

GLOBAL ANTIMICROBIAL RESISTANCE AND USE SURVEILLANCE SYSTEM (GLASS)



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REGIONAL WORKSHOP ON INTERPRETATION AMR AMU / AMR DATA TO IMPROVE
EVIDENCE-BASED DECISION MAKING IN ASIA AND THE PACIFIC

18 to 19 NOVEMBER 2025



Global Commitments

- UNGA High-Level Meeting on AMR (2024)
- WHO Pandemic Agreement (2025)

September 2024: 79th UNGA High-Level Meeting on Antimicrobial Resistance (AMR)

Global leaders pledged to reduce the estimated 4.95 million annual AMR-associated deaths by 10% by 2030.

Commitments:

98 - Strengthen national capacities for sustainable, sector-specific, integrated and interoperable surveillance systems for antimicrobial resistance and antimicrobial use, standards of diagnostics, laboratory information systems and networks, to support **collection of nationally representative data on prevalence, antimicrobial resistance patterns, re-emerging disease surveillance, mortality and morbidity attributable to antimicrobial resistance, data on antimicrobial use across sectors and monitoring of WASH in healthcare facilities and community settings and the environment, and to share relevant information on emerging trends to inform decision-making at all levels**



99 - Encourage **all countries** to report **quality surveillance data on antimicrobial resistance and antimicrobial use by 2030**, through existing global surveillance systems, including the **Global Antimicrobial Resistance and Use Surveillance System (GLASS)**,

100 - Improve access to diagnosis and care, so at least **80 per cent of countries** can **test resistance in all bacterial and fungal pathogens** included in the **Global Antimicrobial Resistance and Use Surveillance System (GLASS)** by 2030



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Objectives of GLASS-AMR



GLASS is a global system for the standardized collection, analysis, and sharing of epidemiological, clinical, and microbiological AMR data

Aim: estimate antimicrobial resistance at national, regional and global levels, and monitor the global response.

Additionally, it aims to:

- guide national and global treatment guidelines on empirical treatment
- foster national AMR surveillance systems and harmonize global standards;
- detect emerging resistance and its international spread; and
- inform research and development of new tools for the prevention, diagnosis and treatment of human infections caused by common bacterial pathogens.



