

THE ANTIMICROBIAL AGENTS' USAGE, ANTIMICROBIAL RESISTANCE AND POLICY SYMPOSIUM REPORT

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Bridging research innovation with policy & practice



East African Community

One People, One Destiny



TWENDE CONSORTIUM ACKNOWLEDGES THE EXPERT PRESENTERS, PANEL DISCUSSANTS AND THE AUDIENCE FOR THEIR VIEWS, OPINIONS AND RECOMMENDATIONS CONTAINED IN THIS REPORT

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EXECUTIVE SUMMARY

Antimicrobial resistance (AMR) is a global health threat and calls for urgent action. The East African community came together at the 6th East African Health and Scientific Research Conference and International Health Exhibition and Trade Fair in Bujumbura, Burundi to discuss, “Preparedness for and Control of Disease Outbreaks, Epidemics, and Pandemics, in the context of Climate Change, Globalization and Gaps in health Systems”. Pertinent to the conference was the Antimicrobial agents’ usage, Antimicrobial resistance and Policy (AAP) symposium held on 31st March 2017. The AAP symposium discussed the burden and drivers of AMR and made policy recommendations for the East African Community (EAC) action against AMR.

Over 200 delegates attended the symposium hosted by TWENDE consortium¹. The delegates were mainly from four: Burundi, Kenya, Tanzania and Uganda, out of the six EAC member States. The symposium had two sessions:

- 1) Thought provoking expert presentations, which discussed the Global action plan on antimicrobial resistance (AMR), the situational analysis of AMR in the EAC; the animal – health interface and its impact on the rise of AMR; and the value of translating research into policy and practice.
- 2) Panel discussion that contextualised the issues raised by expert presenters and gave country perspectives on AAP. Discussants were drawn from Medicines regulatory bodies and national AMR task forces in the EAC.

Policy recommendations were received from expert presenters, panel discussants and the audience. To ensure that every one’s view was heard, note sheets were issued to the audience to note down the recommendations they wanted included in the EAC AMR policy. Forty-three notes were submitted with a total of 107 recommendations. Together with recommendations from expert presenters and panel discussants they were grouped into six thematic areas:

1. Governance and financing
2. Increasing awareness
3. Regulatory framework
4. Training
5. Laboratory capacity enhancement
6. Research and development

The symposium was informed of the existence of most policies on antimicrobial agents’ usage and AMR control among EAC member States. However, the policies are poorly or not at all implemented. Research evidence on the burden and drivers of AMR in the region was quite scattered making it difficult for evidence-based policy making and intervention planning. We are confident that adoption and implementation of the recommendations of this report will put the EAC on the right track to becoming an AMR free region.

¹ TWENDE is Tuberculosis: Working to Empower Nations’ Diagnostic Effort. An EAC interdisciplinary research consortium funded by EDCTP.

1.0 PREAMBLE

1.1 The East African Community (EAC)

Comprised of six member States: Burundi, Kenya, Rwanda, South Sudan, Tanzania and Uganda with a population of 150 million people, the EAC is a regional Intergovernmental organisation of nations working together to achieve sustainable development in all sectors². The EAC provides for forums to review, discuss and make recommendations for improvement in the various economic sectors. The East African Health and Scientific Research Conference (EAHSRC) is a forum that addresses matters affecting health and reviews health research evidence to inform policy. The AAP symposium was held as part of the 6th EAHRC to review evidence on burden and drivers of AMR in the region and inform the EAC policy on AMR.

1.2 Antimicrobial agents and antimicrobial resistance

An Antimicrobial agent is a substance of natural, semisynthetic or synthetic that kills or inhibits the growth of a microorganism but causes little or no damage to the host. The host can be a human or an animal either domesticated or wild. Antimicrobials may be categorised as antibacterial, antiviral, antifungal, antimalarial, anthelmintic etc for action against bacteria, viruses, fungi, malarial parasites and parasitic worms respectively. The term antibacterial is often used as synonym to antibiotic but in a strict sense an antibiotic is a substance produced by a microorganism that kills or inhibits growth of other microorganisms. This means that antimicrobials of semisynthetic (methicillin and amoxicillin) or synthetic (sulfonamides and quinolones), or those which come from plants (quercetin and alkaloids) or animals (lysozyme) should not be defined as antibiotics. Not all antimicrobials are antibiotics but all antibiotics are antimicrobials³. Clear definition and classification of antimicrobial agents is crucial in the fight against antimicrobial resistance by preventing misuse against wrong diseases. We therefore recommend that antimicrobials should be defined and branded (for commercial purposes) according to the microorganism they act against. For example, Antibacterial (for bacterial infections), Antiviral (for viral infections), Antifungal (for fungal infections), Antimalarial (for malaria) to mention a few.

