosis Control Programme Surveillance system in Delhi, India, April 2016-March 2017
» Rakesh Gupta, Sunil D Khaparde, Raghuram Rao, Samir V Sodha, Ekta Saroha, CS Aggarwal

10:48am Evaluation of Acute Respiratory Infection Surveillance Systems in Karachi Division, 2017
» Dr Manzoor Memon

11:06am Evaluation of Completeness and Data Quality of Death Registration - Zaozhuang City, Shandong Province, China, 2016
» Yicheng Zhang, Peng Yin, Tao Shen

11:24am Surveillance systems for the 9th TEPHINET Global Scientific Conference, a key public health element for mass gathering events, Chiang Mai Province, Thailand, August 2017
» Thanachol Wonghirundecha, Ba Soe Thet, Lei Chen, Khauneyngin Yueyai, Thanit Rattanathumsakul, Patcharin Tantiworrawit, Chuleeporn Jiraphongsa

» Alethea De Guzman, Mariz Zheila Blanco, Maria Nemia Sucaldito, Vikki De los Reyes, Ferchito Avelino
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<th>Time</th>
<th>Oral Presentations: HIV/AIDS and Tuberculosis 1</th>
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<tr>
<td>10:30am</td>
<td>Multifunction Hall, 14th Floor</td>
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<tr>
<td>10:30am</td>
<td>Increasing Human Immunodeficiency Virus testing and treatment uptake among Tuberculosis/Human Immunodeficiency Virus Co-infected patients in Daru General Hospital - Papua New Guinea, 2017</td>
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<td>» Moses Dina, Abel Yamba</td>
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<td>10:48am</td>
<td>Analysis of Factors associated with Late Diagnosis of Newly Identified HIV/AIDS Cases in Jiangyin, 2007-2017</td>
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<td>» Xu Yin, Qianqian Ma, Hongda Lu</td>
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<td>11:06am</td>
<td>Determinants of Stigma and Discrimination against People Living with HIV/AIDS among Health Workers in a Rural Area – Indonesia, 2017</td>
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<td>» Gaby Gabriela Langi, Ignatius Praporaharjo, Riris Andono Ahmad</td>
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<td>11:24am</td>
<td>Factors associated with loss to follow up among children (≤15 years) treated for Tuberculosis in Kimbe Provincial Hospital, Papua New Guinea, from January to December 2015</td>
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<td>» Bethseba Peni, Yongjua Laosiritaworn, James Flint</td>
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<td>11:42am</td>
<td>Investigation of Low Tuberculosis Smear Positive Rates of Sputum in Hainan Prefecture, Qinghai, China, 2017</td>
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<td>» Binzhong Ma, Junsheng Yang, Hui Zhang, Lijie Zhang, Mingxia Jiang</td>
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<td>10:30am</td>
<td>Oral Presentations: Improving Preparedness and Surveillance of Diseases 1</td>
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<td>Convention Hall A, 2nd Floor</td>
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<td>10:30am</td>
<td>Evaluation of the enhanced gastrointestinal surveillance system during the 2018 Commonwealth Games</td>
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<td>» Cushia Coffey, Deena Seesaengnom, Ian Hunter, Martyn Kirk, Satyamurthy Anuradha</td>
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<td>10:48am</td>
<td>Enhancing preparedness against imported infectious diseases for the 2020 Tokyo Olympic and Paralympic Games</td>
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<td>» Chiaki Kawakami, Kazuhiko Kanou, Shingo Nishiki, Munehisa Fukusumi, Yuzo Arima, Matthew Griffith, Tamano Matsui, Tomimasa Sunagawa, Kazunori Oishi</td>
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<td>11:06am</td>
<td>Establishment of Rash Surveillance for the Early Detection of Zika Virus Disease (ZVD), September 2016-January 2017</td>
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<td>» Alethea De Guzman, Karen Lonogan, Maria Nemia Suaclito, Vikki De los Reyes, Ferchito Avelino</td>
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<td>11:24am</td>
<td>Surveillance for Middle East Respiratory Syndrome Coronavirus in South Korea, 2016/17</td>
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<td>» Sukhyun Ryu, Jun Jai Kim, Chulhee Kim</td>
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<td>» Kung-Ching Wang, Wan Chin</td>
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<td>10:30am</td>
<td>Oral Presentations: Reproductive Health and Sexually Transmitted Diseases 1</td>
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<td>Conference Hall, 14th Floor</td>
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<td>10:30am</td>
<td>Improving maternal health by identifying barriers to supervised deliveries - Wain Constituency, Morobe Province, Papua New Guinea, 2017</td>
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<td>» John Landime, Julie Collins</td>
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<td>10:48am</td>
<td>Survey on Accuracy of and Factors associated with Diagnosis of Acquired Syphilis in Medical Facilities in Inner Mongolia, China, 2017</td>
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<td>» Jing Liu, Jingyuan Yang, Xiangdong Gong, Yingxin Pei, Yueying Jiao</td>
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<td>11:06am</td>
<td>Survey on Awareness and Acceptance of Non-occupational Post-exposure Prophylaxis among Men who have Sex with Men in Beijing, China, 2018</td>
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<td>» Lijuan Wang, Jing Zhao, Liang Song</td>
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<td>11:42am</td>
<td>HIV exposure following a fatal motor vehicle accident - Central Highlands, Vietnam, 2017</td>
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<td>10:30am</td>
<td>Oral Presentations: Late-breakers</td>
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<td>10:30am</td>
<td>Pandemic Influenza Severity Assessment – Singapore’s Experience</td>
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<td>10:50am</td>
<td>Outbreak management at a long term healthcare facility in Singapore, 2017</td>
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<td>11:10am</td>
<td>Establishing Basic Public Health Laboratory Capacity in the Context of a Large-Scale Acute Refugee Crisis – Challenges and lessons learned</td>
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Abstracts of Oral and Poster Presentations and Author Index

On the next 149 pages, you will find the abstracts accepted for oral and poster presentation followed by the author index.

Abstracts are listed in chronological order according to their sessions beginning with the first oral presentation session on the morning of Tuesday, November 6 (see previous section, “Schedule of Oral and Poster Presentations,” for more details).

Poster abstracts are numbered P1 through P40.
The Elimination of Measles in Malaysia by 2018- How Close are We?

Tuesday, 6th November @ 10:30: Oral Presentations: Vaccine Preventable Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Dr Thilaka Chinnayah

Background
Malaysia did not achieve the target for measles elimination programme (MEP) in 2010 resulting in a revised target being set for 2018. A study was conducted to determine the status of elimination and factors affecting this process.

Methods
We selected seven of 14 Malaysian states after stratification by zones. A descriptive study was done using secondary data for 2006-2016 from the national web-based measles surveillance system. This system has information on demography, vaccine status and laboratory results. We reviewed outbreak reports and vaccine coverage data at three levels of healthcare facilities (state, districts and health centers). We assessed MEP surveillance indicators for 2016. Staff involved in the programme were interviewed on response activities following measles outbreaks using a structured questionnaire based on “Measles Elimination Guidelines 2015”.

Results
Incidence of measles in 2016 was 3 per million population with increasing trend every three years. No gender difference amongst cases. Most affected were those aged <15 years (76%), of whom 29% were infants. Fifty percent of cases were unvaccinated, mainly due to vaccine refusal and taking alternative medicine (47%). The state and district MCV1 coverage were above 95%. Some health centers had coverages of 75-90% (below target). Only 72% of laboratory results were available within four days of specimen receipt and this delayed control activities. The rest of MEP targets were achieved. 78% of staff involved in response activities were noncompliant with the guidelines.

Conclusions
Measles is at low endemic level in Malaysia. We are close to elimination. Low vaccine coverage at pockets and delayed laboratory results has hindered elimination and these issues are being addressed. Supplementary immunization activity targeting children below 15 years is now done in low coverage areas. We recommend follow up campaigns three yearly, strengthen health promotion, enhance staff training and better co-ordination with laboratories for early results to ensure elimination.
Outbreak Investigation of Measles – Longding District, Arunachal Pradesh, India, June 2017

Tuesday, 6th November @ 10:30: Oral Presentations: Vaccine Preventable Diseases 2 (Convention Hall B, 2nd Floor) - Oral

Dr. Kevisetuo Anthony Dzeyie, Dr. Dipu Lowang, Dr. Tanzin Dikid, Dr. Wangnai Wangsu, Mr. Tapak Tamir, Dr. Rajesh Yadav, Dr. Samir V Sodha, Dr. CS Aggarwal, Dr. A.C. Dhariwal

Background
Globally in 2016, there were >89,000 measles-related deaths. Although India targets measles elimination by 2020, there were >2,000 measles outbreaks in 2015. On June 2, 2017, Longding district health-workers reported a measles outbreak. We investigated to describe the epidemiology and identify risk factors.

Methods
We defined a case as fever and maculopapular rash with cough, coryza or conjunctivitis in a Longding resident from March 1 to June 18, 2017. We identified cases by medical records review and house-to-house survey collecting data on clinical presentation, vaccination and vitamin A. In Konsa village, we conducted a retrospective cohort study of children <5 years and assessed routine immunization practices. We confirmed measles in sera by IgM-ELISA and nasopharyngeal swabs by PCR collected from 17 cases.

Results
We identified 125 cases in Longding with rash onset from April 6 to June 16, 2017. Median age was 4 years (range=1m-35y); 52% (79/125) were female. We identified 104 cases in Konsa, 53% (55/104) were female. Attack rate among the children <5y cohort was 86% (75/87) with 5 deaths (case fatality rate=7% (5/75)). All fatalities were unvaccinated and had diarrhoea; none received medical attention or vitamin A. Coverage for children 12m-60m for first dose measles-containing vaccine (MCV1) and vitamin A were 9% (6/65) and 5% (3/65) respectively. Participation in local festival on 20 April (RR=5.3, 95%CI=1.5-18.5) and no MCV1 (RR=1.7, 95%CI=1.1-2.8) were associated with illness. Local health facility had no staff or immunization microplans. Thirteen cases tested positive for measles.

Conclusions
We documented and confirmed a measles outbreak in a low-vaccination and vitamin A coverage area with high case fatality, likely from poor healthcare access. Outbreak investigation led to intensive vitamin A administration in affected villages, measles catch-up campaigns in the entire district, staffing of the Konsa health facility, resumption of immunization activities. The outbreak subsequently ended.
Children overdue for immunisation: a question of coverage or reporting? An audit of the Australian Immunisation Register

Tuesday, 6th November @ 10:30: Oral Presentations: Vaccine Preventable Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Ms. Charlee Law, Mr. Rhydwyn McGuire, Prof. Mark Ferson, Mrs. Su Reid, Ms. Colleen Gately, Ms. Jody Stephenson, Ms. Sue Campbell-lloyd, Ms. Salwa Gabriel, Dr. TA Housen, Dr. Vicky Sheppeard, Mr. Paul Corben, Dr. David Durrheim

Background
Vaccinations administered in Australia are reportable to the Australian Immunisation Register (AIR) which is used to assess coverage at local, state and national levels. Accurate immunisation coverage information can enable targeting of programs and resources to populations with lower vaccination coverage and allow evaluation of these initiatives. Following major immunisation policy initiatives, the New South Wales (NSW) Public Health Network undertook an audit to: estimate true immunisation coverage by quantifying the percentage of NSW children incorrectly registered as overdue for immunisation at 1 year of age, exploring factors associated with under-reporting and reasons for underreporting.

Methods
A cross-sectional survey examined provider- or parent- held immunisation records of a stratified random sample of 414 NSW children >30 days overdue for immunisation on AIR, aged 12-<15 months at 30 September 2017. The strata and sample size for each stratum was calculated using constrained optimisation, weighted on the basis of the eligible population in AIR and reweighted to account for loss to follow-up. We used a GroupWise adjusted Wald test for association.

Results
Of the sample, 34.9% (CI: 30.9-38.9) were incorrectly reported as overdue for at least one immunisation on AIR. The estimated true coverage of fully vaccinated children at 1 year of age in NSW is 96.2% (CI: 95.9-96.4), >2% higher than AIR reported coverage of 94.1%. There were no significant differences in under-reporting by socio-economic status, rurality or reported local coverage level. Contributors to incorrect reporting included delays and data errors in AIR uploading (at provider level) and duplicate records.

Conclusions
Despite strong incentives for childhood vaccinations to be correctly recorded on AIR, under-reporting and duplicate records continue to contribute to significant underestimation of true vaccination coverage in NSW. To provide accurate coverage rates, more reliable and timely transmission of encounters from immunisation providers to the AIR and removal of duplicate records are required.
Knowledge about Hand, Foot, and Mouth Disease and Acceptability of Enterovirus 71 Vaccine among Parents of under-five year old children in Chongqing, China

Tuesday, 6th November @ 10:30: Oral Presentations: Vaccine Preventable Diseases 4 (Conference Hall, 14th Floor) - Oral

Dr. Li Qi, Dr. Tao Shen

Background

EV71 vaccines have been viewed as a promising solution for preventing severe and fatal hand, food and mouth disease (HFMD) and have been available on the market in China since 2016. This study aimed to investigate parental knowledge of HFMD and the acceptability of EV71 vaccine use among children <59 months old in Chongqing.

Methods

A cross-sectional survey of 1,080 parents was conducted in 2017. A validated questionnaire was developed following literature review and consisted of three sections including demographic information, knowledge of HFMD and EV71 vaccine, and the acceptability and reasons for declining vaccination. Factors associated with unwillingness to receive EV71 vaccines were explored using multivariable regression.

Results

A total of 992 parents completed the survey with a response rate of 92%. Awareness of HFMD and EV71 vaccine were reported by 823 (83%) parents and 386 (38.9%) parents, respectively. Knowledge about HFMD was poor with a mean score of 5 (SD = 3.5) out of a total score of 12. Only 369 (37.2%) participants were classified as having good knowledge. 279 (28.1%) participants had their children receive EV71 vaccines and 271 (27.3%) expressed willingness to vaccinate after a simple education program on EV71 vaccine. Acceptability of EV71 vaccine increased along with parents’ education level (p<0.05) and HFMD knowledge level (p<0.05). Vaccine acceptability among parents of children aged less than 3 years old was higher than those of preschool children (p<0.05). 442 (44.6%) of participants were unwilling to vaccinate their children with EV71 vaccine. The most common reasons for declining EV71 vaccine were doubts about its safety (56.6%) and efficacy (48.3%), and the necessity of vaccination (38.3%).

Conclusions

Nearly half of parents expressed unwillingness to vaccinate their children with EV71 vaccine. Our findings show that more efforts by health authorities in Chongqing are needed to enhance the acceptability of EV71 vaccine.
A Pertussis Outbreak among Adolescents, Thailand, 2018: from Home to School

Tuesday, 6th November @ 10:48: Oral Presentations: Vaccine Preventable Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Nichakul Pisitpayat, Dr. Pantila Taweewigyakarn, Mr. Pantasak Boonrak, Mr. Nuttapon Jaiwong, Dr. Chawakit Deeoum

Background
In February 2018, two students from the same classroom in a middle school in Chom Thong subdistrict, Chiang Mai had confirmed pertussis. This investigation was performed to control the outbreak and prevent severe pertussis in the community.

Methods
A descriptive study was done. Active case finding was performed among contacts in the school, households, community, and hospital. Contacts were defined as any person sharing the environment with the cases when they had symptoms. A suspected pertussis case was a contact who had cough ≥7 days with one of the following symptoms: paroxysmal cough, inspiratory whoop or post-tussive vomiting. A confirmed pertussis case was a suspected case who was positive for *B. pertussis* by PCR. An environmental study was done in a school. DTP coverage data was retrieved from the provincial health data center.

Results
From 603 students and 172 teachers screened, we found 34 suspected and 3 confirmed cases. The attack rates (AR) among students and teachers were 5.8% and 1.2%, respectively. All 3 confirmed cases were students from grade 7 (grade-specific AR=6.2%). Two of three confirmed cases were close friends. The primary case in this outbreak was the father of one confirmed student case. He worked at a primary care unit in another subdistrict with a DTP coverage of 80%. Median age of the cases was 13 years (range: 13-48). Three of four specimens collected from the suspects revealed *B. pertussis*.

Conclusions
Transmission occurred mainly among close contacts. We strengthened droplet precaution in the school as well as households and recommended the provincial health office do a catch-up vaccination in the 2 subdistricts involved. Macrolides were prescribed to the cases and close contacts at high risk of severe pertussis or living with those at high risk. After 40 days of follow-up, no further pertussis case was reported from the 2 subdistricts.
Investigation on re-emergence of Pertussis among adolescents and role of complete vaccination in School P, Chiang Mai, Thailand, September 2017

Dr. Chawakit Deeoum, Dr. Patcharin Tantiworawit

Background
Pertussis cases in Thailand have declined continuously since implementation of the EPI program. On 25 September 2017, the Bureau of Epidemiology was notified of three pertussis cases among students of a secondary school in Chiang Mai. We conducted an investigation to describe the re-emergence of pertussis, identify risk factors and assess vaccine effectiveness of the 5th dose.

Methods
We investigated three confirmed cases and actively identified cases in the school (Grade 8: G8), three families and two hospitals. Confirmed cases were defined as persons with chronic cough of at least 2 weeks duration with one of the following: paroxysms of cough, inspiratory whoop and post-pertussive vomiting from 16 May to 8 October 2017 or contacts of confirmed cases with cold-like symptoms and laboratory positive (culture or PCR) for Bordetella pertussis. We examined environmental and behavioral factors by retrospective cohort study. Vaccine effectiveness of the 5th Dose among G8 students was assessed.

Results
Among 720 persons, we found 62 cases (AR=8.6%) including four confirmed cases, 45 probable cases and 13 suspected cases. Most cases were students (98%). Male-to-female ratio was 1.3:1. Median age was 13 years. We identified Bordetella pertussis (by RT-PCR) from 4 of 11 samples. Multivariate analysis indicated studying in the same class as a confirmed case was a risk factor with adjusted OR of 22.51 (95%CI 9.08-55.75). 322 of 355 G8 students received 5 DTP doses. Of those, 26 were pertussis cases. 33 students received 4 DTP doses and of those, 3 were pertussis cases. Pertussis cases were reduced by 11% among those vaccinated with five DTP doses compared to those with four DTP doses.

Conclusions
An outbreak of pertussis re-emerged in Chiang Mai. Since close contact was a risk factor, screening, isolation and case management were key control measures. Complete vaccination implied better disease prevention.
Identifying and addressing barriers to immunization for young children in Gazelle District, East New Britain Province, Papua New Guinea, 2017

Tuesday, 6th November @ 10:48: Oral Presentations: Vaccine Preventable Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Ms. Elsie Stanley, Mr. Alois Pukienei, Dr. Tony Merritt

Background
Improved childhood vaccination is an urgent priority in PNG and coverage in the Gazelle District is low and has declined in recent years. This study set out to identify and address local barriers to vaccine uptake.

Methods
Immunization barriers and facilitating factors were identified in a case-control study at two Health Centres (HC1 and HC2) known to have low coverage. A structured questionnaire was administered to parents of 140 children aged 13-24 months, half of whom were fully immunized and half incompletely immunized for age. These data were used to attract funding for additional local services and training. Provincial immunization data for the third Diphtheria Tetanus Pertussis vaccine (DTP3, due at 3 months of age) were used to monitor the impact of these measures on vaccine uptake and coverage.

Results
Up-to-date vaccination status was associated with living close to the health facility (OR 4.8, 95% CI 2.4 - 9.9, p < 0.01), being a first born child (OR 4, 95%CI 1.2 - 13, p=0.01) and presence of a parent who understood the importance of immunization (OR 3.3, 95%CI 1.6 - 6.8, p < 0.01).

These findings supported a successful WHO grant to enhance immunization activities. From August to November 2017 the number of clinic sites offering vaccinations was increased from 4 to 40. Health staff at all sites received additional training and the vaccination recording system was enhanced.

Annual Provincial immunization data indicated substantial improvement from 2016 to 2017. At HC1, annual DTP3 doses increased from 201 to 598 and estimated coverage from 29% to 115%. At HC2 DTP3 doses increased from 302 to 390 and estimated coverage from 31% to 64%.

Conclusions
The most significant barrier to immunization in these areas was limited access to vaccination clinics. Provision of additional clinic sites had a rapid impact on DTP3 uptake and coverage.
Background
An outbreak of Influenza A occurred among inmates of a drug rehabilitation centre in Pahang in July 2017. The outbreak investigation was aimed at describing the epidemiology, identifying risk factors and recommending preventive measures.

Methods
A suspect case was any inmate or staff who presented with at least one of these symptoms: fever, runny nose, cough or body ache. Cases were identified by active case detection and review of medical records. A matched case control study was conducted using a structured questionnaire to identify predisposing factors. Throat swabs were obtained from active cases and were sent for viral study. Environmental investigation was carried out to assess factors that facilitated transmission of the virus.

Results
A total of 88 cases (33.7%) were identified among the inmates. The median age was 36.4 years and majority were Malay (90.1%). Symptoms were fever (100%), cough (100%), runny nose (97.6%), sore throat (71.8%) and body ache (58.9%). All eight throat swab samples were positive for influenza A (H1N1)pdm09. The predisposing factors were being a chronic smoker for >10 years (aOR=2.95 [95% CI=1.107-8.731]) and having symptomatic inmates in neighbouring beds (aOR=2.23 [95% CI=0.965-5.329]). We observed that the ill inmates were not isolated from those who were well. The living quarters were overcrowded. Daily activities involved close contact between inmates. Control measures that were undertaken were symptomatic treatment, provision of face masks and health education regarding cough etiquette.

Conclusions
There was an influenza A outbreak in a rehabilitation centre involving inmates. We recommended early isolation of inmates who were ill.
An Outbreak of Varicella in a Primary School - Fujian, China, 2017

Tuesday, 6th November @ 11:06: Oral Presentations: Vaccine Preventable Diseases 1 (Convention Hall A, 2nd Floor) - Oral

**Mr. Keqing Tian, Mr. Guoqing Shi, Mr. Jianming Ou, Mr. Rongtao Hong**

**Background**

On November 8, 2017, 15 suspected varicella cases were reported from a district primary school in Fujian, China. The local public health department investigated and took some control measures, however, the outbreak continued. On November 23, 40 cases were reported. An investigation was launched to determine the risk factors for transmission and recommend control measures.

**Methods**

A probable case was defined as any person including teachers and students in the school who developed vesicular dermatomal rash, and/or one of the following: pruritus, fever, headache from October 15 to December 16, 2017. A case search was initiated by interviewing the school clinician and teachers and checking their absenteeism records and disease monitoring records. A retrospective cohort study in affected classes was conducted to identify the risk factors for transmission.

**Results**

42 probable cases were identified from November 5 to December 16, 2017. The main symptoms included vesicular dermatomal rash (100%), pruritus (79%), fever (33%), headache (21%). The outbreak involved 67% (12/18) of the classes with an average attack rate of 11% (42/372) in the affected classes. 33% (14/42) of the cases were not isolated immediately, but 1-3 days after onset of illness. 69% (214/309) of students had received one-dose varicella vaccine and 6.1% (19/309) had received two-dose vaccination before the outbreak in affected classes. The cohort study showed that taking the No.1 school bus was associated with getting sick (RR=9.2, 95% CI=2.6-32). 10.3% (22/214) of students with one-dose varicella vaccine before the outbreak got sick and the effectiveness of one-dose vaccination was 59% (RR=0.32, 95% CI= 0.14-0.77).

**Conclusions**

Cases staying in school after getting sick, contact with cases in the school bus, low vaccination coverage and low effectiveness of one-dose varicella vaccine caused the continuing spread of the virus. We suggested timely isolation of cases and increasing the coverage of two-dose varicella vaccination.
An intervention to measure and improve immunization coverage of one year old children in Kieta district, Central Bougainville - Papua New Guinea, 2016

Tuesday, 6th November @ 11:06: Oral Presentations: Vaccine Preventable Diseases 2 (Convention Hall B, 2nd Floor) - Oral

Ms. Roselyn Gatana, Mr. Alois Pukienei, Dr. Tony Merritt

Background
In Kieta District the estimated coverage for Pentavalent3 (due at 6 months) was less than 65% in 2015. This study aimed to identify and address barriers to vaccination.

Methods
An opportunistic survey of mothers in two health centre areas (HC1 and HC2) was conducted at static, mobile and outreach clinics in 2016. Immunization coverage in children at one year of age and key barriers to vaccination were assessed. Coverage was compared to estimates from the Provincial and National Health Information Systems (PHIS and NHIS). An intervention from May to October, 2016 aimed to increase vaccination by training EPI staff, enhancing follow up of overdue vaccinations and improving record keeping.

Results
Survey data were collected for 134 children from an estimated population of 994 children under the age of 12 months in the District. Vaccination was up-to-date for 86 children (64.2%). Pentavalent3 coverage estimates for the District from the PHIS and NHIS for 2016 were 64.4% and 34.9% respectively, and differed due to the population denominators used.

For 48 children with incomplete vaccination key barriers were: scheduled clinics not held (40%), distance to clinic (19%), parents unaware vaccines were overdue (17%) and previous vaccine reaction (13%).

During the intervention all seven EPI staff in the District were trained and all 67 clinic site registers and tracking forms were reviewed and updated.

The number of vaccinations administered increased substantially during the intervention, with approximately triple the usual number of Pentavalent3 doses administered each month. Estimated 2016 Pentavalent3 coverage for HC1 and HC2 was 82% and 105% respectively.

Conclusions
Training of EPI staff and improved follow-up of overdue vaccinations using revised tracking forms and clinic registers resulted in increased administration of Pentavalent3 vaccines. Immunization coverage in the survey group was similar to PHIS estimates for the District, suggesting this was more accurate than the NHIS estimate.
Outbreak investigation of measles among a migrant population, Shram Vihar, Delhi, India, February 2018

Tuesday, 6th November @ 11:06: Oral Presentations: Vaccine Preventable Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Dr. Syed Qadri, Dr. Kevisetuo Anthony Dzeyie, Dr. Meera Dhuria, Dr. Samir V Sodha, Dr. Ekta Saroha, Dr. Suneet Kaur, Dr. Rajesh Yadav, Dr. Charu Prakash, Dr. Purva Sarkate, Dr. Nidhi Bhatnagar, Dr. Davendra Kumar, Dr. Ashok Talyan, Dr. Akhileshwar Singh, Dr. Rakesh Gupta, Dr. Preeti Madan, Dr. Ginisha Gupta, Dr. CS Aggarwal, Dr. Sujet Singh

Background

Although measles is targeted for elimination in India, 36% of measles-related deaths globally were from India in 2016 with outbreaks frequently reported. In March 2018, Shram Vihar, Delhi reported a measles outbreak. We investigated to describe the epidemiology and provide evidence-based recommendations.

Methods

We defined a case as fever and maculopapular rash with cough, coryza, or conjunctivitis in a Shram Vihar resident between 15 November 2017 and 7 March 2018. We searched for cases house-to-house, collected immunization status regarding first and second dose measles-containing vaccines (MCV1, MCV2), and provided vitamin A. We collected eight serum samples from consenting active cases and tested for measles IgM antibodies. We also assessed the routine immunization system of Shram Vihar.

Results

We identified 166 cases (53% female) with a median age of 3 years (range: 1 month-13 years). Overall attack rate was 9% (166/1759); among children under five was 35% (113/324). Symptoms included rash (100%), cough (97%), coryza (97%), and conjunctivitis (69%). There were three deaths (case fatality rate=2%). Of 166 cases, 6 (4%) received MCV1 and none received MCV2. We delivered vitamin A to 122 (74%) cases but were unable to provide for 44 (26%) untraceable cases. All case-patients were from migrant families (75% domestic, 24% Rohingya muslims), most reportedly living in Shram Vihar for >10 years. Seven of eight serum samples tested positive for measles IgM. Sharam Vihar, an unauthorized slum, received immunization outreaches unofficially by a nearby government clinic, but sessions were not held for the previous 5 months and child tracking was not done during the last year.

Conclusions

This was a laboratory-confirmed measles outbreak in a slum of migrants with weak routine immunization system. Our investigation led to an immunization camp and vitamin A protection of most cases. We recommend including migrant populations and unauthorized slums in microplans to achieve measles elimination.
Measles outbreak in the villages near Myanmar-China border, Eastern Shan State, April 2018

Tuesday, 6th November @ 11:06: Oral Presentations: Vaccine Preventable Diseases 4 (Conference Hall, 14th Floor) - Oral

Dr. Ba Soe Thet, Dr. Witaya Swaddiwudhipong, Dr. Zaw Lin, Mr. Sithu Tun

Background
Myanmar has set a goal of measles elimination by 2020. On 7 April 2018, a suspected measles case with pneumonia was reported from the state hospital. The case lived in a village near the Myanmar-China border, Mong Lar Township, Eastern Shan State. An investigation was promptly conducted to determine epidemiological characteristics and risk factors and recommend control measures.

Methods
Medical records of the measles cases living in Mong Lar Township, with onset in 2018 were reviewed. Active case finding was conducted in the affected and nearby villages for early detection and treatment. Clinical samples for laboratory analyses including serum and throat swab specimens were examined at the National Health Laboratory. A case-control study was conducted to determine possible risk factors.

Results
A total of 48 measles cases were identified from 2 villages of Mong Lar Township, giving an attack rate of 5.1%. None died in this outbreak. Of these 48 cases, 39 (81.3%) clustered during 1-9 April 2018. The highest attack rate was among children 5-9 years old (21.8%) followed by that among those 1-4 years old (18.2%). All 5 sera were positive for measles IgM antibody by ELISA and all 4 throat swabs were positive for measles virus by RT-PCR which was identified as H1 strain. In a case-control study, close contact with a measles case and attending the boarding school were significantly associated with measles, while history of previous measles vaccination was a significant protective factor by both uni-variate and multi-variate analyses. The vaccine efficacy in children < 15 years was 74.2%.

Conclusions
This measles outbreak occurred among both young and school-aged children. In areas with poor vaccination coverage, it is essential to increase vaccination coverage among young children, and screen and complete immunizations when they enter school.
Outbreak Investigation of Re-Emerging Diphtheria Infection - Telangana state, India, 2017

Tuesday, 6th November @ 11:24: Oral Presentations: Vaccine Preventable Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Kiran Kumar Maramraj, Dr. Kavitha Latha ML, Dr. Rukma Reddy, Dr. Sukrutha Reddy, Dr. Samir V Sodha, Dr. Suneet Kaur, Dr. CS Aggarwal, Dr. Sujeet Kumar Singh

Background
Diphtheria is a re-emerging infection in India with 3,380 cases and 177 deaths reported in 2016, accounting for 48% (3,380/7,097) of global burden. We investigated the increased incidence in Telangana state in 2017 to describe epidemiology, identify risk factors, and provide evidence-based recommendations.

Methods
We defined a case as upper respiratory tract illness with adherent membrane and isolation of *Corynebacterium diphtheriae* from naso-pharyngeal swabs of a Telangana resident in 2017. We identified cases by reviewing hospital records and surveillance reports. We obtained clinical and immunization status information through household survey of cases. We reviewed immunization system at six urban primary health centers with most cases reported in Hyderabad city.

Results
We identified 124 confirmed cases (52% female) including 19 deaths (case fatality rate [CFR]: 15%) in 2017. Median age was 12 years (range: 4-26) with 73% between 6-15 years. Most cases occurred from July to November (80%), were from Hyderabad city (72%), and were Muslim (58%). Among cases, coverage of third dose diphtheria-pertussis-tetanus vaccine (DPT3), DPT first and second boosters were 53%, 44% and 35%, respectively. CFR was higher among non-immunized (32%) compared to those immunized with at least three primary DPT doses (8%) with OR=5.6 (95% CI=1.7-18.4). Immunization system review revealed 61% DPT3 coverage in Hyderabad (district level household survey DLHS-4, 2012-13), functional cold chain and no stock-outs based on temperature logs and stock registers from 2014-2017. However, immunization tracking system only follows children under two years.

Conclusions
This was a laboratory-confirmed outbreak of diphtheria with high case fatality in Telangana. Most cases were within Hyderabad and among Muslims, with an age-shift towards school-going children. Non-immunization was associated with higher CFR. Outbreak was likely due to low immunization coverage, especially boosters. We recommend considering DPT second booster as prerequisite for primary school entry and possibly introduction of third (adolescent) booster at exit.
Investigation on the Accuracy of Viral Hepatitis B Reporting in Gannan Tibetan Autonomous Prefecture of China, 2017

Tuesday, 6th November @ 11:24: Oral Presentations: Vaccine Preventable Diseases 2 (Convention Hall B, 2nd Floor) - Oral

Mr. Wang Pinggui, Prof. Lijie Zhang, Mr. Guomin Zhang, Mr. Jian He, Mrs. Yuan Ma, Mr. Weimin Lv

Background
Viral hepatitis B (hepatitis B) is a large global health threat. According to the National notifiable disease reporting system (NDRS), the reported incidence of hepatitis B in Gannan is the highest in the province from 2004 to 2016. To evaluate the accuracy of reporting cases of hepatitis B in NNDRS, we conducted a survey.

Methods
We evaluated the hepatitis B inpatient reports by 7 county hospitals between January 1, 2016 and July 31, 2017, according to the “Classification Diagnostic process of Hepatitis B cases” issued by China Center for Disease Control and prevention from 2012. The positive predictive value (PPV) of reported hepatitis B cases was calculated. We used a self-administered questionnaire to investigate the clinicians' understanding of the diagnostic and reporting criteria of hepatitis B.

Results
400 hepatitis B inpatient records were evaluated. There were no accurately classified acute hepatitis B cases reported in NNDRS. The PPV of chronic hepatitis B and unclassified hepatitis B cases were 5.5% and 15%, respectively. 82%(327/400) of reported hepatitis B cases did not meet the reporting criteria including 65% (261/400) hepatitis B carriers, 15% (59/400) repeated reports cases of chronic hepatitis B, 1.8% (7/400) non-hepatitis B cases. 56% (23/41) of clinicians diagnosed the simulated cases of acute hepatitis B and 17% (7/41) of clinicians diagnosed simulated cases of chronic hepatitis B correctly. Only 22% (9/41) of clinicians know that “only HBsAg positive client do not need to be reported”.

Conclusions
The low accuracy of reporting of hepatitis B cases resulted in falsely high incidence rates in Gannan. To improve hepatitis B surveillance, we recommended local clinicians should be further trained in hepatitis B diagnostic and reporting criteria.
Pertussis outbreak in Saravan Province, Lao PDR, 2018

Background
Pertussis is one of the vaccine preventable diseases (VPDs) under national surveillance, with previous outbreaks reported in the country every year particularly in remote difficult to access areas. In April 2018, a suspected case of pertussis was detected by a clinician from Saravan provincial hospital, Lao PDR.

Methods
The investigation team conducted active case finding in the affected villages, neighboring villages, schools and health facilities. Cases were defined as any person with a cough lasting at least 2 weeks, presenting with either paroxysm or inspiratory whooping. Samples were collected and serological laboratory testing was done. Outbreak control activities were implemented to reduce the spread of the disease in the community.

Results
A total of 125 suspected cases of pertussis were identified from April 15 to May 16, 2018 in 7 villages in an urban area in Saravan district and province. The index case was an 11 year old, reported from Lanongnuva village on April 15, 2018 with no history of pertussis vaccination. The most affected age group were those aged 6-10 years (46%). Mean age was 6 years (range 3 months to 35 years). *Bordetella pertussis* was detected in a sample from the index case (1/18; 6% of samples). The routine vaccination coverage in Saravan district was < 80% in 2017. DTP-HepB-Hib vaccination and Td were provided to children between 6 months to 7 years and 8-15 years of age, respectively in a catch-up campaign. Erythromycin was administered to all pertussis cases and their close contacts.

