



Basic Research for Improving the Contagious Disease Preparedness/Response Systems of KOICA Partner Countries

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Basic Research for Improving the Contagious Disease
Preparedness/Response Systems of KOICA Partner Countries

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Terminology (in Alphabetical Order)

Acronym	Definition
SOP	Standard operating procedures
AADMER	ASEAN Agreement on Disaster Management and Emergency Response
SPS	Sanitary and Phytosanitary Measures
ADDRL	Animal Disease Diagnosis and Reference Laboratory
SWOT	Strength/Weakness/Opportunity/Treatment Analysis
AFENET	African Field Epidemiology Network
TB	Tuberculosis
AFP	acute flaccid paralysis
THIRA	Threat and Hazard Identification and Risk Assessment
AIDS	Acquired Immune Deficiency Syndrome
TOR	Terms of Reference
AMR	antimicrobial resistance
APHA	American Public Health Association
TTX	Table Top Exercise
APSED	Asia Pacific Strategy for Emerging Diseases
TWG	Technical working group
ARIS	Animal health Resource Information System
UNICEF	United Nations Children's Fund
ASEAN	Association of South East Asian Nations
UNSC	UN System Influenza Coordination
ASF	African Swine Fever
USAID	United States Agency for International Development
BSL	Biosafety level
VHF	Viral Haemorrhagic Fever
CBA	Cost-Benefit Analysis
VPD	Vaccine Preventable Diseases
CBRN	chemical, biological, radiological, nuclear
WAHIS	World Animal Health Information System
CD	Communicable Disease
WASH	Water Sanitation and Hygiene programme
CDC	United States Centres for Disease Control and Prevention
WHO	World Health Organization
CDMS	Chronic Disease management System

Acronym	Definition
WPRO	WHO Office for the Western Pacific Region
CDSS	Clinical Decision Support System
ZD	Zoonotic disease
CEN	Comite Europeen de Normalisation, European Committee for Normalization, European Committee for Standardization
CHC	community health centre
CNRP	National Centre of Radiation Protection
CPG	Clinical Practice Guidelines
CPHL	Central Public Health Laboratory
CPOE (=OCS)	Computer Based Physician Order Entry
CPR	Computer-Based Patient Record
CSO	Civil Society Organizations
CVDPV	Circulating Vaccine Derived Poliovirus
DA	Department of Agriculture
DEWS	Disease Early Warning System
DHHS	Department of Health and Human Service
DHIS	District Health Information System
DI	Digital Imaging
DOH	Directorates of Health
DPCB	Disease Prevention and Control Bureau
DPT	Diphtheria pertussis and tetanus vaccine
DSS	Disease Surveillance System
EAC	East African Community
EBS	Event-based surveillance
ECDC	EURO CDC
EET	external evaluation team
EID	emerging infectious disease
EMPHNET	Eastern Mediterranean Public Health Network
EMT	Emergency Medical Team
EOC	Emergency Operations Centre
EPA	Environmental Protection Agency
EPI	Expanded Programme for Immunization
EPR	Emergency preparedness and response
EQA	External Quality Assessment
EVD	Ebola virus disease
EVM	Effective Vaccine Management
EWAR	Early Warning, Alert and Response

Acronym	Definition
EWARS	Early Warning Alert and Response System
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration
FELTP	Field Epidemiology and Laboratory Training Program
GAP	Global Action Plan
GHS	Globally harmonized system of classification and labelling of chemicals
GHSA	Global Health Security Agenda
GHSI	Global Health Security Initiative
GIS	geographic information systems
GLASS	Global Antimicrobial Resistance Surveillance System
GMO	Genetically Modified Organisms
GOARN	Global Outbreak Alert and Response Network
HACCP	Hazard analysis of critical control points
HCAI	Health Care Acquired Infections
HIS	Health Information System
HIV	Human Immunodeficiency Virus
HMN	Health Matrix Network
HPV	Human papilloma virus
HR	human resources
HRH	Human resources for healthc
IAEA	International Atomic Energy Agency
IATA	International Air Transport Association
IBS	indicator-based surveillance
ICC	Interagency Coordinating Committee
ICD	The International Classification of Diseases

Abstract

This study is intended to be used as basic data when determining the current status of infectious diseases in KOICA cooperation countries and when KOICA selects the field, country, method, and timing of support for partner countries as a donor. The main method of understanding the status of infectious diseases of cooperation countries was to quantify and analyze JEE and SPAR evaluation results known to present an unbiased standard of IHR by 1-5 points.

As a result of the annual self-investigation of SPAR by focal point(health officials) from cooperation countries, out of the 10 capacities in 2019 compared to 2018, the remaining 9 capacities excluding the “point of entry” sector increased slightly, and the Zoonotic disease capacity rose 2.7%, showing the largest difference increase. The weakest capacities of the JEE standard were Antimicrobial resistance, Point of entry, Linking public health with security authorities, Emergency preparedness. The countries included Afghanistan, Nigeria, DR Congo, East Timor, and Cameroon. The weakest indicators based on SPAR in 2019 were

Workforce development, Risk communication, Medical countermeasures and personnel deployment, Emergency preparedness, Food safety, Zoonotic disease, and countries include East Timor, Laos, Nepal, DR Congo, and Cote d'Ivoire. As a result of analysis by KOICA department(by continent), the indicators of weakness are as follows.

- ① Southeast Asia Department I- Myanmar(Emergency preparedness), Cambodia (Emergency response operations)
- ② Southeast Asia Department II- East Timor(Zoonotic disease, Emergency preparedness, Linking public health with security authorities)
- ③ Southwest and Pacific Asia Department- Afghanistan(National legislation,

Antimicrobial resistance, Food safety, Biosafety and biosecurity, Point of entry), Pakistan(Antimicrobial resistance, Emergency preparedness), Nepal (National legislation, Zoonotic disease, Food safety), Sri Lanka(Emergency preparedness)

- ④ Middle East and Central Asia Department- Iraq(National legislation), Azerbaijan(National legislation, Food safety)
- ⑤ East Africa Department- Kenya(Medical countermeasures and personnel deployment), Rwanda(Antimicrobial resistance), Mozambique(Emergency preparedness)
- ⑥ West Africa Department- DR Congo(Antimicrobial resistance, Food safety, Emergency preparedness, Linking public health with security authorities, Medical countermeasures and personnel deployment, Point of entry), Cote d'Ivoire(Antimicrobial resistance), Senegal(Point of entry), Ghana(Antimicrobial resistance, Medical countermeasures and personnel deployment), Nigeria(National legislation, Emergency preparedness, Linking public health with security authorities, Medical countermeasures and personnel deployment, Point of entry), Cameroon(National legislation, Point of entry).

From the results of this study, it was possible to know the current status of vulnerable health care in KOICA partner countries, and it was an opportunity to use basic data to search for the timing, fields, and methods of support for Korea as a donor country. Even in the recent Corona-19 situation, Korea has been receiving attention from all over the world as it has been well controlled by utilizing a high health care system. Now that it can be said that sufficient qualifications as a donor country have been verified, it is necessary to find a role and method for supporting the donor country and exporting K-quarantine.

Key words: JEE, SPAR, Cooperation country, Health care facilities, Health care aid

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I. Introduction

1. Content and Purpose of Research

1) Research Content

(1) Analysis of partner countries contagious disease management systems

- Summary of each partner country's joint external evaluation (JEE) and state party self-assessment annual reporting (SPAR) in Korean; analysis of partner countries' contagious management systems
- Analysis of contagious disease response and management by KOICA partner countries through interviews with their ambassadors

(2) Need for and the background to analysis of partner countries' contagious disease response systems

- As a large number of JEEs and SPARs date back to before the current COVID-19 pandemic, an update of information on the progress of and the response to the COVID-19 pandemic and of health/medical systems is required.
- Of the 44 KOICA partner countries, 29 have undergone the JEE. The contagious disease response systems of the countries that have not had a JEE done were assessed through an analysis of SPAR results and related literature.

(3) Identification of an effective approach to official development assistance (ODA) projects related to contagious disease by KOICA and key donor agencies

- Understanding of contagious disease-related ODA projects of KOICA and key donor agencies; understanding of the details of project components and methods

- Based on such understanding, schemes are proposed for linking contagious disease-related ODA projects with KOICA's existing projects, and the direction of new projects.

2) Research Purpose

(1) Analysis of the 44 partner countries' resources and systems for contagious disease response

- Analysis of partner countries' JEEs
- Analysis of partner countries' SPARs
- Analysis of partner countries' resources and governance for contagious disease response through their ambassadors
- Collection of data on contagious disease management through KOICA offices in partner countries

(2) Presentation of novel contagious disease response strategies

- Presentation of strategies in line with partner countries' resources and governance in contagious disease management
- Presentation of schemes to support the ongoing exchange of novel contagious disease information with partner countries
- Proposal for the innovation of partner countries' contagious disease management in conjunction with the World Health Organization's (WHO) Sustainable Development Goals (SDG) index

(3) Update of partner countries' data on contagious disease

- Analysis of data through cooperation with WHO regional officials
- Collection of data on contagious disease management through KOICA offices in

partner countries

(4) Formation of schemes for improving the KOICA's contagious disease-related projects

- Presentation of an effective contagious disease management system based on an analysis of partner countries' contagious disease management systems
- Presentation of KOICA's contagious disease-related programs, in consideration of partner countries' health and medical resources
- Development of KOICA projects aimed at sharing Korea's COVID-19 response strategies and experiences with 44 partner countries

3) Anticipated Effects

- Improvement of KOICA partner countries' contagious disease response systems and update of their data on contagious disease, to contribute to the formation of efficient contagious disease response strategies by KOICA partner countries
- Systematic organization of data on KOICA partner countries' medical systems and contagious disease response strategies, to contribute to strengthening their cooperation with Korean health/medical institutes, and with donor agencies
- Analysis of the structures and outcomes of KOICA projects to gain an understanding of their effectiveness, and to contribute to the formation of effective strategies for future projects related to contagious disease

II. Research Methods and Execution of Research

1. Analytical Methods and Execution of Analysis

1) Analytical Methods

(1) Study of literature

- Study of materials on contagious disease held by Korean donor agencies (KOICA, Economic Development Cooperation Fund [EDCF]), i.e. study and organization of materials, comparison and analysis of evaluation/reporting systems
- Analysis of JEE and SPAR reports

(2) Online survey and interview of experts

- Subject: Contagious disease/quarantine professionals working in an international cooperation capacity (quarantine professionals of the Korea Disease Control and Prevention Agency or an emergency operations center) or experts with experience in research projects
- Details: Study of related projects of KOICA and key donor agencies, sharing of materials, consultation on research contents

2) Interview/meeting (Online/In-person) with Korean and Foreign Experts

- Formation of an expert advisory committee (see <Table 1>)
- Consultation on support of partner countries by public health donor agencies and the methods used; review of the draft of this report

〈Table 1〉 Expert Advisory Committee

No	Name	Expertise	Organization	Research area and academic activities
1	Ki-dong Park	Doctor of Medicine	WHO Representative in Vietnam	WHO Asia-Pacific contagious disease management, current WHO representative in Vietnam
2	Byung-ryul Jeon	Doctor of Medicine	Cha University	Former president of Korea Disease Control and Prevention Agency, doctor, professor, regional society infection management projects, etc.
3	Eun-woo Nam	Doctor of Health Science	Yonsei University	Director of International Health, international health projects, etc.
4	Jae-wook Choi	Doctor of Medicine	Korea University College of Medicine	Doctor, preventive medicine, multiple KOICA health projects, etc.
5	Tae-jong Son	Doctor of Science	Korea Disease Control and Prevention Agency (Quarantine Support Division)	Quarantine support, research, JEE-completed quarantine system
6	Sang-pyo Park	Korean Medicine	Incheon Airport Quarantine Station Director	Airport quarantine
7	Young-seon Jeong		Head of KOICA Mozambique Office	

3) Analysis of Required Improvements

(1) Online Survey and Interview (Attachment 1)

- As it was decided that it was necessary to understand the current system's use before producing improvement plans, from May 7 to May 30, immediately after this research began, eight ambassadors (Cambodia, Mozambique, Sri Lanka, Uzbekistan) and five members of the advisory committee were surveyed.
- In this research, an online survey of ambassadors of partner countries was conducted to understand system demands and the improvements required, and to collect feedback (Table 2).
- In advance of the survey, meetings were held with personnel from KOICA and project-executing agencies for a work progress/status analysis.

〈Table 2〉 Study Methods

Classification	Study method	Outcome
Interview	• Multiple interviewees were gathered into a single group for free conversations and discussions, which were observed and recorded • Study of groups of handlers, users, policy operators • Wide range of feedback could be collected	• Identification of causes of issues • Development of survey questions • Identification of alternatives and plans
Online survey	• Online survey carried out through a website for collection of responses • Survey sent by email, with responses collected by return email • Google Forms used • High efficiency and speed	• Collection of qualitative and quantitative data • Handlers, users, policy operators

4) Details of Analysis

(1) Collection and Analysis of JEE Data

- The JEE is a tool used to assess a country's capacity to prevent, detect, and respond to public health crises in accordance with the International Health Regulations (IHR, 2005) of the WHO.
- The JEE is an assessment tool that was jointly developed by the WHO and the Global Health Security Agenda (GHSa). Of the 44 countries in which KOICA has an office, 29 have announced the results of their JEE.
- The key aspects of the JEE are voluntary participation, a multi-angled approach, and data transparency and openness. Using core indexes, capacities are quantified with a score of 1 to 5. For each core index, 10 to 20 detailed questions are asked to assess the level of competency.
- In this research, the JEE data of 29 countries are reviewed to identify glaring vulnerabilities of each country. In particular, areas in which these countries most urgently require support and improvement in their response to contagious respiratory disease pandemics such as the current COVID-19 pandemic are identified.

〈Table 3〉 JEE Technical Areas and Number of Indicators

Technical areas	Number of indicators
Prevent(예방)	
National legislation, policy and financing(법률, 정책, 예산)	4
IHR coordination, communication and advocacy(조정, 커뮤니케이션, 지지)	1
Antimicrobial resistance(항생제 내성)	4
Zoonotic disease(인수공통감염병)	3
Food safety(식품안전)	2
Biosafety and biosecurity(생물안전 및 생물안보)	2
Immunization(예방접종)	2
Detect(감시)	
National laboratory systems(실험실진단체계)	4
Real-time surveillance(실시간감시)	4
Reporting(보고체계)	2
Work force development(인력개발)	3
Respond(대응)	
Emergency preparedness(공중보건위기 대비)	2
Emergency response operations(공중보건위기 대응)	6
Linking public health with security authorities(다분야 합동신속대응)	1
Medical countermeasures and personnel deployment(의약품 지원 및 보건의료인력 파견)	3
Risk communication(위기소통)	5
Points of entry(출입국)	
Points of entry(검역)	2
Total	50

(2) Collection and Analysis of SPAR Data

○ Collection and Analysis of SPAR Data

- With the JEE, an evaluated country first performs an internal evaluation, which is then used for a joint evaluation by external experts to produce a final report. While the SPAR is similar, a smaller number of capacities are evaluated internally by the evaluated country itself and reported to the WHO each year, with each given a score of 1 to 5. *The JEE is not conducted every year.
- Of the 44 countries in which KOICA has established offices, SPAR data is

available on 41 countries for the year 2018. For 2 other countries, SPAR data for the year 2017 is available. One country has no available SPAR data.

- To verify the compliance of different countries with the IHR (2005) and their contagious disease response capacities, the WHO recommends that all member countries perform a yearly evaluation through the SPAR, and a multi-year evaluation through the JEE.
- In this research, SPAR data of 41 countries are reviewed to identify the most critical vulnerabilities of each country.
- The areas in which each country most urgently needs support and improvement for an effective response to a contagious respiratory disease pandemic (such as COVID-19) are identified.

(3) Acquisition of Materials on Contagious Disease and Execution of Response Strategies

- Review of the Validity of Evaluations by the Advisory Committee
 - Materials were acquired through meetings with the advisory committee, which consists of current and former presidents of the Korea Disease Control and Prevention Agency; members of the Division of Risk Assessment and International Cooperation, the Division of Quarantine Support, and the National Quarantine Station (Korea Disease Control and Prevention Agency; and professors experienced in KOICA research projects. Such materials were referenced in forming response strategies and in reviewing the validity of the capacities assessed through the JEE and SPAR.

