

2024

# **AMR Preparedness Index Progress Report**

Measuring Government Action on AMR Policy



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# List of Definitions

**AMR** Antimicrobial resistance

**AMU** Antimicrobial usage

**APIs** Active pharmaceutical ingredients

**BARDA** Biomedical Advanced Research and Development Authority

**CARB-X** Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator

**CDC** Centers for Disease Control and Prevention

**FAO** Food and Agriculture Organization

**GDP** Gross domestic product

**GLASS** Global antimicrobial resistance and use surveillance system

**GMPs** Good manufacturing practices

**GPs** General practitioners

**HAI** Hospital-acquired infection or healthcare-associated infection

**HCPs** Healthcare professionals

**HICs** High-income countries

**HTA** Health technology assessment

**IAPO** International Alliance of Patient Organizations

**IDSA** Infectious Diseases Society of America

**IMI** Innovative Medicines Initiative

**IPC** Infection prevention and control

**JPIAMR** Joint Programming Initiative on Antimicrobial Resistance

**LMICs** Low- and middle-income countries

**NAPs** National action plans

**NHSN AUR Module** National Healthcare Safety Network Antibiotic Use and Resistance Module, US

**NIAID** National Institute of Allergy and Infectious Diseases, US

**NIH** National Institutes of Health, US

**One Health approach** An approach that recognizes the connections between the health of people, animals, and the environment and that uses cross-sectoral engagement and communication for the design and implementation of policies to improve public health outcomes<sup>1</sup>

**OTC** Over-the-counter

**PNECs** Predicted no-effect concentrations

**Pull incentives** Financial incentives that reward drug development<sup>2</sup>

**Push incentives** Financial incentives that lower the cost of drug development<sup>3</sup>

**SPIDAAR** Surveillance Partnership to Improve Data for Action on Antimicrobial Resistance

**UN** United Nations

**UNGA** United Nations General Assembly

**WASH** Water, sanitation, and hygiene

**WHA** World Health Assembly

**WHO** World Health Organization

**WOAH** World Organization for Animal Health

# Introductory Letter from GCOA and IDSA

The world's largest economies have an important role to play in addressing antimicrobial resistance (AMR), which has accelerated its forward march over the course of the COVID-19 pandemic. AMR refers to the ability of microorganisms to adapt to treatments in such a way as to make them less effective.

As resistance grows, many of the standard infectious disease treatments that have been used for decades no longer work, allowing for diseases to persist and spread. Put simply, the world is losing its antibiotics. And without antibiotics, C-sections, organ transplants, chemotherapy, and even routine outpatient procedures become potentially life-threatening events.

In 2021, the Global Coalition on Aging (GCOA) and the Infectious Disease Society of America (IDSA) released the inaugural *AMR Preparedness Index*, which compiled research, data, surveys, and one-on-one interviews with cross-sectoral experts across eleven of the world's largest economies to provide an assessment of national-level actions to address AMR and create benchmarks to measure progress in the areas that matter most to combatting it.

As we prepare for the next High-level Meeting on AMR at the United Nations General Assembly in September 2024, the *2024 AMR Preparedness Index Progress Report* provides an important "mid-stream" snapshot to allow countries to evaluate their progress against the calls to action included in the *2021 Index*. In this *2024 Progress Report*, we review global progress up to October 2023 on five key areas of AMR action—national strategy, innovation, access, appropriate and responsible use, and AMR and the environment.

We measure our eleven countries' progress on 2021 calls to action in each of these areas and consider where each government currently stands through eleven country reports. All of this information is complemented by case studies from other countries where we see real progress on AMR being made.

AMR is a complex global issue that affects both human and animal health. Addressing this threat will require a coordinated effort involving healthcare providers, policymakers, researchers, and private sector leaders, innovators, and investors, as well as the agricultural and veterinary sectors. We must all collaborate to promote responsible use of antimicrobials, invest in research for new drugs, and implement effective infection prevention and control measures.

We hope that this *2024 Progress Report* will help bring renewed attention to the issue of AMR and strengthens commitment toward actions needed to ensure healthy longevity and a more equitable future.



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President, Infectious Diseases Society of America



**Mike Hodin, PhD**  
CEO, Global Coalition on Aging

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# Overview of Findings

## Current Global Policy Landscape

Since the publication of the *2021 AMR Preparedness Index*, momentum continues to grow for action on AMR globally. However, despite increased attention from global policymakers and some advances, experts agree that additional concrete actions and investments are necessary to effectively combat AMR.<sup>4</sup> At the upcoming UNGA 2024 High-level Meeting on AMR, government leaders will have the opportunity to review progress and gaps, discuss effective approaches and lessons learned, and to commit to new, clear targets and practical steps to continue to address AMR globally.<sup>5</sup>

The lead up to the UNGA 2024 High-Level Meeting on AMR is already underway. In 2022, the Global Leaders Group (GLG) co-chairs hosted a UNGA side event on AMR.<sup>6</sup> This meeting highlighted the urgency of the issue, how AMR is undermining the achievement of the UN Sustainable Development Goals, and the need to work together across sectors to ensure that adequate funding and resources exist to tackle AMR.

AMR has also been discussed at fora for the world's largest economies. The Group of Seven (G7) took up AMR as a key issue in 2019,<sup>7</sup> 2021,<sup>8</sup> 2022,<sup>9</sup> and 2023,<sup>10</sup> and it is expected to remain a key topic during Italy's 2024 G7 Presidency. Discussions in the G7 have shifted focus on gap analyses of current efforts, support for the development and equitable access of new antimicrobials through push and pull incentives,<sup>11</sup> and the importance of utilizing a One Health approach to address AMR.<sup>12</sup> The Group of

Twenty (G20) has also championed AMR through the years, with Germany using the occasion of the G20 to establish the Global AMR R&D Hub in 2018, and India including AMR among the goals of its Presidency in 2023.<sup>13,14,15</sup>

Outside of the above groups, AMR has also been taken up by numerous other multinational gatherings. AMR was a key topic within the European Union (EU) during the Swedish Presidency of the Council of the EU in 2023, resulting in the publication of two key documents by the European Commission with direct relevance to AMR: a proposal to revise and replace the EU general pharmaceutical legislation,<sup>16</sup> including provisions to create new research and development incentives for antimicrobials, and a proposal for a Council Recommendation on AMR,<sup>17</sup> adopted by the Council in June 2023.<sup>18, 19</sup> During the US Chairing of the 13th Asia-Pacific Economic Cooperation (APEC) High-Level Meeting on Health and the Economy in August 2023, AMR was specifically recognized as a key global threat with high costs to both health and the economy and described as such in the Chair's statement.<sup>20</sup> In September 2023, the Organisation for Economic Co-operation and Development (OECD) released a report detailing the importance of adopting a One Health framework to combat antimicrobial resistance and highlighting the link between healthcare expenditures and AMR.<sup>21</sup>

The recent momentum at these levels is encouraging. As the world looks toward the UNGA 2024 High-Level Meeting on AMR, this *Progress Report* aims to examine what concrete actions are being taken at a country



level against the many commitments that the world's largest eleven economies have made internationally toward addressing AMR, and where progress still needs to be made.

### **2021 AMR Index Results and 2024 Progress Report Methodology**

The *2021 AMR Preparedness Index* examined actions to address AMR in the eleven largest global economies through policy reviews, a literature review, and expert interviews. Countries were evaluated across seven areas identified as critical to combatting AMR: a national AMR strategy, awareness and prevention, innovation, access, appropriate and responsible use, AMR and the environment, and a collaborative environment. Broadly, the *2021 Index* aimed to identify best practices, create a framework for accountability and evaluation, drive policy change, and stimulate action and collaboration across the countries evaluated, and beyond.

In each of the countries evaluated – Brazil, Canada, China, France, Germany, India, Italy, Japan, South Korea, the United Kingdom (UK), and the United States (US) – we saw a significant need for progress on priorities and initiatives related to AMR. This was relayed through a series of calls to action. The *2024 Progress Report* takes up these calls to action and examines the extent to which countries have made progress against them since 2021.

This *2024 Progress Report* was developed using a combination of primary and secondary data sources that were collected and analyzed by GCOA. Primary data sources include interviews

and surveys of global experts in AMR, and secondary sources consist of existing research literature as well as white papers, data, and policies from countries and multinational organizations like the OECD and the WHO. To create the *Progress Report*, we examined the calls to action and set out corresponding metrics within a streamlined group of five categories: National Strategy, Innovation, Access, Appropriate Use, and AMR and the Environment. Calls to action and metrics were selected for inclusion based on an assessment of their relative importance and influence on AMR progress, their collective breadth and depth, data availability, and their ability to show change since 2021.

### **Assumptions and Limitations**

It is important to note this *Progress Report* is not an exhaustive listing of every initiative relating to AMR for each country. Rather, it aims to highlight the key gaps, strengths, and opportunities within each. Equally, it is important to note that the availability and recency of data across each of the countries examined varies and may limit comparability. We interviewed and surveyed experts across all of the countries assessed, which allowed some opportunity to bridge the issue of comparability. Data collection ended in October 2023, so updates after this point are not reflected.

Finally, most of the countries included in the *Progress Report* are classified as high income by the World Bank. While this does not mean that lower income countries are less likely to score highly, this may impact the overall scores. Progress in the eleven countries in this report

should not necessarily be taken to represent progress across the world overall.

### **Key Themes from the 2024 Progress Report**

The *2024 Progress Report* shows instances of positive change, as well as areas with less momentum. The National Strategy category saw an overall trend of improvement across all countries, as there were several new National Action Plans released since 2021, and in those countries still in their plans from 2021, many have moved to fund and implement new phases. Many countries are additionally preparing new iterations of their NAPs, with both the UK and India slated to release new strategies in the first quarter of 2024.

With regard to innovation, very few antibiotics treatments have received approvals in the eleven countries since 2021, and even fewer novel antibiotics have been newly developed in that time. Despite the commitment to incentivize research and development, specifically through pull incentives, stated in the 2022 G7 Leaders' Communique, the UK is the only country with firm plans to fully implement their pull incentive model (although there are pull incentive plans or discussions in Canada, at the European Union level, and the United States). Japan has just recently begun implementation of a pilot program following a revenue-guarantee model.

Appropriate Use and Access have seen positive changes overall in most countries. However, the majority of countries have a significant lag time between regulatory approval and access to the general public, and even still, there are

varying degrees to which new antibiotics are even approved and launched in each country, with the United States having the most. These disparities are also strongly linked to the poor recognition of antibiotic value to patients and health systems.<sup>22</sup> Further, the risk of catastrophic health spending for older adults, as well as AMR awareness among the general populace have not improved.

Finally, AMR and the Environment, while not showing large changes as a category, is enjoying some newfound attention. Attention to One Health on the global stage is increasing, and countries that are moving to update their NAPs should include this as a key concept that is integrated throughout their planning.

### **Where Do We Go From Here?**

We have seen some progress on key indicators in this *2024 Progress Report*, but we have also seen stagnancy, particularly and critically on metrics relating to innovation and access.