Conclusions
An unvaccinated child was the index case and might be the source of this outbreak. It is critical to strengthen the routine immunization coverage particularly in the affected district, province and across the country through fixed post, outreach and mobile immunisation sessions in both urban and remote areas.
Mixed Rubella-Measles Outbreak in a Rural Community in Temanggung District, Central Java, Indonesia, 2016

Tuesday, 6th November @ 11:24: Oral Presentations: Vaccine Preventable Diseases 4 (Conference Hall, 14th Floor) - Oral

Ms. Putri Tiara Rosha, Mr. Khabib Mualim, Dr. Dibyo Pramono

Background
On June 11, 2016, a Public Health Centre officer reported an increasing number of fever with rash cases in Bonjor Village. We conducted an investigation to confirm the outbreak, identify risk factors and take control measures.

Methods
We conducted a descriptive and 1:1 case control study. Cases were persons living in Bonjor village who had a fever and rash accompanied by one or more symptoms of cough, common cold, conjunctivitis, diarrhea and pneumonia, confirmed by laboratory tests for rubella IgM and measles IgM. Controls were asymptomatic persons. Data on demographics and risk factors were collected using a structured questionnaire. Data were analyzed using chi square tests.

Results
A mixed rubella-measles outbreak occurred from May 28 to October 1, 2016. There were 59 cases. Signs and symptoms of cases were fever (94.63%), rash (88.14%), common cold (47.46%), cough (45.76%), conjunctivitis (28.81%), diarrhea (15.25%) and pneumonia (6.78%). Three persons were positive for rubella IgM and two for measles IgM. The highest attack rates were among males (12.65%) and those aged ≤4 years (25%). Of 59 cases, 38 (64.41%) were unvaccinated for measles. From our analysis, estimation of vaccine efficacy was 52.17%. Non-vaccination for measles was a risk factor (OR= 4.47, 95% CI=1.92-10.47).

Conclusions
A mixed Rubella-Measles Outbreak occurred in Bonjor Village. Vaccine efficacy was under the national target. We did some control measures such as health promotion about rubella and measles and distribution of vitamin A at the school and in the community. Also we collaborated with religious leaders in the community to increase measles vaccination coverage.
Using dried blood samples of universal newborn screening for detection of congenital rubella syndrome—Taiwan, 2016–2017

Tuesday, 6th November @ 11:42: Oral Presentations: Vaccine Preventable Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Pei-Yuan Wu, Dr. Chia-ping Su, Ms. En-tzu Wang, Mr. Fu-tien Lin

Background
Congenital rubella syndrome (CRS) can occur in fetuses of rubella-infected pregnant women and causes multiple disabilities. Progress toward rubella elimination should be supported by sensitive CRS surveillance. In Taiwan, passive surveillance of CRS has been implemented for over 20 years, but reporting rate is low. To document absence of indigenous cases, Taiwan Centers for Disease Control started using residual dried blood samples collected from universal newborn screening for detection of CRS since 2014. We compared the reporting rate and explored the benefit of the active surveillance.

Methods
We collected data from the passive National Notifiable Disease Surveillance System (NNDSS) during 2006–2015. For the active surveillance, we selected infants with CRS-associated congenital defects, including hearing impairment, purpura, specific congenital heart and ophthalmic diseases, from National Birth Registry, National Newborn Hearing Screening and National Health Insurance Database. We tested their dried blood samples for rubella IgM. We calculated the reporting rate and age of suspected cases from the active surveillance during 2016–2017.

Results
During 2006–2015, 13 suspected CRS cases (0.07 per 10000 live births) were reported to NNDSS, and one case was confirmed. The median reported age was 18 days (range 2–612 days). After implementation of active surveillance, 2250 infants were selected (56.1 per 10000 live births) during 2016–2017. One tested positive for rubella IgM using dried blood sample. This laboratory-confirmed CRS case who presented with hearing impairment and congenital cataract was not reported to NNDSS during 2016-2017. However, the median reported age of the active surveillance was older (approximately 150 days).

Conclusions
Active surveillance using dried blood samples of universal newborn screening for detection of CRS could increase the reporting rate but took longer to report. To enhance identification of suspected CRS cases, the active surveillance could effectively complement the existing passive surveillance system.
The re-emergence of rotavirus - New South Wales, Australia, 2017

Tuesday, 6th November @ 11:42: Oral Presentations: Vaccine Preventable Diseases 2 (Convention Hall B, 2nd Floor) - Oral

Ms. Julia Maguire, Dr. Helen Quinn, Mrs. Keira Glasgow, Dr. Kathryn Glass, Mrs. Susie Roczo-Farkas, Prof. Julie Bines, Dr. Vicky Sheppeard

Background
Prior to the introduction of vaccination, rotavirus was the most common agent causing severe dehydrating gastroenteritis in infants in Australia. Rotarix vaccine has been funded in the state of New South Wales (NSW) since 2007 and is responsible for a 78% reduction in rotavirus hospitalisations in children aged <5 years. In 2017, NSW experienced an outbreak of rotavirus gastroenteritis. We examined the epidemiology, vaccine effectiveness (VE) and genetic profile of outbreak cases to inform vaccination policy.

Methods
Reported rotavirus notifications in NSW between 1 January 2010 and 31 December 2017 were analysed by age, gender and Indigenous status. Two-dose vaccine effectiveness estimates were calculated by age via the screening method. Specimens from a sample of hospitalised cases in 2017 were genotyped by reverse transcription-polymerase chain reaction and analysed by strain and age.

Results
In 2017, there were 2,319 reported rotavirus infections demonstrating a 2.1-fold increase from the 2010–2016 average annual notification rate. Notifications peaked in September with 600 notifications, compared to 174 average September notifications in 2010–2016. Rates peaked in those aged <2 years and decreased with age. In 2017, two-dose VE estimates were 81.6%, 67.3% and 72.5% in those aged <1, 1–<4 and 4–<10 years, respectively, and provide evidence of waning vaccine protection. Genotype analysis identified equine-like G3P[8] (51%) and G8P[8] (25%) as the most common genotypes. These strains were dominant in all age groups except infants aged 0–6 months.

Conclusions
Rotavirus notifications surpassed expected levels in 2017. The emerging dominance of usually uncommon G8P[8] strain partially accounts for this rise, and is consistent with the emergence of G8 strains in Southeast Asia. G8 genotypes have not previously been common in Australia, and their emergence is likely the result of vaccine-related selective pressure. Examining rotavirus epidemiology provides insight into burden of disease resulting from an outbreak in a highly vaccinated population.
An Outbreak of Epidemic Cerebrospinal Meningitis in an Unvaccinated Population in a County of Northwest China, 2017

Tuesday, 6th November @ 11:42: Oral Presentations; Vaccine Preventable Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Mr. Liu Tiecheng, Mr. Zundong Yin, Mrs. Yixing Li, Prof. Lijie Zhang

Background
Epidemic cerebrospinal meningitis (ECM) cases of school-age in a county had been reported by hospitals from November 25 to December 14, 2017. Samples of cases and close contacts were tested by PCR and bacilli culture. The county is an ECM endemic area. We conducted an investigation to identify the magnitude and provide control measures.

Methods
A suspected case was defined as one with fever >37.5°C plus one of the following: headache, vomiting, pharyngalgia or meningeal irritation symptom. A probable case was a suspected case with ecchymosis or increasing numbers of white blood cells. A confirmed case was a probable case with bacilli culture or Neisseriameningitides (Nm) antigen positive. Cases were actively searched for in hospitals and schools in the county.

Results
We identified 21 suspected, 24 probable and 8 confirmed cases (2 deaths) in 4 high and 2 primary schools and 2 kindergartens. 79.3% cases were from two high schools which shared one campus. 88.7% cases were born before ECM vaccines were incorporated into EPI in 2009. Case numbers began to increase from December 5, peaked on December 5-7 and 9-12, ended on December 15 after the implementation of preventive medication to close contacts and a massive emergency immunization campaign to school-aged students of 6-17 years in the county. Ten samples (6 group A, 1 group B and 3 unidentified) of 40 cases were positive. 55% of 80 samples from close contacts were positive including 3 group A, 5 group B, 2 group W, 6 group Y and 28 unidentified.

Conclusions
This outbreak was caused by Nm. An emergency vaccination campaign was necessary in an unimmunized population to control the epidemic. Sensitive preventive drugs should be chosen for close contacts to prevent the serogroups which can't be protected by vaccine. Timely identification and isolating the cases with correct clinical treatment were effective.
Investigation and response to Measles outbreak in Vietnam National Children’s Hospital, September- December 2017

Background
Measles is a highly infectious viral disease that is preventable through vaccination. In September 2017, Hanoi, Vietnam experienced a large outbreak of measles, with many cases seeking care at the National Children Hospital (NCH). We investigated the outbreak to identify opportunities for prevention.

Methods
A case of measles was defined by a positive laboratory test for measles in a child admitted to NCH from September-December 2017. Hospital-acquired (HA) measles was defined as laboratory-confirmed measles among children hospitalized for 22 days before onset date. Possible hospital-associated (PHA) measles was defined as laboratory-confirmed case of measles between 8-21 days after admission; or discharged from the hospital and had onset date in the community within 21 days after discharge. We interviewed patients’ care takers and used hospital records to evaluate practices of hospital staff in conducting examinations, isolating patients, and providing feedback to departments regarding cohorting of confirmed and exposed patients.

Results
From September-December 2017, we identified 132 laboratory confirmed cases, including 117 inpatients and 15 outpatients (2 NCH staff). Children aged 0-8 months comprised 39% (n=45) of all cases. Inpatients having either HA or PHA accounted for 56% (66 cases), including 50% from NCH (15% HA, 35% PHA) and 6% PHA from other hospitals. Beginning October 1st, we implemented specific interventions at NCH, including cohorting confirmed and exposed patients (98 cases in 19 departments). The proportion of HA and PHA cases declined from 63% to 25% between September and December.

Conclusions
We were able to minimize and control the spread of measles in NCH using simple and inexpensive measures. Identification of cases among children aged 6 to 8 months and among healthcare workers suggests that additional vaccination efforts may be warranted for those populations. Our investigation also revealed opportunities for incorporation of specific infection control measures into future preparedness plans.
P23. An outbreak of diarrhea attributed to consumption of street-foods- Bangladesh, March 2018

Tuesday, 6th November @ 13:30: Poster Presentations: Foodborne Diseases (Group A) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Nawroz Afreen, Dr. Abdullahel Maruf, Dr. Manjur Hossen Khan, Dr. Michael Friedman, Prof. Meerjady Sabrina Flora

Background
Diarrhea outbreaks are common in Bangladesh and usually reported through event-based surveillance. Increased admissions of diarrhea cases was noticed in Upazila-health-center in early March 2018 and reported to IEDCR on 11 March. The event was investigated to confirm the outbreak, identify possible exposures and provide control measures.

Methods
We did an investigation on 12-14 March by conducting informal interviews, reviewing clinical records, creating area-maps of case-patients, testing stool and water samples. For the case-control study, case-patients were residents of the sub-district having ≥3 loose stools in 24 hours from 25 February 2018 to date of investigation. We recruited 16 recently admitted case-patients (most previous case-patients lacked contact information) and 32 unmatched neighborhood controls. To identify possible exposures we did logistic regression and computed odds ratios with 95% confidence intervals.

Results
The outbreak started on March 3. Median age of line-listed case-patients (n=251) was 35 years (IQR 25-50) with male predominance (67%). Most case-patients were from the municipality (53%, n=207). For case-patients versus controls, median age was 35 years (IQR 23-45.4) versus 30 years (IQR 24-45); 75% male versus 31%; 60% (9/15) had occupations exposing them frequently to the municipality (versus 19%). Odds ratios for consuming street-foods between 25 February-12 March (aOR 14.19, 95% CI 1.11-181.35) and similar illness among family members (aOR 35.4, 95% CI 2.71-461.98) were higher adjusting for sex and occupation. Many people consumed available street-foods in a fair held in the municipality during 2-10 March (prior to notification of outbreak).

Conclusions
Duration of fair and outbreak showed that consumption of street-foods from the fair was the most likely source of this outbreak. Similar illness among family members might be due to person-to-person transmission or sharing same street-food among family members. We suggested monitoring the safety of street-foods sold in large gatherings (e.g., fair) to prevent future similar outbreaks.
P11. Bacillus cereus contamination of Donated Food for an Orphanage in Gunung Kidul District, Indonesia, 2017

Background
On April 19, 2017, Gunung Kidul District Health Office (DHO) received a report of a suspected food borne outbreak from the village surveillance officer. Fourteen persons had diarrhea and vomiting after consuming the food served in an orphanage on the day before. An investigation was initiated to confirm the outbreak and identify the source and route of transmission.

Methods
We conducted a retrospective cohort study. Cases were persons with one or more of the following symptoms: nausea, vomiting, abdominal pain and diarrhea in the period 18-21 April 2017 after consuming the food served at the orphanage. Interviews using a structured questionnaire were done. An inspection of the kitchen area was also done. Food samples were collected and sent to a laboratory for testing.

Results
Of 55 persons interviewed, 22 cases were identified. Incubation periods ranged from 1-48 hours with an average of 11 hours. People who ate sardines were more likely to get sick (RR=4.1; p=0.007; 95% CI=1.082-15.542). Laboratory results showed that the sardines was positive for Bacillus cereus. Nearly expired food, poor hygiene during food processing and improper food storage posed a potential risk of contamination.

Conclusions
There was a food poisoning outbreak at the orphanage in Gunung Kidul District on 18-20 April 2017. Improper food processing and storage were potential risk factors for food contamination. We recommended that the DHO educate food handlers on food safety and closely monitor the implementation of food safety in the Gunung Kidul area.
P20. A Cohort Study of a Capillariasis Outbreak in a Rural village, Mindanao, Philippines, 2017

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group C) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Alethea De Guzman, Mr. Jasper Kent Ola, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On February 5, 2017, the Event-based Surveillance and Response Unit received a report of clustering of capillariasis cases and deaths in a village in Mabini, Malalag, Davao del Sur. On February 13, 2017, an FETP team was sent to verify the existence of capillariasis cases, determine source and mode of transmission, identify risk factors, and recommend control and prevention measures.

Methods
We conducted a cohort study. A suspect capillariasis case was a resident of Zone 3 sub-village, Mabini, Malalag, Davao del Sur with chronic diarrhea (>two weeks) from January 1, 2016 – February 16, 2017. A confirmed case was a suspect case positive for Capillaria ova or larvae through microscopy. We collected stool samples and tested them for parasites through direct fecal smear and Kato-Katz technique. We conducted an environmental survey.

Results
These are the first reported capillariasis cases in the province. Two hundred twenty-two (97%) residents were profiled. We identified 58 (27%) suspect cases. Seven died (CFR=12%). Forty-seven (71%) were male. Ages ranged from 2-65 years (median: 30). Suspect cases had chronic diarrhea, borborygmus (14, 72%), abdominal pain (37, 64%), and abdominal distention (24, 41%). Residences of most cases were located near a river where they caught shrimp for their meals. Confirmed capillariasis cases and deaths were from a family that frequently ate raw shrimps. Eight (14%) of 174 stools were positive for Capillariasis philippinensis. Risk factors were eating raw shrimp (RR 4.4, 95% CI 3.2-6.0), using open pit toilet (RR 1.25, 95% CI 1.01-1.56), and living near the river (RR 1.41, 95% CI 1.06-1.87).

Conclusions
A capillariasis outbreak occurred in a rural village in Mindanao. Poor Food habits and sanitary practices led to capillariasis infection. Health officials conducted mass administration of albendazole, established chronic diarrhea surveillance, and advocated safe food handling practices. No additional case was reported since.
P39. Fatal puffer fish poisoning reported in Northwest Cambodia, 2017

Mr. Khay Say, Mr. Sophanith Ung

Background
Puffer fish poisoning caused by tetrodotoxin (TTX) is often reported in the media in Cambodia. TTX can be fatal to humans within a short incubation period, although it is not present in all puffer fish species. In August 2017, the rapid response team from Banteay Meanchey Province reported, through event based surveillance, cases of puffer fish poisoning in a village. The objective of this study was to describe the outbreak.

Methods
Face-to-face interviews with the cases from the village were done using a standard questionnaire. A case was defined as a member of the two families in the village who had eaten dinner together on 16 August 2017 and developed symptoms of limb numbness or difficulty breathing or vomiting afterwards. Data were entered and analyzed using Excel 2013. Human and environmental samples were collected.

Results
Seven cases met the case definition, two of whom were female. The mean age of cases was 17 years (range 12-51). Incubation periods ranged from one to nine hours. The main symptoms were numbness (100%), vomiting (71%), dizziness (57%), headache (29%), difficulty breathing (29%) and coma (14%). All cases ate puffer fish before onset of sickness. One case died within one hour after eating the puffer fish. Their symptoms were consistent with puffer fish poisoning. Laboratory testing for TTX is not conducted in Cambodia. Education about the risk of eating puffer fish was conducted in the affected village.

Conclusions
Puffer fish poisoning was the cause of the outbreak in a family that regularly consumes puffer fish. Knowledge about the toxicity of puffer fish could reduce the occurrence of such outbreaks, as could the banning of the consumption of all kinds of puffer fish. The local health and food and agricultural officers need to provide education about the dangers of puffer fish consumption and discourage consumption of puffer fish.
P34. A Food borne Outbreak among funeral attendees associated with Staphylococcus aureus, Kampot Province, Cambodia – September 2017

Background
In Cambodia, food borne disease outbreaks are detected through the event-based surveillance system. In the last three years food borne outbreaks associated with eating Khmer noodle resulted in 3,159 cases and 57 deaths. In September 2017, an outbreak was reported of 40 people who attended a funeral in a village of Kampot province. We investigated the outbreak to describe the epidemiology, identify risk factors and recommend control measures.

Methods
A case was defined as a person residing in Chumkiri district with diarrhea or vomiting from 3-4 September 2017 who attended the funeral. We conducted a 1:2 unmatched case-control study, conducting interviews using a standard questionnaire to identify exposure to risk factors. Uni-variate analysis was done to calculate food specific odds ratios and 95% confidence intervals. We collected samples of food items served during the funeral and pond water used for food preparation to test for common pathogens in the national reference laboratory. We also observed the sanitation conditions and hygiene practices of food handlers.

Results
We identified 33 cases aged 3 to 78 years; 73% were female. All cases were hospitalized. The most frequently reported symptoms were vomiting (91%), diarrhea (85%), abdominal pain (79%), nausea (64%) and fever (42%). Eating Khmer noodles (OR=16.7 [95% CI=5.8-48.4], p<0.05) and Khmer Soup (OR=3.9 [95%CI=1.2–13.1], p<0.05) were associated with illness. Environmental observation where the Khmer noodles were produced revealed that they were washed with water from the pond. This water tested positive for S. aureus.

Conclusions
Khmer noodle washed with contaminated pond water was the food item incriminated in this food borne outbreak. In social gatherings, where Khmer noodles are served, food handlers need to employ hygienic practices and use treated water during food preparation.
Background
An Acute Gastroenteritis (AGE) outbreak occurred in Pusa District, Betong in March 2017, starting with the death of a two-year-old boy. Three other cases were reported from the same locality within a week. EIP Malaysia carried out an investigation to verify the outbreak, identify risk factors and recommend control measures.

Methods
A case-control study was done through face-to-face interviews using structured questionnaires to identify risk factors. Cases were households with AGE cases, controls were households without cases. Environmental assessments were carried out through community interviews and observations. Clinical and environmental samples were taken for laboratory testing.

Results
The outbreak lasted two months, involving 70 cases and one mortality. Overall incidence rate (IR) was 8.87 per 1,000. Ages ranged from four months to 71 years (mean age 15 years 11 months). IR was highest among those <4 years old (66 per 1,000), followed by those 60 years and above (23.3 per 1,000). All cases had watery diarrhea, with additional symptoms of vomiting (60%), abdominal pain (35.7%) and fever (17.1%). Rotavirus and *Escherichia coli* were identified in clinical specimens. We saw vast usage of water pressure pumps and self-connections of pipelines in communities. Improperly secured piping connections and exposed pipe ends were immersed in contaminated water underneath high-rise houses. The risk of having AGE cases in households was four-fold greater with self-connection of piping and consumption of pipe water, and 3.6 times higher with self-connection of piping and houses exposed to high tides. Residual chlorine levels were consistently low (<0.2mg/L).

Conclusions
Improperly connected water pipes with usage of pressure pumps drew in pathogens when pipes were immersed underneath contaminated water. With low chlorination and inadequate boiling, AGE may result when contaminated water is consumed. Improving water quality and pressure, and education in securing pipelines from contamination are needed to control and prevent future outbreaks.
P37. Staphylococcal Food Poisoning among Police Personnel Deployed at the Association of Southeast Asian Nations (ASEAN) Summit – Hotel X, Pasay City, Philippines, August 2017

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group C) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Alethea De Guzman, Ms. Precious May Gabalfin, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On August 23, 2017, a report of suspected food-borne illness among police personnel stationed at Hotel X, Pasay City was received. An FETP team was sent to verify the diagnosis, determine existence of an outbreak, determine source and mode of transmission, identify risk factors, and recommend control and preventive measures.

Methods
A 1:2 unmatched case-control study was done. A suspect food-borne illness case was a previously well police personnel assigned at the steel parking at Hotel X who developed sudden onset of abdominal pain, vomiting, or diarrhea on August 23, 2017. A confirmed case was a suspect case positive for any pathogen. A control was a well police personnel also stationed at the steel parking at Hotel X and negative for any pathogen. We conducted key informant interviews, food trace back, and environmental survey. Human, food, and water samples were sent for bacteriological analyses.

Results
One hundred eleven police personnel were deployed at the steel parking at Hotel X. Sixty-five were interviewed and 17 cases identified. Majority (88%) of cases were male. Ages ranged from 22-30 years (Median = 26). Incubation periods ranged from 1-6 hours (Median = 2). Food handlers had no health certificates and did multiple tasks in the kitchen. No breach in the food production chain was observed during the visit. Seven (41%) cases, two (17%) asymptomatic food handlers, and five (10%) asymptomatic police personnel were positive for Staphylococcus aureus. No significant association between identified factors and disease occurrence was identified on bivariate analysis.

Conclusions
There was a Staphylococcal food poisoning outbreak among police personnel during deployment in the 31st ASEAN Summit. Multi-tasking of food handlers may have increased the risk of food contamination with Staphylococcus aureus. Personal hygiene and strict compliance to existing food safety laws were recommended to prevent recurrence of the outbreak.
P18. Methanol poisoning and illness associated with consumption of contaminated water - North Eastern Province, Cambodia, 2018

Tuesday, 6th November @ 13:30: Poster Presentations: Non-communicable Diseases (Group D) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Sengdoeurn Yi, Dr. Sovann Ly, Dr. Rotha Pen, Mr. Sophanith Ung

Background
On 5 May 2018, an alert was reported to the Cambodia Communicable Disease Control Department through the event-based reporting system about cases and deaths of an unknown disease in a North Eastern province. CDC and WHO teams were deployed to the affected areas to verify the following outbreak hypotheses (1) contamination of rice wine with methanol, (2) contamination of water from river X with pesticides, herbicides used in agriculture.

Methods
The outbreak case definition as of 7 May was any person from Commune Y, who developed at least one major sign (blurry or impaired vision, seizure, loss of consciousness) and one minor sign (chest pain, tightness, palpitations, abdominal pain, headache, malaise, vertigo, dyspnoea). A case investigation form was used to interview patients from the affected area. Univariate and bivariate risk factor analyses were conducted to compare group A (meeting the case definition) and group B (not meeting the case definition).

Results
As of 9 May, a total of 340 cases had been admitted to the provincial hospital. Among 109 patients interviewed, 55 met the case definition. The number of deaths reported was 13 from 1-9 May. All patients who died had a history of contaminated rice wine consumption in the affected villages. Rice wine consumption is the factor the most strongly associated with the occurrence of the diseases (OR=2.5, p=0.02, 95% CI 1.2 – 5.5). The concentration of methanol in rice wine was 14.9% (Reference <0.1%) and total pesticide was 12.39-26.12 ppb in water (maximum 0.5 ppb).

Conclusions
Consumption of rice wine was identified as a risk factor for this event. Concentrations of methanol and pesticides were found above normal range respectively in rice wine and surface water. The Ministry of Health has conducted risk communication, banned production and selling of rice wine, and has temporarily banned the use of stream water.
Background
On 9 February 2017, Purbalingga’s District Health Office was notified of suspect food poisoning cases with gastrointestinal signs after eating grilled chicken from a local food stall. An investigation was initiated to confirm the outbreak and identify risk factors to guide control measures.

Methods
A 1:1 case control study was conducted. Cases were persons with one or more of the following symptoms: nausea, vomiting, abdominal pain, fever, headache or diarrhea on 8-11 February 2017. Controls were those who did not develop any symptoms. Interviews were conducted using a structured questionnaire; ocular inspections of the kitchen and the farms were done. Food samples, feces from patients, and rectal swab from food handler were collected and sent to a laboratory for testing.

Results
There were 80 cases and 80 controls. Most commonly reported symptoms were abdominal pain (86%), headache (83%), fever (72%), diarrhea (71%), nausea (68%), and vomiting (41%). Eighty percent sought medical attention and 30 percent were hospitalized. Incubation periods ranged from 30 minutes-48 hours. Eating grilled chicken was a risk factor (OR=102.7; 95% CI=27.1–546.7). Salmonella choleraesuis and Salmonella spp were found in the grilled chicken but they were not found in the raw chicken. The chicken had been cooked for 1 hour (masak ungkep) before it was roasted. However, the potential for contamination occurred when cooked chicken was left uncovered during the cooling process before roasting. Roasting utensils were not cleaned and covered after use. Health check of food handlers indicated that they were not carriers of salmonella.

Conclusions
Grilled chicken contaminated after the cooking process was the potential source of a salmonellosis outbreak in Purbalingga on 8-11 February 2017. Implementation of standard health and safe food handling procedures need to be applied in the food stall.
P1. Shigella flexneri Food Poisoning Outbreak in a School in Orkhon Province, Mongolia, May 2018

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group B) (Outside of Convention Hall A, 2nd Floor) - Poster

Mrs. Oyunaa Tumurbaatar, Dr. Baigalmaa Jantsansengee, Dr. Batdorj Batjargal

Background
On June 3, 2018, the Emergency Operations Center of NCCD recived a report of several students hospitalized who had loose stools, fever and headache from X school in Orkhon province. We conducted an investigation to verify the diagnosis and cause of the outbreak.

Methods
We conducted a retrospective cohort study among those who ate at X school on 29, 30 and 31 May 2018. A suspect food poisoning case was defined as a previously well individual who went to or worked at the X school on May 29-31, 2018 and had sudden onset of three of the following: loose stools, headache, abdominal pain and fever. A confirmed case was a suspect case positive for Shigella flexneri. We calculated relative risks and 95% confidence intervals.

Results
A total of 77 cases were identified. Overall attack rate was 34.8% (77/221). The epidemic curve suggested a point source. Incubation periods ranged from 9 to 105 hours (median 34 hours). Food association showed piroshki (AR=60%, RR=1.83), gulyash (AR=52%, RR=1.8), kimbab (AR=53%, RR=3) were the highest risk. Students who ate kimbab had statistically significant association with illness (RR=3.54, p=0.003). Twenty one (25%) students tested were positive for Shigella flexneri.

Conclusions
Kimbab was the vehicle of Shigella flexneri food poisoning. Inappropriate storage of cooked food (kimbab) at room temperature was probably to blame for food contamination.
P4. Waterborne Norovirus Outbreak in Nanchong City likely Originating from Municipal Water Contamination

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group C) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Shuhua Ren

Background
On 24 March 2018, Sichuan CDC was notified of > 500 residents with gastroenteritis in Nanchong City. We conducted an outbreak investigation to identify the causative agent and possible vehicle of transmission.

Methods
Three case-control studies were conducted in a secrecy-keeping-unit (case-control1), a school (case-control2) and a community (case-control3). Cases were those associated with 2 episodes of vomiting, or 3 episodes of diarrhea, or both during a 24-hour period. Eligible controls were those from the same unit or community as the case and without the above clinical symptoms. Stool, vomitus, anal swabs from cases and tap water samples were collected, and tested for norovirus by RT-qPCR.

Results
Totally 735 patients were identified; predominantly the elderly and children. The epidemic curve indicated continuous exposure. The distribution of cases was consistent with that of the water supply network. Three case-control studies showed the following three factors were correlated with the disease, while none of the other factors were statistically related. The case-control1 revealed elevated risk associated with frequency of hand washing ($OR=8.67$, 95% CI 2.15-34.90), and there was a positive dose-response relationship between the two ($\chi^2=10.26$, $p=0.0014$). The case-control2 revealed the proportion of those who washed their mouth with tap water was higher among cases (72.73%) than among controls (36.36%, $\chi^2=3.88$, $p=0.0488$, $OR=4.67$, 95% CI 0.96-22.79). The case-control3 showed eating cold dishes washed in tap water, in schools ($OR=5.64$, 95% CI 1.12-28.34) and outside ($OR=4.09$, 95% CI 1.13-14.72) were risk factors for the disease. The pipe network of the First Waterworks was repaired and service interrupted for several hours before the outbreak. Multiple genotypes were identified including GI and GII in stool and anal swab samples.

Conclusions
The epidemiological features of the outbreak were consistent with waterborne transmission while the case-control studies consistently identified contaminated tap water as the most likely vehicle for the outbreak.
P17. Epidemiological Investigation of Illnesses Following Suspected Chemical Spill, District Shamli, Uttar-Pradesh, India, October-November, 2017

Tuesday, 6th November @ 13:30: Poster Presentations: Non-communicable Diseases (Group D) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Ashok Talyan, Dr. Syed Qadri, Dr. Meera Dhuria, Dr. P Khasnobis, Dr. Pavana Murthy, Dr. Sudhir Jain, Dr. CS Aggarwal, Dr. A.C. Dhariwal, Dr. Sujeet Singh

Background
Globally, unintentional chemical poisonings cause an estimated 193,000 deaths annually. In India from 2001-2010, there were 130 reported chemical accidents. On October 10, 2017, students in a school adjacent to a sugar mill dumping ground in Dayanand colony of Shamli District, Uttar Pradesh reported sudden onset of bitter taste and breathlessness. We investigated to describe the epidemiology, determine risk factors and recommend measures for prevention.

Methods
We defined a case as a Dayanand colony resident with bitter taste or breathlessness during October 9-15, 2017. We searched for cases by house-to-house survey, reviewed hospital records, and conducted an environmental investigation.

Results
There were 383 cases (60% female) with attack rate of 4% (383/10,399). Median age was 13 years (range 3-63) with majority (74%) being students. Presenting symptoms were bitter taste (94%), breathlessness (61%), vomiting (49%), headache (28%), abdominal pain (25%) and eye irritation (24%); 70% sought medical care and 3% were hospitalized. There were no deaths. Most cases (90%) had illness onset on October 10 between 8AM and 11AM. A whitish powder found on the road to the dumping yard on October 9 reportedly elicited similar symptoms as cases in team members. Most (77%) students developed symptoms in school or while walking by the dumping yard. The suspected substance was collected from the dumping yard and was reported to be Denatonium saccharide, the most bitter chemical known and known to cause respiratory tract irritation.

Conclusions
This sudden onset of illnesses among mostly children was likely caused by a chemical spill from the sugar mill before reaching the dumping yard. The state government ordered closure of the sugar mill and banned use of the road adjacent to the dumping yard. We recommend an early warning signal be generated in the public health system during future chemical spills to initiate rapid response and detailed epidemiological investigations.
Background
Gamping PHC reported to Sleman District Health Office that 15 elementary students had dizziness, nausea, and vomiting after consuming sachet drink from a street food vendor (angkringan) on March 23, 2018. An investigation was conducted to verify the outbreak, identify the risk factor and preventive measures.

Methods
Active case finding was performed to find new cases in the school and community. We conducted a 1:4 case-control study to find the risk factor. Cases were persons who consumed food or drink from angkringan on March 23, 2018 and had at least one of the following: nausea, vomiting, dizziness, with or without stomachache, fever, diarrhea. Controls were people who consumed food or drink from angkringan on March 23, 2018 but showed no symptoms like cases. Data were collected by interviews using a standard questionnaire and observation. Data was analyzed using Chi-square tests and logistic regression. Samples of drink and drinking water were tested for bacterial contamination. sachet powder was tested for chemical contamination.

Results
We found 15 cases, most were female (73.3%) in the 5-11 years age group. The main symptoms were dizziness (81.8%), nausea (72.7%), and vomiting (63.6%). Incubation periods were 15-30 minutes. Analysis showed that “T” sachet drink was associated with food poisoning (aOR=7.52, 95% CI=1.99-28.40). The sachet drink sample was positive for Bacillus cereus and mold/yeast but the sachet powder and drinking water were negative for pathogens. Observation showed that eating utensils used for the drinks were not properly cleaned.

Conclusions
A food poisoning outbreak occurred in Sleman on March 23, 2018 after consuming sachet drink contaminated with Bacillus cereus and mold/yeast. Possible risk of transmission was use of unclean eating utensils. Supervision and training of food safety was recommended to the District Health Office. Making rules for students not to buy food outside the school was recommended to the headmaster.
**P22. Foodborne outbreak following an Engagement Party, Prey Veng Province, Cambodia, July 2017**

**Background**
Foodborne outbreaks are common in Cambodia, however, only a few investigations documenting the etiology and source have been conducted. In July 2017, 77 cases of acute diarrhea and vomiting in a village following an engagement party were reported through the event based surveillance system. We undertook an investigation to identify the pathogen, source and mode of transmission.

**Methods**
We interviewed the hosts of the engagement party and food handlers to obtain the menu and guest list. We asked about signs and symptoms and onset of illness, time of meals and foods or drinks consumed. Cases were any person who attended the engagement party and their family members, and presented with diarrhea, vomiting, headache, vertigo, abdominal cramps or fever after the food was served from 22 to 24 July 2017.

**Results**
Out of 120 persons, there were 92 interviewees, of which 77 (84%) were ill. Their average age was 38 years (range 3 to 76). There were 59 women and 33 men. The symptoms for the 77 cases were vomiting (81%), stomach ache (57%), diarrhea (57%), headache (49%), dizziness (48%), fever (9%), and other symptoms (21%). During the engagement party, 76 (83%) of the attendees consumed raw beef with salad. This food was prepared the day before and left out overnight. There were hygiene and sanitation issues related to the food preparation.

**Conclusions**
The epidemic curve reflects a common point source outbreak with a short incubation period of 3 to 7 hours, consistent with a bacterial toxin. Contamination of the food may have occurred due to the unsanitary location where the food was prepared and because the food was left out overnight without refrigeration or safe storage. Improved hygiene and food preparation at events is required to prevent outbreaks from occurring.
P6. A Large Outbreak of Norovirus Infection among Students from 4 Schools on a Spring Outing, Wenzhou, China, 2018

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group C) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Bin Lv, Mr. Tiecheng Liu, Prof. Jian Cai, Dr. He Fan, Mr. Zhaorong Ni, Mrs. Lu Ran, Dr. Huihui Liu

Background
In the evening of April 11, 2018, 34 acute gastroenteritis cases from four schools were reported to the local CDC by a county hospital. An investigation was conducted to identify the cause, transmission mode, risk factors and to recommend measures for control and prevention.

Methods
A suspect case was defined as any student or staff in the 4 schools who had onset of vomiting or diarrhea from April 8 to 14, 2018, a confirmed case was a suspect case with positive norovirus lab test. We conducted a case-control study to compare consumption of food and other potential risk factors of 103 patients to 98 controls selected from the same schools. We collected 44 anal swabs and 7 vomitus samples from suspect cases for testing using polymerase chain reaction (PCR) assay.

