Vaccinology for Clinical and Public Health Practice Course in Indonesia

15 – 18 May 2023

Bandung, Indonesia

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List of Abbreviations

ADP	Access and Delivery Partnership
BRIN	Badan Riset dan Inovasi Nasional
CAPACITI	Country-led Assessment for Prioritization on Immunization
CHTA UNPAD	Center of Health Technology Assessment Universitas Padjadjaran
FVVA	Full Value of Vaccine Assessment
HEPR	Health emergency preparedness, response, and resilience
HITAP	Health Intervention and Technology Assessment Program
HPV	Human Papillomavirus
HTA	Health Technology Assessment
INAHTAC	Indonesia HTA Committee
IVI	International Vaccine Institute
ITAGI	Indonesia Technical Advisory Group for Immunization
JKN	Jaminan Kesehatan Nasional
LSHTM	London School of Hygiene and Tropical Medicine
mRNA	Messenger Ribonucleic Acid
MOH	Ministry of Health
PCV	Pneumococcal Conjugate vaccine
R&D	Research & development
RSV	Respiratory Syncytial Virus
SSHSPH NUS	Saw Swee Hock School of Public Health National University of Singapore
UNDP	United Nations Development Program
UNPAD	Universitas Padjajaran
WHO	World Health Organization
WHO EURO	World Health Organization Regional Office for Europe
WHO SEARO	World Health Organization South-east Asia Regional Office

Acknowledgements

This report summarizes the sessions in Vaccinology for Clinical and Public Health Practice policy conference and workshop, held on 15 – 18 May 2023 in Bandung, Indonesia. The conference was organized by the London School of Hygiene & Tropical Medicine (LSHTM), Saw Swee Hock School of Public Health National University of Singapore (SSHSPH NUS), Universitas Padjajaran (UNPAD) and the Health Intervention and Technology Assessment Program (HITAP). The program was supported by the Access and Delivery Partnership (ADP), UNPAD, and Biofarma group. The report has been prepared by Khansa Chavarina, Dimple Butani, Chotika Suwanpanich, and Sarin KC from HITAP, and Farida Rendrayani and Bianca Davinia Gunawan from UNPAD.

The report has been reviewed by Mark Jit from LSHTM, Hannah Clapham from SSHSPH NUS, and Saudamini Dabak from HITAP.

The findings, interpretations, and conclusions expressed in this report do not necessarily reflect the views of the funding or participating agencies.

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Executive summary

LSHTM, SSHSPH NUS, and HITAP conducted the Vaccinology for Clinical and Public Health policy conference and short course, collaborating with UNPAD as the local host. The course was conducted from 15 – 18 May 2023 in Bandung, Indonesia, and was co-funded by the Access and Delivery Partnership (ADP), Biofarma, and UNPAD.

The course had two parts: a policy conference and a short course. The policy conference on 15 May 2023 discussed some of the most pressing issues around vaccinology in Indonesia, including setting priorities of new vaccines, the role of technology, improving resource capacity and communicating evidence, and creating sustainable vaccination programs. The policy conference invited renowned local and international experts in their fields. There was a total of 75 participants; the majority came from Indonesia, and some were from the Philippines, Laos, and Vietnam.

The short course was part of a regular vaccinology short course organised since 2013. It was held for three days from 16 – 18 May 2023. The short course covered technical topics from vaccine development to delivery. The technical topics include the epidemiology of vaccination and clinical trials, modeling and economics of vaccination, and policy and implementation of vaccination programs. Lecturers from LSHTM, SSHSPH NUS, UNPAD, International Vaccine Institute (IVI), Indonesia Ministry of Health (MOH), Biofarma, and HITAP were invited. The short course lectures were designed to match the need of participants, which was to understand basic technical knowledge on various aspects in vaccines' value chain. There were up to 48 workshop participants, mainly from Indonesia and some from the Philippines, Laos, and Vietnam. Overall, the participants were satisfied with the policy conference and short course and found the content to be useful for their work.

About this document

This report aims to provide an overview of the Vaccinology for Clinical and Public Health Practice Course held in Bandung, Indonesia, between 15-18 May 2023. The report contains sections on the background of the course, a summary of the sessions, the evaluation, and the outcomes of the course. The supporting information are appended in this document.

Background

Inception of the Course

London School of Hygiene and Tropical Medicine (LSHTM), National University of Singapore (NUS), and the Health Intervention and Technology Assessment Program (HITAP) have been convening the course, 'Vaccinology for Clinical and Public Health Practice', since 2013. The first course was delivered in Singapore on 28 October – 1 November 2013, and it was held again in SIngapore in 10-14 November 2014. In 2019, it moved out of Singapore with the support of HITAP to Faridabad, India, between 18-21 November 2019 in partnership with the Translational Health Science and Technology Institute (THSTI) and the Jawaharlal Institute of Postgraduate Medical Education and Research (PGIMER). The next edition of the course was delivered online during the Covid-19 pandemic between 6-9 and 14-15 December 2021 in partnership with the Ministry of Health (MoH) of Ghana.

During the 10th Annual HTAsiaLink Conference held in Pattaya, Thailand between 30 November – 2 December 2022, partners from HITAP, LSHTM, NUS, and Universitas Padjadjaran (UNPAD) had the opportunity to discuss the possibility of hosting the next edition of the course in Indonesia. During the discussion, the demand to build country capacity in vaccinology was made apparent, especially in light of Covid-19 pandemic and Indonesia's journey in manufacturing mRNA-based vaccines. With support from national stakeholders including the MoH Indonesia and the Indonesian Technical Advisory Group on Immunization (ITAGI), UNPAD consumed the challenge and responsibility of hosting the third edition of this course in Bandung, Indonesia.

This edition of the course was funded by the Access and Delivery Partnership (ADP) – hosted by the United Nations Development Programme (UNDP) and Biofarma, Indonesia.

Objectives of the Course

Vaccination is one of the most effective tools in preventing many infectious diseases and vaccines are often a highly cost-effective way to drastically reduce mortality and morbidity. The advent of Gavi immunisation support along with other conducive factors has allowed low- and middle-income countries (LMICs) to make huge advances in vaccine adoption and coverage over the last two decades. The last few decades have also been a "golden age" for the development of new vaccines. However, vaccine coverage advances have been stagnating and many of the vaccines licensed in this era have highly complex immunological, ecological, economic, and social effects. Planning the effective use of vaccines requires a new generation of public health professionals with multidisciplinary skills who can comprehend issues around the immunological mechanism, safety, efficacy, effectiveness, population impact, effects on microbiological ecology,

delivery, cost-effectiveness, and public trust of vaccines. Therefore, building capacity for research and institutionalising evidence-informed policy on immunisation is increasingly important as countries transition from Gavi support.

