

UKRI Southeast Asia networking event Bangkok 20-22 February 2024

Findings report

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Summary

UK Research and Innovation, with support from the UK's Foreign, Commonwealth and Development Office FCDO's RIDA fund, delivered a multi-country networking event in Bangkok in February 2024. The event was aimed at developing infectious diseases research networks within Southeast Asia (SEA) and the UK, and to explore research priority areas for HMG in SEA.

Evidence collected through this activity suggest HMG research support in SEA should focus on understanding, monitoring and predicting future health threats, accelerating the application of research into real-life solutions, and harnessing new technical approaches (e.g. advanced bioinformatics, AI). Additionally, at policy level, HMG should prioritise multinational and multidisciplinary approaches framed within a One Health approach.

Background

UKRI is delivering a regional Southeast Asia (SEA) funding opportunity focused on infectious diseases with epidemic/antimicrobial resistance (AMR) potential, in partnership with leading funders in SEA. This programme has now launched <https://www.ukri.org/opportunity/ukri-southeast-asia-collaboration-on-infectious-diseases/>. The partner countries involved in this programme are Indonesia, Malaysia, the Philippines, Thailand, Vietnam, and Singapore, of which national funders have committed varying levels of funding contributions in addition to UKRI's available budget, which is funded through the International Science Partnership Fund (ISPF) ODA.

Partner funding agencies	Country
ARDA - Agricultural Research Development Agency	Thailand
DRTPM DIKTI - Direktorat Jenderal Pendidikan Tinggi Kementerian Pendidikan dan Kebudayaan Republik	Indonesia
HSRI - Health Systems Research Institute	Thailand
MOHE - Ministry of Higher Education	Malaysia
NAFOSTED - National Foundation for Science and Technology Development	Vietnam
PREPARE - Programme for Research in Epidemic Preparedness and Response, on behalf of the National Research Foundation (NRF)	Singapore
DOST-PCHRD - Philippines Council for Health Research and Development, Department of Science and Technology	The Philippines

Conversations with funding partners started in summer 2023, and it quickly became apparent a desire to convene researchers from participating countries in a physical location to better understand national research priorities, explore overlapping research interests, increase connectivity and foster new collaborations. To explore options to make this event a reality and maximise its benefits for SEA and for the funding programme, UKRI worked closely with the Science and Innovation Network (SIN) in SEA and colleagues at the UK's Foreign, Commonwealth and Development Office (FCDO).

Given the potential for the activity to support evidence gathering around health research and innovation priorities across SEA, the Research and Innovation for Development in ASEAN (RIDA) was identified as a suitable fund to complement UKRI's available budget for the activity. A proposal case for RIDA funding was approved in November 2023.

A networking event has been subsequently delivered in Bangkok, Thailand, on 20, 21, and 22 February 2024. It successfully convened 120 academic, funders and government officials from the UK and SEA, including representatives from Least Developed Countries (LDC's).

The event combined networking and discussion facilitated sessions with the aim of answering the key overarching research question “*What should UK government prioritise in work on Infectious Diseases in SEA?*”. To maximise the success of the networking event, *Inclusive Innovation*, a professional facilitation company was enlisted to design and lead the delivery of the facilitated sessions. This ensured an appropriate level of engagement and participation from all attendees, as well as quality discussions throughout the event.

This report presents the evidence obtained through the activity and provides a number of recommendations based on these findings where UK HMG policy makers in the region may want to focus moving forward.

Findings

Pre-event findings

To inform the design of the networking event, an initial scoping consultation with funding partners (in Vietnam, Malaysia, Indonesia, the Philippines, Thailand) was conducted. This aimed to establish high level priority areas for partners within the topic of infectious diseases with epidemic/AMR potential. The results of this consultation are included in Table 1.

On this table, it must be noted that UKRI is working with two different funders in Thailand of complementary remits; hence whilst Thailand's alignment appears more modest than for the other countries, the complementarity of the funders should be taken into account when interpreting the data. Additionally, it should be noted that at the time of this scoping activity, Singapore had not yet confirmed their interest in the programme nor their intention to attend the networking event.

The results show a strong level of alignment on high-level research topics relevant to the developing programme, as well as the need to deliver with a One Health approach. The alignment on the need for interdisciplinary approaches was a welcome finding and could potentially reflect a shift in the region towards more cross-disciplinary work. Alignment on multilateral approach to collaboration was welcomed as this is central to the UKRI-SEA research programme.

