

Global Antimicrobial
Resistance Surveillance
System

Update on Early GLASS Implementation & Summary Findings

Regional Symposium on AMR
Fighting AMR - Partnership in Action
Hong Kong, 13-14 November 2018

Carmem L PESSOA-SILVA, MD, PhD
WHO Global AMR Surveillance System

peassoasilva@who.int

<http://www.who.int/who-campaigns/world-antibiotic-awareness-week>



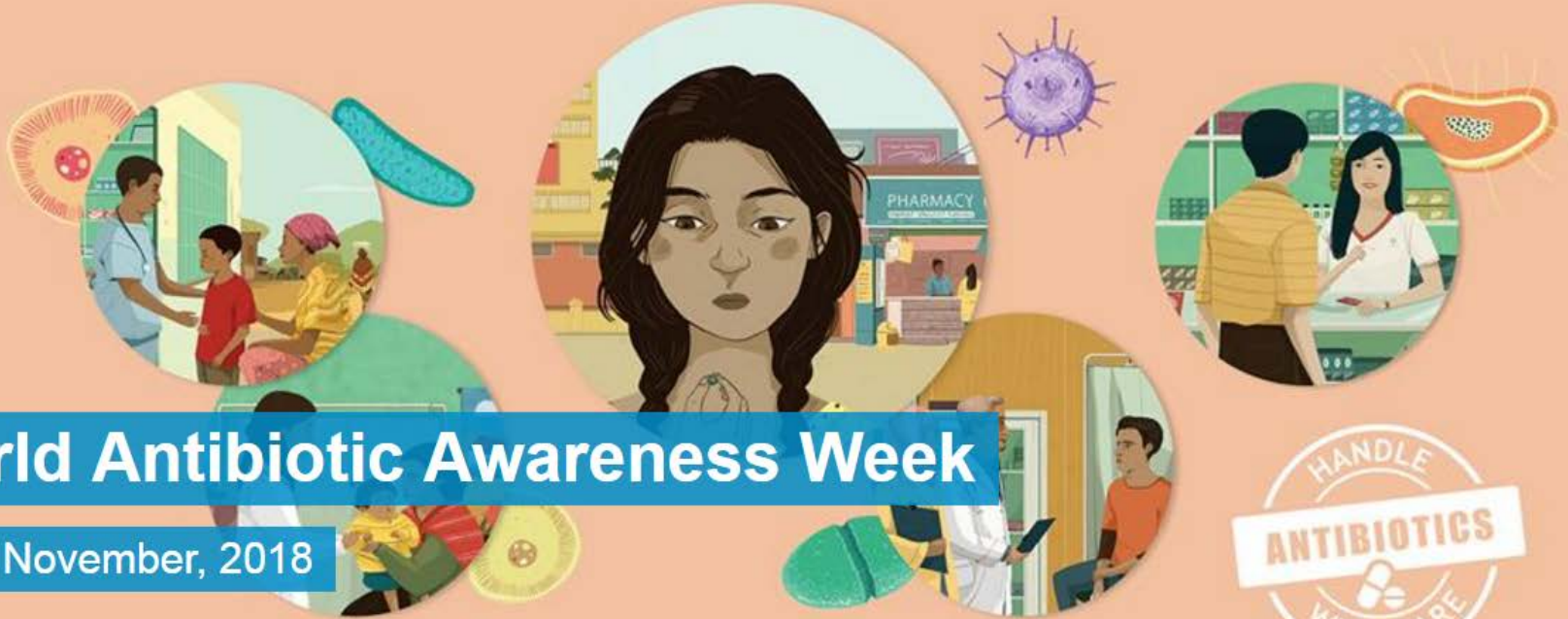
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World Antibiotic Awareness Week

12-18 November, 2018



Outline



- Development of the WHO Global AMR Surveillance System (GLASS)
- Summary results from the first GLASS report
- Preliminary results for 2nd GLASS report (to be issued in Jan 2019)
- Summary results from the first report on antimicrobial consumption
- Ongoing development
- Conclusions