(4) Creation of Basic Data on the Selection of Beneficiary Countries Based on the JEE and SPAR (Attachment 1)

- Basic data are provided to be referenced in ranking the 44 KOICA partner countries that have completed the JEE and SPAR in order of priority for the support and improvement of their contagious disease response capacity. Such

basic data can be used in the formation of detailed policies (priorities, budgets, etc.) for the support of those countries, or for support in specific areas.

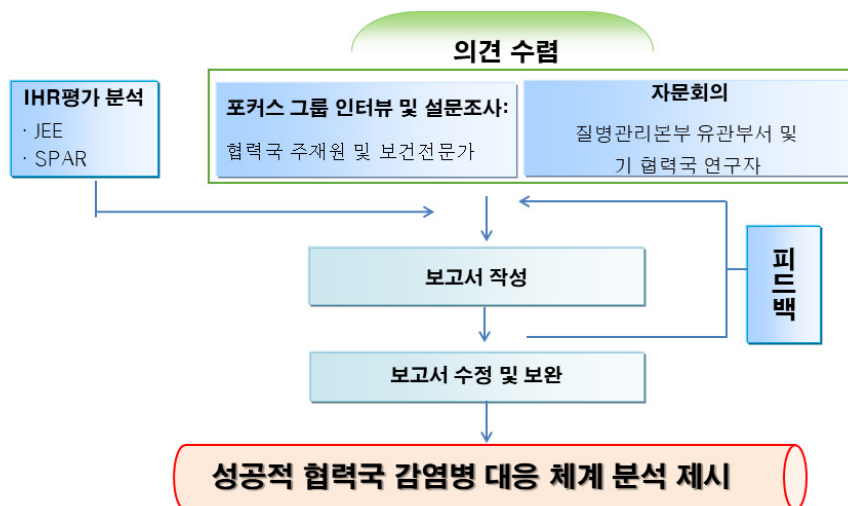
(5) Paradigm Shift for Active Contagious Disease Response

- A paradigm shift toward active contagious disease response is needed to achieve effective contagious disease prevention and management. The need for a switch to a response system that produces new capacities is analyzed. Such capacities would include the control of a novel contagious disease in the regions in which it occurs in addition to the prevention of its import into a country, the control of contagious disease through the control of all public health risks, and the implementation of customized response strategies that can supersede the current response strategies, which have a more rigid structure.

2. Execution System and Schedule

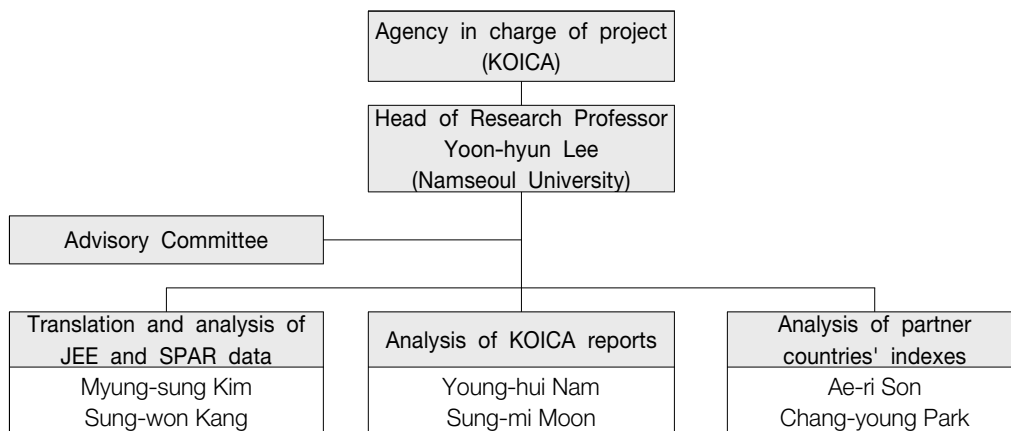
1) Execution System

- Research was executed as shown in the diagram below. The contagious disease management and response systems of KOICA partner countries were analyzed to form strategies that would enable an objective and scientific approach to future projects.
- Partner countries' contagious disease management was analyzed through a literature study, focus group interviews, advisory committee meetings and by KOICA offices in partner countries, in order to generate data that could be referenced in the development of effective programs.



〈Fig. 1〉 Research Execution System

- Led by Professor Yoon-hyun Lee, a team of researchers executed the research, divided into the three areas of translation and analysis of JEE and SPAR data, analysis of KOICA reports, and analysis of the indexes of partner countries (see Fig. 2).



〈Fig. 2〉 Organization of Researchers

2) Execution Schedule

- For the successful execution of the research, regular meetings were held to promote communication among the research team and maintain the consistency of the research product.
- By ensuring a shared understanding of the project's direction with the KOICA project manager, errors in research execution could be minimized and the research was able to take place on schedule.

Serial no.	Research component	Execution schedule (May 2020 - July 2020)			
		May	June	July	Note
1	Commencing meeting and study of KOICA affiliates				Study of personnel experienced in KOICA's contagious disease-related projects
2	Translation and analysis of JEE and SPAR data				
3	Interview of health/medical experts using the Delphi method				Survey and analysis
4	ODA and contagious disease experts				Advisory meeting on contagious disease
5	Meetings with affiliate agencies				Scholars and personnel experienced in KOICA projects
6	Final report creation and KOICA meeting				
7	Edit of final report				
Progress (%)		60	90	100	

III. Research Result

1. Review of Preceding Research

Classification	Work	Key details
Legislation	Infectious Disease Control and Prevention Act [Enforced Jan. 1, 2019] [Legislation No. 16101, Dec. 31, 2018, revision]	① (Purpose) The purpose of this legislation is to specify the requirements to be fulfilled in order to prevent the occurrence and spread of an infectious disease that poses a risk to public health, and to control such infectious disease to contribute to the promotion and maintenance of public health. ② (Definition of infectious disease) "Infectious disease" refers to a class 1 infectious disease, class 2 infectious disease, class 3 infectious disease, class 4 infectious disease, parasitic infectious disease, World Health Organization- monitored infectious disease, bioterrorism infectious disease, sexually transmitted infectious disease, zoonotic infectious disease, or medical infectious disease. ③ Article 4, (Responsibilities of the central government and local governments) Definition of activities executed for the prevention and control of infectious disease.
	Infectious Disease Control and Prevention Act Enforcement Decree [Enforced Jul. 9, 2019] [Presidential Decree No. 299-61, Jul. 9, 2019, partial revision]	① No. 2 of Article 1 (Installation, operation, etc. of infectious disease control project support bodies) ① In accordance with Clause 1 of Article 8 of the Infectious Disease Control and Prevention Act (hereinafter referred to as the "Act"), a central infectious disease control project support body shall be installed within the Ministry of Health and Welfare, and a city/provincial infectious disease control project support body shall be installed in metropolitan cities, provinces, and in the special self-governing province as specified by the Minister of Health and Welfare.
	Infectious Disease Control and Prevention Act Enforcement Regulations [Enforced Mar. 28, 2019] [Ministry of Health and Welfare Decree No. 593, Sep. 27, 2018, partial revision]	① Identification of infectious disease: Article 4 (Bodies capable of identifying pathogens of infectious disease) ② Infectious disease reporting: Article 6 (Infectious disease reporting by doctors, etc.) Article 7 (Reporting of abnormal reactions to vaccination by doctors, etc.), Article 8 (Other infectious diseases to be reported) ③ Definition of work process: Article 11 (Zoonotic infectious disease reporting procedures), etc.

Classification	Work	Key details
Planning	The Second National Plan for the Prevention and Control of Infectious Disease (2018-2022)	① Identification of key tasks based on an epidemiological risk analysis of notifiable infectious disease prevention/management and novel infectious disease preparedness/response ② (Key details) Basic objectives and execution of infectious disease prevention and management, plan for improving the capacity for preventing and managing key infectious diseases and for crisis response, investigation and monitoring of infectious disease, laboratory diagnosis, research and development execution direction ③ Setting of performance indexes for the collection of foreign data on contagious disease, international cooperation on contagious disease control, crisis communication plans, and effective management of basic plans
	KDCA Risk Communication Guidelines 2017	① Basic principles: "Be Right" (supply of accurate information on current situations), "Be First" (fast release of information), "Be Credible" (building of public trust), "Express Empathy" (empathizing with the public and patients), "Promote Action" (provision of behavioral guidelines customized for the public for the prevention and treatment of disease) ② Creation of a crisis communication system: Specification of a crisis communication function to be fulfilled by the national or a regional quarantine system.
	KDCA Public Health Crisis Communication Standard Operating Procedures 2017	① Public Health Crisis Communication Standard Operating Procedures
	2018 Korea's Customized "One Health" System Research for Public Health	① Reference material for analysis of pan-governmental activities for the installation and management of the "One Health" system and the direction of such activities
	2019 Plan for the Installation of Korea's Customized National Preventive Vaccination Active Monitoring System	① Purpose: Creation of an active monitoring system ("Vaccine Safety Datalink") linked to medical databases for detecting abnormal reactions to public vaccinations as an improvement from the existing mode of manual monitoring; creation of a data analysis system for the monitoring of abnormal reactions - Creation of an active monitoring system customized for Korea: Development of a program that combines public vaccination data and medical databases for the monitoring of abnormal reactions ② Project duration: 2018-2022 ③ Merging of vaccination registers data and claims data of the National Health Insurance Service and the Health Insurance Review and Assessment Service for the creation of an active vaccination monitoring system

Classification	Work	Key details
Monitoring	Guidelines on Yearly Reporting of Sentinel Surveillance of Contagious Disease	① Sentinel surveillance: Designated sentinel agencies continuously collect and analyze data on contagious diseases designated for sentinel surveillance in accordance with the Infectious Disease Control and Prevention Act for the prevention and control of infectious disease (Article 16 of the Act [Sentinel surveillance of contagious disease, etc.]) ② Targeted infectious disease (21 types [58 sub-types]): Influenza as a class 3 infectious disease, infectious diseases designated as class 5 infectious disease ③ Reporting of patients, deaths, and pathogen carriers resulting from infection with infectious disease under sentinel surveillance within 7 days to a health center (designated infectious disease) or the KDCA (class 3, class 5, designated infectious disease) by sentinel surveillance agencies ④ Analysis of surveillance materials and distribution of data: Systematic analysis of materials supplied by sentinel surveillance agencies; regular distribution of analyzed data to sentinel surveillance agencies, related institutes/organizations, and the public (weekly)
	2018 Manual for Contagious Disease Control in Storm and Flooding Disasters	① Purpose: Contagious disease prevention activities for storm and flooding disaster preparedness; prevention of the occurrence and spread of contagious disease through immediate action in the event of a storm or flooding disaster ② (Basic direction) ◦ Strengthened infectious disease prevention, e.g. pre-inspection for storm/flood preparedness, ◦ Early detection of and immediate response to infectious disease in the event of a storm/flooding disaster, ◦ Execution of campaigns for the prevention and control of infectious disease related to storm/flooding disasters ③ (Application range) Waterborne disease, food-borne infectious disease (cholera, etc.), mosquito-borne infectious disease (malaria, Japanese encephalitis, etc.), leptospirosis, tetanus, contact dermatitis, ocular infectious disease, scabies, contact dermatitis caused by lice ④ (Related laws and guidelines) No. 5 of Article 34 of the Framework Act on the Management of Disasters and Safety (Creation and operation of disaster crisis management manuals), Basic Guidelines on the Management of National Crises (Presidential Directive No. 229) and the Standard Manual for the Management of Crises Involving Storm and Flooding Disasters, Working-level Manual for Response to Crises Involving Storm and Flooding Disasters, Article 4 of the Infectious Disease Control and Prevention Act (Responsibilities of the central government and local governments)

Classification	Work	Key details
Monitoring	2018 Malaria Control Guidelines	① Purpose: Reduction of malaria infections in Korea through the management of mediums, pathogens, and patients; prevention of the import of malaria viruses into Korea from overseas; prevention of the indigenization of imported malaria viruses ② (Basic direction) ● Formation and operation of task forces in charge of malaria eradication projects, ● Focused management of high-risk regions and groups, ● Implementation of selective and effective preventive/control measures, ● Strengthening of malaria control projects revolving around health centers and local communities, ● Creation of a scientific base for malaria control projects, ● Creation of a system of organic cooperation between related agencies (civilian, public, military) ③ (Related departments) Infectious Disease Monitoring Division (malaria eradication), Quarantine Support Division (sharing of data on confirmed cases of malaria and those displaying symptoms of malaria as detected in during quarantine), Blood Safety Monitoring Division (standards on blood donation ban for malaria prevention, setting of regions of Korea in which blood donation is restricted), Medium Analysis Division (implementation of national standards on malaria control, malaria-carrying mosquito populations investigation, protozoan infection investigation), Infectious Disease Diagnosis Management Division (improvement of local government capacity for diagnosis and testing)
	KDCA Infectious Disease Monitoring System Overview (HIRA Policy Directions 2016)	① Overview of the KDCA's infectious disease monitoring system (Section Chief Dong-han Lee, Infectious Disease Monitoring Division, KDCA) ② (Infectious disease monitoring) Ongoing, systematic collection and analysis of data on occurrences of infectious disease and mediums through which infectious disease is transmitted; distribution of such data to parties and entities that require it for use in the prevention and control of infectious disease. ③ (Infectious disease monitoring system) As effective control of infectious disease requires the speedy and accurate identification of infectious disease occurrences, each country is required to report infectious disease that needs to be managed on a national level. By utilizing data produced by such a monitoring system in diverse areas, new health issues can be identified and infectious disease-related research can be supported.

Classification	Work	Key details
International	WHO_One Health 2017	① One Health: Design and implementation of programs, policies, legislations, and research aimed at communication and cooperation between different sectors as required to achieve improved public health. ② One Health approach: Food safety, animal-borne disease (influenza, hydrophobia, Rift Valley fever), and antimicrobial resistance (development of influenza virus vaccinations, etc.) are all areas to which One Health is applicable. ③ Experts in public health, animals, plants, and the environment must work together in support of One Health. ④ Inter-sector sharing of epidemiological data and laboratory data is required for the effective detection, control, and prevention of animal-borne disease and food safety issues. ⑤ By closely cooperating with the Food and Agriculture Organization and the Office international des épizooties of the UN, the WHO promotes a multi-sector response to food safety risks arising from the human-animal eco-interface, risks in animal protection zones, and other public health risks, and provides guidelines for reducing such risks.
	Health security capacities in the context of COVID-19 outbreak: an analysis of International Health Regulations annual report data from 182 countries	① COVID-19 has spread in a large number of countries in a short span of time. There is almost no existing research on countries' capacities, including strengths and weaknesses, for health crisis preparedness and conformance to IHR 2005. ② IHR SPAR data was used in a review of existing standards of health security capacities. This review was used to identify the functions of prevention, detection, response, and activation, which are crucial to an effective response to health security crises, and was also used to verify the status of preparations being made for protection from public health risks and incidents. ③ Operation preparedness indexes can be referenced by the WHO, governments, and global agencies in setting priorities in the support and realization of preparedness capacities for the response to COVID-19.
	EDisease Control and Prevention Agency_One-Health-preparedness-24-May-2018	① Consulting on awareness of issues 1) For cooperation on the management of key risk factors and disease threats affecting Europe, which areas and principles must be prioritized? 2) What lessons in public health response can be learned from the zoonotic diseases of the past?

Classification	Work	Key details
International	EDisease Control and Prevention Agency_One-Health-preparedness-24-May-2018	3) How can inter-sector preparedness strategies best be implemented to embody the "One Health" ideology? (How are operations and research prioritized in Europe for One Health preparedness?) ② Conclusion: Control of climate change and animal-borne disease must be achieved through One Health-based public health strategies. To successfully realize One Health, coordination and cooperation in the human-animal-environment interface, from which the risks of infectious disease arise, are needed to eradicate zoonotic disease. To this end, improved networks, increased awareness, prevention of silo accidents (data tends to be withheld in this area), a clear definition of roles, joint operations, and methodologies clearly outlined within a coordinated framework are required.
	Development of AI-based technology for immediate alert on infectious disease occurring overseas and support of ensuing decision-making (Seung-woo Lee, KISTI)	① Purpose: Immediate alert on infectious disease occurring overseas and support of ensuing decision-making ② Data source: Official data released by the WHO and the CDC of different governments as well as unofficial data from online news, social media, SMS, etc. ③ Existing examples: Global Public Health Intelligence Network (GPHIN), HealthMap, MediSys, etc.