Table 1: results from the scoping exercise conducted with funding partners

Funding agency	Country	Technology Readiness Level/Stage of technology				High level research topics								Research Pathogens				Approaches		Social and economics		Collaboration type			
		Fundamental science	Applied research	Product/tech development	Clinical research	AMR	Zoonoses	Epidemic preparedness	Immunology	Population-level research	Novel therapeutics	Vaccines	Diagnostics	Surveillance	Bacterial infections	Viral infections	Fungal infections	Parasitic infections	One health approaches	Interdisciplinary approaches	Social sciences	Health economics	Multilateral	Bilateral	
UKRI MRC	UK																								
MOHE	Malaysia																								
DRTCS	Indonesia																								
HSRI	Thailand																								
ARDA	Thailand																								
NAFOSTED	Vietnam																								
DOST-PCHRD	Philippines																								
Strategic priority (top importance)		Of interest								Neutral interest								Out of scope							

To ensure relevant expertise from all participating countries was represented at the networking event, funding organisations were invited to select their own delegations up to a maximum of 10 researchers and 3 funders/government representatives. Funders were invited to make this selection in any way appropriate to their organisations and countries. For the UK, UKRI ran a competitive selection process where attendance was limited to one representative per institution; UK colleagues were asked to attend representing not only their individual research interests but also their institution's. The final attendance list comprised a list of leading researchers and rising stars.

Once selected, participants were invited to complete a questionnaire to help in further refining the networking event sessions. Figure 1 shows a wide spread of academic backgrounds and areas of expertise/interest were present at the event.

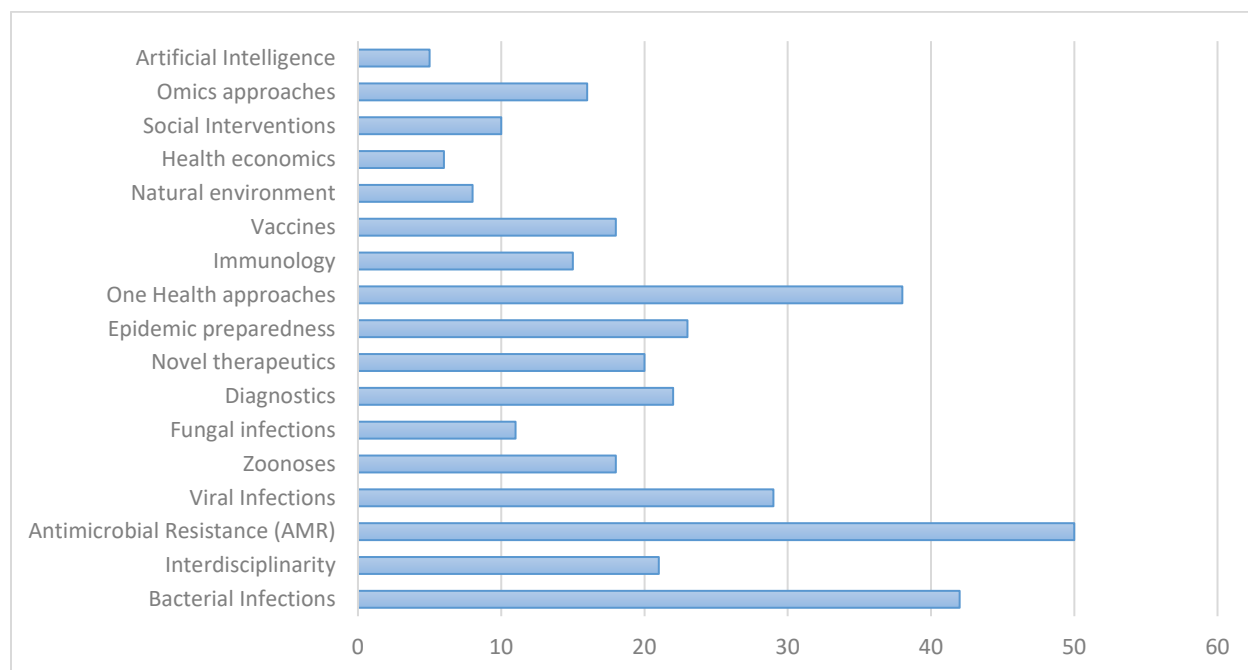


Figure 1: research interests represented at the networking event

Event findings

The event consisted of a mixture of scoping, idea generation and networking sessions to ensure benefits were delivered for UKRI/FCDO, funding partners as well as the academic community represented at the event.

