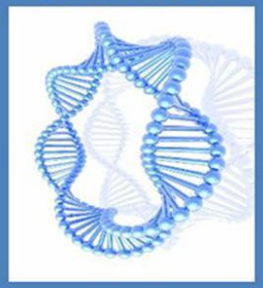
Surveillance of antimicrobial use and consumption in one-health in Uganda; a conceptual exploration

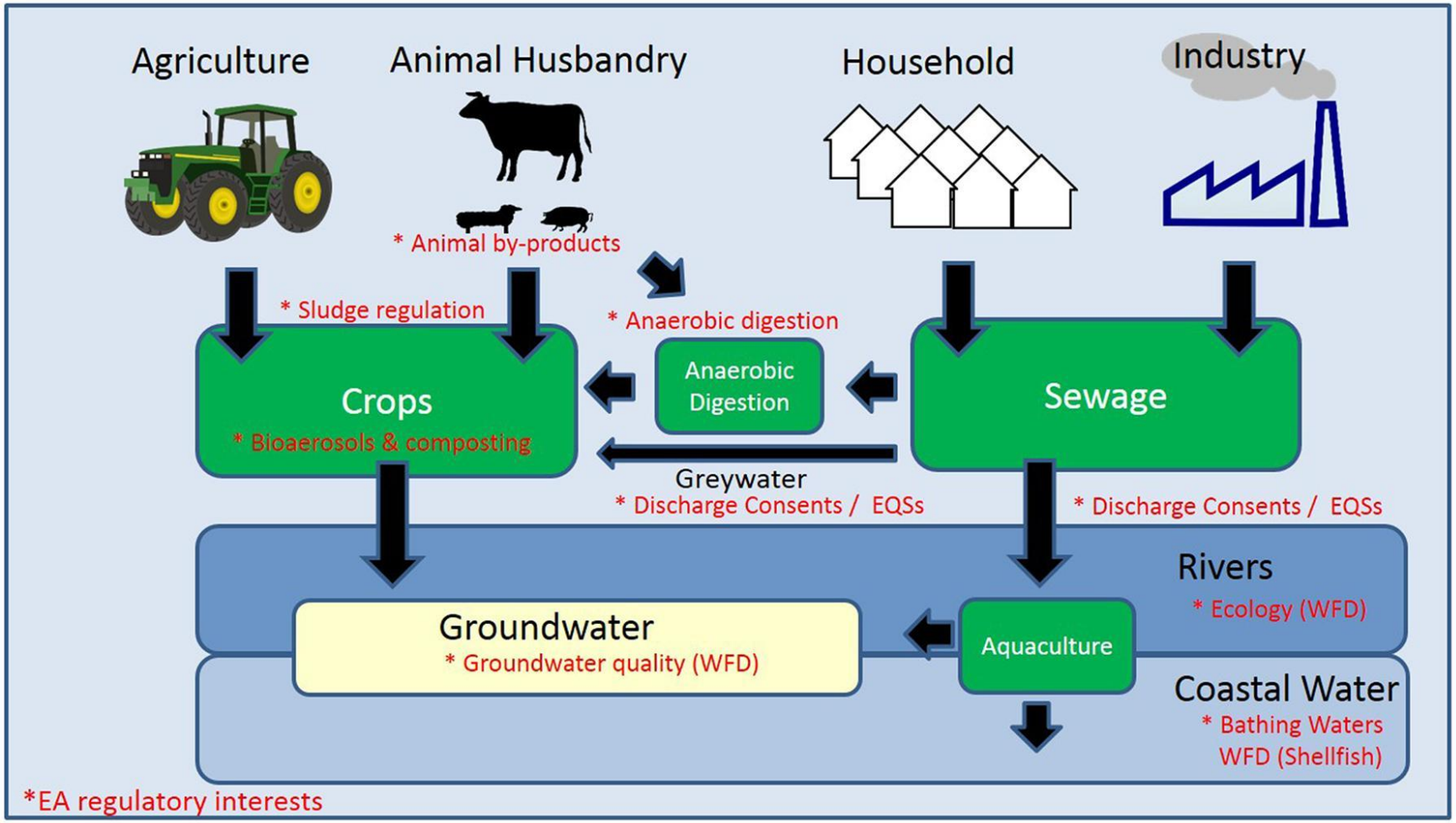
Freddy Eric Kitutu, PhD

Makerere University, Pharmacy Department

2nd Global Network for Antimicrobial Resistance and Infection Prevention Symposium, March 4th to 7th 2019