Global Action Plan on Antimicrobial Resistance



World Health Assembly



➤ *"To ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them."*

Member States request WHO to develop a global AMR surveillance system

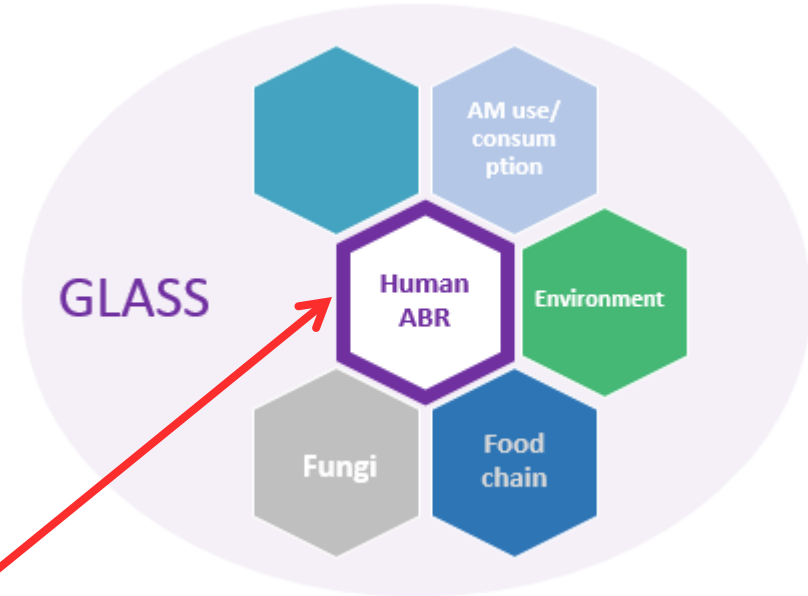
WHO, 2015. Global Action Plan on Antimicrobial Resistance.
http://apps.who.int/iris/bitstream/10665/193736/1/9789241509763_eng.pdf?ua=1

Objectives of GLASS



Foster national AMR surveillance systems through harmonized global standards to:

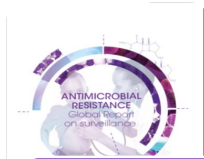
- Monitor AMR trends
- Detect emerging resistance
- Inform estimates of AMR burden



Initial focus:
Bacterial infections in humans

Steps towards a global system

*Global report on
surveillance 2014*



Summarise *status
of AMR
surveillance
globally*
2014 ✓

GLASS manual



Develop *global
surveillance
standards*
2015 ✓

*GLASS
implementation*



Establish a *global
surveillance
system*
2016 ✓

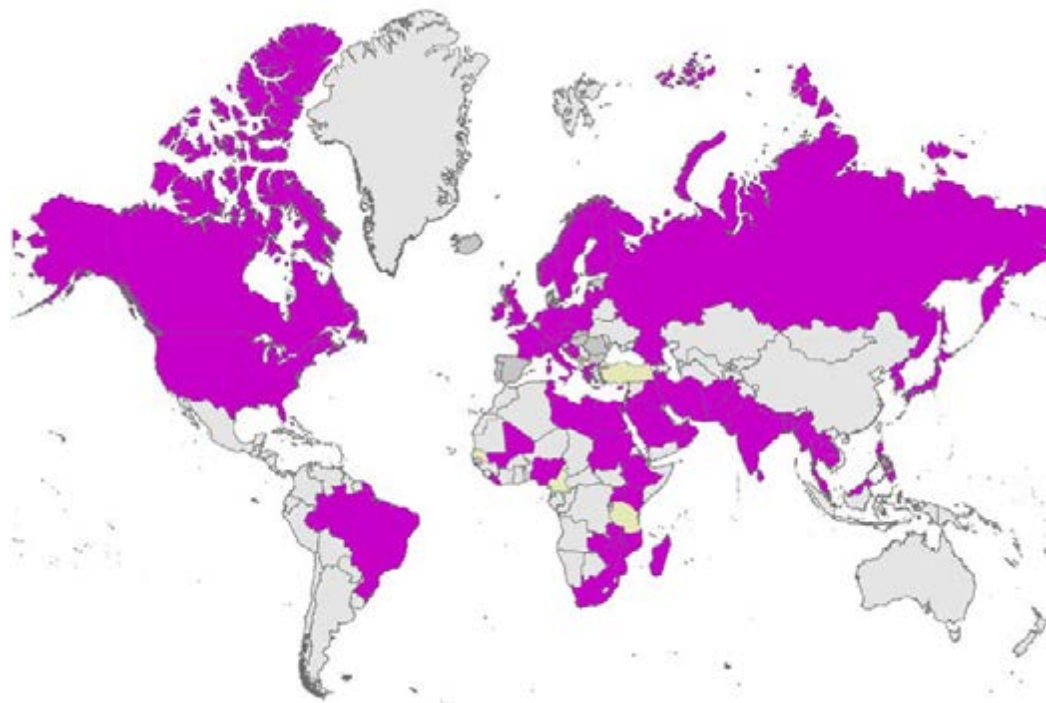


Special studies

- To assess burden of disease
- To inform surveillance in limited resource settings

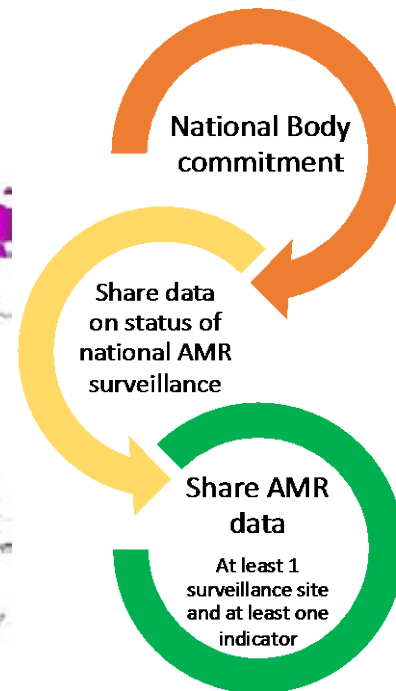
Countries enrolled in GLASS

*As of 11 October 2018**



■ Enrolment completed (n=70)

■ Enrolment in progress (n=5)



* Call for country enrolment issued on 21 March 2016

** African map modified. Only countries participating in GLASS are represented.

Participation in GLASS

What are the benefits for countries?