Hence, the objectives of the course were to: (i) increase the scientific and technical knowledge related to vaccines of the stakeholders involved in evidence generation process; (ii) inform the role of HTA in optimising scarce resources for vaccines; (iii) understand priorities, political economy of vaccine policies, and link researchers to policymakers in Indonesia and other countries in Asia; and (iv) build a network of stakeholders in the field of vaccinology.

Summary of the sessions

Factory visit

Biofarma, a vaccine manufacturer in Indonesia, arranged a factory visit for 50 participants. This visit was divided into two rounds of 30 minutes each. The host began by providing an overview of Biofarma. Biofarma manufactures vaccines that support the Indonesian government, such as the Diphtheria tetanus vaccine (dT), Tetanus and Diphtheria vaccine (Td), Tetanus vaccine (TT), Hepatitis B vaccination, Measles vaccine, Polio vaccine, and Bacillus Calmette-Guérin (BCG) vaccine. They distinguished themselves as a life science manufacturer through their continuing research and development. Its Bandung-based facility is utilized for manufacturing, R&D, marketing, and administration. Then the host directed participants to visit the "Centre of Excellence Facility for Vaccine And Biotechnology Production" building to observe the manufacturing equipment and facilities they used in supporting vaccine research and development covering upstream, downstream as well as quality assessment processes for conducting a pilot scale production to serve the upscaling process before moving on to commercial scale production. Visual documentation was prohibited in this tour.

Policy conference

The policy conference was held on 15 May 2023 at the Biofarma hall, Bandung. There was a total of 75 participants from Indonesia, the Philippines, Vietnam, and Laos. The participants are representatives from hospitals, universities, professional associations, government agencies, and manufacturers. The list of participants is provided in Appendix 2. Dr. Rahman Roestan, the Director of Operations at Biofarma, and Dr. Tomy Perdana from Universitas Padjajaran gave the opening remarks as the local host of the event. They encouraged participants to learn technical knowledge, especially in preparing for the new beginning after the pandemic, and to build a network to strengthen collaboration in the future from this event.

The policy conference continued with discussion sessions with distinguished Indonesian and international speakers. Four sessions covered paramount topics on vaccinology in Indonesia, which included 1) setting priorities for new vaccines, 2) the role of technologies in achieving national vaccination strategy, 3) from data to decisions: resource capacity and using evidence to

inform vaccine policy development, and 4) charting a path to sustainable immunization programs and preparedness/response strategies. The policy conference agenda is provided in Appendix 1.

Photo 1. First row: Dr. Rahman Roestan, the Director of Operations at Biofarma (left), Dr. Tommy Perdana, representative of UNPAD (right). Second row: Policy conference participants.

Session 1: Setting priorities for new vaccines

The objective of this session was to understand the new priority setting process for new vaccine in Indonesia. The session was moderated by Khansa Chavarina from HITAP and had Prof. Sri Rezeki Hadinegoro, the chairwoman of Immunization Technical Advisory Group Indonesia (ITAGI), Prof. Mardiati Nadjib from Indonesia HTA Committee (INAHTAC), and Dr. Auliya Suwantika, the head of Center of Health Technology Assessment, Universitas Padjajaran (CHTA, UNPAD) as speakers.

Prof. Sri Rezeki Hadinegoro started her presentation by introducing ITAGI and its role in the priority-setting process. She explained ITAGI adopted WHO guidelines for introducing new vaccines and the seven steps of introducing new vaccines on the National Childhood Immunization Schedule, including determining the burden of disease, assessing the vaccine efficacy, safety, acceptability, and cost, analyzing the cost-effectiveness of the vaccine and the public health impact of including the vaccine in the program, preparing the financing of the program, and planning the program, that will support a policy decision. She briefly explained the pneumococcal conjugate vaccine (PCV) and Rotavirus vaccine inclusion process to Indonesia's Expanded Program on Immunization (EPI), which took five and eleven years, respectively. She continued to explain ITAGI's role in the implementation phase of the new vaccine introduction with challenges in the community and service provider. She shared multi prongs strategies to overcome the challenges at all levels of implementation that mainly revolve around collaboration, capacity building, and communication.

Prof. Mardiati Nadjib introduced the role of INAHTAC in supporting the introduction of new vaccines. Indonesia's HTA process has recently been systemized for the benefit packages of national health insurance or Jaminan Kesehatan Nasional (JKN). As vaccines are subsidized by the MOH and not covered under the JKN, vaccines are not included in the HTA process. However, HTA agents and INAHTAC assist in the assessment appraisal process of the economic evaluations of vaccines and report to ITAGI and MOH. A separate health economic working group was commissioned to help with the assessment of the human papillomavirus (HPV) vaccine, and the Rotavirus vaccine for the EPI that adopted the Country-led Assessment for Prioritization on Immunization (CAPACITI) tool by WHO.

Dr. Auliya Suwantika continued the explanation on the pilot of the CAPACITI tool adoption for the HPV vaccine and Rotavirus vaccine in Indonesia. The tool allows the team to compare two scenarios of HPV and the Rotavirus vaccines target population for implementation. The team utilized several criteria that were weighed and collected evidence for each criterion. In this pilot, the CAPACITI tool assisted the team in recommending HPV and the Rotavirus implementation scenario and would be considered for the future priority-setting process.

In the plenary discussion, the speakers reflected on the adoption of the CAPACITI tool that helped ITAGI to assess policy questions related to vaccine priorities systematically. The tool induced collaboration with multidisciplinary researchers and facilitated communication between researchers and decision-makers. Although there are rooms for improvement in reliable data sources to generate evidence, the tool is expected to be adopted to support evidence-informed decision-making.

Key takeaways:

- Vaccine priority setting in Indonesia recently adopted the WHO CAPACITI tool to support evidence-informed decision making in a systematic process. The priority setting process is separate from the HTA process, as vaccines are not included in the JKN program.
- Economic evaluation is now included as evidence required to inform policymaking. Assessment and appraisal of the evidence is being supported by a health economic working group, HTA agent, and INAHTAC.
- Challenges remain in the process of priority setting, such as competing priorities with other health programs that complicates the funding planning, supply constraints, vaccine safety data concern, and programmatic challenges.

Photo 2. From left to right: Prof. Sri Rezeki Hadinegoro (ITAGI), Khansa Chavarina (HITAP), Prof. Mardiati Nadjib (INAHTAC), Dr. Auliya Suwantika (CHTA UNPAD)

Session 2: The role of technologies in achieving national vaccination strategy

This session aimed to understand the current development of vaccine technology in Indonesia, from the vaccine development stage to vaccine delivery. The session was moderated by Asst. Prof. Hannah Clapham from SSHPH NUS. The speakers for this session were Dr. Neni Nurainy, the Head Division of Vaccine Development at Biofarma, Prof. Toto Subroto, a Vaccine Development expert at UNPAD, Dr. Martin Friede and Claudia Nannei at WHO, and Vidia Darmawi from the United Nations Development Program (UNDP) Indonesia.