2. Definitions of Evaluation Indicators

1) Definition of JEE Indicators

- Indicators jointly developed by the Global Health Security Agenda (GHSA)¹⁾ and the WHO for compliance with the International Health Regulations (IHR).²⁾ Applied by GHSA and WHO experts to evaluate the health security capacities of countries.
 - An evaluation of a nation's capacities jointly conducted by a ministry of health and welfare and other governmental agencies. JEE is conducted when voluntarily requested by a WHO member nation. Results are publicized in a report, which contains recommendations on the improvement of underdeveloped capacities.
- JEE indicators are divided into 19 items in 4 categories, i.e. prevention, detection, response, and quarantine. There are a total of 52 indicators (see <Table 4>).

1) GHSA: Launched in February 2014 under the leadership of the US. An international consultative body for improved global health security. Consists of 62 member nations (as of June 2020) and such international health agencies as the WHO and OIE.

2) IHR: The legal basis for global health management established by the WHO. Fully revised in 2005 for improved management of public health crises after the 2003 SARS epidemic. Obligates countries to build health crisis response capacities.

〈Table 4〉 JEE Evaluation Categories

Evaluation category	Evaluation item	Indicator No.	Details of evaluation
Prevent	① National legislation, policy and financing	P.1.1	Existence of laws, regulations, guidelines, policies; support IHR compliance by the government
		P.1.2	Coordination of the IHR with a country's laws, policies, guidelines
		P.1.3	Timely supply of funds for a timely response to public health emergencies
	② IHR coordination, communication and advocacy	P.2.1	Integration and coordination of different sectors involved in the implementation of the IHR
	③ IHR coordination, communication and advocacy	P.3.1	Detection of antimicrobial resistance
		P.3.2	Detection of human infection with AMR pathogens
		P.3.3	Management of healthcare-associated infection
		P.3.4	Management of antibiotics use
	④ Zoonotic disease	P.4.1	System of detection of zoonotic disease and pathogens
		P.4.2	Veterinarians or animal health personnel
		P.4.3	System of management of zoonotic infectious disease
	⑤ Food safety	P.5.1	Operation of a system for detection and control of food-borne disease
		P.5.2	Existence of a function/mechanism for response to and management of food safety emergencies
	⑥ Biosafety and biosecurity	P.6.1	National system of biosafety/biosecurity management for humans, animals, and facilities
		P.6.2	Biosafety and biosecurity training system
	⑦ Immunisation	P.7.1	Rate of vaccine (measles) supply as part of a national program
		P.7.2	System of vaccination supply on a national level
Detect	⑧ National laboratory systems	D.1.1	Capacity for diagnosis of key diseases through a national laboratory system
		D.1.2	Sample submission/transfer system
		D.1.3	Effective site testing and laboratory diagnosis
		D.1.4	Laboratory quality management system
	⑨ Real-time surveillance	D.2.1	Incident-based monitoring system
		D.2.2	Operation of an interconnected, real-time electronic reporting system
		D.2.3	Analysis of surveillance data
		D.2.4	Syndromes monitoring system

Evaluation category	Evaluation item	Indicator No.	Details of evaluation
Detect	⑩ Reporting	D.3.1	System of reporting to the WHO, FAO, and OIE
		D.3.2	System of cooperation for multi-sector sharing of information within a country
	⑪ Work force development	D.4.1	Development of personnel for IHR compliance
		D.4.2	Personnel development programs, such as field epidemiology training programs (FETP)
		D.4.3	Personnel development strategies
		D.4.4	Availability of FETP or other educational programs in applied epidemiology
Respond	⑫ Emergency preparedness	R.1.1	Creation and execution of plans for public health crisis preparedness
		R.1.2	Whether resources are obtained and used as prioritized
	⑬ Emergency response operations	R.2.1	Creation and execution of plans for response to public health crises
		R.2.2	Operation of EOCs
		R.2.3	Training for response to public health crises
		R.2.4	Procedures for case-by-case management in accordance with the IHR
	⑭ Linking public health with security authorities	R.3.1	System for multi-sector cooperation in the event of a public health crisis
	⑮ Medical countermeasures and personnel deployment	R.4.1	System for medical supplies distribution in the event of a public health crisis
		R.4.2	System for health personnel activation in the event of a public health crisis
		R.4.3	Procedures for case-by-case management of IHR-related risks
	⑯ Risk communication	R.5.1	System of communication to be implemented in the event of a public health emergency
		R.5.2	Crisis communication among internal personnel and between cooperating agencies
		R.5.3	Crisis communication with the public
		R.5.4	Guarantee of local community participation in crisis communication
		R.5.5	Active detection and management of rumors

Evaluation category	Evaluation item	Indicator No.	Details of evaluation
IHR-RELATED HAZARDS AND POINTS OF ENTRY	⑰ Point of entry	PoE.1	Personnel, facilities, etc. of quarantine stations
		PoE.2	Effective public health crisis response by quarantine stations
	⑱ Chemical event	CE.1	System of chemical accident detection/response
		CE.2	Environment for chemical accident management
	⑲ Radiation event	RE.1	System of radioactive accident detection/response
		RE.2	Environment for radioactive accidents management

2) Definition of SPAR Indicators

- The government and secretary-general of a country reports to the World Health Assembly (WHA) on the implementation of the IHR.
 - Each country uses an annual self-assessment reporting tool or a self-assessment tool for the SPAR.
- The SPAR tool consists of 24 indicators of 13 IHR capacities required to detect, assess, report, and manage public health risks and issues on a national and international level (see <Table 5>).

〈Table 5〉 SPAR Evaluation Categories

Technical areas	Number of indicators
Prevent(예방)	
National legislation, policy and financing	3
IHR coordination, communication and advocacy	1
Antimicrobial resistance	0
Zoonotic disease	1
Food safety	1
Biosafety and biosecurity	0
Immunisation	0
Detect(감시)	
National laboratory systems	3
Real-time surveillance	2
Reporting	1
Work force development	1
Respond(대응)	
Emergency preparedness	1
Emergency response operations	3
Linking public health with security authorities	0
Medical countermeasures and personnel deployment	1
Risk communication	2
Points of entry(출입국검역)	
Points of entry	2
Total	22

3) Comparison of the Evaluation Indicators of the JEE and SPAR

- With the JEE, a country performs an internal evaluation which is then used in a joint evaluation with external experts for final reporting. While similar, the SPAR involves a smaller number of evaluation items that are used for an internal evaluation by each country (each evaluation item rated from 1 to 5) for an annual report to the WHA. *The JEE is not conducted annually.
- The WHO recommends that all member nations undertake a SPAR every year and a JEE at the frequency recommended for the verification of their contagious disease response capacities, as defined in the IHR (2005).

〈Table 6〉 JEE – SPAR Code Mapping

JEE evaluation items		SPAR evaluation items	
P.1.1	Legislation, laws, regulations, administrative requirements, policies or other government instruments in place are sufficient for implementation of IHR(2005)	C.1.1	LEGISLATION, LAWS, REGULATIONS, POLICY, ADMINISTRATIVE REQUIREMENTS OR OTHER GOVERNMENT INSTRUMENTS TO IMPLEMENT THE IHR(2005)
P.1.2	The State can demonstrate that it has adjusted and aligned its domestic legislation, policies and administrative arrangements to enable compliance with IHR(2005)		
P.1.3	Financing is available for the implementation of IHR capacities	C.1.2	FINANCING FOR THE IMPLEMENTATION OF IHR CAPACITIES
P.1.4	A financing mechanism and funds are available for the timely response to public health emergencies	C.1.3	FINANCING MECHANISM AND FUNDS FOR THE TIMELY RESPONSE TO PUBLIC HEALTH EMERGENCIES
P.2.1	A functional mechanism is established for the coordination and integration of relevant sectors in the	C.2.2	MULTI-SECTORAL IHR COORDINATION MECHANISMS
P.3.1	Antimicrobial resistance detection		
P.3.2	Surveillance of infections caused by antimicrobial-resistant pathogens		
P.3.3	Health care-associated infection(HCAI) prevention and control programmes		
P.3.4	Antimicrobial stewardship activities		
P.4.1	Surveillance systems are in place for priority zoonotic diseases/pathogens		
P.4.2	Veterinary or animal health workforce		
P.4.3	Mechanisms for responding to infectious and potential zoonotic diseases are established and functiona	C.3.1	COLLABORATIVE EFFORT ON ACTIVITIES TO ADDRESS ZOONOSSES
P.5.1	Mechanisms for multisectoral collaboration are established to ensure rapid response to food safety	C.4.1	A MULTISECTORAL COLLABORATION MECHANISM FOR FOOD SAFETY EVENTS
P.5.2	Mechanisms are established and functioning for the response and management of food safety emergencies		
P.6.1	Whole-of-government biosafety and biosecurity system is in place for human, animal and agriculture facilities		

JEE evaluation items		SPAR evaluation items	
P.6.2	Biosafety and biosecurity training and practices		
P.7.1	Vaccine coverage(measles) as part of national programme		
P.7.2	National vaccine access and delivery		
D.1.1	Laboratory testing for detection of priority diseases	C.5.3	ACCESS TO LABORATORY TESTING CAPACITY FOR PRIORITY DISEASES
D.1.2	Specimen referral and transport system	C.5.1	SPECIMEN REFERRAL AND TRANSPORT SYSTEM
D.1.3	Effective modern point-of-care and laboratory-based diagnostics	C.5.2	IMPLEMENTATION OF A LABORATORY BIOSAFETY AND BIOSECURITY REGIME
D.1.4	Laboratory quality system		
D.2.1	Indicator- and event-based surveillance systems	C.6.1	EARLY WARNING FUNCTION : INDICATOR- AND EVENT-BASED SURVEILLANCE
D.2.2	Interoperable, interconnected, electronic real-time reporting system		
D.2.3	Integration and analysis of surveillance data	C.6.2	MECHANISM FOR EVENT MANAGEMENT (VERIFICATION, RISK ASSESSMENT ANALYSIS, INVESTIGATION)
D.2.4	Syndromic surveillance systems		
D.3.1	System for efficient reporting to FAO, OIE and WHO	C.2.1	NFP FUNCTIONS UNDER IHR
D.3.2	Reporting network and protocols in country		
D.4.1	Human resources are available to implement IHR core capacity requirements	C.7.1	HUMAN RESOURCES TO IMPLEMENT IHR (2005) CAPACITIES
D.4.2	FETP or other applied epidemiology training programme is in place		
D.4.3	Workforce strategy		
R.1.1	National multi-hazard public health emergency preparedness and response plan is developed and implemented	C.8.1	PLANNING FOR EMERGENCY PREPAREDNESS AND RESPONSE MECHANISM
R.1.2	Priority public health risks and resources are mapped and utilized		
R.2.1	Capacity to activate emergency operations	C.8.2	MANAGEMENT OF HEALTH EMERGENCY RESPONSE OPERATION
R.2.2	EOC operating procedures and plans	C.8.3	EMERGENCY RESOURCE MOBILIZATION

JEE evaluation items		SPAR evaluation items	
R,2,3	Emergency operations programme		
R,2,4	Case management procedures are implemented for IHR relevant hazards	C,9,1	CASE MANAGEMENT CAPACITY FOR IHR RELEVANT HAZARDS
R,3,1	Public health and security authorities(e.g. law enforcement, border control, customs) are linked during a suspect or confirmed biological event		
R,4,1	System is in place for sending and receiving medical countermeasures during a public health emergency		
R,4,2	System is in place for sending and receiving health personnel during a public health emergency	C,9,2	CAPACITY FOR INFECTION PREVENTION AND CONTROL(IPC) AND CHEMICAL AND RADIATION DECONTAMINATION.

- Five color codes are used for visualization of scores. Data is represented in the form of a graph (see <Fig. 3> and <Table 6>).
- This analysis is an unbiased representation of each of the 44 countries' IHR compliance, as indicated in a JEE and SPAR.
- While the majority of the JEE and SPAR indicators share similarities, they differ in the intent behind evaluation and the executors of evaluation. The research team, as shown in Table 7, mapped the JEE and SPAR indicators for a comparison of partner countries.

4) Purpose of the Mapping of JEE and SPAR codes and Its Application (Attachment 2)

- Of the 44 KOICA partner countries, 29 have undergone the JEE so far. For the remaining 29 partner countries, there is a lack of means to verify the circumstances of their contagious disease management. SPAR data is to be used in place of JEE data to verify where these countries stand in terms of contagious disease management.

- Here, a comparative evaluation of similar indicators applied to the partner countries that carried out both the JEE and the SPAR is performed to verify the similarities between indicators.
- After verifying the similarities between JEE and SPAR data, the credibility of SPAR data is verified to determine its suitability for use in evaluating partner countries' contagious disease management.
- The JEE data available dates back to between 2016 and 2018, when the majority of the partner countries underwent a single JEE. With SPAR, annual data for the period leading up to 2019 is available. This creates a difference in the meaning these two sets of data present.
- While most of the JEE and SPAR indicators have similar definitions, the SPAR indicators "NFP functions under IHR" and "medical countermeasures and personnel deployment" have no counterpart in JEE.
- As the SPAR is executed by the health authorities of a given nation, incorrect data may be provided for political reasons.
- As such, the JEE and SPAR indicators of all KOICA partner countries are analyzed to identify the urgent needs of beneficiary countries.
- In the SPAR, as opposed to the JEE, indicators for which a high score was obtained may be dubious, as the absence of an external evaluation creates room for internal data to be represented in a biased manner for political reasons.
- As JEE data is more credible than SPAR data, it should be fully utilized in order to accurately verify KOICA partner countries' contagious disease management circumstances.
- Limitations exist in the form of differences in the SPAR scores of different partner countries due to individual countries' characteristics, e.g. political circumstances, variance in weaknesses, and the unavailability of certain

JEE-SPAR mappings.

5) Result of JEE and SPAR Code Mapping (Attachment 3)

- Table 8 shows the differences in the scores obtained by countries for indicators applied in both the JEE and SPAR.
- The country with the highest scores for SPAR indicators corresponding to their JEE counterparts was Mongolia. This discrepancy was seen in 12 of the 13 indicators applied in both the JEE and SPAR. Myanmar followed second at 11 out of 13 indicators, resulting in this discrepancy in ratings.
- Conversely, the country with the lowest scores for SPAR indicators with corresponding counterparts in the JEE was Laos, with 9 indicators producing lower scores in the SPAR than in the JEE. Kyrgyzstan followed, in second place.
- The country with the highest number of indicator scores showing consistency between the JEE and SPAR was East Timor, with identical scores for nine indicators. The Philippines was second, with eight identical scores.
- These differences in the scores for JEE and SPAR indicators can result from an accurate evaluation by a JEE evaluator or from an accurate SPAR evaluation by the health authorities of a country.
- Low scores given for SPAR indicators by the health authorities of a country can be seen as an attempt to obtain donor contribution in areas where support is urgently needed.
- As such, SPAR indicator scores that are lower than their JEE counterparts should be considered when attempting to identify the areas in which a partner country desires support, and to provide the necessary support.

〈Table 7〉 Comparison of JEE and SPAR Indicators of Partner Countries

Ranking	Countries with SPAR indicator scores higher than JEE indicator scores (no. of indicators)	Countries with SPAR indicator scores higher than JEE indicator scores (no. of indicators)	Countries with identical JEE and SPAR indicator scores
1	Mongolia (12)	Laos (9)	East Timor (9)
2	Myanmar (11)	Kyrgyzstan (8)	Philippines (8)
3	Iraq (11)	Kenya, Ivory Coast, Jordan (7)	Vietnam, Cameroon, Congo, Senegal (7)

〈Table 8〉 Comparison of Differences in the JEE and SPAR Indicators of Partner Countries

Extent of difference in indicators	Countries with SPAR indicator scores higher than JEE indicator scores		Countries with SPAR indicator scores lower than JEE indicator scores	
	Indicator	Country	Indicator	Country
3	Coordination	Kenya	Reporting	Afghanistan
	Supply of personnel	Kyrgyzstan	Public health crisis preparedness	Mozambique
	Supply of medical supplies and health/ medical personnel	Kyrgyzstan, Pakistan	Supply of medical supplies and health/ medical personnel	Iraq

3. Result of JEE Analysis

1) Comparison of JEE Indicator Averages by Partner Country

- A score of one indicates the absence of a capacity. A score of two indicates that a minimal capacity is present, and that development is taking place to further such capacity.
- A score of three indicates issues in the sustainable development of a capacity. Development of such capacity is not incorporated into a national health sector development plan, or has not been sufficiently funded.
- A score of four indicates a verified capacity that can be sustained for a number of years. Such capacity can be measured by drawing a comparison with the properties of a country's "green" health sector development plans or with the

core capacities indicated in the IHR (2005).