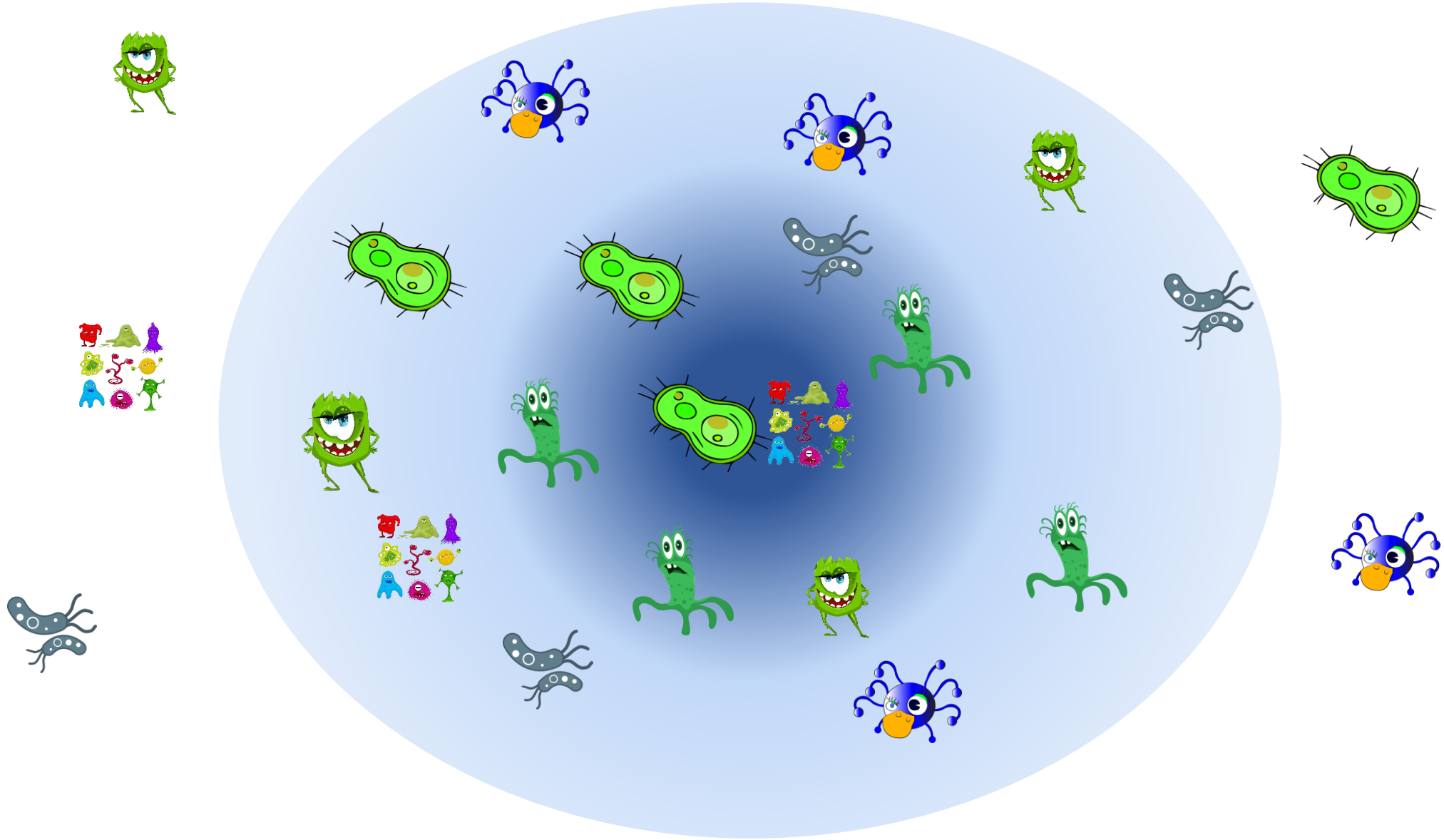
Drivers of Antimicrobial Resistance



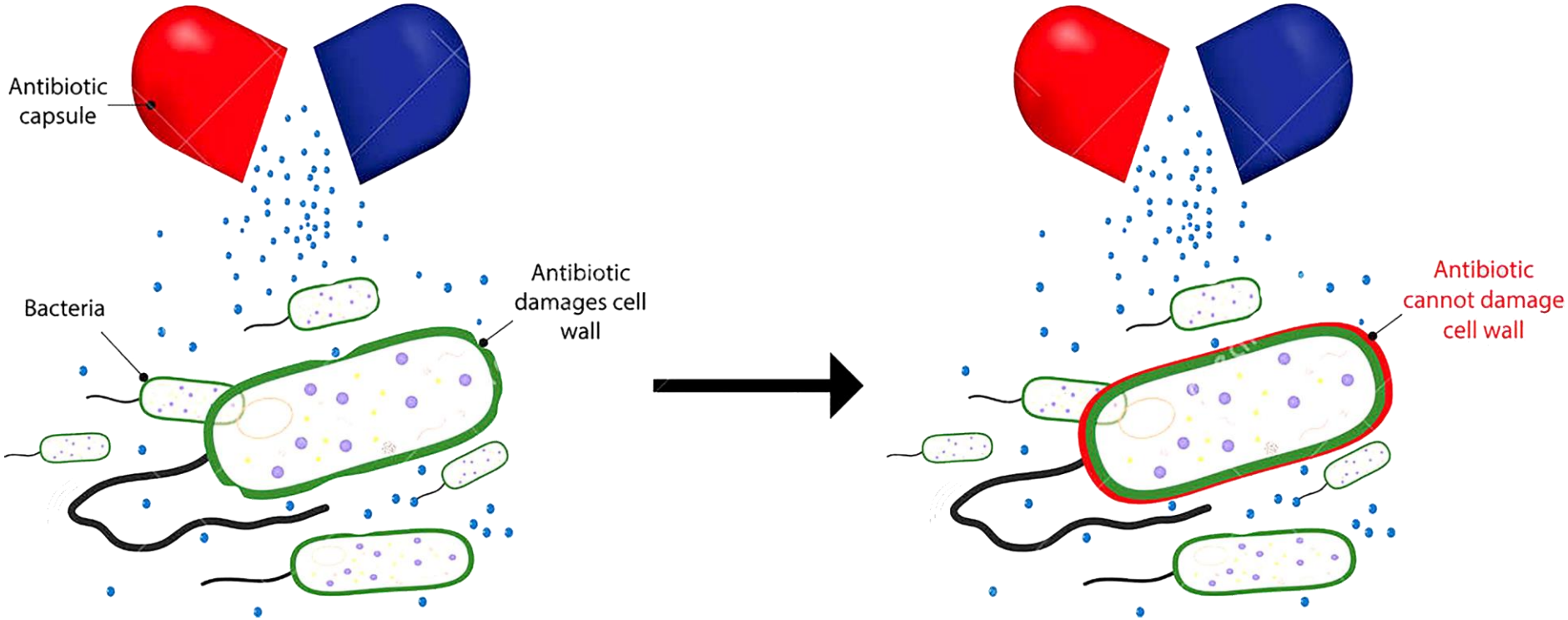


