The State of the World’s Antibiotics, 2015

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• National Institute for Communicable Diseases (NICD)

• South African Antibiotic Stewardship Programme (SAASP)

• Best Care Always!
The State of the World’s Antibiotics, 2015 tracks this important global resource, and asks,
Contents

• Chapter 1: Antibiotic Resistance in 2015
• Chapter 2: Human Use of Antibiotics
• Chapter 3: Antibiotics in Agriculture and the Environment
• Chapter 4: The Global Antibiotic Supply and its Effectiveness
• Chapter 5: What Works at the Country Level

Figure 1.4: Spread of New Delhi metallo beta-lactamase: first detection, by country
Source: Johnson and Woodford 2013 (adapted)

Website for access the report: http://cddep.org/publications/state_worlds_antibiotics_2015
Access to the maps: resistancemap.cddep.org.
The SWA report from the SA perspective

- First time laboratory based data from both the public and private sectors have been consolidated to get an SA picture:
  - Public sector, the laboratory data are reported by the National Institute for Communicable Diseases (NICD) – 14 public sentinel hospitals
  - Private sector by the South African Society of Clinical Microbiology (SASCM) which collates private laboratory data from five laboratory groups for 13 pathogens.
  - ESKAPE organisms (Enterococcus, S. aureus, Klebsiella spp., Acinetobacter spp., Pseudomonas spp., and ESBL-producing Enterobacteriaceae)
- First time that SA data is presented against the rest of the world (benchmarking)
Dramatic increase in antibiotic consumption

Figure 2-4: Percentage change in antibiotic consumption per capita 2000–2010*, by country
Source: Van Boeckel et al. 2015 (adapted)
What constitutes this increase in antibiotic consumption in SA?

Antibiotic Use in South Africa

Source: IMS Health

Center for Disease Dynamics, Economics & Policy (cddep.org)
Benchmarked against the rest of the world

Antibiotic Use in 2010
Source: IMS Health
Human Use of Antibiotics

- Antibiotic consumption in humans is increasing globally. The greatest increase between 2000 and 2010 was in low- and middle-income countries, but in general, high-income countries still use more antibiotics per capita.

- An estimated 80 percent of all antibiotics are used in the community, where prescribing and purchasing of antibiotics without prescription are common, especially in LMICs. In many countries at all economic levels, clinicians have incentives to overuse antibiotics.

- The confluence of patients with serious medical conditions, interconnectedness of hospitals, and high density of antibiotic use make hospital antibiotic use disproportionately important.
Figure 2-1: Global antibiotic use by class, 2000-2010
Source: Van Boeckel et al. 2014 (adapted)
SA’s Antibiotic Resistance picture

• Antibiotic-resistant bacteria are increasing in prevalence worldwide, resulting in infections that are difficult and expensive to treat.

• Laboratory surveillance data in South Africa from 2012 to 2014 for specific Drug-Bug combinations showed the followed:
  ▪ *Escherichia coli (E coli)* resistant to fluroquinolone is at 27% over this period;
  ▪ *Staphylococcus aureus* – MRSA rate is 30%, though slight decline has been noted (from 35% in 2012 to 28% in 2014).
  ▪ *Klebsiella pneumoniae* carbapenems resistant is at 3.2% rate and showed increase from 2.9% to 4.2% over this period.

• All three organisms-antibiotic combinations show no statistically significant change in proportion of resistance from 2012 to 2014
SA’s Antibiotic Resistance picture

Other organisms information from the SWA report (period 2012 – 2014):

- **Enterococcus faecium** vancomycin resistant isolates decreased from 25 to 7 percent.

- **Escherichia coli (E coli) isolates**
  - third-generation cephalosporin resistance remained stable, at 19 percent,
  - fluoroquinolone resistance also remained stable, at 28 percent.

- **Klebsiella pneumoniae** isolates
  - third-generation cephalosporin resistance remained stable, at 32 percent,
  - fluoroquinolone resistance increased slightly, from 28 to 30 percent. In 2013,

- **Klebsiella pneumoniae and E. coli** isolates carbapenem resistance was 2 and 0.8 percent respectively
Figure ES-1: Percentage of Staphylococcus aureus that are methicillin resistant (MRSA) in selected countries, 1999-2014
Source: CDDEP 2015
Figure 1-2: Percentage of extended-spectrum beta-lactamase producing *Escherichia coli*, by country (most recent year, 2011-2014)
Source: CDDEP 2015, WHO 2014 and PAHO, forthcoming
Klebsiella pneumoniae

Antibiotic Resistance of *Klebsiella pneumoniae*

[Graph showing antibiotic resistance percentages for various countries and antibiotic classes: Aminoglycosides, Fluoroquinolones, Carbapenems, Polymyxins, Cephalosporins (3rd gen).]