- A score of five indicates a sustainable capacity and the support of other countries' IHR compliance. This is the highest level of IHR-defined (2005) core capacity achievable.
- As a score of two or lower indicates an insufficient contagious disease response capacity, partner countries in need of support were arranged in the order of priority. The number of countries with a score of 2 or below is shown in Table 9 (JEE indicator averages) and Table 10 (SPAR indicator averages).
- As the JEE indicator averages in Table 9 indicate, the countries that completely lack the required capacities and are in urgent need of support, i.e. countries that received the highest number of scores of one on the indicators, were Nigeria and the Democratic Republic of the Congo, which scored one on six indicators.
- The countries that received the highest number of scores of two on the indicators, indicating capacities in development that need external support, were East Timor and Cameroon, each of which received a score of two or less on fourteen indicators.
- As the SPAR indicator averages show in Table 10, the country with the highest number of scores of one was Ivory Coast, with a score of one on 6 indicators, followed by Afghanistan with a score of one on 5 indicators.
- The SPAR indicator averages show that the country with the highest number of scores of two or less was Laos and Nepal, each of which received a score of two or less on 11 indicators.



〈Fig. 3〉 Color Coding and Scores by Capacity Level

〈Table 9〉 Color Coding and Scores by JEE Capacity Level

The JEE grading and scoring	
Capacity grading, colour code and score	Attribute description
	No data for evaluation.
No capacity—score 1 (red)	Almost no capacity for preventing and controlling risks and events.
Limited capacity—score 2 (yellow)	Almost no capacity that is temporarily employable, even with the support of external resources.
Developed capacity—score 3 (yellow)	Presence of capacity at a national level; however, such capacity is low and ineffective at a regional level.
Demonstrated capacity—score 4 (green)	Presence of capacity for managing a variety of events at a national and regional level.
Sustainable capacity—score 5 (green)	Presence of an established and sustainable capacity in all areas of public health.

〈Table 10〉 Countries in Order of Priority in the Provision of Support Based on JEE Averages
(no. of indicators with low scores)

Country	No. of scores of 1	No. of scores of 2 or less
Timor-Leste	3	14
Raos	0	6
Mongolia	0	2
Myanmar	1	11
Bangladesh	2	6
VIET NAM	0	4
Sri Lanka	1	4
Afghanistan	5	13
Indonesia	0	0
CAMBODIA	2	8
Pakistan	2	8
Philippines	0	7
GHANA	2	10
Nigeria	6	13
Rwanda	1	4
Mozambique	1	8
Morocco	1	2
Senegal	2	11
Ethiopia	0	6
Uganda	0	7
Cameroon	3	14
DR Congo	6	13
Kenya	1	5
Tunisia	0	5
Cote d'Ivoire	1	12
Tanzania	0	10
Jordan	0	6
Iraq	1	10
Kyrgyzstan	0	1

〈Table 11〉 Countries in Order of Priority in the Provision of Support Based on SPAR Averages
(No. of indicators with low scores)

Country	No. of scores of 1	No. of scores of 2 or less
Timor Leste	3	10
Raos	4	11
Mongolia	0	0
Myanmar	0	2
Bangladesh	0	3
VIET NAM	0	1
Sri Lanka	2	5
Afghanistan	2	8
Indonesia	0	0
CAMBODIA	2	6
Pakistan	2	8
Philippines	0	7
GHANA	1	7
Nigeria	1	6
Rwanda	0	2
Mozambique	0	4
Morocco	0	1
Senegal	0	4
Ethiopia	0	3
Uganda	0	4
Cameroon	2	9
DR Congo	3	10
Kenya	2	7
Tunisia	0	1
Cote d'Ivoire	6	10
Tanzania	0	4
Jordan	2	6
Iraq	1	3
Kyrgyzstan	2	5
Nepal	3	11
Fiji	0	3
Algeria	0	0
Egypt	0	0
Guatemala	0	6
Dominican Republic	2	7
Bolivia	0	1
Ecuador	0	0
El Salvador	0	0
Colombia	0	2
Paraguay	0	4
Peru	0	6
Azerbaijan	0	0
Uzbekistan	2	3
No SPAR report available.		

2) Result of the JEE

- Based on the JEE conducted in 29 countries, a color-coded chart quantifying the capacity indicators of 12 Asian countries, 14 African countries, and 3 Middle Eastern countries is presented.
- The area in which the highest number of countries had a score of 1 was "emergency preparedness," (R1.1-R1.2), on which 8 countries scored 1. This was followed by "medical countermeasures" (R4.1-R4.3) with 7 countries, "antimicrobial resistance" (P3.1-P3.4) with 6 countries, and "quarantine" (PoE1-2) with 5 countries.
- The area producing the highest number of scores of 4 and 5 (yellowish-green and green) was "vaccination" (P1.1-P1.2) with 23 countries, followed by "surveillance system" (D2.1-D2.3) with 10 countries, and "timely multi-sector cooperation/response system" (R3.1) with 9 countries.
- Most countries scored two to three. Relatively higher scores were obtained in areas in which Korea is prepared to provide intensive support, such as "vaccination;" "laboratory diagnosis system;" and "vaccination" in the area of "personnel development." (See <Table 9>.)



〈Fig. 4〉 Comparison of 29 Partner Countries Based on JEE Indicators; 2018 Comparison of Partner Countries' SPAR and JEE Indicator Averages (JEE scores converted)

- A color-coded chart quantifying the JEE indicators of 44 countries that underwent the SPAR and JEE in 2018 is presented.
- The area producing the highest number of scores of 1 (red) was "food safety" (P5.1) with 10 countries scoring 1, followed by "public health crisis preparedness" (R1.1-R1.2) with 8 countries scoring 1, and "medical countermeasures" (R4.1-R4.3) with 7 countries scoring 1.
- The area producing the highest number of scores of 4 and 5 (yellowish-green and green) was "surveillance system" (D2.1-D2.3) with 30 countries scoring 4 or 5, followed by "reporting system" (D3.1) with 29 countries scoring 4 or 5, and "zoonotic disease" (P4.3) and "laboratory diagnosis system" (D1.1-D1.3), both of which had 19 countries scoring 4 or 5.
- Pakistan currently has no indicator scores in some areas where no measurement took place. Pakistan's SPAR scores tend to be higher than its JEE scores.
 - As SPAR is performed internally and JEE externally, there is a tendency for SPAR scores to be higher.
- Looking at the areas in which Korea is prepared to provide intensive support, which are "vaccination," "laboratory diagnosis system," and "personnel development," 19 countries scored 4 or higher in "laboratory diagnosis system," while 15 countries scored 4 or higher in "personnel development." The area of "vaccination" was not evaluated.

3) Comparison of Partner Countries' SPAR Indicators (Converted from JEE scores)

- A color-coded chart quantifying the JEE indicators of the 44 countries that underwent the SPAR and JEE in 2019 is presented.
- The area with the highest number of scores of 1 (red) was "system for

health/medical personnel activation in the event of a public health crisis" (R4.2) with 7 countries scoring 1, followed by "personnel development" (D4.1) and "public health crisis preparedness" (R1.1), both of which had 6 countries that scored 1.

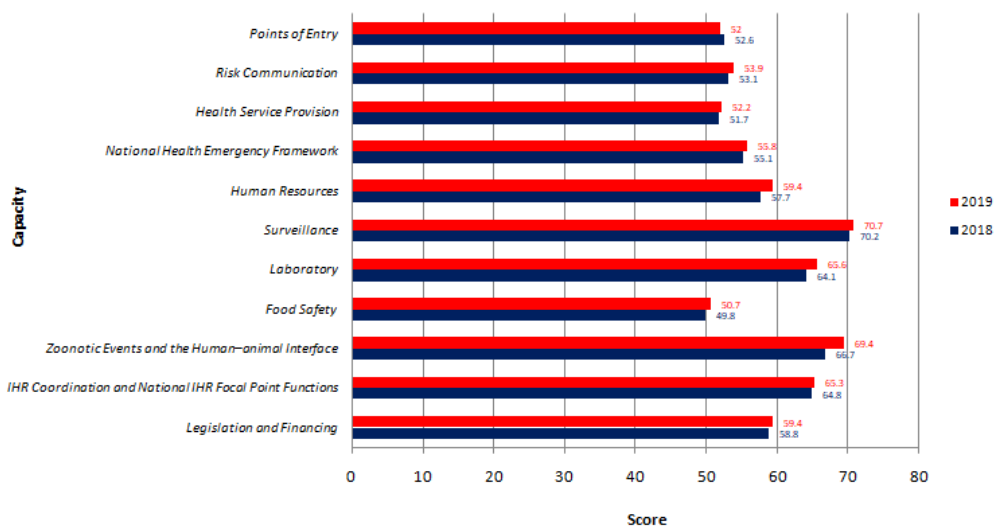
- The area producing the highest number of scores of 4 and 5 (yellowish-green and green) was "surveillance system" (D2.1-D2.3) with 29 countries scoring 4 or 5, followed by "reporting system" (D3.1) with 25 countries scoring 4 or 5, and "zoonotic disease" (P4.3) and "laboratory diagnosis system" (D1.1-D1.3), both of which had 18 countries scoring 4 or 5.
- Pakistan currently has no indicator scores in some areas due to no measurement having taken place. Pakistan's SPAR scores tend to be higher than its JEE scores.
- In the areas in which KOICA is providing intensive support, which are "vaccination," "laboratory diagnosis system," and "personnel development," as of 2019 19 countries scored 4 or higher in "laboratory diagnosis system," while 14 countries scored 4 or higher in "personnel development." "Vaccination" was not evaluated in the SPAR (Attachment 2 [3]). Overall, KOICA partner countries have an adequate capacity in the area of "vaccination" and "laboratory diagnosis system."
- In the 2019 SPARs of KOICA partner countries, East Timor, Laos, Nepal, Democratic Republic of the Congo, and Ivory Coast each received a score of 1 on the indicators of personnel development, crisis communication, supply of medical supplies and health/medical personnel, public health crisis preparedness, food safety, and zoonotic disease.
- As such, when planning support for partner countries based on the 2019 SPAR, the above-listed countries should be prioritized.
- A comparison of indicator averages based on the 2018 and 2019 SPAR shows that higher scores were assigned for most indicators, with the exception of the

"quarantine" indicators. High scores were assigned for the indicators of "disease monitoring," "laboratory," and "zoonotic disease." (See <Fig. 6>.)

- While most partner countries achieved improvement in their contagious disease response systems, there is still room for improvement in their quarantine systems.



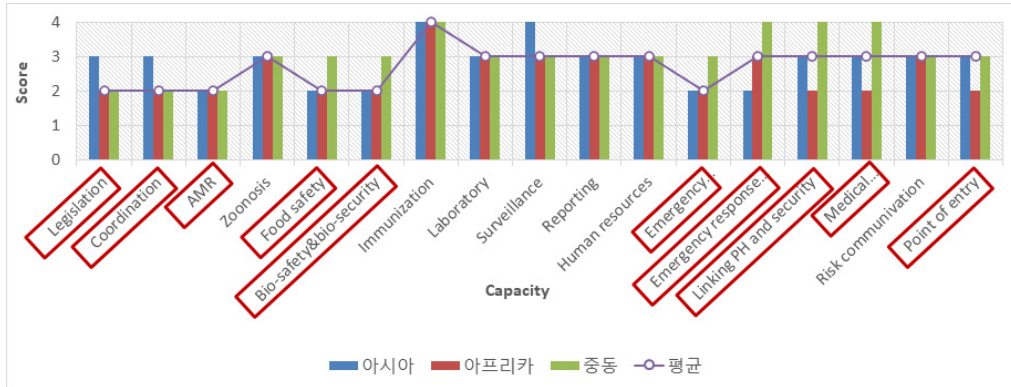
<Fig. 5> Comparison of the 44 Partner Countries Based on SPAR Averages



<Fig. 6> Comparison of SPAR Indicator Averages: 2018 vs. 2019

4) Comparison of Indicator Averages Between Continents (Based on the JEE)

- The 45 countries that underwent the JEE were divided into the groups of Asia-Pacific (14 countries), Africa (16 countries), Central and South America (7 countries), and Middle East/Central Asia (8 countries), and a comparison of indicator averages between these continents was performed.
- The indicator on which all continents obtained a score of 2 or less was "antimicrobial resistance" (P3.1-4).
- The indicator on which all continents obtained a score of 4 was "vaccination" (P7.1-2). The Middle East scored 4 also for the indicators "public health crisis response" (R2.1-2), "timely multi-sector cooperation/response system" (R3.1), and "supply of medical supplies and health/medical personnel" (R4.1-3). Asia scored 4 for "real-time monitoring" (D2.1-4).
- For all KOICA partner countries, an average score of three points or lower was obtained on the indicators of legislation, coordination, antimicrobial resistance, food safety, biosafety, biosafety and public health crisis preparedness, timely multi-sector cooperation/response, supply of medical supplies and health /medical personnel, and quarantine.
- The strengths and weaknesses of each continent are shown in Fig. 7 and Fig. 8. The prevailing strength was in "vaccination," while the prevailing weakness was in "legislation" and "coordination."
 - Asia: Improvement required in antimicrobial resistance, food safety, biosafety, and public health crisis preparedness/response.
 - Africa: Improvement required in legislation, antimicrobial resistance, food safety, biosafety, and public health crisis preparedness/response.
 - Middle East: Improvement required in legislation and antimicrobial resistance.



〈Fig. 7〉 Comparison of Indicator Averages by Continent (Based on the JEE)



〈Fig. 8〉 Strengths and Weaknesses by Continent (Based on the JEE)

5) Analysis of Partner Countries by Type of KOICA Support

The following analysis is based on JEE data. Each partner country was analyzed in the areas of focused support recommended by the GSHA, i.e. "vaccination," "laboratory," and "personnel development." Each partner country was also analyzed in areas in which they received a score of one or less. For details on each partner country, see Attachments 1 and 2.

(1) Southeast Asian Region 1

A. Vaccination

- All 4 countries in the Southeast Asian Region 1 scored 4 in the area of vaccination, an overall high rating. Most countries provide free public vaccinations and have an annual vaccination plan in place.

B. Laboratory

- Laos
 - Laos has standardized laboratory operation procedures in place for the control of influenza, dengue fever, diarrhea, measles, rubella, and Japanese encephalitis. However, as of 2015 it lacks funding of sample transport and a standardized system of laboratory operation. Approval and auditing of laboratories are inadequate. The government entities in charge of the approval and auditing of laboratories are not clearly defined.
- Myanmar
 - While laboratory standards for the testing of human disease (influenza, TB, HIV, malaria, typhoid fever, dengue fever, measles, rubella, poliomyelitis, and Japanese encephalitis) are higher than average, laboratory standards for the testing of livestock and wildlife are conspicuously low. Laos is in need of standard operating procedures for transportation, and a government-run

system of laboratory quality control/certification is required.

- Vietnam

- Vietnam's central government and local governments have a stratified laboratory system in place for the testing of humans and animals. Vietnam maintains cooperation with Australia, Hong Kong, China, Japan, and the US, which allows it to send samples to testing centers in these countries. But a system to support the fast shipping of samples between regions and the ability to carry out diagnoses in the provincial areas of Vietnam is needed to obtain expert diagnostic results.

- Cambodia

- Cambodia has 23 of the IHR-defined core capacities, including influenza analysis and HIV serum separation. But improvements to basic laboratory systems and laboratory quality control systems are required, as well as a standardized mechanism of equipment and supplies transport. Cambodia is in need of experts trained in modern technology for the core testing and modern diagnosis of priority diseases.

C. Personnel Development

- Laos

- Laos has the core personnel required to improve the IHR-defined capacities, and responds adequately to public health incidents. Despite this, there is a need to improve capacities and increase public health personnel (emergency response teams, surveillance authorities) in its provincial regions. Laos also stands to benefit from a convergence of strategies for the management of novel contagious diseases and public health emergencies, and of interdisciplinary technologies in public health.

- Myanmar
 - Myanmar has implemented a regular epidemiological training program (short courses over three months or less and mid-level courses of nine months), and most of its regions have an entity in place for the management of special diseases. However, Myanmar needs programs that can improve the expertise of its health personnel (epidemiology, health statistics, social science) and training in human and animal biosafety. Myanmar needs the equipment to achieve the IHR-defined core capacities.
- Vietnam
 - Vietnam has a wide range of public health professionals, and it has a system of work allocation at the central and regional level. But its provinces need to build their capacity for personnel development, and to improve their personnel capacity through field training in contagious disease management. It also requires incentive-based strategies for contagious disease prevention and control, with a focus on treatment.
- Cambodia
 - Cambodia has governmental personnel who can achieve the IHR-defined core capacities. However, it needs to set personnel operation plans and objectives in the area of public health. Cambodia needs to develop epizootologic experts.