- ➔ An implementation package including **surveillance software**
- ➔ Access to a **web-based platform** for data sharing, data management and reporting
- ➔ **Assistance with capacity building** for national AMR surveillance
- ➔ Assistance with **monitoring** and **evaluation**
- ➔ Regular **reports** on global AMR situation and trends

What data does GLASS collect?

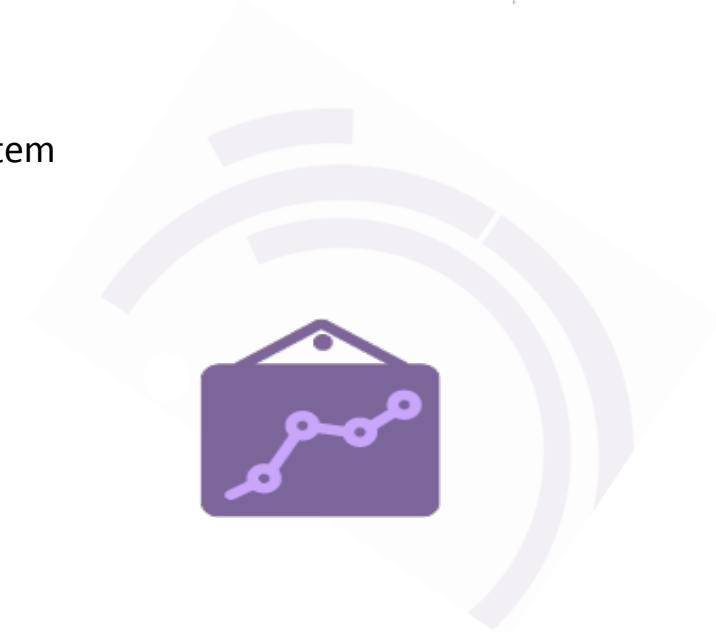


→ Status of national AMR surveillance system

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

→ AMR data

- specimens from patients suspected to have infections
- priority 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 Indicators

8 target pathogens
4 target sites of infection

Rationale

- Common community and hospital infections
- Emerging AMR for which there are few treatment options
- Common indicators used in foodborne AMR surveillance (*E. coli*, *Salmonella* spp)

Pathogen	Antibacterial class
<i>Escherichia coli</i>	Sulfonamides and trimethoprim Fluoroquinolones Third-generation cephalosporins Fourth-generation cephalosporins Carbapenems ^a Polymyxins Penicillins
<i>Klebsiella pneumoniae</i>	Sulfonamides and trimethoprim Fluoroquinolones Third-generation cephalosporins Fourth-generation cephalosporins Carbapenems ^a Polymyxins
<i>Acinetobacter baumannii</i>	Polymyxins
<i>Stenotrophomonas maltophilia</i>	β-lactamase-stable beta-lactams
<i>Salmonella</i> spp.	Penicillins Sulfonamides and trimethoprim Third-generation cephalosporins Fluoroquinolones Third-generation cephalosporins Carbapenems ^a
<i>Shigella</i> spp.	Fluoroquinolones Third-generation cephalosporins Macrolides
<i>Neisseria gonorrhoeae</i>	Third-generation cephalosporins Macrolides Aminocyclitols Fluoroquinolones Aminoglycosides

To be revised in 2019

First GLASS report

Issued in January 2018



Global Antimicrobial Resistance Surveillance System (GLASS) report: early implementation 2016-2017

- GLASS implementation **steps over 2016-2017**
- results from first data collection: **April to July 2017**
- information of the status of national surveillance systems (**42 countries**) and AMR data (**22 countries**).



