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Strengthening regional preparedness and surge workforce through the Global Outbreak Alert and Response Network

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Public health emergencies continue to pose significant threats to global health security. Whether due to novel pathogens or climate issues, the frequency, scale and complexity of outbreaks are increasing. No single institution or country has the capacity to address these threats alone. Coordinated, multidisciplinary and international mechanisms like the Global Outbreak Alert and Response Network (GOARN) are now more essential than ever.

Since the World Health Organization (WHO) established GOARN in 2000, the network has provided a trusted and reliable mechanism to rapidly mobilize technical assistance to countries facing public health threats. GOARN is an integral component of the broader emergency workforce architecture, complementing emergency medical teams and contributing to the Global Health Emergency Corps framework,[1] which collectively strengthen readiness and response capacities worldwide. With more than 320 partners worldwide,[2] GOARN identifies and deploys experts during health emergencies, while also strengthening public health capacities between crises. In the WHO Western Pacific Region, where countries face diverse geographic and health system contexts, GOARN has helped fill critical technical human resource gaps at times when countries need support most.

This special edition provides insights into the response operations, technical assistance provided and GOARN partner initiatives.[3] It showcases the diversity of partner engagement in the Region and highlights areas for future investment including gender equity in outbreak leadership[4] and strategic partner contributions.[5]

A prominent theme is the importance of a ready-to-respond and agile emergency workforce. GOARN continues to demonstrate its lead role in operationalizing this by serving as both a surge deployment mechanism and an emergency workforce capacity-strengthening platform, linking global expertise with national needs.

The analysis of GOARN deployments during the COVID-19 pandemic further enforces the critical role of international surge support in strengthening health systems during a global public health emergency.[6] Complementing this, the first regional analysis of GOARN deployments to, from and within the WHO Western Pacific Region provided a 24-year review, revealing the breadth of partner engagement and the need to continue to engage more partners to contribute to the surge workforce.[7] Together, these analyses demonstrate that GOARN is not only a response mechanism but also a strategic enabler of sustainable public health capacity.

Whether through deployment of epidemiologists, laboratory specialists or infection prevention and control experts, GOARN supports countries to scale up their response when local capacities are overwhelmed. At the same time, by embedding experts within national systems, each deployment becomes an opportunity to transfer knowledge, mentor local responders and build sustainable public health capabilities.

Looking ahead, strengthening the health emergency workforce must remain a top national priority. This means not only maintaining the capacity to deploy experts rapidly during crises but also investing in workforce preparedness

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between emergencies. GOARN's unique position at the intersection of response and capacity-strengthening makes it an essential pillar in this effort.

This special edition serves as both a reflection on past achievements and a call to action, to continue investing in the people, systems and partnerships that make effective emergency response possible, locally, regionally and globally.

Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the editorial decision to publish this article.

Ethics statement

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Funding

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Strengthening international response capacity: International Infectious Diseases Fellowship Programme for Japanese clinicians

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Established in 1898, Tokyo Metropolitan Toshima Hospital (Toshima Hospital) has a longstanding history of caring for patients with infectious diseases.[1] Its communicable disease isolation unit, originally built in the pre-World War II era, was designed to receive patients with smallpox, diphtheria and epidemic typhus. Since then, the unit has continued to lead the treatment of infectious diseases in the Tokyo Metropolitan Region. As public health and sanitation improved, the population's health needs shifted from infectious diseases to noncommunicable diseases. The COVID-19 pandemic highlighted to hospital management the critical importance of maintaining infectious disease clinicians who are equipped to provide optimal patient care, especially for vulnerable populations such as older adults. Motivated by the rapidly unfolding COVID-19 pandemic and the dedication of clinicians to contribute their expertise to coordinated international outbreak response efforts, Toshima Hospital joined the Global Outbreak Alert and Response Network (GOARN) in 2020.

Established by the World Health Organization (WHO) in 2000, GOARN coordinates the rapid deployment of technical experts worldwide to respond to infectious disease outbreaks and public health emergencies.[2] The Network mobilizes professionals from public health institutions, academic centres and other organizations to provide technical support, contain outbreaks and strengthen local response capacities. When a request for assistance is received from a WHO Member State, GOARN partners offer technical expertise through the GOARN Knowledge Platform.[3]

A specific criterion to be selected for deployment is that experts must have relevant international work experience and language proficiency. For Japanese clinicians, who typically work at national institutions in small, specialized teams speaking primarily Japanese, acquiring skills such as collaborating in multicultural and multidisciplinary outbreak response teams can be challenging. As a result, many Japanese doctors, despite having strong clinical skills, do not feel prepared to offer their assistance in response to GOARN requests. Clinical trainers discussed how to strengthen these competencies and developed a fellowship programme to support clinicians interested in participating in international deployments, specifically through GOARN. This report describes the key components of the International Infectious Diseases Fellowship Programme, which was launched in 2022.

ACTION

Programme development

While core clinical skills can be developed within their institutions, Japanese doctors aspiring to deploy through GOARN also need training in competencies that are best acquired in field settings, such as working in multicultural teams, producing results under pressure and being a first responder in emergencies. The authors held a series of career design workshops for health professionals and students, with presenters from Médecins Sans Frontières (MSF) Japan, the Japanese Red Cross and other nongovernmental organizations (NGOs), during which

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the workshop participants' ideal career development was also discussed.[4] The fellowship programme was designed in line with the GOARN Competency Model for an international responder. Upon programme completion, fellows are encouraged to pursue further training opportunities, such as that offered by the 3-tiered GOARN Capacity Strengthening and Training Programme.[5]

Aim and objectives

The aim of the fellowship programme is to train clinicians to provide clinical management during public health emergencies in an international setting. At the end of the fellowship programme, clinicians will be able to:

1. provide appropriate clinical care in the relevant languages, including history taking, physical examination, diagnosis, treatment, communication and record keeping;
2. collaborate effectively as part of a multicultural and multidisciplinary team;
3. work adaptively to produce results in dynamic, high-stress conditions with limited resources; and
4. report the impact of emergencies and crises on individuals and society.

Programme description

The 3-year programme consists of three components: clinical training in Japan, international work experience and international study. Fellows engage in clinical practice at Toshima Hospital for a minimum of 6 months per year. For the remaining months, fellows apply for international field deployment through NGOs for up to 6 months as stipulated by MSF.[6] Fellows select an NGO to apply to and choose a suitable project and country in which to work. They also apply for international study programmes lasting up to 3 months during the fellowship. For those without international work experience aiming to practice medicine in low- and middle-income countries, beginning study in the first year of the programme is a prerequisite.

Applicant eligibility criteria

Applicants must:

- hold a Japanese medical licence;
- have completed a 2-year junior residency and a 3-year senior residency training programme;
- be willing to participate in international humanitarian projects; and
- possess a Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) score that meets the requirements for admission to study programmes abroad.

Course status

The first fellow, accepted in 2022, earned a 3-month diploma in tropical medicine and hygiene from the Liverpool School of Tropical Medicine, United Kingdom of Great Britain and Northern Ireland, and subsequently participated in field activities in Nepal and Kenya. The second fellow had begun training at the time of writing of this report.

DISCUSSION

Traditionally, the training of Japanese clinicians has been oriented towards domestic clinical practice, with most doctors completing their education and postgraduate training in national teaching hospitals. While this approach is well suited for preparing clinicians to work within Japan's health system, it provides limited exposure to the challenges of practicing medicine in international or humanitarian contexts. Few institutions in Japan offer formal training pathways for clinicians who aspire to work in low- and middle-income countries or contribute to international public health emergency responses.

The COVID-19 pandemic reinforced the global nature of infectious disease threats and emphasized the urgent need for a skilled, deployable health emergency

workforce. Yet, despite having strong clinical foundations, Japanese clinicians often feel unprepared to respond to international calls for assistance, such as those issued through GOARN, due to gaps in language proficiency, cross-cultural collaboration experience and familiarity with multidisciplinary field-based emergency operations. This context provided the impetus for Toshima Hospital to launch its International Infectious Diseases Fellowship Programme.

The programme represents an innovative effort to integrate international deployment experience into clinicians' learning journeys and longer-term career development.[7] It is designed to complement existing clinical training with practical and varied exposure to global health settings that are aligned with the GOARN Competency Model.

Through a structured pathway that includes domestic service, fieldwork with international organizations and academic study, the fellowship aims to produce well rounded clinicians capable of contributing meaningfully to international outbreak response efforts. However, implementing and sustaining such a programme poses institutional challenges. Toshima Hospital is part of the Tokyo Metropolitan Hospital Organization, which comprises 14 hospitals that compete for limited professional development funding. The future of the fellowship therefore depends on its continued ability to demonstrate value – both to clinicians seeking global health experience and to the hospital system, which must maintain a stable national health workforce.

Successful implementation requires a careful balance between domestic service delivery needs and the aspirations of clinicians to serve internationally. Matching applicants who are motivated to gain international experience with the hospital's operational requirements is critical. Furthermore, there is a need for ongoing institutional support, flexible staffing models and strong partnerships to ensure sustainability.

Conclusion

Although still in its early stages, the fellowship programme is a promising model for other institutions in Japan and the Western Pacific Region. It directly addresses the gap between strong domestic clinical public health training and the competencies required for international response work. By preparing clinicians to offer assistance through GOARN and similar mechanisms, the programme contributes to strengthening the global health emergency workforce, a goal increasingly recognized as critical to the regional and global health community.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Ethics statement

Ethical clearance was not required as no research was undertaken on human subjects.

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Global Outbreak Alert and Response Network deployments during the COVID-19 pandemic, WHO Western Pacific Region

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Problem: The Global Outbreak Alert and Response Network (GOARN) has responded to more than 100 outbreaks during the past 23 years. The coronavirus disease (COVID-19) pandemic presented unprecedented operational constraints that challenged GOARN's core mission to rapidly deploy technical experts from its partners to support national in-country responses to public health emergencies. This paper describes the type and duration of GOARN deployments to and within the World Health Organization's (WHO's) Western Pacific Region during the COVID-19 pandemic.

Context: Despite strict border closures and ever-changing vaccination and quarantine requirements, GOARN continued to deploy international technical assistance to strengthen COVID-19 response operations within the Region, as requested.

Action: Data were analysed from the GOARN Knowledge Platform about deployments to and within the Region for responses to the COVID-19 pandemic between 1 January 2020 and 5 May 2023. Data were available about deployment duration, technical role requested, country or area, partner organization and deployed expert's demographics. Feedback from postdeployment briefings with the experts was collected and thematically analysed to determine ongoing needs and gaps to help improve deployment operations.

Outcome: There were 72 experts deployed on 89 missions through GOARN to 12 countries and areas in the Region, for a total of 4558 field days, to support the response to the COVID-19 pandemic.

Discussion: The volume of requests for assistance from countries and areas in the Region to respond to the COVID-19 pandemic uncovered a deficit in human resources available for domestic response to outbreaks and the reliance on international assistance. Strengthening the in-country capacity of ready-to-respond public health emergency staff is critical to meet the needs for outbreak response. The ongoing demand for technical experts to support national responses means that these lessons may have immediate implications.

PROBLEM

Requests for deployments made through the Global Outbreak Alert and Response Network (GOARN) continued during the coronavirus disease (COVID-19) pandemic, but these were more challenging to facilitate due to the public health and social measures implemented to control disease transmission. International border closures, restricted and cancelled flights, visa processing delays, and vaccination and quarantine requirements enforced by countries and areas complicated and delayed the rapid deployment of experts through the GOARN mechanism. The increase in requests also highlighted deficits in the availability of local experts with the technical skills required to support outbreak response activities. Therefore, the objective of this paper is to describe, for the first time, the type and duration of GOARN deployments to and within the World Health Organization (WHO) Western Pacific Region during the COVID-19 pandemic, including the issues encountered, and to propose operational improvements.

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governmental departments and agencies. Since 2000, 299 experts have deployed through GOARN from its partner organizations in the Region to 36 global operations.[6]

ACTION

Data were obtained from the GOARN Knowledge Platform[6] about deployments to the Region for the COVID-19 pandemic response from 1 January 2020 to 5 May 2023. Data were available about deployment duration, technical role requested, country or area, partner organization and deployed expert's demographics. Feedback from postdeployment briefings with the experts was collected and thematically analysed to determine ongoing needs and gaps to help support improved deployment operations.

Between January 2020 and May 2023, 72 experts completed 89 GOARN deployments to 12 countries and areas to assist in responses to the COVID-19 pandemic in the Region. There were 35 deployments in 2020, 30 in 2021 and 24 in 2022. Deployments to the Region represented 36% (89/249) of all global GOARN deployments for the COVID-19 pandemic response.

Experts were deployed from 34 of GOARN's partners, 16 (47%) from within the Region. The most requested categories of technical expertise were epidemiology and surveillance, data management, laboratory and infection prevention and control. As experts can provide support across more than one area of technical expertise, there were 100 instances of technical expertise provided (**Fig. 1**). Thirty-four of the 72 experts deployed (47%) were female. The country or area with the highest number of deployments was Papua New Guinea (n = 29), followed by the Philippines (n = 22) and China (n = 19) (**Fig. 2**).

The duration of the deployments ranged from 8 to 139 days (median: 36 days). The longest deployment was to Papua New Guinea for 139 days, followed by the Philippines for 133 days. The highest number of deployments to the Region occurred during the first quarter of 2020 (n = 24), at the beginning of the COVID-19 pandemic, and included not only individual deployments but also two team missions to China. The smaller number of deployments during the second quarter of 2020 (n = 2) coincided with strict international border closures, travel restrictions and quarantine measures (**Fig. 3**).

The majority of deployments involved individual experts sent to support the COVID-19 response in a single country or area. Deployments to China supported two separate WHO–China joint team missions: the first in February 2020 to conduct a field visit to Wuhan to understand the response to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and the second in January and February 2021 to strengthen scientific cooperation on work to trace the origin of the novel coronavirus. One infection prevention and control expert deployed to the WHO Regional Office for the Western Pacific also provided in-country support for the COVID-19 response to Brunei Darussalam and the Lao People's Democratic Republic during the same mission. With the easing of border restrictions and the increased availability of flights, a team of two experts was deployed in-country to the Federated States of Micronesia and the Marshall Islands, and one senior expert with extensive field experience provided remote assistance to the team.

OUTCOME

GOARN's partners demonstrated their capacity to respond internationally despite competing domestic demands for response activities. Effective and safe deployments were possible in the Region even during the extraordinary and unpredictable time of the COVID-19 pandemic. However, there were several challenges in implementing these deployments. Partners' focal points required more tailored communications during the COVID-19 response to understand that deployments through GOARN were possible during the pandemic. Focal points play a key role in communications and in selecting and uploading offers from experts who are willing and able to deploy. Focal points certify that the experts proposed by their organization have the technical skills and work experience that match a request's requirements. Knowledge of the deployment process varied between partners, requiring continual communications between the WHO Regional Office and its partners. Institutes with an international mandate were better equipped to propose experts and support them during deployment.

The demand for GOARN deployments during responses to the COVID-19 pandemic created an

CONTEXT

To fulfil its mandate under the International Health Regulations (2005), WHO rapidly and consistently identifies and assesses events of potential international public health concern. Based on this assessment, WHO alerts its Member States about such threats and provides technical assistance to affected countries and areas during their investigation and control efforts, if requested.[1] In rare circumstances, the WHO Director-General may declare events to be public health emergencies of international concern. For such events, including the COVID-19 pandemic, WHO establishes an incident management support team at national, regional and global levels. The responsibilities of this team are set out in WHO's *Emergency response framework* and include coordinating and supporting technical assistance for health operations in countries, and liaising with GOARN and other partners.[2]

Established by WHO in April 2000, GOARN is a mechanism for technical partners and networks around the world to coordinate and assist WHO Member States in responding to public health emergencies.[3] GOARN's partners include more than 300 technical institutions, organizations and networks, and they can pool their resources to improve communications and information-sharing about emerging and ongoing public health events, and support capacities for preparedness and rapid outbreak response. GOARN's partners are drawn from national, regional and global stakeholders and include ministries of health; national public health institutes; medical, surveillance and laboratory networks; United Nations organizations; International Federation of Red Cross and Red Crescent Societies; nongovernmental organizations; academic institutions; and technical networks. Critical to the success of an outbreak response is the engagement of a multidisciplinary pool of trained experts[4] who have the skills to gain trust, lead and work with local health authorities and communities.[5]

Depending on the magnitude of the event and the national capacity for operational responses, national health authorities may request international technical assistance through the WHO incident management support team. When a request for assistance is initiated, the WHO GOARN Operational Support Team (OST) notifies all GOARN partner institutions through their nominated focal point, detailing the required technical role, including academic qualifications and work experience, the terms of reference, location and minimum deployment duration. Requests for assistance are published via the web-based GOARN Knowledge Platform,[6] accessible to focal points at GOARN's partner organizations.

Focal points at GOARN's partner organizations assess the capacity of their institution and individual experts to provide the support requested. Offers of assistance are uploaded by partners onto the GOARN Knowledge Platform. The GOARN OST reviews and shares offers that meet all requirements with the WHO regional office or country office, as applicable. Offers are then shared with the national authorities who made the request, and they determine which expert(s) will be selected. The GOARN OST and WHO regional and country offices work together to actualize the deployment. Experts selected for deployment are issued a short-term consultant contract by WHO, without remuneration, which includes basic health insurance, security coverage, travel costs and a daily living allowance.

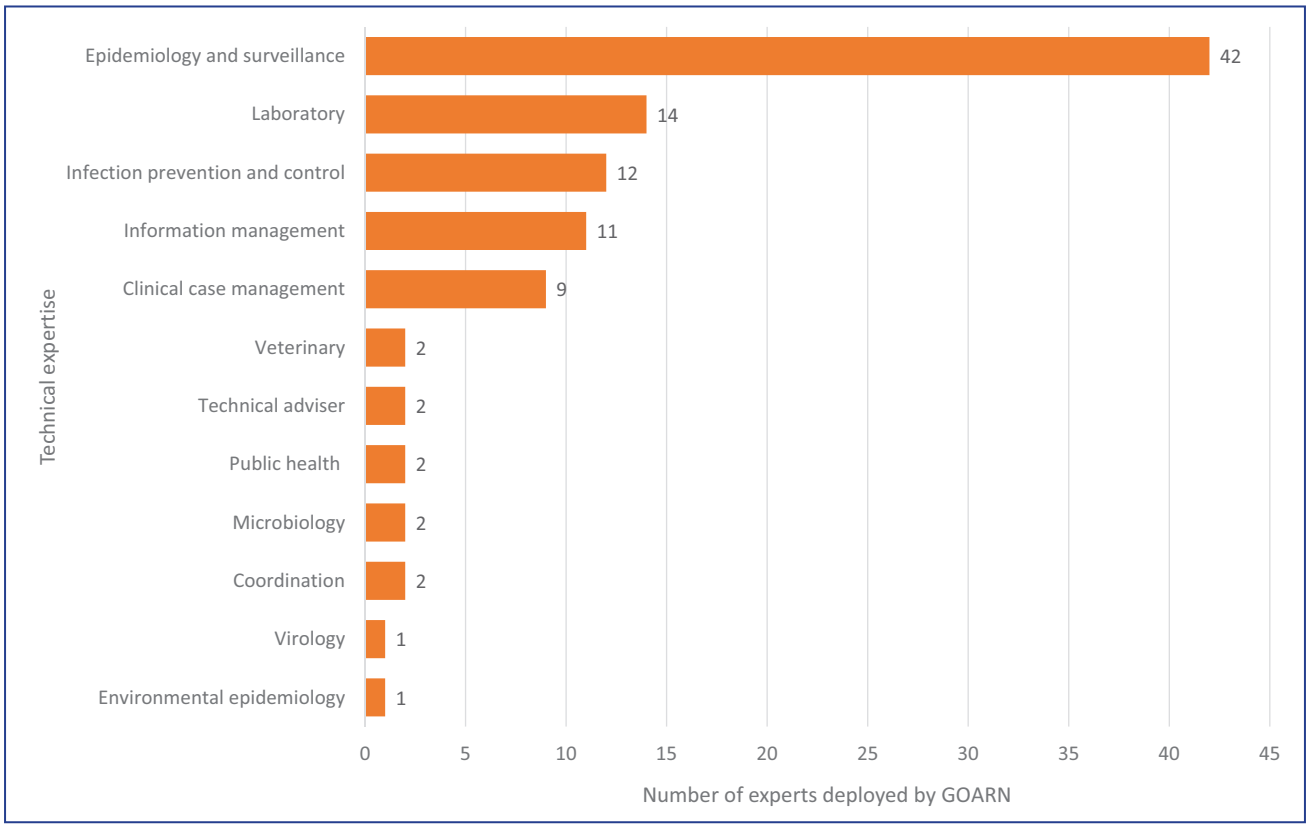
Since GOARN's inception in 2000, its partners have completed deployments to more than 117 countries and areas, involving more than 3573 experts with approximately 122 000 field days. GOARN deployments for the response to the COVID-19 pandemic from 1 January 2020 to 5 May 2023 included 249 experts deployed to 46 countries and areas worldwide.[6]

GOARN in the Western Pacific Region

The Western Pacific Region has a population of approximately 1.9 billion people across 37 countries and areas. The Region suffers a disproportionate burden of preventable infectious disease, and the outbreak response capacity is variable.[7] Increasing urbanization, faster connectivity, globalization and the impacts of climate change have heightened the ever-present risk of health emergencies and the emergence of new health security threats.[7] Since 2000, the Region has experienced outbreaks of diseases such as severe acute respiratory syndrome, avian influenza in humans, Middle East respiratory syndrome, dengue, influenza H1N1 and Zika virus disease.[7]

There are 73 GOARN partner organizations located in the Region at universities, colleges, hospitals, public health and technical institutions and networks, and

Fig. 1. **Number of experts deployed by the Global Outbreak Alert and Response Network (GOARN) during the COVID-19 response in the WHO Western Pacific Region, by area of technical expertise, 1 January 2020 to 5 May 2023[a]**



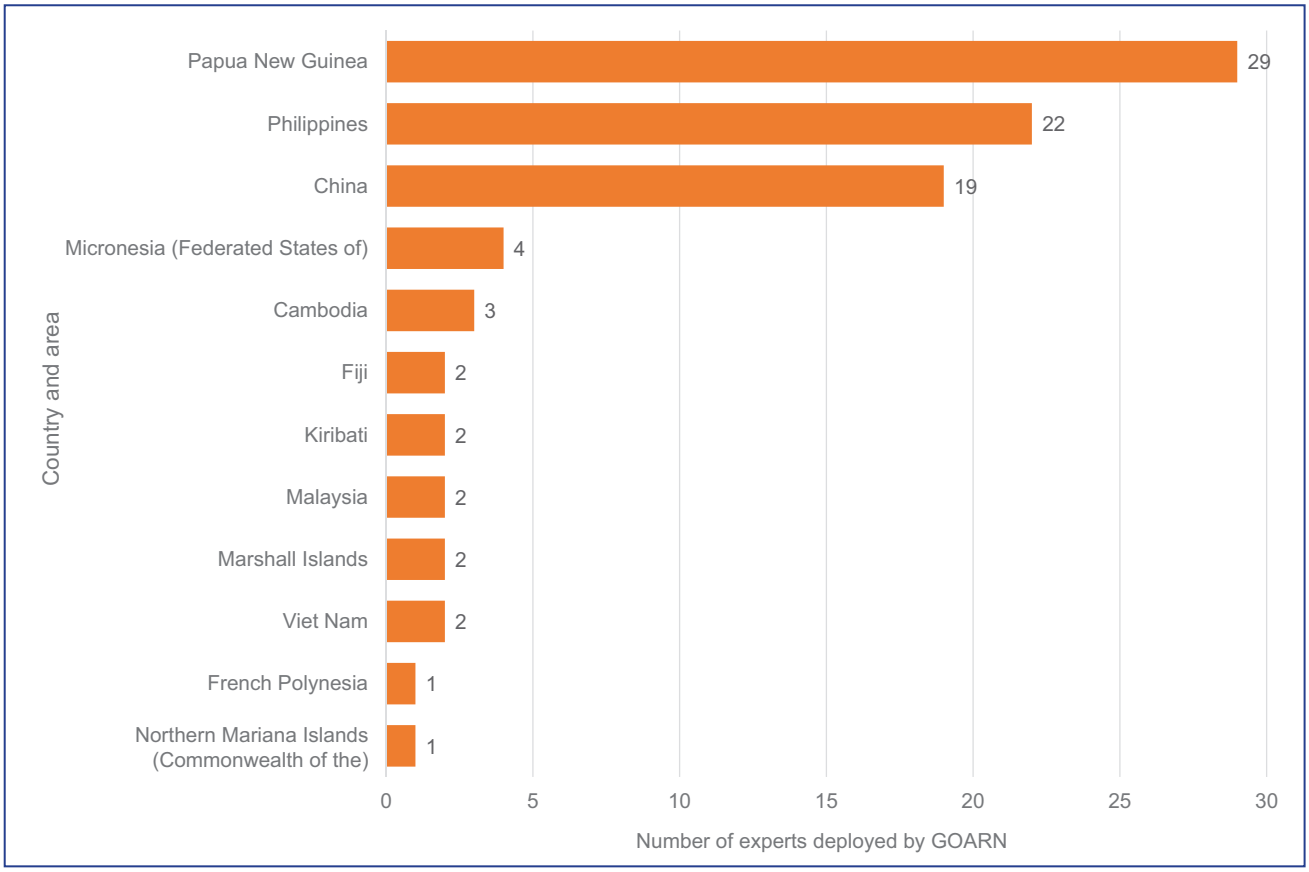
[a] One expert may provide support across more than one area of technical expertise.

exceptional workload for administrative personnel. Being able to rapidly process these deployments was a challenge due to uncertainty about international border restrictions, visa application criteria, delays in visa issuance, limited and/or cancelled international flights, changing COVID-19 testing requirements and the sudden onset of sickness or a laboratory result positive for COVID-19 for the selected expert. These issues all contributed to delays in the speed and efficiency of deploying international experts.