Dr. Neni Nurainy spoke about Biofarma's production capacity and capability and how they have been supporting the Government of Indonesia to procure, produce, and distribute Covid-19 vaccines (CoronaVac, Covid-19 Bio, AstraZeneca, Covovax, Jannsen, Moderna, Pfizer, Sinopharm, and Indovac) since 2021. Available pre-Covid-19 infrastructure helped the company to adapt during Covid-19. Some of them are existing centers of excellence with established off-the-shelf protocols that helped to identify the need for research on novel vaccines for Covid-19 and end-to-end collaboration with academia, industry, and government/funding agency that sped up the vaccine development and deployment. She also spoke about the current research in mRNA and their plan to acquire the production technology. Indonesia has joined the WHO technology transfer program along with Egypt, Kenya, Nigeria, Senegal, South Africa, Tunisia, Bangladesh, Pakistan, Serbia, India, and Ukraine to gain technical training and mobilize a network for future pandemic/epidemic preparedness.

Prof. Toto Subroto gave an overview of the mRNA development initiatives from an academic point of view. He mentioned some mRNA-related research at universities. He spoke about the essence of collaboration and synergy among research institutions, universities, and national pharmaceutical research and development. He thought that The National Research and Innovation Agency (BRIN) should lead the research roadmap for vaccines according to the Indonesian context.

Dr. Martin Friede and Claudia Nannei explained the WHO mRNA technology transfer that aims to increase the capacity and supply of mRNA, which Indonesia is partaking in. WHO mRNA technology transfer hub approaches this issue using a multilateral technology transfer technology hub model. The hub worked with inventors, experts, developers, IP holders, researchers, and member states. The hub will take ownership of the data, rights, and industrial scale process that will be shared to manufacturers in existing or new manufacturers, especially in LMIC. The hub will help to keep vaccine-producing facilities on the ongoing use of manufacturing as it proved to be more timely in responding to pandemic compared to activating dormant facilities. This would need support from functioning R&D ecosystems at the national and regional levels, which require country commitment/regional mechanisms to ensure sustainability.

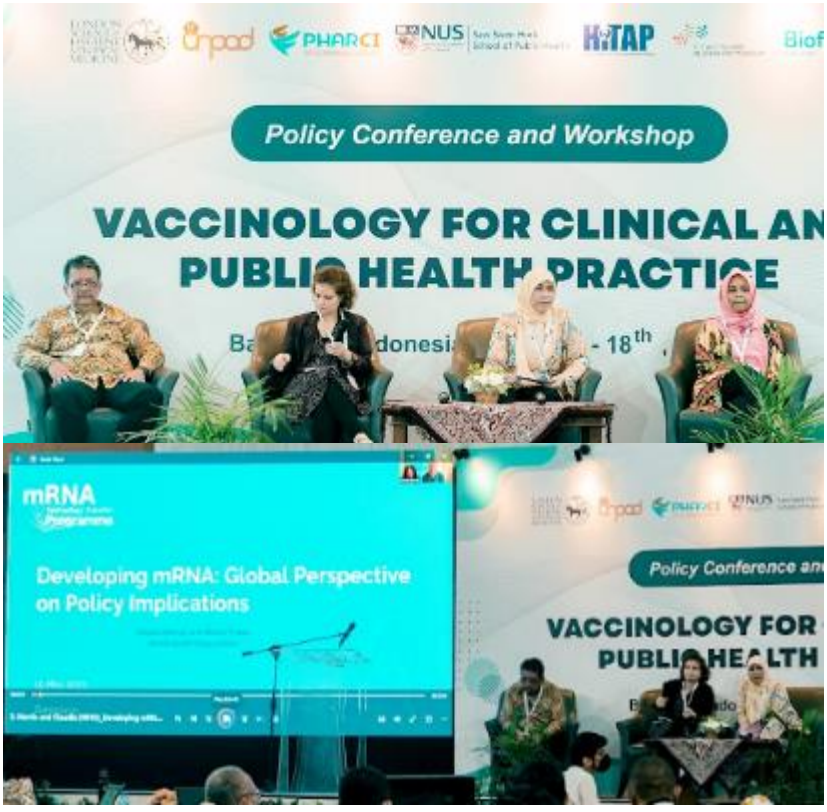
Vidia Darmawi spoke about SMILE, which was introduced during Covid-19 to improve accountability, efficiency, and transparency in vaccine delivery. SMILE helps to track vaccine distribution, monitor temperature, and support online vaccine reporting. It comes with a dashboard that can be accessed via website on the vaccine consumption index, distribution plan, asset

capacity, wastage rate, stock abnormalities, and temperature excursions. They are planning to expand the use to routine vaccine immunization.

Key takeaways:

- Covid-19 has brought significant problems that tested health system's resilience worldwide. This has brought some opportunities especially in biotechnology and healthcare information systems that are beneficial for achieving a better preparedness and mitigation for future pandemics.
- Indonesia is taking this momentum to develop mRNA capability through the WHO mRNA technology transfer and leverage the network to ensure vaccine equity.
- SMILE, the digital supply chain monitoring has been piloted during Covid-19 and planned to be escalated for routine immunization.
- Sustainable development of these initiatives require commitment and support from the government.

Photo 3. Top figure, from left to right: Prof. Toto Subroto (UNPAD), Asst. Prof. Hannah Clapham (SSHSPH NUS), Dr. Neni Nurainy (Biofarma), Vidia Darmawi (UNDP Indonesia). Bottom figure, on video: Dr. Martin Friede and Claudia Nannei (WHO).



Session 3: From data to decisions: resource capacity and using evidence to inform vaccine policy development

This session aimed to discuss how evidence is used to support policymaking and how to communicate them to policymakers. The session was moderated by Dr. Neily Zakiyah from UNPAD. The speakers were Dr. Syarifah Liza Munira, the Head of Health Development Policy Agency, Ministry of Health (MOH), Dr. Adiatma Siregar from UNPAD, Prof. Mark Jit from LSHTM, and Dr. Sushant Sahastrabuddhe from the International Vaccine Institute (IVI).

Dr. Syarifah Liza Munira presented the MOH's health transformation pillars which includes strategies on vaccines, in particular strengthening the primary care for its preventive and promotive functions, building national resilience on pharmaceutical and medical devices, and transformation of data infrastructure. MOH is committed to supporting research that plays an integral part while providing incentives for production and distribution and revitalizing regulations to enable a conducive environment. She shared several learnings from Covid-19 that MOH adopted for future vaccine policy development, which include the timeliness of vaccine development and deployment, ensuring equity in vaccine distribution, transparent communication, leveraging networks and collaboration, and monitoring and evaluation of vaccine programs.