Singer et al, 2016

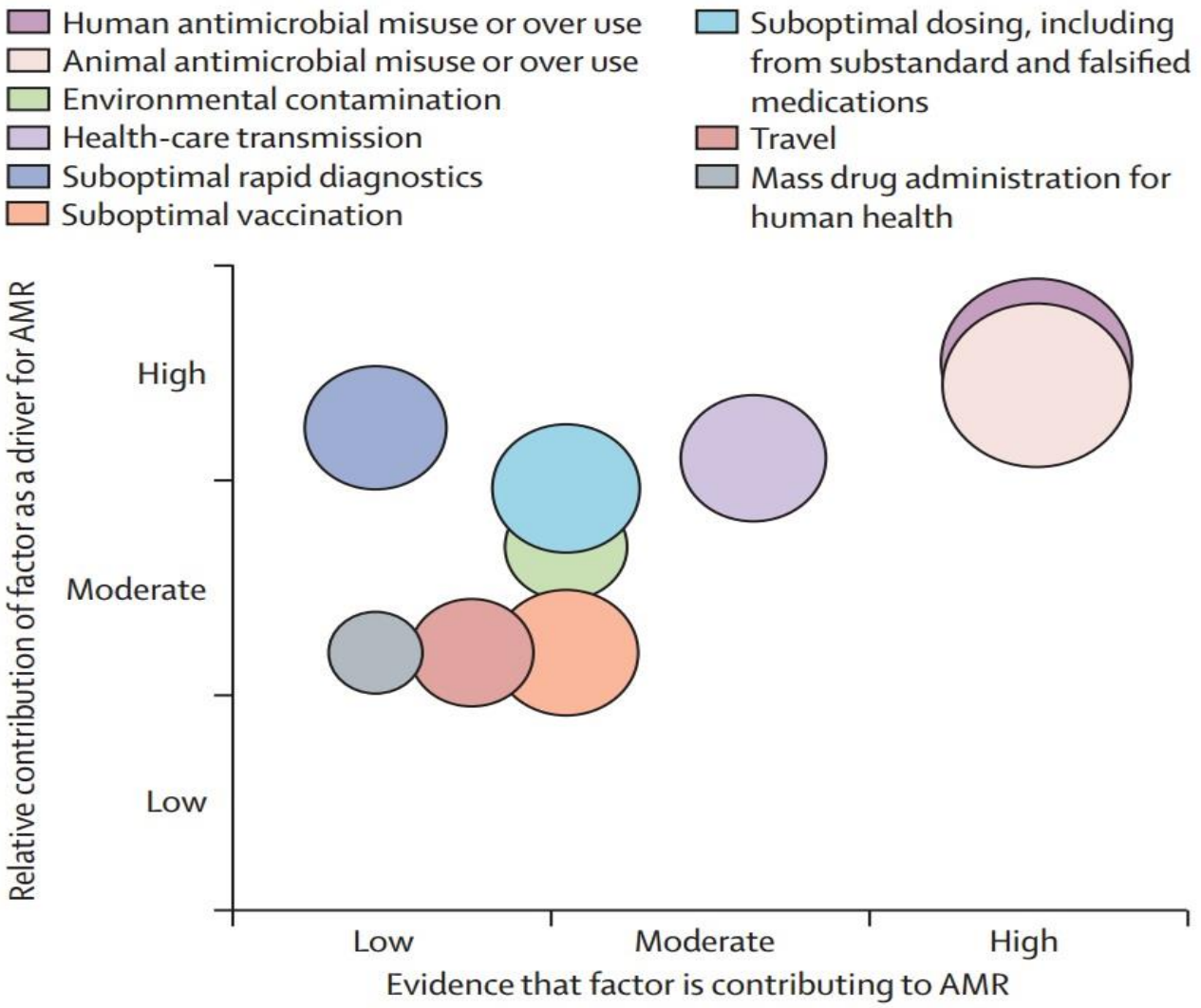
Exposure of microbes to antimicrobial agents