First GLASS report

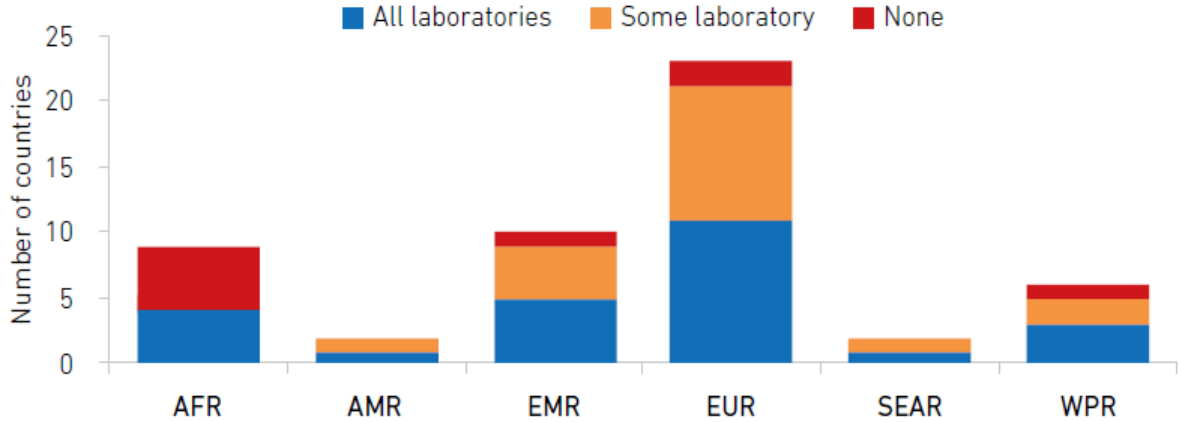
Issued: January 2018



Status of national surveillance system: 42 countries



Fig. 3.10 EQA provided to local laboratories participating in GLASS (per WHO region)



First GLASS report

Issued in January 2018



**AMR data
reported by 22
countries**

Reported to GLASS

Number of sites

Hospitals	466
Outpatients clinics	139
Other institutions	124
Total	729

Number of patients with suspected infection

Blood stream	81,920
Urinary tract	415,679
Gastro-intestinal	7,477
Sexually transmitted	2,847
Total	507,923

Results: AMR data reported by 22 countries (2)



Specimen	Pathogen	Total number of patients with positive samples (isolates)			Total	Number of isolates with AST results*	Proportion of isolates with unknown AST results*
		Community origin	Hospital origin	Unknown origin			
Blood	<i>A. baumannii</i>	608	1,084	721	2,413	2,264	6%
	<i>E. coli</i>	8,092	17,679	14,693	40,464	40,173	1%
	<i>K. pneumoniae</i>	2,026	4,170	3,466	9,662	9,486	2%
	<i>Salmonella</i> spp.	320	62	787	1,169	1,048	10%
	<i>S.aureus</i>	3,436	10,749	8,531	22,716	20,182	11%
	<i>S.pneumoniae</i>	1,159	1,502	2,835	5,496	5,081	8%
Urine	<i>E. coli</i>	64,270	6,820	299,669	370,759	319,264	14%
	<i>K. pneumoniae</i>	8,561	2,108	34,251	44,920	38,279	15%
Stool	<i>Salmonella</i> spp.	719	855	5,465	7,039	5,352	24%
	<i>Shigella</i> spp.	212	8	218	438	435	1%
Genital	<i>N. gonorrhoea</i>	357	0	2,490	2,847	2,819	1%
Total		89,760	45,037	373,126	507,923	444,383	13%

*for at least one antibiotic

*for selected antibiotics this proportion ranged from 0 to 100%

Results: proportion of AMR among tested isolates reported by 22 countries (1)



Name of bacterium/ resistance	Examples of typical diseases	No. of enrolled countries providing national data	Range of reported proportion of resistance (%) *
<i>Acinetobacter spp.</i>	Blood stream infections, pneumonia, wound infection		
<i>vs carbapenems (meropenem)</i>	Blood stream	13	0 - 91
<i>Escherichia coli</i>	Blood stream infections, urinary tract infections		
<i>vs 3rd gen. cephalosporins (ceftazidime)</i>	Blood stream	17	6 - 79
	Urinary tract	13	3 - 75
<i>vs fluoroquinolones (ciprofloxacin)</i>	Blood stream	17	12 - 77
	Urinary tract	13	8 - 65
<i>Klebsiella pneumoniae</i>	Pneumonia, blood stream infections, urinary tract infections		
<i>vs 3rd gen. cephalosporins (ceftazidime)</i>	Blood stream	18	5 - 100
	Urinary tract	13	3 - 87
<i>vs carbapenems (meropenem)</i>	Blood stream	12	0 - 65
	Urinary tract	8	0 - 56
<i>Staphylococcus aureus</i>	Wound infections, blood stream infections		
<i>vs "MRSA" (cefoxitin)</i>	Blood stream	16	0 - 82

*Countries that had less than 10 AST result for a pathogen-antibiotic combination were not included in the estimation

Results: proportion of AMR among tested isolates reported by 22 countries (2)