Results
There were 181 patients from 4 schools and the attack rate (AR) was 5%. The AR among persons who attended the spring outing was 11% (176/1,562) compared to 0.24% (5/2,060) among those who didn’t ($\chi^2=237, p<0.01$). 76 cases (75%) ate ice cream in the park canteen compared to 38% of controls (odds ratio [OR]=5, 95% confidence interval [CI]:2.6-9.5). The ice cream was home made with unboiled tap water and milk. Among the 44 rectal swabs and 7 vomitus specimens, 13 and 4 were positive for Norwalk GII virus, respectively.

Conclusions
The acute gastroenteritis outbreak in the four schools was caused by Norwalk GII virus infection from contaminated homemade ice cream produced with unboiled milk and tap water. It is necessary to strengthen the food and water safety management in scenic spots which may be overlooked by general regulatory guidelines for food safety.

Tuesday, 6th November @ 13:30: Poster Presentations: Non-communicable Diseases (Group D) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Tassana Thammaros

Background
On 24-25 November 2016, the Bureau of Epidemiology and local authorities jointly conducted an investigation of an event where a bus plunged into a ravine along Highway No.11, Uttaradit province to describe the event and contributing factors in order to recommend interventions to prevent road traffic injuries.

Methods
A descriptive study was conducted by gathering data from medical records, reports from multidisciplinary team and interviewing those involved in the event. The event data were analyzed by using the Haddon matrix framework. Injury Severity Scores (ISS) were calculated. We determined the association between injured body region and death by using logistic regression.

Results
The bus transported 38 passengers, aged (median, Q1-Q3): 64.5, 61-69 years; male to female ratio was 1:1.9. There were 20 survivors and 18 fatalities (CFR=47.4%). Main causes of death were a blunt chest injury (33.3%), severe head injury (27.8%) and C-spine fracture (22.2%). The most injured body parts were head and neck (94.4%), face (66.7%) and chest (61.1%) among fatal cases and head and neck (80%), extremities (50%) and surface (90%) among non-fatal cases. The ISS (median, (Q1-Q3)) of fatal and non-fatal cases were 57 (50-68) and 17.5 (11.5-27), respectively. The contributing factors of the event were: (1) bus driver drove on an unfamiliar route at high speed, (2) most victims were old and did not fasten their seat-belts while seated, and (3) the accident scene was far from a hospital, 50-meters-deep from the road and difficult to access.

Conclusions
The bus plunged into a ravine causing 18 fatalities and 20 non-fatal injury cases. Main causes of death were head, neck and chest injuries. Difficulty in accessing the scene decreased patient survival. Most cases didn’t fasten their seatbelt. Major contributing factors included high speed driving and unfamiliar route. Speed control and fastening seat belts should be enforced to prevent further accidents.
P13. Investigation of a Food Poisoning Outbreak from Beef Stew with Coconut Milk Sauce Consumption — Kulon Progo District, Indonesia, 2018

Tuesday, 6th November @ 13:30: Poster Presentations: Foodborne Diseases (Group A) (Outside of Convention Hall A, 2nd Floor) - Poster

Ms. Iffa Karina Permatasari, Mrs. Nurjanna Nurjanna, Mr. Sugianto, Dr. Titiek Hidayati, Mrs. Sarmini Sarmini, Mrs. Sulistyorini Sulistyorini

Background
On 11 April 2018, Wates Hospital, Kulon Progo District reported that there were 13 patients with symptoms of nausea, vomiting, abdominal pain and diarrhea after consuming a meal from a wedding celebration in Pengasih Sub-District, the day before. An investigation was conducted to confirm the outbreak, identify the cause, and recommend preventive measures.

Methods
Active case finding was done by door-to-door visits. An analytical study was done using a retrospective cohort design. Cases were persons who had at least one symptom of nausea, vomiting, abdominal pain or diarrhea, with or without headache, after eating a meal from the wedding celebration at Mr. X's house, in Pengasih on 10 April 2018. Data were collected through interviews. Environmental investigation was done by interviewing food handlers and Mr. X's wife. Data were analyzed using Chi-square tests and Poisson regression using α=5%. We collected food, stool and vomitus samples and sent them to Yogyakarta Health Laboratory.

Results
We estimated that 240 guests attended the wedding and received the food, according to Mr. X's information. We interviewed 209 guests and found 143 cases (AR=68.4%). Main symptoms were diarrhea and abdominal pain (97.2%). Incubation periods ranged from 1-9.5 hours (average 5). Multivariate analysis showed that beef stew was associated with illness (aRR=49.33, 95% CI=6.29-386.60). We found that the color of raw meat was pale red. Beef stew was cooked on 9 April 2018 between 9-11.30 AM and stored at room temperature for 20.5 hours. We found only beef stew sample. Laboratory testing found Proteus mirabilis, Klebsiella pneumoniae, and Pseudomonas spin in the beef stew sample.

Conclusions
A food poisoning outbreak happened on 10 April 2018 at Pengasih after consumption of contaminated beef stew. Improper cooking and storage of the meat led to consumption of contaminated beef. Education of residents on safe food handling was done as a preventive measure.

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group B) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Alethea De Guzman, Ms. Karen Lonogan, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On July 7, 2016, we received a report of clustering of diarrhea cases in a seaside municipality of Quezon Province. An epidemiologic investigation was conducted to establish the existence of an outbreak, determine the source and mode of transmission, identify risk factors, and recommend control and prevention measures.

Methods
We conducted a 1:2 unmatched case-control study. A suspect case was a previously well resident of San Francisco, Quezon with sudden onset of watery diarrhea (≥3 episodes/day) from May 1-August 26, 2016. A confirmed case was a suspect case positive for *Vibrio cholerae* on stool culture. A control was a well resident negative for *Vibrio cholerae*. We assessed the water supply and environmental sanitation of the area and collected water samples and stool specimens for laboratory confirmation. We used EpiInfo 3.5.4 to analyze data.

Results
We identified 234 suspect cholera cases. One hundred twenty-two (52%) were female. Ages of cases ranged from two months to 88 years (median=7 years). Chlorination of level I and II water sources were not regularly done, especially during the rainy months of June and July. Forty-nine percent of households had no access to sanitary toilets. Five (14%) of 36 stool specimens were positive for *Vibrio cholerae*. Nineteen (76%) of 25 water samples were positive for *Aeromonas*. After multivariate analysis, washing hands with soap (Adj. OR=0.37, 95% CI:0.2-0.7) was found to be inversely associated with the disease.

Conclusions
The epidemic curve indicated a common source outbreak of cholera in San Francisco, Quezon. Poor environmental sanitation led to seepage of surface runoffs brought by heavy rains resulting to contamination of water sources. The municipality then conducted chlorination of water sources which controlled the outbreak and continued disease surveillance to monitor the continuous decrease of cases.
P26. Outbreak of Foodborne Gastroenteritis in a School, Kohima District, Nagaland, India, September 2017

Tuesday, 6th November @ 13:30: Poster Presentations: Food and Waterborne Diseases (Group C) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Takujungla Jamir, Dr. John Kemp, Dr. Nyanthung Kikon, Dr. Asenla Lemtur, Dr. Alhunuo Khezhie, Ms. Nyanbeni Murry

Background
A private hospital in Kohima reported 41 admitted cases of diarrhoea to the State Surveillance Unit of Nagaland on September 2, 2017. Our team started an investigation on September 2, 2017 to describe the epidemiological characteristics of the outbreak and to determine the associated risk factors.

Methods
We defined a case as diarrhoea (>3 stools in 24 hours) or vomiting in a child studying in a private school in Kohima from August 29 to September 8, 2017. We did a classroom to classroom survey for cases and conducted a retrospective cohort study among persons who attended or ate from a school farewell event on September 1, 2017. We observed exposures to different food items and risk factors involved. We collected four stool samples and tested them for pathogens.

Results
We identified 209 cases with an attack rate of 77%. Among them, 154 were hospitalized. There were no deaths. Attack rate was highest in the 16-25 years age group (73%). Females (59%) were more affected. Among the identified cohort of 271 persons, 249 attended the farewell event and 187 fell ill, 22 did not attend but ate food brought home. Risk of gastroenteritis was 4.5 times (95% CI= 1.8-11) among those who ate chocolate cake with coffee toppings and 1.2 times (95% CI= 1.0-1.3) among females than among males. Of the four stool samples, one tested positive for *Escherichia coli*, one for Pseudomonas bacilli and two for *Staphylococcus aureus*.

Conclusions
An outbreak of gastroenteritis due to mixed bacterial infection occurred following a school farewell event having strong association with consumption of chocolate cake with coffee toppings. We recommend Information, Education and Communication activities regarding proper cooking and food storage and timely collection of appropriate samples for testing.
P10. Premature Mortality from Coronary Heart Disease -
Regional Health Service 4 of Thailand, 2014-2015

Dr. Kittiphan Chalom, Dr. Phanthanee Thitichai

Background
Cardiovascular diseases (CVDs) are the leading cause of death globally. Of these deaths, 80% are due to coronary heart disease (CHD) and stroke, and 34% occur before 70 years of age. In Thailand, CVDs are a major cause of death. From 2007-2015, CHD mortality rates had increased from 20.2 to 28.9 per 100,000 population, which was highest in Regional Health Service 4 (RHS 4). The objectives of this study were to assess the magnitude and describe characteristics of premature deaths from CHD in the RHS 4, Thailand, from January 2014 – June 2015.

Methods
We retrieved data from national vital registration and national health reporting system (NHRS). We described premature deaths, which were persons who died between 30-60 years old, after matching citizen identification number of each death from the two systems and calculated a 10-year cardiovascular risk using the Thai CVD risk score.

Results
In the study there were 3,278 CHD deaths, of which 1,703 (52%) were premature. The overall mortality rate among premature deaths was 42 per 100,000 population. Male to female ratio was 2.6:1. Among premature deaths, data were available in NHRS for 1,306 (77%) persons: 479 (37%) of those were diagnosed with hypertension, diabetes or dyslipidemia. Among 598 high CVD-risk persons, 197 (33%) and 173 (29%) received aspirin and statins, respectively.

Conclusions
Health education for lifestyle changes and risk factor reduction programs especially those targeting males may reduce premature CHD deaths. In addition, the appropriate management of people at high risk should be emphasized.
An outbreak of gastroenteritis caused by *Escherichia coli* EPEC in a children’s shelter in Ben Tre, Vietnam, 2017

Dr. Uyen Thi Ngoc Phan, Dr. Hung Cong Phan, Prof. Lan Trong Phan

**Background**

On 8 November 2017, media reported 19 hospitalizations and one death associated with gastroenteritis among orphans of a shelter in Ben Tre province, Vietnam. We investigated the outbreak to identify the causative agent and the source of the illness and to make recommendations to control the outbreak.

**Methods**

Cases were defined as resident children or employees with >3 episodes of diarrhea or vomiting during 5 October to 10th November. Stool samples were collected from cases and close contacts and water specimens were collected from the shelter’s water system. All specimens underwent bacterial culture for common enteropathogens and polymerase chain reaction (PCR) for *Escherichia coli*. Observations of routine activities in the shelter were used to identify potential routes of transmission.

**Results**

Of 94 orphans and 7 nannies living in the shelter, 38 (40%) orphans met our case definition, of which 36 (95%) were <5 years old. There were no cases among nannies. Stool samples from 11 (52%) of 21 ill children and 6 (85%) of 7 asymptomatic nannies tested positive for enteropathogenic *Escherichia coli* (EPEC). Eight (100%) of 8 water samples before and after the water filter system tested positive for EPEC. Our environmental investigation identified a broken chlorinator pump on the water system. Milk powder formula was mixed with boiled water which tested negative for EPEC. However, in the room housing children <5 years old, there were no handwashing sinks and nannies did not wash their hands between changing diapers, mixing formula, or feeding children.

**Conclusions**

We identified EPEC-contaminated water and poor hand hygiene practices as the likely causes of this outbreak. Adequately treated water and good hand hygiene practices are necessary to prevent outbreaks of diarrheal illness among children in institutional settings such as this one.
An outbreak of acute diarrheal disease - Thiruper, Tiruvallur district, Tamil Nadu, India, 2016

Tuesday, 6th November @ 15:30: Oral Presentations: Food and Waterborne Diseases 2 (Convention Hall B, 2nd Floor) - Oral

**Dr. Mohan Anandan, Dr. VS Saraswathi, Dr. Manickam Ponnaiah**

**Background**
On 24 December 2016, Devambattu primary health centre reported a cluster of 18 cases of acute diarrheal disease from Thiruper village, Tiruvallur district, Tamil Nadu, India. Surveillance data confirmed the unusual increase in incidence. We investigated this cluster to confirm the outbreak, identify the agent, source and risk factors to propose recommendations.

**Methods**
We actively searched for cases with occurrence of passage of three or more loose/watery stools per day among residents of Thiruper during 14-30 December 2016. We described the outbreak by time, place and person. We compared all cases with that of age (± one year) and gender matched neighbourhood controls and calculated matched odds ratio (MOR) and 95% Confidence Intervals (CI) for risk factors. We tested stool and water specimens for bacterial culture and antimicrobial sensitivity. We conducted environmental investigations to identify contamination of water sources.

**Results**
We identified 38 cases (Population size=625; Attack rate: 6.1%; No deaths) during 26-30 December 2016. The attack rate was highest among children under 5 years (16.5%) [Median age=12 years; Interquartile range: 3-38 years] and among females (6.8%). Cases started occurring on 14 December and peaked on 24 December and declined from 27 December 2016 onwards. Cases were more likely than controls to report exposure to the contaminated bore well water (MOR: 3.7; 95% CI: 1.1 to 16.4). We could not isolate any bacteria in stool specimens. *Escherichia coli* was present in two water specimens. The villagers had access to water from bore well, overhead tank storage and bottled water. We confirmed leakages and contamination of bore well water supplied through pipelines.

**Conclusions**
Drinking contaminated water from the bore well was associated with acute diarrhoeal disease. Repairing the leakage in water supply pipelines led to the control of the outbreak.
Epidemiological Investigation of a Hepatitis A Outbreak - Sabah, 2017

Dr. Muhammad Jikal, Dr. Ismail Ali, Dr. Michal Christina Steven, Mrs. Esther Barnad, Ms. Soong Du Er, Dr. A.l. Liza Latip, Dr. Ahmad Faudzi Mohd Yusoff

Background
From 8 to 28 November 2017, the Sabah State Health Department received 16 notifications of suspected hepatitis A cases. All the suspected cases had attended a funeral ceremony in Membakut District, Beaufort on the 3rd of November 2017. This outbreak investigation aimed to describe the epidemiological characteristics, identify source of the outbreak, determine the circulating genotype and institute appropriate control measures.

Methods
We performed descriptive analysis and conducted a 1:2 case-control study. Cases were defined as those who attended the funeral service and presented with fever/jaundice with/out nausea and were positive for IgM anti HAV from 3rd of November 2017 onwards. Controls were selected among the attendees of the funeral ceremony but had no symptoms. Standard structured questionnaires were used during the interviews. Stool samples were taken for viral isolation and genotyping. Environmental assessments related to the funeral ceremony were conducted.

Results
Ten cases met the case definition, 90% were male and their ages were between 18 to 58 years. Incubation periods ranged from 28 to 39 days. Cases presented with jaundice 10 (100%), fever 10 (100%), chills 8 (80%), joint pain 2 (20%), abdominal pain 2 (20%) and nausea/vomiting 2 (20%). We found that consuming palm wine during the ceremony had a statistically significant association with hepatitis A infection (OR=3.44; 95%CI=1.52-7.76). Viral isolation showed the same genotype. Food and environmental samples were negative. Preparation of the palm wine involved using untreated river water and were observed to be unhygienic.

Conclusions
Palm wine was the likely source of the outbreak. Hygienic preparation of palm wine was advised. Strict monitoring of traditional palm wine production should be implemented by the local authority.
Background
The Event-based Surveillance and Response Unit of the Epidemiology Bureau received a report of increasing numbers of diarrhea cases in sub-village Megbadiang. An epidemiologic investigation was conducted to verify the existence of an outbreak, identify possible source, determine risk factors, and recommend control and preventive measures.

Methods
We conducted a 1:2 case-control study. A suspect case was a previously well individual in sub-village Megbadiang with at least three episodes of watery diarrhea per day from May 12-29, 2017. A confirmed case was a suspect case positive for Vibrio cholerae. A control was a well person residing in sub-village Megbadiang from May 12-29, 2017 negative for Vibrio cholerae. We conducted an environmental survey. We collected rectal swabs and water samples for bacteriological testing.

Results
There were 76 suspect cholera cases; no death was reported. Majority (47, 62%) were female. Ages ranged from eight months to 80 years (median=23 years). There was fecal contamination in drinking water sources due to a leaking pipeline. Poor hygienic practices and high density of flies were noted. Ten (13%) specimens were positive for Vibrio cholerae ogawa El Tor. Risk factors were practicing open defecation (OR = 4.25; 95% CI: 1.69 – 10.64) and using open dug communal toilets (OR = 3.34; 95% CI: 1.67 – 7.18). Boiling drinking water was protective (OR = 0.27; 95% CI: 0.13 – 0.58).

Conclusions
The cholera outbreak in sub-village Megbadiang was likely caused by contamination of the water source through leaking pipes and poor defecation practices. Further transmission probably occurred due to high density of flies. Ensuring safe water, improving access to sanitary toilets, implementing vector control and good hygiene practices will control and prevent recurrence of cholera. The municipality repaired the pipeline and constructed sanitary toilets for the residents.
**Acute Watery Diarrhoea Outbreak at Andasa Holy Water, Bahir Dar Zuriya District, North-West Ethiopia, 2017**

Tuesday, 6th November @ 15:48: Oral Presentations: Food and Waterborne Diseases 1 (Convention Hall A, 2nd Floor) - Oral

*Mr. Yeshambel Worku, Mr. Melaku Kindie*

**Background**

Acute Watery Diarrhoea (AWD) is a public health problem in Ethiopia. Holy-water is famously located at Blue-Nile-River. 10-50 thousand people register to use the site at anytime. People drink and bath in it for healing purposes. The study objective was to assess the magnitude of the AWD outbreak and associated risk factors for appropriate control measures at Andasa Holy-Water, Bahir-Dar Zuria District, North-West Ethiopia, 2017.

**Methods**

An unmatched case-control study was done. A case was a patient ≥5 years with AWD, residing at holy-water site during the study period. Controls were selected from caregivers, families and neighbors in the holy water site. Cases were epidemiologically linked to a confirmed *Vibrio cholerae* 01 serogroup of a previous outbreak in August 2016. Structured questionnaires were used to interview 144 patients and 144 controls. Data were entered to Epi-Info™7 and analyzed by SPSSV20. Crude and adjusted odds ratios and 95% confidence intervals were calculated.

**Results**

144 cases were reported in three months, February 21-April 21-2017 with a CFR of 3.5%. 89(61.8%) of patients were male. The 15-44 years age group was the most affected group. Epidemic curve indicated intermittent common source transmission. The index case was a 26 years old male from Oromia region. He developed AWD after 18 days in holy water. Drinking river water(AOR=13.34, C.I=5.47–32.51), contact with patients(AOR=8.22,CI=3.57–18.92), hand washing after toilet use(AOR=0.28, CI=0.10–0.77), hand washing before eating(AOR=0.03, CI=0.01-0.09), hand washing before cooking food(AOR=0.053, C.I.=0.01–0.3) and knowing AWD transmission mode(AOR=0.137, CI=0.04–0.43) were statistically significant associated factors.

**Conclusions**

The magnitude of outbreak was high with poor response. Drinking Blue Nile River water and contact with patients were risk factors for AWD. Bahir-dar Zuria district Health Office in collaboration with other concerned bodies should work on provision of safe water by chlorination, treating with water-guard, establish tap/pipe water and increase the hygienic awareness of holy-water users.
A Cohort Study of a Shigella flexneri 2a Outbreak during a Village Foundation Anniversary Celebration, Samar, Philippines, 2017

Background
On February 28, 2017, the Event-Based Surveillance and Response Unit received a report of increasing numbers of acute bloody diarrhea cases in Samar. We conducted an epidemiologic investigation to establish the existence of an outbreak, profile cases, determine source and mode of transmission, determine risk factors, and recommend control and prevention measures.

Methods
We conducted a cohort study. A suspect case was a previously well resident from Maypange, Motiong, Samar with acute diarrhea (≥ 3 episodes per day) from February 22–March 3, 2017. A confirmed case was a suspect case positive for any bacterial pathogen. We conducted an environmental survey. We collected rectal swabs and water samples for bacteriological testing.

Results
Three hundred sixty-nine (89%) individuals attended the village event. Two hundred eight (56%) had diarrhea; none died. One hundred-eight (52%) were female. Ages ranged from 1 to 80 years (median=18). A village founding anniversary, where a community lunch was hosted, was held prior to onset of cases. On inspection, the food preparation area was unsanitary. Possible contamination of drinking water sources was also observed. The catchment tank of the spring was flooded. The three communal faucets had pipelines laid above ground. Leaks were temporarily closed with rubber. No water source was regularly chlorinated. Water sources were positive for Aeromonas hydrophila and Aeromonas caviae. Five (6%) of 78 rectal swabs were positive for Shigella flexneri 2a. On multivariate analysis, drinking water from the communal faucet (RR=2.50; 95% CI: 1.06-5.90) and eating “asado” stew (RR=1.99; 95% CI: 1.26-3.16) were associated with illness. Washing hands before eating was protective.

Conclusions
A food and waterborne disease outbreak occurred in Village Maypange due to Shigella flexneri 2a. Food served and contaminated drinking water were possible sources of infection. Food safety was emphasized among food handlers. Water chlorination was conducted by the village officials which controlled the outbreak.
An Outbreak of Hepatitis A associated with Contaminated Water Sources – Sabang Village, Surigao del Sur, Philippines, August – December 2017

Tuesday, 6th November @ 15:48: Oral Presentations: Food and Waterborne Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Dr. Alethea De Guzman, Ms. Denisse Lou Manalili, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
In November 2017, the Philippines' Event-based Surveillance and Response Unit was notified of a cluster of suspect Hepatitis A cases in Sabang Village, Lingig, Surigao del Sur. We conducted an investigation to verify the diagnosis, establish existence of an outbreak, identify implicated source and risk factors, and recommend control and preventive measures.

Methods
We conducted a descriptive study. A suspect case was a previously well individual from Sabang Village with jaundice and any of the following: fever, nausea, vomiting, diarrhea, or abdominal pain from August 31 – December 20, 2017. We reviewed medical records and conducted active case finding and environmental investigation. Serum specimens were confirmed through ELISA. Water samples were collected for bacteriological examination. We conducted a 1:3 case-control study.

Results
This is the first documented Hepatitis A infection in the municipality. Thirty-eight suspect cases were identified. No reported death. Majority (55%) were male. Ages ranged from one to 24 years (median: 9). Majority (89%) were students. Food stalls had no sanitary permits and had poor food safety practices. All drinking water sources had no certification for potability. Water pipes were leaking, submerged in a pond, or near canals. Lack of sanitary toilet facilities led to open defecation. Six (67%) of nine water sources were positive for coliforms and Escherichia coli. Twenty-four (63%) cases were laboratory-confirmed. Multivariate analysis identified that significant risk factors were drinking beverages from food stalls (OR=7, 95% CI=1.97 – 24) and practicing open defecation (OR=4, 95% CI=1.43 – 8.78).

Conclusions
This Hepatitis A outbreak was probably due to water sources contaminated with feces from infected individuals and poor integrity of water pipes. Intake of street drinks not safely prepared is a contributing factor. We recommend that safe drinking water be ensured by treating sources and maintaining distribution system. Immediate interventions like boiling or chlorination were recommended.
A Waterborne Outbreak of Paratyphoid A Transmitted from Community to School - Yunnan Province, China, 2017

Tuesday, 6th November @ 15:48: Oral Presentations: Food and Waterborne Diseases 4 (Conference Hall, 14th Floor) - Oral

Ms. Feng Qiwen, Mr. Wentao Song, Dr. Jing Zhang, Mr. Bo Li, Dr. Huihui Liu, Mr. Xiaoqing Fu

Background
On June 26, 2017, a suspected paratyphoid fever outbreak was reported with 30 cases occurring from the end of May to June in a town in Yunnan Province. We conducted an investigation to confirm the cause, transmission mode, risk factors and to recommend measures for control and prevention.

Methods
We defined a suspect case as a resident in the county with onset of fever (≥37.5°C) for more than 3 days between May and July. A confirmed case was defined as a suspect case with isolation of Salmonella paratyphi A from blood or stool. Medical records in the county hospitals were reviewed to look for cases. A 1:2 case-control study was conducted with 23 confirmed cases enrolled. Controls were selected from the same township as a case and matched on age and sex. Water, food, blood and stool samples were collected for testing.

Results
56 cases were identified in the town from May 1 to July 10, 2017, including 23 laboratory confirmed cases and 33 clinically diagnosed cases. 19 cases (83%) drank un-boiled tap water compared to 54% of controls (odds ratio [OR]=4, 95% confidence interval [CI]:1.2-13.6). Salmonella paratyphi A was isolated from the blood and stool samples. It was observed that the primary case irrigated his farmland with manure. Rainwater had overflowed the farmland causing fertilizer and excrement to seep into the river near the township water supply which was sourced from underground water. The total number of Escherichia coli in the source water and tap water both exceeded 1600 MPN/100 ml which is above the acceptable minimum standard.

Conclusions
This outbreak was attributable to drinking unboiled contaminated tap water from the township water supply. We recommended chlorination of water, further reconstruction of toilets to promote safety and protect drinking water and a strict adherence to safety standards at the water supply unit.
Acute diarrheal disease outbreak investigation, Muzaffarpur village, Chandauli district, Uttar Pradesh, India, September 2017

Tuesday, 6th November @ 16:06: Oral Presentations: Food and Waterborne Diseases 1 (Convention Hall A, 2nd Floor) - Oral

**Dr. Ginisha Gupta, Dr. Akhileshwar Singh, Dr. Neelam Ojha, Dr. Tanzin Dikid, Dr. Ekta Saroha, Dr. Saurabh Goel, Dr. P Khasnobis, Dr. Samir V Sodha, Dr. CS Aggarwal, Dr. Sujeeet Singh**

**Background**

In 2015, there were ~1.4 million diarrheal deaths globally. In India, diarrhea accounts for 25% of all outbreaks reported. Most of these are attributed to unsafe water but often lack thorough epidemiological investigations. On August 18, 2017, Muzaffarpur village, Chandauli district, Uttar Pradesh reported a diarrhea outbreak. We investigated to identify risk factors and provide evidence-based recommendations.

**Methods**

We defined a case as a resident of Muzaffarpur with ≥3 loose stools within 24 hours or vomiting between August 7 and September 9, 2017 and searched for cases from house-to-house. We conducted a 1:1 neighborhood-matched case-control study and calculated matched odds ratio (mOR) with 95% confidence intervals (CI). We tested stool samples for *Vibrio cholerae*, evaluated water sources, and tested water samples for fecal contamination.

**Results**

We identified 70 cases (58% female) with median age 12 years (range: 3 months-70 years). Overall village attack rate was 2% (70/3684) but was 12% (44/384) in neighborhood-A. There were 35 hospitalizations (50%) and two deaths (case fatality rate: 3%). Symptoms included diarrhea (99%), vomiting (63%), and fever (21%). Water consumption from well-A of neighborhood-A (mOR: 43; 95% CI: 2.6-709) and no handwashing (mOR: 2.8; 95% CI: 1.2-6.4) were significantly associated with illness. Well-A was uncovered and susceptible to contamination by nearby bathing and laundry activities. The index case washed soiled clothes at well-A one week before the outbreak. Among 529 households, only 27 (5%) had household toilets. All seven stool samples tested negative for *Vibrio cholerae*. Water from well-A was positive for fecal contamination.

**Conclusions**

This acute diarrheal disease outbreak was associated with consumption of contaminated well water. Our investigation led to chlorination of wells, initiation of toilet construction in households, and health education of the community. We recommend conducting systematic epidemiological investigations for diarrhea outbreaks in India to identify sources of contamination and guide targeted interventions.
Food poisoning outbreak possibly caused by Staphylococcal enterotoxin A in Sagaing Region, Myanmar, April 2018

Tuesday, 6th November @ 16:06: Oral Presentations: Food and Waterborne Diseases 2 (Convention Hall B, 2nd Floor) - Oral

**Dr. Yamin Thaung, Dr. Nyi Nyi Lwin, Dr. Kyaw Thu Swe, Dr. Htun Tin, Dr. Ko Ko Zaw, Dr. Win Lwin, Dr. Witaya Swaddiwudhipong**

**Background**
Myanmar annually reported 16-61 outbreaks of food poisoning/diarrhea during 2010-2017 but the sources and modes of disease transmission were not well identified. We report an epidemiological investigation of a common-source food poisoning outbreak caused by Staphylococcal enterotoxin A (SEA) in one ceremony in a rural village of Myanmar in April 2018.

**Methods**
A total of 959 villagers who attended the ceremony and consumed foods and water during the ceremony were identified and screened for food poisoning. A retrospective cohort study among these attendees was done to determine possible risk factors. An environmental study was carried out in the village where the ceremony was held. Samples for laboratory analysis including stool and vomitus specimens from two cases, nasal and hand swabs from all 15 food handlers, 11 food samples, and two drinking water samples were examined at the National Health Laboratory.

**Results**
Of the 959 attendees, 245 (25.5%) suffered from food poisoning. Twenty-one cases (8.6%) were hospitalized and none died in this outbreak. The most common clinical manifestation was vomiting (81.6%), followed by diarrhea (58.4%), abdominal pain (46.9%), and nausea (42.9%). All the 245 cases had onset of the disease within the ceremony day. The median incubation period was about 5 hours, with a range of 1-12 hours. The outbreak affected all age groups and both sexes. Eating fried dried fish with chili was significantly associated with the disease by both uni-variate and multi-variate analyses (adjusted odds ratio=6.12, 95% CI= 2.66-14.07). *Staphylococcus aureus* producing enterotoxin A was isolated from one vomitus sample from a case, from fried dried fish with chili, and from nasal and hand swabs of one food handler.

**Conclusions**
This common-source outbreak might be caused by SEA from a food handler carrying the organisms.
Outbreak of food poisoning in a rural boarding school - Aurangabad, Maharashtra, India, 2017

Background
In India food-borne outbreaks together with acute diarrheal diseases constituted nearly half of all reported outbreaks between 2011 and 2016. A suspected food poisoning outbreak was reported from a rural male boarding school in Aurangabad, Maharashtra, India, on 14 April 2017. We investigated to describe the epidemiology, identify risk factors, and recommend preventive measures.

Methods
We defined a suspect case as a student of the boarding school in Shendurwada with sudden onset of nausea, vomiting with or without loose stools, fever or abdominal pain from 14 April 2017. We identified cases by reviewing hospital records and by a school survey. Stool for cultures were collected by hospitals. We conducted a retrospective cohort study to determine exposure to suspected left-over rice as the main risk factor. We assessed hygiene and sanitation of the school kitchen, food handlers and tested food samples for contamination.

Results
Overall attack rate was 23.6% (26/110). All cases were male. Attack rate was highest among students aged 5 to 10 years (36.1%, 13/36) and among those who consumed two bowls of rice (41.7%, 10/24). Symptoms reported included vomiting (100%), nausea (100%), diarrhea (23%) and fever (23%). Samples of left-over rice were positive for *Bacillus cereus*. Left-over rice was stored at room temperature (40-42°C) for more than 14 hours. Risk of food poisoning was 3.8 times (95% CI 1.4-10.5) among students who consumed left-over rice compared to those who didn't.

Conclusions
Consumption of left-over rice contaminated with *Bacillus cereus* led to an outbreak of food poisoning in a boarding school in western India. School authorities were asked to regularly check each food prior to serving and maintain hygiene with proper food storage.
Outbreak of Trichinellosis detected for the First Time in Cambodia, September 2017

Tuesday, 6th November @ 16:06: Oral Presentations: Food and Waterborne Diseases 4 (Conference Hall, 14th Floor) - Oral

Ms. Rina Hong, Mrs. Soponnak Chea, Mr. Sokdaro Soy, Mr. Sophanith Ung, Mr. Georgios Theocharopoulos, Mrs. Yasmin Lisson, Mrs. Jennie Musto

Background
Trichinellosis is a parasitic disease caused by Trichinella spiralis. An estimated 10,000 cases occur annually worldwide. In September 2017, the Cambodian Ministry of Environment reported 14 forest rangers in Prey Lang forest with symptoms consistent with severe trichinellosis. All 14 patients were hospitalized and one died a week later. We conducted an investigation to identify the source and magnitude of the outbreak and to implement control measures.

Methods
A suspected case was defined as a worker or visitor of Prey Lang Forest who presented with muscle pain and/or diarrhea and at least one of the following: fever, vomiting, abdominal pain, nausea, arthralgia, itchy skin or peripheral edema or a person whom a clinician diagnosed with trichinellosis between 1 August to 25 September 2017. A confirmed case was one who tested positive for Trichinella spiralis by enzyme-linked immunosorbent assay or muscle biopsy or having an epidemiological link to a confirmed case. A semi-structured questionnaire and medical charts were used to collect information. Microsoft Excel and Epi Info 7 were used for data analysis.

Results
We interviewed 44 people of whom 20 (45.5%) were suspected cases and an additional 16 (36.4%) were confirmed cases. The outbreak started on 1 August; the number of cases peaked between 22 and 28 August 2017. Thirty-two cases were male (89%) with a median age of 35 years (range 16-57). All cases were forest workers. Eight cases (22%) died. All cases consumed pork, with 83% consuming wild boar including 33% who consumed raw wild boar.

Conclusions
This outbreak of trichinellosis was likely associated with the consumption of under-cooked pork and wild boar. It is likely that mild cases of trichinellosis remained undetected in this outbreak investigation. Since Trichinellaspiralis is endemic in Cambodia, all pork products should be fully cooked before consumption.
Mrs. Meng Li, Dr. Yingxin Pei, Dr. Chengye Sun

Background
On March 26, a cluster of students from a technical school presenting with diarrhea and vomiting was reported to Sichuan CDC. To learn about the extent of the outbreak, verify the cause and possible transmission, we conducted an investigation.

Methods
A suspect case was defined as a student or school staff who presented with diarrhea or vomiting from March 20 to 30. A confirmed case was a suspect case positive for norovirus GII. We searched for cases through a review of local hospital records and school absentee logs. Anal swabs from suspect cases were collected and tested for norovirus by PCR. A case-control study was conducted to analyze risk factors.

Results
63 cases aged 16 to 20 years were identified (59 suspect and 4 confirmed). Attack rate among students was 4.4% (62/1447) compared with 12.5% (1/8) among staff. Diarrhea (68%) was the major clinical manifestation followed by vomiting (40%) and stomach ache (32%). Two students from different dorms presented with vomiting around 2 am on March 23 with their vomitus cleaned without disinfection. 18 more cases occurred within 2 days with one dormitory having 5 cases. The number of cases decreased drastically after disinfection of vomitus and environment was implemented. 36% (4/11) anal swabs were positive for norovirus GII. A community main municipal water supply system close to the school leaked at 22 pm on the 20th and same type norovirus outbreak occurred in the area. Case-control study showed eating cold dishes in restaurants off campus in the area (OR=4.1, 95%CI:1.1-15) and the school canteen (OR=5.6, 95%CI:1.1-28) on March 21-22 increased the risk of disease.