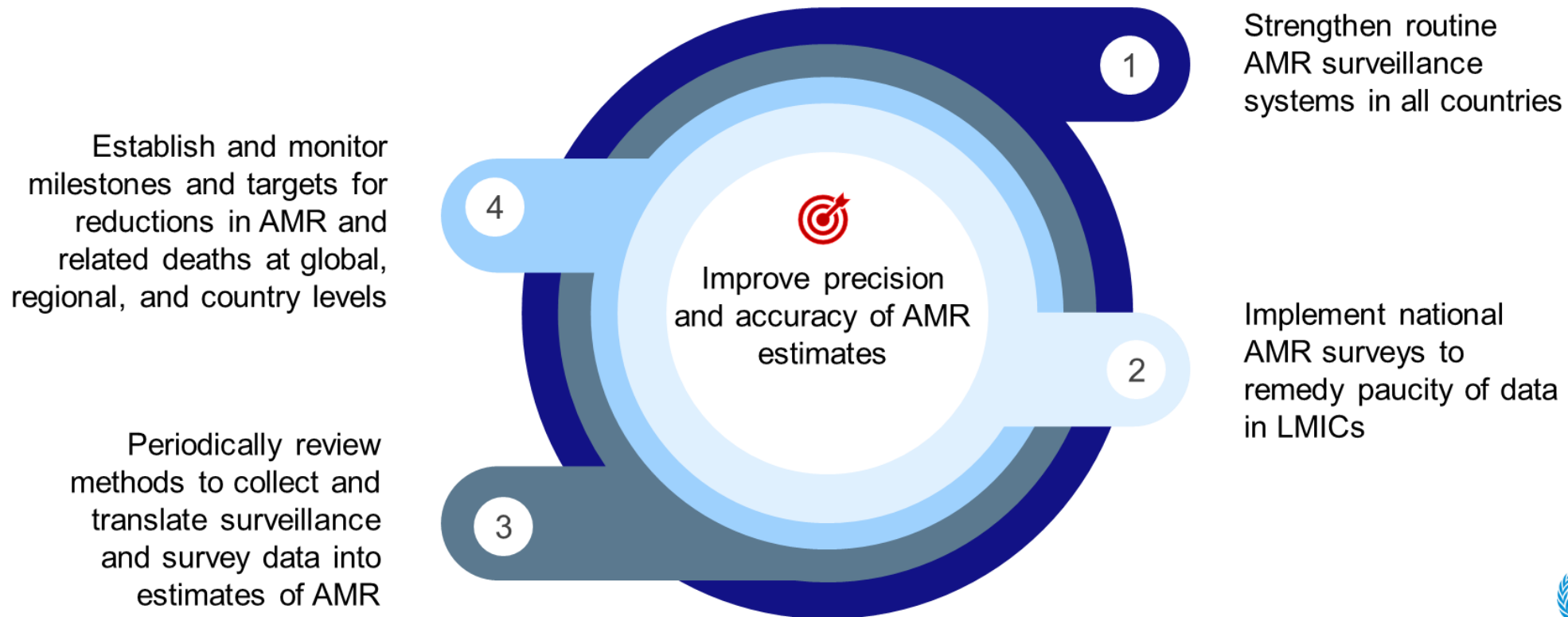
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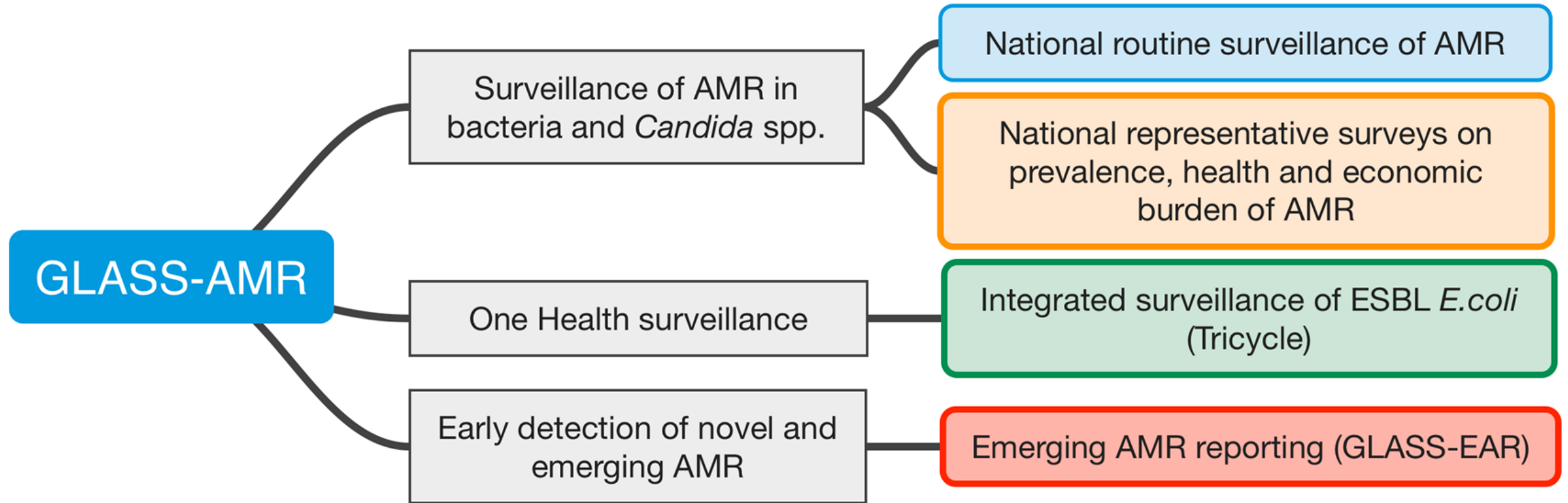
GLASS-AMR Strategy

