



GLobal Amtimicrobial Resistance and Use Surveillance SSystem

NATIONAL ACADEMY OF SCIENCES

*COMMITTEE ON THE LONG-TERM MEDICAL AND ECONOMIC
EFFECTS OF ANTIMICROBIAL RESISTANCE, NOVEMBER 2020*

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Outline

- GLASS development
- Summary results
- GLASS in 2020
- Challenges
- Conclusions

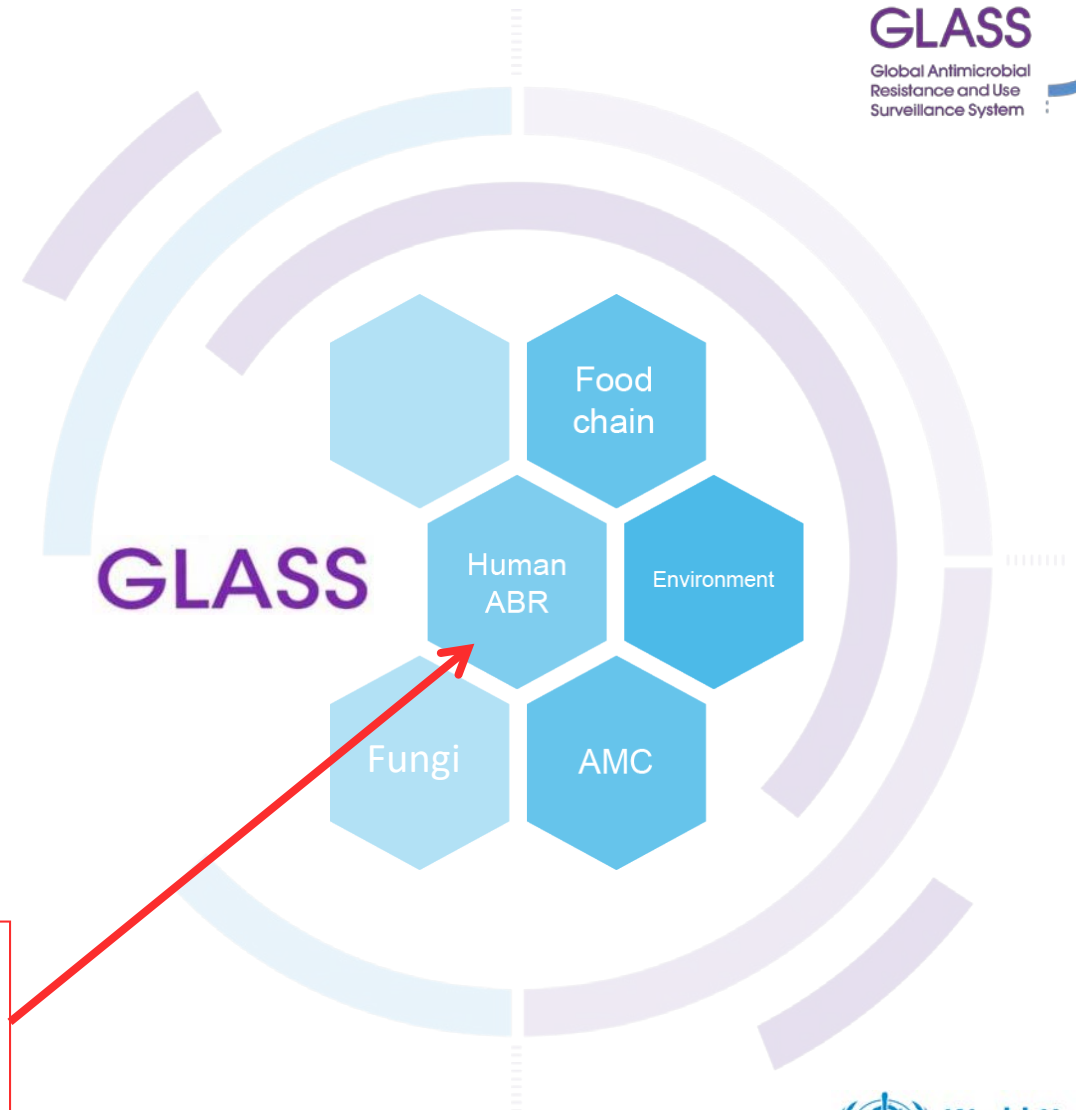


What is GLASS?

Global Antimicrobial Resistance and Use Surveillance System

- The first global system to incorporate official national data from surveillance of AMR
 - standardized approach to the collection, analysis, and sharing of AMR, AMC and AMU data
 - One Health model for AMR surveillance
 - generate data to inform AMR burden estimates

Initial focus:
Bacterial infections in humans



Steps towards the global system



Stockholm, April 2021:

- 3rd High Level Technical Consultation and Meeting on Surveillance of Antimicrobial Resistance and Use for Concerted Actions
- Supported by Republic of Korea and Sweden

Online technical discussions

GLASS environment 2020

ROUTINE DATA SURVEILLANCE

Antimicrobial
Resistance surveillance
(GLASS-AMR)

Antimicrobial Consumption
surveillance (GLASS-AMC)

FOCUSSED SURVEILLANCE

Emerging Antimicrobial
Resistance Reporting
(GLASS-EAR)

Enhanced Gonorrhoeae
surveillance
(GLASS-EGASP)

INITIAL PHASE

Candida spp.
AMR surveillance
(GLASS-Fungi)

INITIAL PHASE

SURVEYS AND STUDIES

One Health AMR
surveillance
(GLASS-One Health)