D. Indicators with a Score of One or Below

- Myanmar – Emergency preparedness
 - Myanmar has a national disaster management system to respond to natural disasters. It has a network of general hospitals for such response. However, it needs to develop plans for the procurement, management, and use of funds in emergencies, and to regularly update its resource mapping based on risk

assessments.

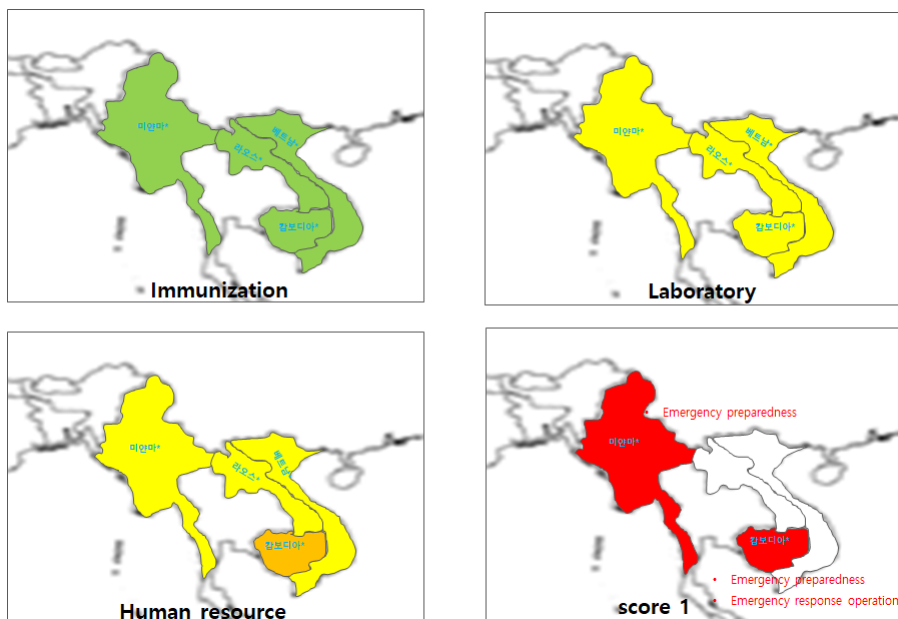
○ Cambodia

- Emergency preparedness

While plans for the operation of working-level entities in the development of public health emergency response plans were discussed, public health risks should be prioritized, and a national public health response plan for identifying required resources is needed.

- Emergency response operation

Cambodia has implemented standard operating procedures for public health crisis response. But no public health crisis planning procedures have been developed, and the systematic management and training of personnel activated in emergencies is not taking place. Emergency response management programs are also needed.



〈Fig. 9〉 Core Capacities of Southeast Asian Region 1

(2) Southeast Asian Region 2

A. Vaccination

- The three countries of Southeast Asian Region Two are providing national vaccination programs and complying with global vaccination action plans. However, the Philippines (score of two) is at risk of a recurrence of poliomyelitis, and is experiencing recurrences of diseases for which there are existing vaccinations, such as diphtheria. A lack of vaccination inventories is emerging at a national level due to inadequate distribution and management.

B. Laboratory

- Indonesia
 - Indonesia has implemented testing strategies for priority diseases. It also has the capacity to test for major animal-borne diseases.
- Philippines
 - There is a disease monitoring system that involves shipping samples to a central government-run laboratory to enable a systematic diagnosis in the event of a suspected contagious disease outbreak. However, the Philippines needs to narrow its approval process and standardize its transportation shipping to accommodate long shipping distances. It lacks expertise in the collection and testing of samples in the area of animal health.
- East Timor
 - East Timor's health authorities have the capacity to perform five of the six core tests, and to detect four animal-borne diseases. There are standard procedures in place for the collection and transport of samples. However, it needs to develop laboratory regulations for prioritized diagnoses, expand its infrastructure, and increase the capacity of laboratory operators.

C. Personnel Development

- Indonesia
 - While there are personnel development strategies and action plans for each agency, Indonesia needs to develop national disaster response programs and improve cooperation between agencies through a range of preventive training.
- Philippines
 - Development of human resources for an improved public health system is required. Multi-sector personnel (epidemiologists, veterinarians, social scientists, IT experts) must be incorporated into public health personnel development strategies. A personnel network for monitoring and tracing is needed.
- East Timor
 - While government-operated health personnel development programs have been implemented in a wide range of areas, capacity improvement through personnel assignment and strengthened coordination of health programs is needed.

D. Indicators with a Score of One or Below

- East Timor
 - Zoonosis

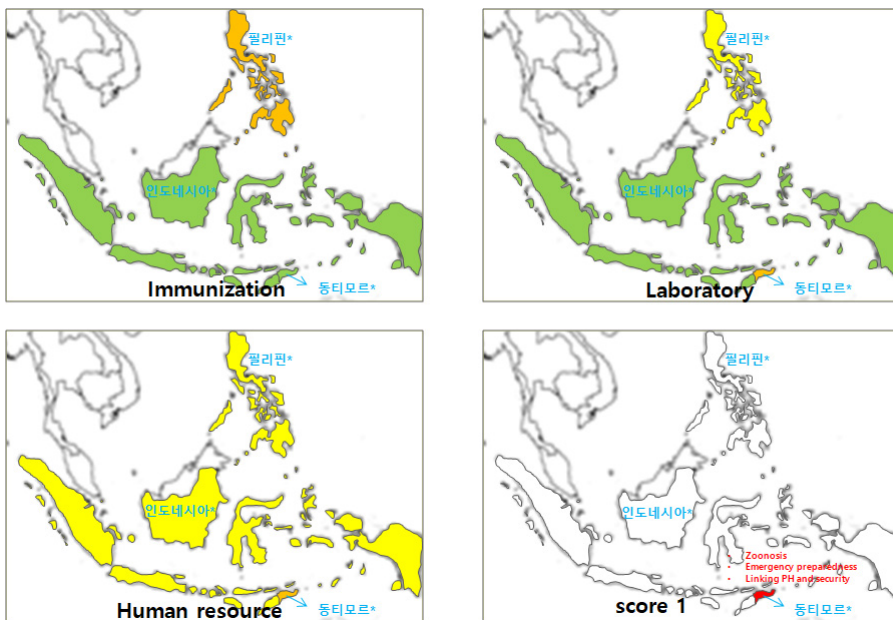
A list of zoonotic diseases must be set, and an effective system of zoonotic disease surveillance is required. "One Health" strategies must be implemented through ongoing funding.
 - Emergency preparedness

Mapping of risk assessments and resources for all risks is needed. A

comprehensive plan for response to all types of risk is required.

- Linking PH and security

A contact system is needed that clearly designates roles and responsibilities in different areas of risk. It is also necessary to identify the circumstances of contagious disease management through risk assessments, and develop a platform for cooperation between agencies.



〈Fig. 10〉 Core Capacities of Southeast Asian Region Two

(1) Southwest Asia-Pacific

A. Vaccination

- Afghanistan
- Detailed plans on the use of vaccinations and data in all regions are needed. Regional health centers must be developed to carry out backbone responsibilities.

- Pakistan

- Provision of vaccination service must be expanded. Logistics and personnel infrastructure must be formed.

B. Laboratory

- Afghanistan

- The ability to quickly report laboratory diagnosis results to the disease surveillance authorities is required. National laboratory policies based on annual budgets are required.

- Pakistan

- National laboratories must be operated to support the formation of essential standards. Infrastructure and personnel for diagnosis and public health research must be improved. A coordination system for the sharing of the functions of diagnosis and research of zoonotic disease is required.

- Bangladesh

- Strategies, networks, and operation plans for laboratory supervision and quality control are needed, in addition to local community laboratories for detection of novel contagious disease.

- Sri Lanka

- A system of laboratory operation and quality control based on standard certifications is required.

C. Personnel Development

- Bangladesh

- The development of personnel for public health emergency response, such as

veterinarians, epidemiologists, and nurses, is needed.

- Pakistan

- The Pakistani government lacks personnel development policies. There is also a lack of qualified public health experts.

- Sri Lanka

- There is a lack of personnel operation plans that utilize veterinarians. National personnel development strategies are insufficient.

D. Indicators with Scores of One or Below

- Afghanistan

- Legislation

A national committee comprising experts in legislation and public health of all areas must be formed for the review and correction of legislations, policies, and administrative procedures.

- Coordination

A pluralistic committee should be formed for ongoing activities in promoting awareness of related departments.

- Antimicrobial resistance

National plans must be formed on the detection and reporting of pathogens with antimicrobial resistance affecting both humans and animals. Development of contagious disease prevention and control policies to be implemented by all health facilities is required.

- Food safety

The food control authority stipulated by the food safety act must be expanded to cover the electronic engineering, laboratory, and environmental health authorities. Food-borne diseases must be designated as notifiable diseases.

- Bio safety

Biosafety and health security systems must be improved to enable not only national health laboratories but also subordinate laboratories to engage in the collection and processing of samples.

- Point of entry

Public health emergency plans must be developed for all risks to which quarantine stations are exposed, with the participation of related agencies. Standard operating procedures must be developed for the early detection, investigation, and evaluation of travelers with symptoms detected at quarantine stations.

- Pakistan

- Antimicrobial resistance

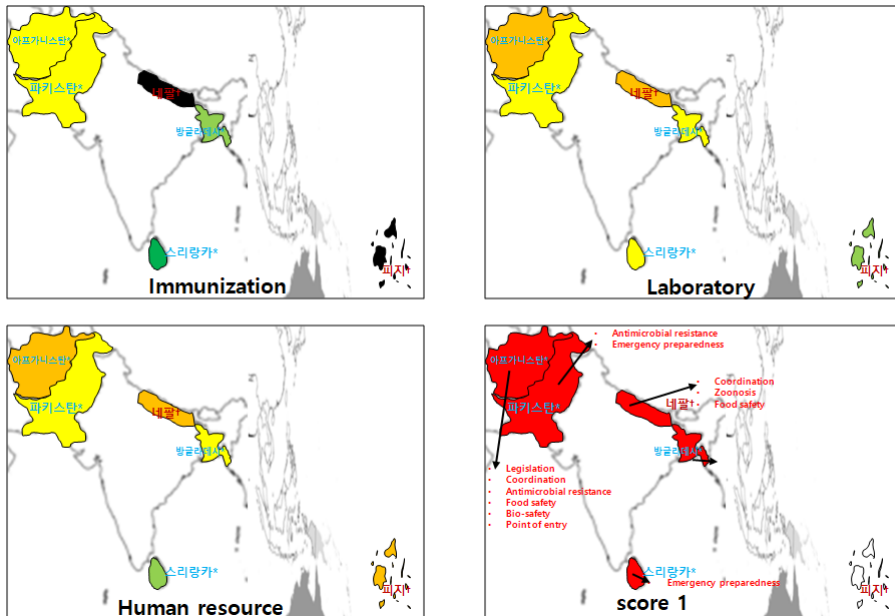
National countermeasure plans must be developed for the investigation and monitoring of antimicrobial resistance, in accordance with the WHO's global countermeasure plans, in addition to national programs for prevention and control.

- Emergency preparedness

An organization is needed that can support the development and execution of "One Health" strategies. Risk mapping must be done at a governmental level (central and local). The central government must develop public health plans to achieve safety from all risks, from all angles.

- Sri Lanka - Emergency preparedness

- Key risks to Sri Lanka as a nation must be identified and managed. Emergency preparedness and response plans of a multi-risk approach must be formed.



〈Fig. 11〉 Core Capacities of Southwest Asia-Pacific

(4) Middle East and Central Asia

A. Vaccination

- National strategies are needed to ensure the vaccination of all refugees. A refrigerated transport system must be established. Multi-year action plans involving related agencies must be formed.

B. Laboratory

- Iraq
 - National laboratory policies must be developed, guaranteed, and implemented for the coordination of future activities to be sustainable. National laboratory quality standards must be developed for application to laboratories nationwide.

- Jordan

- Human medicine, food safety, veterinary medicine, and environment-related laboratories must be coordinated. Information exchange systems and quality control processes need to be upgraded.

C. Personnel Development

- Tunisia

- The operations of personnel in a wide range of areas must be analyzed. The necessary measures must be taken to ensure a suitable and consistent supply of personnel. A wide range of education plans and opportunities must be adopted to develop national strategies in the areas of public health and veterinary science, and for IHR compliance.

- Jordan

- Clear strategies are needed for the development of all personnel capacities. Cooperation between related agencies in all available programs is necessary to achieve sustainable development.

- Mongolia

- Financial stability and health reform must be achieved to develop and implement action plans at the central government level, in a number of areas including the development of public health experts.

D. Indicators with a Score of One or Below

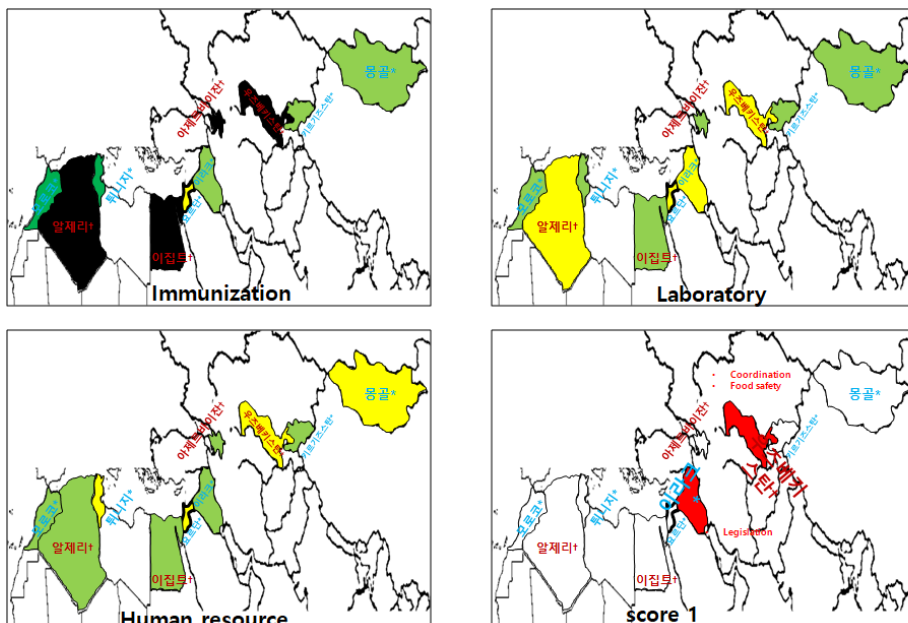
- Iraq - Legislation

- Public health legislation must be updated. Authorities and responsibilities must be clearly designated. The scope of authorities must be clearly defined. Legislation must conform to guidelines, national strategies, and disaster risk

reduction plans that specify the details of contagious disease management, including the requirements of basic data collection.

- Azerbaijan

- Azerbaijan scored the lowest on the indicators of "coordination" and "food safety" based on SPAR data.



〈Fig. 12〉 Core Capacities of the Middle East and Central Asia

(5) East Africa

A. Vaccination

- Most East African countries fared well, obtaining scores of 4 and over based on JEE data.

B. Laboratory

- Ethiopia

- Improvement of laboratory service quality is needed. Laboratory capacity for public emergency preparedness/response is required.
- Kenya
 - Laboratory testing capacity must be enhanced to ensure that important tests can be performed. Kenya's provinces are in need of education and training in sample transport for animal health purposes and in the collection and packaging of samples.
- Uganda
 - Animal sample transport must be merged with the human health system. The development of experts is needed.
- Tanzania
 - Regular information exchanges are needed to support a better connection of human and animal health. Improvements to the transport system and to laboratory capacity are needed in the provinces.
- Mozambique
 - Strategic plans that can be applied to a laboratory quality control system for the approval and guarantee of national laboratory policies are needed.

C. Personnel Development

- Ethiopia
 - Comprehensive strategies for the development of personnel must be developed and implemented to create an ideal public health model. Local governments need to improve their capacity for preventing, investigating, and managing incidents and threats occurring in the provinces.

- Kenya

- Personnel trained in epidemiology and laboratory activities must be utilized to improve the public health sector of the provinces. Local governments must develop health personnel and apply standardized processes for the development of IHR core functions.

- Uganda

- National epidemiological curriculums that include epidemiological and laboratory training must be developed. More core personnel and working-level personnel must be developed for the expansion of the education sector.