Thematic discussions during the event were split in two areas: epidemic preparedness and antimicrobial resistance. These two areas were chosen given the research interests/priorities expressed by participants ahead of the event. In addition, these two overarching topics align with the scope of UKRI's developing partnership programme.

The session was initiated with a high-level discussion of both topics. Then participants were invited to discuss which are the most pressing areas needing UK-SEA action within both overarching topics. The table below summarises the subtopics highlighted as most important by the participants:

Table 2: areas highlighted as top priority for UK-SEA research activity

High level topic	Antimicrobial resistance	Epidemic preparedness
Most pressing areas needing UK-SEA action as discussed by participants	• Drug discovery and clinical research • Health economics and policy implementation • Prevention and vaccines • Diagnostics and surveillance • Basic science and genomics	• One health approaches • Zoonoses, wildlife and vectors • Omics for understanding, predicting and managing • Endemic and emerging infections • Vaccines and scalability

For each sub-topic, participants were subsequently invited to hold a deeper dive session, using the following framework for the discussions:

- Which research questions remain unanswered for this subtopic?
- What are the barriers to addressing those key questions?
- What do researchers in SEA need, to be able to address these questions?
- What can UK-SEA research collaborations enable that's unique?

Key highlights from these discussions are summarised below. Please note that these are the participant's views as collected throughout the discussions:

Table 3: outputs from in-depth AMR sub-topic discussions

Antimicrobial resistance	
Drug discovery and clinical research	- Challenges include quick translation from lab-bench to user, as well as siloed working which results in capability isolation. - Future research should consider new compounds inspired by naturally available products available in SEA and repurposing existing drugs. - Drug-discovery is often limited by poor stewardship, especially for anti-fungals. - The key challenge is a lack of market pull for novel antimicrobials and novel therapeutics.
Health economics and policy implementation	- Developing a better understanding of the sociocultural factors that drive AMR should be a priority, including understanding the knowledge and practices of urban and rural SEA communities. - Key challenges include securing early involvement of key stakeholders such as healthcare workforce and policy makers. Undertaking research with due contextualisation of local needs is also a challenge. - Increasing technical, financial, and technical capabilities are required to support future research. - UK-SEA collaborations can unlock learnings from across different countries and supporting the bridging of technical and financial gaps. It can also contribute reinforcing a unified position around AMR as a priority
Prevention and vaccines	- A key goal should be to reduce hospital acquired infections, something that requires close stakeholder engagement and work of interdisciplinary teams. - Implementing and evaluating prevention strategies for certain resistant infections remains a challenge for research in this area. - Social and cultural themes must be considered when designing prevention policies. - Novel vaccine development and uptake is an international challenge with associated risk aversion problems.
Diagnostics and surveillance	- A One Health approach is central to truly tackle AMR. The key is early pathogen diagnosis and detection of resistance in clinical samples followed by swift communication. - Future research may prioritise genomic analysis wide-spread sampling. Real-time access to surveillance data will be key. - The main challenges at the moment stem from lack of data openness and limited infrastructure in SEA. - UK-SEA collaborations can facilitate access to a broad variety of AMR data, as well as facilitate the sharing of expertise and protocols. - Clear need for more affordable and rapid diagnostic tools, and improved modelling techniques to predict the epidemiology of pathogen infections and pathogen resistance.

Fundamental science and genomics	- The key research question is what drives AMR. Understanding environmental, zoonotic, social, and cultural factors and their interlinks is a complex issue that requires further work. - Analysis of genomic data and wider bioinformatic advances presents an opportunity for capacity building in SEA. There is an opportunity to harmonise methodologies, from sample collection and management to data storage and analytics. Looking further forward there is an opportunity to utilise novel AI approaches for early diagnosis, AMR prediction strategies, and improved treatment outcomes.
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Table 4: outputs from in-depth epidemic preparedness sub-topic discussions