INITIAL PHASE

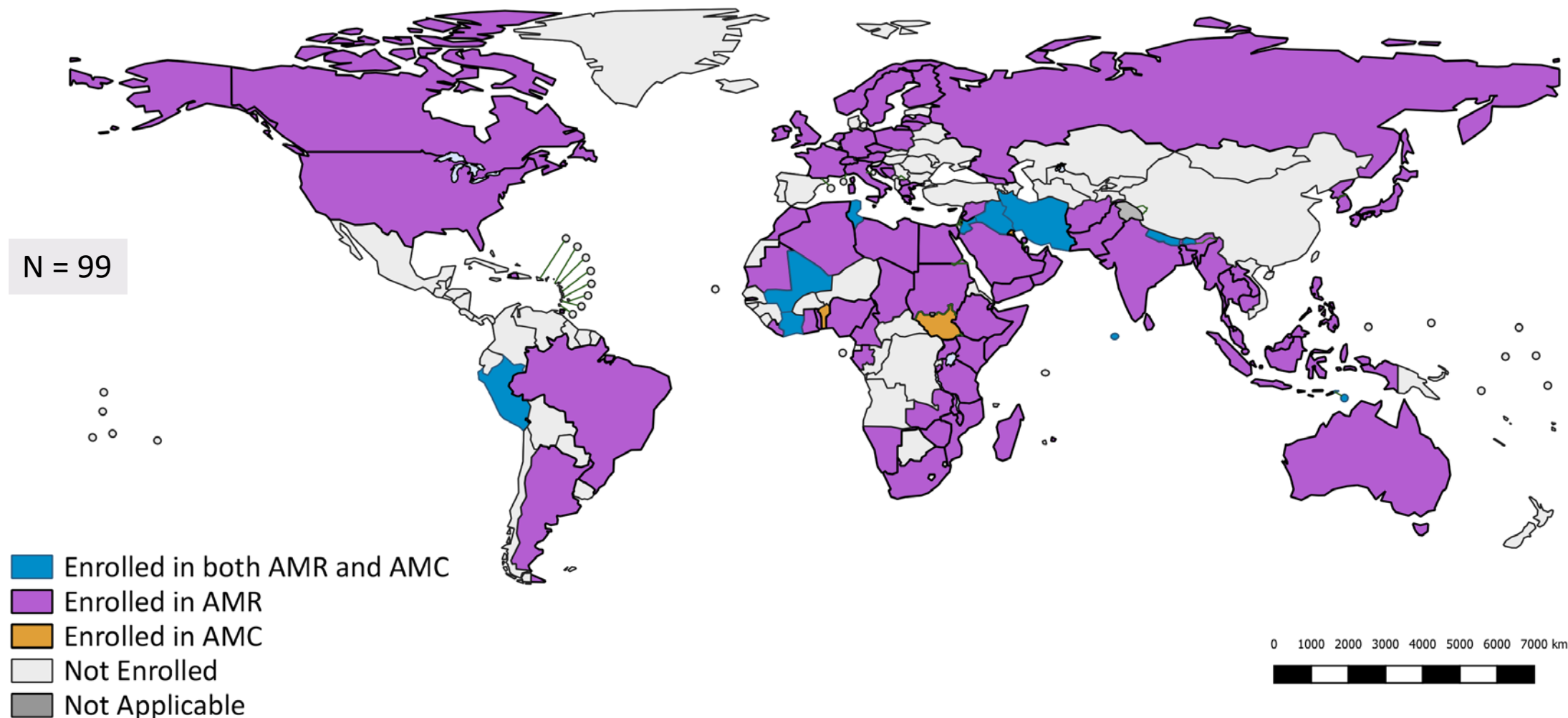
Point Prevalence Survey
methodology for antibiotic use
in hospital

INITIAL PHASE

GLASS methodology
for estimating of
AMR burden

INITIAL PHASE

Countries and territories enrolled in GLASS, as of 22 October 2020

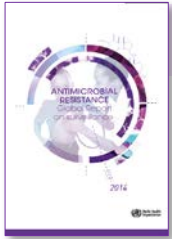


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data source: World Health Organization
Map production: Information Evidence and Research (IER)
World Health Organization
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GLASS impact: progress in surveillance in African Countries