Antibiotic Resistance

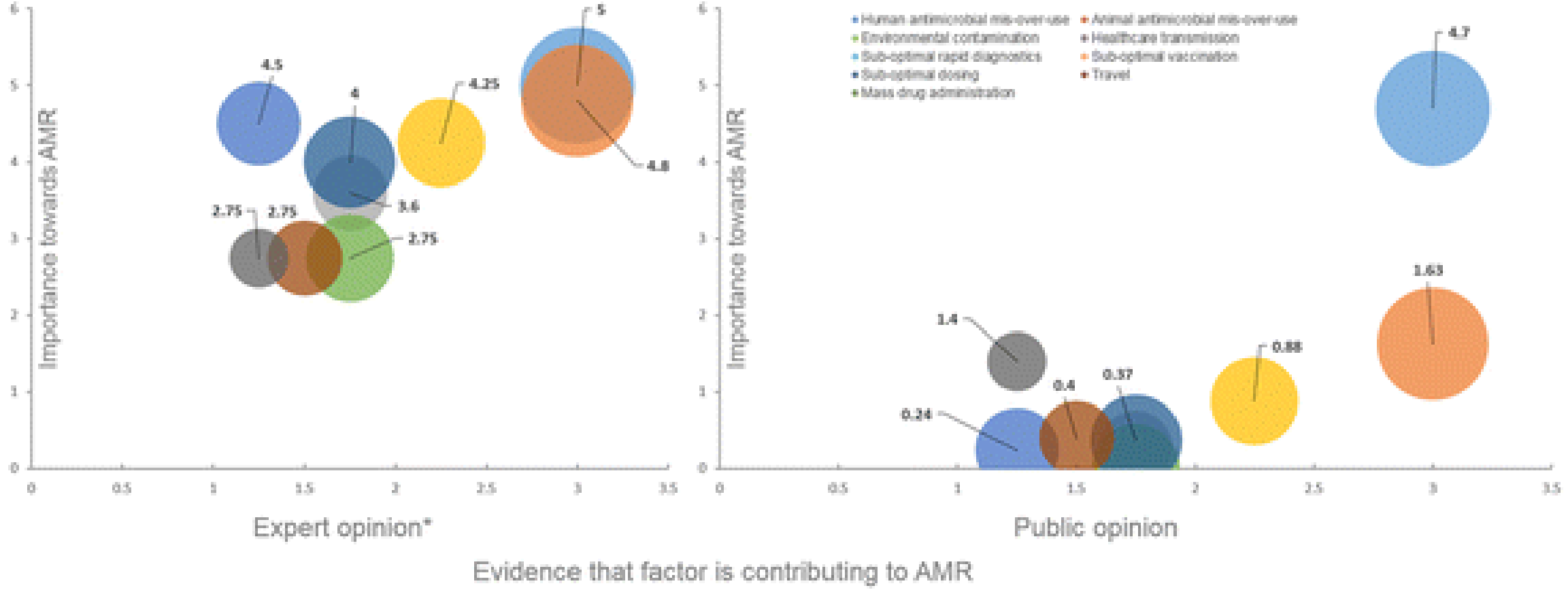


Role of modifiable drivers for antimicrobial resistance: a conceptual framework



Holmes et al, 2015, Lancet

Comparison between expert and public opinion

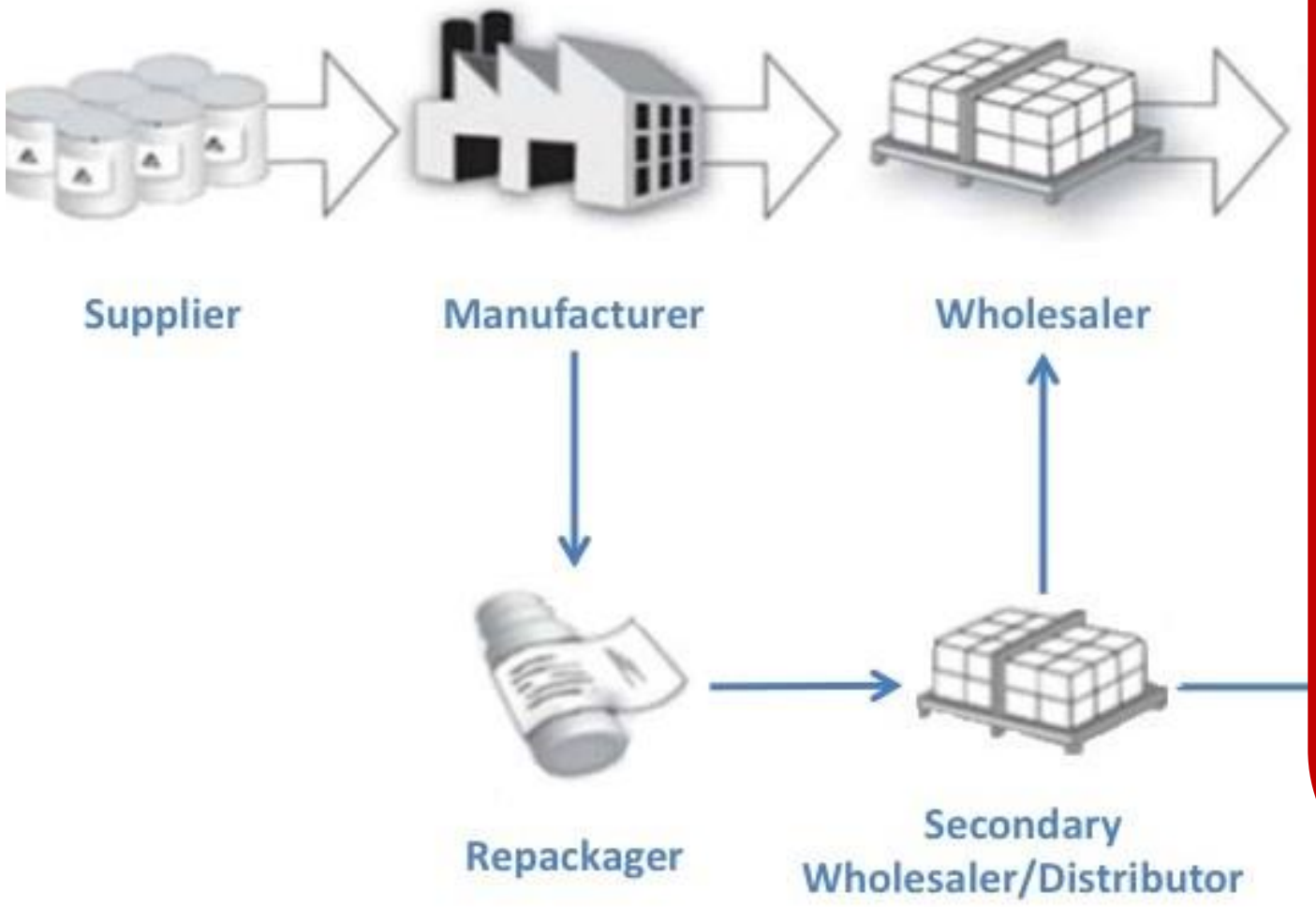


Sanchez et al, 2016, BMC Infect. Dis.