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Future plans with the data

• The future intention is to better characterise the data to allow for true reflections in regional changes, hospital versus community acquired, amongst other factors, and allow for improved policy making.

• To do this the data needs to be of better quality and standardized amongst public and private sectors to allow further analysis and additional information about each sample needs to be collected including
Antibiotics in Agriculture and the Environment

• As the global demand for animal protein grows, antibiotics are increasingly used to raise food-producing animals in intensive production—increasing the prevalence of antibiotic-resistant bacteria in livestock, poultry, and aquaculture, with spillovers that affect human health.

• Livestock farmers must be provided the tools to optimize production systems without antibiotic growth promoters and to minimize antibiotic use for disease prevention.

• We recommend phasing out sales of feed pre-mixed with antibiotics and reducing the use of antibiotics to prevent animal diseases in all countries.
Antibiotics in Agriculture and the Environment

Figure 3-1: Global antibiotic consumption in livestock (milligrams per 10 km² pixels) 2010
Source: Van Boeckel et al. 2015
Figure ES-3: Antibiotic consumption in livestock, top ten countries 2010-2030 (projected for 2030)
Source: Van Boeckel et al. 2015
Global Antibiotic Supply and its Effectiveness

- New antibiotics are more expensive and out of reach for many who need them, especially in low- and middle-income countries with a high burden of infectious diseases.

- New agents are not the only, or the most important, tools in maintaining the global stock of antibiotic effectiveness. Conserving the effectiveness of existing antibiotics and complementary technologies are vital.

- An “empty pipeline” argument has led to an emphasis on incentives for new antibiotic development to the exclusion of policies that encourage antibiotic conservation.
Figure ES-4: Systemic new molecular entity (NME) antibiotics still marketed in the US by period of introduction, 1980-2015
Source: Outterson et al. 2013
Figure 4-1: Prices and consumption of selected antibiotics in the US (retail) by year of FDA approval, 2010
Source: Laxminarayan 2014 and U.S. FDA 2015
Average price per standard unit is determined by dividing total revenue by sales (retail)
What Works at the Country Level

1. **Reduce** the need for antibiotics through improved water, sanitation, and immunization

2. **Improve** hospital infection control and antibiotic stewardship

3. **Change** incentives that encourage antibiotic overuse and misuse to incentives that encourage antibiotic stewardship

4. **Reduce** and eventually phase out subtherapeutic antibiotic use in agriculture

5. **Educate** health professionals, policy makers, and the public on sustainable antibiotic use

6. **Ensure** political commitment to meet the threat of antibiotic resistance

**Antibiotic use can be rationalised by reducing the need for antibiotics through better public health, by curbing unnecessary use, and by improving access where use is warranted.**
The South Africa AMR strategy

Impact: Rational Antimicrobial use and improved patient outcomes

Antimicrobial Resistance Governance

Diagnostic stewardship
Enhance Surveillance
Antimicrobial Stewardship
Prevention including IPC and vaccination

Health systems strengthening, research, education and communication

The evolution of the South African AMR Strategy and Programe

2009 - 2011

GARP places an AMR co-ordinator in SA

GARP - SA Situational analysis on AMR – Published Feb 2011 in SAMJ

SA Antibiotic Stewardship Partnership (SAASP) clinicians group launched

2012

2013

October 2013
Antimicrobial Resistance working group established and meetings held (Feb 2014)

April 2014
Antimicrobial Resistance Stakeholder Consultative meeting.

2014

Oct 2014
AMR summit launch’s AMR strategic framework and background document

Feb 2015 – Norms & standards draft published along side for AMR quality standards

June 2015
SA AMR implementation plan and MAC approved

Background situational analysis

Strategy and policy outlining begins

AMR strategy launched

Implementation planning and stakeholder commitments defined

Jan & May 2014
WHA resolution “Combating AMR including Antibiotic resistance

Feb & Nov 2014
FPGH in Oslo on consultation of member of states

6 – 8 May 2015 – WHO Africa region hosts experts consultative conference on AMR in Brazzaville, DRC

19 May 2015 – FPGH side event at 68th WHA in Geneva

25th May 2015
WHA endorses Global action plan to tackle AMR

The Hague

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2014

2015
16 – 22 November 2015

• aims to increase awareness of global antibiotic resistance and to encourage best practices among the general public, health workers and policy makers to avoid the further emergence and spread of antibiotic resistance.
Center for Disease Dynamics, Economics & Policy

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