Conclusions
This outbreak was caused by norovirus GII. Eating cold dishes probably contaminated by norovirus initiated the outbreak followed by human-to-human transmission. Water supply should be thoroughly disinfected after pipeline breakage and cold dishes should not be offered immediately after pipeline repair.
Staphylococcal Food Poisoning Outbreak during a Traditional Ceremony In a Rural Area, Temanggung District, Central Java, 2017

Tuesday, 6th November @ 16:24: Oral Presentations: Food and Waterborne Diseases 2 (Convention Hall B, 2nd Floor) - Oral

Ms. Faridatun Khasanah, Ms. Julianti Jeanette Sabono, Mr. Khabib Mualim, Dr. Dibyo Pramono

Background
On December 29, 2017, primary health center (PHC) Pringsurat reported to the Temanggung District Health Office (DHO) that forty residents in a rural area (subvillage Pingit Lawang) in Temanggung District had diarrhea after attending a traditional ceremony (called khitanan) the night before. An investigation was conducted to confirm the outbreak and identify risk factors for control measures.

Methods
We did a retrospective cohort study. A case was a person with one or more symptoms of diarrhea, abdominal pain, nausea, vomiting, dizziness, sore throat, and weakness on 28-29 December 2017 after eating rice box during the khitananceremony on 28 December 2017. Interviews were conducted using a standard questionnaire. Ocular inspections of the environment and kitchen were conducted. We interviewed the food handler to identify the risk factor/s. Food samples were sent to a laboratory for testing.

Results
223 persons was interviewed and 115 cases identified. Abdominal pain and diarrhea (93%) were the main symptoms. The epidemic curve was of a common source outbreak. Incubation periods ranged from 1-13 hours (mean 6 hours). Persons who ate grilled chicken (aRR 24.9, 95% CI=3.58-173.15) were more likely to get sick. Poor hygiene of food handler, longer period of cooking and improper storage were potential risks. The laboratory results showed grilled chicken contaminated with Staphylococcus aureus.

Conclusions
There was a food poisoning outbreak following a khitanan in Temanggung District on 28-29 December 2017. We recommended that the DHO educate food handlers on food safety and closely monitor the implementation of food safety in Temanggung.
An Outbreak of Acute Diarrhea caused by Astrovirus in a school–Guangxi, China, 2017

Tuesday, 6th November @ 16:24: Oral Presentations: Food and Waterborne Diseases 3 (Multifunction Hall, 14th Floor) - Oral

Mr. Jianfeng Liu, Mr. Weitao He, Mrs. Lu Ran, Mr. Guoqing Shi, Dr. Mingliu Wang, Mr. Bin Lv

Background
On November 10, 2017, over 100 students developed acute diarrhea in a middle school in Guangxi, China. We investigated the outbreak to identify the agent, mode of transmission and recommend control measures.

Methods
A suspect case was defined as any person in the school who developed acute diarrhea (≥3 times/24h) plus one of the following: fever (≥37.5°C), vomiting, abdominal pain and nausea during November 1 to 21, 2017. A confirmed case was a suspect case with astrovirus PCR (+) stool or rectal swab specimens. We reviewed medical records in the township hospital and absenteeism records in the school and interviewed the students to identify cases. We selected 86 student-patients and 109 student-controls and compared their exposure histories.

Results
We indentified 262 student cases (6 confirmed cases) during November 4-20, 2017. The main symptoms included diarrhea (100%), fever (79%), abdominal pain (76%), headache (74%), weakness (54%), nausea (34%), vomiting (24%), accompanied by: cough (37%), sneezing (36%), runny nose (35%), stuffy nose (34%), chills (32%), and sore throat (24%). The outbreak involved 76% (19/25) of classes with a mean attack rate (AR) of 28% (range: 6-46%). The AR among boarding students was 19% (243/1,300) compared to 10% (18/179) among non-boarding students. The multivariate analysis showed those who ate in the school cafeteria were more likely to get the illness (OR=6.8, 95% CI 1.7-29.3). Astrovirus (HAstV-1b) was detected in 30% (6/20) patients, 60% (6/10) asymptomatic cafeteria staff and 50% (1/2) kitchen chopping board specimens.

Conclusions
This outbreak was caused by astrovirus and possibly associated with the contaminated kitchen. There also may have been a concurrent respiratory illness outbreak, possibly contributing to the unusual astrovirus outbreak among students over 10 years old. We suggested cleaning and disinfecting the kitchen thoroughly and isolation of cafeteria staff with positive stools until no virus is detected in their stools.
Outbreak of Food Poisoning among guests at a Wedding Party in Sakawayana Village, Garut Regency, Indonesia

Tuesday, 6th November @ 16:24: Oral Presentations: Food and Waterborne Diseases 4 (Conference Hall, 14th Floor) - Oral

Mr. Debri Rizki Faisal, Mr. Ahmad Aswal Liambo, Dr. Syahrizal Syarif, Mr. Rusli ., Mr. Yani Haerani Nuriyah

Background
On March 6, 2018 the Health Office of Garut Regency received a report of a food poisoning outbreak in Sakawayana Village allegedly due to besek (box containing several food items) given by the wedding party host to guests. We conducted an investigation to identify the source and risk factors for the food poisoning outbreak.

Methods
We did a retrospective cohort study. Wedding guests who ate items from the besek were interviewed using a structured questionnaire to ascertain food exposures and symptoms. Cases were persons who ate food items contained in the besek on March 5, 2018 with one or more symptoms such as diarrhea, dizziness, fever, nausea, abdominal pain, vomiting, heartburn and seizures. We conducted a sanitary inspection of the kitchen area where foods were cooked. Food samples were collected and sent to a laboratory. Interviews of the food handler and wedding host were done.

Results
Of 537 persons interviewed, 315 (58.66%) became ill. Their symptoms were diarrhea (82.22%), dizziness (78.41%), fever (77.46%), nausea (76.19%), stomachache (65.08%) and vomiting (58.73%). Incubation periods ranged from 0.5-53 hours (mean 16). The suspected source of food poisoning was vermicelli stir fry (OR = 1.64, 95%CI = 1.34-1.99). Laboratory examination revealed that the vermicelli was positive for Staphylococcus aureus. The food was cooked outside the house. There was poor sanitation in the area with a goat cage nearby. The food items were cooked and packed by a home cook and several food handlers.

Conclusions
Based on laboratory examination and clinical symptoms, the food poisoning was possibly caused by eating vermicelli stir fry contaminated with Staphylococcus aureus toxin. Contamination may have been facilitated by the poor hygiene of food handlers and poor sanitation in the cooking area. Health workers should educate caterers or home cooks on safe food handling to ensure food safety during wedding parties.
Retrospective Cohort Study of a Food Poisoning Outbreak associated with Donated Iftar Food - Sleman District, Indonesia, 2018

Background
Sleman District Health Office (DHO) received a report from Minggir Public Health Center (PHC) of a suspected food poisoning outbreak with 40 cases from a female Islamic boarding school on Friday, 2 February 2018. An investigation was conducted to verify the outbreak and identify risk factors.

Methods
We did a retrospective cohort study. Active case finding was performed to find new cases. Cases were persons who received rice box from Caterer X on 1 February 2018 from 03.30-06.00 p.m and had one of these symptoms: abdominal pain, diarrhea, nausea, vomiting, with or without other symptoms. Personal data were collected through interviews using a structured questionnaire. Interviews with food handlers and observation of the kitchen were also conducted. Clinical and food samples were sent to a laboratory. We used chi-square and poisson regression to estimate relative risks (RR).

Results
There were 98 cases out of 160 people that received rice box (AR 61.3%). Cases were 66.3% female and 79.7% aged ≤15 years. Abdominal pain was a common symptom. Rice boxes were sent to two Islamic boarding schools and donor house for Iftar event. Epidemic curve was that of a common source with incubation periods of 2-27 hours (mean 16). Results showed that watermelon was associated with food poisoning (aRR=4.046, 95% CI=1.955-8.370). Unhygienic food processing and utensils allowed for bacterial contamination. Food examination result showed cross-contamination. Vomit sample was positive for Bacillus cereus.

Conclusions
There was a food poisoning outbreak at two Islamic Boarding Schools and Donor house during an Iftar event on 1st-2nd February 2018. Implementation of standard health and safe food handling procedures need to be followed by the caterer. Training on these should be provided by the DHO and targeted to all caterers in the city to ensure safe food for people. Food safety should be monitored continuously.
Outbreak investigation of infectious diarrhea associated with eating unheated smelly bean curd, Anhui Province, China – June 2017

Background
Six people with diarrhea and fever were reported on 13rd June, and all of them had breakfast at the same restaurant in a small town in Anhui Province. We conducted an investigation to explore risk factors, and provide measures for control and prevention.

Methods
A suspect case was defined as a resident with onset of diarrhea (≥3 times/24 hours) between June 8 – 24, 2017, and a probable case was a suspect case with one of the following: abdominal pain, fever, and vomiting. A confirmed case was a suspect or probable case with salmonella positive stool or anal swab. Cases were identified by reviewing hospitals' records. We interviewed 18 concurrent cases and 36 asymptomatic villagers randomly selected from the case's neighborhood and matched on age within 2 years, about their food consumption using a structured questionnaire. Laboratory samples were taken from cases, staff of bean curd workshop and food including the fermented bean curd, brine, other leftover food, and water.

Results
60 suspect cases, 101 probable cases, and 14 confirmed cases were identified, 43% were female with a median age of 50 years (range 6-81). 57% (39/69) of interviewed cases ate fermented bean curd before onset of illness. 61% (11/18) of cases ate fermented bean curd which had not been reheated compared to 22% (8/36) of controls (Odds Ratio=5.5, 95% Confidence Interval = 1.6 – 19). Laboratory confirmed salmonella, London type PFGE matched at 100% homology with 21 collected samples. The fermented bean curd was made of tofu through a fermentation process, with no heating.

Conclusions
This outbreak was associated with eating unheated fermented bean curd contaminated with London type of salmonella. We recommended changing the process of producing fermented bean curd and carrying out pathogenic bacteria detection in family workshop, sterilized packaging and changing the habit of eating unheated fermented bean curd.
An investigation of enterovirus outbreak with probable enterovirus-related death in a child development center, Tak Province, Thailand, 2017

Tuesday, 6th November @ 16:42: Oral Presentations: Food and Waterborne Diseases 3 (Multifunction Hall, 14th Floor) - Oral

**Dr. Nichakul Pisitpayat, Dr. Thanit Rattanathumsakul, Ms. Pipaporn Morarach, Dr. Thanachol Wonghirundecha, Mr. Chamnan Pinna**

**Background**

On 4 September 2017, the Thai Bureau of Epidemiology received notification of an outbreak of hand-foot-mouth disease at a child development center resulting in one death at the provincial hospital. We investigated to confirm the diagnosis and identify the source of infection.

**Methods**

We reviewed medical records and interviewed teachers and household members of the index case. Active case finding was performed in the child development center, residence of index case, and neighborhood. Suspected cases were persons with either rash/vesicles at palm, oral cavity, sole or buttock; or cough, runny nose or sore throat during 8 August to 8 September 2017. Probable cases were suspected cases with severe neurological or cardiopulmonary symptoms with negative confirmation tests. Confirmed cases were suspected cases who had positive polymerase chain reaction results for enterovirus from fresh stool or nasopharyngeal/throat swab.

**Results**

The index case was a probable case, with her clinical manifestations suggesting rhombencephalitis. We could screen 46/51 persons at the child development center and all 12 household members and neighbors. We found nine confirmed cases, one probable case and 20 suspected cases. All of them were from the child development center. The attack rate for probable and confirmed cases was 21.7% and the case fatality proportion was 10%. Compared to adults, children were more likely to have enterovirus infection (p-value=0.03). Virus testing of fresh stool samples from symptomatic cases showed 26% were EV71 and 13% were coxsackie B4.

**Conclusions**

This abnormal event was an enterovirus outbreak in a child development center resulting in one death with rhombencephalitis. The pathogens were identified as EV71 and coxsackie B4. We recommended hand washing with soap, washing of toys more than once a week, and increasing awareness of enterovirus infection among toddlers particularly when there is an outbreak in an area.
Etiologic agents of diarrhea–Vientiane Capital, Lao People’s Democratic Republic

Tuesday, 6th November @ 16:42: Oral Presentations: Food and Waterborne Diseases 4 (Conference Hall, 14th Floor) - Oral

Mr. Souphatsone Houatthongkham, Dr. Noikaseumsy Sithivong, Dr. Bouaphanh Khamphaphongphane, Dr. Bounthanom Sengkeopraseuth, Dr. Onechanh Keosavanh

Background
In the Lao People’s Democratic Republic (Lao PDR), 11% of deaths in children below five years of age are caused by diarrhea. There have been a limited number of studies on the etiologic agents of diarrhea in Lao PDR. This study aimed to demonstrate the recent causal pathogens of diarrhea in Vientiane Capital.

Methods
In 2012, the National Center for Laboratory and Epidemiology started a project to collect clinical data and specimens (stools and rectal swabs) to perform microbiological examinations on patients with diarrhea who were hospitalized at eight diarrhea sentinel surveillance sites in Vientiane Capital. We retrospectively reviewed data from 2012 to 2015 (n=2,482). All patients were tested for bacteria, and children aged five years or younger were additionally tested for rotavirus during the winter season (November to April).

Results
Those aged 1–5 years were 947 (38%). Of the 2,482 cases, at least one entero-pathogen was detected in 17.8% (441 cases). Salmonella spp. was the most commonly detected bacterial pathogen. Enteropathogenic E.coli (EPEC) and Salmonella spp. were the most commonly detected pathogens in the dry winter season and the wet rainy season, respectively. In terms of multiple entero-pathogens, rotavirus with bacterial pathogens was found most often. In 913 children, rotavirus was found in 39.1% (291 children). Bacterial pathogens were consistently found throughout the year and most frequently found during the dry winter season, with a peak in detection rate in February.

Conclusions
Salmonella spp. was the predominant bacterial pathogen for single bacterial infection in individuals of all age groups, and rotavirus was most commonly involved in mixed infections among children who were five years old or younger. A further study examining other types of pathogens for diarrhea should be conducted in other provinces in Lao PDR in the future.
A Foodborne Gastroenteritis Outbreak in a Primary School Caused by Asymptomatic Norovirus-excreting Kitchen Staff in Hubei Province, China, 2017

Background
On November 2, 2017, a hospital reported a suspected norovirus (NV) outbreak in a primary school. An investigation was conducted to confirm the causative agent and mode of transmission and to implement preventive measures.

Methods
A probable case was defined as any person in the school with vomiting (≥2 episodes /day) and/or diarrhea (≥3 episodes /day) from 30 October to 10 November 2017. A confirmed case was a probable case positive for NV by RT-PCR. We undertook case finding among all the students and school staff by checking absenteeism log and interviewing them. A retrospective cohort study was done. We assessed the processing of implicated food and collected stools from 14 suspect cases and 11 kitchen staff to test for NV.

Results
A total of 159 cases were identified (including 14 laboratory-confirmed cases of NV), all of which were students. The attack rate (AR) was 11.5% (159/1378). Signs and symptoms included vomiting (95%), diarrhea (54%) and fever (≥38.5°C) (19%). Results of the analysis revealed that consumption of Fried Chicken Fillet (FCF) offered on 1 Nov [RR: 2.4; 95% confidence interval (CI): 1.29-4.64] was associated with illness. There was a statistically significant association between dose (amount of FCF) and the risk of disease (‘two pieces’: RR: 2.6, 95% CI: 1.02-6.83; ‘eat all’: RR:3.4, 95% CI: 1.59-7.40). All 14 cases and 2 of 11 kitchen staff were positive for NV GII.2, and had 100% genetic homology. One of the two asymptomatic excreters among the kitchen staff served FCF without gloves.

Conclusions
This outbreak was caused by NV GII.2. The food vehicles were FCF, which may have been contaminated by asymptomatic NV-excreting kitchen staff. We recommended implementing strict hand hygiene practices and restriction of any person who has or appears to have NV gastroenteritis for at least 48 hours following the end of symptoms.
Norovirus GII.2 foodborne outbreak in three schools — Hualien, Taiwan, June 2017

Wednesday, 7th November @ 10:30: Oral Presentations: Food and Waterborne Diseases 6 (Convention Hall B, 2nd Floor) - Oral

Ms. Hsin-I Huang, Ms. Wan Chin, Ms. Wan-Ting Huang, Ms. I-chen Cheng, Ms. Fang-tyz Wu

Background
Since late 2016, a previously uncommon norovirus genotype GII.2 caused gastroenteritis outbreaks in Taiwan schools, but the transmission mode was largely unknown. On June 8, 2017, Taiwan CDC was notified of >490 students with gastroenteritis in two elementary and one junior high schools in Hualien, whose lunch was served by the same caterer. We conducted an investigation to identify the implicated foods and causative pathogens.

Methods
We interviewed junior high school students on foods consumed at school. Students were defined as a case if he/she ate school lunch on June 6–8, and had vomiting or diarrhea within 72 hours after eating school lunch. We conducted case-control analyses by day using asymptomatic students who ate school lunch as controls, and calculated odds ratios (ORs) of consumed foods. Stool specimens from students and food workers, leftovers, and environmental specimens were tested for foodborne pathogens. Norovirus-positive specimens were genotyped.

Results
Of 503 students enrolled, 230 (46%) met the case definition; 68% reported vomiting and 63% reported diarrhea. Illness was associated with eating spaghetti (OR 3.10, 95% confidence interval [CI] 1.20–7.98) and bean sprouts (OR 1.67, 95% CI 1.04–2.67) on June 7; median time from school lunch to illness onset was 34 hours. The caterer’s four kitchens prepared lunch for 17 schools; spaghetti was provided by the same kitchen to all affected schools whereas bean sprouts were provided by another kitchen to affected and nonaffected schools. Stool specimens from six ill students and two asymptomatic food workers were positive for norovirus GII.2. Environmental investigation found lack of designated hand wash sinks in food preparation areas.

Conclusions
Spaghetti contaminated with norovirus GII.2 was the most likely vehicle of this foodborne outbreak. We recommended proper hand hygiene of the food workers and redesign of the workplace for enhanced access to hand-washing facilities.
A Case-Control Study of a Chikungunya Outbreak in an Island – Busuanga, Palawan, Philippines, May 8 to August 10, 2017

Dr. Alethea De Guzman, Ms. Precious May Gabalfin, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On June 20, 2017, we received a report of increasing number of Chikungunya cases in Busuanga, Palawan. An FETP team was sent to determine the existence of an outbreak, identify source and mode of transmission, determine risk factors, and recommend control and preventive measures.

Methods
We did a 1:2 unmatched case-control study. A suspect Chikungunya case was a previously well resident of Busuanga, Palawan who had sudden onset of fever and joint pains from May 8 – August 10, 2017. A confirmed Chikungunya case was a suspect case positive for Chikungunya on ELISA and/or PCR. A control was a well resident of Busuanga, Palawan who is either living with/neighbor of a suspect case and negative for Chikungunya on ELISA and/or PCR. We conducted key informant interviews and environmental and entomological surveys. We sent serum samples for virus isolation.

Results
One hundred ninety cases were identified. No reported death. Majority (58%) were female. Ages ranged from one month to 90 years (median = 20 years). The Rainy season started on the last week of April 2017. Storing of water was a common practice and drums (21%) were the top container positive for Aedes larvae. Presence of mosquito breeding sites were evidenced by high indices (HI=61%, CI=30%, BI=163). Twelve (52%) cases were positive for Chikungunya virus. Multivariate analysis revealed that statistically significant risk factor for having the disease was cleaning water containers only every week (OR=13.74, CI=4.18-45.22) while statistically significant protective factors were application of insect repellent (OR=0.47, CI=0.23-0.97) and history of travel outside Busuanga (OR=0.02, CI=0.05-0.81).

Conclusions
There was an outbreak of Chikungunya in Busuanga, Palawan. The early start of rainy season, presence of mosquito breeding sites, and cleaning water containers only once a week led to increased vector density. Vector control activities and continued information dissemination is therefore recommended to stop the transmission.
The spatial-temporal dynamics of Avian Influenza A (H7N9) in China: 2013-2017

Wednesday, 7th November @ 10:30: Oral Presentations: Zoonoses and Vector Borne Diseases 2 (Conference Hall, 14th Floor) - Oral

Dr. Jian Zhao, Dr. Qun Li, Prof. Huilai Ma, Dr. Daxin Ni, Dr. Lianmei Jin, Dr. Lei Zhou, Dr. Ruiqi Ren

Background
The 5th year of the epidemic (or wave) of influenza A (H7N9) in China began in the second half of 2016. Transmission dynamics and progression of influenza A (H7N9) infection in domestic poultry, as well as spill-over transmission to humans, are not fully understood. This study aimed to analyze the spatial patterns and changing temporal dynamics in five epidemic waves of Avian Influenza A (H7N9) between 2013 and 2017.

Methods
Positive H7N9 cases were collected by screening all case report cards from surveillance networks of China CDC. The first case was reported on the 12th of March 2013, and in subsequent years in early September. We geocoded all confirmed H7N9 cases to county level. Descriptive and geographic information system methods were used to depict the spatial and temporal characteristics of H7N9 cases. Global and local autocorrelation analysis was carried out to identify spatial autocorrelations.

Results
A total of 1,532 infections have been reported in mainland China by August 31, 2017. The 5th epidemic wave resulted in 757 infections, of which the spatial distribution expanded to 28 of 31 provinces and 622 counties. The peak of each wave appeared in January with the exception of the first wave. The distribution of the cases infected with the H7N9 virus in the first, second, third and fifth waves presented a spatial autocorrelation, p <0.05. The high clusters emerged in the Yangtze River delta (YRD) in the first wave, then they transferred to the Pearl River delta (PRD) in the second and third waves. But in the fifth wave, the high clusters were located in YRD again.

Conclusions
There were fundamental differences in the spatial-temporal clustering characteristics among the five epidemic waves of H7N9 infections between 2013 and 2017, which provide an empirical basis for identifying priority areas for implementing preventive intervention.
Outbreak Investigation of Foodborne Illness among guests at a Wedding Ceremony, Makunsar Village, Palghar District, Maharashtra, India - February 2018

Wednesday, 7th November @ 10:48: Oral Presentations: Food and Waterborne Diseases 5 (Convention Hall A, 2nd Floor) - Oral

Dr. Vaishali Vardhan, Dr. Tanzin Dikid, Dr. Rajesh Yadav, Dr. Samir V Sodha, Dr. RP Patil, Dr. AKhandare, Dr. P Awate, Dr. CS Aggarwal, Dr. Sujeet Kumar Singh, Dr. PKhasnobis

Background
Despite under-reporting, India has a large foodborne illness burden with >1000 foodborne outbreaks reported during 2014-16. However, most lack epidemiologic investigation to identify food vehicles and source of contamination. On February 18, 2018, a foodborne illness outbreak among wedding attendees from Makunsar village in Palghar district, Maharashtra state was reported. We investigated to describe the epidemiology, identify risk factors and provide evidence-based recommendations.

Methods
We defined a case as a wedding guest from Makunsar village on February 18, 2018 with vomiting or loose stools within 12 hours after the wedding. We conducted active case search and a 1:1 gender-matched case-control study. Controls were defined as wedding guests with no illness. No human samples were available. We interviewed cases, controls and food-handlers, and collected leftovers of suspected foods for culture. We calculated proportions, attack rates and matched odds ratio with 95% confidence intervals.

Results
We identified 75 cases (63% females [45/75]); median age was 38 years (range: 4-85) with 12.5% attack rate among 600 wedding guests. Of cases, 66% (49/75) were hospitalized; none died. Cases reported vomiting (93%; [69/75]), nausea (68%; [50/75]), abdominal pain (43%; [32/75]) and loose stools (41%; [31/75]). Median incubation period was 4 hours (range: 2-8). Among 59 cases and 59 controls, only eating gaajar halwa (carrot pudding) was significantly associated with illness (adjusted odds ratio: 31.3, 95% confidence interval: 3.3-293.6). The carrot pudding was cooked a day before the wedding and stored at room temperature for >12 hours. Culture of carrot pudding yielded no growth.

Conclusions
This foodborne illness outbreak among wedding guests was associated with carrot pudding consumption. Clinical presentation and incubation periods were consistent with enterotoxin-producing Staphylococcus aureus. We recommended community and food-handler education on appropriate food storage and improved awareness among health staff of collection of clinical samples from patients during outbreaks.
Foodborne outbreak investigation in a rural pagoda, Kampong Cham Province, Cambodia, August 2016

Wednesday, 7th November @ 10:48: Oral Presentations: Food and Waterborne Diseases 6 (Convention Hall B, 2nd Floor) - Oral

Mr. Buntha So, Dr. Phalmony Has, Dr. Phat So, Dr. Tek Bunchhoeung, Mr. Puthik Long Hay, Mr. Sokdaro Soy, Dr. Savuth Thai, Dr. Sengdoeurn Yi

Background
In August 2016, the Kampong Cham Provincial Health Department reported through the event based surveillance system that 73 people with acute diarrhea, vomiting and abdominal pain, of whom 19 were hospitalized. A team was deployed to investigate this report and institute control measures.

Methods
We conducted a retrospective cohort study. A case was defined as any person who developed acute diarrhea, vomiting or abdominal pain after eating at the pagoda. We described person, time, and place of the event, and computed relative risks and performed Chi-square tests to identify risk factors associated with the illness.

Results
There were 75 people interviewed (95%); with an attack rate of 46%. All cases were male with ages ranging from 10 to 51 years. Incubation periods ranged from 5 to 12 hours. All cases recovered within 24 hours of their illness onset date. The two foods associated with illness were caramelized bamboo shoots and Swatow mustard cabbage soup (relative risk [RR]=2.34, 95% Confidence interval [CI] 1.5 – 3.7 and RR=3.56, 95% CI 1.47 – 8.62, respectively). Clostridium perfringens was isolated from samples of the water used for cooking. Inspection of the cooking area revealed multiple possible sources of contamination.

Conclusions
Consuming caramelized bamboo shoots and Swatow mustard cabbage soup was associated with illness at the pagoda. The clinical signs and symptoms of cases were compatible with Clostridium perfringens intoxication which was also detected in the water source. Chlorination of the water source was therefore recommended. Healthy food preparation and safe storage messages were delivered.
Knowledge and Practices on Malaria in Ngaputaw township, Ayeyawady Region, Myanmar, 2016

Wednesday, 7th November @ 10:48: Oral Presentations: Zoonoses and Vector Borne Diseases 1 (Multifunction Hall, 14th Floor) - Oral

Dr. Thet Su Mon, Dr. Krongthong Thimasarn, Dr. Waraluk Tangkanakul, Dr. Tun Myint

Background
Malaria health literacy is one of the important factors in malaria prevention especially for its elimination in Myanmar. Ayeyarwady has the 4th highest malaria burden among 15 states and regions in Myanmar. Ngaputaw Township contributed 45% of the malaria cases of Ayeyarwady Region in 2015. The study objectives were to describe the knowledge and practices on long lasting insecticide nets (LLINs) and treatment seeking behaviors for persons with fever.

Methods
A random cross-sectional household survey was done by interviewing respondents using semi-structured questionnaires in Ngaputaw Township in September 2016. 30 out of 405 villages were chosen by simple random sampling method first. Then eight household heads or family members, preferably female, per village were selected by EPI method and interviewed face to face to get a sample size of 240.

Results
Only 46% of respondents slept under LLINs last night and more than 70% did not maintain them properly. All 36 forest-goers used bed nets while sleeping in the forest but only one respondent used LLIN, despite having LLINs in their houses. 9% had fever within the past two weeks; 60% of whom went to the Rural Health Center or consulted with a health volunteers for treatment but no malaria blood tests were done. All respondents knew malaria is caused by the bites of mosquitoes, but some misconceptions (example: by eating banana, by drinking steam water) still existed.

Conclusions
There was limited knowledge on LLIN and low LLIN utilization. So, availability of LLINs should be assessed. The reasons why the forest-goers do not use LLINs should be found out and their utilization should be promoted by means of behavioral change communication and community awareness on malaria. Treatment seeking behavior on fever should be promoted to avoid self-medication, and health workers and village health volunteers trained.
An Outbreak of Leptospirosis After a Tropical Storm – Davao City, Philippines, January 2018

Wednesday, 7th November @ 10:48: Oral Presentations: Zoonoses and Vector Borne Diseases 2 (Conference Hall, 14th Floor) - Oral

Dr. Alethea De Guzman, Ms. Denisse Lou Manalili, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
In December 2017, tropical storm “TEMBIN” hit Davao Region and caused flooding and landslide. In January 2018, the Event-based Surveillance and Response Unit was notified of an increasing number of suspect Leptospirosis cases with deaths in Davao City. We conducted an investigation to verify the diagnosis, identify risk factors, and recommend control and preventive measures.

Methods
We conducted a descriptive study. A suspect case was a previously well individual from Davao City who presented with ≥ two days fever and any of the following: chills, myalgia, vomiting, abdominal pain, diarrhea, conjunctival suffusion, jaundice, anuria/oliguria, hematuria, tea-colored urine, and calf pain from December 22, 2017 – January 27, 2018. We conducted records review and environmental investigation. Serum specimens were collected for Leptospira species confirmation by PCR and MAT. We conducted a 1:3 unmatched case-control study.

Results
Fifty-two suspect cases were identified. Four died (Case Fatality Rate: 8%). Majority (85%) were male. Ages ranged from 3-75 years (median: 29). Majority (92%) were exposed to floodwater and mud. Fourteen (27%) had open wounds. During flooding, people stayed home to secure their properties but did not wear protective clothing nor covered their wounds. Twelve (23%) took post-exposure prophylaxis. Rodents, dogs, pigs, and carabao were seen in the community. Four (14%) of 29 specimens were positive for Leptospira species on PCR. Eight (73%) of 11 specimens were positive on MAT. After multivariate analysis, walking barefoot in floodwater or mud (OR=18, 95% CI=4.92 – 71.99) and having an open wound during floodwater exposure (OR=4, 95% CI=1.47 – 12.64) were associated with the illness.

Conclusions
Exposure to urine-infected floodwater and mud and lack of preventive measures were associated with the outbreak. Consistent behavior change campaigns could have beneficial impact in control and prevention of the disease. Environmental factors which favor breeding places should also be managed.
A protracted outbreak of Salmonella Hessarek infection associated with one brand of eggs - South Australia, March 2017-May 2018

Wednesday, 7th November @ 11:06: Oral Presentations: Food and Waterborne Diseases 5 (Convention Hall A, 2nd Floor) - Oral

Ms. Bernadette Kenny, Dr. Megge Miller, Dr. TA Housen

Background
On 21 March 2017, the South Australian (SA) Communicable Disease Control Branch (CDCB) observed five notifications of *Salmonella* Hessarek infection in the preceding three weeks; this was above the expected 0.8 notifications in March based on data for 2012 to 2016.

Nationally, Australian *S.* Hessarek notifications increased from an average of 12 per year in 2010-2014 to 30 per year in 2016-2017 with notifications predominantly in SA.

The CDCB has investigated previous clusters of *S.* Hessarek infection in SA; in 2006, nine cases were associated with raw or semi-cooked eggs and, cases from clusters investigated in 2014 and 2016 reported consumption of brand X eggs.

A global literature review regarding *S.* Hessarek infections in humans only identified a 2005 outbreak report of five cases of *S.* Hessarek caused by contaminated eggs served at an Australian Capital Territory restaurant.

Methods
A prospective case series study was conducted to determine the source of *S.* Hessarek infection. All persons notified with *S.* Hessarek infection between 1 March 2017 and 3 July 2018 were interviewed using the OzFoodNet *Salmonella* questionnaire to identify exposures. Based on the responses of the first seven persons interviewed, retail sampling of brand X eggs was conducted.

Results
During this period, CDCB received 25 notifications of *S.* Hessarek (15 males, 10 females, median age: 49 years, age range 1-91 years). Twenty-four cases reported consuming eggs with 17 reporting consumption of brand X eggs. Retail sampling found one egg sample tested positive for *S.* Hessarek in the contents of the egg.

Conclusions
The epidemiological and laboratory evidence support brand X eggs as a protracted source of *S.* Hessarek in SA. Further research, including whole genome sequencing, is being undertaken to understand the epidemiology of this emerging *Salmonella* serovar in SA and inform efforts to control *Salmonella* outbreaks associated with eggs.
An Outbreak of Acute Gastroenteritis Caused by Cold Dishes Contaminated with Enteroaggregative Escherichia coli (EAEC) in a Senior High School, Suzhou, China, 2017

Wednesday, 7th November @ 11:06: Oral Presentations: Food and Waterborne Diseases 6 (Convention Hall B, 2nd Floor) - Oral

Mr. Hongjun Zhou, Ms. Mengjiao Zhao, Dr. Hui Liu, Dr. Risheng Zha, Mr. Jun Zhang, Dr. Lixin Hao, Prof. Lijie Zhang

Background
More than 10 students with diarrhea in a senior high school were reported on June 1, 2017. We investigated the outbreak to determine the pathogenic factors, and identify risk factors and make recommendations for control measures.

Methods
A suspected case was defined as a student or staff in the school with onset of abnormal stool (loose) during May 28 - June 5, 2017. A probable cases was a suspected case with diarrhea (≥3 times/24h). A confirmed case was anyone with Enteroaggregative Escherichia coli (EAEC) isolated from rectal swabs and PCR positive. We conducted a retrospective cohort study, and compared attack rates between exposed and unexposed groups. Specimens from patients, food and the environment were collected for EAEC testing.

Results
217 cases (82 suspected, 128 probable and 7 confirmed) were identified with an attack rate of 38%. Diarrhea (62%) and abdominal pain (47%) were the most common symptoms. There were 2 cafeterias: all cases were minority classes students who ate at Halal cafeteria while non-minority classes students didn’t eat at Halal cafeteria. Among the minority classes students, the attack rate among students who ate cold pepper chicken salad was 54%(135/251) compared to 27% among those who didn’t (RR=2, 95% CI: 1.6-4.2). 7 rectal swab samples and 6 food and environment samples, virulence genes tested positive. Food hygiene investigation showed that there was no separate area for cold pepper chicken salad. The raw and cooked food were all prepared in the same areas.

Conclusions
The outbreak was likely caused by cold pepper chicken salad contaminated by EAEC during the food preparation. We recommended strengthening supervision of food preparation process in school canteens. Raw and cooked food should be prepared in different areas.
Microcephaly and other congenital abnormalities in Vientiane, Lao PDR: a review of medical records in central hospitals (2011-2016)

Mr. Anoukone Bouphasyli, Ms. Bouaphanh Khamphaphongphane, Ms. Amphi Khamphasing, Dr. Latdavanh Mouanchanh, Mrs. Jennie Musto, Dr. Khonesavanh Bounma, Dr. Manilay Phengxay, Dr. Dapeng Luo, Dr. Bounlay Phommasack

Background
Infection with Zika virus (ZIKV) during pregnancy may result in an infant being born with Congenital Zika Syndrome (CZS) e.g. microcephaly, intracranial calcifications, or other brain or eye abnormalities. Zika virus was last identified in Lao PDR in 2015. This study aims to estimate the occurrence of microcephaly and other congenital abnormalities. In addition, we sought to assess the knowledge of ZIKV and its complications among healthcare workers in these facilities.

Methods
We reviewed medical logbooks from 2011 to 2016 in four central hospitals to identify the number of presentations of children with microcephaly, using WHO case definitions, and other congenital abnormalities. We interviewed two healthcare workers from each ward. Data was analyzed using Microsoft Excel.

Results
We reviewed 457,507 medical records of children under 15 years. Microcephaly was recorded for three patients, all born in 2015. We identified 24 children with other congenital abnormalities: 12 children with cleft lip/palate, three children with anencephaly, one with Down syndrome and five children with unspecified malformations. We interviewed 33 healthcare workers in four hospitals: 50% knew how ZIKV was transmitted, 57% understood how to prevent ZIKV infection, 70% knew that ZIKV infection during pregnancy may cause a baby to be born with microcephaly and 61% knew the definition of microcephaly.