Objectives of surveillance

- To relate exposure to antimicrobials to the development of antimicrobial resistance
- To identify early warning signals in exposure and utilization and thereby intervene
- Monitoring the outcomes of interventions aimed at changing exposure
- Assessing quality of prescribing against practice guidelines
- Raising awareness in health professionals, consumers and policy makers about the link between AMR and AMU use in humans and animals.

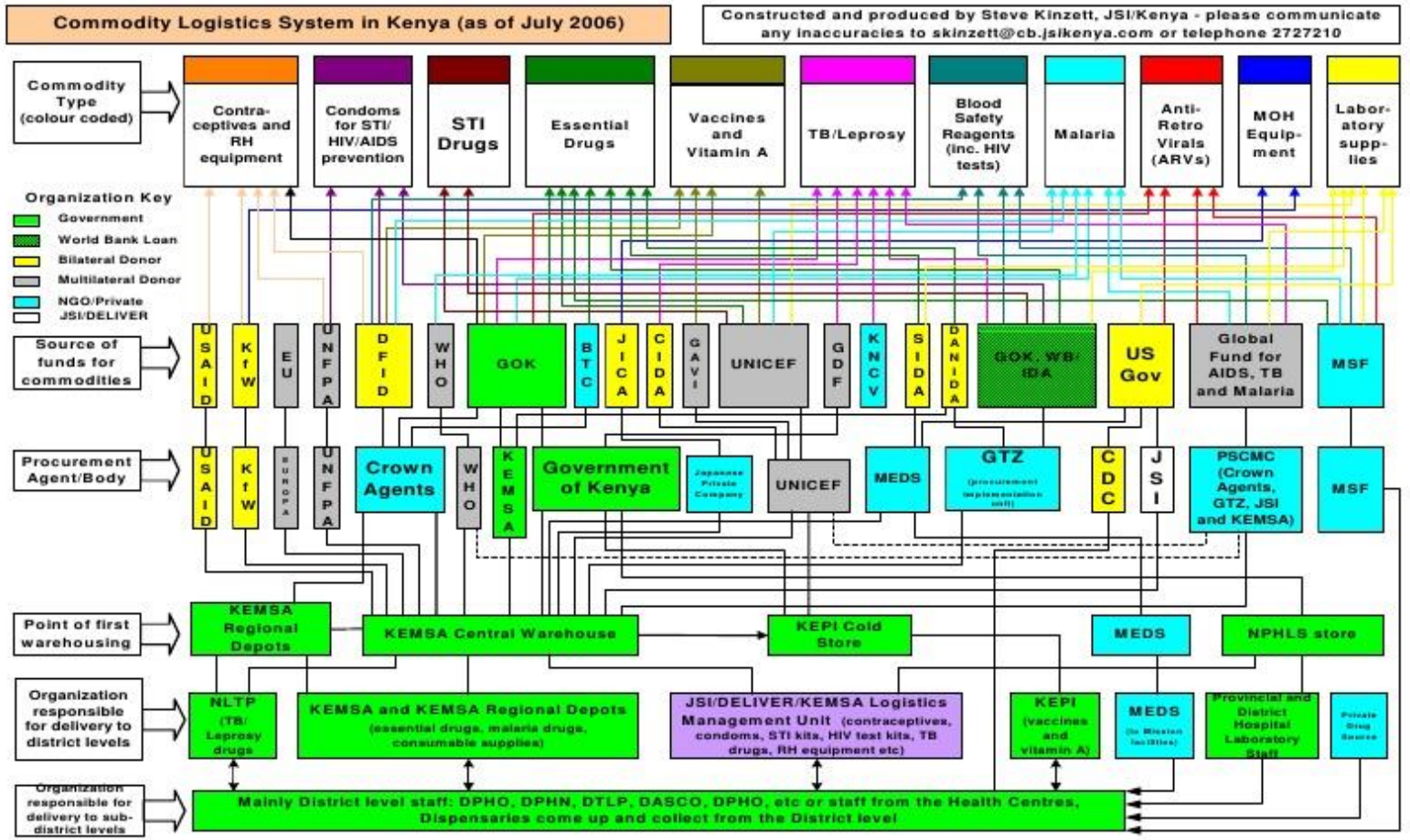
The Pharmaceutical Supply Chain



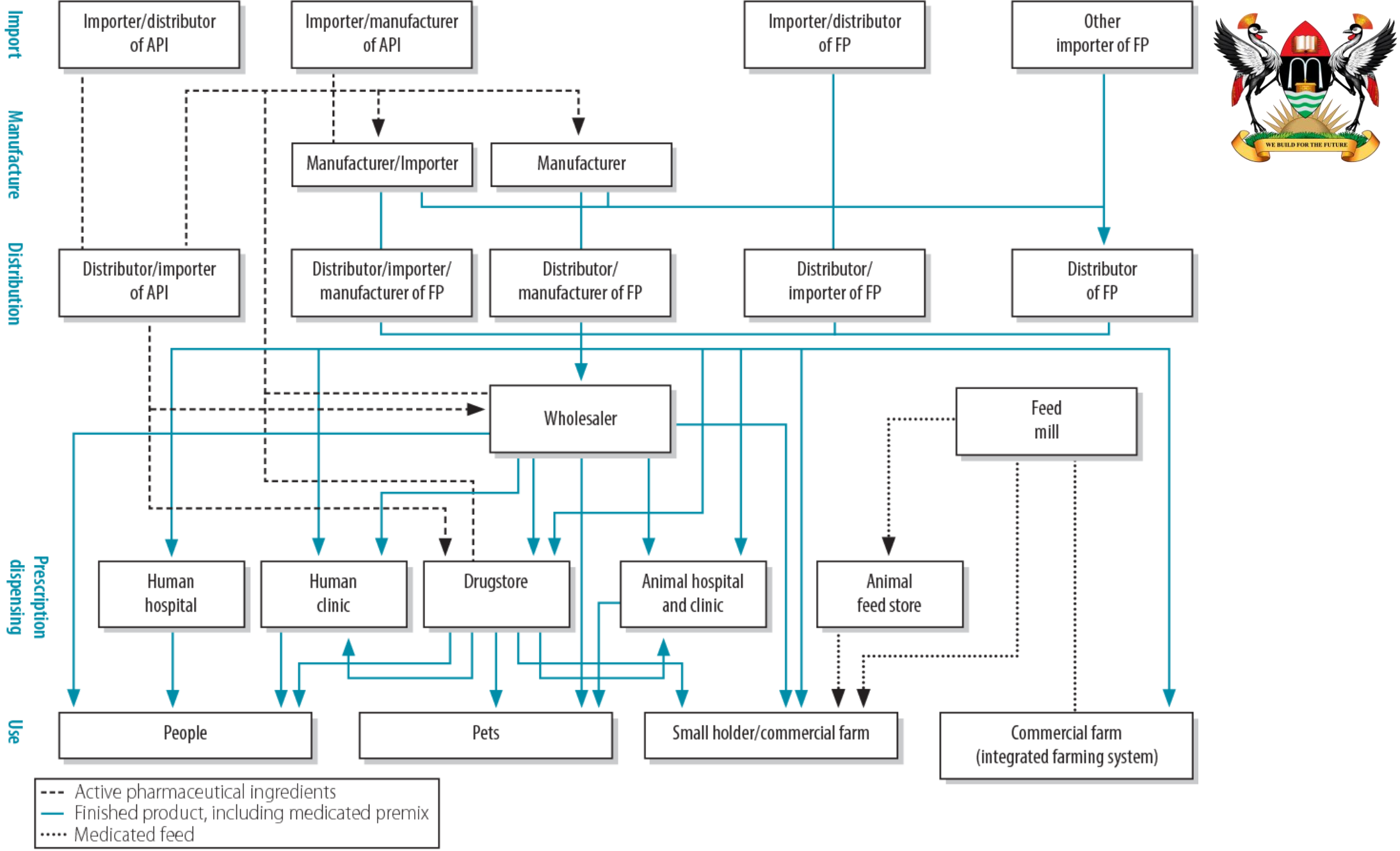
How is the pharmaceutical supply chain that serves animal health organized?

Mapping?

Public Drug Supply Chain: Kenya

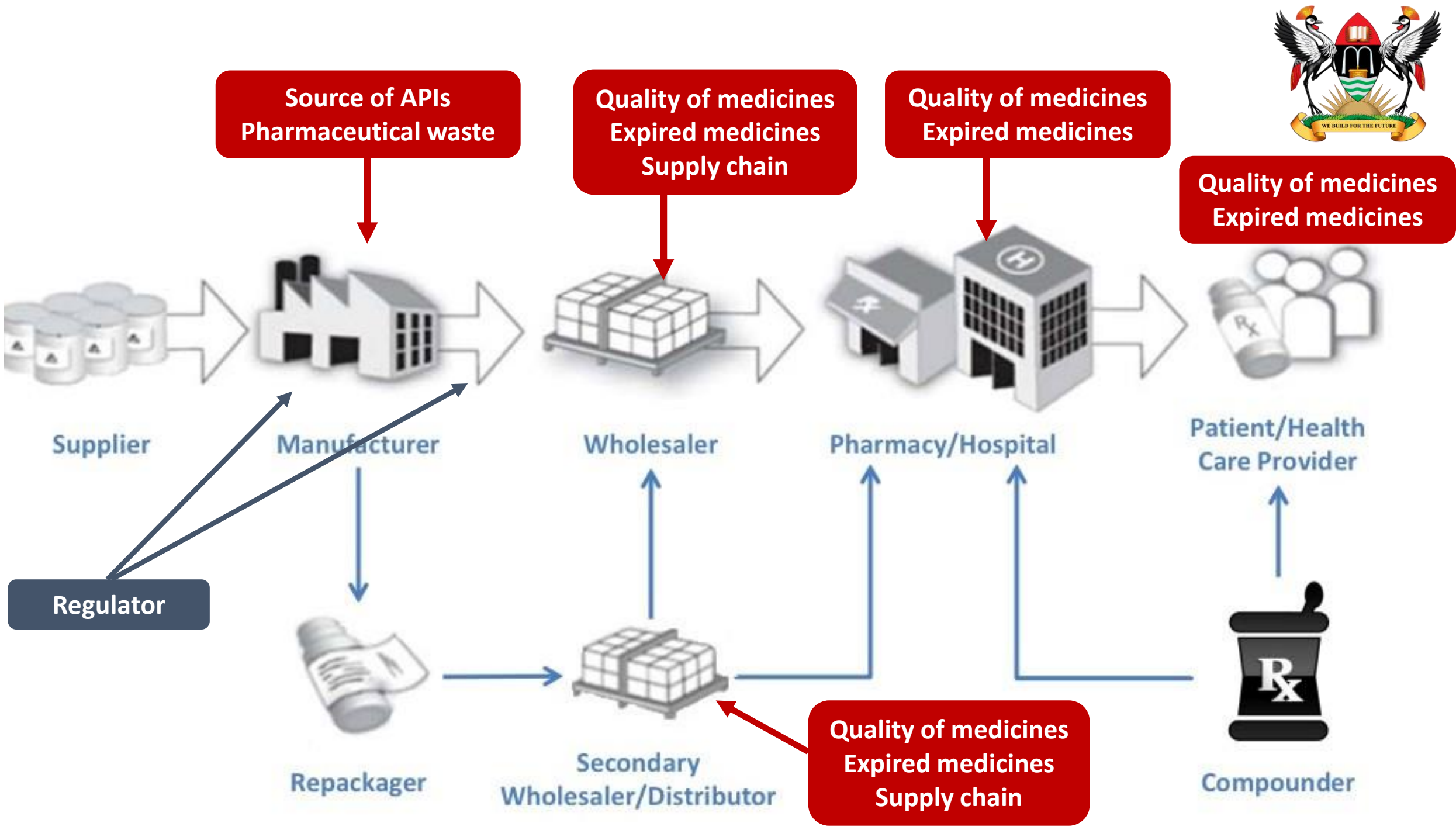


Source: Steve Kinnset, PSI Kenya



API: active pharmaceutical ingredients; FP: finished product.