Epidemic preparedness	
One health approaches	- A broad topic with lots of facets, but some ‘to-do’s’ identified included exploring ways to improve risk assessment and communication to support more effective epidemic and pandemic management; in addition, social approaches to community hygiene practices that help with prevention/control. - There needs to be further efforts to support research translation, capacity building and expanding on available infrastructure.
Zoonoses, wildlife and vectors	- Important research questions include how to identify zoonotic infections to be such, as well as exploring further control measures to prevent zoonotic infections. - Among barriers identified, lack of political interest/commitment to investigating zoonotics in a preventative manner was highlighted. Expanding networks across SEA and increasing capacity were also flagged as needs. - Opportunities identified included improving surveillance data analysis and diagnostic tools, as well as the potential to expand on modelling through the use of AI tools. - UK-SEA collaborations can enable better regional approaches to stakeholder management, as well as providing a platform for protocol standardisation and data sharing.
Omics for understanding, predicting and managing	- Better use of omics for the prediction of virulence, outbreaks, and vaccine development, was highlighted as a top priority. - Bioinformatics and AI represent a key opportunity for the area, and increasing capacity and supporting multilateral collaborations can support their harnessing.
Endemic and emerging infections	- Several research questions were discussed as priorities, including development of rapid diagnostics, prognostic tools, risk assessment and understanding of immune factors - To address these questions, flexibility was highlighted as a key necessary trade; this applies to the tools and platforms available, as well as the funding dedicated to the area and the regulatory environment in SEA/UK - UK-SEA collaborations can provide a new perspective when studying local endemic diseases. It also presents a key opportunity to increase training in SEA and knowledge in the UK

Vaccines and scalability	- A key opportunity of UK-SEA work through a consortium model is the ability to respond rapidly to any emerging pandemic threat. This also offers an opportunity to work coherently with regulatory bodies, improve vaccine sustainability and explore production up-scaling fast
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To focus discussions further and support engagement between experts on different areas of AMR/epidemic preparedness, further topical discussions were conducted focusing on pathogens. Participants were invited to use an alike framework to the previous discussion and focus on the research questions, needs, barriers and the unique offering from UK-SEA collaborative work.

Table 5: outputs from pathogen-focused discussions

Pathogen-focused discussions	
Bacteria	- Drug discovery and screening, increased surveillance and rapid detection are key areas of focus - The need to develop interventions fully contextualised to the SEA region was highlighted. In particular, the complex research environment (e.g. biosafety and security considerations/approvals, bioethical clearances, changing politics around funding priorities) in the region dampens the effectivity of multilateral research efforts
Fungus	- Increasing attention to emerging fungal infections alongside developing fungal diagnostics and therapies are the key challenges for fungal pathogens. - The impacts of climate change, the microbiome, and fungal epidemiology were other noted research topics.
Parasites	- Main research questions include improving detection with a particular focus on multi-parasite detection. - Increasing the sensitivity and specificity of the detection methods is key to addressing the challenges, alongside improved policymaker and public awareness.
Viruses	- Research focus should be on prediction of virus' pandemic potential and severity, investigating and predicting viral mutations, early detection and vaccine development. The need for new approaches to understanding relevant host factors and identify relevant biomarkers was also highlighted. - Key needs highlighted included the need to standardise and harmonise data sharing, across SEA and UK but also globally, as well as developing technical, financial and infrastructure capacity further in SEA.

Recommendations based on findings

To systematically evaluate the finding and develop a series of concise recommendations, related inputs were grouped together and overarching 'summary statements' developed for each group. This analysis is included in Annex III. The prevalence of inputs relevant to each summary statement has been analysed to give illustrate the popularity of the topics throughout the event. This is presented in

Figure 2. Whilst this is not an exhaustive quantification of the support they engendered, it provides a graphical representation of the number of findings underpinning each of the conclusions presented below.

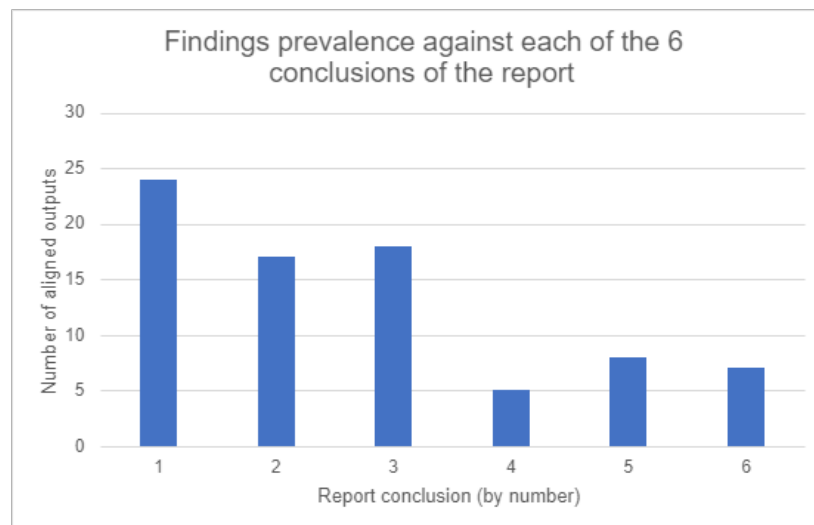


Figure 2: Analysis of the findings, leading to 6 overarching conclusions.