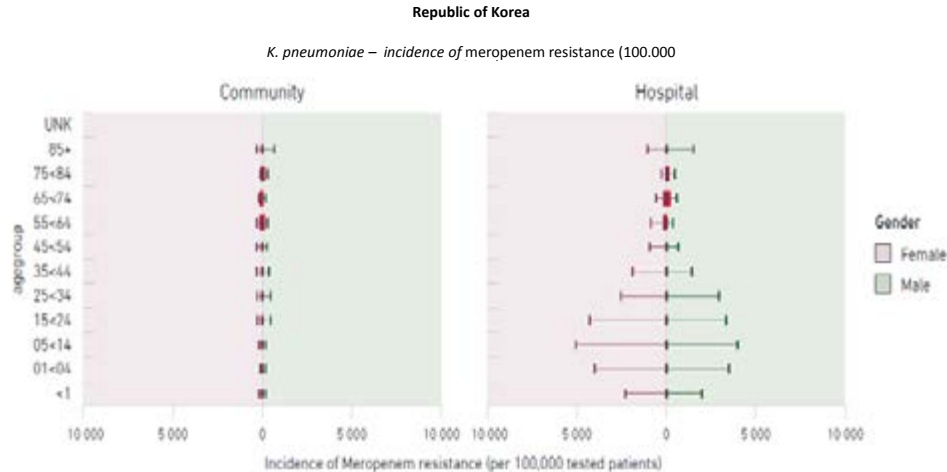
Name of bacterium/ resistance	Examples of typical diseases	No. of enrolled countries providing national data	Range of reported proportion of resistance (%) *
<i>Streptococcus pneumoniae</i>	Pneumonia, meningitis, otitis		
<i>vs non-susceptible to penicillin (penicillin G)</i>	Blood stream	14	0 - 51
<i>Salmonella spp</i>	Foodborne diarrhoea, blood stream infections		
<i>vs fluoroquinolones (ciprofloxacin)</i>	Blood stream	10	8 - 85
	Gastro-intestinal	11	0 - 84
<i>Shigella species</i>	Diarrhoea (“bacillary dysentery”)		
<i>vs fluoroquinolones (ciprofloxacin)</i>	Gastro-intestinal	6	3 - 55
<i>Neisseria gonorrhoeae</i>	Gonorrhoea		
<i>vs 3rd gen. cephalosporins (ceftriaxone)</i>	Sexually transmitted	9	0 - 92

*Countries that had less than 10 AST result for a pathogen-antibiotic combination were not included in the estimation

Results: AMR incidence reported by 5 countries



5 countries submitted data on the total sampled population, enabling the calculation of incidence of resistance **within tested populations** and, in some cases, stratified for gender, age and infection origin.