Countries should seek to improve upon the gaps described in each profile, such as strengthening infection prevention and control measures and integrating principles of AMR into training and education for healthcare professions. However, as we move toward the UNGA High-Level Meeting on AMR later this year, a unique opportunity presents itself. It will be essential to focus on those areas of the fight against AMR where a global convening can propel momentum forward — namely, areas where collaborative efforts are required — such as encouraging innovation, harmonizing data sharing and surveillance efforts, and asking

for countries to make specific commitments to advance broad action on AMR. Similar commitments have already been made at the G7 and the G20 level, with varying levels of follow-through. For these countries in particular, the 2024 UNGA will be an opportunity to reaffirm these commitments and to support other countries in their efforts.

In order to jumpstart urgently needed antimicrobial innovation and maintain it over time, it is imperative that clinical pipelines globally be supported and encouraged through investments in research and development, which necessitates a favorable innovation ecosystem. Experts widely agree that a combination of push and pull incentives will be a critical component of encouraging the research and development of novel antimicrobial products moving forward. While several push incentive mechanisms already exist and should be maintained, action in implementing pull incentives has lagged behind significantly and requires urgent action. The sustainability of research and development should also be discussed at the global level.

Intrinsically tied to innovation is access to antimicrobials. Where possible, countries should look to harmonize their regulatory processes for these antimicrobials and reduce the time to approval, and countries should look to reduce access barriers, particularly in low- and middle-income countries. The 2024 UNGA High-Level Meeting on AMR will provide the platform to discuss these critical issues and provide the opportunity for countries to commit

to well-defined and novel goals and strategies to address AMR.

The following sections summarize the category-specific, high-level findings across the five areas measured in this *Progress Report*.





## ◦ National Strategy

The National Strategy evaluation category considers high-level policies, commitments, and investments that national governments have developed to combat AMR. This includes but is not limited to a named national strategy or National Action Plan (NAP) to combat AMR.



# National Strategy Calls to Action

For National Strategy, the *2021 Index* put forth the following calls to action depicted in the table below. The table also shows how this report measures progress, the key progress we saw, and recommendations for next steps.

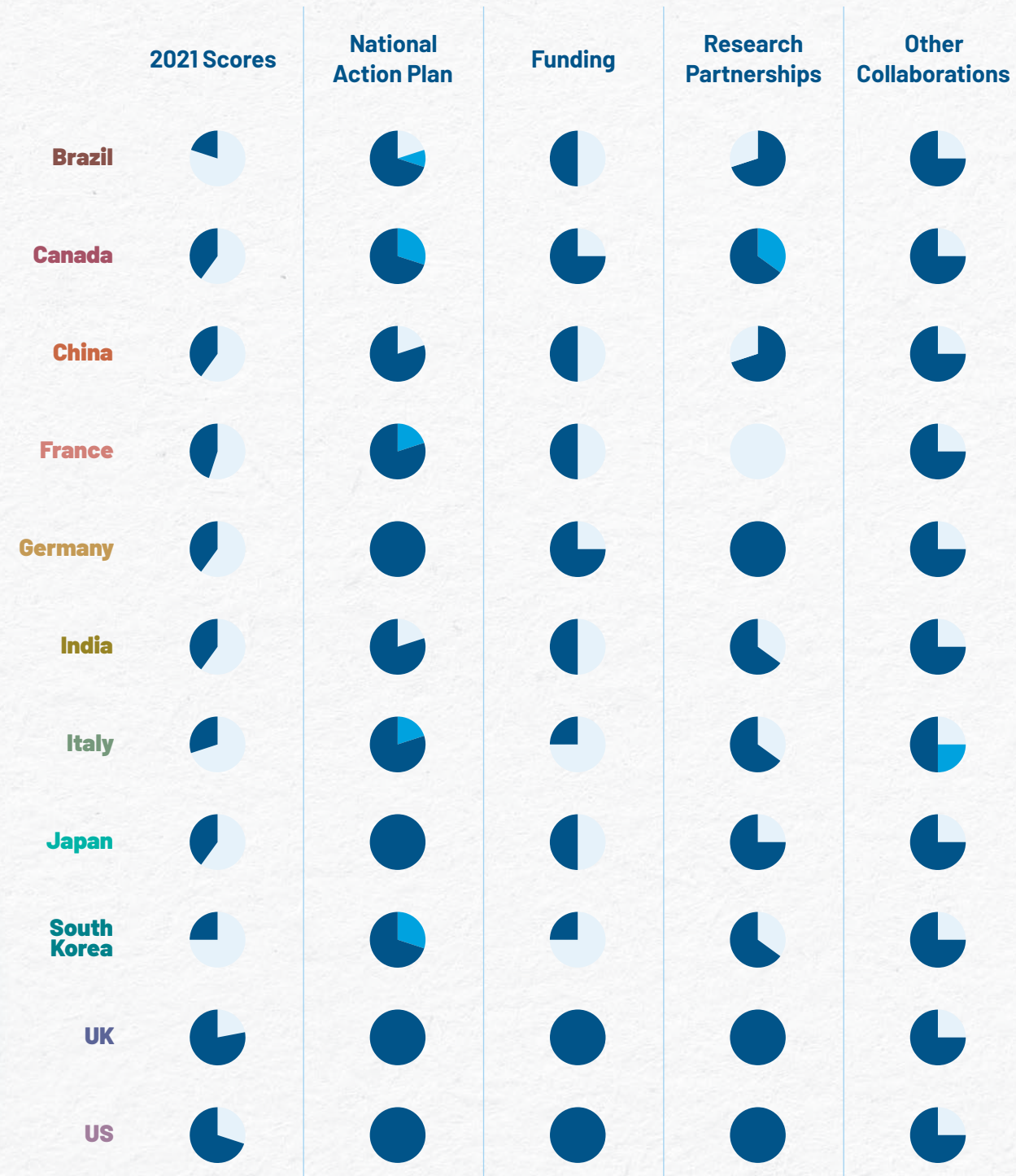
2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should develop more ambitious NAPs and provide sufficient funding to achieve goals. Governments should lean into AMR initiatives and actions now.	Existence and creation of NAPs or new funding for NAPs.	Canada, China, France, Italy, and Japan all released new NAPs. Most countries have committed funds to their NAPs, although experts interviewed across all countries widely agree that more funding is a priority need in nearly all cases.	Governments, especially those with expiring NAPs, should strive to be ambitious in future iterations and devote sufficient funds.
Governments must make bolder financial investments to tackle AMR.	Government funding for research projects related to AMR.	Every country has some level of budget available for projects related to AMR, with the United States and the United Kingdom committing the most funds.	Governments must make bolder financial investments to tackle AMR as a key investment in future health system resiliency.
Governments should provide more direct support for research institutions and working groups, including establishing and growing clinical trial networks. Governments should partner with NGOs, advocacy groups, and patient organizations on pilot programs. Governments should better engage NGOs, advocacy groups, and the patient community in developing and implementing NAPs and other AMR initiatives.	Existence of collaborations with international research initiatives; existence of collaborations among Governments and NGOs or patient groups.	Most governments continued their existing international and civil society partnerships. Italy and Japan were noted to have affirmed and reaffirmed plans to develop further international collaborative efforts in their new National Action Plans. No country was found to be officially collaborating with patient groups.	Governments should continue to collaborate and partner with each other, NGOs, advocacy groups, and other organizations on research, programs, and also on the development and implementation of NAPs and other AMR initiatives.



# National Strategy Scores

## Performance on priority measures since 2021

In the chart below, we show how actions by governments since 2021 would impact their scores within the 2021 Index. In the chart, dark blue shows previous progress, light blue shows movement since 2021.







## 2024 Progress in National Strategy

The *2024 Progress Report* shows substantial improvement in the number of countries with an active and funded NAP. Improvements were seen particularly among countries that had previously lagged in this metric, such as Canada, which did not have a NAP during the *2021 Index* assessment. Other countries that led in *2021 Index* rankings improved on this metric to an extent as well, like the United Kingdom, which has continued to fund and move to further phases of implementation toward its NAP goals.

Many other countries in addition to Canada have also updated or created National Action Plans, including China, France, Italy, and Japan. Further, the UK and India are both expected to release their new NAPs in the first quarter of 2024. There has also been new movement toward funding for NAPs in Canada, Italy, South Korea, and Brazil. This has resulted in improvements for many of the countries. The overall trend toward improvement we observed was validated by experts we surveyed, approximately two-thirds of whom agreed that their country's NAP "comprehensively addresses the most critical aspects of AMR." This finding is also in line with other research on this subject, which has found that many countries throughout the world know have NAPs in place, although the state of implementation and funding varies.<sup>23</sup>

## Case Study

### Chile Leads the Way in Latin America With a Robust NAP and Interdisciplinary Commitments

Chile's most recent National Action Plan (NAP) for 2021–2025, currently in its second iteration, demonstrates the country's burgeoning leadership on AMR through comprehensive strategic priorities and collaborative and cross-disciplinary partnerships.

The Chilean NAP meets all WHO indicators for AMR preparedness. It leads in Latin America for multisector coordination and globally for a strong approach to addressing animal health, as well as One Health alignment.

The core actions of this plan include increasing public and professional awareness; integrating AMR surveillance; strengthening infection control in healthcare settings and communities; monitoring and controlling antibiotics in people, animals, and agriculture; and enhancing research related to AMR to gather evidence for further public policy.

Chile's NAP capacity is enhanced by its cross-disciplinary approach, joining six different government ministries and several academic and scientific societies with regional NGO partnerships. Chile is also engaged in regional partnerships, as a member of the Pan American Health Organization (PAHO) and PAHO's Latin American and Caribbean Network for AMR Surveillance (ReLAVRA), one of the oldest and largest AMR surveillance networks, consisting of 20 member countries. Chile is also a participant in PAHO's project, "Working Together to Combat Antimicrobial Resistance," which has been led by the World Organization for Animal Health (WOAH) and the Food and Agriculture Organization of the UN (FAO) and funded by the EU.





## Innovation

The Innovation evaluation category assesses the state of innovation in research and development across the AMR ecosystem by quantifying government commitments to foster and support critical areas such as new drug development, antibiotic valuation, and pull mechanisms.



# Innovation Calls to Action

The *2021 Index* resulted in the following calls to action related to innovation depicted in the table below. The table also shows how this report measures progress, the key progress we saw, and recommendations for next steps.