Considering the evidence collected as part of this activity, and the question:

“What should UK government prioritise in work on Infectious Diseases in SEA?”

HMG may consider prioritising the following areas for investment:

1. Monitoring and predicting the next AMR and epidemic threats, through:

- Novel/enhanced diagnostics, more affordable and rapid approaches for early detection.
- Long-term investment in the infrastructure that enables diagnostics, early detection and surveillance, including fostering sample collection standardisation
- Improved surveillance and modelling of epidemiology of pathogen infections and pathogen resistance
- Adaptative, flexible approaches to epidemic surveillance and management able to change with an evolving landscape and allow for early intervention.

2. Translational impacts need improving, and this can be achieved through:

- Developing new clinical, policy and behavioural changes and approaches and researching how they can be best implemented.
- Supporting an increase of the market pull for novel antimicrobials and novel therapeutics (e.g. bacteriophages, amplified immune response).
- Encouraging the inclusion of health economics and pharmacodynamics when designing new therapies/drugs, to make sure they are affordable, accessible, and more likely to make it to the clinic (less off-target effects).

3. **Prevention techniques** need to be developed and implemented in parallel, including:
 - Behavioural, environmental and cultural approaches
 - Vaccine development and international uptake, also including the management of vaccine aversion risks
 - Optimised usage of antibiotics and improving stewardship.
4. **Impacts of climate change on AMR and epidemic preparedness**, supporting research to understand the mechanisms through which this happens and novel solutions/management approaches
5. **Accelerating multinational and multidisciplinary research**, maintaining equitability at its core and ensuring research funding is fully collaborative and avoids siloes
6. **AI development and tools**, as new technical approaches hold great potential to modelling infectious diseases and predicting behaviour, aid early diagnosis and improve treatment outcomes