As the COVID-19 pandemic evolved into a protracted emergency, longer deployments were requested. GOARN's usual deployments last 4–8 weeks; however, the median duration of deployments per quarter exceeded this during the majority of the COVID-19 pandemic response (**Fig. 3**). These longer in-country missions improved contextual understanding, continuity and stability and thus allowed for better-tailored response interventions; they also enabled trust to be built with national counterparts despite highly stressful working conditions and demanding circumstances. However, these longer deployments also precluded many experts from participating due to their lack of time amid competing priorities. Senior experts, who would usually be sent to assist in an international response, were unable to deploy during the COVID-19 pandemic due to competing domestic response commitments resulting from the COVID-19 pandemic. This reduced the pool of experts and forced the deployment of some who had only minimal international field experience.

As the COVID-19 pandemic and requests for GOARN deployments continued, the offers of assistance varied in terms of the qualifications and experience of the experts. Many proposed experts did not meet the minimum requirements outlined in the terms of reference, such as having experience working in an international outbreak team. The nomination of unqualified experts may have indicated an eagerness on the part of less experienced staff to gain international outbreak experience during this protracted emergency.

Fig. 2. **Number of deployments by the Global Outbreak Alert and Response Network (GOARN) during the COVID-19 response in the WHO Western Pacific Region, by location of deployment, 1 January 2020 to 5 May 2023**



DISCUSSION

Despite the challenges, GOARN managed to deploy experts in the Region during the response to the COVID-19 pandemic. In preparation for responses to future large outbreaks and emergencies, and to address some of the challenges that arose, the following recommendations to improve the operational deployment process are proposed.

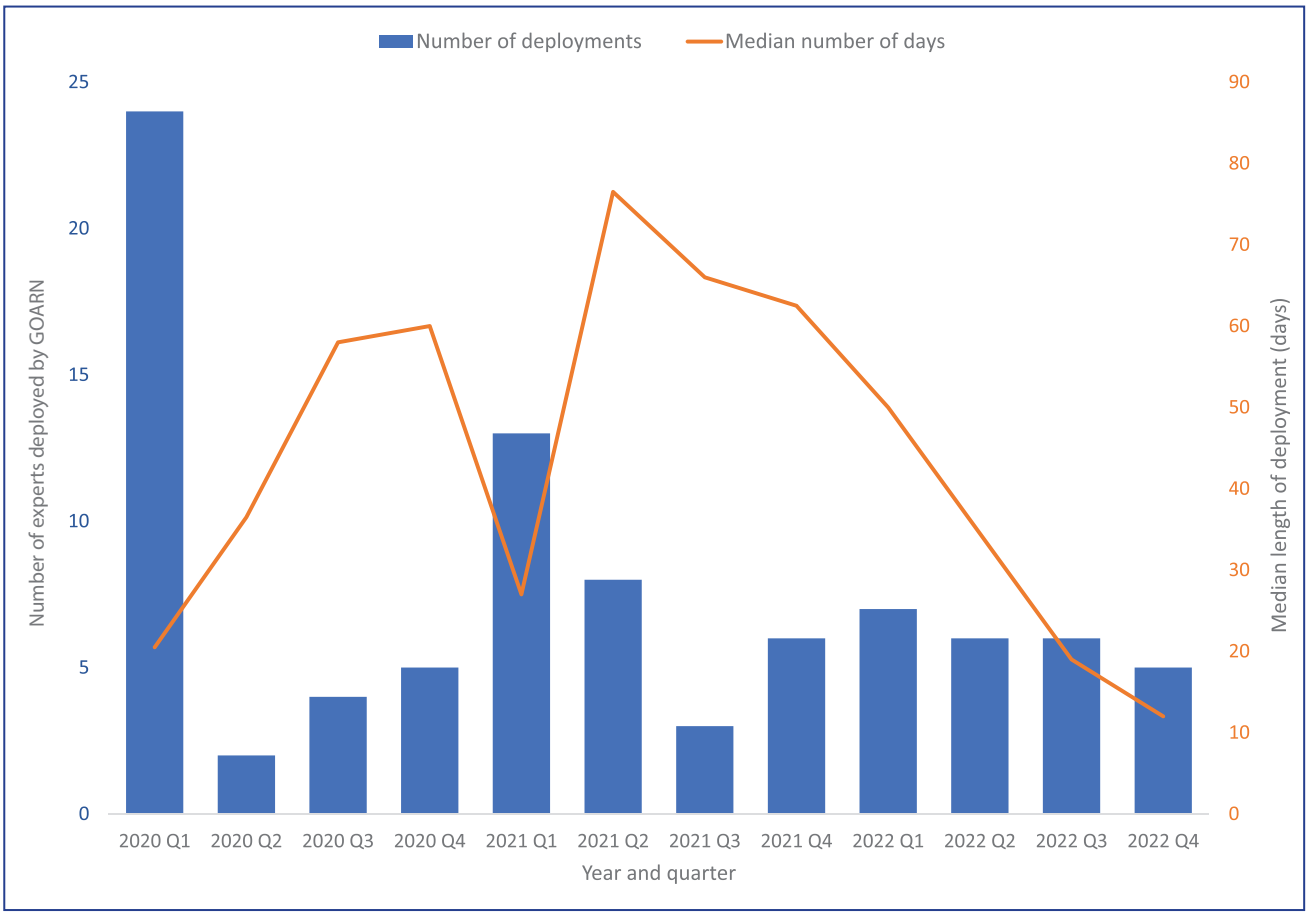
1. Improve focal points' engagement with GOARN

To address inconsistencies in knowledge about GOARN's processes among partners' focal points, regular orientation and/or refresher sessions about processes should be offered. These may ensure that focal points have up-to-date knowledge about their roles and responsibilities. Additionally, to support focal points to quickly identify experts who have the required skills and experience, a roster of ready-to-deploy experts could be compiled for their organization to expedite the process, rather than waiting for experts to propose themselves. More frequent and regular bidirectional communication between the GOARN OST, WHO regional offices and focal points could also support the urgent sourcing and deployment of appropriate experts from neighbouring countries within a region.

2. Integrate virtual technical support for deployments

To achieve a mission's objectives and support less experienced responders to operate in highly stressful field conditions, GOARN should consider having senior experts provide virtual or remote support. Such modalities of team deployment could help by expanding the number of emergency public health staff who are available to respond.

Fig. 3. **Number of experts deployed by the Global Outbreak Alert and Response Network (GOARN) and median duration of deployment during the COVID-19 response in the WHO Western Pacific Region, by quarter, 1 January 2020 to 5 May 2023**



3. Improve intra-regional deployments of GOARN's partners

Conducting a gap analysis of GOARN's partners within the Region, including documenting partners' capacity to respond, would help with readiness, could potentially expedite deployments and could result in an increase in the number of deployments within the Region. Intra-regional deployments would potentially reduce travel time and improve other administrative arrangements, such as visa entry requirements. Improving intra-regional engagement with partners requires raising awareness of GOARN's role and the deployment process. Encouraging GOARN's partners to undertake GOARN trainings and facilitating opportunities for collaboration between partners would also strengthen regional preparedness and response capacities. Further, increasing the number of partners within the Region may better support and complement national in-country rapid response operations, reducing the reliance on having experts from other regions fly in.

The data presented in this report were limited to those reported on the GOARN Knowledge Platform and the challenges identified during semistructured debriefing sessions with experts and WHO. However, the lessons learned provide opportunities to improve GOARN's deployment process and re-emphasize the critical importance of partnerships in addressing global health security and solidarity. Ensuring further engagement between GOARN and its partners and national authorities may strengthen domestic response capacities; additionally, encouraging partners to review their own capacity and ability to respond to requests for outbreak response assistance may expedite future deployments. Expanding the number of partners within the Region may provide improved technical support for current and inevitable future outbreaks.

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Conflicts of interest

SS is an associate editor of the Western Pacific Surveillance and Response journal. She was not involved in the editorial decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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One response: Global Outbreak Alert and Response Network supporting the COVID-19 response, Kiribati

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Problem: In January 2022, Kiribati experienced widespread community transmission of COVID-19, leading to high rates of infection among health-care workers (HCWs), which reduced essential HCWs during a period of increased hospital admissions.

Context: Kiribati, a Pacific island country made up of a remote group of 33 low-lying atolls in the Pacific Ocean, experienced its first surge of COVID-19 cases beginning on 24 January 2022.

Action: Reports of increasing numbers of COVID-19 cases in South Tarawa prompted the Kiribati Ministry of Health and Medical Services to request assistance from the international community, including the World Health Organization's Global Outbreak Alert and Response Network (GOARN), to support national COVID-19 response operations. Specialists in infection prevention and control (IPC) were deployed to Kiribati in February 2022 to assist the Ministry's National COVID-19 Taskforce in collaboration with national partners. These specialists helped review and strengthen IPC capacities to accommodate a potential patient surge and consequent demands for medical consumables in health-care facilities in South Tarawa.

Outcome: Strengthened knowledge about and processes for IPC among HCWs prevented health care-associated infections and reduced community disease transmission during the first surge of COVID-19 cases in Kiribati.

Discussion: GOARN has the capacity and ability to rapidly deploy experts to support requests for assistance. Outbreak response activities can be enhanced and sustained by using GOARN's resources and collaborating with all partners, as necessary.

PROBLEM

After almost 2 years of restrictions on international travel, introduced at the start of the COVID-19 pandemic, Kiribati recorded its first community-acquired cases of COVID-19 in January 2022. Within a few weeks, South Tarawa, the most populated island, had widespread community transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, including among health-care workers (HCWs), propelling a nationwide lockdown and a declaration of a state of disaster by the Government of Kiribati.[1]

As hospital admissions escalated, the number of essential front-line HCWs was reduced owing to increased absenteeism due to illness, thus straining an already fragile health-care system. The Kiribati Ministry of Health and Medical Services (MHMS) initiated two requests for international assistance: the first to the Pacific

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Community and the second through the World Health Organization (WHO) to the Global Outbreak Alert and Response Network (GOARN) to deploy technical experts in infection prevention and control (IPC) to support the national COVID-19 response.

CONTEXT

Kiribati is one of the most geographically isolated countries in the world. Spanning 3.5 million square kilometres of ocean (**Fig. 1**), Kiribati is divided into three groups of islands: the Gilbert Islands, the Phoenix Islands and the Line Islands. Comprising 33 atolls, of which 22 are inhabited (**Fig. 2**), Kiribati is internationally recognized as one of the countries most vulnerable to the impacts of climate change, with most of its land mass less than 2 metres above sea level. As of the 2015 census, Kiribati had a population of approximately 110 136, with roughly 50% of the population living on the main island, South Tarawa.[2]

The Kiribati MHMS provides free health services through a network of health facilities comprising four hospitals, 30 health centres staffed by medical assistants and 75 clinics staffed by public health nurses.[2] Two of the four primary hospitals are located in South Tarawa (**Fig. 3**). Tungaru Central Hospital is a 120-bed referral hospital that provides most of the acute and chronic care in Kiribati, including emergency care, general medical and surgical care, obstetrics and gynaecology, paediatrics and mental health services, as well as additional auxiliary services, including laboratory, medical imaging, pharmacy and physiotherapy services.[3,4] Betio Hospital serves the populations of Bairiki, Nanikai and Teaoraereke, as well as Betio, providing services such as emergency care, general medicine, maternity care, a pharmacy and dental care.

In May 2021, Kiribati received 24 000 doses of the Oxford–AstraZeneca COVID-19 vaccine.[5] These doses supported the initial phase of the vaccination programme that targeted high-risk populations, including HCWs, border control staff, essential workers, individuals with underlying comorbidities and older adults (those aged ≥60 years). By January 2022, Kiribati had received additional deliveries of the Oxford–AstraZeneca and Sinopharm vaccines. Eligibility for vaccination was expanded to include all individuals aged ≥18 years, with a target population of 71 202 people. As of 4 January 2022, 40 534 people had received two doses of vaccine, and 71 152 people had received at least one dose.[6]

In January 2022, 2 years after Kiribati closed its international borders, a chartered flight from Fiji carrying 54 passengers was granted entry into the country. All passengers were tested multiple times, vaccinated and quarantined in Fiji before arriving in Kiribati.[2] Upon arrival in South Tarawa, passengers were retested and assessed for COVID-19 symptoms; asymptomatic passengers were quarantined, and symptomatic passengers were isolated. Of the 54 passengers, 36 tested positive for COVID-19 upon arrival and were transported to either a hotel or a designated isolation facility in South Tarawa. Prior to being released from quarantine, all passengers were tested by polymerase chain reaction (PCR) to ensure they were negative for COVID-19. Early in the quarantine period, a small number of COVID-19 cases were detected in the community, and despite efforts to prevent onward transmission, community spread was confirmed soon after.

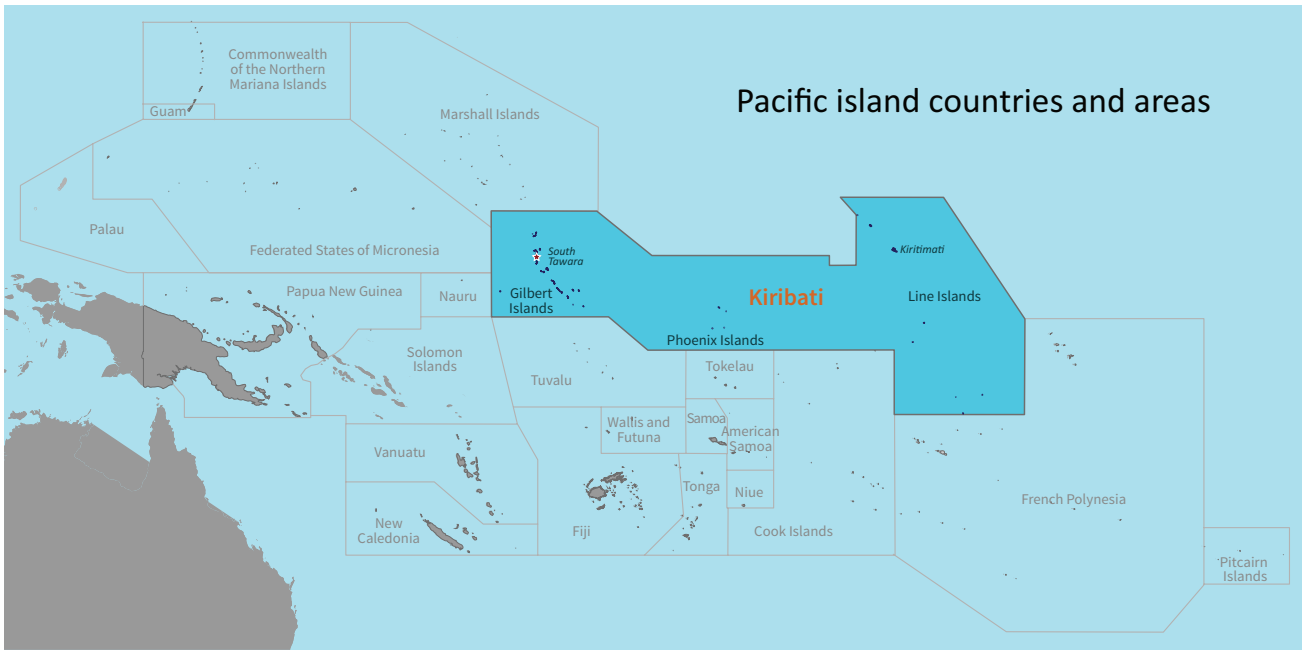
Evidence of community transmission and reports of infections among HCWs, as well as the increasing pressure on health service delivery, prompted the Kiribati MHMS to request international assistance from GOARN. On 1 February 2022, a request was made for IPC technical support, and on 12 February, GOARN deployed to Kiribati an IPC expert and a multidisciplinary international team via a chartered commercial airline. The emergency response team included two IPC specialists, one from GOARN and one from the Pacific Community; a WHO case management specialist; and two pharmacy logistics specialists from International SOS.

ACTION

Since the onset of the COVID-19 pandemic, technical experts have been deployed globally through GOARN to support national response operations (**Box 1**).[7] In February 2022, IPC specialists from GOARN and the Pacific Community, together with the specialists from International SOS, formed a team to collaborate with the Kiribati MHMS National COVID-19 Taskforce and other national partners to assess, review and strengthen IPC capacities and practices in health-care facilities to reduce SARS-CoV-2 infections associated with such facilities.

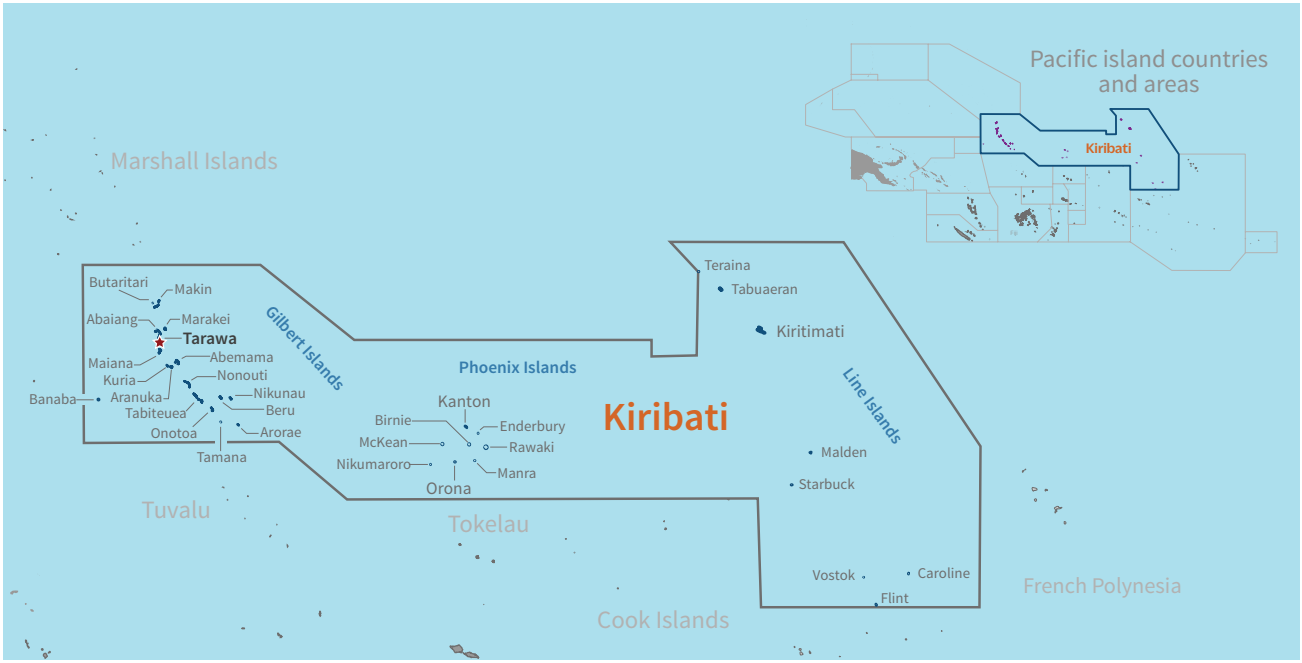
To understand Kiribati's context and needs, the IPC specialists first assessed the two main hospitals in South

Fig. 1. **Kiribati shown relative to all Pacific island countries and areas**



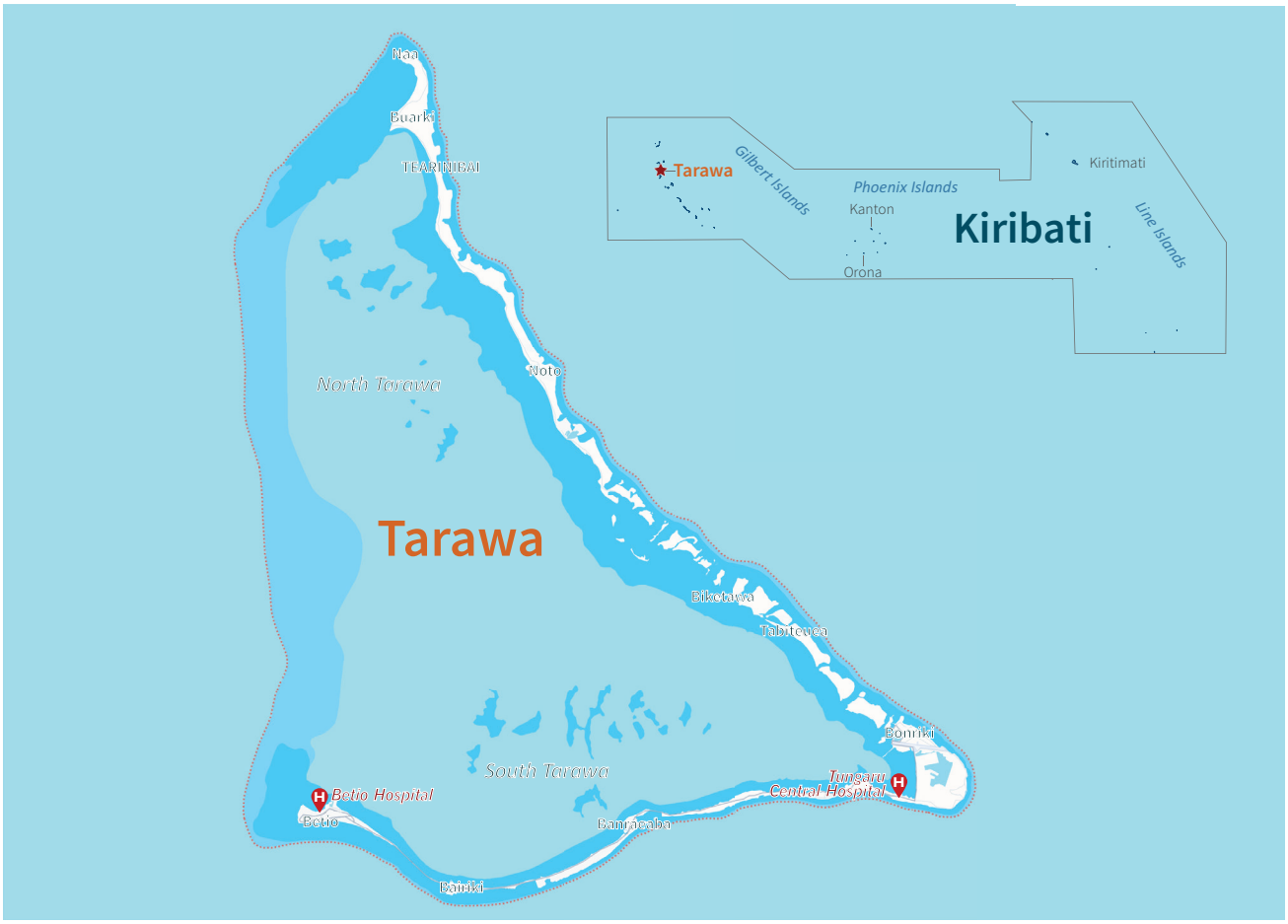
Source: WHO Regional Office for the Western Pacific.