Dr. Adiatma Siregar introduced the HTA concept that has recently been included in the priority-setting process. He spoke about the basic principles and methods, and types of research questions that could be answered with HTA. He encouraged industries and universities to collaborate in supporting HTA research to support policymaking in Indonesia.

Prof. Mark Jit spoke about building technical capacity in the country to support NITAG. He mentioned WHO evidence to recommendation framework that was adopted by WHO EURO specifically for vaccines. The framework is normally appleid as part of a collaborative multidisciplinary process that he simplified into three items. First, the process of bringing the evidence for discussion involves experts from various disciplines (e.g., virology, field epidemiology, law, ethics) sharing their concerns and findings from their points of view. The second process was the deliberative process which requires a larger audience, including policymakers, healthcare delivery staff, patients, and the public. It would be ideal to have a systematic deliberative process that conforms to the committee/country's principles. These two processes required two different sets of capacities: individual technical expertise and 'decision science.' The latter was more about putting pieces of information together and aligning with decision-makers' preferences or a country's values, which led to evidence-informed policy recommendations. The last process was making the final decision based on the recommendations. Capacity building activities in these areas were available in formal education, training at local, regional, and global levels, and practical guidance through regional and global networks, mentoring, and online resources.

Dr. Sushant Sahstrabuddhe complemented the discussion by sharing the work of IVI. IVI provides technical support at almost every point of the vaccine journey, from discovery to surveillance to countries. He presented the case of the Chikungunya vaccine that struggled to be implemented

in countries, as it lacked policy, regulatory, financing, and advocacy efforts. These challenges was due to the nature of the disease that was commonly found in LMICs and currently not GAVI-eligible, no consensus on a global advocacy approach, and was still in the process of preparing a position paper for WHO. On top of that, he mentioned that vaccine acceptance and the Full Value of Vaccine Assessment (FVVA), analyses of global public health rationale for developing vaccines, would be another two factors that play vital role in introducing new vaccines. This case highlighted that new vaccine adoption was mainly driven by global direction.

Key takeaways:

- MOH Indonesia has committed to support research for informing vaccine policy development with transforming the data infrastructure as one of the strategies.
- Apart from the technical capacity of various disciplines, a capacity on 'decision science' is required to connect different insights and align with decision values.

Photo 4. Top figure, from left to right: Dr. Neily Zakiyah (UNPAD), Dr. Adiatma Siregar (UNPAD), Prof. Mark Jit (LSHTM), Dr. Sushant Sahastrabuddhe (IVI). Bottom figure, on video: Dr. Syarifah Liza Munira (Indonesia MOH)

Session 4: Charting a path to sustainable immunization programs and preparedness/response strategies

The session objective was to discuss initiatives and strategies that were employed during crisis and how Indonesia could learn from those. The session was moderated by Prof. Mark Jit from LSHTM and had Prof. Arief Anshory Yusuf, the Director of the Economy and Environment Institute Indonesia, UNPAD, Asst. Prof. Hannah Clapham from SSHPH NUS, Dr. Prima Yosephine, the Director of Immunization Services, MOH, and Dr. Masaya Kato from WHO South-east Asia Regional Office (SEARO).

Dr. Arief Anshory Yusuf shared an economist point of view of Covid-19 in Indonesia. He spoke about 'economic comorbid' of some Indonesian population that made them vulnerable to Covid-19. Those 'economic comorbid' include poverty and vulnerability, income equality, unfavorable structural transformation, and low social protection. He advised Indonesia to eliminate the economic comorbidities to anticipate future pandemic, with focusing on equity rather than growth and empowering state capacity particularly on fiscal space as key to the agenda.

Dr. Hannah Clapham shared how modeling could inform policy decisions for surveillance, outbreak preparedness, and response. She explained case studies in Singapore that utilized modeling to assess the impacts of different control measures and vaccinations and models developed, a case study on modeling to assess the impacts of different types of vaccines and vaccination strategies prior to the vaccination program in Thailand, and a case study of assessing transmission from gaps in immunity in ten countries. She emphasized the process of modeling that is useful to understand the population-level impact with a range of scenarios for different vaccine types and target groups.

Dr. Prima Yosephine spoke on strengthening cross-sectoral collaborations in immunization programs for Indonesia's outbreak preparedness and response. She shared MOH learnings from Covid-19: keeping a close relationship with all stakeholders for routine immunization and VPD surveillance and involving all stakeholders in all steps of preparation, implementation, monitoring, evaluation, and promotion of vaccination and surveillance initiatives on various communication channels. MOH had put more attention to strengthening ground-level implementation which was identified as one of the main challenges during Covid-19.

Dr. Masaya Kato spoke about how collaborative surveillance could strengthen global architecture for health emergency preparedness, response, and resilience (HEPR). He explained that collaborative surveillance is one of five interconnected HEPR subsystems. The goal was to enhance public health intelligence and improve evidence for decision-making. It emphasized the systematic strengthening of capacity and collaboration of diverse stakeholders within and outside the public health sector. It adopted one health approach of integrated disease surveillance. The concept was not new; however, he explained the relative importance was the varying approach over the emergency cycle. He shared the vision for disease surveillance that addresses the intersection of different surveillance programs, enables flexibility, and incorporates other relevant data that available models did not capture through flexible modalities of integration.

Key takeaways:

- Indonesia needs to focus on strengthening both health and non-health determinants that affect population's vulnerability during the time of crisis.
- Modeling vaccine preventable diseases could be utilized as a tool to help inform policy decisions before and during the time of crisis.
- Collaborative surveillance in Indonesia could be improved by including other type of surveillance and consolidation of surveillance activities, improving data and information sharing, and open communication of surveillance findings.

Photo 5. Top figure, from left to right: Prof. Mark Jit (LSHTM), Asst. Prof. Hannah Clapham (SSHSPH NUS), Dr. Arief Anshory Yusuf (UNPAD). Middle figure, on video: Dr. Prima Yosephine (Indonesia MOH). Bottom figure, on video: Dr. Masaya Kato (WHO SEARO)

Short course

The short course was held on 16-18 May 2023 at UNPAD Training Center, Bandung, Indonesia. There were 48 (16 May), 32 (17 May), and 36 (18 May) participants joining the workshop from Indonesia, the Philippines, Vietnam, and Laos. The participants are representatives from universities, MOH and other government agencies, and manufacturers. The list of participants is

provided in Appendix 2. Fourteen lectures were delivered under three main topics: epidemiology of vaccination and clinical trials, modeling health and economic impact of vaccines, and policy and implementation of vaccination programs. The lectures are mainly delivered in a standard teaching format and some with interactive discussions. The short course agenda is provided in Appendix 1.