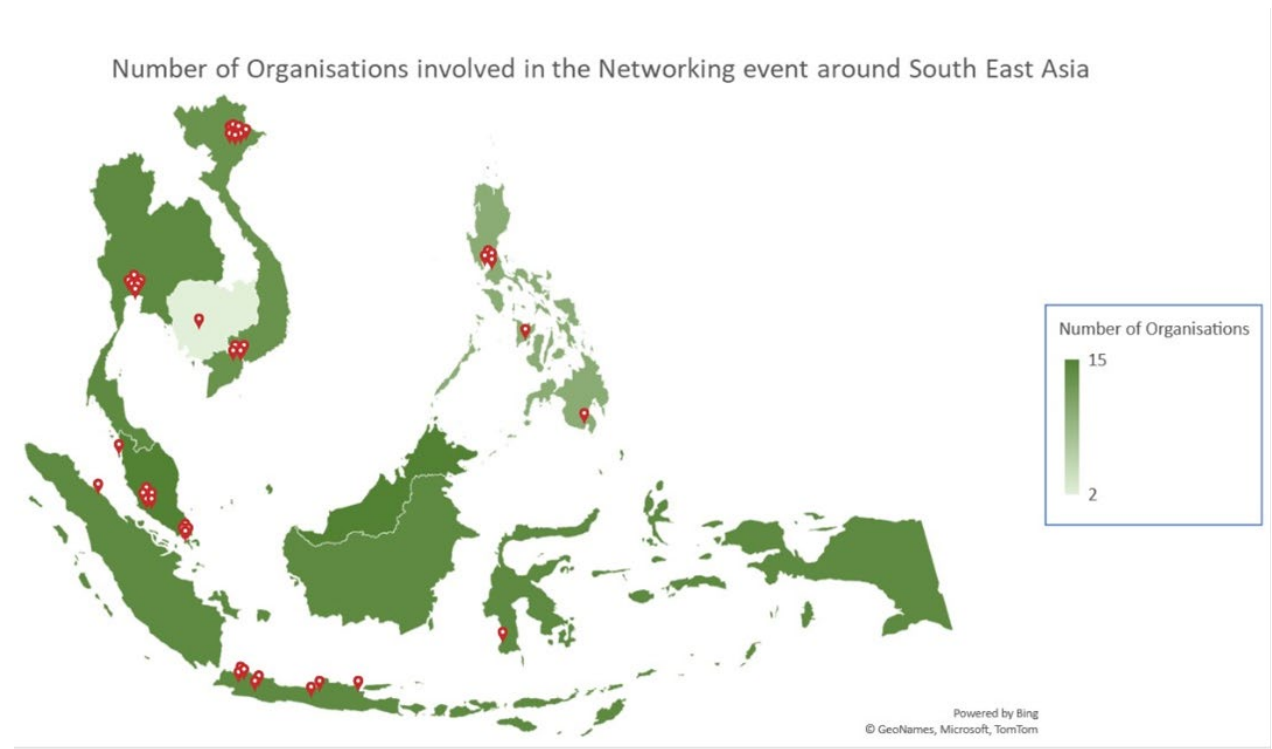
Benefits delivered

The networking event in Bangkok was highly successful, meeting its goals of convening infectious disease experts from SEA and the UK. Based on conversations and feedback gathered during the event, the benefits delivered include:

- Benefits for SEA and UK research communities
 - The event has increased connectivity among academics directly involved and their institutions, ultimately increasing the connectivity between SEA and UK communities
 - The event has aided trust development between participants, reinforcing mutual commitments to work in partnership to solve key infectious diseases challenges
 - The event has enabled initial idea generation conversations between multi-country teams, newly formed during the event, which will facilitate the development of highly competitive funding proposals for the upcoming funding opportunity
 - The event has allowed participants to develop a good understanding of national research priorities across SEA and the UK, which enable collaborative research to flourish beyond the upcoming funding opportunity
- Evidence and knowledge:
 - The event has enabled UKRI to capture information on national research priorities for SEA countries, both at researcher level and also at funder official level. This information is summarised within this report
- Other:

- Conversations during the event highlighted a broad absence of SEA representation within GLOPID-R, a global research collaboration for infectious disease preparedness. SEA funders expressed an interest in exploring involvement, something UKRI is taking forward.
- Building on the benefits delivered through this activity, UKRI plans to support further networking activities for the successful projects funded through this opportunity. This will enable further linkages between UK-SEA and SEA-SEA throughout the lifetime of the programme and beyond.

ANNEX I – map of participation



Map of the Organisations involved in the networking event across the UK



ANNEX II – networking event agenda

Time	Activity
DAY 1. Tuesday 20th Feb 2024	
11:30	Arrivals & lunch provided
12:30	Official Welcome • Vision and Objectives
	Who's here and why? • Getting to know each other
	Exploring the unknown future • An interactive and engaging discussion
14:00	Break (20 mins)
	Talking Science - Round 1. • With colleagues of similar interests
	Talking Science - Round 2. • With colleagues with different interests
	Themed breakout discussions • Starting to look for opportunities
	Open floor plenary discussion • for comments and insights
17:30	Close
19:00	Conference Dinner
DAY 2. Wednesday 21st Feb 2024	

09:00	Welcome back Plan for the day
	The Call Presentation about the call
	Table discussions Identifying questions about the call (to be answered tomorrow)
	Subject Exploration What do we “know” and what do we “wonder” about our subject
11:00	Break (20 mins)
	Themed Speed Networking. Focused one-to-one conversations
13:00	Lunch (60 mins)
	Welcome back Has everyone met everyone yet?
	Sense making Reflecting on connections and ideas so far
	Open floor plenary Opportunity for anyone to raise a comment or insight
	Digging in deeper Enabling participants to focus on specific topics
16:40	Open floor plenary Opportunity for anyone to raise a comment or insight
17:00	Close
18:30	Dinner
DAY 3. Thursday 22nd Feb 2024	
09:00	Welcome back Plan for the day
	Your questions answered about the Call. Funders respond to earlier questions
	Stretching our thinking. A creative exercise
10:30	Break (20 mins)
	Preparing for action and additional networking. Ensuring we are all fully equipped to continue to make progress after this event
	Plenary session Open floor for final comment or insights
12:45	Closing Session Acknowledgement of our progress
13:00	Lunch
14:00	Depart

ANNEX III – analysis of findings: groups leading to overarching summary statements

The table below summarises the inputs collected through the networking activity, groupings and the resulting overarching statement (referred to as recommendation throughout this report). Where the inputs are relevant to more than one recommendation, this is indicated in bold blue. Please note that both number of inputs directly underpinning the conclusions and inputs with relevance (as marked in blue) were used to quantify the findings' prevalence against each conclusion, as presented in Figure 2.