Fig. 2. **The islands of Kiribati**



Source: WHO Regional Office for the Western Pacific.

Fig. 3. **Tarawa and the locations of its two main hospitals in South Tarawa, Kiribati**



Source: WHO Regional Office for the Western Pacific.

Tarawa, Tungaru Central Hospital and Betio Hospital, using the Pan American Health Organization's guidance for assessing IPC practices for COVID-19 isolation areas in health-care facilities.[8] Based on the assessment, weekly reports detailing the recommendations for and actions taken to implement IPC were provided to the National COVID-19 Taskforce.

Findings from the assessment revealed problems with segregating infectious patients, the improper use of and limited access to personal protective equipment (PPE), inadequate hand hygiene supplies, and limited environmental cleaning, including cleaning of medical equipment between patients.

To strengthen clinical pathways and prevent health care-associated infections, the MHMS IPC focal point, nursing directors and the WHO clinical management expert worked together to establish more effective patient triage systems. This involved designating physically separate treatment areas for patients presenting with infectious and noninfectious conditions; these were implemented at both hospitals and also in community health-care centres and vaccination clinics.

HCWs were trained in standard and transmission-based precautions, including managing infectious waste through segregation, safe handling, disposal and incineration.[9–13] Training was delivered through on-site, in-person practical demonstrations, and local HCWs assisted with language translation and provided context.

PPE donning and doffing stations were set up in patient-free areas where there was also access to alcohol-based hand sanitizer and facilities for waste disposal. To ensure there was adequate PPE to meet daily needs for HCWs, a stock inventory management system was established at the two hospitals and overseen by the principal nursing officers. Clean PPE and hand hygiene supplies were collected daily in labelled, sealed, wipeable

Box 1. **About the Global Outbreak Alert and Response Network (GOARN)**

Global Outbreak Alert and Response Network (GOARN)

- GOARN is a WHO network of more than 300 technical institutions and networks globally that respond to acute public health events with the deployment of staff and resources to affected countries.
- GOARN aims to deliver rapid and effective technical support to prevent and control infectious disease outbreaks and public health emergencies when requested.
- For additional information, see **https://goarn.who.int/**.

containers from the dedicated storage space by each ward's principal nursing officer and distributed to on-duty HCWs. Supply requests were submitted weekly to maintain adequate stock at health-care facilities.

The IPC specialists also coordinated the development of standard operating procedures (SOPs) that were endorsed by the Director of Nursing to provide guidance for IPC training and ensure the sustainability of practices. The SOPs included standard and transmission-based precautions, as well as environmental disinfection, the selection and use of PPE, the management of contaminated linen and waste, and hand hygiene.

At the request of the Kiribati Chief for Environmental Health, the IPC specialists conducted a review of practices at the airport and seaports. Staff reported fainting, dehydration, overheating and fears for their safety while wearing coveralls, gloves and face shields for extended periods in high-wind environments such as airport tarmacs and shipping dockyards. The review recommended the development of an SOP to detail when, what and how to wear and remove PPE, including posters for all front-line staff and the community using these services.

OUTCOMES

HCWs identified inadequate space and overcrowding in health-care facilities as stress-inducing and leading to an excessive number of sick patients, posing challenges for both the facility and the health-care team. In Kiribati, where HCWs and cleaning staff are predominantly women who also have substantial caregiving responsibilities at home, absenteeism rates were high due to concerns about contracting and transmitting SARS-CoV-2 to their families. IPC specialists provided practical training to improve HCWs' confidence and skills in administering safe clinical care, thereby lowering the incidence of infections among patients and HCWs. The establishment of an inventory management system streamlined access to PPE and hand hygiene supplies for HCWs, which was achieved through strengthening collaboration among the national pharmacy team, nursing leaders and pharmacy logistics specialists from International SOS. The PPE provided was at times unsuitable; for example, coveralls supplied to workers in a very hot climate can raise concerns about occupational health and safety.[14]

The SOPs developed for airport and seaport staff increased their confidence in selecting the appropriate level of PPE for their activity and risk of exposure. Hand hygiene training and improving access to alcohol-based hand sanitizer eliminated the need for continuous glove-wearing for some staff. Switching from heavy-duty coveralls to lighter disposable gowns, and from full-face shields to goggles, also helped to reduce overall discomfort, fatigue, dehydration and hyperventilation among staff.

DISCUSSION

Kiribati's request for international assistance was met promptly by GOARN and other organizations with response capabilities. Despite international border closures, restrictions on flights, and strict health and visa requirements, MHMS promptly facilitated the entry of international experts into Kiribati to complement its national response capacity.

Several strategies were used to cultivate strong collaboration among stakeholders. Having a clear allocation of roles and responsibilities within the response team ensured that each member comprehended their role in the response effort. Training sessions, although technical, emphasized teamwork to enhance synergy and coordination. An open and inclusive approach

to collaboration was embraced, promoting unity and collective success.

Collaborative joint meetings involving the Kiribati IPC Focal Point, international IPC experts and national partners led to the development of tailored recommendations and interventions for the COVID-19 response. Through efforts coordinated at the national level, key IPC processes were established, including in-person training, the creation of SOPs and implementation of a stock inventory management system. These initiatives enhanced the ability of HCWs in Kiribati to deliver safe clinical care to patients and staff amidst the challenges of the COVID-19 pandemic. However, ongoing efforts are necessary to create a sustainable IPC programme with trained IPC focal points capable of delivering relevant advice and training to HCWs, thereby bolstering IPC capacity and readiness in Pacific island countries and areas.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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Global Outbreak Alert and Response Network (GOARN) focal point engagement meeting with partners in Japan

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In response to the evolving 2015 Ebola virus disease outbreak in West Africa, the Government of Japan formulated an Action Plan for Strengthening Measures on Emerging Infectious Diseases[1] to promote international cooperation, testing and research systems in Japan and strengthen contributions and human resource capacity for supporting domestic and international public health emergencies.

To update and further this work, the first Global Outbreak Alert and Response Network (GOARN) focal point engagement meeting in Japan was held on 18 November 2022. The meeting was hosted by the National Center for Global Health and Medicine (NCGM) and supported by the Ministry of Health, Labour and Welfare, Japan, the World Health Organization (WHO) headquarters and the WHO Regional Office for the Western Pacific. The programme for the meeting aimed to orient participants to GOARN areas of work, determine priority actions to implement the new GOARN Strategy 2022–2026[2] and share partner experiences to identify strengths and limitations in network engagement including deployment. The purpose of the meeting was to gather and connect GOARN partner focal points from Japan to strengthen collaboration between partners, improve network participation, implement activities and increase the number of ready-to-deploy national experts to support international outbreak response.

The half-day programme consisted of four sessions that were delivered with simultaneous translation in Japanese and English. The meeting was attended by 38 participants, including 15 GOARN focal points or designees representing 15 of the 17 partners located in Japan, who attended both virtually and physically in Shinjuku Ward, Tokyo (**Table 1**). Speakers, presenters, panellists and facilitators comprised GOARN partners, the GOARN Steering Committee and WHO.

The first session oriented participants to GOARN and its strategy for 2022–2026,[2] including GOARN activities within the WHO Western Pacific Region, deployment mechanisms and training programmes.

The second session covered the role of the GOARN focal points, outlining expectations and tips on improving partner engagement. A moderated panel discussion enabled the exchange of experiences on effectively sharing GOARN communications within institutions, including ways to gain institutional support for participation during international outbreak response. Panellists shared methodologies for identifying

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Table 1. **Characteristics of participating GOARN partner institutions and individual participants**

Participating GOARN partner institutions		No.
GOARN partner institutions in Japan	Physical/on-site Online	12 3
	Total	**15**
GOARN partner institutions' focal point attendees	Physical/on-site Online	8 2
GOARN partner institutions' focal point designated attendees	Physical/on-site Online	4 1
	Total	**15**
Participants		**No.**
Participant attendance by modality	Physical/on-site Online	25 13
	Total	**38**
Participants' institutional affiliation	Medical institute/health-care facility Government organizations Academic/research or education International or official development assistance implementing agencies Nongovernmental organization	15 10 9 3 1
	Total	**38**

GOARN: Global Outbreak Alert and Response Network.

individuals suitable for deployment and for strengthening response capacity by building a cadre of ready-to-respond young professionals through mentorship.

During session three, speakers from partners in Japan shared experiences with delivering the GOARN trainings at local, national and international levels and presented plans for more trainings. Participants heard individual accounts of how deployment through GOARN's international outbreak response enhanced public health career prospects.

In the final session, participants worked in small groups to develop an action plan for activities with partners in Japan. They were reminded of the obstacles to deployment[3] and discussed the optimal institutional capacity for active involvement in GOARN, and how to improve international deployment capacity in response to public health emergencies.

The partners confirmed GOARN's important role in enhancing global health security through emergency response coordination. GOARN helps to build capacity and respond swiftly to outbreaks by providing real-time information sharing, technical assistance and technical expert deployment to the field.

Participants deemed GOARN focal points crucial as primary contact persons within institutions, facilitating communications and information, and coordinating support to disease outbreaks and health emergencies. Focal points requested more engagement and collaboration across larger institutions with more GOARN involvement. Ideas for opportunities to collaborate included co-hosting or participating in trainings and joining deployment debriefings and information sessions on Japan's GOARN roster system.

An online post-meeting evaluation was conducted with a response rate of 47% (18/38). Participants reported a better understanding of GOARN's activities and processes and were highly satisfied with the meeting's programme and delivery. Participants agreed that GOARN was crucial for preparedness for and response during global infectious disease outbreaks. The three most valued activities in the programme were networking with other partners, understanding the GOARN deployment mechanism and listening to deployment experiences. Participants requested more opportunities to network with partners from Japan and the Western Pacific Region and share deployment experiences to better understand the professional and field skills required to assist in international response.

A key outcome of the meeting was partners' agreement to participate in an annual GOARN focal point engagement meeting to review Network participation, enhance Japan's GOARN deployment roster and collaborate within the Network to strengthen health emergency preparedness and response domestically and internationally.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She was not involved in the editorial decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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Inaugural meeting of Global Outbreak Alert and Response Network partners from Australia

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Established in April 2000, the Global Outbreak Alert and Response Network (GOARN) is a mechanism to allow partners, including technical institutions and networks around the world, to work together to assist World Health Organization (WHO) Member States in responding to public health emergencies.[1] As of February 2024, GOARN has more than 300 partners.[2] Following the GOARN Global Meeting of Partners in 2021, the GOARN Steering Committee adopted the first GOARN strategy 2022–2026.[3] The strategy builds upon its original founding principles and commits the Network to four strategic themes, including "applying a community-centred approach".

In May 2023, a workshop was held with GOARN Steering Committee members and selected partners to develop a strategy implementation plan that operationalized GOARN's aim of working closer to communities. Strategic grouping was agreed to as a priority to enable partners to convene in smaller groups based on mutual interests. Groupings can be based on common interests relevant to GOARN's strategic themes, such as a public health technical area, geography (national, subregional, regional), language (for example, a working coalition of Francophone or Portuguese-speaking countries sharing materials and resources) or other strategic alignments. These groups can actively engage partners within a large global network, enhance information sharing and communication, and promote new opportunities for partners who are less engaged in Network activities and deployments.

A strategic grouping of GOARN focal points from institutional partners in Australia was set up, and an inaugural meeting was convened virtually on 8 November 2023.

Australia hosts 25 out of 76 (33%) GOARN partners in the Western Pacific Region. Since GOARN's establishment in 2000, 18 of these 25 partners have made at least one offer to deploy, with 15 partners deploying an expert at least once. A total of 71 individuals have been deployed to 94 missions for 19 global operations.[2]

The purpose of the meeting was to gather and connect GOARN focal points from Australia to strengthen collaboration between partners to improve Network participation and connectivity among partners, share experiences, and determine interest in remaining connected.

The meeting was hosted virtually by the WHO Regional Office for the Western Pacific. The agenda was designed with partners who attended the strategy implementation workshop: Australian National University, Australasian College for Infection Prevention and Control and Australia's Indo-Pacific Centre for Health Security.

The 2-hour programme consisted of four sessions and was attended by 36 participants, including 34 GOARN focal points representing 18 of the 25 partners from Australia (**Box 1**). All participants delivered a self-

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Box 1. **Participants of the inaugural meeting of GOARN partners in Australia, 8 November 2023**

	GOARN partner institution	No. of participants
1.	Australasian College for Infection Prevention and Control (ACIPC)	2
2.	Australian Centre for Disease Preparedness	1
3.	Australian National Centre for Immunisation Research and Surveillance (NCIRS)	1
4.	Centre for Epidemiology and Population Health (NCEPH), The Australian National University (ANU)	2
5.	Clinical Excellence Commission (CEC), NSW Health Australia	2
6.	Collaborative for the Advancement of Infection Prevention and Control (CAIPC)	1
7.	Health Emergency Branch, Department of Health and Aged Care	4
8.	Hunter New England Health	1
9.	Indo-Pacific Centre for Health Security, Department of Foreign Affairs and Trade	3
10.	College of Public Health, Medical and Veterinary Sciences, James Cook University	1
11.	National Critical Care and Trauma Response Centre (NCCTRC)	1
12.	PathWest Laboratory Medicine WA	1
13.	The University of Sydney Institute for Infectious Diseases	2
14.	The Peter Doherty Institute for Infection and Immunity	4
15.	The University of Newcastle (UON)	2
16.	The University of New South Wales	3
17.	The University of Western Australia	2
18.	Westmead Hospital	1
Total		**34**

GOARN: Global Outbreak and Response Network; NSW: New South Wales; WA: Western Australia.

introduction including a description of the key technical areas of their institution.

The first session oriented participants to GOARN's strategy, deployment process, areas of work and recent activities in the WHO Western Pacific Region.

The second session comprised a moderated panel discussion with three panellists representing a university, government agency and technical network. They explained methods for sharing GOARN communications within the institution and efforts to improve and streamline dissemination, including the use of external instant messaging platforms to enable fast delivery of GOARN requests for assistance. Panellists shared ways of identifying individuals from their institution who are suitable for deployment and ways of recording interest such as through an informal roster of experts.

During the third session, three participants presented their institution's involvement in GOARN activities. Speakers shared experiences participating, delivering and hosting GOARN trainings, conducting operational research, and opportunities for potential collaboration and developing new initiatives to support GOARN activities including deployment mentorship models. Speakers shared personal accounts highlighting how participation in the GOARN capacity strengthening and training programme[4] enhanced personal preparedness to deploy to an international outbreak response mission.

The final session provided a space for virtual interaction among all participants using the interactive presentation tool Mentimeter (Stockholm, Sweden) to understand how partners currently engage with GOARN and how they would engage in the future. The majority of partners reported engagement with the Network through the GOARN Technical Officer based in the WHO Regional Office for the Western Pacific and through accessing information on the GOARN Knowledge Platform.[3] Partners expressed interest in meeting quarterly or every 6 months, with a preference to meet face-to-face with virtual attendance as an option. Conferences were identified as a potential option to host future meetings.

Participants were highly satisfied with this initial meeting and used the opportunity to reach out to each other through the virtual chat function. Partners plan to continue meeting and strengthening cross-collaboration and engagement within GOARN, which will improve preparedness and response to imminent future public health emergencies. Partners have proposed alternating the meeting chair to enhance shared leadership of this group.

Regional or subregional groupings can help put GOARN's objectives and activities in the context of partners' own country, subregion or region, and identify and mobilize resources to increase participation and engagement among partners to implement GOARN activities closer to communities.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She was not involved in the editorial decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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Creating solutions for a better response: Global Outbreak Alert and Response Network Regional Partners Meeting for the Western Pacific, November 2024

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The first hybrid meeting of the Global Outbreak Alert and Response Network (GOARN) partners from the World Health Organization's (WHO) Western Pacific Region was held on 20–21 November 2024 in Tokyo, Japan. Hosted by Japan's National Center for Global Health and Medicine (currently the Japan Institute for Health Security) and the Ministry of Health, Labour and Welfare, the meeting aimed to strengthen regional health security by advancing preparedness and responses to emerging public health threats.

The meeting built on GOARN's strategic theme that emphasizes creating solutions for better responses.[1] The meeting's objectives were to strengthen GOARN partner collaboration to prevent, prepare for, ensure readiness for and respond to public health emergencies; advance health security in the Region through the implementation of the Asia Pacific Health Security Action Framework[2] with the engagement of GOARN; and share opportunities for partners to increase their participation in the Network.

Altogether, 45 GOARN partners attended the meeting from 16 countries across four WHO regions (**Table 1**). Representatives from GOARN partner organizations moderated 2 days of technical sessions. The agenda is in **Supplementary Table 1**. Opening remarks by a representative from Japan's Ministry of Health, Labour and Welfare emphasized Japan's commitment to strengthening regional health security and acknowledged GOARN's long-standing role in outbreak responses, especially in the Western Pacific, home to approximately one quarter of GOARN's 320 partners.

The first session focused on the broader ecosystem that supports health security through the Asia Pacific Health Security Action Framework[2] and the development of interoperable national health emergency workforces aligned with the vision of the Global Health Emergency Corps.[3] The GOARN Handbook[4] was presented, illustrating the expansion of GOARN's role beyond outbreak response to include preparedness and readiness.

GOARN's role in strengthening the health emergency workforce was highlighted through discussion of its Capacity Strengthening and Training Programme,[5] which includes a revised outbreak response simulation exercise and an updated online training platform. A representative from the Public Health Operations in Emergencies for National Strengthening in the Indo-Pacific programme (known as PHOENIX),[6] funded by the Australian Government, described how their increased partner engagement has boosted participation in capacity-strengthening activities.

In 2024, the Chinese Center for Disease Control and Prevention, Japan's National Center for Global Health and Medicine and Germany's Robert Koch Institute jointly delivered GOARN's Orientation to International Outbreak Response, demonstrating GOARN partners' commitment to cross-border capacity-strengthening. A representative

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Table 1. **List of participating institutions by country**

Country	Institutions and organizations
Australia	Australasian College for Infection Prevention and Control
	Australian National University
	Global Health Division, Indo-Pacific Centre for Health Security, Department of Foreign Affairs and Trade
	National Centre for Immunization Research and Surveillance
	National Critical Care and Trauma Response Centre
	Queensland Infection Prevention and Control Unit, Queensland Department of Health
	Sydney Infectious Diseases Institute and Westmead Hospital
	The Asia Pacific Consortium of Veterinary Epidemiology
	University of Newcastle
	University of Sydney
	University of Western Australia
Cambodia	WHO Representative Office for Cambodia
China	Chinese Center for Disease Control and Prevention
Fiji	The Pacific Community, Suva Regional Office
Germany	Centre for International Health Protection, Robert Koch Institute
India	Empower School of Health, Public Health Department
Japan	Association of Medical Doctors of Asia
	Graduate School of Medicine, Department of Virology, Tohoku University
	Graduate School of Medicine, Osaka Metropolitan University
	Hokkaido University
	Japan International Cooperation Agency
	Japanese Red Cross Wakayama Medical Center
	Mie National Hospital
	Ministry of Foreign Affairs
	Ministry of Health, Labour and Welfare
	Nagasaki University
	Nara Medical University
	National Center for Global Health and Medicine
	National Institute of Infectious Diseases
	Saga University Hospital
	Saint Mary's Hospital
	Toshima Hospital
Mongolia	WHO Representative Office for Mongolia
Papua New Guinea	National Department of Health, Ministry of Health
Philippines	WHO Regional Office for the Western Pacific
Republic of Korea	Korea Disease Control and Prevention Agency
Singapore	Centre for Infectious Disease Emergency Response (CIDER), Yong Loo Lin School of Medicine, National University of Singapore
	National Centre for Infectious Diseases and Department of Infectious Diseases, Tan Tock Seng Hospital
Switzerland	WHO headquarters
United Kingdom of Great Britain and Northern Ireland	International Severe Acute Respiratory and Emerging Infection Consortium
	MRC (Medical Research Council) Centre for Global Infectious Disease Analysis, Imperial College London

Country	Institutions and organizations
United States of America	Bureau for Global Health, US Agency for International Development
	East Asia and Pacific Regional Office, and Division of Emergency Operations, Centers for Disease Control and Prevention
	University of Nebraska Medical Center

from the Robert Koch Institute also discussed its involvement in the GOARN Fellowship Programme. Discussions highlighted the need to enhance engagement through strategic groups,[7] strengthen cross-regional collaboration and address fellowship access for Pacific island countries.