Note: An integrated farming system covers all aspects of the commercial production of livestock, including breeding, feeding, processing and marketing.


Source of APIs
Pharmaceutical waste
Quality of medicines
Expired medicines
Supply chain
Quality of medicines
Expired medicines
Quality of medicines
Expired medicines
Supplier
Manufacturer
Wholesaler
Pharmacy/Hospital
Patient/Health
Care Provider
Regulator
Repackager
Secondary
Wholesaler/Distributor
Quality of medicines
Expired medicines
Supply chain
Compounder

Consumption data

- ***Consumption data -*** estimates derived from aggregated data sources
  - Import data at the National Drug Authority
  - Warehouse or wholesaler data at NMS, JMS and other distributors
  - Aggregated health insurance data

No patient information, who or why the antimicrobials are being used.

These data sources provide a *proxy* estimate of use of antimicrobials.

Antimicrobial use data

- Estimates derived from patient-level data.
  - Gender,
  - age,
  - indication,
  - patient symptoms,
  - health worker's diagnoses,
  - medicines prescribed,
  - medicines dispensed
  - Animal
  - Weight
  - Farm
  - Owner
- These data may allow disaggregation of data
- Facilitates assessment of clinical practice against agreed protocols and treatment guidelines

Medicine variables collected

- Name – international non-proprietary name (INN)
- Formulation – tablet, capsule, powder for injection
- Strength – amount of active principle per unit
- Pack size -

Daily Defined Doses (DDDs)

- Technical unit
- Total grams of the medicine used is determined by summing the amounts of active ingredient across the various formulations (different strengths of tablets or capsules, syrup formulations) and pack sizes
- DDD value is assigned - http://www.whocc.no/atc_ddd_index/

Denominator data

- Population under surveillance to which data apply
- May be stratified by healthcare sectors
  - Government run health services
  - Private health providers
  - Health insurance schemes

Contextual information

- Data source information, e.g. national reference data (total) or health care sector (community, hospital)
- Which antimicrobials are included in surveillance
- Specific exclusions, e.g. nursing homes, day care centres, psychiatric facilities, private sector
- Context for veterinary health services

ATC Classification system

- Allows flexibility in reporting by medicine or groups of medicines.
- Active substances are divided into different groups
  - **A**natomical organ or system on which they act
  - **T**herapeutic, pharmacological and
  - **C**hemical properties.
- Important for monitoring trends over time and comparisons across geographical regions

Data sources – a case of Uganda

Consumption data

- Licensed imports - custom records at NDA
- Domestic manufacturers – production records of antimicrobial products
- Licensed wholesalers and distributors – procurement data or records of sales
- Public sector procurement records at MoH,
- Donations
- Data from health insurance programs
- Records from pharmacies or drug stores

Reporting of consumption data

- Consumption data may be presented as total consumption for a country or may be disaggregated by setting (community or hospital; public or private sectors).
- Package level data - total numbers of packages for each antimicrobial product during the defined period of time.
- Substance level data – daily defined doses

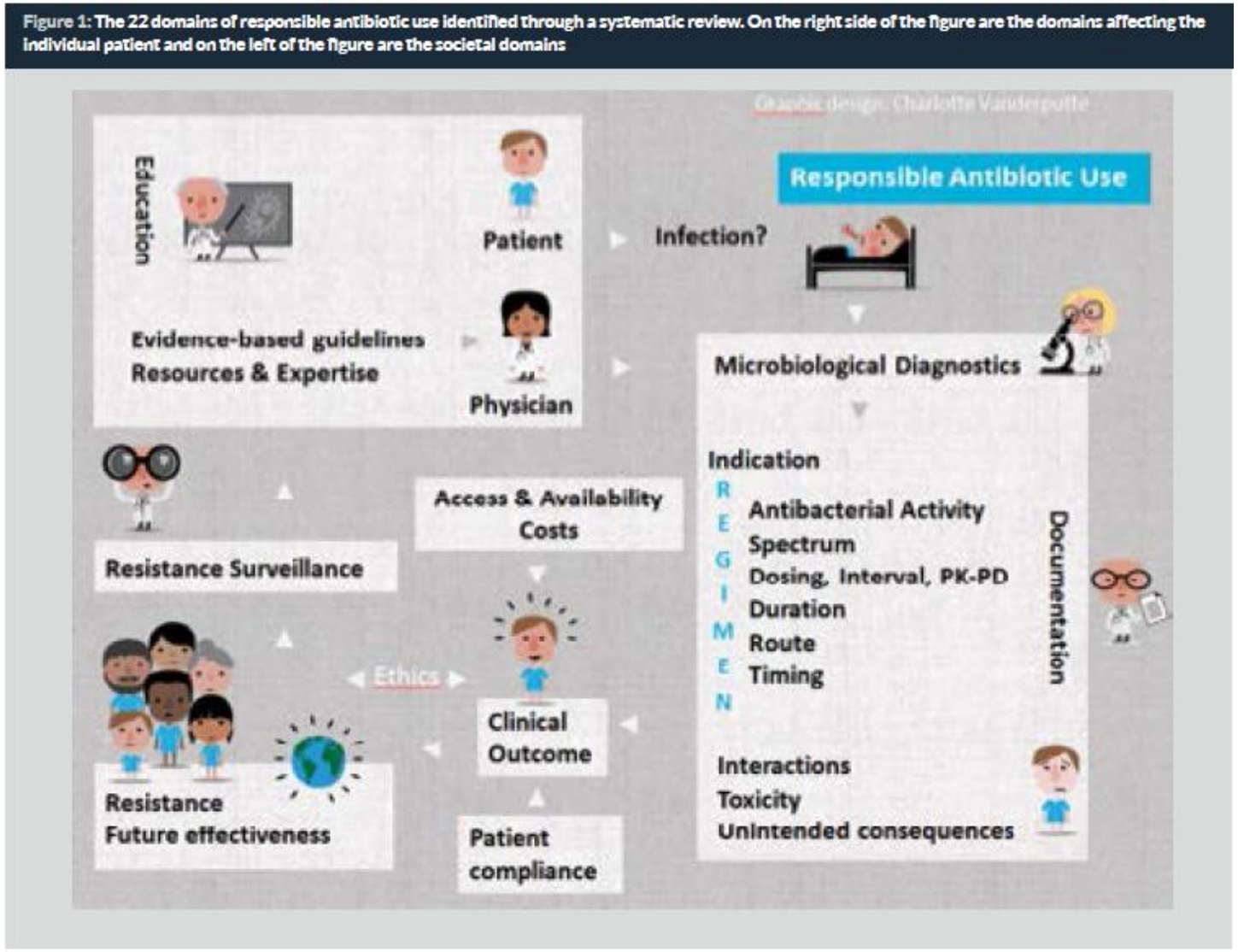
Number of DDDs = $\boldsymbol{Total\ grams\ used/DDD\ value\ in\ grams}$