- Tanzania

- Educational curriculums must be improved. Epidemiological and laboratory training programs must be managed by the government to include the training of animal health experts.

- Mozambique

- Comprehensive personnel development strategies must be implemented to maintain the advantages of the public health service. Mid-level and higher epidemiological and laboratory training programs must be provided.

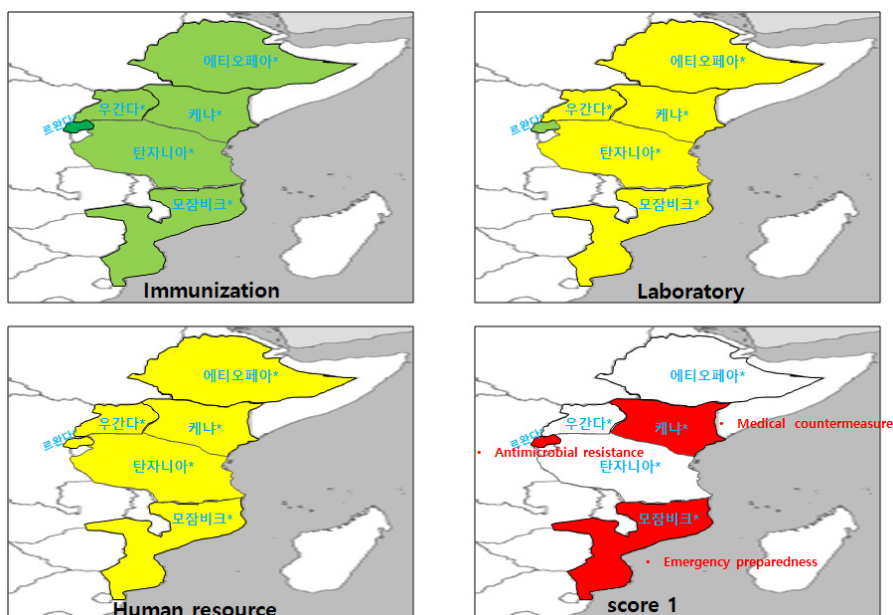
- Rwanda

- The contagious disease experts the provinces require must be developed. Financial capacity must be continuously improved.

D. Indicators with a Score of One or Below

- Kenya - Medical countermeasures

- A system must be developed to ensure the supply of medical supplies and medical/health personnel in public health emergencies. Emergency response capacity in human and animal health must be improved.
- Rwanda - Antimicrobial resistance
 - A national plan for the control of antimicrobial resistance is required. A laboratory system for the detection and reporting of pathogens with antimicrobial resistance is also needed.
- Mozambique - Emergency preparedness
 - A public health emergency preparedness plan against multiple risks is required. Monitoring and evaluation in all areas of human and animal health are required to achieve "One Health."



〈Fig. 13〉 Core Capacities of East Africa

(6) West Africa

A. Vaccination

- Democratic Republic of the Congo
 - For the improved vaccination of humans and animals, a cooperation system must be formed, and vaccination timing and transport equipment maintenance plans must conform to standardized guidelines.
- Ivory Coast
 - Logistics for human and animal health must be improved. Human resources for refrigerated logistics management must be improved.

B. Laboratory

- Democratic Republic of the Congo
 - A multi-sector system that supports the coordination and cooperation of laboratories must be developed. An organization must be established to ensure the regular supply of laboratory reagents and supplies. The laboratory quality control system must be improved in multiple areas.
- Ivory Coast
 - Laboratory capacity must be improved in the areas of equipment and personnel. A network of laboratories for the diagnosis of priority diseases in humans must be created. A transport system must be established to facilitate diagnoses in the provinces.
- Senegal
 - Coordination between human and animal health is needed. Laboratories in all areas, including human/animal health, environment, and food safety, must be managed by the government.

- Ghana

- A nationally standardized sampling and transport system must be developed. A plan must be formed to ensure the standardization of sample testing. Laboratory reagents and methods must be continuously supplied to procure the latest equipment.

- Nigeria

- An integrated national network for the laboratory infrastructure is required. Laboratories must be managed through a national laboratory network certification that is focused on biosafety, biosecurity, and quality assurance. An effective vaccine transport system that guarantees "cold chains" must be developed.

- Cameroon

- Networks of laboratories in human health, animal health, and environment must be created. The regular supply of human resources, laboratory equipment/supplies, and diagnostic reagents must be ensured. Laboratory equipment must be upgraded, and a system that supports the safe transport and distribution of samples must be created.

C. Personnel Development

- Democratic Republic of the Congo

- Personnel development plans must be formed and programs funded by a core source to continue providing training programs in a range of areas, including epidemiology.

- Ivory Coast

- To develop the experience and expertise of local community health personnel, the appropriate policies must be implemented, and human resources

management entities must map human resources in different areas of expertise.

- Senegal

- Coordination among different sectors must occur for the development of public health personnel. Human and animal health training must be given to bioscientists, computer scientists, and biological technicians.

- Ghana

- The ongoing development of public health personnel must occur. Public health experts required by the central government and local governments must be prioritized, and their objectives set and pursued.

- Nigeria

- To increase the number of public health personnel, broaden the areas of their expertise, and maintain their funding, public health personnel development strategies must be developed and implemented on a national level. Mid-level or higher epidemiological training program is required. All regions require trained field epidemiologists.

- Cameroon

- Evaluation of the basic plans is required, in addition to a national plan for the development of personnel.

D. Indicators with a Score of One or Below

- Democratic Republic of the Congo

- a. Antimicrobial resistance

- A pan-governmental action plan for the detection and reporting of pathogens

with antimicrobial resistance must be created and implemented. The central government must engage in planning and undertake development for the monitoring and prevention of contagious disease.

b. Food safety

- A control must be created for the coordination and cooperation of different agencies in charge of food safety. The mechanism of information sharing between food safety entities must be improved.

c. Emergency preparedness

- Plans for emergency preparedness and action execution must be implemented in preparation for public health emergencies. Accumulated resources must be distributed, and a crisis management plan that utilizes local resources must be implemented.

d. Linking PH and security

- A cooperation protocol must be developed for cooperation between the security authorities and the human/animal health sector. Standard operating procedures for interventions between agencies must be developed.

e. Medical countermeasures

- Legislation and coordination methods must be developed to support the supply of medical supplies and health/medical personnel in public health emergencies. Inter-agency plans for the transport of medical supplies are needed.

f. Point of entry

- National response plans for public health emergencies at the border must be implemented. Standardized quarantine guidelines on the care of ill travelers are needed.

- Ivory Coast - Antimicrobial resistance
 - The responsibilities of human and animal health personnel must be clearly established. A national framework for prevention and testing of infection must be created.
- Senegal - Point of entry
 - The legal and systemic framework on the operation of quarantine stations must be updated. Involvement of other agencies in the activities of the health authorities and quarantine stations is required. Standard operating procedures for the central government's internal and external coordination mechanism must be developed and applied.
- Ghana
 - a. Antimicrobial resistance
 - A national action plan for antimicrobial resistance control is needed. Upgrading of laboratory service, including the designation of a sample monitoring entity, is required.
 - b. Medical countermeasure
 - National countermeasures must be approved, developed, and guaranteed. Procedures must be developed to ensure the necessary medical measures are quickly provided in public health emergencies.
- Nigeria
 - a. Legislation
 - A comprehensive evaluation of current legislations and policies is needed. Revision of legislations and policies that are identified as inefficient must take place.

b. Emergency preparedness

- By linking with existing plans, pan-governmental public health emergency preparedness plans must be formed to ensure readiness for all risks. Response strategies must be shared with the related agencies.

c. Linking PH and security

- Current legislations must be reviewed and revised. Unique protocols and MOUs shared by security agencies and public health agencies must be created and strategically developed to clearly establish their roles.

d. Medical countermeasure

- Revision of current legislation is needed, along with ratification of existing bills. An MOU must be signed by all related agencies to establish roles and responsibilities. Inter-agency coordination is required for capacity improvement and joint studies. The involvement of public health experts is needed.

e. Point of entry

- Quarantine stations must be established quickly, and related laws and policies must be revised.

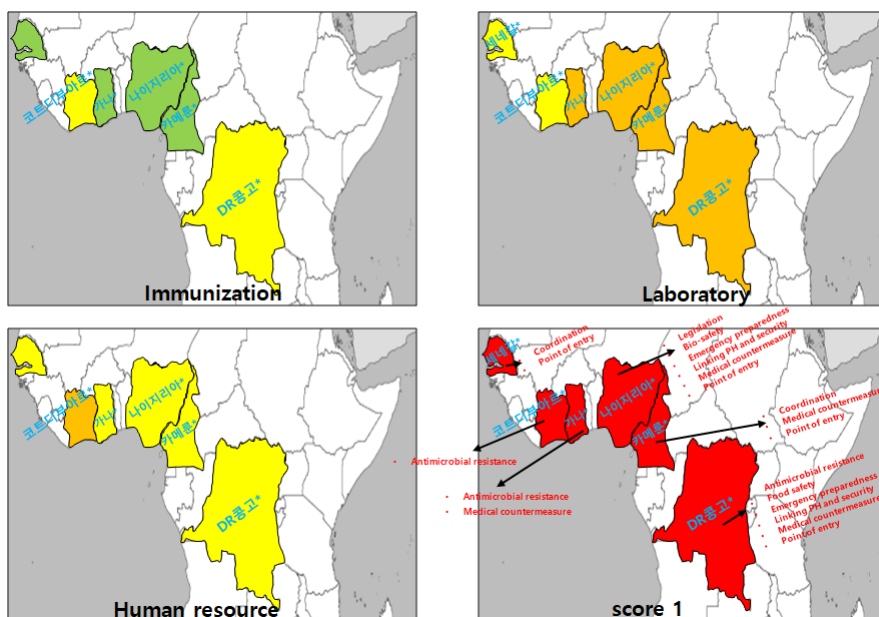
◦ Cameroon

a. Coordination

- Training must take place so the roles required for IHR compliance are fulfilled in a range of areas including health, agriculture, livestock raising, commerce and industry, and logistics.

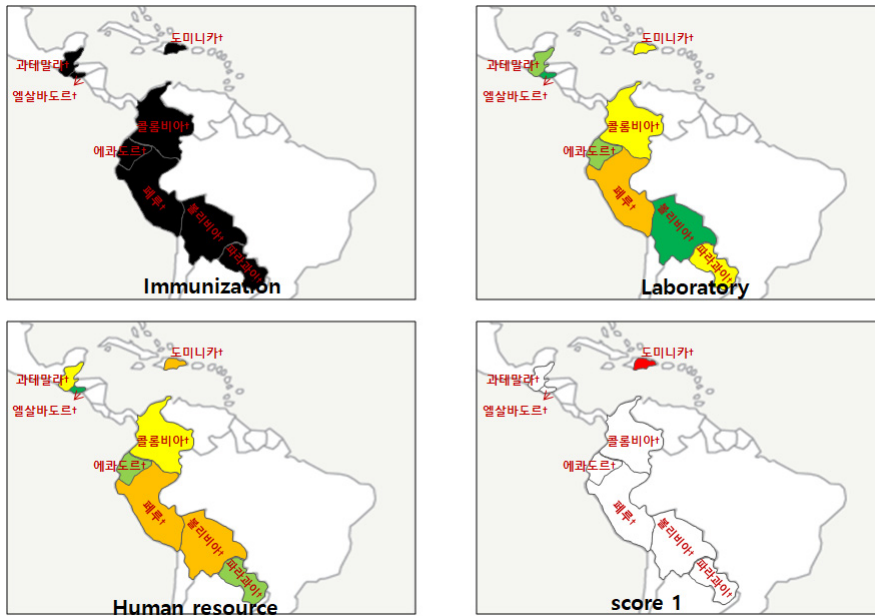
b. Point of entry

- Border region monitoring plans must be set, verified, and shared with all related agencies. Regular training in different areas is needed. Medical personnel, equipment, and supplies must be provided to enable designated quarantine stations to operate efficiently.



〈Fig. 14〉 Core Capacities of West Africa

(7) Central and South America

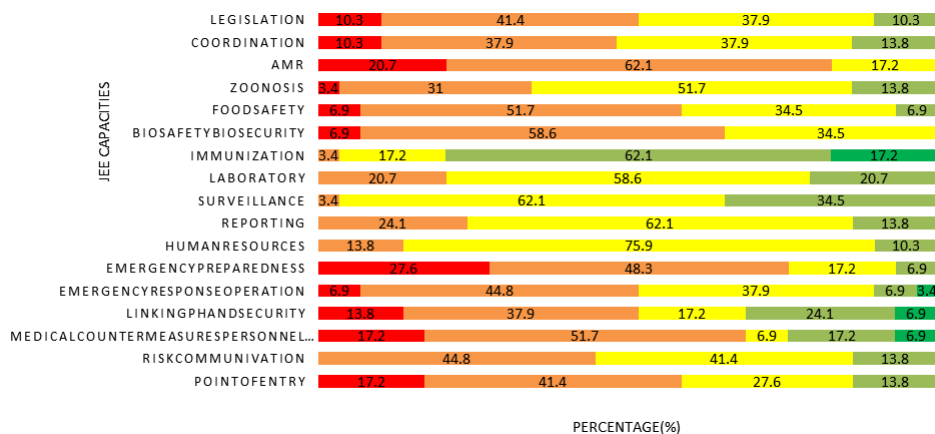


〈Fig. 15〉 Core Capacities of Central and South America

6) Indications of Poor JEE Indicator Scores

[Analysis of JEE Data]

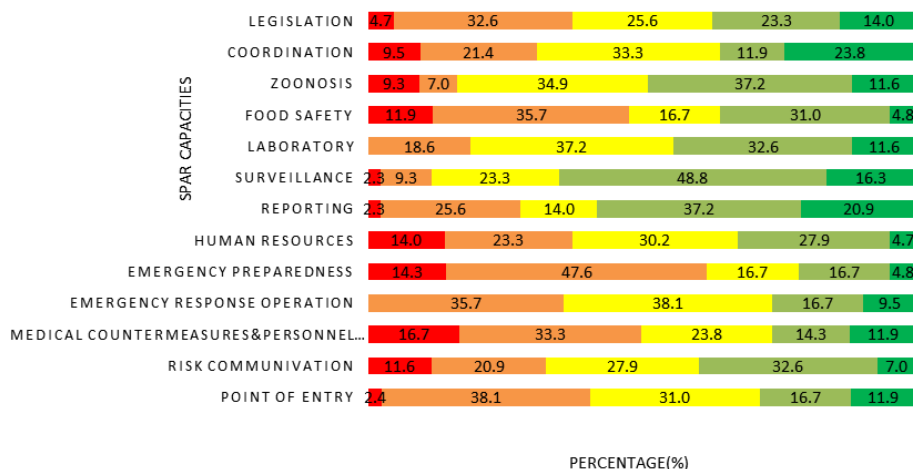
- An analysis of JEE data shows that focused improvement is required in the areas of public health preparedness, antimicrobial resistance, supply of medical supplies and health/medical personnel, and quarantine, in that order of priority. (See 〈Fig. 16〉.)



〈Fig. 16〉 Analysis of Capacities Based on JEE Data

[Analysis of SPAR Data]

- An analysis of SPAR data shows that focused improvement is required in the areas of the provision of medical supplies and health/medical personnel, public health emergency preparedness, and personnel development, in that order of priority. (See 〈Fig. 17〉.)