Epidemiology of vaccination and clinical trials

Epidemiological concepts related to vaccination (Asst. Prof. Hannah Clapham, SSHSPH NUS): The lecture introduced epidemiological study designs, such as randomized control trials (RCT), ecological studies, case-control studies, and cohort studies. She described the strengths and limitations of each study design and how to select the most suitable design for different research questions. She also introduced the outcomes measured in epidemiological studies (e.g., risk ratio) and how the outcomes were interpreted.

Vaccine efficacy (Asst. Prof. Hannah Clapham, SSHSPH NUS): The lecture was introductory to vaccine efficacy. It began with the basic concepts of vaccines, including the basic pharmacology of vaccines. She highlighted the difference between vaccination and immunization, and that a vaccinated person may not necesarilly be protected from disease; therefore, vaccine efficacy was measured as an indication of the likelihood that someone received protection after getting vaccinated. She explained the distinction between efficacy and effectiveness, the study designs commonly used in efficacy studies, how to calculate the outcome measures, potential biases and how to minimize them, and potential study limitations.

Herd immunity and other indirect effects of vaccines (Prof. Paul Fine, LSHTM): The lecture emphasized vaccines' different levels of protection against infection, transmissibility, illness, and death and focuses on the outcome measures of vaccine efficacy. He explained the concept of the attack rate which can be used as one term in the formula for estimating vaccine efficacy. He introduced the direct and indirect (herd) effects of vaccines and which study designs could help to measure them. He also explained the concept of basic reproduction number (R_0) that represents the number of infected individuals assuming no one is immune to the pathogen and how to calculate the herd immunity threshold. He demonstrated a case study on how these measures were used in research and concluded that eliminating an infection was more complex than these simple thresholds imply and some downsides of herd immunity.

Vaccine clinical trials (Dr. Sushant Sahastrabuddhe, IVI): The lecture discussed clinical trial phases, and planning. The lecture began by the introduction of research and development process of new products from discovery to clinical trials. He mentioned aspects to be considered to introduce a vaccine in the market, including the high investment, risk of failure, and long development process. These set the stage for why planning was crucial in the process of developing vaccines. In the clinical trial phase, understanding the target product profile (outlining the desired product characteristics for a particular disease) and a clinical development plan were

essential before conducting the trials. He explained in detail the objective, study designs, and presented some case studies for phase I, II, IIb, and III trials.

Vaccine journey: from the lab to the people (Dr. Rahman Roestan, Biofarma): The lecture discussed lessons from the Covid-19 pandemic era: lack of access to vaccine availability and industry readiness. He explained that pharma industries must foster synergies and partnerships toward pandemic preparedness in the future. He also described the Biofarma strategies in providing Covid-19 vaccine in Indonesia: ready-to-fill bulk for fill or finish technology (short term), collaboration with research institutions, and acquiring new platform technology, especially for pandemic vaccines (mid and long term). He summarized the two main points of the industry strategies in providing vaccines: innovation (either in vaccines or diagnostic kits) and collaboration (with researchers, government, and other industries).

Statistical and reporting issues related to vaccine trials (Prof. Peter Smith, LSHTM): The lecture started with a general approach to interpretation of statistical results in clinical trials and the concept of statistical 'power' for calculating sample size. He explained the considerations for determining sample size that revolve around what the study was designed to detect. He introduced other concepts such as period at risk, variable follow-up time in trials, and the difference between 'intention to treat' and 'per protocol' analyses. He showed why and how sub-group analyses should be carefully conducted by using case studies of PCV and maternal Respiratory Syncytial Virus (RSV) vaccines. He concluded the lecture with ways of adjusting for potential confounding in clinical trials.

Photo 6. From left to right, first row: Dr. Rahman Roestan (Biofarma), Asst. Prof. Hannah Clapham (SSHSPH NUS), Dr. Sushant Sahastrabuddhe (IVI). From left to right, second row (on video): Prof. Paul Fine (LSHTM), Prof. Peter Smith (LSHTM).

<u>Modeling health and economic impact of vaccines</u>

Introduction to infectious disease modeling (Prof. Mark Jit, LSHTM): This introductory lecture covers basic concepts of modeling, types of models for infectious diseases, and a small exercise to construct a basic infectious disease model using Excel. Prof. Mark introduced decision tree,

Markov, compartmental transmission dynamic, and individual-based models. He explained the characteristics of each model and provided examples of situations that were suitable for each model. He dived into detail about SIR compartmental models for infectious diseases and introduced the basic mathematical representations of the model. The class had a small exercise in building the model using the equations and discussed how to interpret the results from the model.

Economic evaluation of vaccination programs (Prof. Mark Jit, LSHTM): The lecture introduced basic concept in economics and economic evaluations for vaccination programs. Basic concepts include scarcity, opportunity cost, rationing, externalities and terms used in economic evaluations. He discussed a study by the World Bank that estimated the cost per DALY for essential health services, including vaccines. He showed that vaccine costs were unaffordable in many low- and middle-income countries. He also explained that economic evaluations could be used to help governments and organisations decide which vaccines to procure. He explained different types of economic evaluations and how they were utilized to answer different sets of questions. He concluded that economic evaluations could help to ensure that limited resources were allocated based on transparent criteria.

Photo 7. From left to right, first row: Prof. Mark Jit (LSHTM), teaching assistant and participant. Second row: teaching assistants and participants.

<u>Policy and Implementation of vaccination programs</u>

Role play in access to vaccines: sharing in the benefits of vaccine research and development (Prof. David Heymann, LSHTM): This interactive role play took the case study of H5N1 virus sharing which was raised at the World Health Assembly by a former Indonesian Minister of Health. Volunteer participants took roles of keye participants at the World Health

Assembly (WHA) while others played the role of member state representatives, arguing over issues around access to the H5N1 virus and vaccines based on it. The role play highlighted gaps in equity in vaccine access, such as the unavailability of vaccine suppplies, lack of funding, financing schemes, and supporting international health regulations at that time. Prof. Heymann summarized the session by explaining how regional and international organizations responded and introduced new global initiatives to provide better vaccine access.

Vaccine surveillance (Prof. David Heymann, LSHTM): The lecture started with reviewing the public health uses of vaccines, from routine disease elimination to outbreak control and prevention, using a case study of Ebola. He also explained some strategies for surveillance to support the introduction of vaccines and the collaboration required. He introduced some methods for surveillance, such as rapid estimation using routine case reporting, serological surveys, and active surveillance using standard case definition and laboratory confirmation. He presented several use cases of these methods for surveillance in Afghanistan, Pakistan, and India. He concluded the lecture by sharing that different diseases require different approaches to control, and not all diseases can be eradicated; therefore, optimal strategies should be carefully considered for controlling the disease.