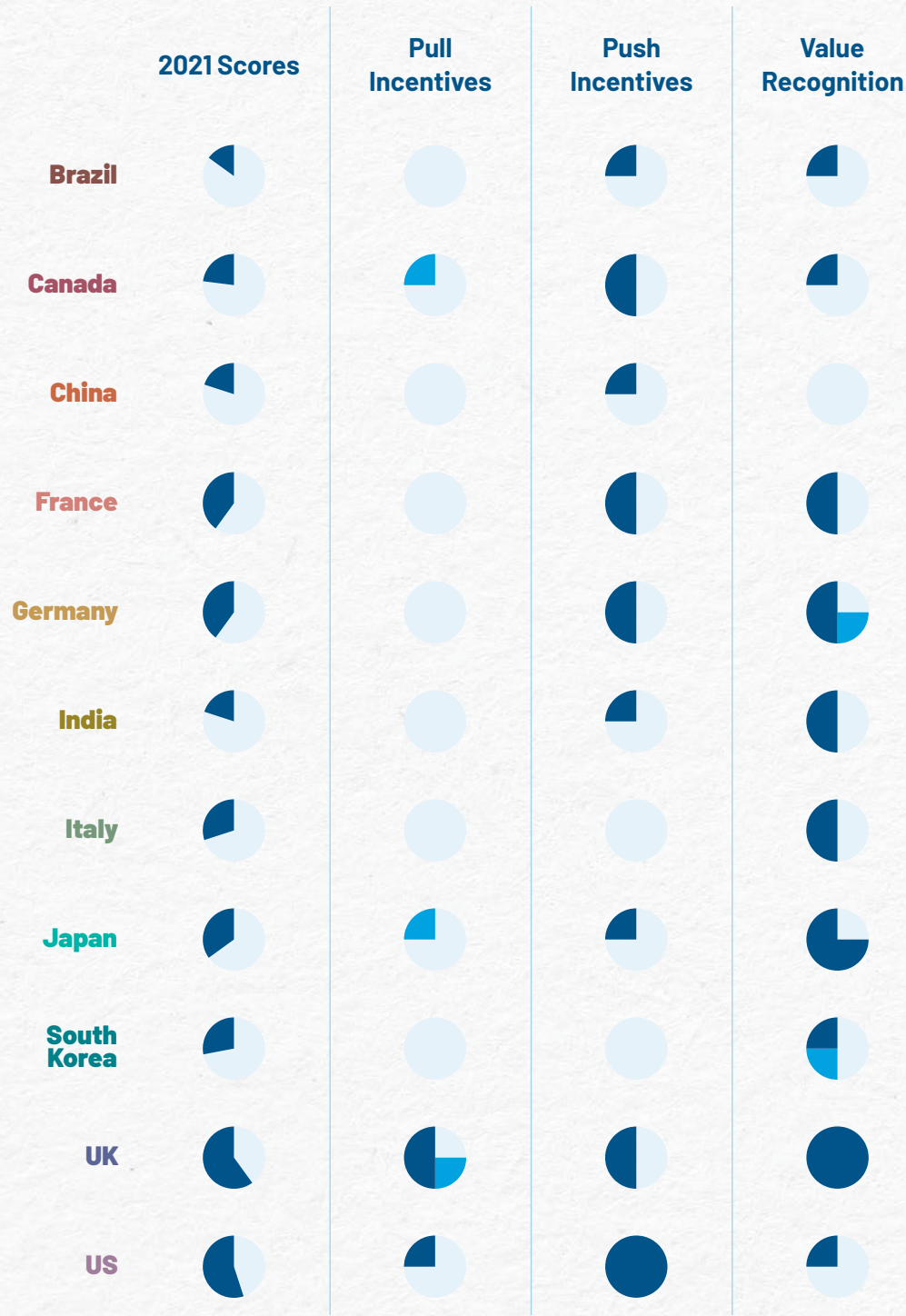
2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should implement pull incentive programs within the next three years.	Existence and creation of pull incentive programs or pilots.	The UK plans to fully implement a permanent subscription model pull incentive in 2024. Japan has started a revenue guarantee pilot as a first step. The US, Canada, and the EU have discussed potential models. There is no tangible progress in the other countries toward pull incentives.	Governments should look to learn lessons from the UK's example and urgently implement adequate pull incentive pilots and programs within their respective systems.
Governments must make bolder financial investments to tackle AMR. Governments should provide more direct support for research institutions and working groups, including establishing and growing clinical trial networks.	Existence and improvement of funding for basic and therapeutic research projects via push incentives.	US, Germany, UK, and Canada provided new funding to CARB-X. Every country in the scope of the <i>Index</i> outside of Brazil and Italy is funding basic, translational, and clinical research projects related to AMR. Brazil and Italy are only funding basic science. Challenges to entering infectious diseases research careers, including insufficient funding to support early career scientists in this area, further limit AMR research capacity.	Governments must continue to tackle AMR via support for global efforts and push mechanisms such as CARB-X. Governments should provide more direct support for research institutions and working groups, including establishing and growing clinical trial networks. Governments should support recruitment, training, and retention of the infectious diseases scientific workforce necessary to conduct AMR research.
Governments should ensure pricing reflects the full value of novel antibiotics.	Existence and creation of policies that consider the value of antibiotics in pricing.	Brazil, South Korea, Germany, France, the UK, and Japan have made slight improvements to pricing and/or HTA systems, which impacts antibiotics.	Governments should recognize and reward the value of antibiotics through appropriate pricing and/or changes to the reimbursement system and mechanisms to facilitate this.



# Innovation Scores

## Performance on priority measures since 2021

In the chart below, we show how actions by governments since 2021 would impact their scores within the 2021 Index. In the chart, dark blue shows previous progress, light blue shows movement since 2021.







## 2024 Progress in Innovation

The UK continues to lead in innovation, with its follow through on commitments to implement a pull incentive. Aside from the UK's subscription model that is set to become permanent in 2024 and Japan's first step in the form of piloting a smaller sized revenue guarantee model, no other country has yet taken a concrete step toward pull incentive implementation. Pull incentives have been identified by health policy and economic experts as a key policy lever to help incentivize innovation,<sup>24</sup> specifically for much-needed novel antibiotics. Only the UK is now putting in place the kind of delinked incentive that experts believe could be a potential solution for the broken antimicrobials market. Pull incentives were identified in our survey in an open-response section by 22% of respondents as a key mitigating effort to addressing critical AMR gaps in their countries. Canada is considering a model that is similar to that in the UK, and the US has reintroduced the PASTEUR Act in Congress, which would establish a delinked subscription model for novel antimicrobials if passed.

Where discussion on the creation of incentives through policy is occurring, it is often limited in scope to initiatives that only expand access, rather than spur the creation of novel antimicrobials through research and development. While

## Case Study

### Switzerland Makes a Play for a Pull Incentive

In December 2021, a Swiss policymaker introduced a motion in the Swiss Federal Council to establish a pull incentive in Switzerland.<sup>25</sup> The effort was the result of broader collaboration between nonprofits and government to drive action on AMR.

AMR-focused nonprofits such as the Swiss Round Table on Antibiotics were key to leveraging international expertise to drive the conversation forward in Switzerland. The Swiss Round Table on Antibiotics' Pull Project was the animating force behind the subsequent attention in the Swiss Federal Council. The project had undertaken a comprehensive review and evaluation of pull incentive schemes from other countries, including the UK, and proposed piloting and assessing an option fit for the Swiss healthcare context, with the goal of ultimately integrating this pilot into the Swiss healthcare system.<sup>26</sup> While the motion ultimately did not pass, its introduction was evidence of a growing attention to the AMR crisis and recognition of the need for a policy solution.

ensuring access to existing treatments is critical, the need for novel treatments is urgent and a prerequisite for future access.

With respect to push incentives, the US, UK, Germany, and Canada committed new funding to CARB-X, with Japan proposing to join the initiative in its draft budget for 2024. UK and Germany also renewed their funding to GARDP.



## Access

The Access evaluation category measures the level of access to and availability of both older and novel antibiotics that patients within each country have, how soon it was made available, and patient expenditure.



## Access Calls to Action

For Access, the *2021 Index* suggested the following calls to action depicted in the table below. The table also shows how this report measures progress, the key progress we saw, and recommendations for next steps.

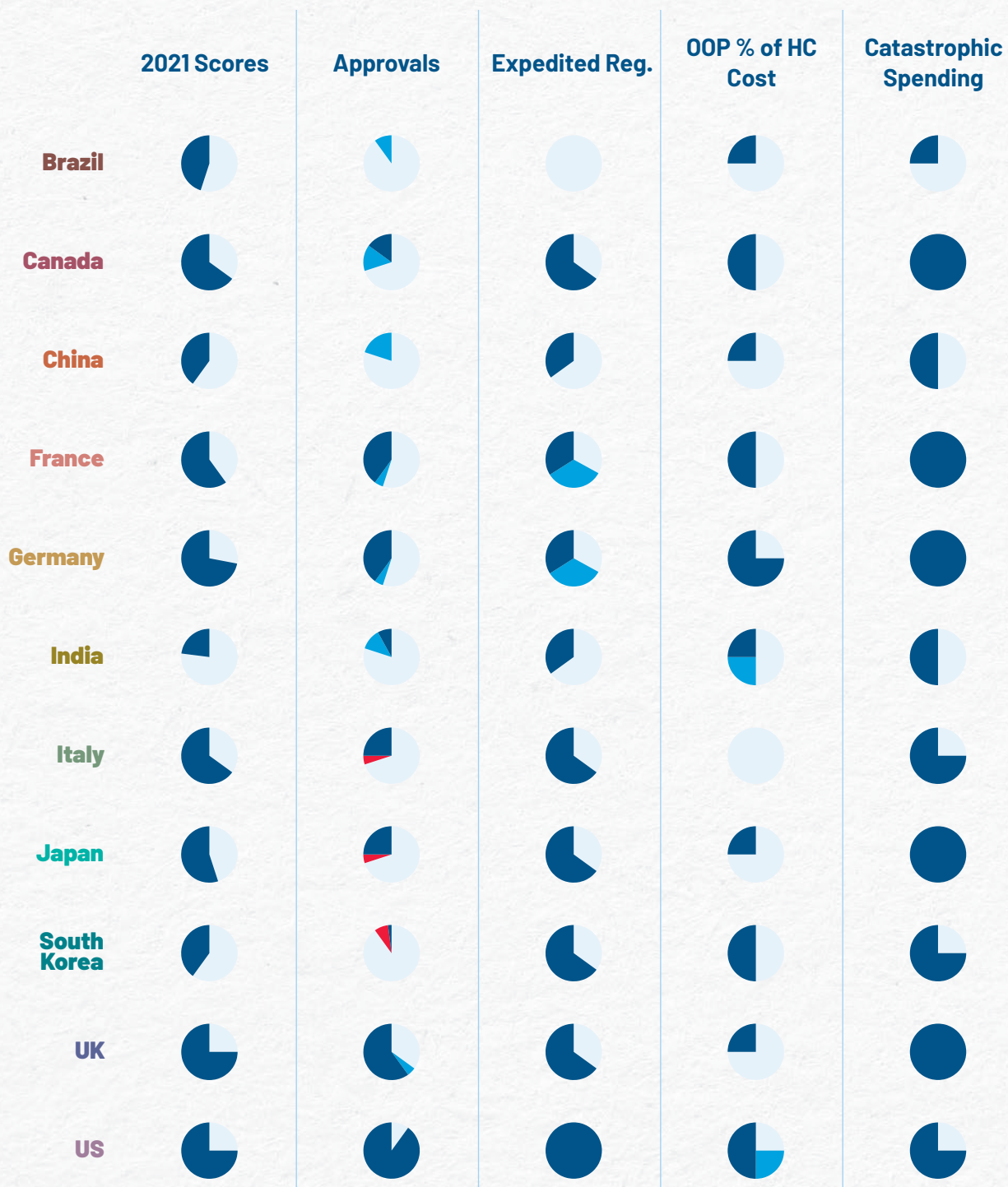
2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should expedite access by reducing regulatory hurdles and accelerating government adoption.	Existence and creation of policies to fast-track drug approvals, including for antibiotics.	All countries except for Brazil have some degree of policy that could work to fast-track drug approval or commercialization, including for antibiotics. Germany and France changed evaluation requirements for antibiotic commercialization since the <i>2021 index</i> .	Governments should expedite access by reducing regulatory hurdles and accelerating government adoption, as well as considering opportunities for global regulatory alignment that can speed access without compromising quality or safety.
Governments should make the availability of novel antibiotics a national priority.	Number of antibiotics commercialized in each country out of all antibiotic new molecular entities developed since 2010; affordability of healthcare and antibiotics in each country in terms of the proportion of populations spending more than 10% of income on healthcare, and the proportion with catastrophic health expenditure.	Since 2021, the only changes in approval are in Canada (3 additional), Germany (1 additional), and the UK (1 additional). As three new molecular entities have been created since the <i>2021 Index</i> , some countries saw their proportion of novel antibiotics approvals fall. Out-of-pocket spending rates improved in the US and India, but otherwise affordability metrics remain unchanged.	Governments should make the availability of novel antibiotics a national priority and ensure that access and affordability are addressed. Governments should also strengthen supply chains and manufacturing to prevent shortages and interruptions to access, as well as emphasize stewardship of novel and existing products to ensure that the issue of AMR is not perpetuated.