GLASS: a global system for the standardized collection, analysis, and sharing of epidemiological, clinical, and microbiological AMR data

Aim: estimate antimicrobial resistance and monitor the global response

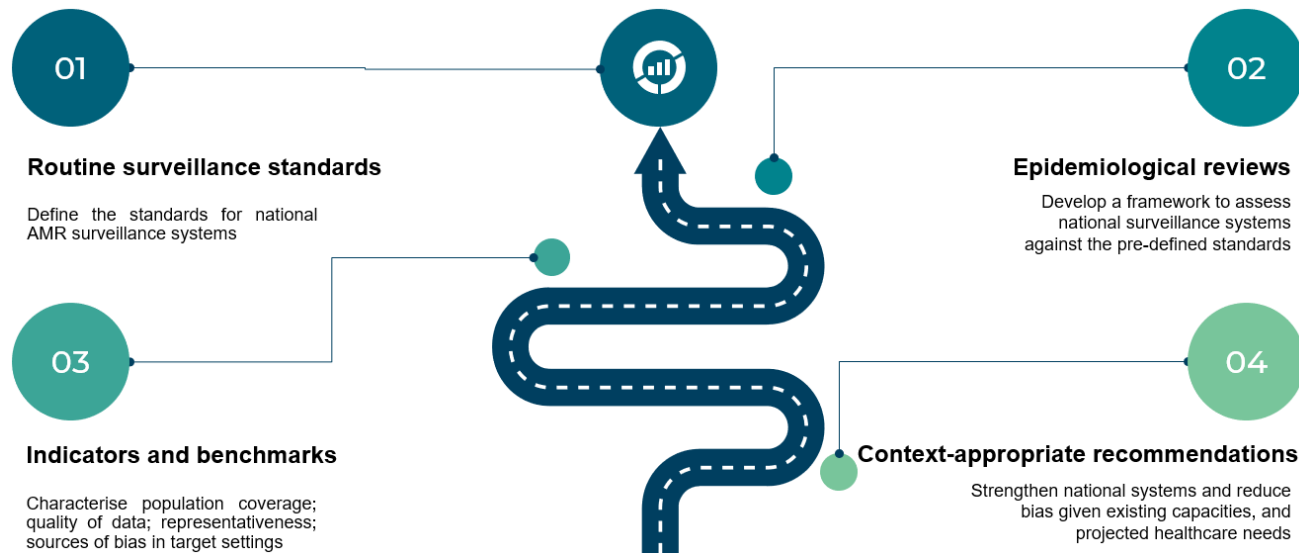


GLASS AMR in 2025



Two-Pronged Approach

Strengthening routine surveillance



GLASS enhancements: Shift from aggregated- to individual-level data including molecular AMR data; enhanced surveillance of fungal infections; new IT platform based on DHIS2; improved metadata to better interpret AMR findings.

<https://www.who.int/publications/i/item/9789240076600>

National surveys of prevalence, health and economic burden of AMR in human BSIs



Surveys are planned or ongoing in Kyrgyzstan, Indonesia, Malawi, with plans to scale-up.

<https://www.who.int/publications/i/item/9789240067004>

<https://www.who.int/publications/i/item/9789240000650>



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Pathogen targets



<https://www.who.int/publications/i/item/9789240076600>

Target pathogens	Blood	CSF	Urine	Stool	Lower respiratory tract	Urethral, cervical, rectal, pharyngeal swabs
Acinetobacter spp.	●	○			●	
E. coli	●	○	●		○	
K. pneumoniae	●	○	●		●	
P. aeruginosa	●	○			●	
S. aureus	●	○			●	
S. pneumoniae	●	●			●	
N. meningitidis	●	●				
H. influenzae	○	●			●	
Salmonella spp. (non-typhoidal)	●	○		●		
S. enterica serovar Typhi	●			○		
S. enterica serovar Paratyphi A	●			○		
Shigella spp.				●		
N. gonorrhoeae						●