Post-licensure Evaluation: The Experience of Biofarma (Dr. Rini Mulia Sari, Biofarma): Dr. Rini started the lecture by explaining two types of evaluation: effectiveness and safety. She dived into the safety aspect using the surveillance method. She mentioned global regulations and local regulations on pharmacovigilance, stakeholders involved in the surveillance, and reporting standards for different report types. She explained that the pharmacovigilance practices in Biofarma include the management of individual case safety report, signal detection and management, and safety evaluation report management. She described each item in detail and mentioned these practices applied to all products produced and/or distributed by Biofarma.

Vaccination communication (Dr. Iqbal Pramukti, UNPAD): The lecture began with the Covid-19 vaccine issue of hesitancy, in which misinformation partly took a role. Dr. Iqbal presented his study validating vaccination acceptance among universities across Taiwan, Indonesia, and Malaysia, using a validated instrument, The Motors of Covid-19 Vaccination Acceptance Scale (MoVac-Covid19S). The study discussed that communication of Covid-19 vaccines should contain four factors: values, impact, knowledge, and autonomy to help reduce vaccine hesitancy. He also presented another study investigating Indonesian university students' willingness to have the covid-19 vaccines and the mental health status of university students that had been and had not been vaccinated. The study concluded that two-thirds of the total sample had a high willingness to receive vaccines and students that had been vaccinated were in a better mental health state compared to those who had not been vaccinated.

Getting vaccines to where they are needed (Dr. Roy Himawan, MOH): The lecture emphasized the importance of vaccine supply, research and development, and delivery. He also explained that learning from the pandemic, the Indonesian Government has designed strategies to provide vaccines where needed, such as improving the readiness of vaccine R&D and manufacturing;

transforming health systems; building partnerships of health sector R&D, manufacturers, and health facilities. He described that Indonesia would have healthcare financing, workers, and technology transformation for the next three years and regulate Clinical Research Unit in every hospital as a unit that provides one clinical trial spot. He concluded that once the vaccine research & development, manufacturing, and delivery are improved, Indonesia will gain the success of the vaccination program.

Case study of PCV in Thailand (Chotika Suwanpanich and Dimple Butani, HITAP): The interactive session was designed to simulate the decision-making process using a real-world case study of Thailand. The participants were divided into groups by different roles: patients, physicians, MOH, payers, and researchers. They had to provide an argument from the perspective of the role they played about whether to fund or not fund PCV in Thailand based on two available pieces of evidence that were produced in 2013 and 2021. The lecture concluded with the decision made in Thailand and a presentation by Dr. Auliya Suwantika on the case study of PCV in Indonesia that changed the regulatory landscape of vaccination procurement.

Key takeaways:

- The rapid vaccine development during Covid-19 pandemic was one of the proofs. There are a lot of potential of vaccines in this era and Indonesia should maximize opportunities for better health of its population.
- Vaccines are complex due to its nature of preventing diseases, indirect, and long-term effects, and complex interactions between host and pathogen. Most of the lectures are introductory lectures and there should be a continuation in building capacity of relevant stakeholders to produce evidence-informed decision making and achieve the country's goals.
- Vaccinology requires interdisciplinary work, therefore better collaboration between stakeholders is encouraged.

Photo 8. From left to right, first row: Dr. Roy Himawan (MOH), Prof. David Heymann (LSHTM). Second row: participants in role play. From left to right, third row: Dr. Iqbal Pramukti (UNPAD), Dr. Rini Mulia Sari (Biofarma). From left to right, fourth row: Chotika Suwanpanich (HITAP), Dimple Butani (HITAP), and Dr. Auliya Suwantika (UNPAD)

Photo 9. Workshop participants

Evaluation

Policy conference

A feedback form was distributed to participants through a QR code display on the screen at the end of the event. The response rate was 63% (47 responses out of 75 participants). The average rating for all sessions was 4.59 out of 5.00, and the average rating for the overall program was 4.60 out of 5.00. Participants mentioned that topics on policy advocacy, health insurance, and program implementation could be covered in the policy conference. The general comments were to have more in-person speakers, longer discussions, and better technical preparation (e.g., standardized presentation template). Overall, the participants found the conference to be useful for their current work.

Table 1. Average ratings of policy conference sessions

	Average Rating

Session 1: Setting Priorities for New Vaccines	4.62
Session 2: The Role of Technologies in Achieving National Vaccination Strategy	4.57
Session 3: From Data to Decisions: Resource Capacity and Using Evidence to Inform Vaccine Policy Development	4.55
Session 4: Charting a Path to Sustainable Immunization Programs	4.61

Table 2. Average ratings of the overall program

Overall program	Average Rating
Program structure	4.72
Program delivery	4.53
Program management	4.57

Short course

A feedback form was distributed to participants at the end of day one, resulting in a 29% response rate (14 responses out of 48 participants). There were two indicators measured: relevance & quality and delivery. The average ratings (maximum rating of 5.00) for each session are shown in Table 3. The general comments from participants were to have the lectures more engaging, longer question and answer sessions, and a screen issue that was not clearly visible.

Table 3. Average ratings for workshop sessions on day one

Shourt course Day 1 (n=14)	Relevance & Quality	Delivery
Session 1: Getting Vaccines Where Needed	4.50	4.50
Session 2: Epidemiological Concepts Related to Vaccination	4.79	4.79
Session 3: Vaccine Journey: From the Lab to the People	4.54	4.46
Session 4: Vaccine efficacy	4.77	4.85
Session 5: Herd Immunity	4.83	4.75

On day two, feedback forms were disseminated at the end of each session with the aim of getting higher response rates. The response rates were 41% for sessions six to eight (13 responses out of 32 participants), 56% for session nine (18 responses out of 32 participants), and 69% for session ten (22 responses out of 32 participants). The indicators for relevance and quality were scored separately as the committee thought there were differences in those aspects. The average ratings (maximum rating of 5.00) are shown in Table 4. Some general comments were to make some sessions longer and shorter, improve slide visibility and have the statistical lecture in the morning.