## Access Scores

### Performance on priority measures since 2021

In the chart below, we show how actions by governments since 2021 would impact their scores within the *2021 Index*. In the chart, dark blue shows previous progress, light blue shows movement since 2021, and red shows backtracking on previous successes.







## 2024 Progress in Access

The *2021 Index* pointed to a need to improve access to novel antimicrobials by reducing regulatory hurdles, which include long and complex processes to approve a drug for use, in addition to efforts needed to actually get the drug into market and available.

There has been little change since 2021 related to access. Outside of just a few new approvals in just Canada, Germany, and the UK, and some slight improvement on affordability metrics, availability has not differed much in the past two years. Positive changes include fixes to rules that were previously creating significant hurdles for access, especially in the European countries examined in this *Progress Report*. However, these changes do not necessarily explicitly encourage better access, and it is yet to be seen what the effect and magnitude of these changes will be. Many experts surveyed also pointed to supply chain sustainability issues and subsequent reliance on a limited number of supply chain actors involved in antimicrobial manufacturing as something that should be addressed going forward. Shortages and interruptions in access to various antimicrobial drugs are common and often lead to use of less optimal or more toxic agents, as well as use of broader spectrum agents, which further accelerates development of resistance.

## Case Study

### Sweden's Work to Improve Access: Leading the Way in AMR and Pharmaceutical Advancements

In 2018, the Public Health Agency of Sweden devised a pioneering model aimed at ensuring the continued availability of antibiotics with specific medical value in the Swedish market.

This pilot reimbursement model marked an important step forward in enhancing access. The outcome of this initiative, reported in May 2023, resulted in the signing of contracts by four pharmaceutical companies for the distribution of five antibiotic products.

Building on this initial pilot, the Public Health Agency of Sweden has once again been asked to work on antibiotic accessibility through an evolving model that will be refined based on insights derived from the first pilot study, with a report from that work set to be submitted to the government by the end of 2023.

The Swedish government's work toward improving availability of antibiotics demonstrates their understanding of the need for system-wide expansions that contribute to broader antibiotic access and government investment in AMR activities.



## ○ Appropriate Use

The Appropriate Use evaluation category assesses governments' efforts to reduce misuse and overuse of antibiotics among medical professionals and the general public and government efforts to promote rational diagnosis and dispensation for antibiotics.



## Appropriate Use Calls to Action

The *2021 Index* put out the following calls to action related to appropriate use, depicted in the table below. The table also shows how this report measures progress, the key progress we saw, and recommendations for next steps.

2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should strengthen efforts to improve patient awareness.	Existence and creation of initiatives to promote and monitor public awareness.	All countries have implemented national initiatives to promote awareness, but only Japan and the UK have national initiatives that have set out to measure awareness more than once.	Governments should strengthen efforts to improve patient awareness and monitor for impact and uptake.
Governments should improve enforcement and administration of existing mechanisms. Governments should provide guidance and funding to strengthen stewardship in inpatient settings and to implement stewardship in outpatient settings.	Existence and creation of policies to promote antimicrobial stewardship teams or practices.	<p>All countries have some level of antimicrobial stewardship practices in place—be they regional, national, voluntary, or mandatory. France, Japan, South Korea, and China have national initiatives with mandatory requirements or incentives to enforce implementation. However, actual adherence to guidelines is more difficult to measure and may vary.</p> <p>The US has a requirement in hospitals and long-term care facilities, though funding is needed to support implementation.</p>	Governments should continue to improve enforcement and administration of existing mechanisms. Governments should provide guidance and funding to strengthen stewardship in inpatient settings and to implement stewardship in outpatient settings, including the access of antibiotics in over-the-counter settings.
Governments should improve sanitation in healthcare systems and public health infrastructure along WHO IPC guidelines.	Country-reported adherence to WHO IPC guidelines.	All countries except Italy have some adherence to WHO IPC guidelines. China, France, Japan, Korea, the US, and the UK have guidelines that exist and are operational.	Governments should improve sanitation in healthcare systems and public health infrastructure along WHO IPC guidelines. Governments should expand immunization programs, including adult immunization, to prevent infectious diseases and lessen the reliance on antibiotic use.



(cont'd)

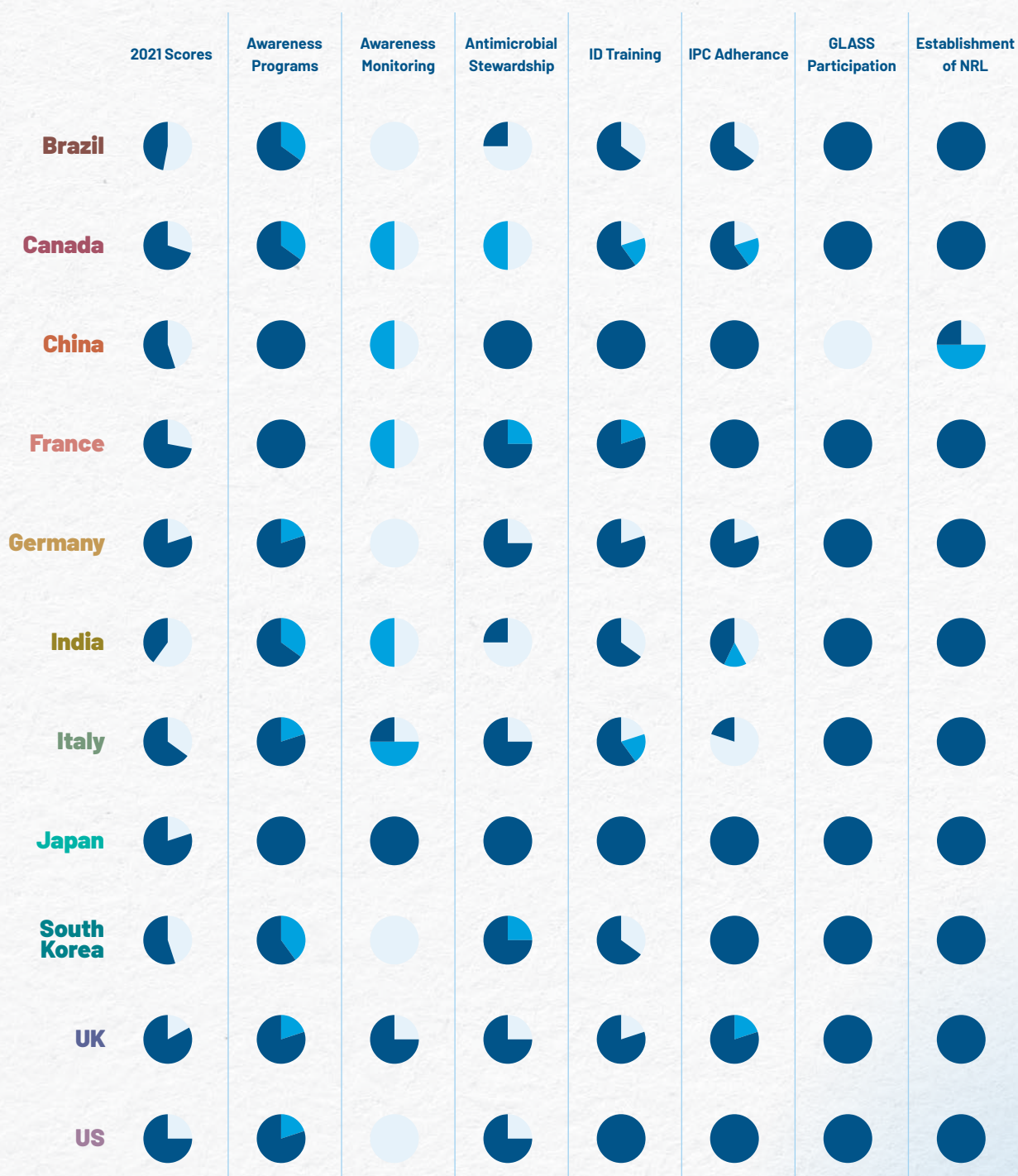
2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should increase surveillance and monitoring. Governments should increase investments in AMR innovations for surveillance and diagnostics.	Participation in GLASS; existence or establishment of national reference laboratories involved in AMR surveillance.	All countries have national reference laboratories, and all except China participate in some aspect of GLASS.	Governments should continue to invest in strengthening AMR and AMU surveillance and diagnostics and collaborate on data-sharing to global databases, including GLASS and other standardized platforms operating regionally.
Countries should invest in training the next generation of AMR researchers and clinicians to support clinical trials. Governments should bolster training requirements and program funding for medical professionals and medical trainees for IPC and beyond. Governments should support the expansion and training of the medical workforce necessary to promote appropriate antibiotic use.	Inclusion of AMR within medical personnel training curriculum.	All countries have some degree of AMR concepts featured in medical personnel training curricula. Shortages of healthcare professionals trained in infectious diseases and antimicrobial stewardship limits access to care for patients with serious infections and limits the implementation of stewardship programs.	Countries should continue to promote workforce strengthening and training and collaborate to create a standard of AMR training to address this global issue. Governments should deepen investments in the recruitment, training, and retention of the infectious diseases workforce needed to care for patients with or at risk of resistant infections and to implement stewardship programs.