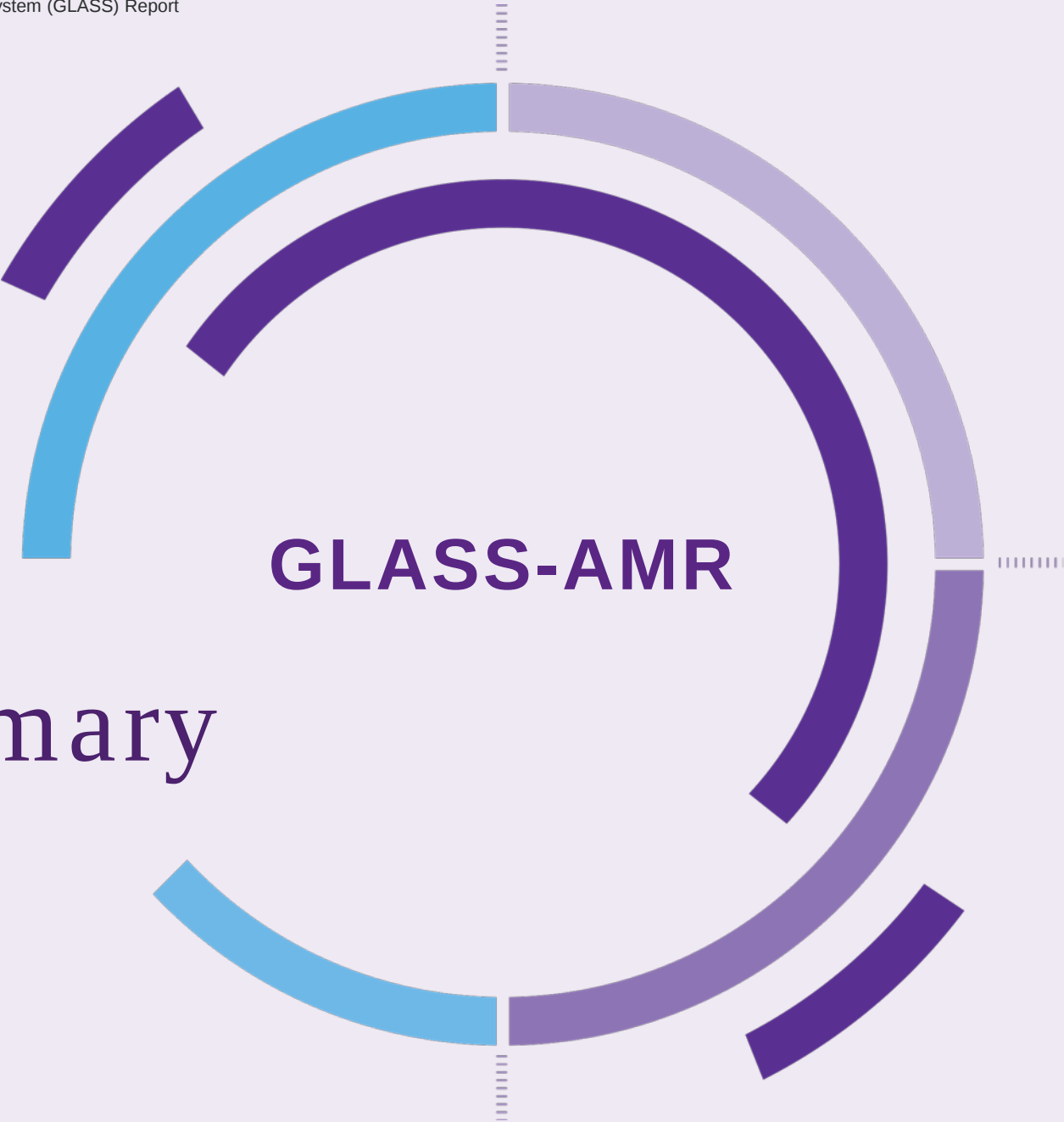


2014 WHO report on AMR surveillance



2020 Countries enrolled in GLASS





Data Summary

What data does GLASS-AMR collect?

Status of national AMR surveillance system

- Indicators collected: overall coordination, surveillance system structure, and quality control

AMR data

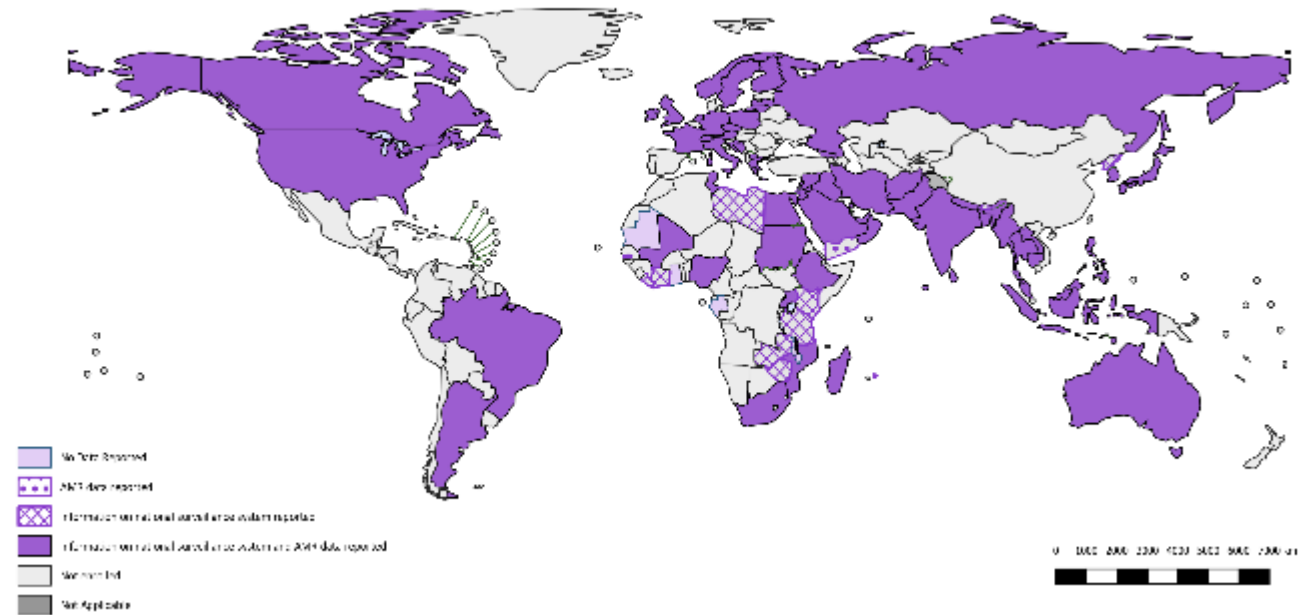
- for eight priority human bacterial pathogens isolated from clinical specimens
 - ✓ blood, urine, stool, and cervical and urethral specimens
- population data:
 - ✓ overall number of patients tested per specific specimen
 - ✓ age, gender, and infection origin (hospital versus community)