〈Fig. 17〉 Analysis of Capacities Based on SPAR Data

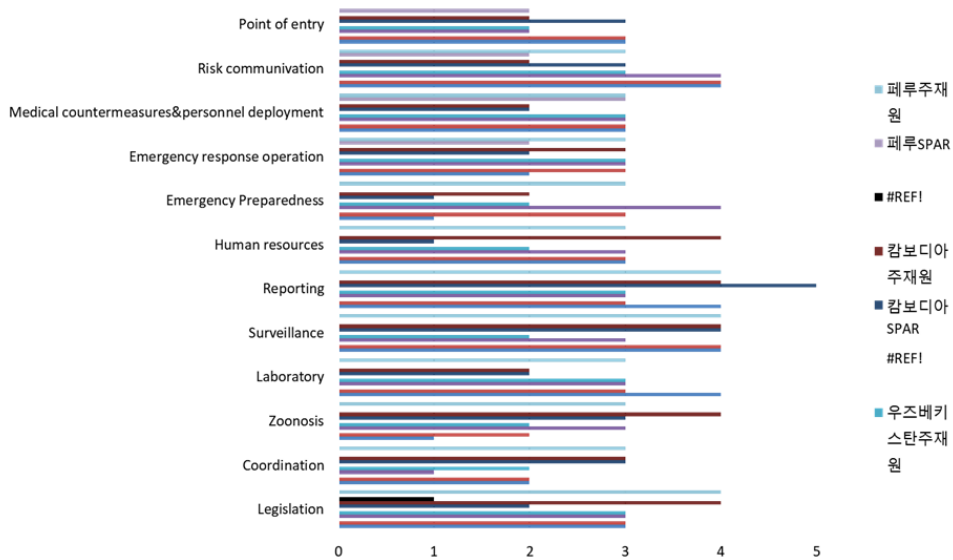
○ Result of Survey of Partner Countries' Ambassadors Based on SPAR Data (〈Fig. 18〉, 〈Fig. 19〉)

- Sri Lanka: SPAR data indicates poor capacities in the areas of zoonotic disease and emergency preparedness. The ambassador's evaluation indicates the need for coordination and preparedness against animal-borne diseases.
- Uzbekistan: SPAR data indicates a low capacity for coordination. The ambassador was in agreement on this point. Support is needed in the areas of contagious disease governance and capacity enhancement.
- Cambodia: Cambodia scored the lowest in the area of emergency preparedness. The ambassador also assigned it a low score of two, indicating that support in this area is required.
- Mozambique: A SPAR score of two was obtained for the areas of legislation and coordination. The ambassador assigned an even lower score of one, indicating that support in systemic improvement and coordination is required.

스리랑카	SPAR	3	2	1	4	4	4	3	1	2	3	4	3
	주재원	3	2	2	3	4	3	3	3	3	3	4	3
우즈베키스탄	SPAR	3	1	3	3	3	3	3	4	3	3	4	2
	주재원	3	2	2	3	2	3	2	2	3	3	3	2
캄보디아	SPAR	2	3	3	2	4	5	1	1	2	2	3	3
	주재원	4	3	4	2	4	4	4	2	3	2	2	2
모잠비크	SPAR	2	2	4	4	4	2	4	4	3	3	3	2
	주재원	1	1	2	3	2	2	3	3	3	3	3	2
페루	SPAR	3	3	4	2	5	2	2	2	3	2	2	
	주재원	4	3	3	3	4	4	3	3	3	3	3	3
		Legislation	Coordination	Zoonosis	Laboratory	Surveillance	Reporting	Human resources	Emergency Preparedness	Emergency response operation	Medical countermeasures&personnel deployment	Risk communication	Point of entry
		p11-14	p21	p41-43	d11-14	d21-24	d31-32	d41-43	r11-12	r21-2	r41-43	r51-55	poe1-2

〈Fig. 18〉 Data from Survey of Partner Countries' Ambassadors Based on SPAR Data

- Peru: While Peru achieved a score of two in multiple areas, the ambassador assigned it a score of three or over in most areas, indicating that no urgent support is required. While there is no data on the indicator of quarantine, the result of the ambassador's survey indicates a score of around three on the operation of quarantine stations in Peru.



〈Fig. 19〉 Data from Survey of Partner Countries' Ambassadors

(1) Weaknesses by Region and Country

- Based on JEE data on 29 countries, a country is considered to have a weakness if it has 3 or more indicators with a score a 1.
- Weaknesses identified: Antimicrobial resistance, quarantine, supply of health personnel, fast and coordinated multi-sector response, public health crisis preparedness/response
- Countries with weaknesses: African nations of Nigeria, Democratic Republic of the Congo, and Cameroon; Afghanistan, East Timor

- Based on SPAR data on 44 countries, a country is considered to have a weakness if it has 3 or more indicators with a score of 1.
 - Weaknesses identified: Personnel development, crisis communication, supply of medical supplies, supply of health/medical personnel, public health crisis preparedness, food safety, zoonotic disease
 - Countries with weaknesses: African nations of Democratic Republic of the Congo and Ivory Coast; Asian nations of East Timor, Laos, and Nepal
- Based on JEE and SPAR data, a country is considered to have a weakness if it has 3 or more indicators with a score of 1.
 - Weaknesses identified: Legislation, coordination, quarantine, supply of medical supplies, supply of health/medical personnel, public health crisis preparedness
 - Countries with weaknesses: African nations of Nigeria, Cameroon, and Democratic Republic of the Congo; Afghanistan and Nepal
- Indications
 - The areas in which the most countries are weak are the supply of health personnel and public health crisis preparedness.
 - Such weaknesses should be addressed through capacity improvement and ongoing education/training. Support should be provided in the form of systemic improvement and capacity enhancement through governance formation.

(2) Recommendation of Core Strategies

- Required Improvements
 - The most common weaknesses are supply of health personnel and public health crisis preparedness.
 - Priority of contagious disease response activities should be set based on an

analysis of weaknesses.

○ Core Strategies

- Strategy 1: Identification of weaknesses based on JEE and SPAR scores; identification of issues and setting of improvement plans
- Strategy 2: Analysis of organization and roles for the formation of governance for contagious response
- Strategy 3: Formation of legal system improvement plans
- Strategy 4: Formation of funding plans for contagious disease response (budgets and financial aid)
- Strategy 5: Formation of plans for the allocation of roles to the central government and local governments
- Strategy 6: Formation of plans for the acquisition of the expert personnel required for contagious disease response
- Strategy 7: Creation of standardized national laboratories; formation of strategies for diagnosis and testing at different stages
- Strategy 8: Formation of strategies for the quarantine of points of entry for the early detection and interception of contagious disease
- Strategy 9: Formation of international cooperation strategies for contagious disease response
- Strategy 10: Creation of crisis communication procedures and manuals

IV. Considerations

Ebola, SARS, MERS, COVID-19... In recent times the world has experienced a number of epidemics, and now a pandemic of an emerging contagious disease. A novel contagious disease does not give us time to take action; it is quickly transmitted among those with a weak immune system and from animals to humans. It hits us without warning, when our guard is down. With all contagious diseases, both known and new, a failure to respond successfully is due to a lack of information on how the disease transmitted and what risks it poses. This means that a country's own sustainable contagious disease response infrastructure, not aid provided by another country, is critical in contagious disease response. Such infrastructure includes systems (emergency-activated organizations, cooperation between entities, etc.), expert personnel (qualified epidemiologists and testing personnel), available funds (emergency-activated funds), and facilities and equipment (isolation facilities, negative pressure isolation units, various testing equipment, transport equipment). Today, with the world united by air travel, a contagious disease is no longer indigenous to a particular nation; it affects us all. As such, advanced technologies and strategies for contagious disease response should not be hoarded by privileged countries; rather, they should be shared with the world so we can cooperate in controlling the spread of contagious disease. In this research, which was an effort to understand how KOICA partner countries are coping with contagious disease and discover the areas in which they need to improve, data from the JEE and the SPAR, both internationally recognized evaluation systems, were used as a tool of analysis. To compare the indicators of partner countries, the indicators of their contagious disease response capacity were quantified using scores of one to five. As data from both the JEE and SPAR show, there were no countries that scored under three in the areas of laboratory diagnosis system, personnel development, and vaccination, which are the areas in which KOICA is providing focused support. In other words, perhaps due to KOICA's previous development aid, the partner countries no longer require

urgent assistance in those areas. It was thus determined that the areas in which KOICA should provide development assistance in the future can be arranged in order of priority based on the following:

① Countries with a large number of JEE and SPAR indicators for which a score of 2 or below was obtained, or continents with a large number of such countries, ② Partner countries with a weakness stemming from political or cultural circumstances or vulnerability to transmission of infection, ③ Countries selected based on indicators of Korea, the donor country, for which a high score was obtained, and ④ Areas selected for support from the standpoint of contagious disease response through global cooperation. As the resources with which support will be provided are limited, one or a combination of these standards should be considered in maintaining an effective and successful partnership. The countries with the highest number of indicators that were given poor scores (score of one for a single indicator) were, based on JEE data, Nigeria and the Democratic Republic of the Congo, followed by East Timor and Cameroon (scores of two or below). These countries should be prioritized in the aid to be provided by KOICA in the future. The poorest indicators of the partner countries were in the area of public health crisis preparedness and response: these indicators were the formation and implementation of plans for public health crisis preparedness (plans for emergency-activated personnel, funds, and resources; acquisition and utilization of resources according to priority), acquisition and utilization of resources according to priority (operation of personnel, budgets, resources based on the urgency of contagious disease response), creation of a system for the fast and safe shipping of medical supplies (cold chain system, dedicated transport modes), and creation of a system for the dispatch of health and medical personnel (acquisition and utilization of a sufficient pool of health experts). All these indicators point to the lack of an organized system for contagious disease response. As such, the partner countries stand to benefit the most from the transfer of technology and techniques used successfully by developed countries, to be utilized in a manner that is suitable for them. As far as Korea is concerned, it received a JEE score of five in the area of public health crisis preparedness and response, and the reason

why its response to the current COVID-19 crisis can provide a shining example was due to its expert health/medical personnel who could respond to a contagious disease outbreak, operation of emergency-activated organizations (Central Disease Control Headquarters, Center Disaster and Safety Countermeasures Headquarters), cooperation between agencies (Ministry of the Interior and Safety, Ministry of Welfare, Ministry of Economy and Finance, Ministry of Environment, National Pension Service), national health insurance system, advanced health/medical technology, and a contagious disease response system developed following its bout with MERS (response through education and training).

In providing health and medical aid to partner countries, factors such as urgency, risk, mode of support, and politics will need to be considered. According to data provided by the Export-Import Bank of Korea, Korea provided Vietnam with the most aid (loan of ₩3,035,397,000,000), at 14.83% of its total aid provided (Attachment 4). Vietnam stands out from the rest of the countries that received aid on a similar scale. In terms of the scale of aid provided by area, aid in the area of contagious disease control and prevention accounted for 74% of the entire budget for basic health aid, which means that aid is actively being provided in the area of contagious disease management. However, as JEE data shows, a very low level of aid is being provided in the area of medical research and education/training, which is linked to the fundamental system of contagious disease response (Attachment 3). Thus, both a review of support policies and further research are required to create a system of international cooperation in contagious disease control, and to provide the KOICA partner countries with effective aid in the prevention and treatment of contagious disease.

This research should serve as a solid foundation for joint international efforts in the control of contagious disease, and as a testament to Korea's success in managing the current COVID-19 crisis, which it intends to share with the world.

The survey of ambassadors and experts that was carried out this research produced qualitative results that were somewhat different from the results of the JEE and SPAR, which involve quantitative evaluations. To gain a clearer picture of the KOICA partner

countries' health and medical capacities, a literature study combined with field study in the partner countries would be ideal.

V. Conclusion

1. Utilization of Research Findings and Anticipated Effects

1) Utilization

(1) Research

- Objective and quantitative JEE and SPAR reports can be referenced to gain an understanding of KOICA partner countries' contagious disease response capacities and their weaknesses, which can be considered when providing partner countries with aid.
- The analysis of partner countries' contagious disease response systems and capacities can be referenced in identifying countries or areas of contagious disease response in which to provide medical resources aid.
- By analyzing the operating methods and achievements of donor agencies, the areas of contagious disease-related projects that different divisions of KOICA should prioritize can be identified, and the necessary strategies can be formed.
- By systematically analyzing materials on KOICA partner countries' medical systems and contagious disease response strategies, their cooperation with Korean health/medical agencies and other donor agencies can be strengthened.

(2) Project Strategies

- Creation of a platform for the designation of Korea's proven quarantine solutions, based on the IHR, as a global standard.
- Comprehensive Approach to KOICA's Contagious Disease Projects
 - Development of an all-encompassing project design model that applies to

drinking water hygiene, vaccination, contagious disease, and neglected tropical diseases.

- Development of a model of cooperation between partner countries and Korea or multi-party entities for contagious disease response.
- Active Conformance to the Change in the International Health/medical Paradigm Prompted by COVID-19
 - Identification of a business model to lead the change in developed and developing countries' health and medical systems
 - Development of capacity to accommodate changes in the priority of partner countries' health and medical projects.

2) Anticipated Effects

(1) Policies

- Transfer of Korea's effective quarantine know-how to improve the contagious disease response capacities of partner countries.
- Promotion of multi-party cooperation in contagious disease response, as opposed to a two-party cooperation system, e.g. Korea and a partner country.
- Contribution to the effective execution of KOICA's mid-term health strategies, and the achievement of the three sustainable development goals (SDG 3) in the health sector.

(2) IHR-based Contagious Disease Response

- Use of objective and quantitative JEE and SPAR reports in a systematic analysis of KOICA partner countries' contagious disease response capacities and poor indicators.
- Execution of sustainable contagious disease response strategies in the aid of

KOICA partner countries to improve their JEE scores.

- Globalization of IHR-based Korean quarantine solutions; creation of a platform to designate Korean quarantine solutions a global standard.

(3) Methodology/Technology

- Establish systematic procedures and methodologies of prevention, monitoring, response, and crisis communication as specified by the IHR.
- Clearly describe the work processes involved in each stage of contagious disease response.
- Present quarantine system improvement measures for early response to contagious disease.
- Present methodologies in contagious disease testing and patient monitoring systems.
- Create community isolation facilities and self-isolation facilities featuring Korea's ICT.
- Localize projects and improve project sustainability in line with global standards.

2. Need for Additional Research

(1) Active Response to the Health/medical Paradigm Change Caused by the Pandemic

- As a result of the COVID-19 pandemic the world's perception of its health and medical systems is changing. A new ODA model that can accommodate the changing health and medical environment is urgently needed.
- The traditional method of supply of personnel, health resources, health management, and health/medical services will change.

- There will be an exponential increase in the demand for health and medical governance that can achieve a preemptive response to new diseases.
- Contagious diseases will expand the range of stakeholders involved in the health and medical sector, previously the domain of medical professionals, to include experts in such areas as ICT and administration.

(2) Contactless Strategies

- The normalization of social distancing brought about a change in health and medical service, previously a face-to-face affair.
- A sharp decrease in international air travel by personnel changed the ways in which overseas ODA projects are conducted.
- ICT-based operations, including contactless treatment and conferences, will dramatically increase.

(3) Change of International Health/medical Leadership in the Direction of Cooperation and Joint Response Under the WHO

- Creative responses tailored to the disease environments of individual countries will increase.
- The traditional approach of one-way transfer of technology from a developed country to a developing country will become obsolete.