# Appropriate Use Scores

## Performance on priority measures since 2021

In the chart below, we show how actions by governments since 2021 would impact their scores within the *2021 Index*. Countries are ordered by the average of their *2021 Index* scores for the two categories of Appropriate and Responsible Use and Awareness. In the chart, dark blue shows previous progress, light blue shows movement since 2021.



## 2024 Progress in Appropriate Use

Countries have largely acknowledged the need to optimize antimicrobial usage through stewardship in order to improve patient outcomes and limit the development of resistance, and many have strengthened awareness programs over the past two years. The importance of these efforts was echoed in our expert survey which ranked “lack of politicians championing AMR” as the number one barrier overall toward greater funding and recognition for AMR measures in their countries.

While most countries were found to have only measured progress on AMR awareness officially just once, Japan conducts regular surveys to monitor public awareness, and the UK has measured awareness multiple times.

Participation in GLASS varies by country: all except China participate in some aspect. All countries could improve upon their contribution, and countries should commit to a higher level of participation going forward. Where possible, countries should also seek to empower other countries, particularly LMICs, to invest in sustainable diagnostic and surveillance programs that can further increase the capacity of global initiatives like GLASS. One such example is the UK’s investment in AMR and AMU surveillance capacity and capability through the Fleming Fund, which has supported the development of 170 NAPs and the submission of AMR/AMU data to GLASS in a number of LMICs.<sup>27</sup>

Brazil, India, and South Korea are to be commended for strengthening stewardship through the creation of antimicrobial stewardship mechanisms as an important step toward implementing and strengthening broader programs. Where possible, all countries should seek to leverage the infrastructure and momentum created by the COVID-19 pandemic for widespread immunization, which can contribute to stewardship through prevention of infectious disease and the resulting reduced need to use antimicrobials. This includes expanding immunization programs to encompass adult immunization. Across the world, there continues to be a low number of infectious disease specialists in many countries, and few countries have done any policy work to fix that issue and encourage training in this area. In the US, the infectious diseases physician specialty is one of the few specialties that regularly fails to fill its training programs year after year, due in large part to its low reimbursement compared to other specialties and high medical student debt. Financial barriers to infectious diseases recruitment and training must be addressed.





## Case Study

### Australia Hones in on Surveillance and Appropriate Use in Food and Animal Products

*Australia's National Antimicrobial Resistance Strategy – 2020 and Beyond* is a national framework for minimizing the spread of antimicrobial resistance, with a targeted focus on food and animal production, preventative surveillance, and proactive identification and response

to emerging resistant bacteria. As a result, a detailed preventative surveillance plan has emerged with crucial screening for environmental and commercial factors that contribute to resistance.

Australia conducts ongoing research on the prevalence of antimicrobial-resistant bacteria in animal and food products. In November 2022, the government launched a nationwide survey of antimicrobial resistance in Australian food supplies.<sup>28</sup> The primary objectives of that survey are to gather nationally representative resistance data, identify AMR to critical antimicrobials, and ensure robust and internationally comparable data for future surveillance efforts in alignment with the One Health approach. Findings from this survey, not yet released, build greater understanding toward the impact of appropriate use policies on emerging resistance and food and animal products.





## Environment

The AMR and the Environment evaluation category examines how national governments are attempting to manage antibiotics throughout their life cycle: production, procurement, usage across sectors (including non-human applications), and disposal, as well as integration of One Health concepts into broader AMR strategies.



# Environment Calls to Action

The *2021 Index* resulted in the following calls to action related to AMR and the environment, depicted in the table below. The table also shows how this report measures progress, the key progress we saw, and recommendations for next steps.

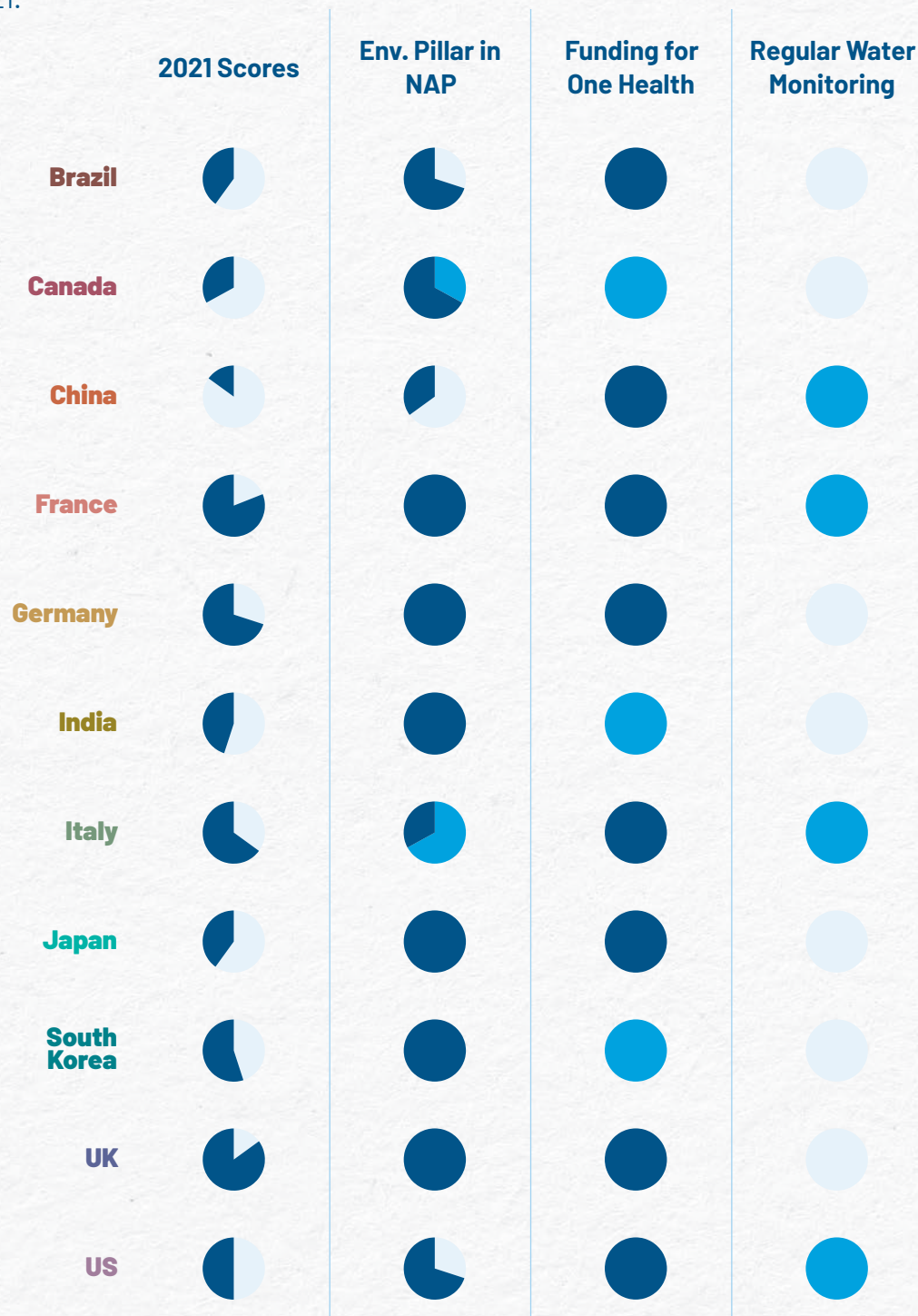
2021 Call to Action	What We Measured in 2024	Key Progress Indicators in 2024	Next Steps
Governments should better integrate environmental controls in their National Actions Plans.	Existence and creation of sections or pillars dedicated to environmental issues in NAPs.	Countries with new NAPs since 2021 show increased incidence of dedicated One Health or Environmental pillars.	Environmental aspects of AMR should continue to be emphasized in future NAP iterations, and given sufficient funding. They could be integrated with other areas, including the environmental component in procurement processes to drive the uptake of established manufacturing standards and reduce the threat of antibiotic pollution from manufacturing
Governments should continue to integrate the One Health approach and give equal weight to environmental components of AMR.	Existence of funding for One Health initiatives in government budgets.	All countries have some level of funding available for One Health initiatives.	Governments should continue to integrate the One Health approach and give equal weight to environmental components of AMR.
Governments should support enhanced data collection to improve global understanding of the impact of antibiotics in the environment.	Existence of initiatives to monitor antimicrobial resistant genes (ARGs) in water.	Only four countries are regularly monitoring ARGs in water.	Governments should continue to support enhanced data collection of antibiotics in the environment and promote research to further elucidate the intersection between AMR and the environment. Following the successes of COVID-19 wastewater surveillance, countries should expand upon this to encompass AMR and ARG monitoring.



# Environment Scores

## Performance on priority measures since 2021

In the chart below, we show how actions by governments since 2021 would impact their scores within the 2021 Index. In the chart, dark blue shows previous progress, light blue shows movement since 2021.







## 2024 Progress in Environment

There has been very little change on environmental aspects of AMR, but where there has been action, it has been wholly positive. While many countries are prioritizing environmental issues in NAPs and gathering some level of funding for One Health initiatives, it remains concerning that few countries are monitoring the presence of antimicrobial resistance in the environment, as shown by the low number of countries doing regular monitoring of ARGs in water.

In our survey of experts, many agreed on the importance of this topic and that greater understanding of the intersection between the environment, AMR, and subtopics like appropriate use and access should be elucidated so that effective counteractions can be implemented. There continues to be a need for countries to integrate AMR measures and environmental considerations. This could be achieved by leveraging initiatives that already exist: for example, the British Standards Institute (BSI) launched its Minimized Risk of AMR certification in June 2023, with the aim to mitigate the risk of AMR spread through the environment due manufacturing discharge.<sup>29,30</sup> Countries should consider encouraging more pharmaceutical manufacturers in their regions to adopt the certification as a means to promote responsible antimicrobial manufacturing.

## Case Study

### Indonesia Increases Focus on Animal and Environmental Health to Strengthen its One Health Approach

Indonesia's second NAP for 2020–2024 demonstrates that concerted efforts guided by stakeholder partnerships and increased funding can result in meaningful AMR action in low-and-middle income (LMIC)

countries. The 2020–2024 Indonesian NAP establishes a One Health approach with engagement from public and private sectors, associations, civil society, and academic organizations.

WHO guidance has spurred an increase in regulatory legislation consistent with the One Health approach. The Ministry of Agriculture created a new regulation that prohibits the use of antibiotics as livestock growth promoters, and the Directorate General of Livestock and Animal Health Services also created a regulation prohibiting the use of the antibiotic colistin, one of the antibiotics on the WHO list of Highest Critically Important Antimicrobials for Human Medicine. In addition, there have been eleven Indonesian Faculties of Veterinary Medicine that are working to meet international standards of infection prevention and control in animal health. These actions contribute to addressing environmental issues around AMR.