GLASS-AMR submission

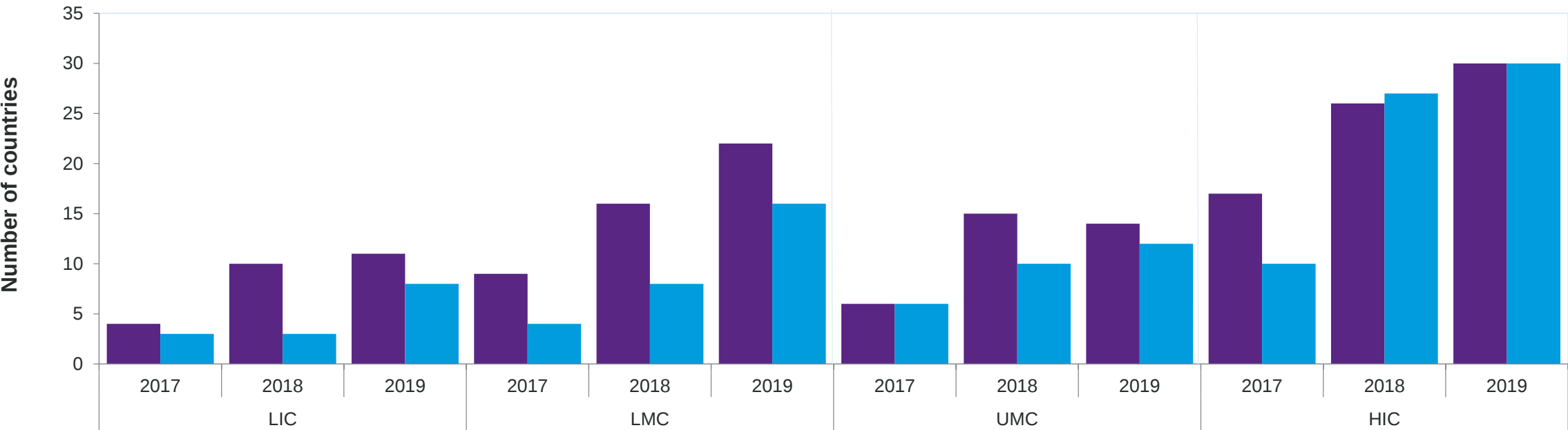
By the end of data call, 31st July 2019

- **82** countries/territories/areas enrolled
- **78** countries/territories/areas submitted data
 - **12** countries provided only the information on the status of their national AMR surveillance systems.
 - **One** country provided AMR rates only
 - **65** countries provided the information on the status of their national AMR surveillance systems and 2018 AMR rates





Reporting by Economic Status

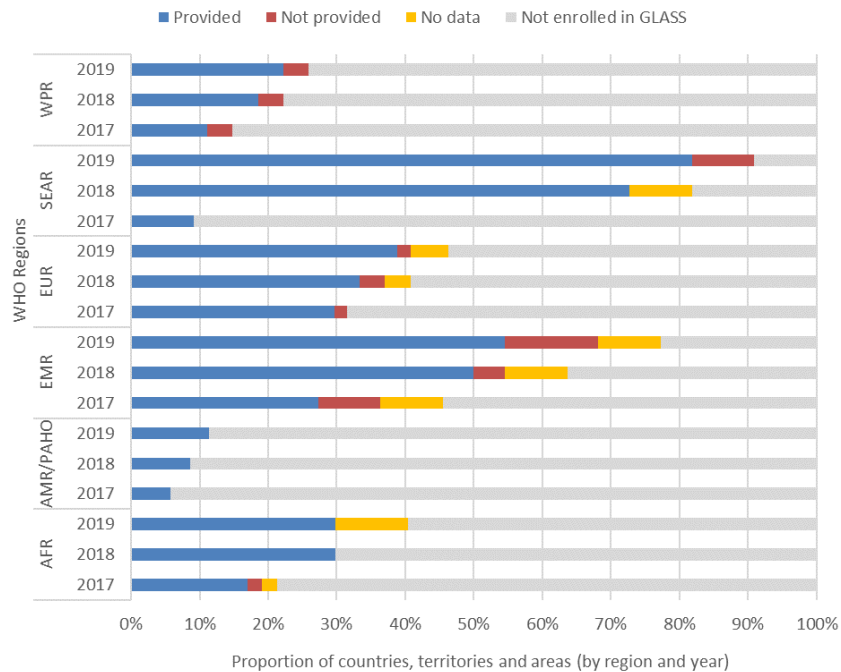


Economic status (World Bank 2019)

■ Information on surveillance system ■ AMR rates

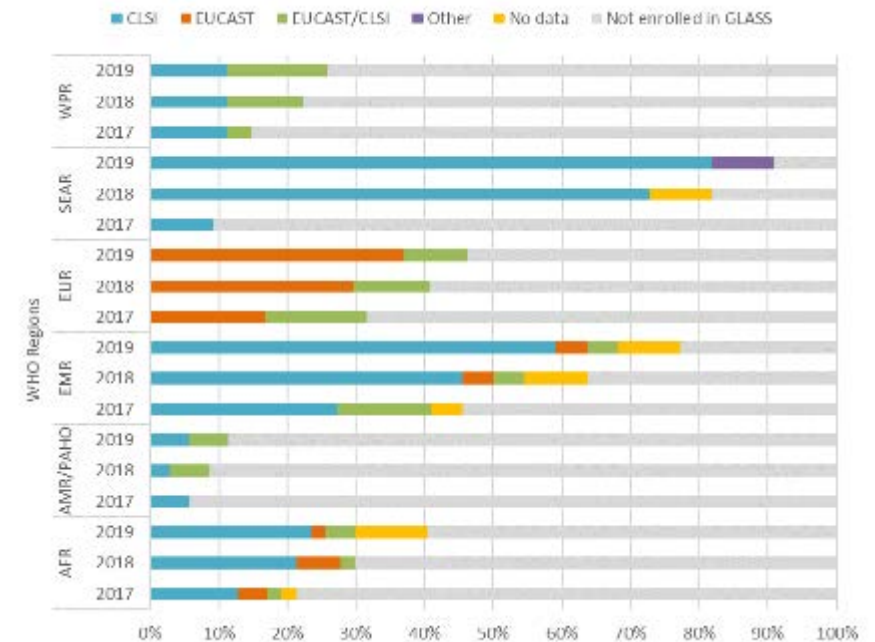
Summary status of national surveillance systems reported by 77 countries, territories and areas

- Almost all NRLs participate in an External Quality Assessment (EQA) scheme
- AST according to internationally recognised standards



EQA provided to NRLs by region and year

AFR, African Region n=47
 AMR/PAHO, Region of the Americas/ Pan American Health Organization n=35
 EMR, Eastern Mediterranean Region n=22



Types of AST standards used by region and year

EUR, European Region = 54
 SEAR, South-East Asia Region n=11
 WPR, Western Pacific Region n=27