Conclusions
Three microcephaly cases were identified that met the WHO standard case definition indicating that microcephaly as a reason for hospital admission is rare in Vientiane and the occurrence of microcephaly is low. The number of presentations for other congenital abnormalities is also low. Consideration should be given to maintaining a register of all birth defects, particularly now that ZIKV is a known cause of microcephaly and other congenital abnormalities and has circulated in Lao PDR in the past. Education and awareness raising of CZS among health professionals is required.
Brucellosis Infection Rate and Risk Factors among Mutton Restaurant Workers in Zigong, 2017

Wednesday, 7th November @ 11:06: Oral Presentations: Zoonoses and Vector Borne Diseases 2 (Conference Hall, 14th Floor) - Oral

Mr. Jie Zhang, Mr. Zhengdong Zhang, Mr. Xi Chen

Background
Brucellosis usually is an occupational disease among people who raise, transport or slaughter livestock. In Zigong City, mutton restaurant workers accounted for an unexpectedly large proportion of brucellosis cases (14.3%, 2/14). We conducted an investigation to evaluate the infection risk of mutton restaurant workers and identify potential risk factors.

Methods
We conducted a field investigation with the assistance of the local food and drug administration bureau under the local CDC. All the mutton restaurant workers were asked to have serum tests free of charge and answer a questionnaire. We used rose benga1 plate test (RBPT) for preliminary screening and test tube agglutination (SAT) test for secondary screening. We did a case control study to identify risk factors for infection.

Results
We investigated 332 workers, 16 were RBPT positive, positivity rate 4.82%, four of whom had SAT titer ≥1:100. The infected persons were from 71% (5/7) districts of Zigong. The mutton restaurants usually have their workers slaughter sheep in public near the restaurant and raw meat hanged at the restaurant entrance to show their mutton is original and fresh. 20.2% of mutton restaurant workers slaughtered sheep, their infection rate was 8.96% while the infection rate of workers who only process raw meat was 4.55% and among those with other jobs 4.35%. None of those who processed cooked meat were infected. 37.50% of cases slaughtered sheep compared to 19.3% of controls, but the difference was not statistically significant, OR=2.51 (95% CI 0.88-7.1). The infection risk accumulated with the duration of time they worked in a mutton restaurant (χ²=10.12, p<0.01).

Conclusions
Slaughtering sheep is the main cause of high brucellosis incidence among mutton restaurant workers in Zigong. This threatens both the workers and customers of these restaurants. The relevant departments should prohibit the slaughter of sheep in public and consider mutton restaurant workers at high risk for brucellosis.
An outbreak of dual bacterial contaminated lunch boxes during a Vesak celebration in Yasothon Province, 2018

Wednesday, 7th November @ 11:24: Oral Presentations: Food and Waterborne Diseases 5 (Convention Hall A, 2nd Floor) - Oral

Dr. Thanachol Wonghirundecha, Dr. Darin Areechokchai, Dr. Panithee Thammawijaya

Background
On 28 May 2018, the Bureau of Epidemiology (BoE) learned of a cluster of patients with acute gastro-intestinal symptoms after attending a Vesak (Buddha day) celebration. Most patients were students from seven schools in Yasothon Province. A BoE and local public health team conducted an investigation to confirm diagnosis, determine source of outbreak, and implement prevention and control measures.

Methods
Active case finding was conducted among students, teachers, officers in the affected schools and villagers who attended the event including their relatives who shared the lunchbox. We defined a case as an event participant or their relative who had nausea, diarrhea or abdominal pain. A descriptive study was performed through medical record review, case interview about symptoms and meal. Retrospective cohort study was conducted to determine source of outbreak. We interviewed the food handlers to understand cooking processes and surveyed the cooking area. Specimens, including vomitus and rectal swab of patients, fingertip and nasal swab of food-handlers, and suspected food and water, were collected to identify the pathogens.

Results
480 attendees were interviewed. Overall attack rate was 67.5% (324/480). Major symptoms were vomiting (84.9%), abdominal pain (77.5%) and diarrhea (62.3%) with two hours mean incubation period. Hainanese rice chicken lunchboxes cooked by an unlicensed food shop were provided during this event. Consumption of chicken rice was strongly associated with the illness (exact OR 53.9, 95%CI 8.9-inf.). Laboratory testing of food samples revealed *Staphylococcus aureus* with enterotoxin-A gene and *Bacillus cereus* which was consistent with samples from patients’ vomitus and rectal swab. Moreover *S. aureus* with same toxin gene was isolated from cook’s nasal swab.

Conclusions
This is a food poisoning outbreak caused by enterotoxin from *S. aureus* and *B. cereus* correlated with clinical symptoms and isolated organisms. This shop was shutdown temporarily and event organizers were required to only use licensed food providers.
Hepatitis outbreak in Halishahor, Chattagram, Bangladesh, 2018

Wednesday, 7th November @ 11:24: Oral Presentations: Food and Waterborne Diseases 6 (Convention Hall B, 2nd Floor) - Oral

Dr. Husam Muhammad Alam, Dr. Abdullahel Maruf, Dr. Manjur Hossen Khan, Dr. Mallick Masum Billah, Dr. M. Salim Uzzaman, Prof. Meerjady Sabrina Flora

Background
Hepatitis E (HEV) infection causes hepatic-illness with symptoms like yellow coloration of eye and sclera, anorexia, nausea, and dark urine. On 30 April 2018, the Health-Authority of Chattagram, Southern Division of Bangladesh reported, through a hotline, to the Institute of Epidemiology, Disease Control and Research (IEDCR) increased numbers of jaundiced patients in the locality. We investigated the outbreak to confirm the diagnosis, identify possible exposure and provide control measures.

Methods
We investigated the outbreak from 1-5 May 2018. Cases were persons residing in Halishahor having jaundice with malaise or anorexia or fever or abdominal pain within the last 70 days. We identified cases from hospital records and community visits. We conducted a case-control study (2 controls/case). Controls were healthy individuals in the same community. Blood samples were tested for Anti-HEV IgM. We collected water samples from different sites in Halishahor. We calculated odds ratios with 95% confidence intervals to identify possible exposures.

Results
Among 92 suspected jaundice patients, 79% were from Halishahor and most of them (17%) developed symptoms during 20-25 April 2018. Mean age was 31 years (SD: ± 13.8) and majority (78%) were male. Common associated symptoms were jaundice (100%), nausea (97%), generalized weakness (87%), and fever (81%). Case-control study showed that persons using untreated municipality water (OR: 9.4, 95%CI:2.7-41), having water source near sewage (OR:14.06, 95%CI:2.6-137.4) and eating street food (OR:1.66, 95%CI: 0.52-5.9) were more likely to develop hepatitis. 1/5 water samples were found contaminated with fecal coliforms. 30/30 (100%) blood samples tested positive for Anti-HEV IgM.

Conclusions
Possible connection of sewage with municipality water was the possible source of this HEV outbreak in Halishahor. We recommended identifying possible leakage to stop water contamination. We conducted an information campaign in the community and advised them to purify drinking and household usage-water and avoid street-foods to control the outbreak.
Lyme borreliosis in Mongolia, 2005-2016

Wednesday, 7th November @ 11:24: Oral Presentations: Zoonoses and Vector Borne Diseases 1 (Multifunction Hall, 14th Floor) - Oral

Dr. Ganbileg Gansukh, Dr. Batdorj Batjargal, Dr. Munkhzul Battsend, Dr. Baigalmaa Jantsansengee, Dr. Uyanga Baasandagva, Dr. Battsetseg Jigjav, Dr. Tsogbadrakh Nyamdorj, Mr. Nyamkhuu Khuslen

Background
Lyme borreliosis (LB) is reported in 120 countries and around 100,000 people get infected every year. In Mongolia, the first human case of LB was reported in 2003 and surveillance of the disease started in 2005. In 2016, a total of 91 cases were reported which was 4 times higher than the previous year. We aim to describe the epidemiological characteristics of LB in Mongolia.

Methods
We conducted a descriptive study using National lyme borreliosis surveillance data from 2005-2016 and survey of natural foci surveillance, 2005-2016. We analyzed proportions, incidence rates and ratio using ArcMap 10.2 and Epi info7.

Results
In the last twelve years, the incidence rate of lyme borreliosis per 100’000 population in Mongolia increased from 0.55 to 2.53. The highest incidence rate (51) was reported in Zavkhan province. Majority of the cases were children aged 0-9 years (9.5 per 100,000), adults aged >50 years (8.1 per 100,000) and females. Among patients with LB, 65.1% had fever and 43.4% had erythema migrans. A total of 48 cases had laboratory test results of which 64.4% were IgM positive. Among those with positive results, 7 cases were co-infections, including 6 cases of Rickettsia and 1 case of Tick-borne encephalitis. Of all cases, 35% got infected during livestock herding or handling of raw wool and cashmere and 45% got infected during vacation or in a forest. Among all ticks collected by natural foci surveillance, 32.8% were Ixodes persulcatus which is a reservoir of Lyme borreliosis, and they were collected from provinces where most land is covered by forest.

Conclusions
The incidence of LB is increasing in Mongolia, especially in Zavkhan and Selenge provinces where lands are covered by forest. People who handle livestock or work in forests are more likely to get infected. Thus, education of those who live in forest areas was recommended.
Kyasanur Forest Disease Surveillance System Evaluation, Shivamogga, Karnataka and Sindhudurg, Maharashtra, India – 2016-2017

Wednesday, 7th November @ 11:24: Oral Presentations: Zoonoses and Vector Borne Diseases 2 (Conference Hall, 14th Floor) - Oral

Dr. Ashok Talyan, Dr. Nataraju Mariyappa, Dr. P Khasnobis, Dr. Pavana Murthy, Dr. Sanket Kulkarni, Dr. CS Aggarwal, Dr. Ruchi Jain, Dr. Ekta Saroja, Dr. Rajesh Yadav, Dr. Arun Chauhan, Dr. Samir V Sodha, Dr. Sudhir Jain, Dr. Sujeet Singh

Background
Kyasanur Forest Disease (KFD), transmitted by ticks or contact with infected monkeys, can cause hemorrhagic fever and death. In India, KFD was first reported from Shivamogga district, Karnataka but recently spread to neighboring states: Kerala, Goa, and Maharashtra. In 2016, there were 411 cases and 11 deaths. We evaluated KFD surveillance in Shivamogga, Karnataka and Sindhudurg, Maharashtra to identify strengths, weaknesses, and make recommendations to prevent spread.

Methods
We interviewed district health officers and stakeholders from veterinary and forest departments at study sites. We analyzed April 2016-March 2017 data to evaluate simplicity, timeliness, data quality, representativeness, stability, and flexibility.

Results
KFD is not notifiable but is reported as a state-specific disease to the national Integrated Disease Surveillance Programme. There were 38 KFD cases in Shivamogga and 150 in Sindhudurg during April 2016-March 2017. All 12 (100%) health officers interviewed in Shivamogga and 11/12 (92%) in Sindhudurg knew the case definition. Similarly, 11/12(92%) officers in Shivamogga and 10/12 (83%) in Sindhudurg said reporting was easy and simple. Among assessed facilities, only 5 (42%) in Shivamogga and 7 (58%) in Sindhudurg submitted weekly reports on time on Mondays. Upon checking data quality, among KFD cases reported to the district, 38/38(100%) cases' data matched health facility records in Shivamogga and 12/150(8%) cases' data matched records in Sindhudurg. KFD cases were only reported from government facilities. With respect to stability, in Shivamogga 11/12(92%) health facilities had enough reporting forms compared with 9/12(75%) in Sindhudurg. To achieve flexibility, three inter-department meetings in Shivamogga and six in Sindhudurg were held in 2016-17 with veterinary and forest departments.

Conclusions
KFD surveillance in both districts was simple, stable, and flexible but needs improvement for timeliness, data quality, and representativeness. We recommend KFD surveillance (human and animal) training for public and private health departments, forest and veterinary departments along with inter-department coordination.
A neighborhood picnic ended in a neighborhood food poisoning in Yogyakarta, Indonesia, 2017

Wednesday, 7th November @ 11:42: Oral Presentations: Food and Waterborne Diseases 5 (Convention Hall A, 2nd Floor) - Oral

**Ms. Fovilia Dewi, Mr. Dahlen Napitupulu, Mrs. Susilawati Susilawati, Dr. Riris Andono Ahmad**

**Background**
Foodborne diseases are an important cause of morbidity and mortality worldwide. In mid July 2017, a Public Health Center (PHC) reported a number of residents in neighborhood X having diarrhea after going on a picnic the day before. An investigation was conducted to confirm and describe the outbreak, to identify the source and the transmission.

**Methods**
A retrospective cohort study was done. Cases were persons who consumed picnic meal and had diarrhea and or abdominal pain during July 16-17, 2017. Food handlers and residents who consumed the meal were investigated. Data was collected using a questionnaire and observation checklist. Food samples were taken to Yogyakarta Laboratory for microbiological analysis. Bivariate and multivariate analyses were done to obtain RR value.

**Results**
The epidemic curve was that of a common source outbreak. Sixty two residents became ill (AR 62.6%; N=99) and had diarrhea (95%) and abdominal pain (79%). The average incubation period was 11 hours. The outbreak lasted less than 24 hours. The 41-50 years age group had the highest attack rate (87.5%). For lunch, the residents ordered ricebox, grilled chicken, offal chicken meats, eggs with soy sauce, vegetable dish, sliced cheese cake, and rice cake. Multivariate analysis showed that grilled chicken was the source of this outbreak (RR=3.6; p=0.013; 95%CI : 1.3 – 9.9) and laboratory analysis found *Bacillus cereus* in grilled chicken. Food handlers stated that the raw chicken meat was not fresh. The materials were purchased in the afternoon, cooked at dawn the next day, and consumed at lunch time.

**Conclusions**
The food poisoning outbreak in neighborhood X was caused by *Bacillus cereus* in grilled chicken. Failure to provide fresh chicken meat, poor kitchen hygiene and sanitation, and improper food handling might have enabled spore contamination and growth. Health promotion, training, and regular monitoring are necessary to avoid similar outbreaks.
An outbreak of hepatitis E caused by contaminated drinking water from a bore well in an urban slum, Bhubaneswar, Odisha, India, 2017

Dr. Anna Salomi Kerketta, Dr. Manickam Ponnaiah

Background
A cluster of jaundice cases was reported from Purusottam Basti slum, Bhubaneswar City, Odisha, India, during March to July 2017. We investigated the outbreak to describe epidemiological characteristics, identify source of infection and formulate recommendations.

Methods
We defined a case as a resident of Pursottam Basti slum, Bhubaneswar, Odisha with sudden onset of jaundice between March to July 2017. We searched for cases door to door. We described the outbreak by time (epidemic curve), place (spot map) and person (attack rate by age and gender using population denominators). All reported cases were compared with age, gender and neighborhood matched controls and we computed matched odds ratios (mOR) and 95% Confidence Intervals (CI). We tested serum samples for antibodies to hepatitis A, C, E virus and for hepatitis B surface antigen by ELISA. We tested drinking water specimens for bacteriological contamination and free residual chlorine.

Results
A total of 70 cases (Attack rate=125 per 1000) and no deaths were identified. Attack rate was high among those aged above 45 years (81 per 1000) and among females (75 per 1000). The cases were clustered around a bore well near an open sewage. The epidemic curve was suggestive of continuous common source infection. Ten of the 12 specimens were positive for IgM for Hepatitis E and two of the five water samples had fecal contamination and residual chlorine less than required. Cases were more likely to have consumed contaminated bore well water than controls (mOR=9; 95% CI: 4 to 19.5).

Conclusions
Contaminated bore well water in a slum area led to an outbreak of hepatitis E. The quality of drinking water provided to poor communities in a city requires regular monitoring and provision of alternative water supply should be ensured.
Evaluation of Leptospirosis Surveillance System – Tapi District, Gujarat, India, June 2017

Dr. Davendra Kumar, Dr. Ajit Shewale, Dr. Monil Singhai, Dr. Simmi ., Dr. P Khasnobis, Dr. Naveen Gupta, Dr. Sujeet Kumar Singh

Background
Leptospirosis is an underdiagnosed and underreported zoonotic disease transmitted by urine of infected animals. It may have case fatality rates up to 30% if untreated. In India, leptospirosis cases and outbreaks are reported frequently to the Integrated Disease Surveillance Programme (IDSP). We evaluated leptospirosis surveillance in Tapi district, a coastal district of Gujarat state, to provide evidence-based recommendations.

Methods
We conducted a cross-sectional evaluation of Leptospirosis surveillance system in existing IDSP of 12 (5 public and 7 private) health facilities for the peak 14 weeks of cases from June to September 2016. We reviewed registers and reporting formats and interviewed concerned stakeholders of public health institutions, animal husbandry, agriculture departments and private sector to assess the surveillance system with respect to the attributes of usefulness, simplicity, data quality, timeliness, stability and representativeness.

Results
Leptospirosis surveillance data were found to be useful to guide anti-rodent activities by animal husbandry department, leptospirosis surveillance in cattle by agriculture department, and chemoprophylaxis by health workers in high risk areas. Regarding simplicity, all 16 health care providers knew the case definition. For data quality, 100% (176/176) of presumptive leptospirosis cases and 100% (8/8) of laboratory confirmed cases were matched from data in reporting formats and IDSP web-portal with patient registers. All 140 reporting formats reviewed were completely filled manually and were available for review at sub-district levels. All 140 district reporting formats (100%) were submitted manually within specified times. System was stable with no internet or electrical failures during the study period. All five (5/5) public health facilities but no private (0/7) facilities were participating due to lack of manpower.

Conclusions
Leptospirosis surveillance system in Tapi district was useful, simple, having good data quality, stable and timely but needs improvement in representativeness. We recommend engaging private sector facilities and encouraging electronic reporting of leptospirosis cases.
Ownership and Usage of Long-lasting Insecticidal Nets (LLINs) Six Months after a Mass Distribution Campaign in Five Townships, Rakhine State, Myanmar, 2016

Wednesday, 7th November @ 11:42: Oral Presentations: Zoonoses and Vector Borne Diseases 2 (Conference Hall, 14th Floor) - Oral

San Kyawt Khine

Background
Long-lasting insecticidal nets (LLINs) distribution is one of the preventive interventions used by the Myanmar National Malaria Control Programme with a policy of one net/two persons. This study was conducted to re-assess the ownership, coverage, and usage of LLINs in five townships in Rakhine State six months after a mass distribution campaign as part of a program evaluation.

Methods
Multistage cluster sampling proportionate to size was conducted in five townships. Twelve households from each of thirty clusters were selected and female household heads were interviewed. Descriptive statistics were used to measure the ownership and usage of bed nets/LLINs. Bivariate and multivariate logistic regressions were used to identify factors associated with LLIN utilization by all family members.

Results
Among 360 study households, 53.6% had large family size (≥5 members). All households had nets and 99.2% had at least one LLIN. Only 58.9% had sufficient coverage of LLINs even if 90% of households had at least one net/two persons. Among 1784 family members, 98.4% and 70% slept under any net and LLINs, respectively. Two hundred and seven households (57.5%) had at least one member not sleeping under LLINs in the night before the survey. Age of the respondent, education level, family size, insufficient coverage of LLINs (>2 persons/LLIN) were factors associated with non-usage of LLINs by all family members. After adjusting other factors, age, education level and insufficient coverage were still associated and insufficient coverage (adjusted odds ratio (AOR) =3.07, p<0.0001) was the factor most associated with non-usage of LLINs by all members.

Conclusions
Usage and coverage of LLIN were insufficient six months after distribution and insufficient coverage was the most significant factor associated with non-usage of LLINs by all members. Therefore, the national program needs to track coverage over time and consider how to replenish LLIN distribution in addition to mass campaigns.
Background
The Department of Agriculture declared an Avian Influenza (H5N6) outbreak in Pampanga and Nueva Ecija. An FETP team was sent to identify timeline and magnitude of event, profile poultry farms and depopulation volunteers, describe depopulation activities, establish human surveillance, and recommend measures to enhance response activities.

Methods
A descriptive study was done. Key informant interviews, environmental survey, and active case finding were conducted. Surveillance for human avian influenza (AI) was established. A suspect human AI case was any individual with close contact with sick or dead poultry or participated in culling activity and presented with any of these: fever, cough, colds, other respiratory signs/symptoms, or dyspnea within 10 days after exposure. A confirmed case was a suspect case positive for H5N6 virus by PCR. Serum, OPS, and NPS were collected.

Results
In April 2017, the first poultry death was reported in Pampanga. To manage the outbreak, depopulation and carcass disposal of poultry within 1-km radius from ground zero were implemented. After pre-deployment procedures, farm workers and military volunteers conducted the activity. During human AI surveillance, 37 suspect AI cases were identified. Majority (95%) handled live/dead poultry. Twenty-nine (78%) were from military forces. The attack rate was 6/100 persons. All cases were male. Ages ranged from 19 to 57 years (median: 24). Majority (69%) presented with cough and colds (60%). Thirty-one (84%) were admitted. Six were positive for Rhinovirus, two for Human coronavirus NL63, and one each for Human metapneumovirus and Seasonal Influenza A(H3); 27 were negative for Influenza.

Conclusions
No confirmed human AI case reported. Avian Influenza is currently not easily transmitted from infected animals to humans, however, human surveillance is essential for detection of illness and timely management. Furthermore, one health approach and strengthening coordination and management structure from national to local levels are keys to effective and efficient public health response.
P33. Measles Outbreak in a Community, Why did it Happen?

Wednesday, 7th November @ 13:30: Poster Presentations: Infectious Diseases (Group F) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Nur Aishah Buang, Dr. Noorhaida Ujang, Dr. Shazelin Ali Pitchay, Dr. Hazlinda Hamzah, Dr. Amirullah Mohd Arshad

Background
Malaysia initiated a Measles Elimination Programme in 2004, aiming for elimination status by 2021. Even one confirmed case is considered an outbreak. On 6 January 2016, the Alor Gajah CDC received notification of a 6 year old boy who was suspected to have measles from a village in Alor Gajah. No cases were reported from this area in the past five years. We investigated to verify the outbreak, identify risk factors and implement control measures.

Methods
House to house active case finding was done within a one-kilometer radius from the index house with case definition of a person in the village with fever and maculopapular rash from 15 December 2015 to 5 February 2016. A confirmed case was a person with a positive laboratory test. Contact tracing and review of MCV-1 immunization coverage for the past three years were done.

Results
Seven cases fulfilled the case definition for a suspect case and three were confirmed. There were no deaths. The index case was not immunized and had travelled to a wedding reception outside Melaka. The other two cases were boys aged 16 and 17 years who self-claimed to have been vaccinated before. All cases did not have close contact with each other and only met at a mosque which was a common community area. The attack rate was 0.32% (3/940). MCV-1 coverage rates for 2013-2015 were 85.2%, 85.9% and 95.3%, respectively, leading to an estimated cumulative risk population of 43 (32.6%) susceptible individuals from 132 actual live births in 2013.

Conclusions
There was a community-based measles outbreak. The risk factors were non-vaccination and low herd immunity leading to disease transmission at a common area. We recommended strengthening of the immunization program in this area and regular risk assessment for early intervention.

Wednesday, 7th November @ 13:30: Poster Presentations: Surveillance Systems (Group G) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Ai Chia Ho, Dr. Rosemawati Ariffin

Background
Japanese encephalitis (JE) is the leading cause of vaccine-preventable encephalitis in Asia, causing high mortality and morbidity. Sarawak recorded the highest incidence rate in Malaysia, with 0.76 cases per 100,000 population in 2015. In Malaysia, JE is a notifiable disease and needs laboratory confirmation. The main objectives of JE surveillance include monitoring disease trends and early detection of outbreaks. The surveillance system was evaluated to determine its achievement of objectives and to assess the system’s attributes.

Methods
The evaluation was carried out in Kuching Division, involving state hospital, district and state health departments. Data was collected through key-informant interviews to describe the system, survey using self-administered questionnaires among health personnel and clinicians, and systematic review of surveillance data, inclusive of medical and laboratory records, notifications and guidelines, from 1 January 2015 to 31 August 2016.

Results
Specific guidelines on JE case management were not available. All JE cases were reported either through notification of viral encephalitis (60%) or when laboratory positive results were obtained (40%). The notification system was simple (54%) and 87% realised its importance. However, only 5% of medical doctors knew the correct case definition of JE. Trends of JE prevalence were monitored and disseminated through weekly bulletins. Average duration from date of specimen collection to result availability was 14 days, with 70% JE cases obtaining laboratory confirmation after discharge or death. Control measures were delayed as only initiated after laboratory confirmation.

Conclusions
The current JE surveillance system was simple, acceptable and useful in monitoring JE trends. It was poor in detecting outbreaks early as clinical notification was not sensitive and laboratory confirmation was not timely. Guidelines on JE case management and regular training of health personnel on case definition and reporting of cases is needed, and laboratory facilities should be made available locally to reduce the turn-around-time of diagnostic testing.

Wednesday, 7th November @ 13:30: Poster Presentations: Other Topics (Group H) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Alethea De Guzman, Mr. Alireza Faiyaz, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
The Event-based Surveillance and Response Unit of the Epidemiology Bureau received a report regarding an AEFMDA of ferrous sulfate in a National High School (NHS) in Mati City. An investigation was conducted to determine the magnitude, profile AEFMDA cases, determine drug supply chain, describe implementation of WIFA, and recommend control and preventive measures.

Methods
We conducted a retrospective cohort study. An AEFMDA case was a female student from Grades 7-10 at NHS with any of the following: abdominal pain, vomiting, diarrhea, headache, dizziness, or fever within 24 hours after intake of iron tablet on July 11, 2017. Further classification of AEFMDA cases were: Mild, Moderate, Severe, and Serious Adverse Events (AE). We collected rectal swabs and acquired blood chemistry results from the referral hospitals. Iron tablet samples were tested for potency.

Results
Nineteen (48%) of 40 public high schools under the School Division reported 421 AEFMDA cases (Incidence Rate [IR]: 37 per 1,000 population) and NHS had the highest incidence rate (90 per 100 population). Of the 172 female students at NHS, 123 (72%) were AEFMDA cases. Ages ranged from 11-20 years (Median 14). Twenty (18%) were hospitalized. Six (5%) were Severe AE. None died. There were limited orientations regarding side effects and a lack of coordination for surveillance and management of AEFMDAs. The iron tablets purchased from a local supplier were above the dosage specified in its label. Eleven (19%) of the 58 rectal swabs were positive for Aeromonas spp. Eighty-eight (94%) of 94 blood samples had normal SGPT. No factor was significantly associated.

Conclusions
Based on research findings, the incidence of AEFMDA was within the expected rate and iron toxicity was unlikely. The Schools Division ensured compliance to the prescribed iron preparation in continuing the WIFA implementation and proper coordination with the health office for monitoring and surveillance of adverse reactions.
P32. Public Health Response to a Poultry Outbreak of Highly Pathogenic Avian Influenza (H5N1) in Kelantan, 2017

Wednesday, 7th November @ 13:30: Poster Presentations: Zoonoses (Group E) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Intan Din, Dr. Suhaiza Sulaiman

Background

H5N1 is the most virulent subtype in a long list of highly pathogenic avian influenza (HPAI) viruses with pandemic potential. The last reported HPAI outbreak among poultry in Kelantan was in 2004, and 2007 in Malaysia. There was no reported human case in Malaysia. The Kelantan Department of Veterinary Service (DVS) reported a positive HPAI H5N1 case among domestic chicken in Kg Pulau Tebu on 6 March 2017; subsequently affecting six districts within a 30 km radius from the index case.

Methods

A public health response was implemented according to the Management Guidelines for Avian Influenza, 2004, Malaysia. Level 1 emergency preparedness and contingency plans were implemented through activation of operations rooms at state and district levels, enhanced ILI surveillance, health surveillance of at risk individuals, active and passive case finding and management of suspect human cases. Active case detection was conducted within a 300 meter radius from infected poultry for 10 days after exposure. Biosecurity measures were undertaken by DVS and KKM to prevent spread of disease.

Results

We screened 13,385 at risk persons, of whom five suspect cases and 50 with mild symptoms were identified. The symptomatic cases were advised to practice social distancing. None of the cases tested positive. A total of 330 healthcare workers and 184 veterinary staff who were exposed were monitored for 10 days. Public awareness and risk communication was conducted through social media. A total of 26,477 pamphlets and 9,061 Health Alert Cards were distributed, 11,394 residents attended small group discussions and 31,065 personal advises were given. Health education on good husbandry practices involving 327 poultry farmers and inspection of 176 premises were conducted together with the local council.

Conclusions

A HPAI outbreak among fowls in Kelantan occurred within one month involving six districts. The effective public health response resulted in no human cases detected.
P35. Rubella Outbreak in a Public Secondary School, Northern Samar, Philippines, March 2017

Wednesday, 7th November @ 13:30: Poster Presentations: Infectious Diseases (Group F) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Alethea De Guzman, Ms. Mariz Zheila Blanco, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
Measles, Mumps, and Rubella (MMR) vaccination became a nationwide public health program in 2009. Measles-Rubella School-Based Immunization (SBI) began in 2016. On March 2017, the Event-based Surveillance and Response Unit received a report regarding confirmed rubella cases in Northern Samar. We conducted an epidemiologic investigation to profile cases, determine existence of outbreak, source and mode of transmission, and risk factors, and recommend control and prevention measures.

Methods
We conducted an unmatched 1:2 case-control study. A suspect case was a student or personnel with rash and any of the following: fever, joint pains, cough, coryza, conjunctivitis. A confirmed case was a suspect case positive for rubella IgM. Controls were well students or personnel negative for rubella IgM. Environmental survey was done. Sera were collected for confirmatory testing.

Results
Thirty-eight cases were identified. Majority (22, 58%) were female. Ages ranged from 13-46 years (Median = 17). Thirty-seven (97%) were students. Cases were not isolated and allowed to attend school while symptomatic. Grade 11 had the highest attack rate (42/100). Possible index case was a Grade 11 student exposed to a sibling who came from another province. Grade 11 classroom was located far from other rooms. The 2016 municipal MMR vaccine coverage was 69%. Only 53% of students received Measles-Rubella vaccine during the 2016 SBI because parents refused to give consent. Twenty-nine (76%) cases were positive for rubella IgM. Multivariate analysis showed that being a Grade 11 student was a significant risk factor (OR=9.02, 95% CI=3.69 – 22.08).

Conclusions
There was a rubella outbreak in a secondary school in Northern Samar. Cases were mostly young adults unvaccinated against rubella. Early detection, immediate referral of cases, and proper management could prevent transmission. Providing information about vaccination to parents and community members and identifying unvaccinated children through home visits may help ensure that coverage reaches herd immunity threshold.
P31. Evaluation of Severe Acute Respiratory Illness Surveillance System in Kirivong Referral Hospital Site, Cambodia, 2016

Wednesday, 7th November @ 13:30: Poster Presentations: Surveillance Systems (Group G) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Buntha So, Dr. Phalmony Has, Dr. Tek Bunchhoeung, Dr. Sopheap Tek

Background
Recent global experience emphasized the importance of severe acute respiratory illness (SARI) surveillance in identifying trends, numbers of influenza viruses in circulation and related outbreaks. SARI surveillance began in 2009 at Kirivong Referral Hospital and this system has not undergone a formal evaluation. We evaluated the SARI surveillance system's attributes and made recommendations for improvement.

Methods
SARI cases were defined as having onset of fever >38°C (armpit) within 10 days of admission to the hospital and a cough or sore throat and shortness of breath or difficulty breathing. We reviewed medical records, patient charts, logbooks, and laboratory results between 30/12/2015 to 28/06/2016. Surveillance staff were interviewed to assess timeliness, completeness, simplicity, sensitivity, and PVP of reporting. The evaluation also described the acceptability, flexibility, and usefulness of the system.

Results
We reviewed 4,794 in-patient charts, 432 cases with SARI diagnoses were analyzed. 265 SARI cases were reported and peaked in week 9. The influenza positivity rate was 5.3%. Children under 5 years of age (47%) were the most affected group. Micro-pathogens detected were H1N1, Parainfluenza 1, hMPV, Flu B Yamagata, and Parainfluenza 3. Timeliness, completeness, simplicity, flexibility, usefulness, sensitivity, and PVP were 92%, 96%, 85%, 70%, 100%, 71%, and 75% respectively. PVP for patients' aged 5 years and above was 65% and only 59% for patients in medicine wards. Twelve health care staff were interviewed; all were willing to participate in the system. The referral of SARI or SRI cases from health centers was low and underestimated.

Conclusions
The timeliness, completeness, simplicity, flexibility, acceptability, and usefulness of the surveillance system were high. Sensitivity and PVP were low related to quality of diagnosis and patients' age-group. The competencies of the SARI surveillance staff must be improved through training, regular meetings, and information dissemination. SARI surveillance sentinel sites should be expanded to be more nationally representative.
P9. Survey on the Effect of the Beijing Smoking Control Regulations on Smoking Occurrence in Restaurants, 2018

Wednesday, 7th November @ 13:30: Poster Presentations: Other Topics (Group H) (Outside of Convention Hall A, 2nd Floor) - Poster

Ms. Li Xie, Dr. Yingxin Pei, Prof. Yuan Jiang, Mrs. Jie Yang, Dr. Tao Shen

Background
The Beijing Smoking Control Regulation which took effect on June 2015 stipulates that all indoor public places must be smoke-free. To evaluate the effect of implementation of the regulation, occurrence of smoking in restaurants was compared before and after the law took effect.

Methods
An observational cohort study was conducted in a multi-staged randomly selected sample of 93 restaurants in two districts of Beijing. Undercover visits were paid by investigators to the restaurants at lunch or dinner time. Occurrence of smoking behavior and no-smoking signs were observed, waiters were interviewed about awareness of the regulation, and comparisons with the results of 6 months before and 1 month after the original implementation regulation were made.

Results
After 3 years of implementing the regulation, the occurrence of smoking in restaurants (29%) was lower than before the regulation was implemented (37%), but it was significantly higher than one month after the initiation of the implementation (15%). This conflicted with higher numbers of no-smoking signs (76%) and waiters’ higher overall awareness of the regulation. No active intervention from the restaurant staff or the public was observed whenever smoking occurred. Prevalence of smoking in restaurants within commercial buildings with regular inspections by the property management and security unit (3%) was significantly lower than in those in non-commercial buildings without community management (41%) (p<0.01).

Conclusions
The effect of the regulations has weakened after 3 years compared with the first year after the implementation. Due to insufficient law enforcement, social forces such as property managers, security personnel as well as volunteers could be encouraged to participate in actively encouraging compliance. Increased public education as well as trainings for restaurant staff are of key importance to stop illegal smoking in restaurants. Penalties as well as media exposure could also help to form and guide public compliance.
P7. Poultry supply chains for Avian Influenza (AI) outbreak in poultry, October 2016 - Luangprabang, Lao PDR

Wednesday, 7th November @ 13:30: Poster Presentations: Zoonoses (Group E) (Outside of Convention Hall A, 2nd Floor) - Poster

**Mr. Korlakot Latsaphong, Dr. Phetdavanh Leuangvilay, Dr. Bouaphanh Khamphaphongphane, Dr. Latdavanh Mouanchanh, Dr. Viengsavanh Kitthiphong, Dr. Bounheuang Khounnavong**

**Background**
Avian influenza (AI) A H5N1 causes severe disease that can be transmitted from animals to humans. Lao PDR has experienced avian influenza outbreaks in poultry since 2007 across eight provinces, including the national capital, Vientiane. Sources of the poultry outbreaks were frequently unknown and supply chains were unclear. This study aims to better understand poultry supply chains and potential sources of AI outbreaks in October 2016 in Luangprabang to improve future prevention and control measures.