GOARN partners shared information about deployment experiences, including providing support to Mongolia during a measles outbreak and the Japan International Cooperation Agency's surge response to a cholera outbreak in Zambia.

Partners presented research on factors influencing the activation of rapid response teams in Papua New Guinea, with findings that could be used to inform strategies to improve future deployments. A separate partner collaboration emphasized the importance of gender-inclusive leadership by conducting research on women's leadership during health emergencies. Participants also discussed regional research priorities, including workforce development, rapid response team operations and community engagement.

Panellists discussed the urgency of building local resilience and cross-sector coordination to ensure effective emergency responses, especially in Pacific island countries where climate change has heightened community vulnerabilities. Key strategies that were considered included strengthening community preparedness, integrating health and disaster risk management, and enhancing collaboration among governments, nongovernmental organizations and local stakeholders.

In conclusion, GOARN's vital role in advancing regional health security was reaffirmed. Partners called for regular communication from GOARN and among partners, shared leadership and regional strategic groups to ensure that activities are tailored to the local context and that they engage underrepresented partners. Key priorities included expanding the GOARN Capacity Strengthening and Training Programme[5] and addressing deployment barriers, such as institutional, financial and administrative challenges. Mentorship and remote support during deployments were identified as effective ways to boost partners' involvement in outbreak responses. Partners also committed to advancing operational research and establishing a regional community of practice to enhance response methods and guide future strategies. Overall, the meeting confirmed GOARN partners' shared commitment to building a more resilient, collaborative and effective regional health emergency response system.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the editorial decision to publish this manuscript. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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Outbreak response capacity of the Global Outbreak Alert and Response Network across WHO's South-East Asia and Western Pacific regions

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Objective: The COVID-19 pandemic challenged the Global Outbreak Alert and Response Network's (GOARN) mechanism used to rapidly deploy technical support for international responses and highlighted areas that require strengthened capacity within the Network. GOARN's partners in the World Health Organization's (WHO) South-East Asia and Western Pacific regions were engaged to explore their levels of preparedness, readiness and ability to respond to international public health emergencies.

Methods: Consultative discussions were held and a survey was conducted with GOARN's partners from the two WHO regions. Discussion topics included partners' capacity to support and participate in a GOARN deployment, training, research and collaboration. Descriptive and content analyses were conducted.

Results: Barriers to engaging in GOARN's international outbreak response efforts included limited numbers of personnel trained to respond to outbreaks; institutional, financial and administrative hurdles; and limited collaboration opportunities. Partners identified innovative solutions that could strengthen their engagement with deployment, such as financial subsidies, mentorship for less experienced staff, and the ability to provide remote support.

Discussion: GOARN plays an important role in enabling WHO to fulfil its international alert and response duties during disease outbreaks and humanitarian crises that have the potential to spark disease outbreaks. Yet without systematic improvement to strengthen national outbreak capacity and regional connectedness, support for international outbreak responses may remain limited. Thus, it is necessary to integrate novel approaches to support international deployments, as identified in this study.

The COVID-19 pandemic tested and stretched health systems and the health workforce. The pandemic presented unique challenges to international collaboration for emergency responses and emphasized the critical importance of partnerships and developing innovative solutions to address global health emergencies.

Established by the World Health Organization (WHO) in April 2000, the Global Outbreak Alert and Response Network (GOARN) comprises technical institutions and networks from around the world. GOARN can pool resources to coordinate response activities and facilitate information-sharing about emerging and ongoing public health events. When requested by WHO Member States, GOARN coordinates its partners' technical capacities to respond to a public health emergency.[1]

WHO's South-East Asia and Western Pacific regions are home to more than one quarter of the world's population. Both regions are prone to natural disasters, disease outbreaks and health risks from climate change.[1]

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In September 2022, GOARN comprised 270 partners internationally, including 22 (8%) in the South-East Asia Region and 63 (23%) in the Western Pacific Region.[2]

The COVID-19 pandemic created an opportunity for GOARN's partners to reflect on their institutional capacities for preparedness and response activities. This study aimed to explore the enablers and barriers to partners' engagement with GOARN to strengthen international responses to and preparedness and readiness for global health emergencies after the COVID-19 pandemic. This opportunity also provided a platform for partners within the two regions to contribute to the drafting of the GOARN Strategy 2022–2026.[3]

METHODS

Small-group discussions were conducted with GOARN's partners in the Western Pacific Region. Subsequently, partners from both regions responded to a survey designed to document their preparedness, readiness and capacity to respond to acute public health events.

Group discussions

In May 2022, all 63 GOARN partners in the Western Pacific Region were invited via e-mail to attend a virtual discussion. Partners in the South-East Asia Region were not available for this component of the study. Invitations were extended to GOARN focal points, but they were transferrable to other personnel. More than one person from each institution could attend, if available. Participation in the group discussions was voluntary; all participants were verbally informed that notes would be taken during the discussions but no data about the individuals or institutions participating in the discussions would be collected (e.g. demographic data or role within the GOARN partner institution). Participants self-selected into one of two separate online, interactive sessions. Each session included standard questions, was facilitated by the same two staff from The Australian National University and lasted approximately 90 minutes.

To encourage interaction, participants were asked to answer questions by responding verbally or using the chat function on Zoom. Participants were also asked to respond to a series of short-answer questions using the Mentimeter online tool (Stockholm, Sweden). Topics explored in the discussions included partners' activities undertaken in relation to preparedness and response, challenges and enablers to participating in GOARN, perceptions of the value of partnering with GOARN, and what support would be required to encourage partners to become more active. Participants were also consulted about the draft GOARN strategy document.

Discussion notes, as well as digital data from Zoom and Mentimeter, were categorized and descriptively analysed. Inductive content analysis was used to group common concerns and issues raised by participants. These identified concerns were then used to inform the development of the subsequent survey of GOARN's partners.

Survey

GOARN's partners from both regions were invited to complete one self-administered online survey per institution using REDCap (Research Electronic Data Capture; REDCap Consortium, Vanderbilt University, Nashville, TN, USA). Survey questions covered four main themes: institutional preparedness and readiness, deployment, operational research and collaboration. Closed and open-ended questions were included. The survey link was distributed to 85 GOARN focal points in the two regions (Western Pacific, $n = 63$; South-East Asia, $n = 22$) via e-mail and was open during 5–25 July 2022. Consent was obtained online before access to the survey was provided. Survey data were analysed using Microsoft Excel (2016) and Stata 15 (StataCorp, College Station, TX, USA). Two researchers conducted qualitative inductive content analysis to identify patterns and groupings in the responses to the open-ended questions.[4]

Dissemination

Study results were presented and discussed at a biregional online meeting of GOARN's partners on 23 August 2022. A report was then finalized and distributed to all partners in these two regions.[5]

RESULTS

Sixty-six individuals from invited GOARN partner institutions participated in the two group discussions (group 1, $n = 36$; group 2, $n = 30$). Analysis of the group

Table 1. **Technical characteristics of survey respondents at GOARN's partner organizations in WHO's South-East Asia and Western Pacific regions, 2022 (n = 47)**

Technical area	No. (%)
Infection prevention and control, protection of the health workforce	29 (62)
Surveillance and risk assessment	29 (62)
Operational research, implementation science, monitoring and evaluation	29 (62)
Laboratory services and diagnostics	27 (57)
Case management, clinical operations, therapeutics research	19 (40)
Case investigation, contact tracing	12 (26)
Implementation of GOARN projects or tools to improve data collection, harmonization and analysis during outbreaks[a]	11 (23)
Coordination and planning	10 (21)
Risk communication and community engagement, infodemic management	10 (21)
Vaccinations	9 (19)
Points of entry, international travel and transport, mass gatherings	8 (17)
Maintaining essential health services and systems	4 (9)
Operational support and logistics, supply chains	2 (4)

GOARN: Global Outbreak Alert and Response Network.

[a] GOARN's projects or tools include Go.Data and integrated outbreak analytics.

discussions identified concerns and challenges regarding partners' ability to deploy, partners' involvement in GOARN training, collaboration with GOARN and with other partners, and partners' capacity to participate in operational research about emergency responses. Survey questions were developed to address these areas.

The overall survey response rate was 55% (47/85): 48% (30/63) of partners from the Western Pacific and 77% (17/22) of partners from the South-East Asia regions. Respondents were from 13/48 Member States within the two WHO regions (Western Pacific, 8/37; South-East Asia, 5/11). One duplicate partner survey was removed, and all remaining data were included in the analysis. The majority of respondents were from partners at universities and government organizations. All GOARN technical capacities were represented (**Table 1**).

Theme 1: partner preparedness and readiness

Approximately one third (17/47, 36%) of respondents reported staff or member participation in any tier of the GOARN Capacity-Strengthening and Training Programme. In terms of training delivery, 74% (35/47) of respondents indicated they had not yet delivered a GOARN training, but they might in the future have the capacity and interest to deliver such training.

Theme 2: deployment

Forty-five per cent (21/47) of respondents reported deploying personnel to an international response with GOARN since becoming a partner (**Table 2**). Forty per cent (19/47) stated that their institution was "deployment-ready" and able to deploy immediately if requested.

Respondents expressed interest in exploring virtual deployment, with 31/47 (66%) reporting interest in engaging in this style of deployment if it was offered. Respondents also suggested that their capacity to support international deployments would increase if less experienced personnel could be paired with or shadow experienced experts (**Table 2**).

Results showed that to enable the deployment of staff, it would be important to ensure continuation of pay or salary (38%, 18/47), provide leave to respond (36%, 17/47) and backfill deployed employees (19%, 9/47) (**Table 3**). Other enabling strategies included being able to delegate work responsibilities and having procedures to facilitate non-personal leave.

Respondents reported multiple barriers to deploying personnel through GOARN. Administrative barriers included financial, human resources and contractual

Table 2. **Ability of GOARN's partners to engage in deployment activities in WHO's Western Pacific and South-East Asia regions, survey results, 2022 (n = 47)**

Deployment	No. (%) of responses		
	Yes	No	Unsure
Organization has deployed personnel to international response via GOARN	21 (45)	ND	ND
Organization has deployed personnel to international response via non-GOARN mechanisms	20 (43)	ND	ND
Interested in virtual deployments	31 (66)	ND	ND
Able to deploy immediately	19 (40)	8 (17)	19 (40)
By institution type			
Governmental organization	8 (53)	2 (13)	5 (33)
Ministry or Department of Health	1 (50)	0 (0)	1 (50)
Hospital	5 (45)	3 (27)	3 (27)
International organization	1 (50)	1 (50)	0 (0)
Professional network	0 (0)	2 (100)	0 (0)
Nongovernmental organization	3 (43)	0 (0)	4 (57)
Special programme	1 (100)	0 (0)	0 (0)
University	7 (44)	4 (25)	5 (31)
Research institute	6 (55)	4 (36)	1 (9)
By GOARN pillar			
Infection prevention and control, protection of the health workforce	15 (50)	4 (13)	11 (37)
Surveillance and risk assessment	16 (55)	2 (7)	11 (38)
Operational research, implementation science, monitoring and evaluation	11 (38)	4 (14)	14 (48)
Laboratory services and diagnostics	11 (41)	6 (22)	10 (37)
Case management, clinical operations, therapeutics research	10 (53)	4 (21)	5 (26)
Case investigation, contact tracing	8 (67)	0 (0)	4 (33)
Implementation of GOARN projects or tools to improve data collection, harmonization and analysis during an outbreak	9 (82)	0 (0)	2 (18)
Coordination and planning	5 (50)	0 (0)	5 (50)
Risk communication and community engagement, infodemic management	5 (50)	1 (10)	4 (40)
Vaccinations	5 (56)	2 (22)	2 (22)
Points of entry, international travel and transport, mass gatherings	4 (50)	0 (0)	4 (50)
Maintaining essential health services and systems	2 (50)	1 (25)	1 (25)
Operational support and logistics, supply chains	2 (100)	0 (0)	0 (0)

GOARN: Global Outbreak Alert and Response Network; ND: no data.

challenges, as well as long institutional approval times for deployments. Broader barriers included family commitments, competing domestic response priorities, routine work commitments and the requested duration of deployment being too long.

Theme 3: operational research

Operational research was identified as integral to improving the effectiveness of GOARN's activities and its overall preparedness and response. Respondents

Table 3. **Strategies used by GOARN's partners in WHO's South-East Asia and Western Pacific regions to enable staff to deploy, 2022 (n = 47)**

Strategy	No. (%)
Continuation of pay	18 (38)
Provision of leave	17 (36)
Backfill employee	9 (19)
Other	8 (17)
None	14 (30)

identified a range of institutional capacities relating to operational research, with 40% (19/47) reporting that their institution was able to undertake rapid literature reviews and 28% (13/47) reporting they were able to assist with ethics reviews. Respondents noted that any research undertaken should be translated into action and that data-sharing between partners could be improved. Respondents expressed an interest in collaborating on operational research with other GOARN partners across the regions.

Theme 4: collaboration

To strengthen partnerships across the regions, the study explored partners' reasons for engaging with GOARN and their interest in and capacity for interpartner collaborations. The key motivations for participating were to engage in capacity-strengthening and training (75%, 35/47) and in networking among partners (72%, 34/47); to take part in international deployments for outbreak response (64%, 30/47) and operational research (64%, 30/47); and to support response preparedness (47%, 22/47). The most useful GOARN activities were trainings, deployments, networking and communication of outbreak information, including through webinars.

Eighty-one per cent (38/47) of respondents expressed an interest in collaborating with other GOARN partners. Regular opportunities for networking were perceived by many as key to increasing collaboration.

DISCUSSION

This study identified that GOARN's partners in the South-East Asia and Western Pacific regions have richly diverse experiences and technical capacities across each of GOARN's areas of work. The study identified partners' interest in collaborating and their capacity to do so. Partners involved in this study shared innovative ideas around how to strengthen emergency responses.

Capacity-building was identified as a key priority for partners. Partners identified actions that could scale up and sustain emergency response training, as well as challenges to be considered and addressed. Traditionally, GOARN's training has been conducted by the GOARN Operational Support Team;[6] this study highlighted the potential to expand the emergency-ready workforce through partner-delivered trainings. Greater partner involvement in delivering GOARN training could help scale up emergency response workforce preparedness, creating teams equipped with the necessary skills to respond to acute national, regional and international public health events.

The potential to take part in international deployments for emergency responses was identified as a core purpose for joining GOARN. Partners in the South-East Asia and Western Pacific regions acknowledged their intent to support international deployments; however, multiple barriers to fulfilling this intent were reported. Respondents identified innovative solutions to address these barriers, including developing support mechanisms, such as mentorships for less experienced members of the workforce during deployment. Mentorship during emergency response is possible and can improve the workforce's capacity to respond.[7,8] Developing a mentorship programme that pairs experienced, previously deployed team members with those who are inexperienced may strengthen and increase participation, Network collaboration and capabilities.

Respondents from universities or linked to universities indicated a willingness to deploy. GOARN could benefit from exploring these opportunities to create closer collaborations with universities and identify individuals from these partners who are ready to respond. Partners who were not able to deploy immediately wanted to further explore how they could in the future. GOARN would benefit from identifying alternative, acceptable deployment modes that are family-friendly, such as remote deployments. Collaborating with partners to support them to deploy will strengthen these regions' capacity to provide quality responses to public health emergency events.

The importance of operational research to ensure an improved, evidence-informed response has been underscored in the GOARN Strategy 2022–2026.[3] This study found that GOARN's partners across the South-East Asia and Western Pacific regions have a range of institutional capacities in operational research, which are presently underutilized. Developing a collaborative operational research agenda for emergency preparedness and response, along with a regional community of practice, would support the discovery of new and stronger ways to navigate this space.

This study has helped GOARN gain a better understanding of the capacities of its partners, as well as their needs. To take advantage of the information gleaned from and momentum created by this study and to strengthen communication and collaboration with partners, GOARN could map its membership by areas of technical expertise, desired collaboration areas, and collaboration capacity to GOARN and to each of its partners. Partners have voiced their interest in developing stronger connections with GOARN and among partners. The Network would benefit from creating technical or location-based hubs to improve collaboration, connection and engagement among partners.

This project successfully engaged many of GOARN's partners from WHO's South-East Asia and Western Pacific regions; however, there were limitations. First, GOARN's partners from the South-East Asia Region were not able to participate in the first round of the study, the group discussions. To counterbalance this, the authors consulted with WHO's GOARN staff to ensure regional input. Second, as partners were asked to provide only one survey response per institution, some institutional memory or content may have been unintentionally omitted. Dissemination of the final deidentified report to partners has helped to address this limitation.

GOARN plays a critical role in enabling WHO to fulfil its international alert and response duties during disease outbreaks and humanitarian crises that have the potential to spark disease outbreaks.[9] Continued strengthening of GOARN's operational capacity to respond will ensure its preparedness for future public health emergencies at the national and international levels.

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Conflicts of interest

AEP and SS are associate editors of the *Western Pacific Surveillance and Response* journal. They had no role in the decision to publish this manuscript. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethics approval was not needed as GOARN partners were interviewed in their official capacity about publicly available information, and survey responses were anonymously submitted.

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A woman's role in health leadership: an assessment of experiences during acute public health emergencies

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Objective: We explored the experiences of women in senior or leadership roles in navigating and leading during acute public health emergencies.

Methods: Women leaders in the World Health Organization Western Pacific Region attending the Global Outbreak Alert and Response Network's Outbreak Response Leadership Training (11–18 September 2024) were invited to participate in this phenomenological study. Eleven interviews were conducted with training attendees and observational data were gathered. Inductive thematic analysis was conducted to identify key themes.

Results: Four themes associated with women-centric experiences in public health emergency response were identified: disproportionate expectations in the workplace; the use of authoritarian decision-making during planning and implementation; encompassing different perspectives and leadership styles compared to men; and requesting additional opportunities and equitable prospects for career growth. Four themes that reflect non-gender-exclusive challenges experienced during emergency responses were also detailed. Themes observed were related to: barriers to efficiency; consequences of working within this field; and needs and necessities during emergency response.

Discussion: This study highlights both gender-specific and systemic challenges experienced by women leaders in public health emergency responses, revealing how sociocultural norms and operational barriers intersect during times of crisis. We identified opportunities to assist women leaders through the recognition and promotion of different leadership styles, establishing a support network for women, and addressing systemic and organizational barriers that impact women.

Women have held a pivotal role in the global health sector as providers of clinical care, comprising 70% of all health-care workers, including over 80% of nursing professionals, over 90% of midwifery roles, and countless unpaid community health worker and caregiver positions.[1] Women in health leadership positions have been found to improve financial performance, encourage stability, increase engagement with environmental and health-focused initiatives and invest in worker welfare.[2] Such traits are essential within the context of an emergency, defined as "a situation impacting the lives and well-being of a large number of people or a significant percentage of a population and requiring substantial multisectoral assistance" and includes "humanitarian emergencies due to conflict, natural disasters, food insecurity, outbreaks and famine."[3] In public health emergency response (PHER), emphasis is placed on the rapid distribution of tasks, flexible decision-making informed by evolving data and information, dynamic coordination among

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stakeholders, a knowledgeable and scalable workforce, and the redirection of resources to mitigate supply chain disruptions.[4]

Women leaders have demonstrated the ability to react decisively and lead with a more democratic and participative style that aligns with the communication and coordination needs of PHER, yet women have continuously faced inequities in the fields of emergency response and global health.[2,5] Documented gendered inequalities faced by women in PHER include inadequate or ill-fitting personal protective gear, elevated risk of exposure to infection, increased workload, greater economic insecurity, greater mental health burden and burnout.[1,6,7] Women leaders who operate within emergency response have also reported receiving less support than their male colleagues, both in technical areas such as epidemiological support and in non-technical areas related to administrative, communication or well-being assistance.[7] The lack of gender parity within all hierarchical levels of PHER-related sectors limits women's ability to function to their full capacity, resulting in financial loss and harmful physical and mental health repercussions for both genders.[8]

The contrast between women's role in health and their representation in health leadership illustrates an undeniable inequity known as the XX Paradox: women hold around 70% of the health worker jobs globally, yet they only constitute 25% of leadership roles in health.[1,9] From a representation perspective, women from low- and middle-income countries (LMICs) are least represented in global health leadership.[1] Although there has been advocacy on paper to seat women at the leadership table, informal rules and discrimination continue to exist against women at all stages of their professional life.[6,10] Women who pursue leadership positions often encounter gender-based obstacles during their career, such as sexual harassment, gender bias, discrimination, power imbalance, privilege and gender norms.[9,11]

It is crucial to understand the lived experiences, challenges and barriers faced by women leaders to identify, improve and provide adequate support for them in all roles during a PHER. Most research detailing gender and equity in the global health workforce has documented experiences from high-income countries that are not applicable to LMICs.[9] Although current knowledge has highlighted women's roles in leadership, there is limited data sharing women's perspectives on their experiences in leadership, particularly related to PHER.

Established by the World Health Organization (WHO), the Global Outbreak Alert and Response Network (GOARN) is a global technical partnership to strengthen and coordinate the rapid mobilization of experts responding to international outbreaks through outbreak response training, networking, research and collaboration.[12] Women leaders in the WHO Western Pacific Region have previously shared insights into their experiences, challenges, and advice for other women in PHER fields and roles.[13] A continuous evaluation of challenges and barriers is necessary to produce a temporal assessment of disparities for women within the field of PHER. Leadership programmes offer a critical space for networking and collaboration across diverse career levels and institutions. Further research evaluating the PHER-related experiences of women leaders is warranted to better explore the systemic barriers women face in PHER settings and address ongoing knowledge gaps, particularly across the Asia and Pacific region.[13] The objective of this study is to examine the experiences of women in senior or leadership roles among GOARN partners by identifying the key themes they rely on to navigate and lead during acute public health emergencies.

METHODS

Study design

A phenomenological approach was used to capture data through in-depth, semi-structured interviews and participant observation. Phenomenology, a qualitative research approach that investigates the experience and perspectives of individuals around a certain phenomenon, has been used in prior literature to gain insight into the barriers and setbacks encountered by those in female leadership roles as they ascended into their positions.[14,15] An exploratory design was used for the interviews to investigate participant experiences and perceptions regarding their roles in PHER.