Antimicrobial resistance is the ability of microorganisms to survive and multiply in presence of antimicrobial agent that used to kill or inhibit them⁴. For example, Penicillin resistance is the ability to thrive in presence of Penicillin. Resistance to more than one antimicrobial is referred to as multidrug resistance (MDR). Some microorganisms inherently possess genes that confer resistance and so exposure to antimicrobial during treatment kills only the sensitive strains leaving the resistant ones to multiply. In other cases, microorganisms develop gene mutation or acquire gene elements from other microorganisms that confer them resistance to antimicrobials that they were otherwise sensitive to. Therefore, all effort must be made to ensure appropriate antimicrobials are prescribed and that patients take the optimal dose.

² <http://www.eac.int/about/overview> accessed 6th May 2017

³ <http://amrls.cvm.msu.edu/pharmacology/antimicrobials/tools/module-pdf-files/pharmacology> accessed 6th May 2017.

⁴ <http://amrls.cvm.msu.edu/pharmacology/antimicrobials/tools/module-pdf-files/pharmacology> accessed 6th May 2017

1.3 The Global action plan against antimicrobial resistance

The O'Neill Commission reviewed the global AMR situation and warned that failure to act would result in an additional 10 million lives lost each year to drug-resistant strains of malaria, HIV, TB, and certain bacterial infections by 2050, at a cost to the world economy of 100 trillion USD^{5,6}. On the 21st of Sept 2016, the UN general assembly acknowledged AMR as a global health threat and declared their commitment to fight it^{7,8}. At this meeting, countries reaffirmed their commitment to develop national action plans on AMR, as stipulated in the *Global Action Plan on Antimicrobial Resistance (GAP)*—the blueprint for tackling AMR⁹. In line with the action plan, countries are expected to investigate the magnitude of the problem, stop misuse of antimicrobial medicines, strengthen surveillance systems to monitor anti-microbial infections and the volume used in humans, animals and crops⁷.

The strategic objectives of GAP are:

- 1) Increasing awareness of AMR in educational & public settings
- 2) Increasing knowledge of incidence & prevalence of AMR
- 3) Disease prevention by improving sanitation, Hygiene & Infection control measures
- 4) Implementing Antimicrobial stewardship, international harmonization of medicines policy & regulations
- 5) Investing of Research & Development (R&D) for new drugs and diagnostics

The AAP symposium contextualised the GAP objectives into the EAC perspective and drew policy recommendations for AMR action plan for the region and member States.

⁵ The Review on antimicrobial resistance, chaired by Jim O'Neill. *Securing New Drugs for Future Generations: the Pipeline of Antibiotics*. London; 2015:1-44

⁶ The Review on antimicrobial resistance, chaired by Jim O'Neill. *Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations*. 2014:1-20

⁷ General Assembly of the United Nations. PRESS RELEASE: High-Level Meeting on Antimicrobial Resistance. September 21st 2016:1-5

⁸ General Assembly of the United Nations. *Draft Political Declaration of the High-Level Meeting of the General Assembly on Antimicrobial Resistance*. New York; 2016:1-5.

⁹ World Health Organisation. *Global Action Plan on Antimicrobial Resistance*. Geneva; 2015:1-28.