# BRAZIL

## 2021 Index Results Baseline

In 2021, Brazil ranked eleventh out of the eleven countries examined. Efforts to improve awareness, access, and usage were underway at the time of the assessment, but commitments to a national strategy and innovation were lacking, and funding for the NAP was essentially nonexistent.

Due to the lack of dedicated government funding, Brazil's NAP was not fully implemented. Appropriate use and access to antimicrobials also needed to be addressed, as did strengthening of the health infrastructure to reduce the spread of hospital-acquired infections.

## 2024 Progress Summary of Updated Scores

**Brazil is currently working on a new National Action Plan that will span 2024–2028.**

The new government recognizes that awareness and governance have been major weaknesses thus far and seek to improve medical curricula to complement the training programs currently available for health agents. Brazilian experts who were interviewed showed great optimism for renewed attention to AMR and noted many signs of positive forward momentum. Brazil will host the G20 for the first time in 2024, and this is a key opportunity to demonstrate commitment to AMR, both domestically and on the world stage.<sup>31</sup>

Funding exists for health and is being used for AMR but is not earmarked specifically for AMR. There are talks to change that, which have not been solidified due to the recent change in government. Further, the government is actively working on surveillance system strengthening, and new large collaborations have been started for research and for surveillance.



## KEY FINDINGS

- Brazil is currently working on a new NAP that will span 2024–2028.
- The government has acknowledged that awareness and governance have been major weaknesses thus far.
- Funding exists for health and is being used for AMR but is not earmarked specifically for AMR.
- The government is actively working on surveillance system strengthening.
- Access remains an issue for vulnerable populations.
- New large collaborations have been started for research and for surveillance.

Despite these promising signs,, access remains an issue for vulnerable populations, as does appropriate use. Although Brazil has very high consumption of antibiotics and low enforcement of prescriptions, AMR ranks highly among Brazilians as a public health issue.<sup>32</sup> AMR stewardship programs are in place but lack national standardization.<sup>33</sup> Both nurses and doctors are permitted to prescribe antibiotics, which may contribute to the overconsumption of antibiotics because of the increased channels of access.<sup>34</sup>



# CANADA

## 2021 Index Results Baseline

Canada ranked sixth out of eleven countries in the *2021 Index*. Although Canada's NAP released in 2015 promised full implementation by 2020, as of mid-2021, many of the stated goals were not fully implemented.

Canada demonstrated strong implementation in training, awareness, and healthcare infection prevention programs, but the lack of commitment to the NAP was a concern, and the Pan-Canadian Action Plan on Antimicrobial Resistance promised in 2019 remained delayed. While Canada was evaluated as having a relatively strong healthcare system with low out-of-pocket costs, expert interviews have conveyed that the regionalized delivery model can complicate efforts for vaccination and surveillance because each province or territory is responsible for healthcare within their jurisdiction. AMR training for healthcare providers was found to be relatively weak, and no plans to incentivize drug development were noted.

## 2024 Progress Summary of Updated Scores

Canada released the long-awaited five-year Pan-Canadian Action Plan on Antimicrobial Resistance in June 2023.

There are plans to fund the Action Plan across five pillars and ten priority actions and utilize a One Health approach.<sup>35</sup> However, many of the programs and initiatives are yet to be fully implemented, and guidance on implementation under the new NAP is yet to be released.

In May 2023, Canada joined CARB-X with a grant of CAD 6.3 million.<sup>36</sup> Moreover, a government-funded meeting in 2022 led to expert agreement that Canada should explore a pull-incentive based model to spur innovation.<sup>37</sup> There is momentum to trial a pull incentive, with a proposal released in September 2023 stemming from an expert panel sponsored by the Public Health



## KEY FINDINGS

- Canada has released a Pan-Canadian Action Plan on AMR.
- There are plans to fund the Action Plan.
- Canada joined CARB-X and there is a proposal to trial a pull incentive that was commissioned by the Public Health Agency of Canada
- Canada performs well on environmental calls to action.

Agency of Canada (PHAC),<sup>38</sup> and to incentivize drug development. The Canadian budget reflects this commitment, however no details on the actual value of the commitment have been released as of yet. Canada should continue to build on this momentum to demonstrate its commitment to the G7's resolve to further explore pull incentives as a critical piece of antimicrobial innovation.<sup>39</sup>

Experts were concerned that Canada's Drug and Health Technology Agency (CADTH), which is funded by provincial and federal governments to conduct health technology assessments, is not specifically mandated to examine antimicrobials. This disconnect indicates a lack of prioritization within the public reimbursement process even once a drug is approved for safety and effectiveness.<sup>40</sup> This is demonstrated by the fact that, in Canada, the approval of novel antibiotics falls behind other industrialized nations. For example, of eighteen novel antibiotics approved and commercially launched in 14 high-income countries between

2010–2020, only two were introduced in Canada. At the end of October 2023, the Auditor General of Canada released a report to Canadian Parliament stating that PHAC and Health Canada, both of which are responsible for access, have not done enough to improve market access to new antibiotics already available in other countries.<sup>41</sup> The Auditor General further criticized the new NAP's general lack of specific milestones and deadlines.

Finally, Canada performs moderately well on environmental calls to action, integrating One Health principles in its new NAP and conducting robust surveillance in livestock and veterinary practice. Surveyed experts pointed to noteworthy researchers and networks in this field, including the Canadian Integrated Program on Antimicrobial Resistance Surveillance (CIPARS), which is a leader in the integrated surveillance field and provides ongoing benefits to AMR mitigation efforts.



# CHINA

## 2021 Index Results Baseline

In 2021, China ranked ninth out of the eleven countries examined. Investment into research and development for vaccines and antibiotics was insufficient, and vaccine utilization and surveillance efforts were equally low.

High usage rates, likely clinically inappropriate, of antimicrobials, in humans and livestock alike, also raised significant concern about environmental impacts. There was no policy governing the usage of antimicrobials for livestock growth production. China also did not participate in the World Health Organization's (WHO) GLASS program.

## 2024 Progress Summary of Updated Scores

Unfortunately, China may be losing ground on AMR, despite releasing its *Second national action plan for containing antimicrobial resistance 2022–2025* in October 2022.<sup>42</sup>

While this plan lays out key focus areas, it lacks details in terms of funding and measurable goals for many of its initiatives. This lack of funding was highlighted by surveyed experts as a barrier to its implementation. While the plan does acknowledge the need for international collaboration, it does not call out specific forms of engagement. It is important to note that China is still not part of GLASS, and the new NAP makes no mention of joining it.

The five key pillars of the NAP are to slow the emergence of resistant organisms and prevent the spread of resistant infections; strengthen the national health surveillance network monitoring AMR; accelerate basic and applied research and development for new antimicrobial agents, vaccines, and diagnostics; establish national reference laboratory performance standards for antimicrobial susceptibility; and



## KEY FINDINGS

- China released a new NAP spanning 2022–2025, which aims to establish performance standards for its national reference laboratories.
- Lack of specific funding details and measurable goals in the new NAP suggest that China may be losing ground on AMR.

improve international collaboration and capacities for AMR prevention, surveillance, control, and antibiotic research. China's first NAP on AMR spanning from 2016–2020 called for the establishment of national reference laboratories, so the move to establish performance standards does show some forward momentum.<sup>43</sup>

Initially, over the past few years, China experienced a decrease in antibiotic use due to its strict zero-COVID policy, which decreased the spread of other infectious airborne diseases.<sup>44</sup> However, with the easing of zero-COVID policies, China should take action to curtail the inappropriate use and self-medication with antibiotics to prevent

the spread of AMR. This includes increasing surveillance and increasing stewardship and educational awareness of appropriate use of antibiotics.

China saw the approval of a new antibiotic, contezolid, in June 2021,<sup>45</sup> which can treat multi-drug-resistant Gram-positive bacterial infections. While the drug does not meet any of the WHO's innovation criteria, it nonetheless represents a positive step forward in available treatment options.



# FRANCE

## 2021 Index Results Baseline

In 2021, France ranked fourth overall among the countries evaluated. France was notably strong in its involvement in awareness efforts and well-funded vaccination programs, as well as a strong surveillance program compatible with GLASS.

France was seen to have a strong health infrastructure with favorable reimbursement policies and low out-of-pocket costs for patients. However, significant lags between market approval, launch, and reimbursement of novel antimicrobials were noted. Further gaps included the lack of oversight and awareness of AMR, as well as a cultural desire for antibiotics that contributed to both high prescription and consumption rates, even when clinically inappropriate. Stewardship programs were not fully implemented, and French decisionmakers were seen as struggling to draft and implement clear national plans. Experts felt that a material commitment to the creation of pull incentives was needed to encourage the innovation pipeline.

## 2024 Progress Summary of Updated Scores

### France's new National Strategy for Preventing Infections and Antibiotic Resistance spans from 2022–2025.<sup>46</sup>

It replaces the previous 2015 Prevention of Healthcare-Associated Infections National Programme, and in doing so, has implemented lessons learned from the COVID-19 pandemic into its formulation, as well as specific One Health principles. This non-siloed and multi-sectoral approach was lauded by surveyed experts. The strategy outlines nine priority areas, new to this iteration of the NAP, which include public engagement and uptake, educating healthcare professionals, improvements to infection control and AMR stewardship, promotion of innovative research and data infrastructure, environmental preservation, and specific leadership by France at a global scale.



## KEY FINDINGS

- France has made strides on environmental initiatives and awareness.
- France recently updated its valuation process for reimbursement of antibiotics targeting multi-drug resistant bacteria.

With regard to innovation, France has recently made progress in valuation. In February 2023, the country established new evaluation principles for reimbursement of antibiotics targeting multi-drug resistant pathogens.<sup>47</sup> However, incentivizing innovation through a pull incentive has not been attempted.<sup>48</sup> Following the launch of France's Healthcare Innovation 2030 plan, which aims to position France as Europe's health innovation leader through a €54 billion investment over ten years, the government should strongly consider how a pull incentive could both support and be supported under this framework.<sup>49</sup> Further, in 2022, the multidisciplinary consortium ARPEGE gave €9 million to fight AMR, with one of the key pillars being to "expand the arsenal of effective antibiotics."<sup>50</sup>

France continues to work on environmental initiatives and awareness under the current NAP. It continues to face challenges with inappropriate prescribing. Antibiotic

consumption in France declined from 2011 to 2020, only to rise again in 2021.<sup>51</sup> In 2021, doctors prescribed 705 antibiotic prescriptions per 1,000 inhabitants, marking a 6% increase from the previous year, with consumption also rising by 5%. The highest increase in antibiotic prescriptions was noted in children aged 0 to 4 years. France continues to be the fourth-largest consumer of antibiotics in Europe, trailing behind Greece, Romania, and Bulgaria, which may be in part due to a strong cultural desire for antibiotics. Surveyed experts largely felt that guidelines and communication from trusted bodies like the French Infectious Diseases Society could help to address the issue of appropriate use and IPC measures.