AMR data: Progress in reporting

Reported to GLASS - AMR	2017 (22 countries)	2018 (48 countries)	2019 (66 countries)
Number of sites			
Hospitals	466	3,097	5,521
Outpatients clinics	139	2,358	56,818
In-out patients	N.A.	N.A.	1,998
Other institutions	124	560	424
Total	729	6,015	64,761
Number of patients with suspected infection			
Blood stream	81,920	262,265	441,794
Urinary tract	415,679	1,424,011	1,888,545
Gastro-intestinal	7,477	10,735	17,061
Sexually transmitted	2,847	9567	18,572
Total	507,923	1,706,578	2,365,972

Most countries reporting for the third year in a row showed an increase in the number of surveillance sites reporting

GLASS Report 2020: infections by pathogen & site

Infection site	Total number of infected patients	Pathogen	Number of infected patients (by pathogen)				Number of patients with AST results	Pathogen	Number of patients with AST results (by pathogen) ^a			
			Community	Hospital	Unknown	TOTAL			Community	Hospital	Unknown	TOTAL
Bloodstream	441 794	<i>Acinetobacter spp.</i>	1 780	2 736	12 922	17 438	426 010	<i>Acinetobacter spp.</i>	1 495	2 464	11526	15485
		<i>E. coli</i>	48 939	35 974	144 701	229 614		<i>E. coli</i>	46 788	35 544	142140	224472
		<i>K. pneumoniae</i>	15 306	15 455	44 279	75 040		<i>K. pneumoniae</i>	14 465	14 951	42088	71504
		<i>Salmonella spp.</i>	2 947	334	7 907	11 188		<i>Salmonella spp.</i>	1 528	270	7113	8911
		<i>S. aureus</i>	12 030	17 408	60 054	89 492		<i>S. aureus</i>	10 325	17 007	59728	87060
		<i>S. pneumoniae</i>	3 627	1 274	14 121	19 022		<i>S. pneumoniae</i>	3 261	1 236	14081	18578
Urinary tract	1 888 545	<i>E. coli</i>	405 942	164 385	1 121 325	1 691 652	1 705 167	<i>E. coli</i>	293 063	157 075	1079508	1529646
		<i>K. pneumoniae</i>	64 571	42 206	90 116	196 893		<i>K. pneumoniae</i>	51 154	40 541	83826	175521
Gastroenteric	17 061	<i>Salmonella spp.</i>	2 630	257	9 269	12 156	15 029	<i>Salmonella spp.</i>	1 966	152	8207	10325
		<i>Shigella spp.</i>	375	42	4 488	4 905		<i>Shigella spp.</i>	358	29	4317	4704
Genital	18 572	<i>N. gonorrhoeae</i>	16 336	1	2 235	18 572	18 362	<i>N. gonorrhoeae</i>	16 195	0	2167	18362
Total	2 365 972		574 483	280 072	1 511 417	2 365 972	2 164 568		440 598	269 269	1,454,701	2,164,568

Sustainable Development Goal AMR Indicator



Goal 3: Ensure healthy lives and promote well-being for all at all ages

TARGET 3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

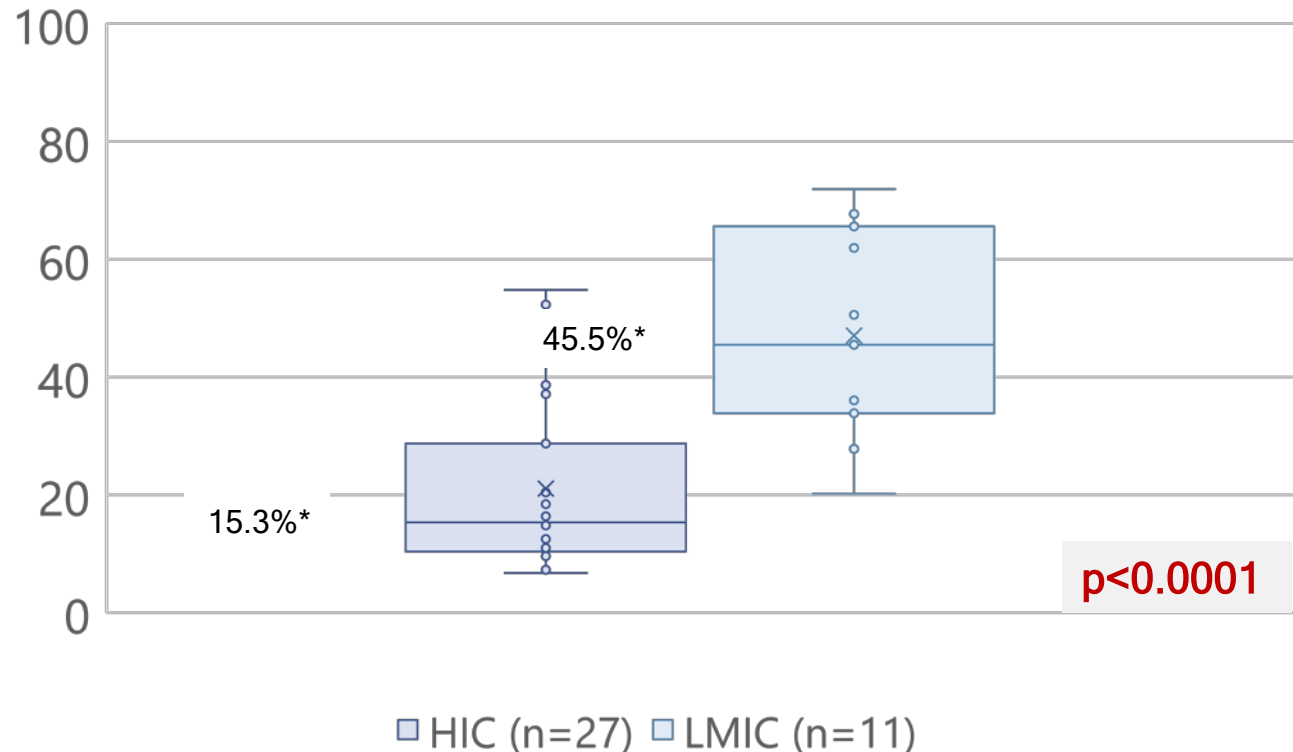
Proportion of bloodstream infections among patients due to