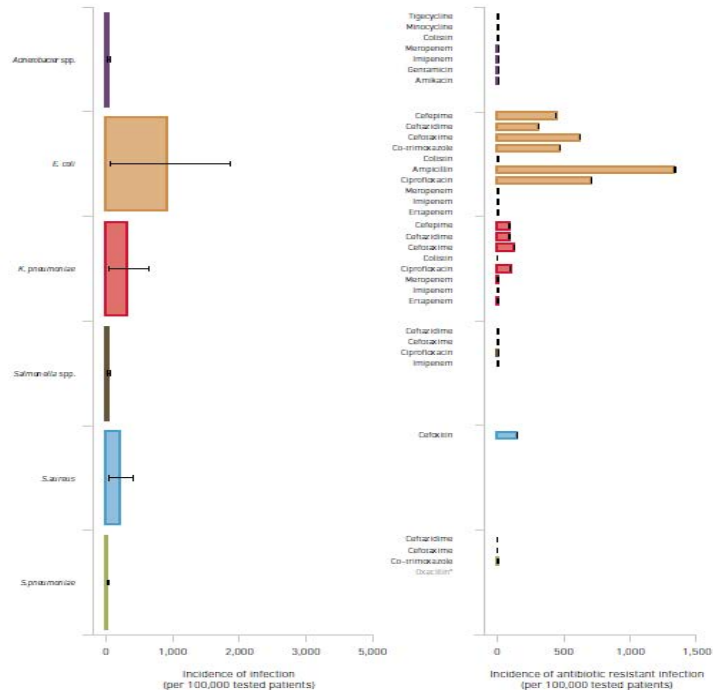


Bloodstream infection by pathogen

1st GLASS report, January 2018

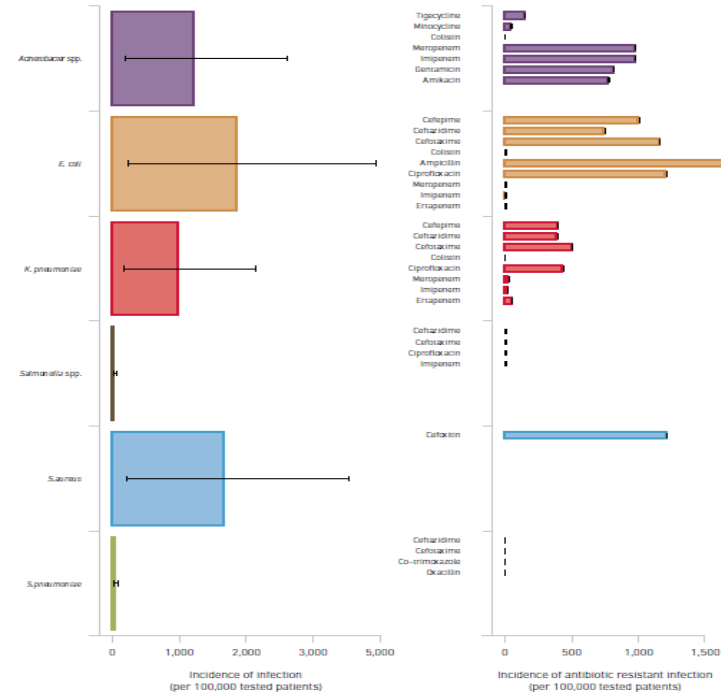


Blood – Community infection origin (n tested = 38938)



*Antibiotic with >30% unknown AST results – AMR rates not shown

Blood – Hospital infection origin



2018 GLASS data call

Summary preliminary results

Full report to be issued in January 2019

AMR data reported to GLASS



2017 (22 countries)

Number of sites

Hospitals	466
Outpatients clinics	139
Other institutions	124
Total	729

Number of patients with suspected infection

Blood stream	81,920
Urinary tract	415,679
Gastro-intestinal	7,477
Sexually transmitted	2,847
Total	507,923

2018 (48 countries)

Number of sites

Hospitals	3097
Outpatients clinics	2358
Other institutions	560
Total	6015

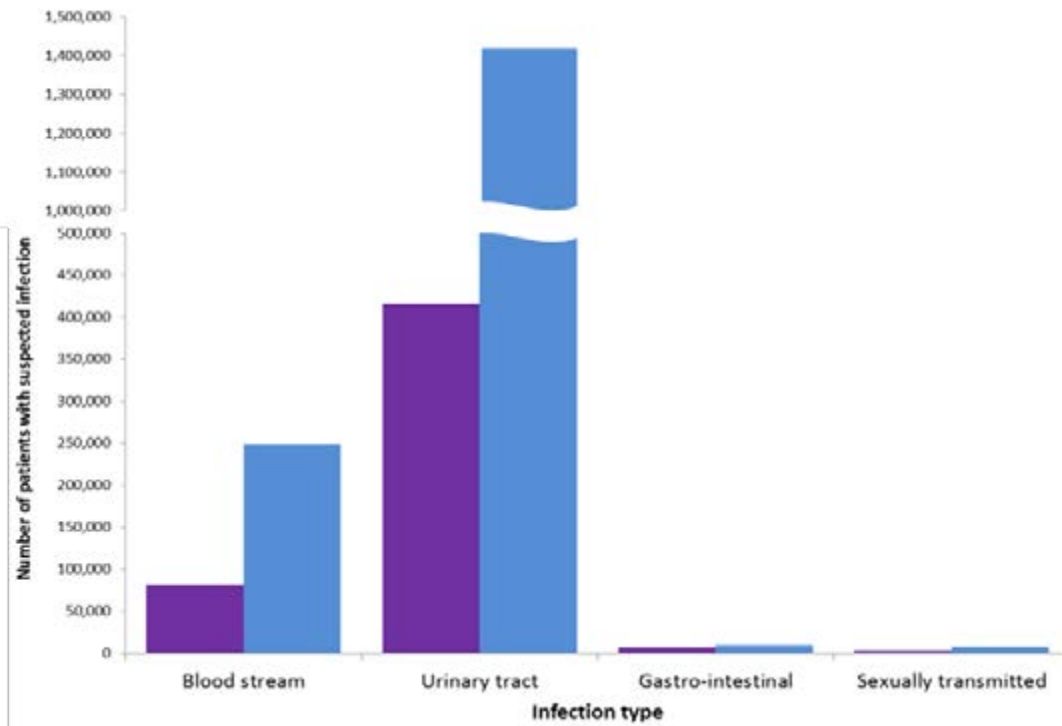
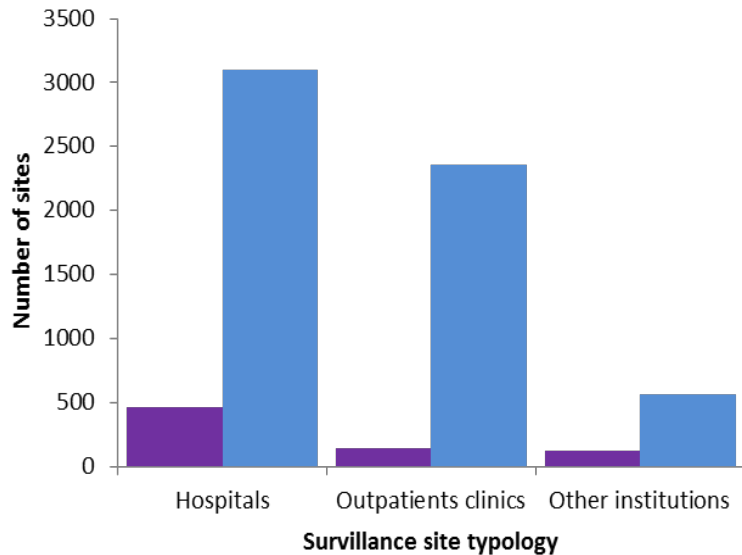
Number of patients with suspected infection