13 bacterial pathogens. 9 specimen types. 32 antibiotics across 11 antimicrobial classes

The newest addition: AMR in **Candida spp.**

Specimens, pathogens, and antimicrobials selected for global surveillance

- Detection of the most important antibiotic resistance mechanisms
- Consideration given to antimicrobials that are commonly used and available locally and nationally
- **32 antimicrobial drugs monitored**
- According to WHO AWaRe categorization of antibiotics
 - 11 in “Access” group
 - 18 in “Watch” group
 - 3 in “Reserve” group
- 18 antibiotics included in the current WHO EMLs

Specimen ^a	Laboratory case definition ^b	Pathogens under surveillance ^c	Antimicrobial group (ATC) ^d	Antimicrobials to report to GLASS if tested ^e
Blood ^f	Isolation of pathogen from blood ^h	<i>Acinetobacter</i> spp. ^g	Tetracyclines ⁱ Aminoglycosides ^j Carbapenems ^k Polymyxins ^l	Tigecycline, minocycline ^m Gentamicin, amikacin ⁿ Imipenem, meropenem, doripenem ^o Colistin ^p
		<i>E. coli</i> and <i>K. pneumoniae</i> ^q	Sulfonamides and trimethoprim ^r Fluoroquinolones ^s Third-generation cephalosporins ^t Fourth-generation cephalosporins ^u Carbapenems ^v Polymyxins ^w	Co-trimoxazole ^x Ciprofloxacin, levofloxacin ^y Ceftriaxone, cefotaxime, ceftazidime ^z Cefepime ^{aa} Imipenem, meropenem, ertapenem, doripenem ^{ab} Colistin ^{ac}
		<i>P. aeruginosa</i> ^{ad}	Third-generation cephalosporins ^{ae} Combinations of penicillins, including beta-lactamase inhibitors ^{af} Aminoglycosides ^{ag} Carbapenems ^{ah} Polymyxins ^{ai}	Ceftazidime ^{aj} Piperacillin/tazobactam ^{ak} Gentamicin, amikacin, tobramycin ^{al} Imipenem, meropenem, doripenem ^{am} Colistin ^{an}
		<i>S. aureus</i> ^{ao}	Beta-lactamase resistant penicillins ^{ap} Second-generation cephalosporins ^{aq}	Oxacillin ^{ar} ^{as} Cefoxitin ^{at}
		<i>S. pneumoniae</i> ^{au}	Beta-lactamase sensitive penicillins ^{av} Beta-lactamase resistant penicillins ^{aw} Third-generation cephalosporins ^{ax} Sulfonamides and trimethoprim ^{ay} Macrolides ^{az}	Penicillin G ^{ba} Oxacillin ^{bb} ^{bc} Ceftriaxone, cefotaxime ^{bd} Co-trimoxazole ^{be} Erythromycin ^{bf}
		<i>Salmonella</i> spp. ^{bg}	Fluoroquinolones ^{bh} Third-generation cephalosporins ^{bi} Carbapenems ^{bj}	Ciprofloxacin, levofloxacin ^{bk} Ceftriaxone, cefotaxime, ceftazidime ^{bl} Imipenem, meropenem, ertapenem, doripenem ^{bm}
		<i>Salmonella enterica</i> serovar Typhi and <i>Salmonella enterica</i> serovar Paratyphi A ^{bn}	Amphenicols ^{bo} Penicillins with extended spectrum ^{bp} Sulfonamides and trimethoprim ^{bq} Fluoroquinolones ^{br} Third-generation cephalosporins ^{bs} Macrolides ^{bt}	Chloramphenicol ^{bu} Ampicillin ^{bv} Co-trimoxazole ^{bw} Ciprofloxacin, levofloxacin ^{bx} Ceftriaxone, cefotaxime, ceftazidime ^{by} Azithromycin ^{bz}
Stool	Isolation of <i>Salmonella</i> spp. ^h or <i>Shigella</i> spp. from stool	<i>Salmonella</i> spp.	Sulfonamides and trimethoprim ^c Fluoroquinolones ^d Third-generation cephalosporins ^e Carbapenems ^f	Co-trimoxazole ^g Ciprofloxacin, levofloxacin ^h Ceftriaxone, cefotaxime, ceftazidime ⁱ Imipenem, meropenem, ertapenem, doripenem ^j
		<i>Shigella</i> spp.	Sulfonamides and trimethoprim ^k Fluoroquinolones ^l Third-generation cephalosporins ^m Macrolides ⁿ	Co-trimoxazole ^o Ciprofloxacin, levofloxacin ^p Ceftriaxone, cefotaxime, ceftazidime ^q Azithromycin ^r
		<i>P. aeruginosa</i>	Polymyxins ^s Third-generation cephalosporins ^t Combinations of penicillins, including beta-lactamase inhibitors ^u Aminoglycosides ^v Carbapenems ^w Polymyxins ^x	Colistin ^y Ceftazidime ^z Piperacillin/tazobactam ^{aa} Gentamicin, amikacin, tobramycin ^{ab} Imipenem, meropenem, doripenem ^{ac} Colistin ^{ad}