**Methods**
We interviewed all residents in an affected village where H5N1 was confirmed in poultry and large poultry farmers in Luangprabang in December 2016, using a standardized questionnaire form about their poultry sources. Data analysis was conducted using Microsoft Excel.

**Results**
The majority of residents in the affected village buy poultry from local markets and other villages in the province. There were 11,400 poultry imported into Luangprabang from China in May 2015, and Vientiane capital in September 2016. The first consignment was from China: (19% - 2200) and distributed to Aliew and Ayee farm. The second consignment from Vientiane capital (81% - 9200) and distributed to 4 different farms in Luangprabang. However, there was no reports of sick or dead poultry in these local farms in 2016.

**Conclusions**
The source of the AI outbreak in Luangprabang in October 2016 is suspected to be within the villages where several outbreaks had occurred before in a neighboring province. Enhanced routine surveillance in poultry will improve rapid detection and timely response.
P29. Burden of Influenza-Associated Hospitalisations, Cambodia, 2016

Dr. M Ximena Tolosa, Mr. Vanra Ieng, Ms. Sovantha Om, Mr. Sokdaro Soy, Dr. Miliya Thyl, Mr. Chan Dara, Dr. Moniborin Mey, Dr. Borann Sar, Dr. Seng Heng, Dr. Sovann Ly, Ms. Rebekah Stewart, Dr. Erica Dueger, Dr. Sheena Sullivan

Background
Cambodia has recently established systematic surveillance of severe-acute respiratory infection (SARI) as a mechanism to estimate the burden of seasonal influenza and for influenza pandemic preparedness. This study provided the first estimates of the national burden of SARI in hospitalisations in Cambodia using surveillance data.

Methods
Following WHO recommended methodologies, we estimated age-specific influenza-associated SARI hospitalisations (counts) in three sentinel surveillance sites, using SARI surveillance data for 2016. Hospital admission surveys were conducted at each site to estimate the population denominator. A national influenza-associated SARI hospitalisation rate was calculated dividing the pooled influenza-associated SARI hospitalisation counts by the sum of the population of each site. National influenza-associated SARI case counts were estimated by applying hospitalisation rates to the national population. We conducted staff surveys at two sites to explore factors that enable and obstruct patient recruitment in SARI surveillance.

Results
The 2016 estimated national influenza-associated SARI hospitalisation rates per 100,000 population (95% confidence interval) were 323 for children <1 year (261–399); 196 for children 1-4 years (160–239); 62 for children 5–15 years (48–80); 9 for people 16-24 years (5–17); 15 for adults 25–49 years (10–21); 35 for adults 50–64 years (25–50); and 91 for adults ≥65 years. The total number of hospitalisations due to severe influenza for Cambodia (population 15,087,360) was estimated at 7,547 with 47% of these represented by children younger than five years old. Through staff surveys we found that SARI surveillance under-estimated SARI in infants and children due to difficulties in obtaining swabs from these groups and the fact that those without swabs were not counted as SARI.

Conclusions
The highest burden of severe influenza infection is borne by the younger age groups. These findings can be used by Cambodian authorities to formulate targeted public health strategies to reduce the impact of severe influenza illness in children.

Wednesday, 7th November @ 13:30: Poster Presentations: Surveillance Systems (Group G) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Ginisha Gupta, Dr. D Somashekar, Dr. Ekta Saroha, Dr. Amol Patil, Dr. Samir V Sodha, Dr. CS Aggarwal, Dr. A.C. Dhariwal, Dr. Sujeet Singh

Background
Delhi has a large burden of vector-borne diseases with 4,431 dengue and 12,279 chikungunya cases in 2016. Municipal Corporation of Delhi implements National Vector Borne Disease Control Programme guidelines using hospital-based surveillance to guide epidemiological investigations and entomological interventions. We evaluated dengue and chikungunya disease surveillance of East Delhi Municipal Corporation in Shahdara south zone to identify strengths and weaknesses.

Methods
We conducted a cross-sectional study of key informants from four highest burden hospitals (three government, one private) of south Shahdara zone to evaluate attributes, including usefulness, acceptability, simplicity, data quality, timeliness, predictive value positive, representativeness, flexibility, and stability.

Results
Surveillance data in 2016 guided 325 epidemiological investigations with approximately 3.7 million houses investigated for breeding sites and 300,000 sprayed. There was 100% reporting from all four hospitals. Reporting was described as simple during non-transmission season by all four hospitals and during transmission season by two hospitals. No stakeholders were trained on the guidelines. All case-reporting formats had contact details but 22% (346/1573) were incorrect and untraceable during house visits. Median time between hospitalization and reporting was 3 days (range: 0-20 days) during transmission season and 10 days (range: 2-34 days) during non-transmission season. Daily processing of serum samples for dengue and chikungunya occurred during transmission season in all hospitals but in only one during non-transmission season. Predictive value positive (PVP) was 16% (135/849) and 27% (194/724) for suspected dengue and chikungunya cases, respectively. The system was more representative of public sector and severe illnesses. The system was flexible enough to add malaria in 2009. No transmission failure occurred in 2016 reflecting stability.

Conclusions
The system has high acceptability, flexibility, and stability but needs improvement in data quality, simplicity, timeliness, and representativeness. PVP was likely low from sensitive case definitions. We recommended daily sample processing, better case representation, and providing training and guidelines.
**P3. A Study on Using SmartVA for Verbal Autopsy in China, 2017**

**Background**
Nearly 80% of people die at home in China and deaths outside of health facilities create challenges for primary-level staff assigning cause of death. SmartVA can play an important role in assessing the cause of death in such cases by utilizing the intelligent cause of death inference tool, based on the traditional verbal autopsy (VA).

**Methods**
SmartVA uses questionnaires to conduct surveys with the family members of the deceased or other relevant insider using tablets. Thirteen counties were selected in five provinces of Shandong, Hubei, Henan, Ningxia and Shaanxi, representing the middle, eastern and western areas of China. The results were compared with the Global Burden of Disease Study 2015 (GBD2015).

**Results**
The survey included 5,350 people. The top three causes of death at home for those ≥12 years old were stroke (24%), ischemic heart disease (IHD, 22%) and chronic respiratory diseases (8.7%), similar to the results from GBD2015. The top three causes of death for those between the ages of 12 to 44 years were road traffic injuries, stroke and IHD. The three leading causes of death for those aged 45 to 64 years were stroke, IHD and lung cancer. The three leading causes of death for those aged 65 to 74 and ≥75 years old were the same, stroke, IHD, and chronic respiratory disease. Stroke, IHD and chronic respiratory diseases were the main causes of death in all provinces, accounting for a vast proportion of all mortalities. Chronic non-communicable diseases (74%) were the primary cause of death in all provinces, consistent with the results of surveillance system in China and from GBD2015.

**Conclusions**
SmartVA is one potential tool that can help primary-level health workers effectively assess data on deaths at home. By using data recorded by SmartVA, it is possible to shed light on the causes of home mortalities.
P8. Investigation of a Family Cluster of H7N9 Avian Influenza in Inner Mongolia, China, 2017

Wednesday, 7th November @ 13:30: Poster Presentations: Zoonoses (Group E) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Xiaofeng Jiang, Mr. Weidong Guo, Dr. Yingxin Pei, Dr. Junling Sun

Background
Two laboratory-confirmed H7N9 cases from the same household were reported 8 days after the first H7N9 case detected in Inner Mongolia on June 7, 2017. In order to identify the source of infection and whether there was human-to-human transmission and provide prevention and control measures, an investigation was initiated.

Methods
Information on demographics, health status and exposure to poultry were obtained by face-to-face interviews. Close contacts were defined as family members, patients in same ward and someone else in close contact with the cases 1 day before their onset. Close contacts were identified through interviews of cases and monitored for flu-like symptoms for 7 days. Environmental specimens were collected and tested for H7N9 virus by PCR.

Results
Both cases were a married couple, farmers, aged 67 years. The husband became ill with fever and cough on May 23 and found positive for H7N9 virus and *Mycobacterium tuberculosis* on June 7. The wife presented with the same symptoms on May 26 with H7N9 detected 5 days later. Neither case had travel history nor contact with person with respiratory symptoms 10 days before their onset. On May 18, both went to their village market to buy chickens. All 5 newly-bought and 6 of 10 original ones died from May 19 to 21. They tended to sick/dead chickens without any protective measures. 28 close contacts were identified, none of them presented symptoms within the health-monitored period. 30 samples including poultry manure, cage swabs and sewage specimens were collected after the market was disinfected and none were positive for H7N9 virus.

Conclusions
These cases were probably infected through the live poultry market and sick/dead poultry exposure; no human-to-human transmission ensued. *Mycobacterium tuberculosis* infection may have made the case more susceptible to H7N9 co-infection. We recommended avoiding contact with dead poultry and closure of the live poultry market.
P36. The First Outbreak of Autochthonous Zika Virus in Sabah, Malaysian Borneo, 2016

Wednesday, 7th November @ 13:30: Poster Presentations: Infectious Diseases (Group F) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Mohammad Saffree Jeffree

Background
The first ZIKV outside Africa was detected in a mosquito in Malaysia. Previously, serological surveys indicated the presence of ZIKV among humans and orangutans in Sabah. Recently, a case of human ZIKV infection was reported in a traveler. Then the first autochthonous cases were detected in Sabah. Therefore, the present study was performed to analyze the outbreak of ZIKV cases and to determine their relationship with the burden of ZIKV infection in the local population, mosquitoes, and wild nonhuman primates in Sabah.

Methods
Serum and urine samples were collected from two local patients with ZIKV infection, their household members, and those who resided within 400m of the patients’ residences. Serum samples were also collected from four wild *M. fascicularis*. Mosquito samples, mostly female *Aedes albopictus*, were collected from 30 sites. The presence of ZIKV was assessed by RT-qPCR and RT-PCR. Phylogenetic analysis was performed using the neighbor-joining method.

Results
Two cases of ZIKV infection were identified in Kota Kinabalu, and the Taiwanese health authorities reported one case who visited Sabah. All household members of both local patients and people living within a 400 m radius of the patients were negative for ZIKV. Furthermore, mosquitoes collected from the surroundings of the residences and places visited by the patients and four serum samples from *M. fascicularis* were also negative for ZIKV. A phylogenetic tree constructed using the nucleotide sequences of the envelope genes of ZIKV showed that the strains from Sabah formed a cluster with strains from Thailand and Cambodia, and belong to the Asian lineage.

Conclusions
ZIKVs in Sabah are of Asian lineage and are not related to the recent outbreak strains in the Americas and Singapore. ZIKV infection in Sabah is sporadic, possibly because of limited transmission of the virus. Further studies are needed to characterize the evolutionary history of ZIKV in Sabah.

Wednesday, 7th November @ 13:30: Poster Presentations: Surveillance Systems (Group G) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Zulraini Jusof, Dr. Rusdi Abdul Rahman, Dr. Dr Siti Halimah Syed Shaikh, Dr. Amirullah Mohd Arshad, Dr. Hashimah Hassan

Background
A Hepatitis B Surveillance System (HBSS) is important to provide distribution, incidence trend and various epidemiological data for public health action and program planning. An evaluation of HBSS was conducted in Melaka Tengah to determine how the surveillance activities were being implemented with respect to its attributes and to make recommendations for its improvement.

Methods
The evaluation covered the Malacca State Health Department, Malacca Hospital, Melaka Tengah District Health Office, 11 government health clinics, 3 private hospitals and 17 private clinics using CDC and WHO guidelines. Data on notified lab-confirmed hepatitis B cases were reviewed from e-notifications and investigation reports. Evaluation involved direct observation of workflow and interviewing target respondents using structured questionnaires and a checklist. The studied attributes were data quality, timeliness, usefulness, simplicity, acceptability, stability and flexibility.

Results
There were 312 respondents: 9 data users, 10 data managers and 293 notifiers with response rates of 88.9%, 100% and 66.9%, respectively. About 81% of respondents were from the government sector. The incidence rate of Hepatitis B increased from 16/100,000 in 2013 to 19/100,000 in 2017, with a case fatality rate of 1.06% and six deaths in 2017. Data quality was excellent (100%) and notification after diagnosis was timely (84%). The HBSS was useful for data users (87.5%) and beneficial in making policy decisions (75%), simple to receive notification among data managers (100%) and acceptable to notifiers (88.3%). The HBSS exhibited flexibility by a minor change of sub diagnosis made in 2012. Even though the HBSS was perceived as stable and operating well by 73.3% of notifiers, it had low reliability in a few aspects.

Conclusions
The HBSS in Melaka Tengah met its objective. We recommend the system capture more information on disease outcome, treatment of chronic Hepatitis B, immunization, disease progression/survival and integration with other surveillance system to maximize its function.

Wednesday, 7th November @ 13:30: Poster Presentations: Other Topics (Group H) (Outside of Convention Hall A, 2nd Floor) - Poster

Ms. Faridha Almira, Dr. Atik Choirul Hidajah, Mr. Agung Nugroho, Mr. Anharul Qoni

Background
An analysis of health problems was conducted to find out the description of a health problem in a region where the results can serve as a basis for planning and implementation of a disease control program. This study aims to find out the priority health problems that occurred in the Blitar District in 2017.

Methods
This study is a descriptive observational study conducted at the Blitar District Health Office in January 2018. The types of data collected are data on demographic characteristics, health status, morbidity and mortality data obtained from the Blitar District Health Profile in 2014-2017, surveillance reports and interviews of health officers. Determination of priority health issues was carried out using the USG method based on the criteria of Urgency, Seriousness, Growth.

Results
Increasing case fatality rate (CFR) of Dengue Hemorrhagic Fever (DHF) with USG score of 139 was a top priority health problem in Blitar District. The incidence rate of DHF in 2017 was 8.58 per 100,000 population, less than the last year. The CFR of DHF increased from 2.27% in 2016 to 4.04% in 2017 and it’s higher than the national target. The larva-free rate in Blitar District for the last three years did not reach the national target. Fatal DHF cases in 2016-2017 were more among the 5-14 years age group (37.5%) and most were male (56.25%).

Conclusions
Increasing CFR of DHF is a priority health problem in Blitar District. Necessary efforts towards strengthening the role of cadre, larva observer, involvement of public figures, teachers, student organization to optimize the dissemination of DHF information such as risk factors, prevention efforts, signs and symptoms, treatment and the importance of conducting laboratory examination. To get a proper diagnosis and treatment, it is necessary to enhance the comprehension of health workers for early detection, especially private health care workers.
P2. Outbreak Investigation of Anthrax, H County, Ningxia Hui Autonomous Region, China – April 2018

Wednesday, 7th November @ 13:30: Poster Presentations: Zoonoses (Group E) (Outside of Convention Hall A, 2nd Floor) - Poster

Mr. Ming Yang, Mr. Enmin Zhang, Mr. Wei Li, Prof. Wenwu Yin, Dr. Tao Shen

Background
A suspected anthrax patient died during a visit to a hospital in Ninxia on April 11, 2018. The hospital reported two more suspected cutaneous anthrax cases on April 13 and 14. We conducted an investigation to verify the diagnosis and outbreak, identify transmission mode, risk factors, and recommend preventive and control measures.

Methods
Case definition was made according to national criteria. We searched for anthrax cases in all clinics and hospitals of two towns where patients came from. All patients and family member of a fatal case were interviewed to investigate the source of infection, trace the source and residue of the dead cattle and sheep. Samples of skin lesions, herpes secretions of patients and residual beef and mutton were collected for bacterial culture and nucleic acid test.

Results
Case A was cut by a knife during the dissection of a sick cow without any protective measures, wasn't diagnosed and treated in time, with inappropriate self-treatment, and finally died of sepsis infection with multiple organ failure. Cases B and C dissected the sheep with anthrax without any protective measures. One of them had a wound in his hand. Case A's broken finger exudate phage cracking test was positive. The fluorescence quantitative PCR test results of cotton swabs from Cases B and C were positive. Serum anthrax specific antibody titers of case C increased by 4 times. Gram positive bacilli were seen in mutton specimen.

Conclusions
These two confirmed anthrax outbreaks were caused by salvaging dead cow and sick sheep. Case A's death was attributed to not receiving timely diagnosis and treatment. We recommended enhanced health education on the transmission mode and clinical manifestation of anthrax; training of village medical personnel in endemic areas on the detection and reporting of anthrax; enhanced cooperation between human health and veterinary departments on zoonosis disease detection and prevention.
**P5. Effects of a School-based Hand Hygiene Intervention on Student Hand-washing Practices - Shanghai, China, 2016-2017**

Wednesday, 7th November @ 13:30: Poster Presentations: Infectious Diseases (Group F) (Outside of Convention Hall A, 2nd Floor) - Poster

Ms. Dongling Yang, Dr. Chunyan Luo, Ms. Zhe Zhang, Mrs. Yuefang Zhou, Dr. Lijing Sun, Ms. Shuangxiao Qu, Mr. Xiaogang Feng

**Background**
Hand-washing is one of the most cost-effective investments in public health. However, only 3 to 34% of the population in developing countries routinely wash their hands at critical junctures. We aimed to assess the effects of a school-based hand hygiene intervention on student hand-washing practices in Shanghai, China.

**Methods**
We recruited 34 schools from 17 districts in Shanghai (17 schools as the intervention group and 17 other comparable schools as the control group). Guided by social cognitive theory, the school-based hand hygiene intervention consisted of improved hygiene facilities, providing adequate liquid soaps and tissues, establishment of health management system and health education for students. The interventions were carried out from June to November 2016. A total of 9,861 students aged 8-15 years (4,957 in the intervention group and 4,904 in the control group) filled-out questionnaires at baseline and 6 months follow-up. 680 students (340 in the intervention group and 340 in the control group) were observed at baseline, 6 and 12 months follow-up. The primary outcomes were self-reported and observed hand-washing after defecation and before eating. We evaluated the effects of the intervention by multivariate logistic regression analysis.

**Results**
At 6 months follow-up, compared with the control group, the intervention group had a significantly higher rate of self-reported and observed hand-washing after defecation and before eating. The adjusted odds ratios were 1.19 (95% CI, 1.06-1.33), 2.96 (95% CI, 2.13-4.13), 1.30 (95% CI, 1.19-1.43) and 4.47 (95% CI, 2.88-6.94) respectively. At 12 months follow-up, the intervention also resulted in a significantly higher rate of observed hand-washing after defecation and before eating. The adjusted odds ratios were 2.28 (95% CI, 1.65-3.15) and 2.57 (95% CI, 1.80-3.67) respectively.

**Conclusions**
The school-based hand hygiene intervention may be effective in promoting hand-washing practices for students.
Background
In India, the large burden of emerging infectious diseases with epidemic and pandemic potential necessitates quality surveillance for acute febrile illnesses. We described and evaluated surveillance for febrile illnesses through the Integrated Disease Surveillance Programme (IDSP) in Hosanagara Taluk of Shivamogga district, Karnataka to provide evidence-based recommendations for improvement.

Methods
We evaluated records and registers and conducted 25 key informant interviews from four village level subcentres and four subdistrict health facilities to evaluate acceptability, simplicity, flexibility, representativeness, timeliness, data quality and stability.

Results
In Hosanagara Taluk, all 41 subcentres participated in active surveillance for fever in villages while all 13 health facilities conduct passive clinical surveillance for 16 acute febrile illnesses including influenza, malaria, and typhoid. Among eight facilities visited, all reported on a weekly basis. All 15 key informants involved in active surveillance reported difficulty in detecting fever. Among four subcenters, median of 39% (16-48%) houses were covered per week. All key informants felt ease in reporting to higher reporting units. Shivamogga district in 2016 began reporting of Kyasanur Forest Disease, a viral haemorrhagic fever of local importance. Paper-based reporting was upgraded to direct web portal reporting at taluk level in 2015. Among 48 weekly reports from health facilities, timeliness was 77% and completeness was 67%. Among the four laboratories within assessed health facilities, all four had testing and reporting for only two febrile illnesses: malaria by microscopy and typhoid by Widal test. There were no reports of computer or internet failures when uploading data in web portal.

Conclusions
Surveillance for acute febrile illnesses through IDSP in Hosanagara is representative, flexible and stable but needs improvement in data quality, acceptability for active surveillance, and laboratory capacity for acute febrile illnesses. We recommend training key informants for detecting fever and acute febrile illnesses and improvement in laboratory capacity to detect more diseases.
P40. An Analysis of Interventions Presented at the 2015 CDC EIS Conference and the 2015 TEPHINET Conference

Wednesday, 7th November @ 13:30: Poster Presentations: Other Topics (Group H) (Outside of Convention Hall A, 2nd Floor) - Poster

Dr. Abdul Rauf Shirzad

Background
Field Epidemiology Training Programs, TEPHINET, and the CDC EIS Program concentrate almost exclusively on nonintervention epidemiology. Fields of health services research that concentrate on interventions such as randomized controlled trials or operations research are seldom taught. We believe this is a mistake; unless interventions are performed, health and healthcare are not improved. We analyzed the oral presentations of the 2015 EIS Conference (2015 EISC) and the 2015 TEPHINET Conference (2015 TEPHINETC) to determine how frequently interventions were performed.

Methods
Three reviewers read abstracts. Two reviewers read the 2015 EISC and two the 2015 TEPHINETC. Abstracts were judged to have had an intervention or not and, if so, whether the principal intention was to present an intervention (“primary intervention”) or, if the intervention followed a noninterventional epidemiology investigation, a “secondary intervention.” Abstracts were then graded by whether the presenters called for an intervention to be done or not (“intervention needed”). Discrepancy in scoring was resolved by discussion.

Results
Neither set of abstracts contained the words “randomized controlled trial,” “operations research” or “operational research.” The 2015 TEPHINETC contained 126 presentations, of which 28 (22.2%) contained an intervention (three primary, 2.4%; 25 secondary, 19.8%). Eighty-five abstracts (67.5%) called for an intervention to be done. The 2015 EISC contained 103 presentations but we have been able to read to date only 61. Of these, 11 (18%) contained an intervention (three primary, 4.9%; 8 secondary, 13.1%). Thirty abstracts (49.2%) called for an intervention to be done.

Conclusions
CDC and TEPHINET do not emphasize intervention epidemiology. While the need for an intervention is highlighted by CDC and FETP authors, it is unclear who will do those or if they will be done. We believe FETP and CDC EIS training programs should be revised to emphasize intervention epidemiology.
Salmonellosis Outbreak among Tourists in a Popular Vacation Resort - Pahang, Malaysia, 2016

Wednesday, 7th November @ 15:30: Oral Presentations: Infectious Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Sahrol Azmi Termizi, Dr. Rohani Ismail

Background
On 3 August 2016, an outbreak was declared when tourists at a popular vacation resort in Pahang went to a health facility for abdominal pain, diarrhea and vomiting. The aim of the investigation was to describe the outbreak, identify risk factors and institute preventive measures.

Methods
A suspect case was defined as any person who had eaten at the BBQ dinner in the resort on 2 August 2016 and presented with abdominal pain, diarrhea or vomiting. These cases were identified by active case detection and review of medical records. An unmatched case control study was conducted using a structured questionnaire to identify risk factors. Laboratory testing of blood and stool samples from cases was done. Cultures of hand swabs from food handlers were also done. Proxy food samples and environmental swabs were sent to the laboratory. Environmental investigation and HACCP were carried out to assess the hygiene and sanitation of the kitchen.

Results
A total of 290 cases (46%) were identified. The median age was 32.4 years and most were Malay (42.4%). 42 cases (14.5%) were hospitalised for dehydration with 1 mortality. Symptoms were abdominal pain (87.9%), diarrhea (87.6%), fever (62.8%) and vomiting (28.6%). Odds ratios were highest for grilled squid (OR=1.57[95%CI=1.38-1.81]), fried rice (OR=1.24[95%CI=1.08-1.43]) and grilled meat (OR=1.22[95%CI=1.08-1.38]). However, multivariate analysis was not statistically significant. Two food samples had *Salmonella spp*. All hand swabs of food handlers and utensil swabs grew aerobic organisms. The predisposing factors were unhygienic practices of food handlers and improper storage of raw materials. The kitchen was ordered to close for 2 weeks for cleaning and rectification of the problems.

Conclusions
There was a salmonellosis outbreak in a popular vacation resort in Pahang due to improper storage of raw materials and unhygienic practices. We recommended proper maintenance of the kitchen equipment and health education of the food handlers.
Epidemiological Investigation of Chemical leak related illness at Tughlakabad, Southeast District Delhi, May-June 2017

Wednesday, 7th November @ 15:30: Oral Presentations: Miscellaneous Studies 1 (Multifunction Hall, 14th Floor) - Oral

Dr. Jayanti Singh, Dr. Sushma Choudhary, Dr. Samir V Sodha, Dr. CS Aggarwal, Dr. Meera Dhuria, Dr. Kapil Goel, Dr. Shikha Vardhan, Dr. A.C. Dhariwal, Dr. Ritu Yadav

Background
Exposures to hazardous chemicals are a public health risk in India. Chemical leak of 2-chloro, 5-chloromethyl pyridine, a mucosal and skin irritant, occurred at Tughlakabad Inland Container Depot (ICD) in Southeast District, Delhi on May 6, 2017, causing over 600 illnesses. The India National Centre for Disease Control investigated to describe the epidemiology and identify risk factors.

Methods
We defined a case as eye irritation or breathlessness in a resident or student of Tughlakabad ward on May 6, 2017. We reviewed hospital records and did house-to-house surveys in neighborhoods and school adjacent to ICD to identify cases. We interviewed key informants such as school principals, medical superintendents, and first responders. We also conducted a 1:2 unmatched case-control study to identify risk factors.

Results
There were 619 cases (92% female) with no deaths; median age was 13 years (range: 3-63). Most (93%) sought medical care; 97% recovered within 24 hours. Among 110 interviewed, symptoms included eye irritation (99%), watery eyes (75%), headache (34%), throat irritation (30%), vertigo (24%) and breathlessness (22%). Among 30 cases and 60 controls, only walking on the ICD exit road (OR=5.4 [95% CI=2.1–14.1]) was associated with illness. The exit road is walled and part of a restricted ICD area, but residents commonly accessed the road through broken boundary walls to decrease their commute. Spill was reportedly covered with sand but removal of mixture from site was not done. No cases or controls reported receiving communication about the spill in the area.

Conclusions
This chemical spill caused illnesses associated with trespassing on ICD exit road which likely led to exposure to 2-chloro, 5-chloromethyl pyridine. Inappropriate chemical spill management and poor risk communication likely exacerbated illnesses. To prevent future illnesses, ICD repaired walls to prevent access to ICD exit road. We also recommended proper implementation of chemical neutralization and risk communication protocols.
Outbreak of Vancomycin resistant enterococci in a Neonatal Intensive Care Unit – Canberra, Australia, January to May 2017

Wednesday, 7th November @ 15:30: Oral Presentations: Outbreak Investigations 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Patiyan Andersson, Dr. Ming Chen, Mrs. Wendy Beckingham, Dr. Karina Kennedy, Dr. Kathryn Daveson, Dr. Katrina Roper, Dr. Nicholas Coatsworth

Background
Nosocomial infections with vancomycin resistant enterococci (VRE) cause of significant morbidity and mortality worldwide. Colonisation usually precedes infections and therefore it is crucial to minimise the burden of colonisation in highly vulnerable patient populations. This study investigates the first occurrence of VRE colonisation in the neonatal intensive care unit (NICU), a restricted clinical environment, at the Canberra Hospital. The aim was to determine risk factors for colonisation and whether the VRE originated from within the hospital.

Methods
Demographic and clinical variables for a cohort of 14 colonised infants and 77 non-colonised infants, representing all admitted patients at the NICU and SCN over the outbreak period January to May 2017, were analysed using multivariate logistic regression to assess possible transmission pathways for VRE colonisation. Whole genome sequencing of the VRE isolates was used to determine the origin of the outbreak strain.

Results
Transmission ceased following implementation of enhanced infection control measures. Absence of routine VRE screening in the NICU caused a delay in the detection of cases. Multivariate logistic regression revealed a strong association between gestational age and colonisation (aOR 3.97, 95% CI 1.94-7.00). Whole genome sequencing showed the isolates to be highly clonal non-typeable Enterococcus faecium (NTEfm) vanA and closely related to other NTEfm previously sequenced from the hospital. No environmental samples were positive for VRE. There were staffing shortages and a high proportion of non-regular staff in the NICU during the period preceding the outbreak.

Conclusions
The colonisation of NICU patients was with a highly successful clone endemic to the Canberra Hospital likely introduced into the NICU environment from other wards, possibly through staff working across multiple wards. Subsequent cross contamination spread it among susceptible premature neonates. Implementation of ongoing routine surveillance screening in the NICU could lead to earlier identification of colonisation, and subsequent interventions.
The Spatial-temporal Dynamics of Human Cases of Avian Influenza A (H7N9) in Mainland China from 2013 to 2017

Wednesday, 7th November @ 15:30: Oral Presentations: Respiratory Diseases 1 (Multifunction Hall, 14th Floor) - Oral

Ms. Ruoxi Sun, Dr. Lei Zhou, Mr. Chao Li, Dr. Jian Zhao, Dr. Ruiqi Ren, Prof. Huilai Ma, Dr. Qun Li, Dr. Daxin Ni

Background
The fifth-wave epidemic of avian influenza A (H7N9) in mainland China emerged in the second half of 2016. The spread of H7N9 epidemic showed significant spatial-temporal autocorrelation. The aims of this study were to analyze the changing spatial and temporal patterns and changing dynamics in five epidemic waves of avian influenza A (H7N9) in mainland China between 2013 and 2017.

Methods
We conducted a spatial-temporal analysis to evaluate disease clustering of human infections of H7N9 viruses in China. H7N9 confirmed cases were collected from the National Notifiable Infectious Diseases Surveillance System by Chinese Center for Disease Control and Prevention (China CDC) through March 2013 and December 2017. We examined the most likely spatial disease clusters and estimated the relative risk (RR) using the space-time scan analysis.

Results
In general, the epidemic time frame fluctuation of H7N9 waves was between December and the following May, except the first wave which was between March and April in 2013 and the fifth wave which had an earlier start in November of 2016. The spatial distribution of high risk areas (p<0.01) of five epidemic waves were mainly concentrated in eastern, central, and southern regions, but these high risk areas were expanding particularly in the fifth wave which showed the most widespread high risk areas in eastern, central, southern, southwest and northwest regions in mainland China, involving 257 counties in 15 provinces (RR=1.89, LLR=35.09, p<0.01). The most likely clustering areas of each epidemic wave were moving from south to north areas of mainland China.

Conclusions
The spatial spreading of human avian influenza A (H7N9) virus infections varied across five epidemic waves in China from 2013 to 2017. The pattern of spatial-temporal dynamics of H7N9 epidemic indicated some potential factors associated with transmission and spreading of virus and highlighted the importance of surveillance and rapid response of avian outbreaks.
Water dispenser as possible source of infection in nosocomial Legionnaires’ disease cases in Hong Kong

Wednesday, 7th November @ 15:48: Oral Presentations: Infectious Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Ambrose Wong, Dr. Yiu Hong Leung, Dr. Carol Yau, Dr. Yonnie Lam, Dr. Shuk Kwan Chuang

Background

The use of water dispensers equipped with different types of water treatment devices has gained popularity in Hong Kong including health care facilities where high risk population is staying. We reported 4 nosocomial LD cases with *Legionella pneumophila* (*Lp*) isolated in water samples from water dispensers with an ultraviolet (UV) sterilizer and a filter.

Methods

LD is a notifiable infectious disease in Hong Kong. For suspected nosocomial cases, in addition to epidemiological investigation, we conduct field investigation and take water samples as indicated for testing of *Lp* to identify possible source of infection. *Legionella* sequence-based typing (SBT) of *Lp* isolates from human and water samples are performed for matching as required.

Results

Among 4 nosocomial LD cases (two males and two females), three of them were immunocompromised. The median age was 63.5 years (range 49-90 years). Isolates of two patients belonged to sequence type (ST) 1 (common in local setting) and that of one patient belonged to ST 583 (rare in local setting). All cases had history of consumption of un-boiled potable water from water dispenser for drinking or face washing in hospital. Water samples taken from four water dispensers were cultured positive for *Lp* ranging from 0.1 to 17.2 cfu/ml. Among the 3 cases with SBT performed for both respiratory specimens and water samples, water samples were found identical to the corresponding patients, with 2 belonged to ST 1 and 1 belonged to ST 583.

Conclusions

We described potable water from water dispenser with an UV sterilizer and a filter as possible source of nosocomial *Lp* infection. We advised immunocompromised patients, particularly those who are at high risk of aspiration, to avoid drinking water from these water dispensers or to use it for face washing without boiling. Moreover, hospitals should avoid using water dispensers to serve immunocompromised patients.
Strengthening diagnostic algorithms in support of Yaws elimination – East New Britain Province, Papua New Guinea, September–October 2016

Wednesday, 7th November @ 15:48: Oral Presentations: Miscellaneous Studies 1 (Multifunction Hall, 14th Floor) - Oral

Ms. Clare Pidik Tedor, Dr. Mathias Bauri, Ms. Julie Collins

Background
Yaws is a neglected tropical disease affecting skin, bone and cartilage. It is mainly transmitted from person-to-person through direct contact with skin lesions. East New Britain is one of the few provinces in Papua New Guinea where yaws remains endemic. The province has a prevalence rate of 75%, however the majority of cases are diagnosed clinically. A study was conducted to examine diagnostic practices and improve laboratory testing for yaws in Butuwin Urban Clinic in 2016.

Methods
A descriptive analysis of yaws diagnoses at Butuwin Urban Clinic from 2011 to 2015 was conducted. A yaws diagnosis algorithm was developed and placed at the adult and children outpatient departments as a referral pathway for laboratory testing using the Venereal Disease Research Laboratory (VDRL) test.

Results
From 2011 to 2015, 95% of yaws cases at Butuwin Urban Clinic were diagnosed clinically. Of the 5% (100/1,830) that were referred for laboratory testing, only 36% (36/100) were positive for yaws using VDRL. After the intervention to improve referral pathways was implemented in September–October 2016, the proportion of suspected yaws cases referred for laboratory testing increased to 80% (41/51). Twenty-percent were not able to be referred for laboratory testing due to stock shortages. Of the 41 cases that were tested using VDRL, 29 (71%) were positive for yaws.

Conclusions
Laboratory-confirmed yaws diagnoses enable appropriate management and treatment of patients and provide a more accurate understanding of the prevalence of this neglected tropical disease in East New Britain. The implementation of laboratory testing referral pathways for yaws dramatically increased the proportion of cases referred for VDRL testing in Butuwin Urban Clinic. Continued supply of testing kits is critical to ensure ongoing laboratory testing for yaws in East New Britain.
Nosocomial outbreak of hepatitis C virus by invasive procedures at a single primary outpatient clinic

Wednesday, 7th November @ 15:48: Oral Presentations: Outbreak Investigations 1 (Convention Hall B, 2nd Floor) - Oral

Ms. Insil Huh, Dr. Jungmee Kim, Ms. Seonju Yi, Ms. Seran Park, Dr. Hyungmin Lee, Ms. Siwon Choi, Ms. Minhee Sung, Prof. Jong-koo Lee, Prof. Ji Hwan Bang, Prof. Myoung-don Oh, Prof. Eung Soo Hwang, Prof. Sung-il Cho

Background
In February 2016, Korea Center for Disease Control and Prevention (KCDC) received a report of a patient diagnosed with hepatitis C virus (HCV) infection after receiving treatments at an outpatient clinic. Significantly higher HCV infection rates were found among patients who visited the clinic between June 2011 and December 2012. Thus, an investigation was conducted to identify the unexplained routes of HCV transmission.