- methicillin-resistant *Staphylococcus aureus* (**MRSA**)
- *Escherichia coli* resistant to 3rd generation cephalosporin

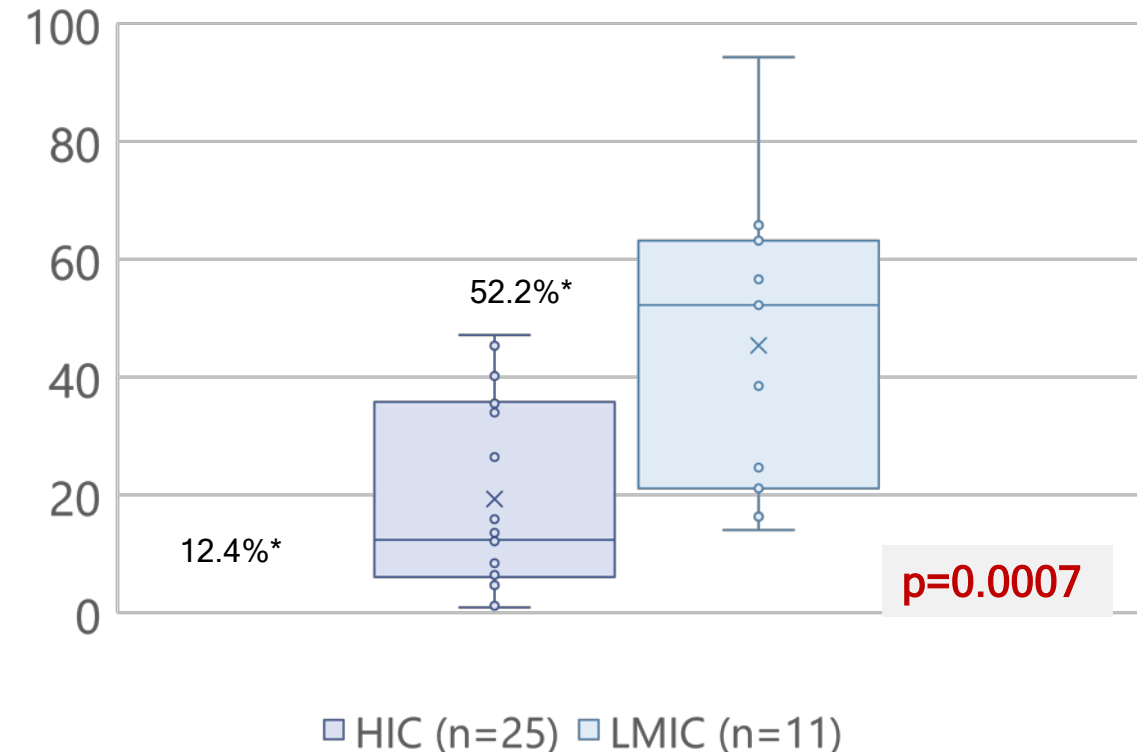
SDG indicators for AMR: LMICs report higher AMR BSI rates

LMIC need urgent support and analysis of underlying causes (e.g. selection biases?)