^a Any pathogen isolated from a blood culture may be significant for local and national surveillance; only the pathogens selected for global surveillance are listed here

^b Imipenem or meropenem is preferred to represent the group when available

^c Recommended for the detection of methicillin resistance in *Staphylococcus aureus* (MRSA) when using disk diffusion testing.

^d Oxacillin disk testing is a screening for reduced susceptibility or resistance to penicillin

^e Not serovar Typhi or Paratyphi A

^f Urinary catheter samples should be excluded if possible

^g Discriminate serovar Typhi or Paratyphi A whenever possible



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Key Enhancements to GLASS

Global Antimicrobial Resistance and Use Surveillance System (GLASS)

GLASS manual for antimicrobial resistance surveillance in common bacteria causing human infection



Shift from aggregated-
to individual-level data



More infectious
syndromes, bacterial
pathogens and antibiotics



New IT platform based
on DHIS2



Metadata to facilitate the
interpretation of AMR
rates at population level



Complementary methods
to address global data
scarcity



Enhanced surveillance of
fungal infections



025



GLASS IT platform updated with new modules individual data on AMR in bacteria and fungi

The screenshot displays the GLASS IT platform interface. At the top, the GLASS logo and World Health Organization emblem are visible, along with a notification bell icon showing 10 alerts, a location dropdown set to 'Australia', and a user profile icon labeled 'SE'. The left sidebar contains a navigation menu with 'HOME' (selected), 'AMR', 'AMR - Individual', and 'AMR - Fungal'. The main content area features three modules: 'AMR 2023', 'AMR - Fungal 2023', and 'AMR - Individual 2023'. Each module has a purple header, an 'ACTION REQUIRED' banner, a description, status information ('OPEN ALL YEAR', '0 files uploaded', '0 questionnaires completed'), and a 'GO' button. The bottom section, 'Your Notifications', lists two identical notifications dated 06/23/2024 regarding a data submission update for the AMR module for year 2022 and country Kingdom of Saudi Arabia.

GLASS World Health Organization

10 Australia SE

★ HOME

- AMR
- AMR - Individual
- AMR - Fungal

Log Out

★ **AMR 2023**

ACTION REQUIRED Please complete the mandatory implementation questionnaire

OPEN ALL YEAR
0 files uploaded
0 questionnaires completed

GO

★ **AMR - Fungal 2023**

ACTION REQUIRED Please complete all mandatory questionnaires/uploads.

OPEN ALL YEAR
0 files uploaded
0 questionnaires completed

GO

★ **AMR - Individual 2023**

ACTION REQUIRED Please complete all mandatory questionnaires/uploads.