Blood stream	249,230
Urinary tract	1,419,252
Gastro-intestinal	9,975
Sexually transmitted	8,004
Total	1,686,461

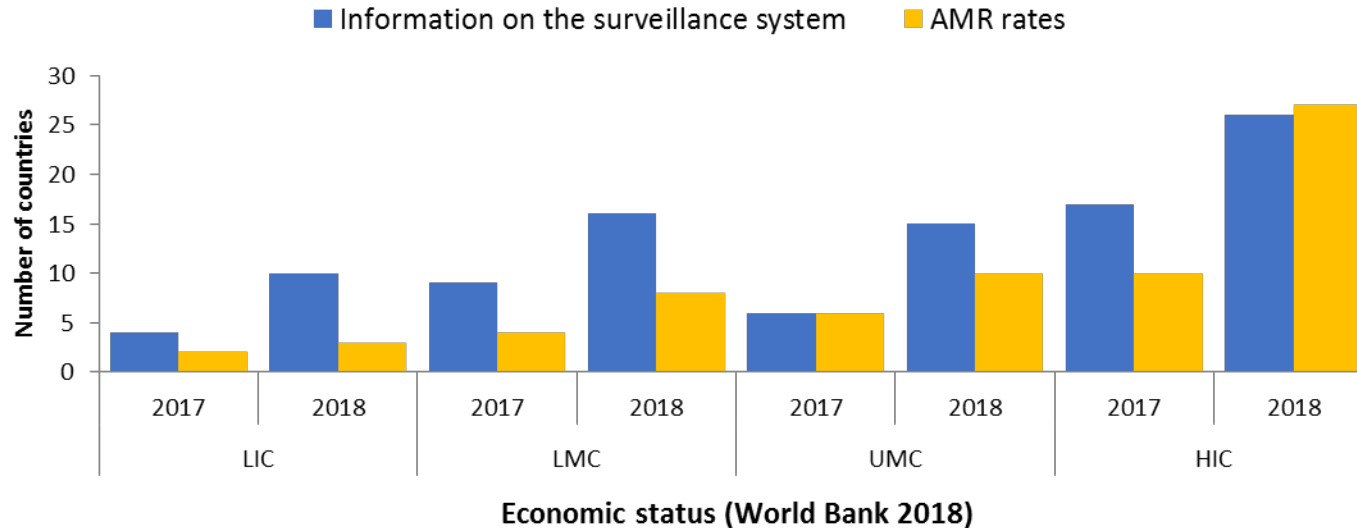
Progress in reporting to GLASS



■ 2017 (22 countries) ■ 2018 (48 countries)



Enrolment



- 13 countries that last year reported only on the implementation of their national surveillance system this year also reported AMR data
- 14 countries, compared to 5 last year, have reported denominator data.

Challenges: broadening the scope

Antimicrobial Consumption



GLASS



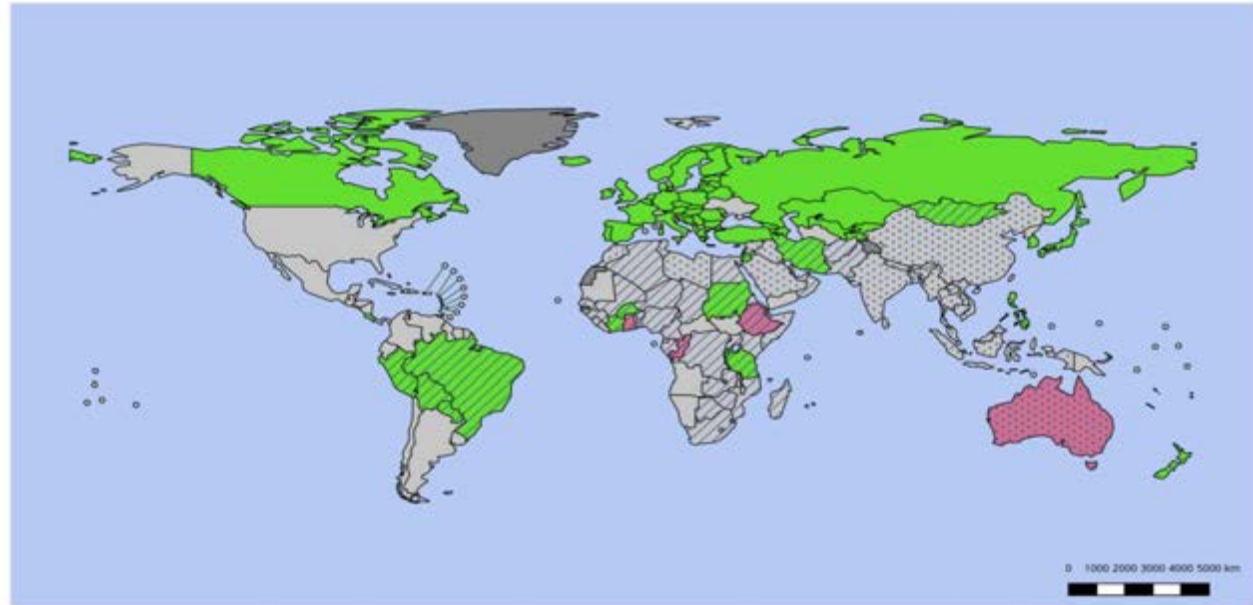
Just issued!