Methods
We conducted a case-control study of outpatient clinic patients between 2011 and 2012 with serologic laboratory test results, surveys of patients and medical staff, and electronic medical records. A case was defined as an HCV infected patient (1) who received therapeutic treatment at the clinic; (2) participated in the epidemiological investigation survey. Potential nosocomial risk factors were a variety of practices at the orthopedics clinic including nerve block/trigger-point injection, platelet-rich plasma (PRP), prolotherapy, hyaluronic acid injection, regenerative injection, intramuscular, and intravenous injection.

Results
Of 14,516 patients, 7,573 patients (52.2%) had met the case definition and were tested for HCV infection. Serologic survey resulted in 258 HCV-infected patients (3.4%), in which 125 (1.7%) were newly diagnosed. Significantly higher HCV-infection rates were found among individuals treated with PRP (aOR 2.8, CI95 2.02-3.83), prolotherapy (aOR 2.3, CI95 1.54-3.45), or hyaluronic acid injection (aOR 2.3, CI95 1.46-3.56). A similar association was found among those given regenerative injections which consisted of PRP, prolotherapy, hyaluronic acid injection (aOR 2.5, CI95 1.86-3.34). Medical practices of nurse assistants giving PRP (aOR 2.7, CI95 1.48-4.48), hyaluronic acid injection (aOR 2.5, CI95 1.09-5.93) and regenerative injection (aOR 2.1, CI95 1.29-5.93) were significantly associated with HCV infection.

Conclusions
HCV was transmitted through regenerative injection treatments resulting in a large nosocomial outbreak. Further emphasis on infection control when giving regenerative injections is necessary to prevent further outbreaks.
Quantifying influenza severity - Australia, 2012-2017

Background
Australian influenza surveillance traditionally uses historical ranges and expert opinion to determine the influenza seasonal period and its severity. The World Health Organization has recently published the Pandemic Influenza Severity Assessment (PISA) for in-country implementation to standardise and enhance global capacity to monitor severe and pandemic influenza. As globalisation increases the interface between communities of animals and humans, the threat of emerging influenza strains and transmission between populations makes detecting severe influenza increasingly important.

Methods
National data from sentinel GP surveillance, hospital surveillance, a public health hotline and an influenza-like illness survey system were used to define influenza severity indicators (transmission, impact and seriousness) defined using PISA guidelines. Thresholds for indicator parameters were set using 2012-2016 data and then applied to 2017 seasonal data.

Results
Multiple sources of reliable Australian data measured and produced thresholds for each severity indicator, including confirmed influenza data to validate measurements. When thresholds were applied to the 2017 season, there was good agreement between all data sources in measuring each indicator's activity. The season was characterised as having high transmission and extraordinary impact. Seriousness was characterised as moderate in all groups except those aged ≥65 years where it was high.

Conclusions
Evidence-based, internationally comparable, timely measurement of national influenza severity is now possible in Australia. This measurement can inform the scale, focus and timing of activities in response to seasonal and pandemic influenza and maximise the impact of activities. This application of PISA demonstrates the tool's implementation and exemplifies the possible flexibility of data sources, measurements and threshold calculations. By sharing an in-country experience we hope to enhance understanding of PISA and encourage other nations to incorporate this into routine surveillance, thereby increasing the strength of an international assessment and enabling swift action in the event of an influenza pandemic.
Prevalence of Subclinical Leprosy and Associated Factors among Children who Live with Leprosy Cases in Bangkalan District, Indonesia, 2017

Wednesday, 7th November @ 16:06: Oral Presentations: Infectious Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Ms. Dian Muspitaloka Hikmayati, Dr. Atik Choirul Hidajah, Prof. Chatarina Umbul Wahyuni, Dr. Windhu Purnomo, Dr. Rachmat Hargono, Dr. Cita Rosita Sigit Prakoeswa

Background
Subclinical leprosy is a condition found among healthy individuals living in endemic leprosy areas, has no clinical signs, but with high levels of *Mycobacterium leprae* in the blood. Leprosy at this stage has the potential to become clinical leprosy and a source of transmission. The prevalence of child leprosy has been used as an indicator of transmission in the community. Therefore, we conducted a study to describe subclinical leprosy in children and risk factors for transmission.

Methods
This research was an analytical observational study with a cross sectional design. Subjects were 126 children aged 1-14 years in households of 46 leprosy patients randomly selected in Bangkalan District. Diagnosis of subclinical leprosy was determined based on physical examination and serological examination of anti phenolic glycolipid-1 (PGL-1) in the blood (positive if ≥ 245 u/ml). Data was also obtained using interviews, questionnaires and observation of the physical environment in homes.

Results
There were 10 children (7.9%) who were positive for subclinical leprosy. The proportion of subclinical leprosy cases was higher among females (9.8%), children with no history of Bacillus Calmette-Guerin (BCG) vaccine (8.8%), contact with Paucibacillary (PB) leprosy patients (40%), children living in homes with inadequate humidity (17.6%). The multivariable analysis showed that age was associated with subclinical leprosy in children.

Conclusions
The presence of subclinical leprosy in children indicates the occurrence of transmission to household contacts. Therefore, it is necessary to improve the patient's household contact tracking up to the contact data system to facilitate the early diagnosis of new leprosy cases and monitoring of the household contacts, and also provide education related to environmental sanitation of houses and residential houses at the leprosy spread point.
Factors associated with pasung (physical restraint and confinement) of schizophrenia patients in Bogor Regency, West Java province, Indonesia, 2017

Ms. Nenden H. Laila, Mrs. Rentti Mahkota, Dr. Tri Krianto, Dr. Siddharudha Shivalli

Background
Schizophrenia is a chronic mental disorder affecting >21 million persons worldwide. In Indonesia, 14.3% of households have a patient with mental disorder and a majority of these are in rural areas. In West Java province, prevalence of severe mental disorder is 1.6 per million. Prevalence of pasung (physical restraint and confinement) of schizophrenia patients in Bogor Regency (2012-16) was 5.6%. This study aimed to determine factors associated with pasung of schizophrenia patients in Bogor Regency, West Java province, Indonesia in 2017.

Methods
A mixed-method (quantitative and qualitative) study was conducted in Bogor Regency from May-June 2017. A case-control study where a case was defined as schizophrenia patient in pasung and control was a schizophrenia patient without pasung. Multi-stage sampling was used to select cases and controls from Health Service register of Bogor Regency (2012-16). A semi-structured questionnaire was used to collect the data. Chi-square and multivariate logistic regression were used for data analysis. Qualitative study included 12 key stakeholders. Data triangulation was performed by interviewing residents and mental health workers. Content analysis was conducted and themes were identified based on valid inference.

Results
A total of 114 cases and 136 controls were studied. Patient's aggressive behaviour (AdjOR:4.49, 95%CI:2.52-8), unemployment (AdjOR:2.74, 95%CI:1.09-6.9) or informal employment (AdjOR:2.5, 95%CI:1.1-5.84) in the family and negative attitude of the family towards the patient (AdjOR:2.52, 95%CI:1.43-4.43) were associated with pasung. Family members and society in general perceived that pasung is necessary for security reasons due to the patient's aggressive behavior such as physical violence to neighbors, stealing food, etc.

Conclusions
Involving family members during routine care of schizophrenia patients and developing a positive attitude among them is needed. Treating schizophrenia patient with aggressive behaviour at a mental health facility should be encouraged. Creating employment opportunities and a social support system for treated patients and family members may avert pasung.
Outbreak Investigation of Acute Gastroenteritis, Pali district, Rajasthan, India, April 2018

Wednesday, 7th November @ 16:06: Oral Presentations: Outbreak Investigations 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Ankit Mathur, Dr. Surendra Singh Shekhawat, Dr. Vikas Marwal, Dr. Satyanarayan Dholpuria, Dr. Deepa Meena

Background
In India, diarrheal diseases and food-poisonings account for 40% of outbreaks but these often lack in-depth epidemiological investigation. On 20 April 2018, Nadol health centre, Pali district, Rajasthan reported an acute gastroenteritis outbreak among 3000 wedding attendees. We investigated to identify food vehicles and possible mechanisms of contamination.

Methods
We defined a case as vomiting or ≥3 loose stools within 24 hours among wedding attendees in Nadol, Pali on April 20-21, 2018. We searched for cases from the Nadol health centre register. We performed 1:1 unmatched case-control study and enrolled hospitalized cases. Well family members who attended the wedding and had the nearest birthdate as a case were enrolled as controls. We used multivariable logistic regression analysis to calculate adjusted odds ratios (aOR) with 95% confidence intervals (CI).

Results
Among 193 cases identified, we interviewed 89 (46%). Median age was 32 years (range: 1-70) and 42 (47%) were female. Of 89 cases, 40 (45%) were hospitalized and there were no deaths. The attack rate among wedding attendees was 6% (193/3000). Symptoms included vomiting (48, 54%), ≥3 loose stools within 24 hours (40, 45%), abdominal pain (46, 52%), nausea (43, 48%), and no fever. Median time from eating dinner to illness onset was 4 hours (range: 3-6). All recovered within 24 hours. Of 10 food items, only rasmalai, a milk-based dessert with 100% exposure among cases, was associated with illness (aOR= 67, 95% CI: 9.37-∞). Rasmalai was prepared with boiled milk but milkfat was rolled by bare hands.

Conclusions
This was an acute gastroenteritis outbreak associated with consumption of milk-based dessert at a wedding. Clinical presentation and incubation periods suggest Staphylococcus aureus toxin as the most likely etiology. This investigation highlights the potential of epidemiological investigations to determine food vehicles and identify possible etiological agents.
Estimates of influenza-associated excess hospitalizations for pneumonia and influenza in Taiwan, 2009–2017

Wednesday, 7th November @ 16:06: Oral Presentations: Respiratory Diseases 1 (Multifunction Hall, 14th Floor) - Oral

Mrs. Yi-Chen Tsai, Dr. Min-Hau Lin, Dr. Chia Wei, Mr. Hung-Wei Kuo

Background
Influenza virus infection could cause severe illnesses which lead to a substantial burden. In order to identify the health impact of the influenza virus circulation in Taiwan, the objective of this study was to estimate the influenza-associated excess hospitalizations for pneumonia and influenza (P&I) from 2009–2017.

Methods
We obtained the weekly number of P&I hospitalizations through nationwide medical visits data from the National Health Insurance Database, and the viral surveillance data from the national influenza surveillance network of the Taiwan Centers for Disease Control. A negative binomial regression model was fitted to the weekly number of P&I hospitalizations by using the proportions of influenza virus-positive specimens as a surrogate of influenza activity. Time series trend, temperature, relative humidity, and respiratory syncytial virus circulation were also included in the model.

Results
During 2009–2017, a total of 18,741 (19.4%) respiratory specimens tested positive for influenza virus. The weekly number of P&I hospitalizations was significantly correlated with influenza activity (Pearson correlation coefficient: 0.50, p<0.01). The negative binomial regression model showed that influenza activity had a significant contribution to the weekly number of P&I hospitalizations. According to the standardized coefficients of the model, influenza A(H3N2) virus had a greater effect on the weekly number of P&I hospitalizations than influenza A(H1N1) and B viruses. In addition, our preliminary estimates showed 17.4% of the total number of P&I hospitalizations could be attributable to influenza. The annual mean excess number of influenza-associated hospitalizations for P&I was 20,302, ranging from 6,447 to 31,432.

Conclusions
Our study addressed the health impact of influenza and quantified the excess number of P&I hospitalizations attributed to influenza in Taiwan. The methodological framework we built in this study would have further application for evaluating prevention and control strategies to reduce the impact of influenza.
Meningococcal meningitis: Public Health Response to a Single Case in Tien Phong village, Ba Vi District, Hanoi, Vietnam, April 2018

Ms. Nguyen Thi Bich Hue

Background

*Neisseria meningitidis* (meningococcus) a severe but vaccine-preventable cause of meningitis with a case fatality rate of 10-15 percent. In April 2018, a 15-year-old female presented to the National Hospital for Tropical Diseases (NHTD) in Hanoi, Vietnam with signs and symptoms of meningitis, which was ultimately determined to be caused by meningococcus. We formed a multi-sectoral team of hospital and preventive medicine staff, we conducted a field investigation, and we implemented a public health response to prevent additional cases.

Methods

Tien Phong, Ba Vi is a village approximately 35 kilometers from Hanoi center and it has a population of 8,538 with 2,406 households. Cases of suspected bacterial meningitis were defined as residents of Ba Vi district with high fever, drowsiness, headache, joint pain, urinary incontinence and diffuse skin rashes the past 2 days. Laboratory-confirmed cases had meningococcus identified from cerebrospinal fluid by culture or PCR. We searched for additional cases by reviewing local hospital records. Through interviews with family members, roommates, and co-workers, we identified 14 close-contacts and interviewed them using a pre-designed questionnaire.

Results

*N. meningitidis* was identified in the cerebrospinal fluid of the index patient by PCR. She had not been vaccinated against meningococcal disease. After 18 days in the hospital, she was discharged and went home. Her 14 close-contacts included roommates (N=12), work colleagues (N=2); and healthcare workers (N=8). All received antibiotic prophylaxis with Ciprofloxacin; none of her contacts developed symptoms and no other cases were identified in the community. We disinfected her rental-residence and workplace with Cloramin B 0.5% and provided risk communication.

Conclusions

The collaboration between hospital and preventive medicine staff was critical in responding effectively to this individual case which had epidemic potential. Response to cases such as these provide an effective means for multiple sectors to collaborate and prepare for even larger scale responses.
Leisure-time Exercise, Sedentary Behavior and Sleeping Time and Their Relationships with Hypertension and Diabetes among Adult Residents in Shandong province, 2013

Background
We conducted a survey to examine current status of leisure-time exercise, sedentary and sleeping time and their associations with the prevalence of hypertension and diabetes among adult residents in Shandong province to provide evidences for developing relevant intervention measures.

Methods
We collected data through a questionnaire survey, physical examination and laboratory detection among 11,214 residents aged 18-years or older selected by multi-stage stratified cluster random sampling at 19 sites of National Chronic Disease and Risk Factor Surveillance in Shandong province in September 2013.

Results
Among the participants, 19.8% reported having leisure-time exercise, and the reported average sedentary and sleeping times were 4.6 ± 2.4 and 7.6 ± 1.3 hours/day. The prevalence rates of hypertension and diabetes were 29% and 9.6% among the participants having leisure-time exercise and the rate was 30% and 9% among the participants not having leisure-time exercise, respectively (p > 0.05). Among the participants reporting sedentary times of < 2, 2—2.9, 3—3.9, and ≥ 4 hours per day, the prevalence rates of hypertension were 32.3%, 32.6%, 31.9%, and 28.7%, and the prevalence rates of diabetes were 8.5%, 8.3%, 9.1%, and 9.4%, respectively (χ² = 15.528, p = 0.001), but not in the prevalence rate of diabetes (p > 0.05) between the participants with different sedentary times. For the participants reporting sleeping times of < 7, 7—8, and > 8 hours per day, the prevalence rates of hypertension were 38%, 28%, and 31% and the prevalence rates of diabetes were 11.3%, 8.4%, and 9.8%, respectively (p < 0.001 for all).

Conclusions
Among adult residents in Shandong province, the prevalence rate of leisure-time exercise is low, sedentary time is long, and sleeping time needs to be improved; the sedentary and sleeping times are correlated with prevalence of hypertension and the sleeping time is correlated with the prevalence of diabetes.
Herpes Simplex Type-1 Outbreak in a Rural Primary School, Melaka, 2017

Wednesday, 7th November @ 16:24: Oral Presentations: Outbreak Investigations 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Nur Aishah Buang, Dr. Noorhaida Ujang, Dr. Zulraini Jusof, Dr. Muhammad Hafiz Yusof, Dr. Rusdi Abdul Rahman, Dr. Nurmawati Ahmad, Dr. Amirullah Mohd Arshad

Background
On 14 August 2017, the Alor Gajah District Health Office was notified by the Pantai Kundor Primary School (PKPS) of 26 schoolchildren who had painful mouth sores. We investigated to ascertain the magnitude of the outbreak, find the source and implement control measures.

Methods
We did case finding with a case definition of anybody in PKPS who presented with lip sore and any of the following symptoms: lip edema, buccal mucosal petichae or sore throat from 5 July to 23 September 2017. Cases were described by time, place and person. Clinical human samples were sent to the National Public Health Laboratory for Polymerase Chain Reaction (PCR) test for HSV DNA. A 1:1 case-control study was conducted to identify risk factors. Controls were asymptomatic students in PKPS.

Results
Forty-three cases were identified out of 588 students with a crude attack rate of 7.3%. The causative pathogen was Herpes Simplex Virus Type-1 (HSV-1). Median age of cases was 8.5 years (± 1.4 IQR). Male to female ratio was 1.8:1, (OR=2.17, 95% CI=0.85-5.53). The risk of infection was higher among those who shared food and drinking bottles (OR=5.63, 95% CI=2.07-15.3). All cases were given symptomatic treatment. The outbreak was declared over when no cases were detected after two incubation periods.

Conclusions
There was a HSV Type-1 outbreak at PKPS from 5-23 September 2017 involving 43 cases. The virus was possibly transmitted through fomites while sharing food and drinking bottles. Health promotion and education on personal hygiene including eating behavior was carried out and the outbreak was controlled.
Background
A teacher at secondary school “A” in Ulaanbaatar City in Mongolia was diagnosed with sputum smear positive TB and also some students of the same school were diagnosed with active TB in early 2017. Officers from NCCD and MFETP trainees were deployed to the field to investigate this outbreak and provide recommendations to contain the outbreak and prevent further illness.

Methods
Tuberculosis (TB) screening was conducted among school students, teachers and staff. Screening included tuberculin skin test (TST), chest x-ray and sputum smear test. Students and school staff of school “A” were considered as suspect cases. Those who had TST results more than 10 mm or abnormal chest x-ray results were considered probable cases. Probable cases had to be laboratory confirmed. We also looked at the TB surveillance database to match and find additional cases. We used Epi-Info 7.2.1.0 for statistical analyses.

Results
A total of 1,340 (82.8%) students and 107 (99%) staff were screened. We found 60 active TB cases (overall AR was 3.2%) and 16 of them were smear positive pulmonary cases that were reported at secondary school “A” from 2015 to mid-2017. 66.3% of students had a tuberculin skin test of whom 49.1% had a more than 10mm reaction (6-9 years age group 33.7%, 10-14 years age group 73.6%). Percentage of TST positive students increased as students’ ages increased. Attack rates (AR) were highest among 4th graders (AR=21%) and 10th graders (AR=19.4%). Active and latent TB cases were higher among classmates and students in school floors where smear positive cases studied.

Conclusions
We verified a TB outbreak at the school. The school was overcrowded due to combination of two schools; this could have facilitated TB transmission throughout the school. All outbreak cases received the standard 6-month TB treatment. Recommendations were given to school administration and TB surveillance department.
Japanese Encephalitis Outbreak in a Geographically Isolated Island, Calayan, Cagayan, Philippines, 2017

Wednesday, 7th November @ 16:42: Oral Presentations: Infectious Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Alethea De Guzman, Ms. Farah May Clamor, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On August 11, 2017, the Epidemiology Bureau received a report of a cluster of suspect bacterial meningitis cases and one death in Village Magsidel, Calayan, Cagayan. An FETP team was sent to confirm the existence of an outbreak, identify risk factors, and suggest measures for prevention and control.

Methods
A descriptive study was conducted. A suspect Acute Meningitis Encephalitis Syndrome (AMES) case was a previously well resident of Calayan, Cagayan with sudden onset of fever and headache with or without associated symptoms from July 10-August 19, 2017. A confirmed case was a suspect case positive for bacterial meningitis by PCR or Japanese encephalitis (JE) virus by ELISA. Specimen samples were collected for laboratory confirmation. Environmental and entomological surveys were conducted.

Results
Six suspect AMES cases were identified. Two deaths were reported (CFR = 33%). Previously, only one case a year was reported. Majority (5, 83%) were male. Ages of cases ranged from 6-11 years (median = 6). Aside from fever and headache, cases also presented with vomiting (50%) and nuchal rigidity (50%). Presence of swine, breeding sites, rice fields, and a stream surrounding the residence of cases were observed. The entomological survey showed that primary (Culex tritaeniorhynchus, 3%) and secondary (Culex vishnui, Culex fuscocephala, Culex gelidus, 46%) vectors of Japanese encephalitis were abundant. One (17%) case was positive for Japanese encephalitis.

Conclusions
There was an outbreak of Japanese encephalitis in Calayan. This may be due to the presence of an infected amplifying host (swine) that have been bitten by the primary and/or secondary vectors present in the municipality. The residences of cases were located near rice fields and streams of water which are a favorable breeding site for JE vectors. Possible vector breeding sites were destroyed and health education on Japanese encephalitis was conducted.
Partograph utilization and its associated factors among obstetrics care givers in public health institutions - Aurangabad, Maharashtra, India, 2017

Wednesday, 7th November @ 16:42: Oral Presentations: Miscellaneous Studies 1 (Multifunction Hall, 14th Floor) - Oral

Dr. Vijaykumar Wagh, Dr. Tarun Bhatnagar, Dr. Prabhdeep Kaur, Dr. Manoj Murhekar

Background
Globally, prolonged and obstructed labor contributes to ~10% of maternal deaths. WHO recommends universal use of partograph during labor to improve maternal and fetal outcome. Partograph is a graphic record of the progress of labour and relevant details of the mother and foetus. We conducted a study in Aurangabad District, Maharashtra, to estimate the proportion of obstetric care givers (OCGs) using partograph, identify factors influencing its use and assess their competence in using partograph as a decision making tool.

Methods
We conducted a cross sectional study among 237 OCGs working at the primary, secondary and tertiary level public health institutions in Aurangabad. Using a structured questionnaire, we interviewed them to collect their sociodemographic details, partograph use, knowledge and attitude about partograph use. We used case vignettes to assess their competence in using partograph as a decision making tool. We calculated odds ratios (OR) with 95% confidence intervals (CI) to determine the factors associated with partograph utilization.

Results
Among 237 OCGs interviewed, 112 (47.3%, 95% CI 41%-50.6%) utilized partograph. Only 54 (22.8%) were competent in using partograph for decision-making. Younger age (OR 2.9, 95% CI 1.7-4.9), working at secondary level facilities (OR=4.6, 95% CI 2.4-8.7), good knowledge (Adj. OR 7.1, 95% CI 3.5-14.3), favourable attitude (Adj. OR 2.9, 95% CI 1.5-5.4) and training (OR 6.4, 95% CI 1.4-28.9) were significantly associated with partograph utilization. OCGs who had difficulty in understanding English, lack of support from colleagues (OR 0.4, 95% CI 0.2-0.7) and lack of supervision (OR 0.3, 95% CI 0.2-0.5) were less likely to use the partograph.

Conclusions
Utilization and competence in using the partograph among the OCGs in public health facilities in Aurangabad was low. Routine use of the partograph could be encouraged through supportive supervision and monitoring. Skill based hands-on training could be given for building competence.
An Outbreak of Acute Gastroenteritis caused by Astrovirus, China, 2017

Wednesday, 7th November @ 16:42: Oral Presentations: Outbreak Investigations 1 (Convention Hall B, 2nd Floor) - Oral

Mrs. Luo Li, Mr. Yuan Li, Mr. Zhiyong Gao, Mr. Jinshui Zeng, Ms. Yiyao Lian, Mr. Wentao Song, Mr. Bin Lv, Mrs. Qi Chen, Mrs. Na Liu, Mrs. Miao Jin, Mr. Guoqing Shi, Mrs. Lu Ran

Background
In November of 2017, a school outbreak of acute gastroenteritis was reported from Shenzhen City. We investigated to identify the cause, exposure mode and recommend control measures.

Methods
A suspect case was defined as anyone in the school with vomiting or ≥3 loose stools/24 hours from October 23-November 17. A confirmed case was a suspect case with a stool or rectal swab positive for astrovirus by PCR test. We reviewed absenteeism records, and interviewed students and teachers to identify cases; collected stool or rectal swabs from ill students, food handlers and sanitation staff and tested them for common viral or bacterial pathogens. Five classes with the highest attack rates (AR) were included in a cohort study to identify the mode of transmission.

Results
98 student-cases (6 confirmed) were identified from October 23-November 14. The main symptoms included vomiting (69%), abdominal pain (59%), nausea (47%), diarrhea (43%) and cough (38%) with a median duration of illness of 2 days (range: 1-9 days). The AR was 3.2% (98/3053) and involved 63% (31/49) of the classes. Cases had a median age of 10 years (range 6-15 years). The multivariate analysis showed that touching an ill student (RR=3.95, 95% CI=2.18-5.58) and the handles of a faucet (RR=4.18, 95% CI=1.50-8.37) were associated with illness. The cleaning staff used the same cleaning cloth and gloves to clean the water faucet, toilets and sewage. Astrovirus was detected from six ill students and one asymptomatic cleaning staff.

Conclusions
This outbreak was caused by astrovirus and the main mode of transmission was likely person to person and touching a contaminated water faucet. Recommendations included immediate isolation of cases, proper handling of vomitus, with environmental disinfectants, and training in good hand washing for students and teachers. Moreover, the drinking water faucet should be disinfected daily.
Tuberculosis Outbreak in a School, Thailand, 2017-2018

Dr. BHURINUD SALAKIJ, Dr. Hataikarn Bunyaratavej, Mrs. Bunyarat Pongphantarak, Mrs. Nipa Pansanae, Ms. Duangporn Churassamee, Ms. Somsri Charoenpichitnan, Dr. Kritchavat Ploddi, Ms. Orathai Suwanchairoob, Dr. Wanna Hanshaoworakul

Background
Thailand is currently one of the countries with the highest TB burden. A cluster of tuberculosis cases in a male high school was reported in November 2017. We conducted an investigation to examine possible TB linkage and implement control measures.

Methods
We reviewed medical records and conducted active case finding. Close contacts referred to household members, classmates, or co-workers; others in the school were identified as school contacts. Chest x-rays were performed for all contacts. Suspected cases were defined as persons having either signs/symptoms or abnormal chest X-ray compatible with TB from June 2017 to June 2018. Probable cases were suspected cases with a physician's diagnosis of TB. Laboratory-confirmed cases were those found sputum positive by AFB smear, culture, or Xpert MTB/RIF assay. Genome sequencing and social network analysis were performed to explore the linkage among cases. An environmental study was also conducted.

Results
There were 3,190 persons including 3,043 students, 130 teachers, and 17 personnel in the school. Of those, the attack rates for suspected, probable and confirmed cases were 2.3%, 0.3%, and 0.2%, respectively. Besides pulmonary TB, we found 2 pleural TB cases. All 7 confirmed patients were students; one teacher was identified as a probable case. Majority of patients were in Grade 11; 35% of them studied in the same classroom (11A) where air conditioners were without proper ventilation. Four water samples from air conditioning cleaning were TB-culture negative. Three cases had identical genome sequencing; 2 of them were in Classroom 11A. This suggests that 11A could be a significant part of the linkage, relevant to the social network analysis.

Conclusions
A school tuberculosis outbreak was confirmed with the attack rate higher than that among the general population. Strict monitoring of the close contacts should be continued for 2 years, whereas environmental modification to improve ventilation should be adequately implemented.
Evaluation of the Revised National Tuberculosis Control Programme Surveillance system in Delhi, India, April 2016-March 2017

Dr. Rakesh Gupta, Dr. Sunil D Khaparde, Dr. Raghuram Rao, Dr. Samir V Sodha, Dr. Ekta Saroha, Dr. CS Aggarwal

Background
Tuberculosis (TB) is the leading cause of death worldwide from a single infectious agent. India accounts for 1/4 of the global burden. The Revised National Tuberculosis Control Programme (RNTCP) leads tuberculosis surveillance in India. We evaluated RNTCP surveillance in Delhi to determine strengths and weaknesses for evidence-based recommendations.

Methods
We evaluated one sub-district TB unit and its four peripheral health facilities in Delhi during April 2016-March 2017 for multiple attributes including data quality, timeliness, usefulness, flexibility, acceptability, representativeness, and positive predictive value (PPV).

Results
Regarding data quality, all new (170), old (62), and multi-drug resistant (2) cases were correctly classified. Among 114 treatment cards, 36 (32%) had incomplete data for comorbidities. All 16 quarterly reports from the four peripheral units were submitted on time, i.e. within one week of quarter’s end. From quarterly reports, the trends of notification rates and age and gender distribution could be calculated indicating usefulness of the system. Demonstrating flexibility, the system could be modified to online reporting and treatment cards and reporting formats modified to include information regarding diabetes, tobacco use, alcohol intake and treatment regimen. Regarding acceptability, 6/8 staff received training but reported data entry difficulties on web portal due to frequent automatic logouts. All four public and 5/77 (6%) private units submitted monthly reports. For PPV, out of 1,793 suspected cases, 234 (13%) were microscopically confirmed or clinically diagnosed tuberculosis cases.

Conclusions
For RNTCP surveillance in Delhi, data quality was good with regards to patient classification but needs improvement with regards to completeness of comorbidity data. Reports were timely and the system has flexibility. Private sector representativeness and PPV needs improvement. Based on our recommendations, corrections were made to the web portal which has led to improved efficiency of data entry, reduced backlog, increased acceptability, and improved completeness of the system.
Increasing Human Immunodeficiency Virus testing and treatment uptake among Tuberculosis/Human Immunodeficiency Virus Co-infected patients in Daru General Hospital - Papua New Guinea, 2017

Thursday, 8th November @ 10:30: Oral Presentations: HIV/AIDS and Tuberculosis 1 (Multifunction Hall, 14th Floor) - Oral

Mr. Moses Dina, Dr. Abel Yamba

Background
Tuberculosis (TB) is the most common presenting illness among people living with Human Immuno-deficiency Virus (PLHIV). HIV infection is the highest risk factor for developing TB disease from latent TB and mortality is high among co-infected patients. In PNG, an estimated 9.2% of the new cases of TB had HIV, of which one third received anti-retroviral treatment (ART). Daru is a TB hotspot in PNG with the highest rates of drug resistant TB (DRTB) and among the drug sensitive (DSTB) and DRTB cases, co-infection rates were 1.1% and 2.8% respectively.

Methods
Retrospective record reviews were done on HIV and TB case registries in Daru Hospital from 2014-2016. HIV testing coverage, prevalence rates and treatment uptakes, and co-infection rates were calculated. In 2017, TB and HIV officers were trained on proper documentation and screening, proper referrals between clinics, and communication between TB and HIV clinics were strengthened and monitored. Counselling was intensified for those receiving treatment for HIV or TB. Post intervention assessment was made to assess impact.

Results
From 2014-2016, HIV testing coverage among DSTB cases and DRTB cases were 47.8% and 88.8% respectively. Post intervention, HIV testing coverage increased to 87.5% among DSTB cases and 100% among DRTB cases. TB screening among HIV patients during the intervention period also increased from 79.7% to 100%. Co-infection treatment uptake improved to 100%.

Conclusions
The interventions increased the HIV testing coverage among both DSTB and DRTB cases, and improved treatment uptake among HIV/TB co-infected patients. This has potentially contributed to reducing mortality and morbidity among PLHIV and HIV/TB co-infected patients, and subsequent improvement in the quality of life. Simple and inexpensive methods of effective monitoring and communication employed here could be adopted elsewhere in resource-limited settings to improve TB and HIV programs.
Evaluation of the enhanced gastrointestinal surveillance system during the 2018 Commonwealth Games

Ms. Cushla Coffey, Ms. Deena Seesaengnom, Mr. Ian Hunter, Prof. Martyn Kirk, Dr. Satyamurthy Anuradha

Background
Syndromic surveillance for real-time disease monitoring during mass gathering events is rapidly evolving due to availability of data and new analytical tools. We established an enhanced surveillance system during the 2018 Commonwealth Games, including the introduction of the Emergency Department Syndromic Surveillance System (EDSSS) and an SMS electronic questionnaire. We examined the role of the EDSSS and questionnaire in identifying potential gastrointestinal (GI) outbreaks during the enhanced surveillance period, 20 March–18 April 2018.

Methods
Selected and validated ICD-10 diagnosis codes were used to classify the GI syndrome. A dashboard that provided real-time data on these GI presentations was monitored daily. The questionnaire requesting food and water exposure information prior to symptom onset was sent upon ED discharge. Alert thresholds were based on historical ED GI presentation data. EDSSS and questionnaire data were extracted and analysed using Epi Info™ software daily.

Results
338 people with GI were identified through EDSSS; daily presentations exceeded the statistical alert threshold on one occasion. There were 307 (90.8%) SMS messages sent and 88 (28.6%) electronic questionnaires completed. Ten signals based on common exposures identified through the questionnaires were validated through follow-up epidemiological and environmental investigation to determine if they were real signals; none were established as true outbreaks.

Conclusions
EDSSS and electronic questionnaire for GI surveillance was beneficial in monitoring outbreaks with little demand on staff time. Much of this work is ongoing post Games as direct legacy. A key recommendation for health agencies during mass gathering events is to have these enhanced surveillance systems to allow early identification of the presence or absence of outbreaks and appropriate public health action if required.
Improving maternal health by identifying barriers to supervised deliveries - Wain Constituency, Morobe Province, Papua New Guinea, 2017

Thursday, 8th November @ 10:30: Oral Presentations: Reproductive Health and Sexually Transmitted Diseases 1 (Conference Hall, 14th Floor) - Oral

Mr. John Landime, Ms. Julie Collins

Background
Maternal mortality is a major public health problem in Papua New Guinea (PNG) with national estimates at 733 deaths per 100,000 live births. In order to prevent maternal and infant complications and deaths during delivery, the World Health Organisation recommends that births are conducted at a health facility by staff who have had training in midwifery (supervised deliveries). However, in many parts of PNG the proportion of supervised deliveries remains low. The objective of this study was to identify barriers to supervised deliveries in Wain Constituency.

Methods
A list of all women who gave birth in 2016 in Wain Constituency was compiled using data from Boana Health Centre and information collected from village birth attendants. A case-control study was conducted among 100 randomly selected women who gave birth in 2016. Women were interviewed about their delivery experiences using a standardised questionnaire.

Results
There were 181 deliveries in Wain Constituency in 2016, however only 75 (41%) were supervised in a health facility. Women with higher levels of formal education were more likely to have a supervised delivery (OR 6.00 [0.82-68.17], p=0.057). Women who had a supervised delivery were more likely to discuss their pregnancy with their husband (OR 4.50 [1.37-15.06], p=0.007) and were more likely to have their husband's support for a supervised delivery (OR 20.34 [5.69-88.47], p<0.001). Concerns about being attended by a male health worker and distance to the health facility were both factors contributing to unsupervised deliveries. Interestingly, all women interviewed who had unsupervised deliveries actually attended antenatal care.

Conclusions
Whilst women in Wain Constituency attend antenatal care during pregnancy, many women do not have a supervised delivery. Strategies are being implemented at Boana Health Centre to improve antenatal clinics and to involve men in the discussion around the importance of supervised deliveries to reduce maternal mortality.
Evaluation of Acute Respiratory Infection Surveillance Systems in Karachi Division, 2017

Thursday, 8th November @ 10:48: Oral Presentations: Health Information Systems 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Dr Manzoor Memon

Background
Acute respiratory infection (ARI) is major cause of morbidity and mortality among children under 5 years in low-middle income countries. Pakistan reported 16% prevalence of ARI among children less than 5 years. For monitoring of disease two surveillance systems are in place namely Health Management Information System (HMIS) and Lady Health Workers’ Management Information System (LHWs-MIS). An evaluation of surveillance system was conducted with objectives to identify the strengths and weakness of ARI surveillance system.

Methods
Evaluation was conducted from June-July 2017 in six districts of Karachi division. Updated CDC Guidelines for Evaluating Public Health Surveillance Systems, 2001, was used for assessment of quantitative and qualitative system attributes. Reports desk, literature reviews were conducted. A list of stakeholders was identified and engaged. In-depth Interviews were conducted for collection of relevant information. Systems attributed were ranked as good, average and poor.