Study population

Subjects eligible for the study included all 24 women who were invited to participate in the inaugural GOARN Outbreak Response Leadership Programme conducted in Darwin, Northern Territory, Australia, in September

Table 1. **Interview questions and probes of women's leadership and contributions to PHER during the WHO Western Pacific Region GOARN Leadership Programme, 11–18 September 2024**

Topic of focus	Question	Probe
Career, responsibilities, accomplishments	Can you tell me about your current role in your organization?	• What are some of the responsibilities and duties that you have? • How long have you been in this role? • What was your previous role right before this? • Was this role recommended by a mentor?
Public health emergency response experience: challenges	What is the most challenging part about responding to public health emergencies?	• Can you give me an example of this challenge? • How did these challenges impact your ability to lead? • How did you navigate those challenges? • Did you receive any support for this challenge later on? • What was the end result?
Public health emergency response experience: support and community	What types of support and resources have you found critical for public health response?	• Do you wish you had more support? • Do you think you and your male colleagues get different amounts of support? • Where does the support come from? ◦ If individuals/peers: Are they female peers as well? • Were there any gaps in the support you received?
Peer-to-peer challenges	Have you had a negative experience with a peer while leading?	• Can you tell me more about this experience? • How did you overcome this issue? • Do you think your gender played a role in this experience? Why or why not?
Leadership	Do you think women leaders contribute anything unique to public health emergency response?	• Why or why not? • If so, what are those things? • How can our field better support women responders, from women at junior levels to those in senior positions?

GOARN: Global Outbreak Alert and Response Network; PHER: public health emergency response; WHO: World Health Organization.

2024.[16] Additionally, three mentors were invited to participate. Attendees were all senior-level women from GOARN partner institutions within the WHO South-East Asia and Western Pacific regions who had a minimum of 10 years of professional experience in a relevant field related to public health and significant outbreak response experience at international, regional and/or national levels.

Recruitment and data collection

Semi-structured interviews

All participants were selected via purposive sampling and contacted individually by the WHO technical officer. In order to promote the inclusion of perspectives from all participating countries with representatives attending the training, participant outreach was based on country of origin. Emails were sent with the participant information sheet detailing the objective and scope of the study. If interested in participating, invitees confirmed their availability and a 60-minute Zoom (version 6.3.11) interview time slot was scheduled for them by the interviewer. All interviews were conducted in English.

Interview questions were informed by available literature and related to challenges in emergency response, experiences surrounding leadership and women's contribution to PHER. The interview questions are outlined in **Table 1**.

Workshop observation

All of the programme participants were subjected to naturalistic phenomenological observational data collection.[14] Investigators (JB, SS) observed each workshop seminar and recorded verbal and non-verbal cues and interactions between participants as field notes coupled with their own reflections of the observations. The investigators used their observation notes from the seminar to confirm intercoder consistency with the phenomenological concepts identified from the interviews.[14]

Data analysis

Recordings of the interviews were transcribed verbatim using the Zoom transcription process and manually cleaned by comparing the transcript data to the Zoom recording. The transcript data were subjected to inductive thematic analysis, a six-step process of identifying themes and patterns within qualitative data by familiarizing oneself with the data, categorizing them into codes, then aggregating codes into major themes to determine significance of findings.[17] All transcripts and workshop observation notes were reviewed and evaluated by both analysis researchers (JB, JH) to reduce confirmation and selection bias before the interviews were independently coded. Disagreements over the categorization of codes or themes were resolved through discussion among analysis researchers until consensus was reached. All analyses were conducted in NVivo 12 Pro.

RESULTS

Of those invited, interviews were conducted with 11 individuals (10 participants, one mentor) from eight countries and areas: Australia, Cambodia, Fiji, Guam, Indonesia, Singapore, Tonga and Viet Nam. Australia had three participants and Singapore had two participants; all other countries were represented by one participant. Participants were between the ages of 35–65 years and held a wide range of professions, including medical physician, health-care organization director, epidemiologist, veterinarian and laboratory clinician. All interviews were conducted on 11–18 September 2024, with an average interview time of 55 minutes (range 30–61 minutes). Through thematic analysis, four themes associated with women-centric experiences in PHER and four themes related to the overarching PHER experience were identified and reported in **Table 2** and **Table 3**, respectively.

Women-centric experiences in public health response

Themes pertaining to women-centric experiences in the field of PHER highlighted gender-specific challenges faced by women leaders and how they navigate their responsibilities despite the obstacles they encounter. The themes capture the sociocultural influence on the workplace during PHER and the barriers it creates for women in leadership positions. These themes included: 1) shattering glass cliffs; dismantling glass walls; 2) owning authority; 3) cultivating resilience and shaping perspective; and 4) creating equitable opportunities.

Shattering glass cliffs, dismantling glass walls

This theme emphasized the gender imbalance within the workforce and the disproportionate need for women to build credibility and prove their worth within their PHER field. Participants discussed instances of the "glass cliff" theory, when women are placed in positions of leadership during times of high risk and are subjected to greater scrutiny.[18] Women also shared their struggles in having their voice heard, their communication style accepted, and maintaining open dialogue with their male peers compared to that between male peers. Contrasting perspectives were observed among Pacific island participants, who indicated feeling heard and accepted among their male colleagues, attributing it to the matriarchal aspects within their culture.

Owning authority

This authoritative theme highlighted women leaders providing an active, responsive role in PHER. Participants discussed the importance of standing firm on decisions when planning and implementing action plans with senior collaborators and external partners. The importance of trustworthiness and honesty in messaging between public health partners and the community was emphasized.

Cultivating resilience and shaping perspective

Participants characterized women leaders as empathetic and approachable due to their emotional awareness. They reported that women have a different, broader perspective compared to men, often practising adaptability and incorporating wider considerations into their work as opposed to lateral thinking during PHER. Participants recounted using these qualities while communicating with colleagues and the community.

Creating equitable opportunities

Additional opportunities for women to experience leadership and equitable prospects for lateral career growth were identified as a necessity. Participants reported that women role models and mentors are important for shaping a network of support for women

Table 2. **Women-centric experience in public health emergency response themes identified during interview questions and probes of women's leadership and contributions to PHER during the WHO Western Pacific Region GOARN Leadership Programme, 11–18 September 2024**

Theme	Code	Code explained	Example quote
Shattering glass cliffs, dismantling glass walls • Struggles for women to have their voice heard among male peers • Gender imbalance within the workforce • Disproportionate need for women to build credibility and prove their worth in their field • Placing women in leadership positions during times of high risk	Glass wall	Pertains to struggles for women to have their voice heard and to maintain the same level of open dialogue among their male peers as male peers would among each other. Communication is paired with credibility for women, often through what is acceptable in terms of communication and leadership style.	"They will support you sometimes and they will tell you that you can do this, and you cannot do that. But if the is [sic] team integrated together, male and female, then male is the priority." (P2)
	Glass cliff	Instances of placing women in positions of leadership during times of high risk in emergency response, where women could be subjected to greater criticism or scrutiny.	"I think also, when it comes to, say, doing extra work or doing extra coverage because there was a surge or something, sometimes it seems it's the same people who are asked again, the women tend to be asked because maybe we won't say no." (P5)
	Boy's club	Discussions emphasizing the gender imbalance within the workforce in certain countries and the disproportionate need for women to build credibility to prove their worth in their field compared to their male colleagues. While some countries exhibit a male majority in senior positions, others have male-dominated workforce in all levels of public health. Female participants from Asian countries, in particular, have emphasized feeling outnumbered.	"…Particularly in Asia, most of the higher positions are held by males and for the females, not only you have to proof [sic] that you are more than capable, but you also have to find ways to be able to break yourself into this so-called 'male domain' and be able to fully understand their mental models and how be a part of them." (L2)
Owning authority • Women's roles as active, responsive leaders • Having to stand their ground on decisions made by senior positions or external collaborators • Importance of trust and honesty in messaging during emergency response	Standing firm	Difficulties in having to push back or having to stand your ground on decisions made by senior positions and external collaborators during emergency response.	"I know one meeting I got out [sic] and I think one of the executive directors said to me, 'You know, we usually try to be on the same page', and things like that, and I said, 'Well, you don't pay me to be on the same page. I think you're wrong'." (P1)
	Messaging during emergency response	The impact of trust and honesty in messaging among public health partners and the community. Codes detail how lack of trust in messaging can become a barrier in emergency response; alternatively, trust and honesty in messaging helps guide policy changes that impact response. Messaging with the public must be paired with honesty and transparency for trust to remain.	"I just had to keep being honest and repeat myself saying, 'Yes, this is a situation and we need your help. We can't do it alone, but if you don't want to take these preventive measures, correct our course' […] trying to be out there first [as the] first voice. Be honest with what you know, what you don't know, and then come back and give updates frequently. So those kinds of things, be present." (P7)
	Active leadership potential	Instances of placing women in positions of leadership and having an active, responsive leader who is open to discuss and dissect issues.	"…It's more direct now, whenever we come in with a request. She's been trying to address them immediately compared to the former heads for public health, I think, in terms of meetings and discussions. There's more opportunity for us to discuss and dissect any issue with our female leader at the moment compared to the previous leader." (P11)

Theme	Code	Code explained	Example quote
Cultivating resilience and shaping perspective • Resilience and tenacity to operate in public health workforce • Women encompass a broader perspective • Practice adaptability • More approachable, more empathetic • Emotional awareness	Resilience and perspective	Women have the resilience and strength to persevere due to having to do so in their personal lives. Women also hold a broad perspective and can look at tasks with a more empathetic lens compared to men. Highlights the strength in using emotions instead of viewing it as a weakness.	"We can be more empathetic. We bring our emotions in, and some people will be like, no, that's not good, but you have to always remember there's the human side of any emergency response, right?" (P7)
Creating equitable opportunities • Additional opportunities for women to experience leadership • Equitable prospects • Connections with women role models and mentors • Network of support	Equitable opportunities	Discussions pertaining to women needing additional support and networking with other women leaders. Mentorship should be bidirectional. Providing more opportunities for women in senior positions would be beneficial for promoting leadership among all levels of government.	"I think that the junior responders need more support than the senior responders. The first engagement, I think, support in terms of having someone to talk to is important and with the senior responders, it's supporting the decision-making processes." (P12)

GOARN: Global Outbreak Alert and Response Network; L: leader/mentor; P: participant; PHER: public health emergency response; WHO: World Health Organization.

in all chapters of their career journey. Some participants further indicated that active support from male mentors has been helpful in progressing their career within male-dominated workforces.

Overarching public health emergency response experience

Themes related to the overarching PHER experience reflected in this section include the challenges related to emergency response that are not gender-exclusive and the barriers to efficient emergency response. Participants also illustrated the consequences of working within the PHER field and their needs and necessities during response. Four themes emerged here: 1) leading under emergency response pressure; 2) underscoring priorities during emergency response; 3) overcoming capacity barriers pre-response; and 4) mobilizing community support.

Leading under emergency response pressure

This theme focused on the topics of mental health, fatigue and the pressure participants feel to work past their capacity. They reflected on the hypocritical assertion that seeking help is considered taboo while overworking is praised and expected, highlighting a cultural contradiction. Responses urge for prioritized monitoring of workers' mental health during PHER.

Underscoring priorities during emergency response

This theme discusses finding space for PHER among daily tasks and obligations, pivoting PHER recommendations and tasks based on updated evidence and research, and difficulties related to multidisciplinary collaboration in PHER. Participants identified a lack of network or established multidisciplinary teams as a barrier to timely PHER management while dealing with normal business.

Overcoming capacity barriers pre-response

Participants discussed many systemic concerns that impact PHER, including outdated guidelines and regulations that require revision to reflect current PHER standards, bureaucratic delays, lapses in resources and workforce shortages. Participants emphasized the importance of logistics preparation, pre-response training and the strengthening of in-country health emergency workforce capacity.

Mobilizing community support

The community support theme highlights participants' comments detailing the need for partnerships with community members to participate in PHER activities that further encourage trust and transparency. Participants discussed collaboration during PHER, relying on colleagues for support, expert-led decision-making,

Table 3. **Overarching public health emergency response themes identified during interview questions and probes of women's leadership and contributions to PHER during the WHO Western Pacific Region GOARN Leadership Programme, 11–18 September 2024**

Theme	Code	Code explained	Example quote
Leading under emergency response pressure • Burnout, mental fatigue • Support seen among ER departments • Asking for help could be considered taboo • Nonstop pressure to perform • Guilt from feeling fatigue	Mental health and fatigue	Comments pertaining to burnout and mental fatigue during ER, prioritizing work while placing all other aspects in one's life secondary. Discussions of how public health sectors have supported mental health during ER, from support groups to taking physical leave from the stationed post. Asking for help while working in ER could be considered a taboo subject for some.	"It's hard to know yourself when you're fatigued when you're just wanting to get the job done so I think that's probably something that leaders need to [keep] a closer eye on and not just work their teams to the absolute end of their energy level, but to manage teams [with] taking consideration of breaks and not just having a break and then everyone go out drinking." (P14)
	Pressure to perform	Having nonstop pressure to continuously perform, with feelings of guilt and need to overwork considered the norm. Furthermore, engaging with new colleagues and team dynamics while simultaneously trying to keep up with tasks and implementation of strategies during acute ER while new information could be dropped at any time.	"I've done so many interviews, and I was at a point where I've had enough and I thought I have to say no to these things, and my communications person called me after I declined something and she said, 'you did this, really well and as a woman in science, I want you to do this'[...] This was my breaking point, just leave me alone, why can't I just do my job? Get someone else to do that interview? And at that point, I don't care, I'm just a scientist. Take another scientist. I don't want to do everything that's there to represent women. Just go away." (P16)
Underscoring priorities during emergency response • Collaboration among internal and external partners is essential • Pivoting strategies and tasks during ER based on updated information • Working on ER simultaneously with daily tasks • Prioritization of tasks based on hierarchy of urgency related to ER	Multidisciplinary collaboration	When having multidisciplinary teams, priorities can differ among colleagues and may require additional deliberation and communication. One barrier discussed is the lack of prior established collaboration or networking within internal and external partners, leading to lengthening time for follow-up, identifying personnel for tasks, etc.	"So communications become a little bit steep, because [it is no] longer somebody that you know very well. Coordination also became a little bit of the issue because you need to work with them in terms of what priorities would be. And your priorities and their priorities may not necessarily be the same, because we have our own agenda depending on who you work with and the issues at hand." (L2)
	Pivoting decision-making	Mentions of pivoting public health suggestions during ER due to the most updated evidence and research, leading to changes in the prioritization of resources and funding as well as changes in policy.	"The anecdotal evidence is important but so is generating our own research and also taking into account research done across the world, whether it's the recovery trial or other studies, and then using that evidence to pivot your policy in a mindful way." (P5)
	Adjusting work with ER duties	Impact of having to modulate work outside of ER and private life with ER-related duties, including excess travel, hierarchy of 'urgency' in simultaneous outbreak response, and realizing when an unfolding outbreak becomes severe and requires more attention and priority.	"I look at other people and think, how are they like so calm. And everything will be going on and then part of my team will come in and I'm like, I don't have time for this. I know that I need to moderate that response because I can't be seen as out of control or that you don't have the situation under control, but I'm not really a calm person, so that I feel like under time pressures, it just becomes more evident." (P16)

Theme	Code	Code explained	Example quote
Overcoming capacity barriers pre-response • Guidelines need to be revised and updated • Cascading issues due to outdated regulations and guidelines, lack of resources and workforce, etc. • Multilevel mobilization during ER can cause delay in tasks • Requiring additional workforce and training before ER	Outdated guidelines	Details outdated government regulations, procedures, and newly created emergency guidelines and how they impact ER preparedness and efficiency. Outdated guidelines pertaining to ER are mentioned to cause cascading issues with providing efficient workforce and funding as well as understanding expected roles and duties during ER.	"We have the law [regarding infection control] but is over 20 years with no adjustment, so the emergency operation center is not included. Because emergency response is not included in the law, in many states, parties are not clear about their roles in emergency, and then they are not active in their response." (P13)
	Multilevel infrastructure mobilization	Discussions involving the necessity of multilevel government mobilization in ER and how government infrastructure can impact timeliness and decision-making when it comes to acute emergency responsiveness and policy.	"We [would like to] take care of our own procurement and recruitment because there's delays, we're talking months, years for some things like recruitment. We've been trying to recruit some positions for years and we still haven't gotten anyone because we're dependent on [another department's] personnel section to do that, but they also have more than 30 other agencies they have to assist." (P7)
	Lacking resources and logistics	Comments regarding lack of resources and funding that led to shortages of equipment, testing capabilities, facilities for suspected patients, etc. A lack of pre-emergency response training and logistics can further cause delays during ER.	"In this year, 2024, there was a lack of the budget for testing and that made it more difficult to do the proper testing when we have cases in the field. So, I really hope in 2025, we will get more support..." (P9)
	Lacking workforce capacity	Mentions a lack of technical experts, workforce, and issues concerning the migration of personnel from the workforce completely, leading to necessary procurement of replacement personnel and additional training.	"The main problem that I encounter is our workforce capacity. We had few technical experts on the ground. We definitely need technical assistance from abroad." (P11)
	Additional training	Comments regarding training and exercises needed before ER to increase knowledge in emergency management for within-country response and deployment. Training will promote adaptability during ER, familiarity with responsibilities and duties, confidence, and enhance decision-making.	"I think increasing their knowledge in public health emergency management. We can do some training that is some emergency, or some outbreak [under] different contexts." (P13)
Mobilizing community support • Collaboration between community and public health partners to establish partnerships during ER • Finding support and trust among colleagues and team members • Coming together with information from different departments and teams, disseminating details related to ER	Community outreach	Encouraging engagement with members of the community to participate in certain aspects of ER that include correspondence with the community they are a part of. In doing so, ER personnel and the community collaboration will further bridge partnerships and trust.	"So that's how I picked up that we really need help from the people in the community, and we were able to do contact tracing training with non-health participants. We identified some supporters from the community, and we conducted training on contact tracing with them." (P11)
	Colleague support	Discussions involving finding support among colleagues and team members during ER. Comments reflect sharing perspectives on an issue, communicating and piecing together what each team member is working on independently, creating new networking opportunities, and working collaboratively.	"Maybe when I'm become a leader and I have staff or colleagues to do the program together, they can freely to ask me [if they don't understand me] and they can tell me whatever I said that bothered them." (P9)

GOARN: Global Outbreak Alert and Response Network; ER: emergency response; L: leader/mentor; P: participant; PHER: public health emergency response; WHO: World Health Organization.

communicating the latest developments and establishing network partners.

DISCUSSION

This study highlights both gender-specific and systemic challenges experienced by women leaders in PHER, revealing how sociocultural norms and operational barriers intersect during times of crisis. Through the themes identified in this study, participants illustrated the complexity of navigating PHER roles while striving for trust, adaptability and meaningful collaboration.

Current systems and policies used in global health security and PHER are predominantly created by men from high-income countries, resulting in a lack of collaborative engagement with women leaders, specifically from LMICs. This results in failure to consider the disproportionate impact that outbreaks have on the predominantly female global health workforce.[19] With the participation of GOARN-associated women leaders, we were able to capture the unique challenges experienced in LMICs through the immersive, multifaceted training programme.

Patriarchal culture, gender stereotypes and gender-based expectations affecting women in the workforce were noted to be significant among participants from LMICs in our study. Gender, along with seniority, come with pre-established biases about the capabilities, usefulness and trustworthiness of women. Traditional gender ideology, which emphasizes the role of men in the workforce due to being the sole income earner in the household, creates workplace gender disparities, leading to the sidelining of women's input and the promotion of a disproportionate need for credibility among women in exchange for trust.[20] During times of crisis in PHER, the "glass cliff" effect places women in the role of the "miracle worker" at the forefront of the firing line, often burdened with relentless requests and a small margin for error, as indicated by our interviews.[18] However, when placed in positions of leadership, women's ability to wield both stereotypically feminine and masculine behaviour during PHER simulates assertive but humane executive authority.[21,22] Similarly, participants remarked how the stereotypically masculine qualities of decisiveness and assertiveness are required during PHER when priorities differ among competing stakeholders and resources are limited. Participants also viewed their stereotypically feminine qualities of empathy and compassion positively, using their emotions to provide a communal sense of shared goals during multidisciplinary collaboration. Such prioritization of anticipatory policies and preventive measures seen among women leaders builds the capacity and resilience needed during PHER.[21]

The issue women face within the global health workforce is double-barrelled. One, women are consistently underrepresented in PHER and global health leadership with structural, systemic and social barriers that continue to present substantial obstacles against career advancement.[23–25] Two, the act of including women within established processes and systems without considering gender-responsive leadership will reinforce the persistence of gender-based discrimination, pay gaps and other workforce disparities.[26,27]

Implications

Through our study, we identified improvements to assist women leaders during PHER and promote the future of women in leadership positions.

The most obvious strategy to mitigate gender disparities in PHER leadership is through the promotion of gender mainstreaming (gender-focused evaluation of all planned action, policies and processes) for leadership roles, further reducing gender-based expectations and biases regarding competency, capabilities and responsibilities.[28] One way of doing so is to recognize and promote leadership styles and qualities that are different from stereotypically masculine qualities associated with hierarchical, directive leadership styles.[29] The evaluation of women's leadership competence is more directly related to their communal behaviours than their male counterparts.[30] Similarly, displaying traditionally masculine leadership qualities evokes greater penalties for women regarding leader likeability, while these qualities displayed by male leaders are associated with greater likeability.[30] By challenging gender stereotypes in leadership, leadership can be evaluated based on merit rather than gendered expectations.

More equitable opportunities for leadership positions, fostering mentorship among women leaders and establishing a network for women to connect could

reduce feelings of isolation and cultivate support from women in similar positions. Challenging organizational structural barriers through evidence-based interventions rather than leaning on professional development to prepackage women to fit leadership roles will instead promote female representation at an institutional level, not the individual level.[31] Daily reflections from all participants of the leadership training supported GOARN's objective of establishing a network of women leaders within the field of PHER and fielding mentorship opportunities among them. Furthermore, providing leadership training to all workplace leaders can help ensure that gender-mainstreaming policies and procedures are consistently understood and that gender-related responsibilities are more evenly shared.