High level topic	Subtopic	Input	Summary of inputs
AMR	Health economics and policy implementation	Increasing technical and financial capabilities are required to support future research.	1. Monitoring and predicting the next AMR and epidemic threats, through: • Novel/enhanced diagnostics, more affordable and rapid approaches for early detection. • Long-term investment in the infrastructure that enables diagnostics, early detection and surveillance, including fostering sample collection standardisation • Improved surveillance and modelling of epidemiology of pathogen infections and pathogen resistance • Adaptative, flexible approaches to epidemic surveillance and management able to change with an evolving landscape and allow for early intervention.
AMR	Diagnostics and surveillance	A One Health approach is central to truly tackle AMR. The key is early pathogen diagnosis and detection of resistance in clinical samples followed by swift communication. (also 2 and 4)	
AMR	Diagnostics and surveillance	Future research may prioritise genomic analysis wide-spread sampling. Real-time access to surveillance data will be key. (also 6)	
AMR	Diagnostics and surveillance	The main challenges at the moment stem from lack of data openness and limited infrastructure in SEA.	
AMR	Fundamental science and genomics	The key research question is what drives AMR. Understanding environmental, zoonotic, social, and cultural factors and their interlinks is a complex issue that requires further work. (also 2, 3 and 4)	
Epidemic preparedness	Zoonoses, wildlife and vectors	Important research questions include how to identify zoonotic infections to be such, as well as exploring further control measures to prevent zoonotic infections. (also 3)	
Epidemic preparedness	Zoonoses, wildlife and vectors	UK-SEA collaborations can enable better regional approaches to stakeholder management, as well as providing a platform for protocol standardisation and data sharing. (also 2, 5)	
Epidemic preparedness	Omics for understanding, predicting and managing	Better use of omics for the prediction of virulence, outbreaks, and vaccine development, was highlighted as a top priority. (also 3 and 6)	
Epidemic preparedness	Endemic and emerging infections	To address these questions, flexibility was highlighted as a key necessary trade; this applies to the tools and platforms available, as well as the funding dedicated to the area and the regulatory environment in SEA/UK	
Epidemic preparedness	Endemic and emerging infections	Several research questions were discussed as priorities, including development of rapid diagnostics, prognostic tools, risk assessment and understanding of immune factors	
Pathogen-focused discussions	Bacteria	Drug discovery and screening, increased surveillance and rapid detection are key areas of focus	
Pathogen-focused discussions	Fungus	Increasing attention to emerging fungal infections alongside developing fungal diagnostics and therapies are the key challenges for fungal pathogens. (also 3)	
Pathogen-focused discussions	Parasites	Main research questions include improving detection with a particular focus on multi-parasite detection.	
Pathogen-focused discussions	Parasites	Increasing the sensitivity and specificity of the detection methods is key to addressing the challenges, alongside improved policymaker and public awareness. (also 2)	