Results
HMIS had good simplicity, but inflexible to accommodate new information. Data quality was average because completeness of forms was 70%. Data from health care facilities (HCF) reached provincial level after 30 days. Representativeness was average as system was collecting data from primary and secondary public HCF. Sensitivity was 1%, predictive value positive (PVP) was not calculated due to absence of laboratory component. System had good stability as it is using resources of Department of Health. LHWs-MIS was simple, good in flexibility to add new disease. Data quality was good with form completeness over 90%, filled by LHW. Poorly representative as it covered only 20% of the Karachi division. Data were transmitted from lower to higher level after 30 days. Sensitivity was 18% and PVP could not be calculated. System had good stability.

Conclusions
Both systems were poor in timeliness and representativeness with absence of lab component. Deployment of LHWs in uncovered areas and involvement of tertiary health care facilities are highly recommended.
Analysis of Factors associated with Late Diagnosis of Newly Identified HIV/AIDS Cases in Jiangyin, 2007-2017

Thursday, 8th November @ 10:48: Oral Presentations: HIV/AIDS and Tuberculosis 1 (Multifunction Hall, 14th Floor) - Oral

Mrs. Xu Yin, Mrs. Qianqian Ma, Mr. Hongda Lu

Background
The late diagnosis (LD) of HIV/AIDS may result in poor treatment outcomes, while treatment costs and potential risk of transmission grow exponentially. We sought to explore the factors associated with late diagnosis of newly identified HIV/AIDS cases in Jiangyin, and provide a basis for further promoting early diagnosis of HIV.

Methods
Newly identified HIV/AIDS cases in Jiangyin City from 2007 to 2017 were selected from the National HIV/AIDS comprehensive information system. HIV-infected participants with CD4 counts less than 200 cells/μL were defined as having a late HIV diagnosis. Logistic regression was conducted to explore the factors associated with LD. Classification tree was applied to build a prediction model for LD.

Results
Among 628 cases, the LD rate was 29.78%. The LD rate in the past five years did not show a significant downward trend ($c^2_{\text{trend}} = 3.61$, $p = 0.46$). Those who were infected via homosexual transmission ($OR=2.87$, 95% CI=1.62-5.10), found from medical institutions ($OR=3.12$, 95% CI=2.03-4.81), have never been tested for HIV before ($OR=4.76$, 95% CI=1.41-16.11) were more likely to be diagnosed late. The classification tree model has 3 layers and 9 nodes. Three factors were selected: institutions where HIV/AIDS cases were found, route of infection, and age at diagnosis, of which the institutions that patients came from was the most important influencing factor for LD. The model has a Risk value of 0.269, the area under the ROC curve is 0.715 (95% CI = 0.671-0.759).

Conclusions
We should expand the coverage of HIV detection and pay more attention to MSM. Moreover, it is urgent to promote all medical institutions to carry out PITC (provider initiated HIV testing and counseling) in order to improve the early detection of HIV/AIDS.
Enhancing preparedness against imported infectious diseases for the 2020 Tokyo Olympic and Paralympic Games

Thursday, 8th November @ 10:48: Oral Presentations: Improving Preparedness and Surveillance of Diseases 1
(Convention Hall A, 2nd Floor) - Oral

**Dr. Chiaki Kawakami, Dr. Kazuhiko Kanou, Dr. Shingo Nishiki, Dr. Munehisa Fukusumi, Dr. Yuzo Arima, Mr. Matthew Griffith, Dr. Tamano Matsui, Dr. Tomimasa Sunagawa, Dr. Kazunori Oishi**

**Background**
Importations of infectious diseases threaten public health and increase costs associated with medical care. More than 20 million visitors are expected for the 2020 Tokyo Olympic and Paralympic Games, which raises the potential for an acute increase in such importations. Following a systematic prioritization process, we aimed to analyze surveillance data for infectious diseases with potential for importation to better prepare for this upcoming mass gathering.

**Methods**
Based on national disease surveillance data reported in 2015 (or for zika virus disease in 2016), we prioritized diseases based on the relative and absolute burden of importations. For the 34 notifiable acute-onset infectious diseases, we calculated the ratio of imported to domestic cases to indicate the proportionate burden of importation (median=0.05; interquartile range=0.0-0.45). We then described diseases with a value greater than the median and more than 10 notifications (indicating high frequency) by year, month, and country of suspected infection for 2013-2017.

**Results**
Fifteen diseases met the criteria (n=4,203 imported cases). Notifications of amebiasis, malaria, dengue fever, and shigellosis tended to increase during summer. Among cases with clear records of suspected location of infection, most cases of amebiasis, dengue fever, hepatitis A, hepatitis E, rubella, shigellosis, giardiasis, typhoid fever, measles, leptospirosis, paratyphoid fever, chikungunya fever, and cryptosporidiosis came from Asia (n=2,833/3,166; range=66-95%). Africa was dominant for malaria (n=185 [76%]) and Latin America for zika virus disease (n=9 [60%]).

**Conclusions**
A substantial number of acute-onset imported infectious diseases were notified in Japan. Since there are many reported infections in Asia during the summer, there may be an increase in these diseases during the Tokyo Games. Although characteristics may differ between Japanese outbound travelers and inbound foreign visitors, these findings—including seasonality and associated country/region—can support local public health preparedness and clinical diagnosis and are being widely disseminated to inform decision-making regarding the 2020 Tokyo Summer Games.
Background

Syphilis is a classic sexually transmitted disease (STD). Diagnosis of syphilis is complicated and needs to be based on clinical manifestation and laboratory test considering stage (primary, secondary, tertiary) and type (e.g. latent) of syphilis. In order to evaluate overall accuracy of diagnosis of acquired syphilis cases and relevant factors due to its low accordance rate conducted by China CDC in Hulunbir county in 2015, a survey was conducted.

Methods

30 hospitals (15 tertiary and 15 secondary or lower level) in 6 counties, with high numbers of syphilis cases were selected. 40 reported syphilis cases from each facility were randomly selected for clinical and laboratory data review. If the total number of cases was less than 40, all cases were included. Physicians responsible for syphilis reporting were interviewed.

Results

Totally 895 records were reviewed and 474 questionnaires were administered. Proportions for primary, secondary, tertiary and latent syphilis were 19%, 15%, 0.4% and 66%, respectively. Overall diagnostic accordance rate was 67%(559/895) and ranged from 72% in tertiary hospitals to 56% in other hospitals. Sentinel areas had higher accordance rate than non-sentinel ones; 72%(227/314) vs 64%(372/581), respectively. Accordance rates for primary, secondary, and latent syphilis were 45%, 51% and 76% respectively with 100% for tertiary cases. Diagnostic accordance rate of dermatological(75%) was significantly higher than that of non-dermatology (58%) ones. 78%(368/474) physician knew about syphilis diagnosis(cutoff/full mark:≥80/100 points), with 86% in tertiary and 58% in other hospitals. Multi-factor logistic regression showed that higher level hospitals, dermatology departments and STD disease sentinel areas have correlation with increasing syphilis reporting accuracy.

Conclusions

Diagnostic accordance rate for reported syphilis cases was low especially for physicians in secondary and lower level hospitals and in non-dermatology departments due to their insufficient knowledge about syphilis diagnosis. Training for these physicians needs to be strengthened to increase correct diagnosis for syphilis cases.
Evaluation of Completeness and Data Quality of Death Registration - Zaozhuang City, Shandong Province, China, 2016

Thursday, 8th November @ 11:06: Oral Presentations: Health Information Systems 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Yicheng Zhang, Prof. Peng Yin, Dr. Tao Shen

Background
Accurate death registration data could provide information on patterns and trends for leading diseases of public health concern. Zaozhuang City has established a death registration system since 2010. It is necessary to have a detailed understanding of problems in the mortality dataset, particularly with regard to completeness and accuracy. We carried out an evaluation to assess the completeness and quality of death registration data in Zaozhuang, China, 2016.

Methods
We retrieved and analyzed mortality data from the online death registration information system in Zaozhuang City. The population data was obtained from the Statistics Bureau. We used the analysis tool “Analysis of Causes of National Death for Action (ANACONDA)” developed by University of Melbourne, and compared with estimates for mortality rate of Global Burden of Disease (GBD) study 2015. The Vital Statistics Performance Index (VSPI) was generated to assess the performance of the death registration system.

Results
The mortality rate of under 5 year olds was 0.59%; for males- 0.63%, and females- 0.5%, this was lower than the GBD estimates (1.1%). 11.1% of the codes for cause of deaths were classified as unusable and insufficiently specified causes, among which two causes for men and three causes for women ranked in the top 20 causes of deaths. The overall completeness of death registration in 2016 was 76%, classified as usable but not the most reliable level (85%). The completeness of death reporting in VSPI Quality Components Score was 93%.

Conclusions
The completeness of registration for under 5 year-olds child deaths in Zaozhuang needs to be improved. More efforts should be made to reduce the unusable codes for causes. Trainings for medical doctors who fill in death certificates and public health professionals who make the coding for underlying cause of deaths need to be strengthened in Zaozhuang City.
Determinants of Stigma and Discrimination against People Living with HIV/AIDS among Health Workers in a Rural Area – Indonesia, 2017

Thursday, 8th November @ 11:06: Oral Presentations: HIV/AIDS and Tuberculosis 1 (Multifunction Hall, 14th Floor) - Oral

Ms. Gaby Gabriela Langi, Mr. Ignatius Praptoraharjo, Dr. Riris Andono Ahmad

Background
Stigma and discrimination against people living with HIV/AIDS (PLWHA) in health facilities are one of the key barriers to an effective response to the HIV/AIDS epidemic. Stigma and discrimination among health workers adversely affects the adherence of patients to antiretroviral treatment (ART), access to health services and quality of life of PLWHA. We identified factors associated with stigma and discrimination against PLWHA among health workers in a rural area in Indonesia.

Methods
We conducted a cross-sectional study in a public hospital and 13 public health centres in Gunungkidul District, Yogyakarta, from December 2016 until March 2017. We enrolled 234 health workers selected by stratified random sampling of all employed health workers. The data collection tool was a self-administered questionnaire. We used ordinal logistic regression to explore associations between variables.

Results
Of the 234 health workers, 191 (81.62%) had ever encountered PLWHA; 91.88% of the 191 expressed at least one form of stigma and discrimination. There was a significant relationship between knowledge of HIV/AIDS (aOR 0.71; 95% CI 0.58-0.87), fear of being infected with HIV (aOR 1.26; 95% CI 1.15-1.39), contact experience with PLWHA (aOR 0.55; 95% CI 0.31-0.97), and types of health workers (paramedical personnel aOR 3.27; 95% CI 1.25-8.53) with stigma and discrimination against PLWHA. Fear of being infected with HIV had the highest z value (z=4.80).

Conclusions
Fear of being infected with HIV was the most powerful factor associated with stigma and discrimination against PLWHA among health workers compared with low knowledge of HIV/AIDS, no contact experience with PLWHA, and being paramedical personnel. Health facilities should provide comprehensive HIV/AIDS-related training to health workers, ensure the availability of standard protective equipment, and supervise the use of standard protective equipment among health workers.
Establishment of Rash Surveillance for the Early Detection of Zika Virus Disease (ZVD), September 2016-January 2017

Thursday, 8th November @ 11:06: Oral Presentations: Improving Preparedness and Surveillance of Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Dr. Alethea De Guzman, Ms. Karen Lonogan, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
On September 14, 2016, the Philippines’ first confirmed ZVD case was reported by an Iloilo City hospital. Clustering of cases was noted in the case’s household with one confirmed case presenting only with rash for a few hours. Hence, we conducted rash surveillance to detect early local transmission of Zika Virus infection in the area.

Methods
We selected two hospitals in Iloilo City with the highest admissions and consultations. A suspect ZVD case was a resident of Iloilo City seen at the identified hospitals on September 2016-January 2017 with skin rashes and any of the following: fever, arthralgia, myalgia, and conjunctivitis. A confirmed case was a suspect case positive for Zika virus thru qRT-PCR test. Paired urine and serum specimens were collected.

Results
We identified 402 patients with rashes. Seventy-five (19%) were ZVD suspects. Forty (53%) were female. Ages ranged from seven months to 55 years (median:16 years). There were 80 specimens collected, 50 (62%) urine and 30 (38%) sera. Specimens were collected less than one to 18 days (median: 2) from rash onset. Eleven (22%) of 50 urine specimens were positive for Zika, two (4%) for dengue, and two (4%) for Chikungunya. Zika virus was isolated from urine specimens collected one to seven days (median=3) after rash onset. Of the 30 sera, three (10%) were dengue positive and three (10%) positive for Chikungunya. No serum was positive for Zika virus. No case was positive for multiple viruses. All had no travel history outside the country.

Conclusions
Our findings highlighted ongoing local transmission of Zika virus in Iloilo City. Co-circulation with dengue and Chikungunya viruses was noted. The findings of our study prompted nationwide rash surveillance for ZVD using the developed Integrated Chikungunya, Dengue, Zika, and Measles Surveillance Form. We recommended intensified vector-borne disease surveillance and prevention and control in the locality.
Survey on Awareness and Acceptance of Non-occupational Post-exposure Prophylaxis among Men who have Sex with Men in Beijing, China, 2018

Mrs. Lijuan Wang, Ms. Jing Zhao, Ms. Liang Song

Background
73% of the reported new HIV cases in 2017 in Beijing, China were men who have sex with men (MSM). Similar proportions were observed in the previous 5 years. However, there was an increase in case numbers. Non-occupational post-exposure prophylaxis (nPEP) is an effective medical intervention aiming to interrupt HIV infection after exposure to the virus and has been implemented in many countries after being recommended by WHO in 2014. In order to provide evidence for its initiation in China, we investigated the awareness and acceptance of nPEP among MSM.

Methods
MSM aged >18 years who were unaware of their HIV infection status or self-reported as HIV-negative were enrolled into the survey by convenience sampling from January 15 to April 15, 2018. Information on demographics, sexual behavior, and awareness and acceptance of nPEP were collected through face to face interviews and HIV antibody tests done.

Results
291 MSM aged 18-58 years (median=30) were interviewed and 22 were HIV positive (8%). Although 59% (171/291) of MSM had heard of nPEP, only 27% (47/171) of them understood nPEP correctly with a total awareness rate of 16% (47/291). The main sources of acquiring knowledge on nPEP were internet surfing (46%, 78/171), followed by consulting with friends (19%, 33/171). 86% (251/291) of the subjects were willing to accept nPEP after being informed of benefits and risks of nPEP. The main reasons to refuse nPEP were having a fixed partner (40%,16/40), maintaining safe sex (25%,10/40), and worrying about adverse effects (23%,9/40).

Conclusions
Acceptance of nPEP was high despite low awareness among MSM. Given the high HIV prevalence among MSM and demonstrated effectiveness of nPEP in other countries, nPEP should not only be integrated into routine HIV prevention and control in China but also advocacy for nPEP implementation through internet especially for MSM were strongly recommended.
Surveillance systems for the 9th TEPHINET Global Scientific Conference, a key public health element for mass gathering events, Chiang Mai Province, Thailand, August 2017

Thursday, 8th November @ 11:24: Oral Presentations: Health Information Systems 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Thanachol Wonghirundecha, Dr. Ba Soe Thet, Dr. Lei Chen, Ms. Khanuengnij Yueayai, Dr. Thanit Rattanathumsakul, Dr. Patcharin Tantiworrawit, Dr. Chuleeporn Jiraphongsa

Background

The 9th TEPHINET Global Scientific Conference was held in Chiang Mai during 6-11 August 2017. Delegates came from 80 countries. Since mass gatherings increase risk of infectious disease spread, we developed a surveillance system to detect and respond to important threats and outbreaks.

Methods

Middle east respiratory syndrome, Ebola virus disease (EVD), influenza-like illness (ILI), foodborne disease, cardiovascular disease, chronic lung disease and road traffic injury were selected as conditions under surveillance. An infrared camera was set up at the conference center entrance. Health alert cards with emergency and surveillance contact numbers were distributed while surveying for upper respiratory tract infection (URI) symptoms. Indicator based surveillance (IBS) was added to the daily job of the onsite first-aid service. An event based surveillance (EBS) unit was set up to monitor and verify reports from the first-aid unit, hotline and others. Rapid response teams were prepared. We collected and stored food specimens. A post-conference survey was conducted for delegates to report illnesses.

Results

Totally 1,070 delegates joined the conference. Twenty-seven fever scans triggered alarms but none had fever. Fourteen screened delegates (1.7%) had URI; none met the surveillance case definition. Thirty-one delegates visited the first-aid unit, nine met case definitions, including ILI, diarrheas, and non-infectious conditions. One patient was investigated to exclude EVD and later confirmed as influenza A/H3. We collected 141 food specimens and stored them until 27 August 2017. We observed that additional cautions were applied on routine practice. Forty delegates (9%) reported illnesses in the post-conference survey but they were not clustered. Majority of respondents found the health alert card useful.

Conclusions

The mass gathering surveillance allowed prompt detection and timely management of emergencies. We found no outbreak occurred in this conference. Surveillance capacity could be maximized, if the system was integrated into the first-aid service provided by a local medical team.
Factors associated with loss to follow up among children (<15 years) treated for Tuberculosis in Kimbe Provincial Hospital, Papua New Guinea, from January to December 2015

Background
West New Britain Province is one of the 22 provinces of Papua New Guinea (PNG). In 2015, the Kimbe Provincial Hospital registered 1,387 Tuberculosis (TB) patients in children <15 years; 50% of these cases failed to complete their TB treatment (loss to follow-up). The treatment regimen for children consists of 6-9 months of injectable and oral medications. The national target is that less than 2% of children in PNG are lost to follow-up. This study identified factors associated with loss to follow up in children <15 years old.

Methods
An unmatched case-control study was conducted amongst children under 15 years old who were diagnosed with tuberculosis and registered at Kimbe Provincial hospital TB clinic from January to December 2015. Cases were children less than 15 years diagnosed with TB in 2015 and lost to follow-up. Controls were children less than 15 years who had completed TB treatment. Loss to follow up was defined as missing TB treatment for >2 months. Simple random sampling was used to select cases and controls and analysis was conducted using Epi Info.

Results
A total of 53 cases and 106 controls were interviewed. The majority of the cases (64%) stopped taking medication after 2-4 months of being on treatment; 15% stopped within the first 2 months and 21% stopped after 4 months. Factors that were associated with a child being lost to follow-up included not feeling better (OR 8.26, 95% CI 3.5-19.8), moving residence (OR 10.6, 95%CI 2.2-51.2), believing TB was due to a supernatural power (OR13.4, 95%CI 1.6-114.5) and reporting family problems (OR 6.6, 95% CI 1.3-25.6).

Conclusions
Moving residence and believing that TB is caused by supernatural powers were important factors associated with loss to follow-up. These findings will guide interventions designed to reduce loss to follow-up and increase TB cure rates in children.
Surveillance for Middle East Respiratory Syndrome Coronavirus in South Korea, 2016/17

Thursday, 8th November @ 11:24: Oral Presentations: Improving Preparedness and Surveillance of Diseases 1  
(Convention Hall A, 2nd Floor) - Oral

Dr. Sukhyun Ryu, Dr. Jun Jai Kim, Mr. Chulhee Kim

Background
In the aftermath of Middle-East respiratory syndrome Coronavirus (MERS-CoV) outbreak in Korea, a surveillance program was implemented to rapidly identify importations of MERS-CoV infection. Here, we describe the results from the surveillance program in Gyeonggi province, Korea, in 2016 and 2017.

Methods
Travelers with respiratory illness returning from MERS affected countries within the preceding 14 days were asked to report to public health authorities by using text messages through mobile phones and flight announcements. Travelers suspected to have MERS-CoV infection were defined as persons presenting with lower respiratory tract symptoms and fever. Respiratory and blood samples with clinical information on suspected patients were collected. Qualitative Real-time Reverse Transcription-Polymerase Chain Reaction testing were conducted to identify MERS-CoV and other respiratory viruses. Contact tracing was performed and the delay between the onset of symptoms and notification of public health authorities, and the time of quarantine were recorded.

Results
The median age of the suspect patients was 43 years (range: 1-70); 56 were male. The suspect patients had a median of 11 contacts (range: 1-33). The median delay between the onset of symptoms and notification was 30 hours (range: 0-240). The median time interval between notification and quarantine of patients was 1 hour (range: 0-63), and between the onset of symptoms and quarantine was 35 hours (range: 2-240). All the specimens were confirmed as MERS-CoV negative. However, a viral etiology was detected in 66% of patients; Influenza A H3N2 (23%), hRSV (12%), Influenza B (11%), Influenza A H1N1 (10%), hMPV (7%), hCoV (5%), hAdV (3%), hPIV II (1%), hBoC (1%) were identified.

Conclusions
Continuous surveillance with rapid public health response and laboratory testing including other respiratory viruses are important to rule in or out MERS-CoV infection and make decisions accordingly.

Thursday, 8th November @ 11:24: Oral Presentations: Reproductive Health and Sexually Transmitted Diseases 1 (Conference Hall, 14th Floor) - Oral

Dr. Abdullah Husam A Shukor, Dr. Shaa’ri Ngadiman, Dr. Azmani Wahab, Dr. Ismail Ali

Background
HIV is a mandatory notifiable disease in Malaysia since 1985. The transmission route has shifted progressively from predominantly injecting drug use to more sexual transmission. The first HIV case in Sabah was reported in 1991 and notification rates have increased from year to year. A situational analysis was conducted to describe the burden of HIV.

Methods
Data from the National AIDS Registry in Sabah from 2011-2015 were reviewed. Descriptive analysis was done to describe the epidemiology of HIV.

Results
A total of 1,116 HIV cases were reported in Sabah from 2011-2015 with increasing notification rates from 5.4/100,000 population in 2011 to 6.3/100,000 population in 2015. Chinese had the highest ethnicity-specific rates from 9.7/100,000 in 2011 to 11/100,000 in 2015. The male-specific rate was higher than the female-specific rate and it increased from 6.7/100,000 in 2011 to 10/100,000 in 2015. Except for 2013, the age-specific rate for the 30-39 year age group was the highest in 2011 (11.3/100,000), 2012 (11.9/100,000), 2014 (14.1/100,000) and 2015 (12.3/100,000). Kota Kinabalu district, the capital city of Sabah, had the highest notification rate in 2012 (11.1/100,000), 2014 (18.3/100,000) and 2015 (19.9/100,000). The main mode of HIV transmission was sexual transmission (97.3% in 2011 to 99.6% in 2015). Homosexual/bisexual transmission increased from 0% in 2011 to 32.6% in 2015 and heterosexual transmission decreased from 97.3% in 2011 to 67% in 2015.

Conclusions
Sexual transmission is the major contributor to HIV transmission in Sabah with the rise of homosexual/bisexual transmission. This situation is an alarm to strengthen the program for prevention of HIV especially among high-risk populations.

Thursday, 8th November @ 11:42: Oral Presentations: Health Information Systems 1 (Convention Hall B, 2nd Floor) - Oral

Dr. Alethea De Guzman, Ms. Mariz Zheila Blanco, Dr. Maria Nemia Sucaldito, Dr. Vikki De los Reyes, Dr. Ferchito Avelino

Background
Under the International Health Regulations (IHR), Member States are required to develop an integrated approach towards strengthening their epidemiologic surveillance and response system. In the Philippines, an event-based surveillance and response (ESR) system was designed to complement the indicator-based disease surveillance in detecting events that may pose a risk to the communities. An assessment of detection, reporting, laboratory confirmation and public health communications of captured events was conducted to improve outbreak detection.

Methods
We did an across-method type of triangulation. We reviewed records of health events from 2017 in three subnational regions. We adopted Smolinski’s Outbreak Milestones to measure timeliness. We conducted face-to-face interviews with Surveillance Officers using a developed monitoring and evaluation tool. Unstructured interviews with surveillance unit heads and coordinators were also conducted.

Results
A total of 316 health events were reviewed. The median time from onset date of an index case to ESR capture was eight days. Vaccine preventable diseases had the longest interval from starting date to capture with a median of 9.5 days. Seventy nine percent of events had human specimen collection (median time from onset date to specimen collection was 16 days). The median time from the starting date of an event to reporting and response was 16 days. Reports were disseminated within 1 – 124 days (median = 13) from the starting date of an event through verbal and written communications.

Conclusions
The Smolinski’s outbreak milestones indicators may prove more substantial in monitoring health events. In the current way of ESR monitoring in the Philippines, there’s limited capacity to review timeliness of outbreak milestones as to detection, reporting, laboratory confirmation and communications.
Investigation of Low Tuberculosis Smear Positive Rates of Sputum in Hainan Prefecture, Qinghai, China, 2017

Dr. Binzhong Ma, Mrs. Junsheng Yang, Dr. Hui Zhang, Prof. Lijie Zhang, Dr. Mingxia Jiang

Background
Sputum smear examination is one of the main methods to detect infectious tuberculosis. The national tuberculosis guidelines require that each case produce 1 morning, 1 night and 1 instant (sputum produced at clinic when cases visit doctors) sputum specimens to be examined. The sputum should be mucus, purulent or blood-like. Saliva is not useful for diagnosis. The sputum smear positivity rate was 4.7% in Hainan prefecture, Qinghai in 2016; lower than an average of 10-15% in China. We conducted this survey to identify reasons for the low positivity rate.

Methods
We reviewed laboratory records in all five tuberculosis hospitals to collect information on sputum specimens taken from March to June 2017, including type, production time and numbers of sputum specimens. We randomly selected 10% of negative smear slides to reexamine according to national sputum smear examination criteria. In addition, we interviewed all the 17 tuberculosis laboratory technicians.

Results
There were 655 suspected tuberculosis cases with 1,603 sputum specimens. 20% (322/1603) of the specimens were saliva. 46% (300/655) of cases failed to provide three specimens as required. 54% (355/655) of cases produced instant sputum specimens and 84% (547/655) submitted night sputum specimens. The positivity rates of saliva, mucus, purulent and blood-like sputum were 1.9%, 2.4%, 17% and 22%, respectively. Among selected negative smear slides, 4.4% (7/159) were diagnosed as positive with 1 to 8 bacteria per 300 fields of microscope after reexamination. The seven misdiagnosed specimens were all saliva samples. The laboratory technicians survey revealed that 35% (6/17) of all technicians in 5 tuberculosis hospitals failed to complete 300 fields of microscope examination as required.

Conclusions
Not following the national guidelines for tuberculosis laboratory diagnosis resulted in the low tuberculosis sputum smear positivity rate. We recommend better laboratory oversight and education of laboratory staff to comply with the guidelines and enforcement of strict laboratory procedures.
Evaluation of Carbapenem-Resistant Enterobacteriaceae Surveillance System in Taiwan, 2014–2017

Thursday, 8th November @ 11:42: Oral Presentations: Improving Preparedness and Surveillance of Diseases 1 (Convention Hall A, 2nd Floor) - Oral

Ms. Kung-Ching Wang, Ms. Wan Chin

Background
Carbapenem-resistant Enterobacteriaceae (CRE) is highly transmissible in hospitals, especially CRE carrying Klebsiella pneumoniae carbapenemase (KPC) or New Delhi metallo-beta-lactamase (NDM) gene. During 2014–2017, mandatory reporting to Taiwan's Nosocomial Infection Surveillance System found the number of CRE infections stable, but the number voluntarily reported to the National Notifiable Disease Surveillance System (NNDSS) dropped. We evaluated the performance of NNDSS for CRE surveillance.

Methods
We analyzed data collected in NNDSS during 2014–2017, reviewed outbreaks reported in 2015, and interviewed hospital staff about CRE reporting by convenience sampling. Physicians voluntarily report CRE infections and send isolates to Taiwan Centers for Disease Control for resistance gene detection along with patient information. Hospital-acquired infection was defined as infection occurring >48 hours after admission. Cases were illnesses in patients infected by CRE carrying KPC/NDM gene. Once identified, medical staff should complete a case report form for each case. When ≥2 cases were identified from the same unit within one month public health authorities would convene outbreak investigation. Outbreak duration was defined as time elapsed from the first to the last isolate.

Results
Of the 3,731 CRE-infected patients reported, 2,470 (66%) were hospital-acquired; 762 (20%) isolates carried the KPC gene; 26 (0.7%) carried the NDM gene. Among the 7 outbreaks identified, the outbreaks lasted 128–487 days (median: 236) with 3–77 cases (median: 9) involved. Interviews of staff from 16 hospitals found that it took 45 minutes to complete the follow-up CRE questionnaires. Furthermore, physicians were unwilling to report CRE cases to NNDSS because many hospitals had their own CRE gene surveillance, they disliked public health intervention, and it took too long to complete CRE case report forms.

Conclusions
Voluntary CRE reporting identified hospital-acquired outbreaks which lasted months. To effectively intervene in hospital-acquired CRE outbreaks, TCDC should collaborate with hospitals to simplify the reporting process.
HIV exposure following a fatal motor vehicle accident - Central Highlands, Vietnam, 2017

Mr. Thang Hoang, Mr. Duoc Pham Tho, Ms. Ha Nguyen Thi Thu, Ms. Thao Phan Thi Thanh

Background
On 30 June 2017, a motor vehicle accident in Kon Tum province, Central Highland, Vietnam resulted in four deaths including one HIV-infected person. During the emergency response, 36 persons were exposed to blood from the HIV-infected person. To inform responses to future similar events, we aimed to describe characteristics of the exposed persons, their post-exposure responses, and their post-exposure HIV infection status.

Methods
We performed a retrospective cohort study of exposed persons. We used face-to-face interviews to collect socio-demographic information, exposure history, self-protection measures, health-seeking behaviors, psychological impact, and exposure response. We followed up the HIV testing results of the exposed persons to determine their HIV-infection status after 3-months of post-exposure prophylaxis (PEP) with Lamivudine (3TC), Tenofovir (TDF), and Efavirenz (EFV).

Results
The 36 exposed persons included one police officer, 24 health staff, and 11 community persons. Thirty (83%) reported having skin contact with the HIV-infected person; six (20%) of these had breaks in their skin. Twenty (83%) of 24 health staff as well as the one police officer wore gloves and masks during the response. Among 11 community members, none reported use of gloves or masks during the response. Five (21%) health staff and four (36%) community responders took full body baths with soap and water immediately after their exposures. Within 72 hours of exposure, all 36 exposed persons were tested for baseline HIV infection and received post-exposure prophylaxis. Most (35, 97%) exposed persons felt worried about their status and nine (25%) experienced stress. Three months after exposure, all 36 patients remained HIV-negative.

Conclusions
We identified a few lessons learnt from this public health event. First, the responses to similar events in the future should restrict the community involvement. Second, all health staff and emergency responders should be required to use appropriate personal protection equipment.
Pandemic Influenza Severity Assessment – Singapore’s Experience

Friday, 9th November @ 10:30: Oral Presentations: Late-breakers (Convention Hall A, 2nd Floor) - Oral

Ms. Rachael Pung, Dr. Peng Lim Ooi, Prof. Vernon Lee

Background
We report our experience in evaluating the severity of local influenza epidemics based on the World Health Organisation (WHO) pandemic influenza severity assessment framework.

Methods
We assessed the severity of influenza by monitoring indicators of: (a) transmissibility (average daily attendances for ARI at government primary care clinics, average daily attendances for ILI at government primary care clinics, and four-week moving proportion of ILI samples positive for influenza); (b) seriousness of disease (weekly proportion of ARI attendances at the ED that were hospitalised, weekly proportion of pneumonia attendances at the ED that were hospitalised); and (c) impact (weekly number of lab-confirmed influenza cases who were admitted to ICU or died). Weekly data from eight hospitals, 20 polyclinics, 30 sentinel GP clinics and our national public health laboratory were compared with the past surveillance data to determine the percentile rank of the current data. Subsequently, the severity of an indicator was evaluated using an assessment scale.

Results
Our assessment scale now provides the Ministry of Health, Singapore, with a summary measure of an indicator’s severity and a confidence level of the assessment. All the parameters of an indicator were assumed to be equally informative though some parameters may be influenced by the activity of other respiratory viruses. Although preliminary findings were promising, further work is needed to validate our assessment method under actual epidemic conditions.

Conclusions
Early assessment of severity in an influenza epidemic is needed for effective response. With each parameter portraying a different aspect of the local influenza situation, we can identify abnormal occurrences for investigation.
Outbreak management at a long term healthcare facility in Singapore, 2017

Mr. Muhammad Imran, Dr. Peng Lim Ooi, Dr. K Nandar, Ms. K Foo, Ms. C Low

Background
Healthcare-associated outbreaks in long term care facilities (LTCFs) can be both costly and disruptive to the institution and residents. With an increasing demand for long term care and an increasingly ageing population, effective surveillance and response are imperative in mitigating such impacts. We report herein our experience in investigating an influenza outbreak at a long term care facility (LTCF) in Singapore and the lessons learned.

Methods
In late April 2017, an unusual cluster of respiratory cases was reported to the Ministry of Health. We immediately conducted epidemiological investigations to identify the source of infection and mode of transmission. Working with partner agencies, we further carried out active case finding, stakeholder engagement, and proper risk communications. To break the chain of transmission, we adopted a multipronged infection control approach which included strict infection control measures, reinforced hand hygiene, stepped up environmental cleaning, vaccination exercises for both staff and residents, and cessation of non-essential activities.

Results
A total of 36 cases (27 residents, 9 staff) reported fever and/or respiratory symptoms between 26 April and 11 May 2017, giving an attack rate of 10.3%. Of the 11 residents who were hospitalised, two fatalities were attributed to pneumonia. Six of ten nasopharyngeal swabs obtained for respiratory multiplex PCR Film Essay test showed Influenza A (H3). The LTCF had also last conducted an influenza vaccination exercise in December 2015. This outbreak was both costly and disruptive to the LTCF.

Conclusions
This outbreak has highlighted important lessons in healthcare epidemiology for effectively managing an LTCF outbreak, viz. early detection through surveillance, timely vaccination, multipronged approach to infection control, and partnership with stakeholders.
Establishing Basic Public Health Laboratory Capacity in the Context of a Large-Scale Acute Refugee Crisis – Challenges and lessons learned

Dr. M Ximena Tolosa, Dr. T Shirin, Mr. F Yesurajan, Dr. TA Housen, Dr. A Stewart, Dr. L Sangal

Background
Over 650,000 Rohingya fled Myanmar in August 2017 following violent conflict and sought refuge in Cox's Bazar, Bangladesh. An under-immunised population living in over-crowded makeshift shelters are at high-risk of disease outbreaks. On 8 November 2017 an outbreak of diphtheria was declared resulting in a large-scale international response.

Methods
This case-study is based on the experiences of a field epidemiology trainee working with the Ministry of Health and Family Welfare, Bangladesh, and the WHO case management team between 8 January and 6 February 2018. Jointly developed documentation and field notes inform this case study.

Results
One of the aims of the case management team was to address difficulties obtaining timely results of laboratory testing of specimens from suspected diphtheria patients. Given the key role of diagnostics for disease control and case management and in the context of delays in specimen transfer, testing and reporting due to logistical and operational challenges, it was critical to set up a basic public health laboratory in proximity to the refugee camps. In partnership with the Institute of Epidemiology, Disease Control and Research, we planned the establishment of a laboratory in Cox's Bazar, close to the camps. Challenges encountered were lack of a functional public health laboratory facility that could be enhanced or expanded; time needed to locate, refurbish and equip facilities; political and health equity considerations regarding the role of the laboratory; and difficulties recruiting skilled staff willing to relocate to Cox's Bazar. Nevertheless, WHO and the Bangladesh government reached an agreement that resulted in the new laboratory becoming functional in April 2018.

Conclusions
Lessons learned while establishing a basic laboratory in the context of a large-scale refugee crisis and complex political environment add to the discussion on best strategies for enabling rapid diagnostics in this setting.
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