Attachment 1

(1) Comparison of 43 KOICA Partner Countries' JEE and SPAR Indicator Averages (2019)

Comparison of KOICA Partner Countries' Indicator Averages (2019 JEE and SPAR)

Timor-Leste	2	2	2	2	1	2	2	2	4	2	3	2	2	1	2	2	3	2	2
Rcos	4	4	2	2	3	2	2	4	4	3	4	4	3	2	2	4	2	3	3
Mongolia	3	3	3	3	3	2	2	4	4	4	4	3	3	3	3	3	2	3	3
Myanmar	2	2	2	2	3	2	2	4	4	3	3	3	3	1	2	2	2	2	2
Bangladesh	3	3	2	3	3	3	3	4	4	3	4	4	3	2	1	1	2	3	2
VIET NAM	3	4	2	4	4	3	3	4	4	3	4	3	3	2	3	2	2	3	3
Sri Lanka	4	2	3	3	3	2	2	5	4	3	4	3	4	1	3	4	2	4	4
Afghanistan	1	1	1	3	1	1	1	3	2	2	4	2	2	2	2	4	2	2	1
Indonesia	3	3	3	3	3	3	3	4	4	4	3	3	3	3	3	4	4	4	4
CAMBODIA	3	4	2	3	3	2	2	4	4	3	4	3	2	1	1	2	2	3	3
Pakistan	3	3	1	3	3	2	2	3	3	3	3	2	3	1	2	3	4	2	2
Philippines	2	2	3	2	2	2	2	2	2	3	3	2	3	3	3	3	4	3	4
GHANA	2	3	1	3	3	2	2	4	4	2	3	3	3	2	2	2	1	2	3
Nigeria	1	2	2	2	2	2	1	4	4	2	3	3	3	1	2	1	1	2	1
Rwanda	3	3	1	3	3	3	3	5	4	4	4	3	3	2	3	5	2	4	2
Mozambique	2	2	2	2	2	3	2	4	4	3	3	3	3	1	4	2	3	3	2
Morocco	3	4	2	4	4	2	2	5	4	4	3	4	4	4	4	4	5	3	3
Senegal	2	1	2	2	2	2	2	4	4	3	3	3	3	2	3	2	2	2	1
Ethiopia	4	3	2	3	3	2	2	4	4	3	3	3	3	3	2	2	3	3	2
Uganda	2	2	3	2	2	3	3	4	4	3	3	3	3	3	3	2	2	3	2
Cameroon	2	1	2	2	2	2	2	4	4	2	3	2	3	2	2	2	1	2	1
DR Congo	2	2	1	2	2	1	2	3	3	2	3	3	3	1	2	1	1	2	1

Kenya	3	3	2	3	3	4	3	4	3	3	2	2	3	1	3	2	
Tunisia	2	3	2	4	3	5	4	3	3	3	2	3	4	4	2	3	
Cote d'Ivoire	2	2	1	3	3	3	3	3	3	3	2	2	2	2	2	2	
Tanzania	3	3	2	2	3	4	3	3	2	3	2	2	2	2	2	2	
Jordan	2	2	2	3	3	5	3	3	3	3	2	3	4	5	2	2	
Iraq	1	2	2	2	3	3	3	2	2	3	2	3	3	2	2	3	
Kyrgyzstan	3	3	2	4	4	4	4	4	4	4	4	5	5	4	4	4	
Nepal	2	1		1			2	3	4	2	2	2		2	2	2	
Fiji	5	5		3			4	4	5	2	3	3		2	2	5	
Algeria	5	5		4			3	4	4	4	3	3		5	4	3	
Egypt	5	5		4			4	5	4	4	5	5		4	4	5	
Guatemala	3	2		2			4	4	2	3	3	3		2	2	3	
Dominican Republic	2	1		2			3	4	5	2	2	3		1	4	3	
Bolivia	5	4		5			5	5	4	2					3	5	
Ecuador	4	5		4			4	4	4	4	3	4		3	3	4	
El Salvador	5	5		5			5	5	5	5	5	5		5	4	5	
Colombia	4	3		4			3	3	4	3	2	4		4	2	5	
Paraguay	2	5		3			3	4	5	4	2	2		2	3	3	
Peru	3	3		4			2	5	2	2	2	3		2	2		
Azerbaijan	4	5		4			4	5	4	4	3	4		5	5	4	
Uzbekistan	3	1		3			3	3	3	4	4	3		3	4	2	
Palestine																	
Capacity	Legislation	Coordination	AMR	Zoonosis	Food safety	Biosafety & security	Immunization	Laboratory	Surveillance	Reporting	Human resources	Emergency Preparedness	Emergency response	Linking PH and security	Medical countermeasures	Risk communication	Point of entry
	p11-14	p21	p31-34	p41-43	p51-52	p61-62	p71-72	d11-14	d21-24	d31-32	d41-43	r11-12	r21-2	r31	r41-43	r51-55	poel-2

(2) Comparison of the Indicator Averages of KOICA Partner Countries That Underwent Both the JEE and SPAR (2019, JEE

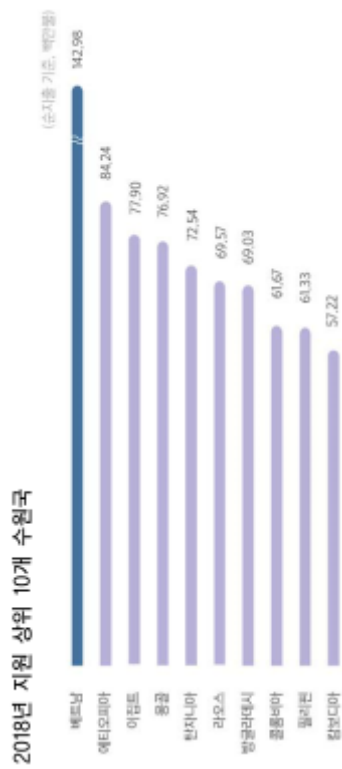
indicators – SPAR indicators)

○ Legend

Background color	Font color
JEE indicator - SPAR indicator = 0	
JEE indicator - SPAR indicator = 1	JEE indicator - SPAR indicator = -1
JEE indicator - SPAR indicator = 2	JEE indicator - SPAR indicator = -2
JEE indicator - SPAR indicator = 3	JEE indicator - SPAR indicator = -3

* SCORE: JEE indicators – SPAR indicators

(3) Beneficiary Countries with the Most Aid Received (Source: ROK government, EDCD statistics)



Attachment 2

(1) Comparison of 29 KOICA Partner Countries' JEE Averages

JEE_ 지표별 평균																												
	2	2	2	1	2	2	4	2	4	2	3	2	1	2	2	1	2	2	1	2	2	2	1	2	2	3	2	2
Timor-Leste	4	4	2	3	2	2	4	4	3	4	4	3	2	2	2	4	3	2	4	2	2	2	3	3	3	3	3	3
Raos	3	3	3	3	3	2	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Mongolia	2	2	2	3	2	2	4	3	3	3	3	3	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Myanmar	3	3	2	3	3	3	4	3	4	3	4	3	2	1	1	2	3	2	1	2	2	3	3	3	3	3	3	2
Bangladesh	3	4	2	4	3	3	4	3	4	3	4	3	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	3
VIET NAM	4	2	3	3	3	2	5	3	4	3	4	3	4	1	3	4	3	4	4	2	2	4	4	4	4	4	4	4
Sri Lanka	1	1	1	3	1	1	3	2	4	2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Afghanistan	3	3	3	3	3	3	4	4	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4
Indonesia	3	4	2	3	2	2	4	3	4	3	4	3	2	1	1	2	2	1	2	2	2	2	2	2	2	2	2	3
CAMBODIA	3	3	1	3	2	2	3	3	3	3	3	3	3	1	2	3	3	3	3	4	2	4	3	4	3	4	3	4
Pakistan	2	2	3	2	2	2	2	3	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Philippines	2	3	1	3	2	2	4	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
GHANA	1	2	2	2	2	1	4	2	3	3	3	3	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
Nigeria	3	3	1	3	3	3	5	4	4	3	3	3	2	3	3	2	3	2	5	2	4	2	4	2	4	2	2	2
Rwanda	2	2	2	2	3	2	4	3	3	3	3	3	1	4	4	3	2	3	2	3	3	3	3	3	3	3	3	2
Mozambique	3	4	2	4	4	2	5	4	3	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Morocco	2	1	2	2	2	2	4	3	3	3	3	3	2	3	3	2	3	2	2	2	2	2	2	2	2	2	2	3
Senegal	4	3	2	3	2	2	4	3	3	3	3	3	4	3	3	3	3	3	4	4	3	3	3	3	3	3	3	3
Ethiopia	2	2	3	2	2	2	4	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Uganda	2	2	3	2	2	2	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
Cameroon	2	1	2	2	2	2	4	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
DR Congo	2	2	1	2	1	2	3	2	3	3	3	3	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2
Kenya	3	3	2	3	3	3	4	3	4	3	4	3	2	3	3	2	2	2	3	4	3	3	3	3	3	3	3	2
Tunisia	2	3	2	4	3	2	5	4	3	3	3	3	2	3	3	2	3	2	4	4	2	2	2	2	2	2	2	3
Cote d'Ivoire	2	2	1	3	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Tanzania	3	3	2	2	2	2	4	3	3	3	3	3	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Jordan	2	2	2	3	3	3	5	3	3	3	3	3	2	3	3	2	3	3	4	5	2	2	2	2	2	2	2	2
Iraq	1	2	2	2	2	3	3	3	3	2	2	3	2	3	3	2	3	3	3	2	2	2	2	2	2	2	2	3
Kyrgyzstan	3	3	2	4	4	3	4	4	4	4	4	4	4	5	5	4	4	5	5	4	4	4	4	4	4	4	4	4
Capacity	Legislation	Coordinator	AMR	Zoonosis	Food safety	Bio-safety& bio-security	Immunization	Laborator	Surveillance	Reporting	resources	Emergency Preparedness	Emergency response operation	Linking PH and security	Medical countermeasures & personnel deployment	Risk communication	Point of entry											
	p11-14	p21	p31-34	p41-43	p51-52	p61-62	p71-72	d11-14	d21-24	d31-32	d41-43	r11-12	r21-2	r31	r41-43	r51-55	poel-2											

(2) Comparison of 43 KOICA Partner Countries' SPAR Averages (2018)

Timor Leste	3	3	1	2	2	3	4	1	1	2	2	2	3	4
Reos	2	3	1	2	2	4	2	1	2	2	2	1	1	2
Mongolia	4	5	5	3	4	5	5	4	5	4	5	5	5	5
Myanmar	3	3	4	2	3	4	4	3	2	3	3	4	4	3
Bangladesh	3	3	4	2	4	4	5	2	2	2	3	4	4	3
VIET NAM	4	5	3	3	3	3	3	3	2	3	3	3	3	2
Sri Lanka	3	1	1	1	3	4	3	3	1	2	1	4	4	3
Afghanistan	1	3	4	1	2	4	3	2	1	2	1	2	2	1
Indonesia	4	3	3	3	3	4	3	4	3	2	3	3	3	4
CAMBODIA	2	1	3	2	2	4	5	1	1	2	2	2	2	3
Pakistan	1	5	3	2	3	3	3	3	2	2	1	2	2	2
Philippines	5	5	5	4	5	5	5	2				5	5	2
GHANA	1	2	3	2	2	4	3	1	2	1	2	3	3	2
Nigeria	3	5	3	4	1	4	5	3	2	2	2	2	2	2
Rwanda	5	5	4	4	5	4	4	2	1	3	3	5	5	2
Mozambique	2	2	3	3	3	3	3	3	3	2	3	3	3	2
Morocco	4	3	4	4	4	4	2	4	4	4	3	4	4	4
Senegal	3	4	3	2	3	2	3	2	2	3	2	2	2	1
Ethiopia	3	2	3	1	4	4	4	4	4	4	3	4	4	2
Uganda	2	2	2	1	4	4	3	4	3	4	3	3	3	1
Cameroon	1	2	3	2	2	3	2	3	2	2	2	1	1	1
DR Congo	2	2	3	1	2	2	4	3	2	2	1	1	1	2
Kenya	2		3	1	3	3	2	1	1	2	2	1	1	2
Tunisia	3	3	4	3	5	4	4	3	2	4	4	3	3	3

Cote d'Ivoire	2	1	3	1	4	2	1	4	1	2	1	1	2
Tanzania	3	2	3	3	3	2	2	1	3	2	1	3	2
Jordan	1	1	3	2	2	4	4	2	4	3	3	2	2
Iraq	3	4	5	3	4	5	5	5	4	5	5	4	4
Kyrgyzstan	3	3	4	2	3	4	3	3	3	3	3	3	2
Nepal	1		1	1	2	2	2	2	1	2	1	1	1
Fiji	5	5	3	4	4	4	4	5	3	3	2	2	5
Algeria	5	5	4	4	3	4	4	4	3	3	5	4	3
Egypt	5	5	4	4	4	5	4	4	5	5	3	3	5
Guatemala	3	1	3	1	4	4	4	2	4	3	2	2	3
Dominican Republic	4	5	4	5	4	3	4	4	4	4	2	4	5
Bolivia	5	4	5	5	5	5	4	4	2			3	5
Ecuador	4	4	4	3	4	4	4	4	3	4	2	3	4
El Salvador	5	5	5	1	5	5	5	5	4	2	2	4	5
Colombia	4	3	4	4	4	3	4	4	2	4	2	3	4
Paraguay	2	4	4	4	3	4	5	5	2	2	3	3	3
Peru	3	3	3	2	2	4	2	2	2	3	2	2	2
Azerbaijan	4	5	4	3	4	5	4	4	3	4	5	5	4
Uzbekistan	2		3		3	3	3	3	3	3	3	4	
Palestine													
Capacity	Legislation p11-13	Coordination p21	Zoonosis p43	Food safety p51	Laboratory d11-13	Surveillance d21, d23	Reporting d31	Human resources d41	Emergency Preparedness r11	Emergency response r21, r22, r24	Medical countermeasures r42	Risk communication r51-52	Point of entry pe1-2

(3) Comparison of 43 KOICA Partner Countries' SPAR Averages (2019)

Timor Leste	2	2	1	2	3	2	2	2	2	2	2	1	3	1	1
Reos	2	3	1	2	2	4	1	2	2	1	1	1	1	2	2
Mongolia	4	5	5	4	3	5	4	4	4	4	4	4	5	4	4
Myanmar	3	3	4	3	4	5	4	2	2	3	3	3	4	2	2
Bangladesh	4	4	4	2	4	4	5	2	2	3	4	4	4	3	3
VIET NAM	4	4	3	4	3	3	3	2	2	3	3	4	4	3	3
Sri Lanka	3	2	1	2	4	4	4	3	1	2	3	4	4	3	3
Afghanistan	2	3	4	1	2	4	5	2	1	2	2	3	3	2	2
Indonesia	4	3	4	4	5	4	3	4	4	3	3	4	4	4	4
CAMBODIA	2	3	3	3	2	4	5	1	1	2	2	3	3	3	3
Pakistan	1	2	3	2	3	3	3	2	2	2	1	2	2	2	2
Philippines	2	2	4	2	3	3	2	2	2	3	3	2	2	4	4
GHANA	2	3	3	2	3	4	3	1	2	2	2	3	3	2	2
Nigeria	3	5	3	2	2	4	5	3	2	2	2	1	1	3	3
Rwanda	5	5	4	5	5	4	4	3	2	3	3	5	5	2	2
Mozambique	2	2	4	3	4	4	2	4	4	3	3	3	3	2	2
Morocco	4	3	4	4	4	4	2	4	4	4	3	4	4	4	4
Senegal	3	4	3	4	3	3	4	3	2	3	2	2	2	2	2
Ethiopia	4	4	2	2	4	4	4	4	4	4	4	4	4	2	2
Uganda	3	2	3	2	4	4	3	4	3	5	2	4	4	2	2
Cameroon	1	3	4	2	2	3	2	3	2	2	2	1	1	2	2
DR Congo	2	2	3	1	2	2	4	3	2	2	1	1	1	2	2
Kenya	2		3	3	3	3	2	1	1	2	2	2	2	3	3

Tunisia	4	3	5	3	5	4	4	4	3	2	4	5	3	3
Cote d'Ivoire	2	1	3	1	4	2	1	4	4	1	2	1	1	2
Tanzania	3	2	3	3	3	2	4	2	2	3	3	2	3	3
Jordan	3	3	3	2	3	2	2	1	1	1	2	4	3	4
Iraq	2	3	5	2	4	1	4	5	5	4	5	5	4	3
Kyrgyzstan	3	3	4		3	4	2	1	2	2	3	1	3	2
Nepal	2	1	1	1	2	3	4	2	2	2	2	2	2	2
Fiji	5	5	3	4	4	4	5	2	3	3	3	2	2	5
Algeria	5	5	4	4	3	4	4	4	3	3	3	5	4	3
Egypt	5	5	4	4	4	5	4	4	4	5	5	4	4	5
Guatemala	3	2	2	2	4	4	2	3	3	3	3	2	2	3
Dominican Republic	2	1	2	2	3	4	5	2	2	2	3	1	4	3
Bolivia	5	4	5	5	5	5	4	2					3	5
Ecuador	4	5	4	4	4	4	4	4	3	3	4	3	3	4
El Salvador	5	5	5	4	5	5	5	5	5	5	5	5	4	5
Colombia	4	3	4	4	3	3	4	3	2	2	4	4	2	5
Paraguay	2	5	3	4	3	4	5	4	2	2	2	2	3	3
Peru	3	3	4	3	2	5	2	2	2	2	3	2	2	
Azerbaijan	4	5	4	4	4	5	4	4	3	3	4	5	5	4
Uzbekistan	3	1	3	1	3	3	3	3	4	4	3	3	4	2
Palestine														
Capacity	Legislation	Coordination	Zoonosis	Food safety	Laboratory	Surveillance	Reporting	Human resources	Emergency Preparedness	Emergency response	Medical countermeasures	Risk communication	Point of entry	
	p11-13	p21	p43	p51	d11-13	d21, d23	d31	d41	r11	r21, r22, r24	r42	r51-52	p81-2	

(4) Comparison of 43 KOICA Countries' JEE Averages by Continent

		JEE_지표별 평균																				Capacity	Legislation	Coordinator/AMR	Zoonosis	Food safety	Bio-safety&	Immunizatio	laboratory	Surveillance	Reporting	Human resources	Emergency Preparedness	Emergency respo	Linking PH and security	Medical countermeasures & personnel deployment	Risk communication	Point of entry																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		2	2	2	2	2	2	4	2	3	2	2	2	1	2	2	4	2	3	2	1	2	1	2	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3	2	3

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Preparedness/Response Systems of KOICA Partner Countries

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