OPEN ALL YEAR
0 files uploaded
0 questionnaires completed

GO

Your Notifications

06/23/2024 The data submission for AMR module for year 2022 and country Kingdom of Saudi Arabia has changed to UPDATE REQUEST ACCEPTED. > 🗑️

06/23/2024 The data submission for AMR module for year 2022 and country Kingdom of Saudi Arabia has changed to UPDATE REQUEST ACCEPTED. > 🗑️

GLASS Dashboard

Online fully interactive and flexible data visualization portal of **crude data** submitted by MoH

- Data
- Graphs
- Maps
- GLASS indicators



GLASS dashboard

The GLASS dashboard presents global antimicrobial consumption (AMC) and resistance (AMR) data for countries, territories, and areas (CTAs) that were enrolled in GLASS by the end of 2022, by means of interactive visualisations. CTA profiles for AMR and AMC are also provided. Dashboards are optimised for use in Google Chrome.

All figures and underlying data are downloadable.

Further information about GLASS can be found in the link below. The link also provides access to comprehensive pdf GLASS reports for previous years.

[Go to WHO Global Antimicrobial Resistance and Use Surveillance System \(GLASS\)](#)



Global AMC data

[Explore](#)

Global AMR data

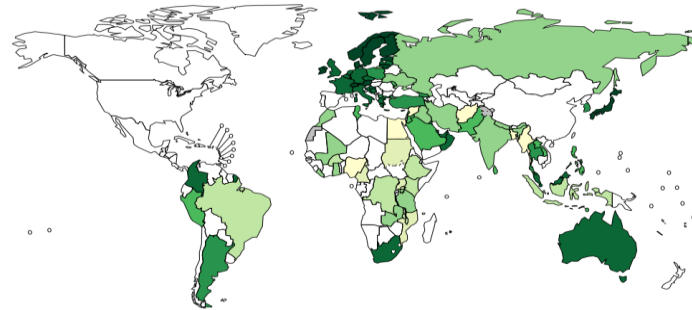
[Explore](#)

Country, territory or area profiles

[Explore](#)

Global maps of testing coverage by infectious syndrome

Year: 2021 Infection syndrome: Bloodstream



BCIs With AST per million population

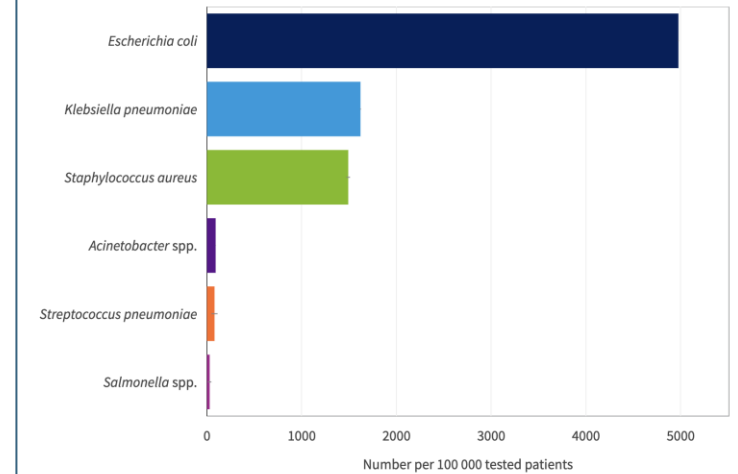
0.7	3.3	9.6	29.4	71.1	234.1	828.1
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No data Not applicable

Global Antimicrobial Resistance and Use Surveillance System (GLASS): data reported by December 2022
Downloaded on 21 May 2024 from worldhealthorg.shinyapps.io/glass-dashboard/