# GERMANY

## 2021 Index Results Baseline

In 2021, Germany ranked third in its approach to AMR preparedness. Overall, the national strategy (2015–2020), surveillance efforts, and international collaborations were judged to be relatively strong.

Additionally, Germany had a number of programs meant to incentivize innovation, including tax incentives and clinical trial cost-sharing programs, but no true pull incentive. Some additional gaps were identified, including the need to create and implement valuation models that better capture the full value of antibiotics, the relatively low level of public funding for AMR compared to the size and scope of the AMR problem in Germany and Europe more broadly, and the resulting misalignment with Germany's perceived leadership in Europe. Finally, Germany, and other member countries, had yet to fully follow through on commitments made through the G7 and G20.

## 2024 Progress Summary of Updated Scores

Germany's previous NAP, the *German Antimicrobial Resistance Strategy (DART)*, ran until 2020.

An interim report was published in 2022,<sup>52</sup> but a new, full-length DART has not yet been released. However, the resistance strategy was adopted by the Federal Cabinet in April 2023.<sup>53</sup> The 2022 interim report indicated that the new DART 2030 would be published in two parts: the Strategy in November 2022 (which does not yet appear to be publicly available), and the Action Plan in 2023.

Overall, although Germany previously performed comparatively better on certain metrics than other countries and continues to do so, it is not improving as much as some of its peers, just maintaining a moderate standard. The release of an updated DART should set more ambitious standards, particularly in the



## KEY FINDINGS

- Germany continues to do much to fund and support international collaborative efforts, such as CARB-X and GARDP.
- Germany has developed and is beginning to implement some pricing reforms.
- Although Germany continues to outperform other countries on many metrics, it is not improving, just maintaining its standard.

innovation sphere, although experts noted the presence of good permanent funding for translational infectious disease research.

With regard to innovation, surveyed experts further highlighted the need to prioritize research and development, as well as strengthen supply chains for existing antimicrobials, including generics. In 2023, Germany renewed its commitment to GARDP and CARB-X, with an additional financial commitment.<sup>54</sup> Germany has created a system for new “reserve” antibiotics that exempts them from pricing assessments by considering them to have 100% added benefit. This system has not yet been fully implemented, so its impact on access and prices remains to be seen. Germany does not presently have any kind of pull incentive to spur innovation, which is a missed opportunity considering their economic role

within the EU and the G7 Leaders’ Communique committing to exploring innovation models including pull incentives that stemmed from their own G7 Presidency in 2022.<sup>55, 56</sup> Germany faces greater pressure to develop an antibiotic and to create an accommodating regulatory framework due to its pharmaceutical monopolization of antibiotics in the EU. As such, other member states will look to Germany to lead on market development and set the tone for the rest of the Union.



# INDIA

## 2021 Index Results Baseline

In 2021, India ranked tenth out of the eleven countries examined. Although India's 2017 to 2021 National Action Plan was large and ambitious in scope, as were the handful of action plans released by individual Indian states, the implementation of such plans were severely limited due to lack of financing, decentralization, and lack of stakeholder engagement and political will.

Increased funding for the NAP and SAPs was noted as a key lever for improvement. Likewise, it was noted that more funding would be needed for surveillance, as well as for basic infection prevention and control measures, awareness education, and research and development. Inter- and intra-sector collaboration and synchronization of efforts involving the public and CSOs were felt to be key to containment in a federal system of governance.

## 2024 Progress Summary of Updated Scores

India has yet to release an updated NAP at this time, although surveyed experts indicated that the second iteration is currently being finalized.

The national plan is complemented by some states having released their own AMR plans. As of March 2022, only four states have functional state action plans in implementation.<sup>57</sup> Kerala in particular has been successful, creating a public-private partnership that has realized their AMR action plan in three essential areas: statewide, standardized update to clinical protocols on antimicrobial use, medical school curriculum training on AMR, and general practitioner training on AMR.<sup>58</sup> Efforts are needed to expand initiatives like the four successful state action plans to the other 24 states.



## KEY FINDINGS

- India has a number of active research projects and ongoing research collaborations.
- Efforts are needed to expand initiatives like the four successful state action plans to the other 24 states.
- The government has moved to fund its NAP.
- The government has started awareness monitoring.
- India has a few initiatives that are working to improve environmental measures.

The federal government has moved to fund its NAP and has begun awareness monitoring. India has a number of active research projects and ongoing research collaborations, including several with the United Kingdom.<sup>59</sup> There is movement toward improving metrics within AMR and the environment. However, experts surveyed noted the need to implement solutions to reduce antimicrobial waste pollution, including that from the pharmaceutical manufacturing industry. Mandated attainment of an independent manufacturing certification like that available from the BSI could demonstrate India's commitment to resolving this issue.

Overall, expert interviews revealed great optimism for India's efforts to mitigate AMR going forward, including the creation of the National Biopharma Mission<sup>60</sup> to expand innovation, with the caveat that continued funding and collaborations between industry and government will be essential to propel this momentum forward.



# ITALY

## 2021 Index Results Baseline

Italy ranked seventh out of eleven countries in the *2021 Index*. Despite high burden of AMR and huge costs to the health system, Italy was noted to have weak commitments to national strategy, innovation, testing infrastructure, and appropriate usage, the latter of which was exacerbated by the COVID-19 pandemic.

Due to high antibiotic consumption, Italy demonstrated a clear need for intensive awareness campaigns and targeted interventions in prescription settings. An alarming drop in immunization rates further highlighted the need for awareness as well as widespread antimicrobial stewardship guidelines. Italy had no specific incentives passed or proposed by the government to encourage the development of new antimicrobials, leading to a weak innovation ecosystem. Experts noted that an overhaul of the reference pricing model that limits the entry of novel antimicrobials would improve access, and decentralized standards and data collection would improve surveillance efforts.

## 2024 Progress Summary of Updated Scores

Emerging from the COVID-19 pandemic, the Italian government has again started serious work on AMR, organizing a number of working groups to consider improvements based on its most recent *National Action Plan on Antimicrobial Resistance (2022–2025)* released in August 2022.<sup>61</sup>

Their NAP is divided into four broad categories, covering training; information, communication, and transparency; research, information and bioethics; and finally national and international cooperation. The NAP additionally contains three vertical pillars that are dedicated to prevention and control activities in human, animal, and environmental interfaces. They



## KEY FINDINGS

- The Italian government has reinitiated work on AMR since the COVID-19 pandemic, including developing working groups to address key improvements from the NAP.
- The government will start funding AMR initiatives at a national level.
- Italy's newest NAP includes environmental issues.
- Discussions are underway around education for medical professionals on AMR.

include integrated surveillance and monitoring, prevention of hospital-acquired infections (HAIs), and appropriate use of antibiotics in hospital and veterinary fields.

Italy is stagnating on innovation, with no measurable progress toward a pull incentive. In a 2022 special issue report on recommendations to combat AMR authored by a number of healthcare and medical groups in Italy, there was mention of other countries like the UK moving toward pull incentives to incentivize innovation, and a related recommendation for Italy was included. However, national efforts have not progressed.<sup>62</sup> As Italy begins its G7 Presidency in 2024, AMR is likely to be included as a prioritized issue, according to an interviewed expert. The G7 Presidency gives Italy the opportunity to lead the discourse on AMR on the world stage and commit to implementation of pull incentives, which have been called for in previous G7 communiqués.<sup>63</sup>

There is also an informal focus on One Health approaches in Italy, which is enabled through research activities at regional institutes.<sup>64</sup> The government will start funding AMR initiatives at a national level, primarily through the Ministries of Health and of Education, but surveyed experts have expressed a need to include dedicated regional funding and dedicated resources at the hospital level. Finally, discussions are underway around education for medical professionals on AMR. Experts indicated that strengthening the clinical and scientific workforce to combat AMR as an underfunded area in Italy and greater access to resources like e-learning modules could help to strengthen awareness in the hospital workforce. Finally, as the only major antimicrobial manufacturer in the Global North, Italy has the opportunity to make real strides toward setting standards around antimicrobial manufacturing pollution.



# JAPAN

## 2021 Index Results Baseline

Japan ranked fifth out of eleven in 2021. Prevention efforts were commended as a major strength, although Japan was noted to have relatively low vaccination rates, despite improvement of this metric as a preventative measure set as a goal of the National Action Plan, which ended in 2020.

AMR does not receive much political attention in Japan, which could possibly contribute to the low vaccination rates, despite Japan having a very robust healthcare system with low out-of-pocket costs for patients. Further, testing and surveillance programs were found to be too narrow in scope to effectively capture necessary data to drive political impetus.

## 2024 Progress Summary of Updated Scores

Japan recently updated its National Action Plan on AMR for 2023–2027,<sup>65</sup> including within it six key objectives: public awareness and education, investigation and monitoring of trends, infection prevention and control, appropriate use of antimicrobials, research and development of antimicrobials, and international cooperation.<sup>66</sup>

Significant infrastructure changes are underway. Japan will reform its public health infrastructure, merging the National Center for Global Health and Medicine (NCGM) and the National Institute of Infectious Diseases (NIID) and some Japan Agency for Medical Research and Development (AMED) functions under the Cabinet Office.

Surveillance programs have progressed significantly since 2021, especially for previously unseen areas like long-term care facilities. Interviewed experts also expressed that goals



## KEY FINDINGS

- The government has put forth plans for an “Antimicrobial Securement Support Program” as an incentive intended to encourage new research and development. These plans are a positive first step, although their design is more effective for enabling access than incentivizing R&D. A very limited official period for stakeholder input into the plans was a potential missed opportunity.
- Japan will fully reform its public health infrastructure, merging NCGM and NIID and some AMED functions under the Cabinet Office.
- Surveillance programs have progressed significantly since 2021, especially for previously unseen areas like long-term care facilities and limited unseen areas like clinics.
- Japan released a new NAP in 2023 that highlights the need for collaboration and R&D efforts. Japan has increased funding for collaborations on AMR in line with the new NAP.

for decreased consumption of antimicrobials are on track. Further, Japan continues to fund wastewater monitoring programs.<sup>67</sup>

Finally, the innovation ecosystem may see some change in coming years. In addition to supporting GARDP, the draft government budget for 2024 includes a new contribution to CARB-X. Moreover, in response to calls for pull incentives in Japan and around the world, the government has outlined plans to create an “Antimicrobial Securement Support Program.” The government has called for forecasting to determine the market size of any drugs selected for the new program. If sales exceed the

calculated market size, companies will be contractually obligated to invest profits into new R&D. Under the proposed plan, government funding would only be available for selected antimicrobials if they underperform projections and only to up to the amount needed to match the pre-calculated market size. It is unclear as of yet the extent to which the proposed system will be able to effectively incentivize new R&D. Interviewed experts conveyed that discussions on how to implement this program remain ongoing.



# SOUTH KOREA

## 2021 Index Results Baseline

In 2021, South Korea ranked eighth out of eleven countries assessed. The country was noted to have prioritized surveillance infrastructure, strong healthcare system infrastructure, and favorable intellectual property and patent policies.