Data sources – a case of Uganda

Antimicrobial use data

- Data from health insurance programs
- Records from pharmacies or drug stores – community pharmacies, hospital pharmacies and licensed drug stores
- Patient registers and charts in hospitals, medical centers and clinics
- Patient information
- Households
- Farms
- Veterinary practice

Global definition of responsible antibiotic use



Gyssens and Monnier, 2016 the DRIVE AB Project

Indicators and metrics for antibiotic use

- A **quality indicator** reflects the degree in which antibiotic is correct or appropriate.
  - outcome has value on its own

- A **quantity metric** reflects the volume or the costs of antibiotic use.
  - outcome only gains value in its comparison

Quality indicators

Antibiotic Prescribing

- Local practice guidelines.
- National guidelines when no local guidelines are available.
- Antibiotic prescriptions that deviate from guidelines should be justified.

Availability

- Antibiotics on the formulary should not be out of stock at the health care facility.

Diagnostics

- Two sets of blood culture should be taken before antibiotic administration when bacteremia is suspected.
- Specimens for culture from suspected sites of infection should be collected before antibiotic administration.
- Microbiological investigations should be performed according to guidelines.

DRIVE AB Project, 2016

Additional quality indicators suggested

- Antibiotic stewardship
- Documentation
- Dosing
- Duration – discontinuation
- Education
- Guidelines
- Outcome
- Prescribing administration
- Route
- Safety
  - General
  - Allergy
  - Interaction
  - Toxicity
- Selective reporting
- Spectrum
- Streamlining/de-escalation
- Surgical prophylaxis
- Therapeutic Drug Monitoring
- Timing

DRIVE AB Project, 2016

Quantity metrics for inpatient setting

- Defined Daily Dose (DDD) per 100(0) Patient Days (Bed Days or Occupied Bed Days)
- Defined Daily Dose (DDD) per Admissions
- Defined Daily Dose (DDD) per 100 Bed Days (per Case Mix Index)
- Prescribed Daily Dose (PDD) per 100 Patient Days
- Days of Therapy (DOT) per Patient Days
- Days of Therapy (DOT) per Patients
- Days of Therapy (DOT) per Admissions

Quantity metrics for inpatient setting 2

- Length of Therapy (LOT) per Admissions
- Length of Therapy (LOT) per Patients
- Patients exposed to antibiotics per all Patients
- Patients exposed to antibiotics per Admissions
- Antibiotic use should be preferably expressed in at least two metrics simultaneously

Quantity Metrics for the Outpatient Setting

- Defined Daily Doses (DDD) per defined population
- Treatments or courses per defined population
- Treatments or courses per physician contact
- Prescriptions per defined population
- Prescriptions per physician contact
- Seasonal variation of total antibiotic use

Implementation in the Uganda AMR NAP

- Makerere University Pharmacy Department with support from IDI/Fleming Fund will support the surveillance of AMC/U in human and animal health
- Establishing and strengthening the surveillance system
  - Supporting the development of the surveillance plan, guidelines, tools and protocol
  - Piloting the protocol and writing up the report
- Serving as the secretariat for AMC/U surveillance

Efforts to contain antimicrobial resistance are intertwined with improving the quality of healthcare and strengthening the health system.

"THANK YOU" IN SEVERAL AFRICAN LANGUAGES

Egypt:
"Shukran"
(Arabic)

Ethiopia:
"Amesegënallô"
(Amharic)

Cameroon:
"Merci"
(French)

Kenya:
"Asante"
(Swahili)

Angola:
"Obrigado"
(Portuguese)

Uganda:
"Webale"
(Luganda)

South Africa:
"Ngiyabonga"
(Zulu)
"Enkosi"
(Xhosa)
"Dankie"
(Afrikaans)

Botswana:
"Ke a leboga"
(Setswana)

tripsavvy