In addressing overarching PHER themes, greater emphasis should be placed on reducing fatigue and burnout and prioritizing a proactive approach towards mental health. Women often have a greater risk of disease exposure, an increase in workload and elevated emotional burden due to guilt and a heightened sense of duty for community and patients.[32] The promotion of proactive mental health support among PHER workers can strengthen resilience against burnout, improve workforce retention and support teamwork efficiency and morale.[33] Also, addressing systemic and organization-level contributors to burnout and fatigue through intentional changes to policies and practices can provide actionable intervention while providing benefits to the employer as well.[34,35] Paid leave, subsidized childcare and eldercare, and flexibility in scheduling can further increase job retention and ensure productivity and focus.[34,36]

Participants from some countries requested that in-country capabilities through technical training, stakeholder collaboration and the updating of PHER guidelines be prioritized; specifically, that women's differential needs be addressed due to their overwhelming contributions to front-line health care and PHER. Given the lack of gender-specific language among current PHER management and planning, future training and guideline revisions should include gender-inclusive frameworks to ensure women PHER workers are supported and compensated.[33] The revision of guidelines and procedures will also ensure PHER is managed with updated methodology and streamlined emergency response procedures, thereby enhancing equity and reducing waste by optimizing resource and workforce allocation.[32] The latter is especially important for countries that require stronger community resilience due to limited in-country resources and workforce capacity. Additional training among PHER workers will enhance response time, improve efficiency, foster proactive multilevel decision-making and encourage collaboration among stakeholders.[37]

Positioning and reflexivity

As researchers and women with a background in emergency response, we acknowledge that our interpretation of the data is reflected by our personal lived experiences. We adopted insights and observations from existing literature and encouraged ongoing team discussions to mitigate the subjectivity of our observations. We aimed to provide transparency and encourage our audience to critically assess our findings within the context of our positionalities.

Limitations

There were some limitations. Our recruitment was opportunistic and purposive and, hence, the findings cannot be generalized. There were participants from other countries in the programme who did not participate in our study and may have contributed additional perspectives to our research. Similarly, participants who attended the GOARN programme may not be representative of PHER leaders who did not attend. Participants were asked to retrospectively reflect on details related to PHER, subjecting our research to potential recall bias. The power dynamics associated with leadership positions may produce bias when recalling events. Furthermore, our single mentor interview may produce outlier data due to their elevated leadership position in comparison to other participants. Transcription data were manually reviewed, providing opportunity for human error during the data cleaning phase. There is a risk of data saturation and bias with coding reliability due to the limited number of researchers involved in the assessment and data categorization. Personal and cultural aspects of behaviour and belief were not prioritized during the interview, both of which could impact perspective. Finally, the limited number of attendees and publicly available communications materials regarding the training programme can lead to a risk of participant identification. We aimed to reduce this risk by de-identifying personal details from their interview responses, including their organization, specific leadership titles and country of origin.

Conclusion

Women's achievements and contributions to the field of PHER have been extensive, despite the inequities, challenges and barriers they have faced. Our study highlights the lived experiences of women leaders in PHER by capturing the lessons learned both in the field and throughout their careers. Our findings emphasized differing societal and cultural disparities that continue to impact women of all PHER fields. We hope that by encouraging equitable opportunities in leadership positions, in-country capacity-building and the implementation of mental health support interventions will enhance PHER practices and empower respondents in all positions.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the editorial decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

The study was exempt from ethics review by the University of Nebraska Medical Center Institutional Review Board (protocol: 0553-24-EX).

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Beyond deployments: Australia's strategic contributions to the Global Outbreak Alert and Response Network

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The Global Outbreak Alert and Response Network (GOARN) was established by the World Health Organization (WHO) in April 2000 as a mechanism for technical partners and networks around the world to coordinate and assist WHO Member States in responding to public health emergencies. There are more than 300 GOARN partners, including technical institutions, organizations and networks, each willing to pool their resources to improve communication and information-sharing about emerging and ongoing public health events, and to support the capacities required for preparedness and rapid response activities.[1]

GOARN's partners are national, regional and global stakeholders. Partners include ministries of health, national public health institutes, United Nations organizations, nongovernmental organizations, academic institutions, and surveillance, laboratory and technical networks. Each partner varies in its capacity, technical specialty, resources and ability to provide support.

Australia's Indo-Pacific Centre for Health Security (CHS) is a branch of the Global Health Division of the Australian Government's Department of Foreign Affairs and Trade. CHS, as part of Australia's development assistance programme, provides institutional support to GOARN in ways that may serve as examples for other existing or potential partners to the Network.

CHS was established to enhance health security and strengthen public health responses in the Indo-Pacific region. CHS directs Australian aid funds to projects aimed at improving health systems and health security, sharing Australian expertise, and improving coordination to enhance the health and well-being of people and communities within the Indo-Pacific region.

Health emergency workforce development, including rapid outbreak response capability, has been a priority area for Australia's health security investments through CHS since its establishment.[2] CHS joined GOARN as a global technical partner in health emergency response and coordination in 2018, and funded secondments to the WHO regional offices for South-East Asia and the Western Pacific the following year. Both CHS-funded roles are designated as GOARN technical officer positions. These positions were introduced to concentrate efforts on goals shared by CHS and GOARN: to increase the number of GOARN's partners in both WHO regions, increase the engagement of existing South-East Asian and Pacific partners, and contribute to the development of the GOARN Strategy 2022–2026.[3]

The establishment of an Australian-funded position in the WHO Regional Office for the Western Pacific has led to measurable benefits for GOARN in the Region. Since February 2020, the Regional Office's GOARN technical officer (SS) has facilitated 21 new partners to join the Network, including nine from Australia (**Box 1**). During the COVID-19 pandemic, close coordination between the GOARN technical officer in the Regional Office, WHO headquarters and country offices enabled the Network to navigate country entry requirements and travel restrictions for those being deployed by the

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Box 1. **List of new Global Outbreak Alert and Response Network (GOARN) partners in the WHO Western Pacific Region since 2020**

Australia
Asia Pacific Consortium of Veterinary Epidemiology
Clinical Excellence Commission, New South Wales Government
Collaborative for the Advancement of Infection Prevention and Control
National Critical Care and Trauma Response Centre
Queensland Infection Prevention and Control Unit, Queensland Health
School of Population Health, Medicine and Health, University of New South Wales
University of Newcastle
University of Western Australia
Sydney Infectious Diseases Institute, University of Sydney
Cook Islands
Public Health Directorate of the Ministry of Health, Te Marae Ora
Guam
Guam Department of Public Health and Social Services
Japan
Toshima Hospital
Papua New Guinea
Field Epidemiology Training Programme
Philippines
Association of Asia-Pacific Operational Research Societies
Republic of Korea
National Medical Center
Singapore
National Centre for Infectious Diseases
Vanuatu
Surveillance, Research and Emergency Response Unit, Ministry of Health
Viet Nam
Cho Ray Hospital
Pasteur Institute Ho Chi Minh City
Pasteur Institute Nha Trang
Tay Nguyen Institute of Hygiene and Epidemiology

Network, and ensured it was able to meet a diverse range of requests for assistance from WHO Member States. Between January 2020 and May 2023, 72 individuals completed 89 deployments to 12 Member States in the WHO Western Pacific Region. Of those deployed, 47% (34/72) were female. Thirty-four GOARN partner institutions provided technical experts for deployment, 16 of which were based within the Region.[4]

In response to restrictive entry requirements across the Region, the technical officer supported the shift of the GOARN Tier 1.5 training – orientation to international outbreak response – from an in-person to a virtual format. Since February 2020, 380 individuals have completed this training, and 34 have been trained as trainers.

In addition to funding GOARN-focused positions in WHO regional offices, CHS has pursued other avenues to support GOARN's work. As the COVID-19 pandemic evolved into a protracted emergency, Member States' requests for assistance were for longer durations than GOARN's usual 4- to 8-week deployments. CHS used a flexible mechanism to support income supplementation for longer deployments of Australian experts who would otherwise have been unable to respond to requests for assistance in the Region. CHS's use of this mechanism was unique among GOARN's institutional partners and, in certain circumstances, could continue to add value to the Network when available and appropriate.

CHS also seeks to make a positive contribution to GOARN's governance and strategic direction. In 2022, a representative from CHS was elected as one of 21 partners to join the GOARN Steering Committee. The 4-year term provides CHS with the opportunity to further contribute to guiding the planning, implementation and evaluation of GOARN's activities and strategic goals.

CHS intends to continue bolstering outbreak response capacity in the Indo-Pacific region through a range of mechanisms. This will include acting as an engaged institutional partner to support GOARN, as

well as implementing Australia's commitment to the Quad Health Security Partnership[5] to support outbreak preparedness and response training for the public health emergency workforce in South-East Asia. Each GOARN partner has the opportunity to support both their own and GOARN's strategic goals through participation in the Network.

Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the decision to publish this manuscript. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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Opportunities and aspirations: the Korea Disease Control and Prevention Agency's partnership with the Global Outbreak Alert and Response Network

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The Global Outbreak Alert and Response Network (GOARN) is a network of institutions that provides technical support to countries responding to public health emergencies, upon request.[1] Since its establishment in 2000, GOARN has steadily expanded to include over 310 partner institutions[2] and brings more than two decades of experience in facilitating the rapid deployment of experts to support outbreak response operations worldwide.[3]

The Republic of Korea has three GOARN partners: the Korea Disease Control and Prevention Agency (KDCA), the Lee Jong Wook Global Medical Center and the National Medical Center. KDCA serves as the country's national public health authority and holds primary responsibility for coordinating responses to public health emergencies. It has led national technical support during international public health events, including the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak and, more recently, the COVID-19 pandemic.

While deployment through GOARN has not yet occurred for the three institutions during their 15-year partnership, engagement is increasing, with two offers of assistance submitted in response to the 2022 Sudan virus disease outbreak in Uganda. Despite the absence of deployments through GOARN, KDCA has been actively involved in other network activities, including participating in the GOARN Capacity Strengthening and Training Programme and providing technical assistance to the GOARN Operational Support Team (OST)[3] at WHO headquarters in Geneva, Switzerland.

Participation in the GOARN Capacity Building and Training Programme

The GOARN Capacity Building and Training Programme is a multitiered initiative aimed at enhancing the technical skills of outbreak response experts while preparing them to work effectively in multidisciplinary and culturally diverse teams. It focuses on building the core capacities needed for international responders to adapt and apply their expertise in various outbreak response teams and field settings.[4]

In 2018, a public health officer from KDCA participated in the 5-day GOARN Outbreak Response Scenario Training (Tier 2) in Brazzaville, Democratic Republic of the Congo. This training emphasizes team building, problem solving during rapidly evolving outbreak scenarios, stakeholder interviews, data analysis and the development of contextual control strategies. It provides participants with a realistic understanding of the challenges faced by international multidisciplinary outbreak response teams. More recently in 2024, the Orientation to International Outbreak Response with GOARN (Tier 1.5) training was hosted by KDCA in Seoul, with the participation of staff from KDCA and the National Medical Center interested in international outbreak response. The training offered participants a

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valuable opportunity to engage in real-world scenarios through interactive table-top exercises.

Technical assistance to the GOARN Operational Support Team

In 2019, KDCA facilitated a temporary assignment of one of its staff members to the GOARN OST.[5] The secondment was a temporary transfer of 1 year with the staff member remaining employed by KDCA. This assignment was designed to share expertise, develop skills and address specific organizational needs, including supporting the alert and risk assessment sector in the network. It reflected KDCA's priority to expand its international collaborative network.

During the assignment, the staff member actively contributed to a range of activities, including supporting the management of alert and risk assessment functions, implementing standard operating procedures such as screening candidates for deployments, and coordinating the GOARN weekly operational call to facilitate information-sharing for ongoing field operations.

Benefits of GOARN engagement

Participation in the 5-day GOARN Outbreak Response Scenario Training provided the KDCA participant with hands-on experience in managing effective field responses during rapidly evolving and complex public health emergencies. The experience proved invaluable during the COVID-19 pandemic response in the Republic of Korea, where the participant applied skills gained in the training, such as conducting rapid risk assessment, coordinating with multidisciplinary teams and applying interventions based on rapid decision-making. The participant also shared their experience and knowledge with KDCA's newly hired epidemiological investigation officers through the Korean field epidemiology training programme. This facilitated the strengthening of institutional response capacity by transferring practical outbreak response experiences and expertise, encouraging active participation in international public health issues, and mentoring new staff for future public health emergencies.

The secondment of a KDCA staff member to the GOARN OST provided an opportunity to contribute meaningfully to the expansion of the Epidemic Intelligence from Open Sources (EIOS) initiative. EIOS is a key tool for comprehensive event-based surveillance and facilitates real-time information-sharing among WHO Member States and partners. The EIOS platform supports collaboration and coordination among partner organizations involved in monitoring and assessing public health threats.

This collaboration between KDCA and the EIOS core team at WHO headquarters led to the hosting of the 2019 EIOS Global Technical Meeting held from 12–14 November 2019 in Seoul, Republic of Korea.[6] The event brought together many GOARN partners and featured active discussions on improving information-sharing and strengthening collaboration across the Network. Hosting the meeting laid the foundation for continued technical cooperation and contributed to the global development and expansion of the EIOS platform.[7]

Following the year-long secondment, the staff member was appointed as KDCA's liaison officer to WHO, with the primary role of advancing institutional collaboration. The secondment yielded lasting and tangible benefits at both individual and institutional levels. Individually, the officer gained valuable international experience and career development opportunities. Institutionally, KDCA strengthened its global networks, enhanced its visibility within the GOARN community, and deepened its engagement with WHO and other partner institutions. These outcomes align with KDCA's strategic priority to expand its international engagement following the COVID-19 pandemic.

What next?

Strengthening KDCA's contribution to the GOARN network is vital to the enhancement of global health security and outbreak response capacity. Greater involvement in the GOARN Capacity Building and Training Programme is essential, as it provides experts with opportunities to refine their field skills and prepares them to effectively operate in multisectoral and international response teams. This not only advances KDCA's ability to respond to global health emergencies but also contributes to building a more robust and coordinated global response framework.

It is essential to establish streamlined administrative procedures, including the development of a roster of qualified experts, to facilitate the deployment of technical experts. This roster would enable the rapid identification and mobilization of suitable candidates, ensuring timely and effective responses to requests for assistance.

Ongoing communications between KDCA and the GOARN OST as well as active participation in GOARN partner engagement activities should be prioritized. These mechanisms offer valuable insights into outbreak response efforts, foster networking and opportunities for collaboration, and enable knowledge-sharing with other partner institutions to enhance collective efforts and facilitate effective field responses.

KDCA has made valuable contributions to GOARN through diverse activities and now has a chance to enhance this collaboration further. The expansion of KDCA's role in global health, particularly in outbreak field response, is a valuable opportunity to strengthen partnerships and broaden its impact. Leveraging GOARN's well-established mechanism for field deployment will help KDCA achieve its aspiration to make meaningful contributions to global response operations.

Conflicts of interest

The authors have no conflicts of interest to declare.

Ethics statement

Ethics approval was not required for this report.

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GOARN training: supporting field epidemiology trainees to upskill for public health emergency response

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Global health security is underpinned by a skilled public health workforce. Epidemiologists play a crucial role not only in protecting individuals and communities from infectious diseases and public health events, but also in establishing relationships among countries and areas in the Western Pacific Region.[1] Field epidemiology training programmes (FETPs) build and strengthen a nation's capacity to respond to health threats both locally and regionally by providing graduates with technical expertise in public health surveillance, outbreak investigation, risk assessment and data analysis. To be impactful as epidemiologists in public health emergency responses, training such as the multitiered Global Outbreak Alert and Response Network (GOARN) training course, specifically the introduction to emergency response tier of the programme (Tier 1.5), is essential to the curriculum. GOARN Tier 1.5, which incorporates the online modules of Tier 1 learning, is an important supplement to the FETP curriculum, providing simulation exercises for public health emergencies that fellows may not experience in their field placements.

The Australian advanced FETP is located within the National Centre for Epidemiology and Population Health (NCEPH) at the Australian National University (ANU).[2] NCEPH has been a GOARN partner since the network's inception in 2000 and has maintained a close relationship with the GOARN team. An opt-in GOARN Tier 1.5 training has been conducted with Australian FETP trainees on an ad hoc basis on five occasions over several years to increase the pool of field epidemiologists ready to deploy for international public health emergency response. However, due to the broad-reaching impacts of the COVID-19 pandemic, for the first time the Australian FETP took a systematic approach and extended the Tier 1.5 training to all trainees of the 2021 and 2022 cohorts, which provided them with an introduction to international outbreak response. Australian FETP trainees could then apply individually for further tiers, if interested. This article outlines our perspective on the importance of upskilling FETP trainees for public health response.

In September 2022, over 30 Australian FETP trainees participated in a GOARN Tier 1.5 training tailored for field epidemiologists. The training consisted of two components: a series of self-directed online modules (Tier 1) and a face-to-face workshop (Tier 1.5) (**Table 1**). The online modules covered GOARN's core objectives, the structures of an international response with GOARN and the World Health Organization, information regarding pre-deployment processes, safety and cultural awareness in the field, and some of the challenges involved in fieldwork in low-resource and remote settings. The face-to-face workshop encouraged further reflection through in-depth group discussions and interaction through real-world scenario-based situations. Australian FETP trainees finished the training with a deeper understanding of the realities of deployment, multidisciplinary teamwork, leadership, capacity-building and best practices for working with local communities, governments and partners during a domestic or international public health emergency response.

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Table 1. **Summary of topics covered by GOARN training: online modules (Tier 1) and face-to-face workshop (Tier 1.5) for Australian FETP trainees, September 2022**

Topic	Tier 1 online modules	Tier 1.5 workshop scenarios
Structures of an international emergency response	The Global Outbreak Alert and Response Network The Public Health Emergency and Humanitarian Architecture and Landscape Incident Management System Functional Areas	Principles, structure and purpose of GOARN International outbreak investigations – requesting and receiving international assistance
GOARN and operating in an emergency response	Working with GOARN in the Field Ethics and Values	Types of deployments and the relationship of GOARN and WHO in outbreak response Following the GOARN Code of Conduct
Role of the epidemiologist in an emergency response	Working in an International Multidisciplinary Outbreak Response Team	International outbreak investigations – priority tasks of a deployed epidemiologist Stories from the field – COVID-19 response in Papua New Guinea
Field skills	Team Dynamics	Adapting interventions to the community – cultural sensitivities, communicating with communities, design, and implementation of control measures Stories from the field – applied epidemiology and infection prevention and control in Ebola virus disease response in West Africa
Realities of deployment	Me and the Mission – An Overview of How to Manage Well-being Prior, During and Post Deployment	Stories from the field – natural disaster responses in the Philippines and Indonesia
Personal well-being	Personal Well-being for Deployment BSAFE – United Nations Safety and Security Training Module	Advice for mental and physical well-being before, during and post deployment from past deployers

FETP: field epidemiology training programme; GOARN: Global Outbreak Alert and Response Network; WHO: World Health Organization.

Peer-to-peer learning is a powerful tool used during FETP training and is also a critical element of the Tier 1.5 training. Real-world scenario discussions used in the training showcased the complexities of working in high-pressure environments as well as rapidly changing and time-critical situations. The personal stories shared by former deployers were thought-provoking and included wide-ranging examples, from expanding clinical capacity and infection control standards in low-resource settings to problem-solving for pregnant women with Ebola virus disease. At the heart of these responses were well equipped and prepared responders, applying agile thinking and intercultural fluency when working with communities and with their emergency response team members. Participation in the training enabled FETP trainees to learn directly from practitioners who had deployed to a range of different international emergency response settings and provided an opportunity for them to ask questions and seek clarifications.

Critically, the training imparted the importance of interpersonal skills such as communication and collaboration, sometimes known as "field skills". Field skills are essential skills for all responders, whether deployed domestically or internationally; however, research has found that applied epidemiologists deployed to public health emergency responses have reported challenges with interpersonal communication, working within multicultural, multidisciplinary teams, and clarifying the role of an epidemiologist.[3,4] Understanding these nuances and developing these capabilities are necessary for a successful public health emergency response and may not be addressed in the current FETP curriculum.[5,6]

FETPs focus on developing technical skills and applied epidemiological methods skills among its trainees. Despite the training being mostly based in the "field" (workplace), a trainee is likely to progress through their

FETP without exposure to an international public health emergency response.[6] Depending on their workplace and the projects they undertake as part of the programme, field skills such as communication and leadership may or may not be developed.[3,6] FETP trainees are therefore unlikely to test their technical and field skills in a real-time emergency, within a supportive learning environment.

Indeed, despite the breadth of knowledge and expertise among Australian FETP trainees at the time of the GOARN Tier 1.5 training, few had experience in international public health emergency response. The training provided a safe place for trainees to explore and self-reflect on their skills, personality and individual career objectives, and the skills they needed to hone before international deployment. Further, the training highlighted important considerations that are transferrable to domestic public health emergency response, including communication strategies across multidisciplinary teams and the need to clarify roles and responsibilities during the response.

During public health emergency response, field epidemiologists play a pivotal role in mitigating adverse impacts on communities. To enhance the pool of well prepared deployers, collaboration between FETPs and GOARN is essential. This collaboration ensures that FETP trainees possess the necessary skills for effective domestic and international responses.[6,7] The COVID-19 pandemic exposed the fragility of global health systems and underscored the need to strengthen national workforces and broaden the regional network of responders. Now more than ever, the public health workforce needs FETP trainees and alumni to be better able to apply both their technical and field skills across various contexts to drive positive health outcomes. The Australian FETP aims to continue its partnership with GOARN through routine training, mentored field deployments, and upskilling FETP faculty to complete GOARN training of trainers. The GOARN Tier 1.5 training provided a valuable learning experience for the Australian FETP trainees and should be considered as an ongoing component of the curriculum of advanced FETPs internationally.

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Conflicts of interest

TS was a member of the GOARN Steering Committee during 2005–2014 and worked as a senior epidemiologist for the GOARN secretariat at WHO headquarters during 2015–2019. AP is an Associate Editor of the *Western Pacific Surveillance and Response* journal. She was not involved in the editorial decision-making of this manuscript. The remaining authors have no conflicts of interest to declare.

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Scenario-based outbreak response training: perspectives from a multidisciplinary trainee team

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The World Health Organization's (WHO) Global Outbreak Alert and Response Network's (GOARN) multitiered Capacity-Building and Training Programme aims to strengthen public health capacity to respond to global outbreaks of infectious diseases. Tier 1 introduces the essential knowledge and skills needed before deployment and is delivered via online modules as well as a classroom-based workshop (known as Tier 1.5). Tier 2 is an immersive, residential, scenario-driven simulation exercise, and Tier 3 focuses on specialized leadership training for outbreak responders. Participants in Tiers 2 and 3 must complete an application, and selection is competitive.[1] This Perspective has been written by participants and a training faculty member in the Tier 2 outbreak scenario training held in New Delhi, India, from 31 October to 5 November 2022, hosted by WHO's Regional Offices for South-East Asia and the Western Pacific. It provides a general overview of the GOARN outbreak scenario training programme, participants' perspectives and suggestions for future programmes.

The Tier 2 training is designed for mid-level technical experts from GOARN's partners who have a minimum of 7 years of professional experience, including in national or international responses to outbreaks, and who are committed to deploying on a GOARN field mission. The selection of training participants is a competitive process requiring submission of a curriculum vitae, a letter of personal motivation and institutional support to attend the training from the GOARN focal point at the partner's organization. Shortlisted candidates are then assessed using a competency-based interview.