Several gaps in Korea's AMR strategy were identified. These include the need to raise awareness and prioritize prevention, as vaccine spending per capita was low and vaccine costs are not fully covered by national insurance. Further, training on AMR for health professionals was found to be largely inaccessible and narrow in focus. There were also found to be weaknesses in the innovation and regulatory spheres. Very few AMR research projects were underway in the country and there were no antimicrobials in the development pipeline, despite policies encouraging innovation. Finally, there was a noted lag between market approval and reimbursement of novel antimicrobials.

## 2024 Progress Summary of Updated Scores

South Korea released its *Second national action plan on antimicrobial resistance 2021–2025* in 2022.<sup>68</sup>

Their approach to AMR management is largely divided into two strategies, the first being enforcement of proper antibiotic usage to prevent the spread of resistance and the implementation of stronger infection prevention and control measures to prevent the spread of already resistant pathogens. The NAP includes measurable goals, including the construction of new hospitals and a 100% completion rate of antimicrobial stewardship programs within hospitals. Expert interviews also revealed that there are legal mechanisms outside of the NAP that govern work related to AMR, which include a regulation



## KEY FINDINGS

- Resources for AMR remain a challenge, but funding is increasing.
- Major efforts to enhance surveillance systems are underway.
- South Korea has current basic research science projects, but not all are government supported.
- South Korea will increase and fund the use of ASTs in hospitals.
- Awareness remains a challenge.

requiring hospitals to report AMR pathogen discovery in humans to the Korea Disease Control and Prevention Agency.<sup>69</sup> Funding and resources devoted to AMR should be increased.

South Korea should continue to focus on fostering a favorable innovation ecosystem. However, recently, an amendment to the Patent Act has been proposed that could weaken pharmaceutical innovation. While there are currently a number of basic research science projects underway, not all are government supported. Increased government funding would also help to spur innovation. Experts have also shown concern for the lack of government interest in expediting access to novel antibiotics.

South Korea has made progress in appropriate use. Major efforts to enhance surveillance systems are underway, and the country will increase and fund the use of ASTs in hospitals. Public awareness remains a challenge, however. It is addressed through the new NAP, which contains provisions to conduct surveys and outreach related to AMR with both the public and various healthcare professionals.<sup>70</sup> The NAP also outlines goals to improve stewardship programs to promote responsible and appropriate use.<sup>71</sup>

South Korea has made some progress in access, with reforms to its health technology assessment (HTA) system to expand reimbursement and coverage for antimicrobials. Under the Health Insurance Review and Assessment Service's Drug Expenditure Rationalization Plan, drugs must meet positive list criteria to be reimbursed, which includes economic valuation considerations. In 2020, the exemption pathway for drugs with no alternatives was expanded to include antimicrobials.<sup>72</sup> However, experts cite the securement of new antimicrobials as a major challenge still threatening AMR progress. Due to the complicated regulatory system, only a few recently developed antibiotics are available in the country, and experts feel that the Korean FDA must urgently improve its regulatory process to address limited availability of new antibiotics.



# UNITED KINGDOM

## 2021 Index Results Baseline

The UK ranked first overall in the *2021 Index*, having demonstrated a strong willingness to address AMR head-on. In particular, the UK was noted to have developed a strong National Action Plan with comprehensive scope, including pet owners, veterinarians, and farmers, and plans for a first-of-its-kind pull incentive to encourage innovation in the development of antibiotics.

That said, there remained room for improvement. As noted in the NAP itself, the UK innovation pipeline was found to be inadequate, although this was not an issue unique to the UK. There were also noted regulatory barriers, such as long lags between market approval and reimbursement that impede access to new drugs. Funding for AMR overall was agreed by experts to be too low, and more resources needed to be devoted to stewardship and awareness across the health system.

## 2024 Progress Summary of Updated Scores

The UK is currently at the end of its five-year NAP (2019–2024), which focuses on reducing the need for and optimizing the use of antimicrobials, investing in innovation to increase the supply and access to antimicrobials, and involving public and private sector participation.

The next iteration of its plan is under development and will span 2024–2029. The UK is one of the only countries to have a specific global envoy or ambassador on AMR.<sup>73</sup>

In addition to supporting CARB-X and GARDP,<sup>74</sup> the UK is moving to permanent implementation of its pilot of a fully delinked pull incentive scheme to encourage innovation in antimicrobial development.<sup>75</sup> The National Health Service (NHS) is currently



## KEY FINDINGS

- UK has moved to make its pilot pull incentive model permanent beginning in 2024, the first and only country in the world to do so, in addition to renewing support to push mechanisms such as CARB-X and GARDP.
- UK has progressed across funding, access, and surveillance metrics.
- While leading the charge against AMR at the global level, the UK must ensure to continue to iterate on the work it has done to ensure that progress is not lost.

involved in consultancy proposals on the forms that the subscription-style contracts could take.<sup>76</sup> Contracts under the subscription system can achieve different value bands but could be set up to 20 million pounds for antibiotics meeting clinical criteria set by the National Institute for Health and Care Excellence (NICE).<sup>77</sup> This incentive is delinked from sales volume. While this is an innovative approach, much of the success can be attributed to these drugs having already been developed, and the higher value bands will need to be realistically achievable to unlock full incentive potential in incentivizing new innovation.<sup>78</sup> The newly proposed pull incentive has new scoring criteria

that are different from those of the pilot plan. These new criteria aim to also address lags between market approval and reimbursement that impede access to new drugs as noted in the *2021 Index*. These include allowing the company to apply for a subscription-style contract even while the marketing authorization process is ongoing.<sup>79</sup> The UK has also attempted to convene agreement for G7-wide “shared principles” for market incentives<sup>80</sup>, with the aim to build a collective effort that adds up to more than the sum of their individual parts in each country. There has been some progress, with a joint finance ministers’ statement,<sup>81</sup> but other countries are yet to implement or deliver against the agreements made at the end of 2021.

Further, the UK has progressed across funding, access, and surveillance metrics, for example, renewing its funding for both CARB-X and GARDP. Experts surveyed indicated that while work in the environmental sector is not always clearly seen, there have been recent investments by the government into a pathogen surveillance program in agriculture, food, and the environment (PATH-SAFE).<sup>82</sup> Although the UK is leading the world’s charge against AMR, the government must ensure that it continues to iterate and innovate on what the country is already doing, continuing to raise the standard, as AMR remains a critical and urgent issue.



# UNITED STATES

## 2021 Index Results Baseline

In 2021, the US ranked second overall among the countries evaluated. The US has been a notable leader in many international partnerships against AMR, as well as innovation.

However, several gaps and concerning trends were noted. Antibiotic usage increased during the COVID-19 pandemic, which may have been due to bacterial co-infections, but it is estimated that as much as 70% of the antibiotics dispensed to patients with COVID-19<sup>83</sup> were not strictly needed. Further, in hospital settings, an estimated 20–50% of antibiotic prescriptions were thought to be inappropriate. This trend could be in part due to understaffed and under-resourced antimicrobial stewardship programs and the lack of patient integration into awareness campaigns and resulting requests to prescribe. Antibiotic overprescribing in outpatient settings was also seen to be unacceptably high. Finally, there were large research gaps regarding AMR and environmental implications and the stagnated potential of the introduced but yet-unpassed PASTEUR Act, which experts cited as a key type of policy to promote novel antimicrobial innovation.

## 2024 Progress Summary of Updated Scores

The US remains in the same iteration of its National Action Plan, entitled the *U.S. National Action Plan for Combating Antibiotic-Resistant Bacteria (CARB)* for 2020–2025.

The CARB lists multiple objectives and sub-objectives across five national goals.

The US government continues to lead on push incentives. In 2022, BARDA committed up to US\$300 million over ten years to support CARB-X.<sup>84</sup> With respect to pull incentives, the PASTEUR Act continues to gain support among legislators, although it is yet to be passed into law. In 2023, House and



## KEY FINDINGS

- BARDA renewed funding to CARB-X for 10 years
- The PASTEUR Act continues to be promoted with bipartisan support and endorsement of over 230 non-government organizations, but has not been passed
- The US continues to lead the world on approvals and access to new antibiotics

Senate subcommittees held hearings on the issue of AMR, which garnered robust bipartisan interest from subcommittee members and expert testimony from physicians, patients, and other key stakeholders about the importance of PASTEUR. Experts repeatedly expressed the need to pass PASTEUR to implement pull incentives that would complement existing push funding for research and development. If enacted, PASTEUR would create a subscription model system to stimulate the creation of new antimicrobials by paying successful therapeutic developers a guaranteed annual amount<sup>85</sup>. Experts consistently cited incentives for AMR drug development as an area that is inadequately supported by the government.

The US continues as the world leader on approvals and access to antibiotics, which has included the development and FDA approval of a few non-traditional antibiotics like Vowst and Rebyota for recurrent *C. difficile* infections and sulbactam/durlobactam for the treatment of infections by *Acinetobacter baumannii*-calcoaceticus complex.<sup>86</sup> Further, contezolid, a new antimicrobial approved in China in 2021, received the go-ahead to be fast-tracked through the FDA regulatory process under the

Generating Antibiotic Incentives Now (GAIN) Act for the treatment of diabetic foot infection in September 2023.<sup>87</sup>

Despite these positive developments, the COVID-19 pandemic has been cited as a barrier to recent progress against AMR, due to clinically inappropriate usage of antimicrobials and a resulting increase of resistant infections. Market challenges and high out-of-pocket

payment concerns further complicate both innovation and access, leading to calls for policy changes.<sup>88</sup>

Looking forward, experts expressed the need to focus on workforce development as a key component to mitigating AMR. In 2022, only 56% of infectious disease physician training programs filled, whereas most other specialties filled 90–100% of their training programs.<sup>89</sup> ID physicians are the fourth lowest reimbursed medical specialty in the US, below general internal medicine physicians, despite years of additional training.<sup>90</sup> Undervalued reimbursement, coupled with high medical student debt, pose major financial barriers to entering the field of infectious disease. In 2022, Congress took a step forward by enacting the Bio-Preparedness Workforce Pilot Program to provide targeted loan repayment to ID healthcare professionals who work in underserved areas.<sup>91</sup> Congress must now appropriate funding in order to launch the pilot. The government should also seek to level the playing field with regard to physician reimbursement in order to enable recruitment and retention of ID physicians.



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# IDSA

Infectious Diseases Society of America

IDSA is a leader on issues of importance to ID professionals, including education and training, policy and advocacy, setting guidelines for patient care, and developing resources for clinical practice. It remains at the forefront of global health issues such as COVID-19, antimicrobial resistance and HIV/AIDS. Housed within IDSA is the HIV Medicine Association, (HIVMA) which represents medical providers and researchers working on the front lines of HIV. More than 12,000 IDSA and HIVMA members work across the United States and in nearly 100 other countries on six different continents. For more information visit [www.idsociety.org](http://www.idsociety.org). Follow IDSA on Facebook and X.

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