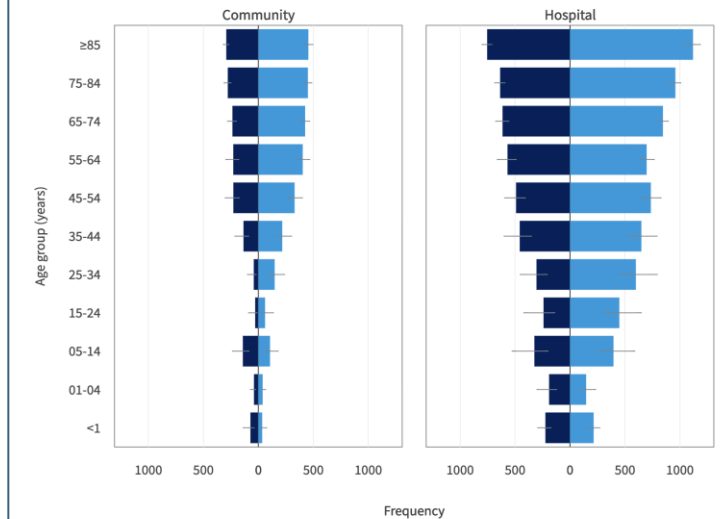


Frequency of bloodstream BCIs due to bacterial pathogens under surveillance per 100 000 tested patients



Bacterial pathogens are arranged in descending order of frequency per 100 000 tested patients.

Methicillin-resistant *Staphylococcus aureus*



Frequency observations per 100,000 tested patients based on < 10 BCIs with AST, are excluded from the plots.



GLASS dashboard

an Union

Anonymised individual-level data submission

- monitor the occurrence of multidrug resistance, critical for informing research and development of new therapeutic and diagnostic tools;
- better manage and validate data
- explore additional data analyses and stratifications;
- generate state/province or regional statistics by including facility identifiers to support an analysis of data by national surveillance systems
- analyse drivers and risk factors linked to resistance
- enhance the ability to study the evolution of resistance during the year
- improve capacity for outbreak detection
- generate transmission trends, using both spatial and genetic information
- provide several additional ways to assess data quality