Table 4. Average ratings of workshop sessions on day two

Short course Day 2	n	Relevance	Quality	Delivery
Session 6: Vaccine Trials	13	4.92	4.77	4.69
Session 7: Case Studies in Vaccination	13	4.92	4.77	4.85
Session 8: Surveillance and Burden Estimation	13	4.75	4.42	4.83
Session 9: Modelling Vaccine Preventable Diseases	18	5.00	5.00	4.92
Session 10: Statistical and Reporting Issues Related to Vaccine Trials	22	4.77	4.31	4.46

On day three, a similar approach was used as day two to obtain better response rates. The response rates were 67% for session eleven (24 responses out of 36 participants), 61% for session twelve (22 responses out of 36 participants), 36% for session thirteen (13 responses out of 36 participants), 28% for session fourteen (10 responses out of 36 participants), and 61% for session fifteen (22 responses out of 36 participants). The average ratings (maximum rating of 5.00) are shown in Table 5. The general comment was to have more space and a more conducive environment for practice sessions. At the end of the day, we distributed another feedback form for the overall program. The response rate was 56% (20 responses out of 36 participants), with the average ratings (maximum rating of 5.00) shown in Table 6. Some general comments were to have more case studies and interactive sessions and to improve some technical items such as visual and audio. Overall, participants were satisfied with the workshop.

Table 5. Average ratings for workshop sessions on day three

Workshop Day 3	n	Relevance	Quality	Delivery
Session 11: Practice on Modelling Vaccine Preventable Diseases	24	4.96	5.00	4.96

Session 12: Economics of Vaccination	22	5.00	4.95	4.95
Session 13: Post-licensure Evaluation	13	4.75	4.42	4.83
Session 14: Vaccine Acceptance	10	3.9	4.2	3.8
Session 15: PCV Role play	22	4.91	4.86	4.86

Table 6. Average ratings for the overall workshop program

Overall program	Average Rating
Program structure	4.85
Program delivery	4.85
Program management	4.80

Outcomes

This course strengthened the partnership between HITAP, NUS, LSHTM, UNPAD, and ADP, as well as brought in a new partner, Biofarma. Vaccinology has been one of Indonesia's highlighted issues, with the introduction of new vaccines in the EPI, such as PCV, HPV, and Rotavirus vaccines. The policy conference brought stakeholders from MOH and other government representatives, health workers, health providers, manufacturers, and researchers, to understand the process and new tools adopted in introducing these new vaccines and potential advancement for Indonesia's vaccinology work.

The workshop helped to build the capacity of researchers, MOH, and other government agencies, and manufacturers on vaccine development to delivery. As the lectures were mainly introductory, they suited the need of most participants that require a broader set of understanding along the vaccine value chain. The workshop also brought closer the participants that represent different stakeholders that worked in the vaccinology area in Indonesia and would strengthen collaboration between stakeholders for future work.

Lessons Learned

HITAP, LSHTM, and UNPAD conducted an after-action review meeting after the workshop on day three (18 May) concluded. The meeting aimed to evaluate the preparation and implementation of all aspects of the course, such as academics, logistics, partner engagement, communication, and promotion, from the organizers' perspective. The attendee list is presented in Appendix 3.

The meeting participants' were asked the following questions and answer from their point of view based on their responsibilities or other aspects in the course: what did we expect to happen? What really happened? What went well and why? What would you do differently for the next course? Any other suggestions? For the preparation phase, the team thought to have at least one year of preparation. The team only had six months of preparation for this course and led to substantial issues regarding the funding. The issue was sorted in time, but required more effort than it should have. It also led to uncertainty in the availability of many of the speakers, and the programme having to be finalised quite late. For the implementation phase, the main discussion was around the logistics during the course, as there were issues regarding the audio and video throughout the course. The team thought that it would be good to have more in-person speakers, for better engagement and technical arrangement. The output from the meeting was recommendations and lessons learned for future courses, summarized in Table 7.

Table 7. Summary of after-action review meeting

Category	Preparation	Implementation
Logistics	• High likelihood of speakers sending presentations in last minute, prepare a clear	• Plan a sufficient time to conduct dry run

	procedure for the teams on the ground to enable faster slide sharing • Prepare a sufficient time for participants to confirm their registration • Prepare a sufficient time for the technical team to get acquainted with technical tools (e.g., laptop) and system	• Have a clear checklist for all technical items, such as projector and audio quality, therefore the team could mitigate potential issues earlier • Get to know all technical team members from the vendors, ensure they are on standby during the event • Each technical team lead to have a dedicated standby post for easier coordination • Prepare sufficient ice breaking ideas to fill in extra technical preparation time • Have a timer that all participants can see to ensure everything are on time (esp. during breaks)
Note-taking	• Read and familiarize the presentation material before the event • Moderators and/or session lead to have a meeting with note-takers to provide an overview of the talking points	• Ensure someone in the note-taking team has a good level of understanding on each topic
Academic	• Have more young researchers involved in delivering the course • Understand institutions' characteristics and have tailored mitigation plans • Have a sufficient time to discuss with organizers, moderators, and speakers to plan for a session	• To have the course structure explained on day one • Consider a longer time period for the workshop
Planning and budgeting	• Plan at least one year ahead of the course and match the proposal submission timing with funders' budget plan submission timeline • Expect prolonged timeline for budget discussion with partners	N/A

Appendices

Appendix 1 – Agenda

Policy conference (15 May 2023)
Venue: Biofarma hall

Time	Session Title	Description	Speakers and Moderators
08.00	Factory visit at Biofarma, leave to the factory at 07.45		
08.45	Participants gather in the Biofarma hall + break		
09.00 + 30’	Opening		**Rector of UNPAD** **Director of Biofarma**
09.30 + 30’	Setting priorities for new vaccines	What are the barriers to introducing vaccines? How is the current process for setting new vaccines priorities in Indonesia? What are the challenges?	**Prof. Sri Rezeki Hadinegoro** (Immunization Technical Advisory Group Indonesia)
		From HTA perspective, are UHC policies complementing vaccine policy? If yes, how can policymakers leverage UHC to advance vaccine policy? If not, how can we make it supportive of vaccine policy? From HTA perspective, how can one work with Ministries of Finance to increase prioritization for vaccines?	**Prof. Mardiati Nadjib** (Indonesia HTA Committee)
		What are the innovative policies currently being used for financing vaccines in countries?	**Dr. Auliya Suwantika** (CHTA, Universitas Padjajaran)

Time	Session Title	Description	Speakers and Moderators
		How can one make vaccines a priority for healthcare payers when competing with other disease areas? WHO CAPACITI tool project	
			Moderator: **Kinanti Khansa Chavarina** (Health Intervention and Technology Assessment Program)
10.45 + 30’	Break		
11.00 + 30’	The role of technologies in achieving national vaccination strategy	How is the current technology advancement in vaccinology (from research to distribution)? Which technology has been implemented? How is the implementation process?	**Dr. Neni Nurainy** (Head Division of Vaccine Development, Biofarma)
		How can technology help Indonesia to achieve national resilience?	**Prof. Toto Subroto** (Vaccine Development Expert, UNPAD)
		Developing mRNA: global perspective on policy implications	**Dr. Martin Friede / Claudia Nannei** (WHO HQ)
		Digital initiative: the role of technology to ensure higher vaccination coverage – SMILE	**Vidia Darmawi** (United Nations Development Programme, Indonesia)
			Moderator: **Asst. Prof. Hannah Clapham** (National University of Singapore)
12.15 + 30’	Lunch break		
13.30 + 30’		How can one empower decision-makers to make best use of the evidence available and enhance their knowledge on HTA?	**Dr. Adiatma Siregar** (Universitas Padjadjaran)