Successful participants complete their initial training via the GOARN online learning management system, which includes modules about GOARN,[2] working with GOARN in the field, the landscape of public health emergencies and humanitarian interventions, working as part of an international outbreak response team composed of professionals from different disciplines, personal well-being for deployment and the United Nations' BSAFE security awareness training. The online training is easy to navigate and provides a useful introduction to the Tier 2 training programme.

Upon arriving for the residential component, participants are divided into three multidisciplinary teams whose members work together throughout the training to determine the agent causing the outbreak in the scenario presented.

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During the training, our team (Team Zuum) consisted of eight participants from six countries (Australia, Brazil, Indonesia, Nepal, the Philippines and Singapore) with expertise in epidemiology, clinical management, infection prevention and control, laboratory, and risk communication and community engagement. Three of the eight participants had international deployment experience.

Mirroring the composition of the teams, training faculty are also from different countries and disciplines, anchored by training leads experienced in GOARN deployments and WHO missions. To simulate the work of outbreak response teams, participants are not provided with a training agenda, which contributes to an authentic experience.

Central to the training is the emphasis on developing field skills – that is, the personal qualities and skills necessary to work as part of a team and adapt to various contexts and settings. An evolving scenario incorporating role plays, news reports, field investigations and data analysis forces teams to think creatively, pivot quickly to make decisions and consider the audience for any engagement. Participants in Team Zuum who had deployment experience commented on the realistic nature of the training model, which included the types of intense time and fatigue pressures routinely faced during an outbreak response mission.

Daily mentor-facilitated debriefs with each team provided an opportunity for self-reflection for participants and to improve team dynamics. This helped teams to rapidly move through the stages of team development that would usually occur over a longer period during a deployment.

Despite the diverse and multidisciplinary composition of Team Zuum, no team member had a background in animal health or One Health to complement the expertise in human health. However, as with real-life deployments, team composition is driven by applicants and their availability, so the absence of a One Health expert provided a developmental opportunity for the team to use existing networks to overcome the gap and to understand that deploying with a full complement of technical expertise is not always achievable. The benefit of using a One Health approach has been highlighted in the GOARN Strategy 2022–2026, so participation by One Health experts may increase in the future.[3]

The way forward

While the GOARN Tier 2 training model is highly successful and achieves the desired outcome of preparing technical experts to deploy with GOARN, there is an opportunity to further ongoing coordinated engagement, such as by including alumni among trainees and those being deployed. This engagement may provide support for trainees considering applying for deployment, as alumni can share their lived experiences, connect trainees and those who have been deployed with technical experts, and provide mentoring to less experienced individuals. The strong focus on team-building during Tier 2 training creates enduring links between trainees, which often continue long after the training. Members of Team Zuum have maintained contact through informal channels, building additional relationships within the team and among other teams, faculty members and those who have been previously deployed through formal and informal mechanisms, and these may also prove beneficial in ensuring the longer-term commitment and availability of trainees. A variety of mechanisms could be used to ensure ongoing engagement, such as newsletters and mentoring networks or webinars. Another option is to develop communities of interest to assist in linking technical experts across courses so that networks and relationships can be established before real-life deployments occur. Communities of interest could be based on technical disciplines as defined by GOARN and could also be used to provide a reach-back service for advice during deployments to support technical experts in the field.

Tier 2 training should continue to strengthen and incorporate concepts of adult and experiential learning theory[4,5] and assess the outcomes of the training with effective evaluation tools that measure how participants' new skills are applied and their impact.[6] GOARN could consider developing further training scenarios that can be delivered in person or virtually to alumni of the Tier 2 trainings to maintain engagement and ensure their skills are current. While GOARN Tier 2 learning is realistic and allows team learning in a simulated environment, it remains a means to an end: actual, successful GOARN deployments.

Intense simulation exercises provide an invaluable training experience for those who will be deployed by

GOARN and an opportunity to expand the global network of ready-to-deploy experts. Overall, the Tier 2 training programme is strongly recommended for public health professionals wanting to be better prepared to deploy on an international outbreak response mission with GOARN.

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Ethics statement

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Japan's contribution to strengthening global health emergency workforce capacity through the Global Outbreak Alert and Response Network

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The COVID-19 pandemic served as a stark reminder of how rapidly infectious disease threats can escalate into global crises and of the critical importance of a well-prepared, agile and coordinated emergency workforce to contain them. At the heart of this global readiness is the Global Outbreak Alert and Response Network (GOARN), a trusted mechanism established by the World Health Organization (WHO) and powered by a worldwide collaboration of more than 320 partners. GOARN enables the rapid deployment of experts during outbreaks and plays a central role in strengthening the long-term capacity, coordination and resilience needed to address public health emergencies.[1]

Building on Japan's National Action Plan for Strengthening Measures on Emerging Infectious Diseases[2] and in alignment with GOARN's mission[3] to coordinate international responses to outbreaks and to support capacities to detect and contain health threats, the Government of Japan launched its Global Health Strategy[4] in May 2022; the Strategy signals a renewed commitment to global health security, especially in strengthening prevention and preparedness for, and responses to, public health crises, and promoting collaboration and surge support during international health emergencies. Informed by lessons from the COVID-19 pandemic, this Strategy aims to support the development of a resilient global health architecture through enhanced prevention, preparedness and response activities. Both GOARN and Japan's Global Health Strategy recognize that global collaboration is essential for building an agile and capable health emergency workforce. This shared vision laid the foundation for Japan's deeper engagement with GOARN, resulting in increased Network activities and the participation of domestic institutions. This Perspective article outlines Japan's contributions towards strengthening the global health emergency workforce through GOARN, highlighting efforts to advance coordinated outbreak preparedness, emergency response and long-term capacity-strengthening.

As of May 2025, 19 institutions in Japan are GOARN partners, including hospitals, universities and national authorities (**Box 1**).[5] This level of participation reflects Japan's strong commitment to ensuring global outbreak preparedness and response. To build on this foundation, the Global Outbreak Intelligence, Capacity Building and Deployment Coordination Center (GIC) was established in December 2022 within Japan's National Center for Global Health and Medicine (NCGM). The GIC has a dual mandate to enhance domestic expertise and to strengthen engagement with global networks. As the focal point for GOARN activities in Japan, the

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GIC supports outbreak preparedness and response by delivering GOARN trainings, facilitating the use of outbreak intelligence, coordinating deployments of experts during public health emergencies, and working closely with WHO and other international partners. The GIC also provides localized access to GOARN resources through a dedicated Japanese-language website.[6]

Strengthening the emergency workforce through training and capacity-building

In response to lessons identified from the 2014 outbreak of Ebola virus disease in West Africa and the 2015 outbreak of Middle East respiratory syndrome in Republic of Korea, the Government of Japan identified the need to further strengthen both domestic and global response capabilities for threats from infectious diseases. Japan developed a comprehensive action plan to enhance its surveillance, coordination and rapid response capacities as part of its contribution to global health security.

Since 2019, the NCGM, a designated WHO Collaborating Centre for Prevention, Preparedness and Response to Emerging Infectious Diseases, has participated in and delivered GOARN's multitiered training programme,[7] in addition to contributing more broadly to global health security and outbreak responses. In close collaboration with WHO headquarters, the WHO Regional Office for the Western Pacific and other GOARN partners, the NCGM has organized six annual sessions of the Tier 1.5 training, introduction to international outbreak response, for 175 Japanese and other regional public health experts since 2019. This intermediate-level training, bridging Tier 1 and Tier 2, emphasizes a multidisciplinary approach to deployments and team-based coordination across specialties, such as epidemiology, laboratory diagnostics, clinical case management, and infection prevention and control. It also strengthens communication, teamwork and problem-solving skills through interactive workshops, preparing both Japanese and other regional experts for deployments during international outbreaks.[8]

The NCGM identified staff to participate in and be trainers for GOARN's Tier 2 training, which uses an outbreak response scenario, held in New Delhi, India, in 2022. This intensive course is designed to simulate the conditions encountered during deployments for international outbreaks, providing a safe environment for multidisciplinary teams to apply their technical knowledge while adapting to the complex realities of responding to outbreaks in unfamiliar settings.[9]

Box 1. **GOARN partners in Japan**

1. Association of Medical Doctors of Asia
2. Hokkaido University
3. Hyogo Medical University
4. Japan International Cooperation Agency
5. Japanese Red Cross Wakayama Medical Center
6. Kurume University
7. Mie National University
8. Ministry of Health, Labour and Welfare
9. Nagasaki University
10. Nara Medical University
11. National Center for Global Health and Medicine
12. National Institute of Infectious Diseases
13. Niigata University
14. Osaka Metropolitan University
15. Saint Mary's Hospital
16. Tohoku University
17. Toshima Hospital
18. University of Osaka
19. University of Tokyo

Outbreak response leaders from several Japanese GOARN partner institutions have also participated in the Tier 3 training, designed to address leadership during outbreaks, including in the inaugural training in Berlin, Germany, and the first women-focused leadership course in Darwin, Australia.

To ensure the continuity and sustainability of training efforts, 14 Japanese experts have been trained as trainers, contributing to both domestic and international GOARN capacity-building activities. Japan has also deployed these trainers to support GOARN training workshops organized by partner institutions in other countries.

To further strengthen the engagement of Japanese GOARN partners, the NCGM, with support from the Ministry of Health, Labour and Welfare, convened two meetings of national GOARN focal points in November 2022 and November 2023. These meetings facilitated the exchange of information about deployment experiences, coordination mechanisms and institutional readiness, and reinforced Japan's commitment to strengthening its role in responses to global outbreaks through GOARN.[10]

Facilitating deployments through a national roster

From 28 January 2020 to 12 May 2025, GOARN partners in Japan submitted 147 offers of assistance, resulting in the deployment of 50 individuals to 16 operations across 15 countries. In collaboration with the Ministry of Health, Labour and Welfare, the NCGM established a streamlined process for mobilizing Japanese experts in response to GOARN requests, using the Japan GOARN roster mailing list. This roster includes more than 200 experts available for rapid deployment. The initiative has also strengthened collaboration among Japanese institutions, thereby enhancing national capacity to contribute to responses to global health emergencies.

As the threat of future pandemics persists, GOARN partners in Japan remain committed to strengthening outbreak response capacity – domestically, regionally and globally – through sustained collaboration, capacity development and rapid deployment mechanisms. By serving as active members of GOARN, Japanese partners bridge global needs with their national expertise, exemplifying how strategic national engagement can enhance global health security. Looking ahead, continued investment in workforce development, cross-border collaboration and systems for rapid responses will be essential to building a safer and more resilient future for global health.

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Conflicts of interest

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Ethics statement

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Twenty-four years of response: an analysis of Global Outbreak Alert and Response Network deployments to and from the WHO Western Pacific Region

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Since its inception in April 2000, the Global Outbreak Alert and Response Network has played a pivotal role in coordinating the rapid deployment of technical experts to support countries, when requested, during public health emergencies. This paper presents a regional analysis of the Network's deployments within, to and from the World Health Organization Western Pacific Region over the past 24 years. The findings emphasize the critical importance of a well coordinated surge workforce and advocate for enhanced partner engagement with strategic utilization of regional and global expertise to strengthen future outbreak responses.

The Global Outbreak Alert and Response Network (GOARN) was established on 28 April 2000 as a mechanism for partners and networks around the world to provide surge support to national health authorities responding to public health emergencies. By coordinating technical expertise and resources from over 310 partners worldwide, GOARN plays an instrumental role in strengthening national responses to outbreaks of infectious diseases and other public health emergencies. GOARN's partners include ministries of health, national public health institutes, medical and surveillance networks, academic institutions, United Nations organizations, nongovernmental organizations (NGOs) and others. GOARN's operational coordination is provided by the Operational Support Team (OST) at the World Health Organization (WHO) headquarters and by the six WHO regional offices where technical leads work collaboratively with partners to mobilize experts and resources.[1–3]

This is the first time that GOARN's role in supporting operational responses, both to and from the WHO Western Pacific Region, has been described and covers the period from 28 April 2000 to 31 December 2024.

CONTEXT

GOARN comprises more than 310 partners from a wide range of institutions globally, all with a capacity to contribute resources to support countries in managing infectious disease outbreaks or public health emergencies.[2] When a significant outbreak or public health emergency is suspected or identified, an alert is triggered by WHO, Member States or other health partners. Alerts are typically generated for infectious diseases with a high potential for rapid spread or substantive international health risks and major natural disasters. On detection of a health emergency, the affected country, area or territory, in consultation with WHO, assesses the situation and determines the need for specialized technical assistance. Depending on the nature of the event, the expertise provided may include epidemiologists, clinicians, laboratory scientists, infection prevention and control specialists, veterinarians, communication specialists and

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other public health professionals. The number of experts and type of technical expertise requested vary according to the nature of the threat. Based on the assessment, a request for assistance (RFA) is drafted and circulated via the online GOARN Knowledge Platform through the designated focal point(s) from the partner institution. The RFA includes known details of the outbreak or event, the specific technical expertise required and the urgency and anticipated duration of the deployment.[1]

Each GOARN partner's designated focal point is responsible for acting as a liaison between the GOARN OST and their institution. The focal point plays a key role in identifying potential experts for deployment, aligning their skills with the specific needs of the response and submitting offers of deployment through the GOARN Knowledge Platform.[1] Once an expert is selected, the onboarding process commences to rapidly deploy the individual to the requesting country.[1]

The deployment process is meticulously managed through WHO to ensure that the expert arrives with the appropriate tools, resources and knowledge to effectively respond to the public health emergency. WHO regional offices, along with country offices, facilitate the pre- and post-departure briefing of experts. Deployment duration varies depending on the nature of the response, with experts typically remaining in-country for approximately 4–6 weeks, or sometimes longer, as needed.[4]

GOARN partners have two primary responsibilities in supporting expert deployments. First, they are responsible for maintaining the deployed expert's salary throughout the duration of the deployment. Second, to enable the deployed expert to concentrate fully on the response without the burden of their regular duties, partners are expected to arrange cover for the expert's responsibilities within their home institution.[1]

The deployed expert collaborates closely with the WHO Incident Management Team and national health authorities, providing support for response activities in accordance with the terms of reference. These activities may include enhancing surveillance, case management, laboratory diagnostics and the implementation of effective public health interventions.[5]

GOARN's ability to quickly mobilize experts is crucial for controlling disease spread and minimizing the impact of health threats and provides a global mechanism for rapid collaborative responses to public health emergencies. As the outbreak or emergency is brought under control, the need for expert deployments often decreases. However, some experts may remain involved in long-term recovery efforts, such as for capacity-building, post-outbreak training and the strengthening of local health systems.

Between 2000 and 2024, GOARN facilitated the deployment of 3635 experts to 184 operations in 118 countries, areas and territories across all WHO regions, contributing approximately 121 000 person-days.

The WHO Western Pacific Region, home to approximately 1.9 billion people, is spread across 37 countries and areas (before May 2025).[6] It is characterized by vast cultural and geographical diversity, as well as a heightened vulnerability to natural disasters and disease outbreaks. As of 31 December 2024, the WHO Western Pacific Region has 77 GOARN partners, representing colleges, governmental departments and agencies, hospitals, public health and technical institutions, networks and universities[2] (**Table 1**). There has been substantial growth in the number of partners since the Network's inception (**Fig. 1**). This report describes GOARN deployments associated with the Western Pacific.

METHODS

Data were extracted from the GOARN Knowledge Platform,[2] an internal database that captures operational information on GOARN-supported outbreak response missions. The platform records data related to individual deployments, institutions, countries and associated technical and operational details. All outbreak response operations that triggered GOARN activation between 28 April 2000 and 31 December 2024 were included in the analysis.

Extracted variables included response operation details such as the date of activation, countries involved and the disease or event type. Deployment records were reviewed for dates of deployment, duration and technical expertise provided. Partner data included the name and type of organization (for example, academic institution, public health institute or NGO). Country-level data included the recipient country and duty station location. Where individual-level variables were missing or incomplete, such

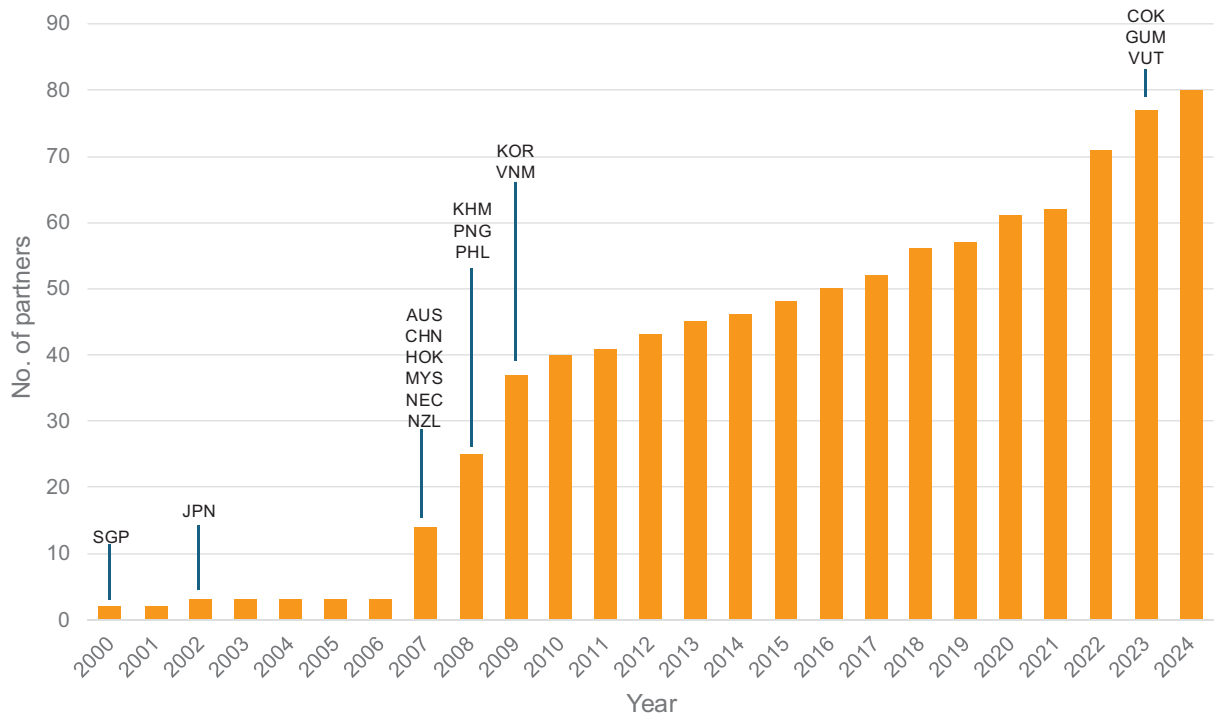
Table 1. **List of GOARN partners in the WHO Western Pacific Region by country and area, as of 31 December 2024 (*N* = 77)**

Australia (24)
1. Asia Pacific Consortium of Veterinary Epidemiology
2. Australasian College for Infection Prevention and Control
3. Australian National Centre for Immunization Research and Surveillance
4. Burnet Institute for Medical Research and Public Health
5. Clinical Excellence Commission, NSW Health
6. Collaborative for the Advancement of Infection Prevention and Control
7. College of Public Health, Medical and Veterinary Sciences, James Cook University
8. CSIRO Australian Centre for Disease Preparedness
9. Doctors Without Borders – Australia
10. Health Emergency Branch, Department of Health and Aged Care
11. Hunter New England Health
12. Indo-Pacific Centre for Health Security, Department of Foreign Affairs and Trade
13. Institute for Glycomics, Griffith University, Gold Coast Campus
14. National Centre for Epidemiology and Population Health, The Australian National University
15. National Critical Care and Trauma Response Centre
16. PathWest Laboratory Medicine
17. Queensland Infection Prevention and Control Unit, Queensland Health
18. School of Population Health, UNSW Medicine
19. The Peter Doherty Institute for Infection and Immunity
20. The University of New South Wales, Sydney
21. The University of Newcastle
22. The University of Western Australia
23. University of Sydney Institute for Infectious Diseases
24. Westmead Hospital
Cambodia (1)
25. Pasteur Institute, Cambodia
China (3)
26. Chinese Center for Disease Control and Prevention
27. Guangdong Provincial Center for Disease Control and Prevention
28. Pasteur Institute of Shanghai, Chinese Academy of Sciences
China, Hong Kong Special Administrative Region (3)
29. Centre for Health Protection, Department of Health
30. The Chinese University of Hong Kong
31. University of Hong Kong
Cook Islands (1)
32. Public Health Directorate of the Ministry of Health
Guam (1)
33. Guam Department of Public Health and Social Services
Japan (17)
34. Association of Medical Doctors of Asia
35. Center for Infectious Diseases, Nara Medical University
36. Department of Public Health, Osaka Metropolitan University Graduate School of Medicine
37. Department of Virology, Tohoku University, School of Medicine

Japan (17)
38. Division of Infectious Disease Prevention and Control, Ministry of Health, Labour and Welfare
39. Hokkaido University Research Center for Zoonosis Control
40. Institute of Tropical Medicine, Nagasaki University
41. Japan Disaster Relief Team, Japan International Cooperation Agency
42. Japanese Red Cross Wakayama Medical Center
43. Kurume University
44. Mie National Hospital
45. National Center for Global Health and Medicine
46. National Institute of Infectious Diseases
47. Osaka University
48. Our Lady of Snow Medical Juridical Corporation St. Mary's Hospital
49. Research Institute of Nursing Care for People and Community, University of Hyogo
50. School of Medicine, Niigata University
Malaysia (2)
51. Epidemiology Intelligence Program
52. Institute of Health and Community Medicine, Universiti Malaysia Sarawak
New Caledonia (2)
53. Pasteur Institute, New Caledonia
54. Secretariat of the Pacific Community
New Zealand (1)
55. Institute of Environmental Science and Research Limited
Papua New Guinea (2)
56. Field Epidemiology Training Programme
57. Papua New Guinea Institute of Medical Research
Philippines (3)
58. Association of Asia Pacific Operational Research Societies
59. Epidemiology Bureau, Department of Health
60. WHO Regional Office for the Western Pacific
Republic of Korea (3)
61. JW LEE Center for Global Medicine, Seoul National University College of Medicine
62. Korea Disease Control and Prevention Agency
63. National Medical Centre
Singapore (6)
64. Ministry of Health
65. National Centre for Infectious Diseases
66. National University of Singapore
67. Program in Emerging Infectious Diseases, Duke-NUS Graduate Medical School
68. Singapore General Hospital
69. Tan Tock Seng Hospital
Vanuatu (1)
70. The Ministry of Health Surveillance, Research and Emergency Response Unit
Viet Nam (7)
71. Cho Ray Hospital, Ho Chi Minh City
72. Clinical Research Unit, Hospital for Tropical Diseases, Ha Noi
73. National Institute of Hygiene and Epidemiology, Ha Noi

Viet Nam (7)
74. National Institute of Malariology, Parasitology and Entomology
75. Pasteur Institute, Ho Chi Minh City
76. Pasteur Institute, Nha Trang
77. Tay Nguyen Institute of Hygiene and Epidemiology

Fig. 1. **Cumulative number of GOARN partners in the WHO Western Pacific Region by year, as of 31 December 2024**



AUS: Australia; CHN: China; COK: Cook Islands; GUM: Guam; HOK: Hong Kong Special Administrative Region, China; JPN: Japan; KHM: Cambodia; KOR: Republic of Korea; MYS: Malaysia; NEC: New Caledonia; NZL: New Zealand; PHL: Philippines; PNG: Papua New Guinea; SGP: Singapore; VNM: Viet Nam; VUT: Vanuatu.