Individual level variables

GLASS-Bacteria

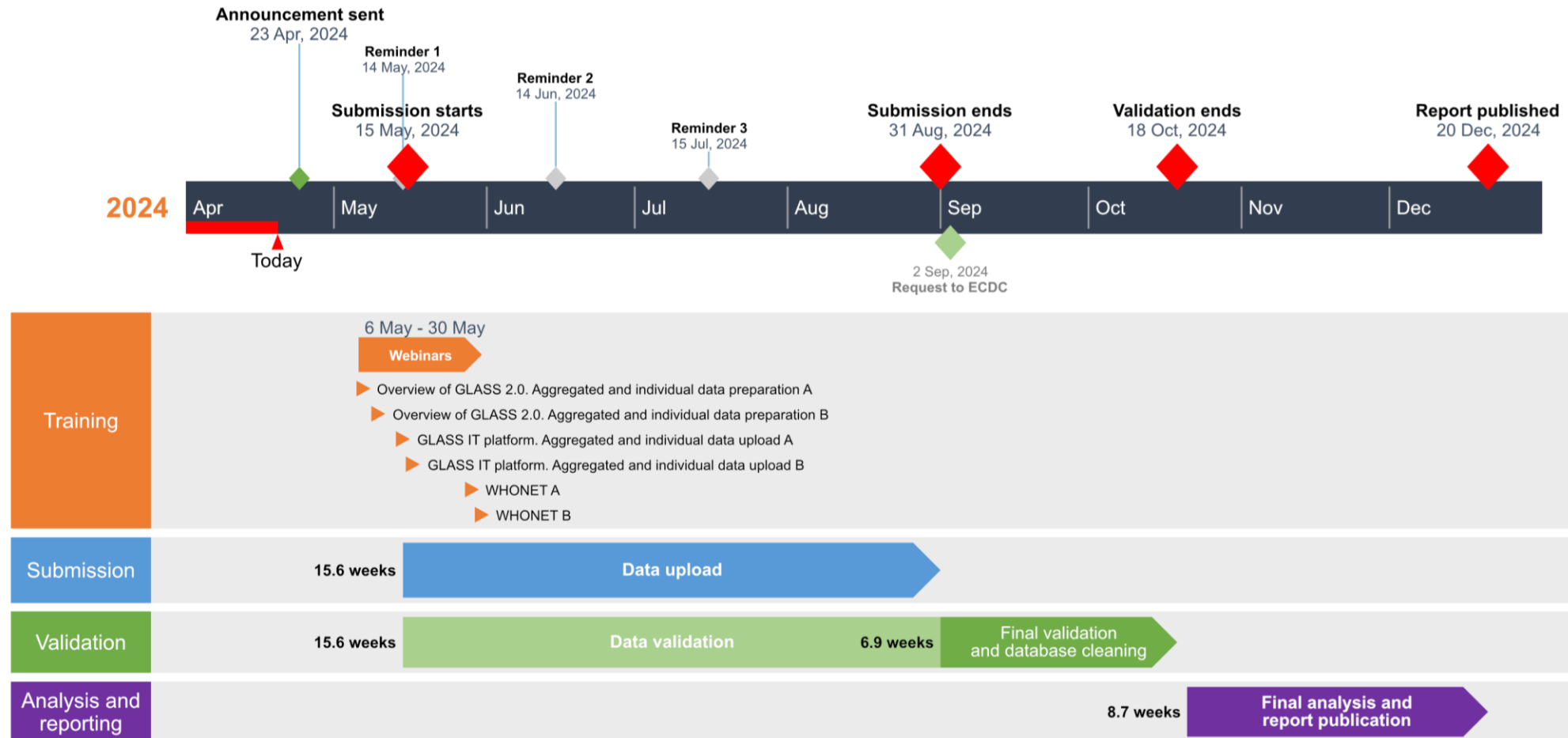
#	Variable name	Type of variable
1	COUNTRY	Coded value
2	YEAR	Numeric
3	HCF_ID	Text
4	HCF_TYPE	Coded value
5	HOSPITALUNITTYPE	Coded value
6	PATIENT_ID	String
7	AGE	Numeric (integer)
8	GENDER	Coded value
9	PATIENTTYPE	Coded value
10	DATEOFHOSPITALISATION_VISIT	Date
11	PATIENTCOUNTER	Numeric (integer)
12	LABORATORYCODE	Coded value
13	SAMPLE_DATE	Date
13	ISOLATEID	Text
14	SPECIMEN	Coded value
16	PATHOGEN	Coded value
17	ANTIBIOTIC	Coded value
18	SIR	Coded value
19	REFERENCEGUIDELINESSIR	Coded value
20	DISKLOAD	Text
21	RESULTETESTSIGN	Coded value
22	RESULTETESTVALUE	Numeric
23	RESULTETESTSIR	Coded value
24	RESULTZONEVALUE	Numeric
25	RESULTZONESIGN	Coded value
26	RESULTZONESIR	Coded value
27	RESULTMICSIGN	Coded value
28	RESULTMICVALUE	Numeric
29	RESULTMICSIR	Coded value

GLASS-FUNGI

#	Variable name	Type of variable
1	COUNTRY	Coded value
2	YEAR	Numeric
3	HCF_ID	Text
4	HCF_TYPE	Coded value
5	HOSPITALUNITTYPE	Coded value
6	PATIENT_ID	String
7	AGE	Numeric (integer)
8	GENDER	Coded value
9	PATIENTTYPE	Coded value
10	DATEOFHOSPITALISATION_VISIT	Date
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12	LABORATORYCODE	Coded value
13	SAMPLE_DATE	Date
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16	PATHOGEN	Coded value
17	ANTIBIOTIC	Coded value
18	SIR	Coded value
19	REFERENCEGUIDELINESSIR	Coded value
21	RESULTETESTSIGN	Coded value
22	RESULTETESTVALUE	Numeric
23	RESULTETESTSIR	Coded value
24	RESULTZONEVALUE	Numeric
25	RESULTZONESIGN	Coded value
26	RESULTZONESIR	Coded value
27	RESULTMICSIGN	Coded value
28	RESULTMICVALUE	Numeric
29	RESULTMICSIR	Coded value
30	AST_METHOD	Coded value
31	IDENT_METHOD	Coded value
32	PERFORMED_TEST	Coded value

GLASS call for AMR data

shortening the reporting cycle



Acknowledgements

This presentation was developed with contributions from colleagues who provided technical insights and materials:

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Thank you