Time	Session Title	Description	Speakers and Moderators
	From data to decisions: Resource capacity and using evidence to inform vaccine policy development	What kind of evidence is important for decision-makers?	**Dr. Syarifah Liza Munira** (Head of Health Development Policy Agency, Ministry of Health)
		How National Immunization Technical Advisory Groups (NITAGs) can better collaborate and coordinate with stakeholders involved in vaccine policymaking? What are the learnings from previous crises? What are the challenges and potential solutions in communicating evidence to policymakers?	**Prof. Mark Jit** (London School of Hygiene and Tropical Medicine)
		Case studies on new vaccine introduction: challenges in communicating evidence to policymakers	**Sushant Sahastrabuddhe** (International Vaccine Institute)
			Moderator: **Dr. Neily Zakiyah** (Universitas Padjajaran)
14.45 + 30’	Break		
15.00 + 30’	Charting a Path to Sustainable Immunization Programs and Preparedness/Response Strategies	How can these learnings help countries to better prepare for the next crisis? What is Indonesia’s strategy and/or plan to prepare the next crisis?	**Prof. Arief Anshory Yusuf** (Director of the Economy and Environment Institute Indonesia/UNPAD)
		Learnings from Covid-19/other crisis surveillance and response	**Asst. Prof. Hannah Clapham** (National University of Singapore)
		Strengthening field-epi role and cross-sectoral collaborations for VPD surveillance, outbreak preparedness and response	**Dr. Prima Yosephine** (Director of Immunization Services, Ministry of Health)

Time	Session Title	Description	Speakers and Moderators
		'Collaborative Surveillance' as a priority for global architecture for health emergency preparedness, response, and resilience – global/regional perspectives	**Dr**. **Masaya Kato** (WHO SEARO)
			Moderator: **Prof. Mark Jit** (London School of Hygiene and Tropical Medicine)
16.15 + 30’	A way forward and closing remarks		**Asst**. **Prof. Hannah Clapham** Dr. Neily Zakiyah (Universitas Padjajaran)
16.45 + 30’	End of program		

Workshop (16 – 18 May 2023)

<table>
<tr><th>Time (GMT+7)</th><th>Workshop Day 1</th><th>Workshop Day 2</th><th>Workshop Day 3</th></tr>
<tr><td>09:00</td><td rowspan="3">Opening remarks – Prof. Ajeng Diantini (Director of Research and Community Engagement UNPAD)

Keynote address – Dr. Lucia Rizka Andalucia (Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health)</td><td>Recap, Q&A and day overview

Prof. Mark Jit
London School of Hygiene and Tropical Medicine</td><td>Recap, Q&A and day overview

Hannah Clapham
National University of Singapore</td></tr>
<tr><td>09:15</td><td rowspan="4">Vaccine trials – phase I, II, III, and safety

Dr. Sushant Sahastrabuddhe
International Vaccine Institute</td><td rowspan="4">Practice on modelling vaccine preventable diseases

Prof. Mark Jit
London School of Hygiene and Tropical Medicine</td></tr>
<tr><td>09:30</td><td rowspan="2">Introduction and overview

Prof. Mark Jit
London School of Hygiene and Tropical Medicine</td></tr>
<tr><td>09:45</td></tr>
<tr><td>10:00</td><td rowspan="4">Getting vaccines where needed

Dr. Roy Himawan
(Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health)</td></tr>
<tr><td>10:15</td><td>Coffee break</td><td>Coffee break</td></tr>
<tr><td>10:30</td><td rowspan="2">Case studies in vaccination (interactive class exercise, role play)

Prof. David Heymann
London School of Hygiene and Tropical Medicine</td><td rowspan="2">Economics of vaccination

Prof. Mark Jit
London School of Hygiene and Tropical Medicine</td></tr>
<tr><td>10:45</td></tr>
<tr><td>11:00</td><td>Coffee break</td></tr>
</table>

Time (GMT+7)	Workshop Day 1	Workshop Day 2	Workshop Day 3
11:15	Epidemiological concepts related to vaccination **Dr. Hannah Clapham** National University of Singapore	(105 mins)	Post-licensure evaluation **Dr. Rini Mulia Sari** Biofarma
11:30			
11:45			
12:00			
12:15	Lunch break	Lunch break	Lunch break
12:30			
12:45			
13:00			
13:15	Vaccine journey: from the lab to the people **Dr. Rahman Roestan** Operational Director of Biofarma	Surveillance and burden estimation **Prof. David Heymann** London School of Hygiene and Tropical Medicine	Vaccine acceptance **Dr. Iqbal Pramukti** UNPAD
13:30			
13:45			
14:00			
14:15	Coffee break	Coffee break	Coffee break
14:30	Vaccine efficacy **Dr. Hannah Clapham** NUS	Modelling vaccine preventable diseases **Prof. Mark Jit** LSHTM	Case study: PCV/HPV **Chotika Suwanpanich, Dimple Butani**
14:45			
15:00			
15:15			

Time (GMT+7)	Workshop Day 1	Workshop Day 2	Workshop Day 3
		(75 mins)	Health Intervention and Technology Assessment Program
15:30	Preparation for role play **Prof. David Heymann** LSHTM		Closing remarks, evaluation and general Q&A, distribution of certificates
15:45	Coffee break	Coffee break	
16:00	Herd immunity and other indirect effects of vaccination **Prof. Paul Fine** LSHTM	Statistical and reporting issues related to vaccine trials **Prof. Peter Smith** LSHTM	
16:15			
16:30			End of programme
16:45			
17:00	Summary and agenda review for next day	Summary and agenda review for next day	

Appendix 2 – List of Participants

Complete Participant List of ID Vaccinology

Appendix 3 – After-action review meeting attendees

Name	Institution
Mark Jit	LSHTM
Khansa Chavarina	HITAP
Dimple Butani	HITAP
Chotika Suwanpanich	HITAP
Sarin K C	HITAP
Saudamini Dabak	HITAP
Auliya Suwantika	UNPAD
Febby Valentine Purwadi	UNPAD
Yasmin Fatinah	UNPAD
Yudisia Ausi	UNPAD
Bagus Adhinagoro	UNPAD
Qisty Aulia Khoiry	UNPAD
Farida Rendrayani	UNPAD
RR Kalinda Nareswari	UNPAD
Aghnia Hazrina	UNPAD
Alifah Fathina Naufalia	UNPAD