3rd gen cephalosporin resistant *E. coli*



methicillin resistant *S. aureus*

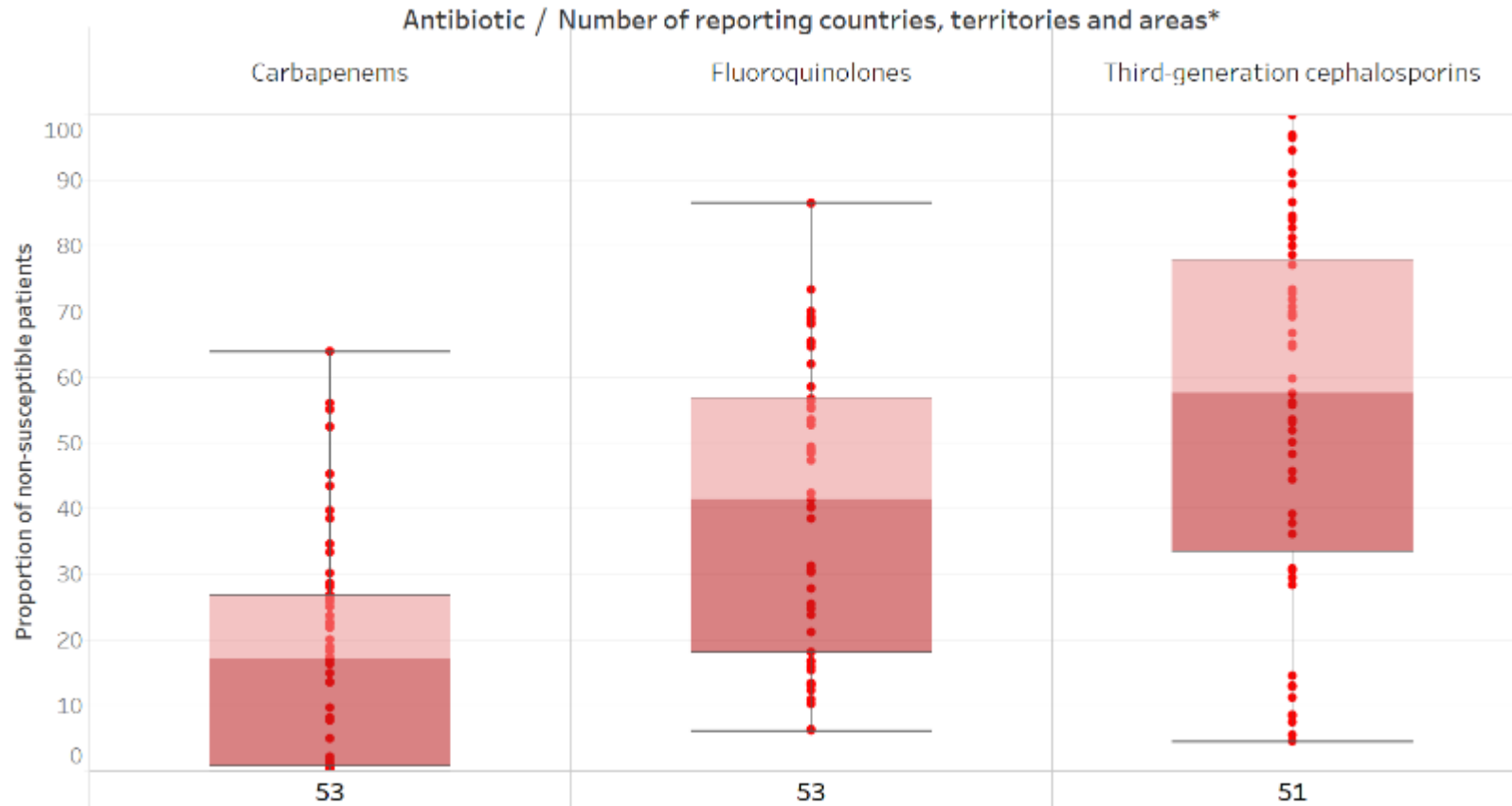


*median proportion; countries that reported < 100 isolates with antibiotic susceptibility testing results were excluded from the analysis.

Global summaries of AMR rates

Bloodstream infections

Blood - *K. Pneumoniae*

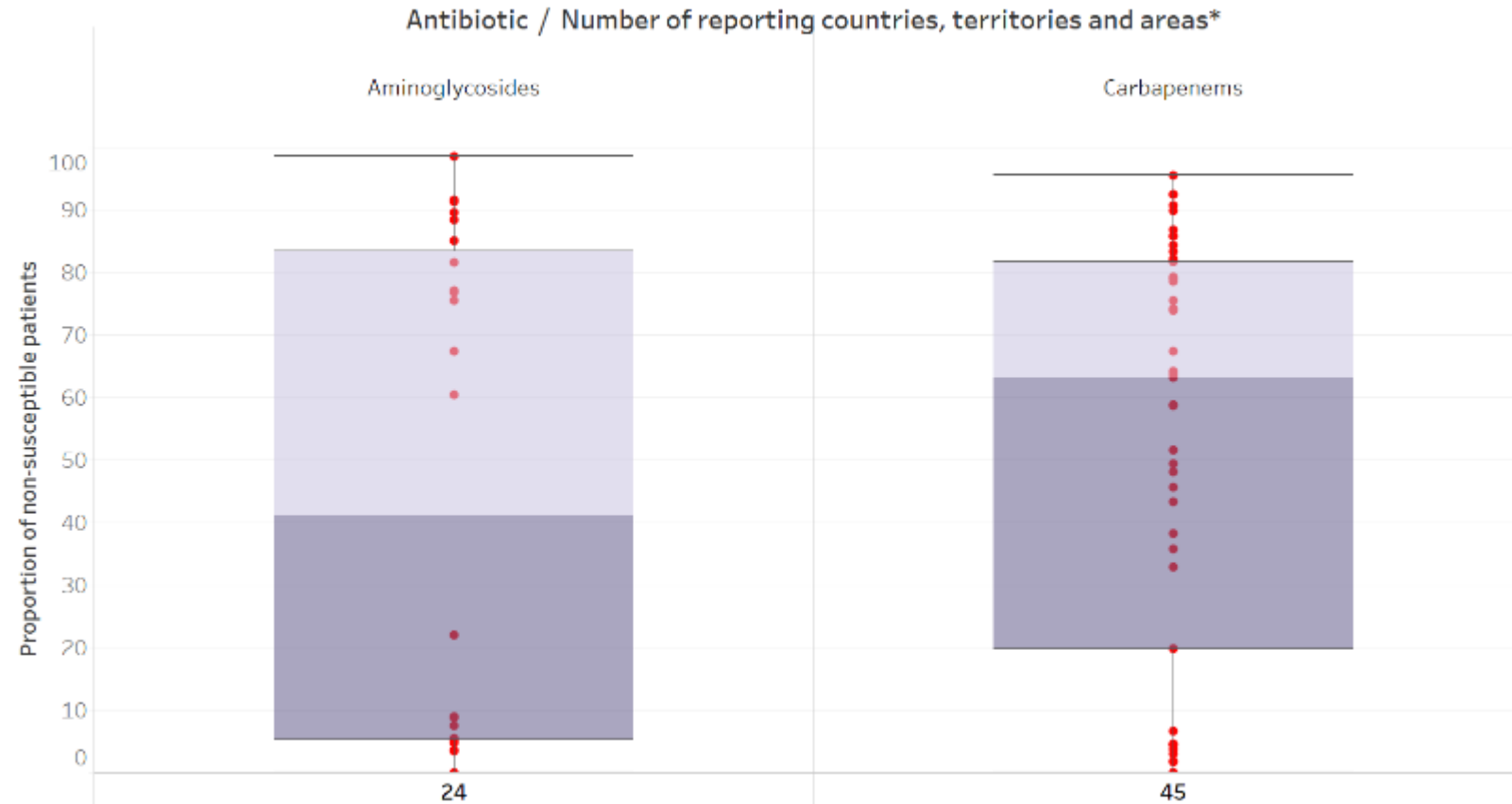


*Rates are shown only if results were reported for > 10 patients and for pathogen-antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

Global summaries of AMR rates

Bloodstream infections

Blood - *Acinetobacter* spp.