Countries are shown according to the year their first partner joined the GOARN.

as gender, missing fields were noted but not imputed. In instances where duplicate records were identified, for example, due to overlapping deployments, manual validation was conducted to ensure accuracy and resolve inconsistencies. Data cleaning and basic descriptive analyses, including calculations of counts and medians, were performed using Microsoft Excel® (Microsoft Corporation, Redmond, WA, United States of America).

RESULTS

Since 2003, GOARN has deployed experts almost annually to support 18 operations within the Western Pacific Region. These responses have addressed a range of infectious disease outbreaks including severe acute respiratory syndrome (SARS), avian influenza A(H5N1), meningitis, cholera, leptospirosis, *Vibrio vulnificus*, poliomyelitis, dengue, *Acinetobacter baumannii*, measles, Zika virus disease and COVID-19,[7] as well as emergencies triggered by natural hazards such as cyclones and typhoons (**Fig. 2**).

As of 31 December 2024, through the GOARN mechanism, 349 individuals conducted 408 missions to, from or within the WHO Western Pacific Region. The greatest number of deployments was for the COVID-19 response (n = 89),[3] followed by SARS (n = 78) and the West Africa Ebola outbreak (n = 54). Of the 349 individuals,

Table 2. **Number of individual deployments by country/area and direction of deployment, 2000–2024**

Country or area	Within Western Pacific	From Western Pacific to other regions	To Western Pacific from other regions	Total
Australia	55	40	–	95
Japan	13	34	–	47
Philippines	24	15	–	39
United States of America[a]	–	–	39	39
Switzerland[a]	–	–	29	29
Singapore	10	16	–	26
France[a]	–	–	24	24
United Kingdom of Great Britain and Northern Ireland[a]	–	–	19	19
Sweden[a]	–	–	16	16
Germany[a]	–	–	14	14
Canada[a]	–	–	13	13
Malaysia	1	11	–	12
Belgium[a]	–	–	7	7
China	2	4	–	6
Bangladesh[a]	–	–	4	4
Denmark[a]	–	–	3	3
Norway[a]	–	–	3	3
Italy[a]	–	–	2	2
Netherlands[a]	–	-	2	2
Nigeria[a]	–	–	2	2
Russian Federation[a]	–	–	2	2
China, Hong Kong Special Administrative Region	1	–	–	1
Egypt[a]	–	–	1	1
Jordan[a]	–	–	1	1
Spain[a]	–	–	1	1
Total	**106**	**120**	**182**	**408**

[a] Countries, areas or territories outside of the WHO Western Pacific Region.

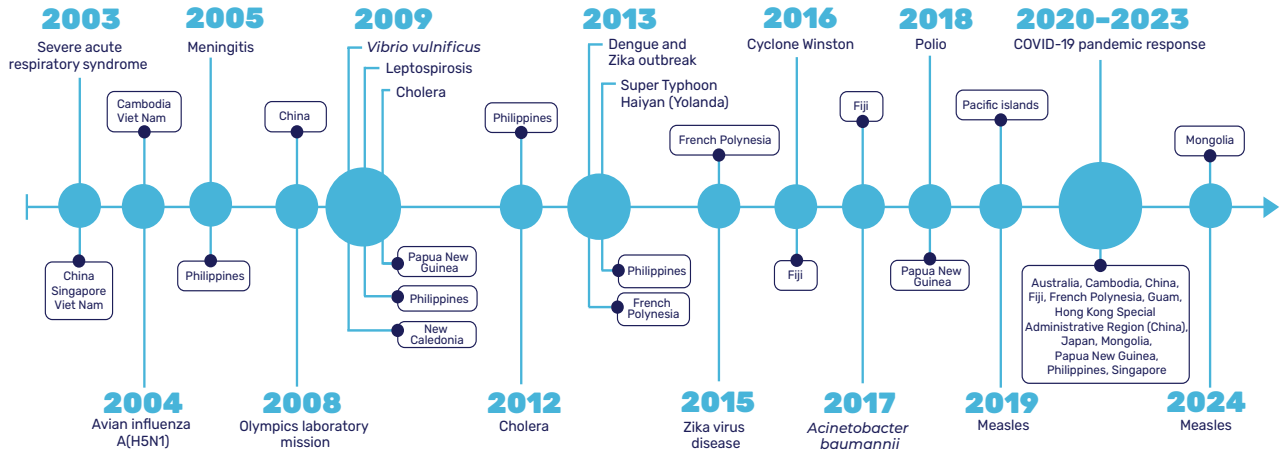
40 participated in more than one deployment; the greatest number of deployments by a single individual was six.

There were 106 deployments within the Western Pacific Region, 120 deployments from the Western Pacific Region to other regions and 182 deployments from other regions to the Western Pacific Region. The largest number of deployments from other regions to the Western Pacific Region was in support of the SARS response (n = 56) and the COVID-19 response (n = 47). A significant number of deployments (n = 54) from the Region to other regions supported the West Africa Ebola outbreak response.

A total of 25 countries, areas and territories contributed to deploying individuals through GOARN to and from the Region, including six from the Region itself. Australia contributed the highest number of experts, with 95 deployments, followed by Japan (n = 47) and the Philippines (n = 39). Notably, the deployments from the Philippines were from within the WHO Regional Office for the Western Pacific (**Table 2**).

Of the 41 countries that received experts, the countries from within the Western Pacific Region that received the greatest number of deployments were the Philippines (n = 73), followed by China (n = 65),

Fig. 2. **Timeline of GOARN-supported operations in the WHO Western Pacific Region, 2003–2024**



Circles represent one or more GOARN-supported events in the Western Pacific Region, with circle size reflecting the number of individuals deployed. Text boxes indicate the countries and areas where support was provided.

Viet Nam (n = 63), Papua New Guinea (n = 42) and Fiji (n = 13) (**Table 3**).

A total of 64 partners were involved in the 408 Region-associated deployments. GOARN partners that deployed the greatest number of individuals included the WHO Regional Office for the Western Pacific (n = 39), the United States Centers for Disease Control and Prevention (n = 38) and the Australian Response MAE (Master of Applied Epidemiology) Network (n = 30) (**Table 4**).

Of the 408 deployments, the most requested technical expertise was epidemiology and surveillance (n = 204), followed by technical laboratory assistance (n = 53). The number and type of technical expertise deployed by GOARN partners by geographic location is shown in **Fig. 3**.

GOARN experts supported 40 operations ranging from infectious disease outbreaks to natural disasters. Of the 408 deployments, 106 (26%) were deployed within the Western Pacific Region, 120 (30%) were deployed from the Western Pacific Region to other regions, and 182 (45%) came from other regions to support responses within the Western Pacific Region (**Table 5**).

The median length of deployment was 27 days, with half of all assignments ranging between 16 and 42 days. The COVID-19 pandemic operation recorded the longest deployments, with one expert deployed to Papua New Guinea for 191 days, followed by the Philippines for 133 days and Fiji for 121 days. In addition, one expert provided remote technical support to an in-person team during this period.[4]

DISCUSSION

The findings emphasize GOARN's critical role in strengthening outbreak response capabilities through timely technical surge support. Deployments addressed a wide array of public health emergencies from emerging infectious diseases such as SARS, Zika and COVID-19 to recurrent threats like dengue and measles. This breadth of activity highlights the adaptability and reach of the GOARN mechanism in supporting not only acute responses but also, where needed, post-emergency recovery and capacity-building efforts.

The involvement of Western Pacific Region partners in deployments beyond their own region highlights GOARN's dual function as both a responder to local emergencies and a contributor to global health security. Countries, such as Australia and Japan, have consistently supported international operations, underscoring the value of cross-regional collaboration and shared responsibility in addressing global public health threats.

The predominance of deployments for epidemiology and surveillance assistance reflects the need for timely detection, case investigation and outbreak monitoring. However, the comparatively lower number

Table 3. **Global GOARN deployments by receiving country or area, 2000–2024**

Receiving country or area	Within Western Pacific	From Western Pacific to other regions	To Western Pacific from other regions	Total
Philippines	24	–	49	73
China	19	–	46	65
Viet Nam	18	–	45	63
Papua New Guinea	23	1	18	42
Sierra Leone	–	33	–	33
Liberia	–	20	–	20
Fiji	7		6	13
Bangladesh	–	12	–	12
Indonesia	–	12	–	12
Uganda	–	8	–	8
Cambodia	–	–	6	6
Singapore	2	–	3	5
Switzerland	–	5	–	5
Angola	–	4	–	4
French Polynesia	–	–	4	4
Micronesia (Federated States of)	4	–	–	4
New Caledonia	1	–	3	4
India	–	3	–	3
Nigeria	–	3	–	3
Kiribati	2	–	–	2
Marshall Islands	2	–	–	2
Mexico	–	2	–	2
Mongolia	2	–	–	2
Sri Lanka	–	2	–	2
Timor-Leste	–	2	–	2
Tonga	2	–	–	2
Egypt	–	1	–	1
Eswatini	–	1	–	1
Haiti	–	1	–	1
Malaysia	–	–	1	1
Northern Mariana Islands (Commonwealth of the)	–	–	1	1
Pacific islands	–	1	–	1
Poland	–	1	–	1
Republic of Moldova	–	1	–	1
Sao Tome and Principe	–	1	–	1
South Africa	–	1	–	1
South Sudan	–	1	–	1
Switzerland	–	1	–	1
United Arab Emirates	–	1	–	1
Yemen	–	1	–	1
Zimbabwe	–	1	–	1
Total	**106**	**120**	**182**	**408**

Table 4. **Number of individuals deployed to, from or within the Western Pacific Region by GOARN partner, 2000–2024**

Deploying GOARN partner	No. of individuals
WHO Regional Office for the Western Pacific	39
United States Centers for Disease Control and Prevention	38
ARM Network (Australian Response MAE Network)	30
National Institute of Infectious Diseases, Japan	26
GOARN Secretariat, Switzerland	24
National Centre for Epidemiology and Population Health, The Australian National University	15
Division of Tuberculosis and Infectious Disease Control, Ministry of Health, Labour and Welfare, Japan	14
National University of Singapore	14
Robert Koch Institute, Germany	14
Public Health Agency of Canada	13
Hunter New England Health, Australia	12
Santé publique, France	12
Institute of Health and Community Medicine, Universiti Malaysia Sarawak, Malaysia	10
United Kingdom Health Security Agency, United Kingdom of Great Britain and Northern Ireland	10
Burnet Institute for Medical Research and Public Health, Australia	9
United Kingdom Public Health Rapid Support Team, United Kingdom of Great Britain and Northern Ireland	8
European Centre for Disease Prevention and Control	7
Chinese Center for Disease Control and Prevention	6
European Programme for Intervention Epidemiology Training	6
Médecins Sans Frontières – International Office	6
Ministry of Health, Singapore	6
Australasian College for Infection Prevention and Control	5
EPIET Alumni Network	5
Faculty of Health Sciences, Curtin University of Technology, Australia	5
International Centre for Diarrhoeal Disease Research, Bangladesh	4
National Center for Global Health and Medicine, Japan	4
National Centre for Infectious Diseases, Singapore	4
The University of Newcastle, Australia	4
Department of Virology, Tohoku University School of Medicine, Japan	3
Doherty Institute, Australia	3
EPITER: Association pour le développement de l'épidémiologie de terrain, France	3
Norwegian Institute of Public Health	3
Public Health Agency of Sweden	3
WHO WHE Operations Support and Logistics	3
Epidemiology Intelligence Program, Malaysia	2
Health Emergency Branch, Department of Health and Aged Care, Australia	2
Indo-Pacific Centre for Health Security, Department of Foreign Affairs and Trade, Australia	2
National Critical Care and Trauma Response Centre, Australia	2
Pasteur Institute, Cambodia	2
Rospotrebnadzor, Russian Federation	2
The University of New South Wales, Australia	2
Westmead Hospital, Australia	2
WHO Regional Office for Europe	2

Deploying GOARN partner	No. of individuals
World Organization for Animal Health	2
Association of Medical Doctors of Asia, Japan	1
Australian National Centre for Immunization Research and Surveillance	1
Eastern Mediterranean Public Health Network	1
Emerging and Dangerous Pathogens Laboratory Network	1
Erasmus University Medical Center, Netherlands	1
Federal University Oye Ekiti, Nigeria	1
Global Infection Prevention and Control Network	1
Instituto de Salud Carlos III, Spain	1
Istituto Superiore di Sanita, Italy	1
London School of Hygiene and Tropical Medicine, United Kingdom of Great Britain and Northern Ireland	1
Médecins Sans Frontières, Belgium	1
National Institute for Public Health and the Environment, Netherlands	1
Nigeria Centre for Disease Control, Nigeria	1
Queensland Infection Prevention and Control Unit, Australia	1
Statens Serum Institut, Denmark	1
Tan Tock Seng Hospital, Singapore	1
United Nations Food and Agriculture Organization	1
University of Hong Kong, Hong Kong Special Administrative Region, China	1
University of Nebraska Medical Center, United States of America	1
WHO Regional Office for the Eastern Mediterranean	1
Total	**408**

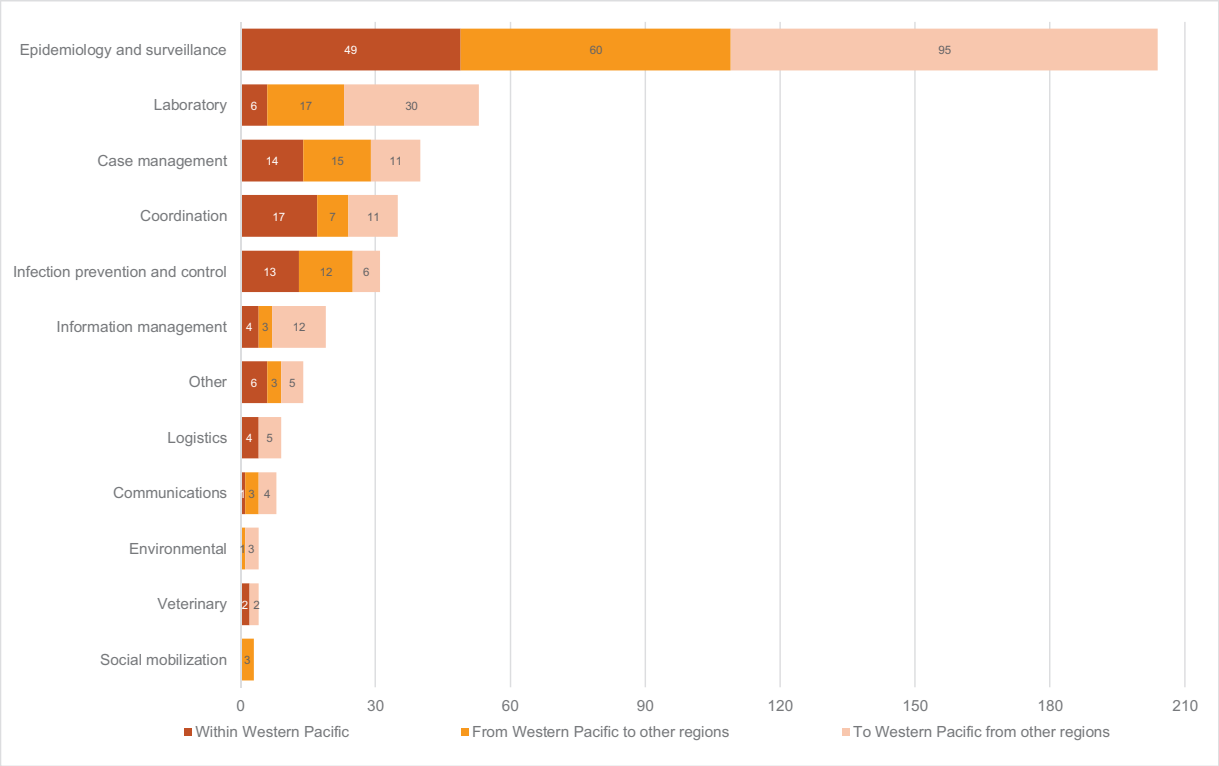
GOARN: Global Outbreak Alert and Response Network; MAE: Master of Applied Epidemiology; WHE: WHO Health Emergencies Programme; WHO: World Health Organization.

of deployments in other important areas, such as risk communication, logistics and coordination, suggests opportunities to further strengthen multidisciplinary surge capacities across the Network. The recurring involvement of key institutions – such as the WHO Regional Office for the Western Pacific, the United States Centers for Disease Control and Prevention and the Australian Response MAE Network – demonstrates the importance of sustained engagement by a core group of active and reliable partners. Continued investment in the readiness of all GOARN partners, especially those less frequently involved, could help expand the pool of deployable expertise and enhance the Network's flexibility.

Operationally, several challenges persist, including aligning expert availability with the rapidly changing demands of outbreak contexts, navigating complex cross-border logistical requirements and sustaining voluntary contributions from partner institutions. GOARN's model, which relies on partners to maintain deployed staff salaries and backfill their roles, has been key to its function but raises questions about sustainability, especially during large-scale or prolonged responses. Strengthening institutional agreements, investing in rapid deployment mechanisms and leveraging resources, such as WHO collaborating centres, may help improve the predictability and scalability of future mobilizations.

The lack of gender-disaggregated data limits any analysis of equity in deployment participation. As gender equity becomes an increasingly important component of the global health workforce agenda, future data systems should include demographic indicators to support more inclusive monitoring and reporting. This will be essential for fostering greater diversity, ensuring equal participation and promoting equity within GOARN's deployments.

Fig. 3. **Number and type of technical expertise deployed by GOARN partners by geographical location, as of 31 December 2024**



Limitations

This analysis has several limitations. First, the completeness and consistency of deployment records may vary over time, particularly in the earlier years of GOARN's operations, potentially affecting the accuracy of trend analysis. The analysis does not assess the direct impact of deployments; however, there are published reports on health outcomes and system capacity strengthening.[8] Contextual factors influencing deployments, such as political or logistical constraints, were not systematically captured. Additionally, gender-disaggregated data were not available, limiting the ability to assess gender representation among deployed experts. Finally, informal or undocumented contributions may not be reflected, leading to the potential underestimation of the full scope of GOARN's utilization in the Region.

Conclusion

Over the past 24 years, GOARN's work in the WHO Western Pacific Region has exemplified the power of coordinated international collaboration in responding to infectious disease outbreaks. The analysis showed that GOARN has successfully established a vast international infrastructure of partners, capable of rapid, collaborative action during public health emergencies. This infrastructure has proven highly effective – demonstrated by the number, diversity and growth of deployments, alongside an exponential increase in participating partners over time.

As a core partner of the Global Health Emergency Corps, GOARN plays a pivotal role in shaping a more agile, interoperable and prepared global response architecture. Its experience in the Region offers valuable lessons for strengthening global emergency

Table 5. **Number of individuals deployed by operation involving the Western Pacific Region, categorized by deployment origin, as of 31 December 2024**

Year	Operation	Within Western Pacific	Western Pacific to other regions	Other regions to Western Pacific	Total
2000	Ebola haemorrhagic fever, Uganda	–	8	–	8
2003	Severe acute respiratory syndrome, China, Singapore, Viet Nam	22	–	56	78
2004	Avian influenza A(H5N1), Viet Nam	11	–	19	30
2004	Tsunami, India, Indonesia	–	11	–	11
2004	Avian influenza A(H5N1), Cambodia	–	–	3	3
2004	Avian influenza A(H5N1), Indonesia	–	2	–	2
2004	Nipah, Bangladesh	–	2	–	2
2005	Meningitis, Philippines	3	–	6	9
2005	Marburg virus international outbreak response, Angola	–	4	–	4
2005	Dengue haemorrhagic fever, Timor-Leste	–	2	–	2
2005	Myocarditis, Sri Lanka	–	2	–	2
2006	Avian influenza: coordination of response operations, Indonesia	–	1	–	1
2008	Olympics laboratory mission, China	1	–	3	4
2008	Cholera and anthrax outbreak, Zimbabwe	–	1	–	1
2009	Cholera outbreak, Papua New Guinea	1	–	8	9
2009	Pandemic influenza A(H1N1) investigation and response, multicountry	–	6	–	6
2009	Leptospirosis outbreak, Philippines	2	–	3	5
2009	*Vibrio vulnificus*, New Caledonia	1	–	3	4
2010	Cholera outbreak, Haiti	–	1	–	1
2012	Cholera outbreak, Philippines	–	–	2	2
2013	Disaster and conflict response mission, Philippines	13	–	24	37
2013	Dengue and Zika outbreak, French Polynesia	–	–	1	1
2013	Middle East respiratory syndrome, Eastern Mediterranean	–	1	–	1
2014	Ebola outbreak, West Africa	–	54	–	54
2014	Cholera outbreak, South Sudan	–	1	–	1
2015	Zika virus disease, multiple locations	–	–	2	2
2016	Cyclone Winston, Fiji	5	–	1	6
2017	Rohingya crisis (protracted emergency), Bangladesh	–	10	–	10
2017	*Acinetobacter baumannii*, Fiji	2	–	1	3
2018	Poliomyelitis, Papua New Guinea	2	1	1	4
2018	Lassa fever, Nigeria	–	2	–	2
2018	Ebola virus disease preparedness and readiness, Democratic Republic of the Congo	–	1	–	1
2018	Listeriosis, South Africa	–	1	–	1
2019	Measles, Pacific island countries and areas	2	1	2	5
2019	Cholera outbreak, Yemen	–	1	–	1

Year	Operation	Within Western Pacific	Western Pacific to other regions	Other regions to Western Pacific	Total
2019	Lassa fever, Nigeria	–	1	–	1
2021	COVID-19 global response	39	2	47	88
2021	COVID-19 vaccination response, African Region	–	1	–	1
2022	Ukraine emergency	–	2	–	2
2022	Dengue fever, Sao Tome and Principe	–	1	–	1
2024	Measles, Mongolia	2	–	–	2
	Total	**106**	**120**	**182**	**408**

preparedness, underscoring the importance of trusted partnerships, standardized mechanisms and strong technical coordination.

In an increasingly interconnected world, GOARN is well positioned to continue enabling timely, effective and equitable outbreak responses across regions.

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Conflicts of interest

SS is an associate editor of the *Western Pacific Surveillance and Response* journal. She had no role in the editorial decision to publish this article. The other authors have no conflicts of interest to declare.

Ethics statement

Formal ethical approval was not sought as research was not undertaken.

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