AM Consumption

- ➔ Information on volume of sales of antimicrobial medicines
 - proxy for use in the population

➔ Presenting 2015 data on sales of antibiotics from 65 countries and areas

WHO Global Report on Antimicrobial Consumption



Legend

- Data included
- Data submitted
- Trained countries
- Informed countries
- Not applicable

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: Essential Medicines and Health Products Department
World Health Organization
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Key results

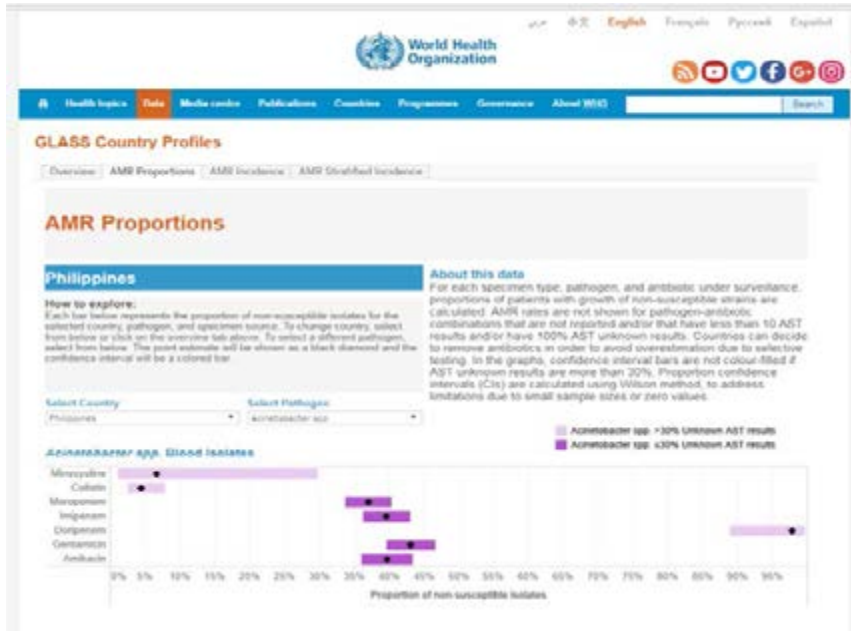


- Great variation in quantity and type of antibiotics consumed between countries
 - From 4 to 64 DDD/1000 inhabitants per day
- Most frequently used antibiotics
 - Oral: Amoxicillin and amoxicillin/clavulanic acid
 - Parenteral: Ceftriaxone (3rd gen cephalosporin)
- Consumption of last resort antibiotics* not reported by most low- and middle-income countries in the report

*WHO AWaRe Reserve antibiotics: includes 4th and 5th gen cephalosporins, polymyxins, daptomycin, tigecycline, fosfomycin, linezolid, tedizolid, aztreonam, carumonam

Widespread use of antibiotics in some countries, while access to antibiotics remains low in other countries!

GLASS data visualization



➔ All data produced by GLASS is available free online and will be updated regularly:

- GLASS data visualization page on the WHO Global Health Observatory
<http://who.int/entity/gho/glass/en/index.html>
- GLASS website
<http://www.who.int/glass/en/>

GLASS consolidation & further development



➔ Consolidation

- Better representativeness and completeness of data
- Early reporting of emerging AMR

➔ Development and incorporation of additional functions

- Antimicrobial consumption monitoring
- Enhanced surveillance of multi-resistant gonorrhoea (eGASP)
- AMR surveillance in invasive fungal infection
- One Health: 1 indicator across human, animal & environment

Conclusions



- 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 improvements are urgently needed.
- However, more and more countries are working towards achieving a status that will enable them to **report data in a more complete and systematic manner**.
- The assessment of **frequency rates by age groups and infections types** is key to inform and direct mitigation strategies to control AMR.
- ***We are at the initial steps of the global system!***

For more information on GLASS



- ➔ More information on GLASS 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/>

謝謝!

Thank you!