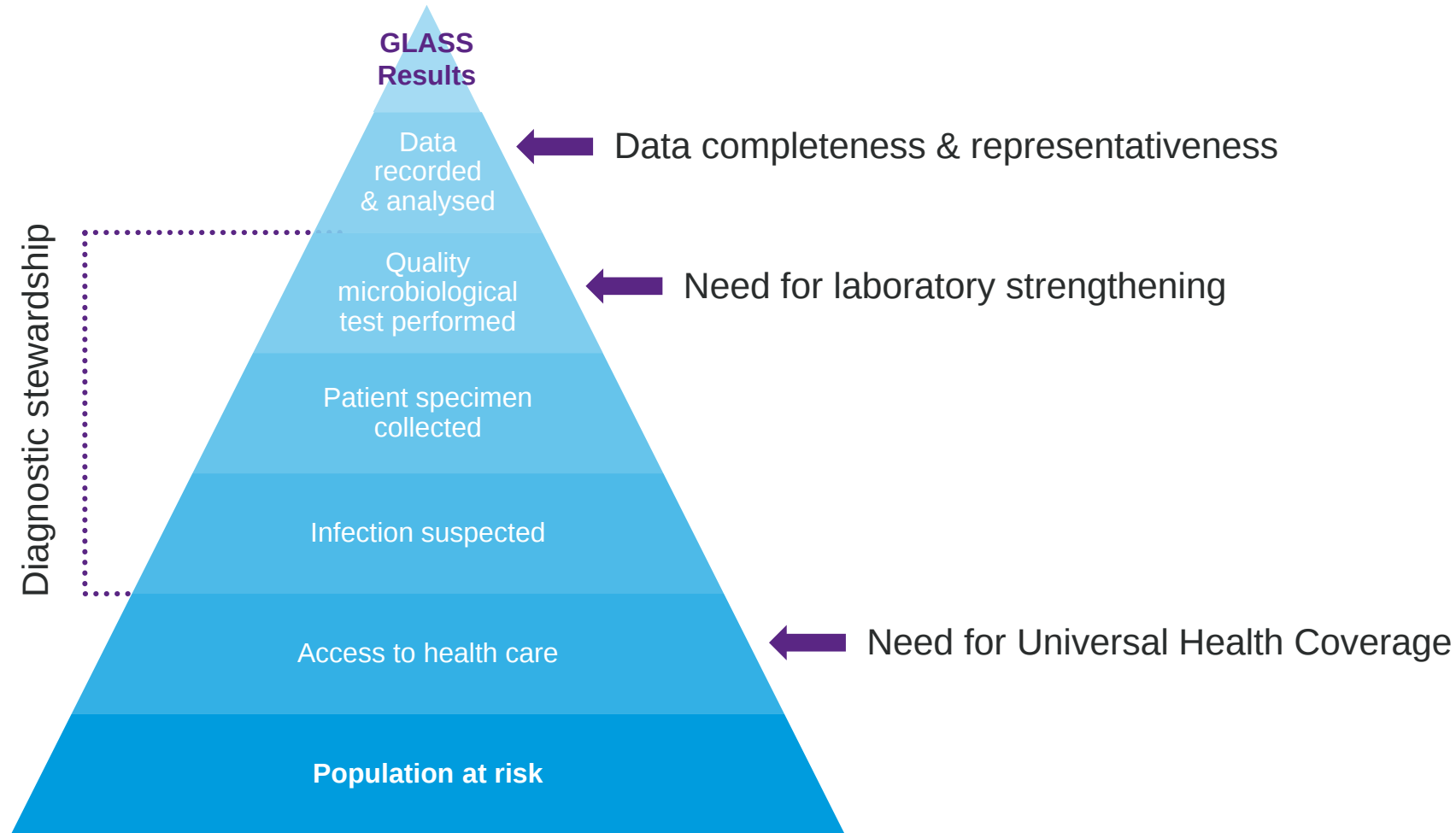
*Rates are shown only if results were reported for > 10 patients and for pathogen-antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

Highlights of reported resistance

While the data still need to improve national representativeness, some alarming rates have been reported.

- Median frequency of resistance in pathogens isolated from patients with bloodstream infections
 - methicillin-resistant *S. aureus* (MRSA): 12.11% (IQR 6.4–26.4)
 - *E. coli* resistant to third-generation cephalosporins: 36.0% (IQR 15.2–63.0)
 - *K. pneumoniae* resistant to third-generation cephalosporins 57.6% (IQR 33.4-77.8)
 - *Acinetobacter* spp.: aminoglycosides 41.2% (IQR 5.20–83.31); carbapenems 63.2% (IQR 19.78 -81.63)
- Median resistance to ciprofloxacin in urinary tract infections
 - 43.29% (IQR 23.8 – 46.4)) for *E. coli* in 33 reporting countries, territories and areas
 - 38.1% (IQR 8.41 – 63.53) for *K. pneumoniae* in 34 reporting countries, territories and areas

Limitations and challenges





Conclusion

- GLASS relies on continued data sharing as well as global collaboration, harmonization, and coordination between all partners involved in the implementation of AMR surveillance.
 - Some countries still face huge challenges to building their national surveillance systems and partners play a key role in assisting WHO support countries.
 - Data limitations should not impede the surveillance, but rather be used to improve it!
 - Country full ownership of data is paramount
- We are at the initial steps of the global system!

For more information on GLASS

- More information on GLASS and synergies, enrolment procedures, links to the GLASS manuals, the yearly report, and data visualization can be found on the GLASS website <http://www.who.int/glass/en/>
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- Other WHO AMR surveillance initiatives
 - HIV Drug Resistance <http://www.who.int/hiv/pub/drugresistance/hivdr-action-plan-2017-2021/en/>
 - MDR-TB Surveillance <http://www.who.int/tb/areas-of-work/monitoring-evaluation/mdr-tb-surveillance/en/>
 - Malaria drug resistance and response http://www.who.int/malaria/areas/drug_resistance/en/
 - Influenza virus resistance http://www.who.int/influenza/patient_care/antivirals/oseltamivir_summary/en/

Thank you!