Pathogen-focused discussions	Viruses	Research focus should be on prediction of virus' pandemic potential and severity, investigating and predicting viral mutations, early detection and vaccine development. The need for new approaches to understanding relevant host factors and identify relevant biomarkers was also highlighted. (also 3 and 6)	
Pathogen-focused discussions	Viruses	Key needs highlighted included the need to standardise and harmonise data sharing, across SEA and UK but also globally, as well as developing technical, financial and infrastructure capacity further in SEA.	
AMR	Health economics and policy implementation	Developing a better understanding of the sociocultural factors that drive AMR should be a priority, including understanding the knowledge and practices of urban and rural SEA communities.	2. Translational impacts need improving, and this can be achieved through: • Developing new clinical, policy and behavioural changes and approaches and researching how they can be best implemented. • Supporting an increase of the market pull for novel antimicrobials and novel therapeutics (e.g. bacteriophages, amplified immune response). • Encouraging the inclusion of health economics and pharmacodynamics when designing new therapies/drugs, to make sure they are affordable, accessible, and more likely to make it to the clinic (less off-target effects).
AMR	Drug Discovery and clinical research	The key challenge is a lack of market pull for novel antimicrobials and novel therapeutics.	
AMR	Health economics and policy implementation	Key challenges include securing early involvement of key stakeholders such as healthcare workforce and policy makers. Undertaking research with due contextualisation of local needs is also a challenge. (also 3)	
AMR	Diagnostics and surveillance	Clear need for more affordable and rapid diagnostic tools, and improved modelling techniques to predict the epidemiology of pathogen infections and pathogen resistance. (also 1 and 6)	
Epidemic preparedness	One health approaches	There needs to be further efforts to support research translation, capacity building and expanding on available infrastructure	
Pathogen-focused discussions	Bacteria	The need to develop interventions fully contextualised to the SEA region was highlighted. In particular, the complex research environment (e.g. biosafety and security considerations/approvals, bioethical clearances, changing politics around funding priorities) in the region dampens the effectivity of multilateral research efforts (also 4 and 5)	
AMR	Drug Discovery and clinical research	Future research should consider new compounds inspired by naturally available products available in SEA and repurposing existing drugs. (also 3)	
AMR	Drug Discovery and clinical research	Challenges include quick translation from lab-bench to user, as well as siloed working which results in capability isolation.	
AMR	Drug Discovery and clinical research	Drug-discovery is often limited by poor stewardship, especially for anti-fungals.	3. Prevention techniques need to be developed and implemented in parallel, including: • Behavioural, environmental and cultural approaches • Vaccine development and international uptake, also including the management of vaccine aversion risks • Optimised usage of antibiotics and improving stewardship.
AMR	Health economics and policy implementation	UK-SEA collaborations can unlock learnings from across different countries and supporting the bridging of technical and financial gaps. It can also contribute reinforcing a unified position around AMR as a priority (also 5)	
AMR	Prevention and vaccines	A key goal should be to reduce hospital acquired infections, something that requires close stakeholder engagement and work of interdisciplinary teams. (also 2)	
AMR	Prevention and vaccines	Implementing and evaluating prevention strategies for certain resistant infections remains a challenge for research in this area.	
AMR	Prevention and vaccines	Social and cultural themes must be considered when designing prevention policies.	
AMR	Prevention and vaccines	Novel vaccine development and uptake is an international challenge with associated risk aversion problems.	
Epidemic preparedness	Zoonoses, wildlife and vectors	Important research questions include how to identify zoonotic infections to be such, as well as exploring further control measures to prevent zoonotic infections. (also 1)	

Epidemic preparedness	One health approaches	A broad topic with lots of facets, but some 'to-do's' identified included exploring ways to improve risk assessment and communication to support more effective epidemic and pandemic management; in addition, social approaches to community hygiene practices that help with prevention/control. (also 1 and 2)	
Pathogen-focused discussions	Fungus	The impacts of climate change, the microbiome, and fungal epidemiology were other noted research topics.	4. Impacts of climate change on AMR and epidemic preparedness, supporting research to understand the mechanisms through which this happens and novel solutions/management approaches
AMR	Diagnostics and surveillance	UK-SEA collaborations can facilitate access to a broad variety of AMR data, as well as facilitate the sharing of expertise and protocols. (also 1, 2 and 3)	5. Accelerating multinational and multidisciplinary research, maintaining equitability at its core and ensuring research funding is fully collaborative and avoids siloes
Epidemic preparedness	Zoonoses, wildlife and vectors	Among barriers identified, lack of political interest/commitment to investigating zoonotics in a preventative manner was highlighted. Expanding networks across SEA and increasing capacity were also flagged as needs. (also 3)	
Epidemic preparedness	Vaccines and scalability	A key opportunity of UK-SEA work through a consortium model is the ability to respond rapidly to any emerging pandemic threat. This also offers an opportunity to work coherently with regulatory bodies, improve vaccine sustainability and explore production up-scaling fast (also 1, 2 and 3)	
Epidemic preparedness	Endemic and emerging infections	UK-SEA collaborations can provide a new perspective when studying local endemic diseases. It also presents a key opportunity to increase training in SEA and knowledge in the UK (also 1)	
AMR	Fundamental science and genomics	Analysis of genomic data and wider bioinformatic advances presents an opportunity for capacity building in SEA. There is an opportunity to harmonise methodologies, from sample collection and management to data storage and analytics. Looking further forward there is an opportunity to utilise novel AI approaches for early diagnosis, AMR prediction strategies, and improved treatment outcomes. (also 1, 2, 3 and 4)	6. AI development and tools, as new technical approaches hold great potential to modelling infectious diseases and predicting behaviour, aid early diagnosis and improve treatment outcomes
Epidemic preparedness	Zoonoses, wildlife and vectors	Opportunities identified included improving surveillance data analysis and diagnostic tools, as well as the potential to expand on modelling through the use of AI tools. (also 1)	
Epidemic preparedness	Zoonoses, wildlife and vectors	Bioinformatics and AI represent a key opportunity for the area, and increasing capacity and supporting multilateral collaborations can support their harnessing. (also 5)	