2.0 THE AMR SITUATION IN THE EAC

2.1 The AMR burden in the EAC

The magnitude of AMR in the EAC is not clearly known but indicators point to the situation reaching crisis levels. Focusing mainly on HIV, malaria and tuberculosis, the conference book of AMR abstracts documented 284 past and present studies associated with AMR. This leaves out AMR in fungal and majority of bacterial infections. Several single studies have reported the presence and rising trend of antibacterial resistance in the region^{10,11,12,13,14,15,16}. Although these studies demonstrate AMR prevalence, they are sporadic in nature and do not present a wholesome picture of the AMR burden in the region. The studies have also not explored the AMR impact on clinical outcomes and economic cost of health service delivery. The need to establish and develop surveillance system capacity for coordinated and coherent data collection on AMR prevalence and impact on health outcomes has never been more urgent¹⁷.

2.2 The AMR drivers in the EAC

Multiple factors including the way antimicrobial agents are used in human medicine, agriculture and inability to implement medicines regulatory policies drive development and spread of antimicrobial resistance (AMR)¹⁸. The unrestricted access to antimicrobials, poor prescription practices, non-adherence to prescribed dose, and use of antimicrobials for animal health within the EAC could be driving AMR. An interplay of humans, animals, food chain, water systems, unhygienic healthcare settings and poor quality antimicrobials drive the emergence and spread of AMR in the region (Figure 1).

¹⁰ Rutebemberwa E, Mpeka B, Pariyo G, et al. High prevalence of antibiotic resistance in nasopharyngeal bacterial isolates from healthy children in rural Uganda: A cross-sectional study. *Upsala Journal of Medical Sciences*. 2015;120(4):249-256. doi:10.3109/03009734.2015.1072606.

¹¹ Okoche D, Asimwe BB, Katabazi FA, Kato L, Najjuka CF. Prevalence and Characterization of Carbapenem-Resistant Enterobacteriaceae Isolated from Mulago National Referral Hospital, Uganda. Zhang Q, ed. *PLoS ONE*. 2015;10(8):e0135745. doi:10.1371/journal.pone.0135745.

¹² Ikwap K, Erume J, Owiny DO, Nasinyama GW, Melin L, Bengtsson B, et al. Salmonella species in piglets and weaners from Uganda: Prevalence, antimicrobial resistance and herd-level risk factors. *Preventive Veterinary Medicine*. 115(12):39-47.

¹³ Mehta SD, Maclean I, Ndinya-Achola JO, et al. Emergence of Quinolone Resistance and Cephalosporin MIC Creep in *Neisseria gonorrhoeae* Isolates from a Cohort of Young Men in Kisumu, Kenya, 2002 to 2009. *Antimicrobial Agents and Chemotherapy*. 2011;55(8):3882-3888. doi:10.1128/AAC.00155-11.

¹⁴ Katakweba, A.A.S., Møller, K.S., Muumba, J., Muhairwa, A.P., Damborg, P., Rosenkrantz, J.T., Minga, U.M., Mtambo, M.M.A. and Olsen, J.E. (2015), Antimicrobial resistance in faecal samples from buffalo, wildebeest and zebra grazing together with and without cattle in Tanzania. *J Appl Microbiol*, 118: 966-975. doi:10.1111/jam.12738

¹⁵ Moremi N, Mushi MF, Fidelis M, Chalya P, Mirambo M, Mshana SE. Predominance of multi-resistant gram-negative bacteria colonizing chronic lower limb ulcers (CLLUs) at Bugando Medical Center. *BMC Research Notes*. 2014;7:211. doi:10.1186/1756-0500-7-211.

¹⁶ Kariuki S, Revathi G, Kiiru J, et al. Typhoid in Kenya Is Associated with a Dominant Multidrug Resistant *Salmonella enterica* Serovar Typhi Haplotype That Is Also Widespread in Southeast Asia. *Journal of Clinical Microbiology*. 2010;48(6):2171-2176. doi:10.1128/JCM.01983-09.

¹⁷ Mshana SE, Matee M, Rweyemamu M. Antimicrobial resistance in human and animal pathogens in Zambia, Democratic Republic of Congo, Mozambique and Tanzania: an urgent need of a sustainable surveillance system. *Annals of Clinical Microbiology and Antimicrobials*. 2013;12:28. doi:10.1186/1476-0711-12-28.

¹⁸ The Review on antimicrobial resistance, chaired by Jim O'Neill. *Securing New Drugs for Future Generations: the Pipeline of Antibiotics*. London; 2015:1-44

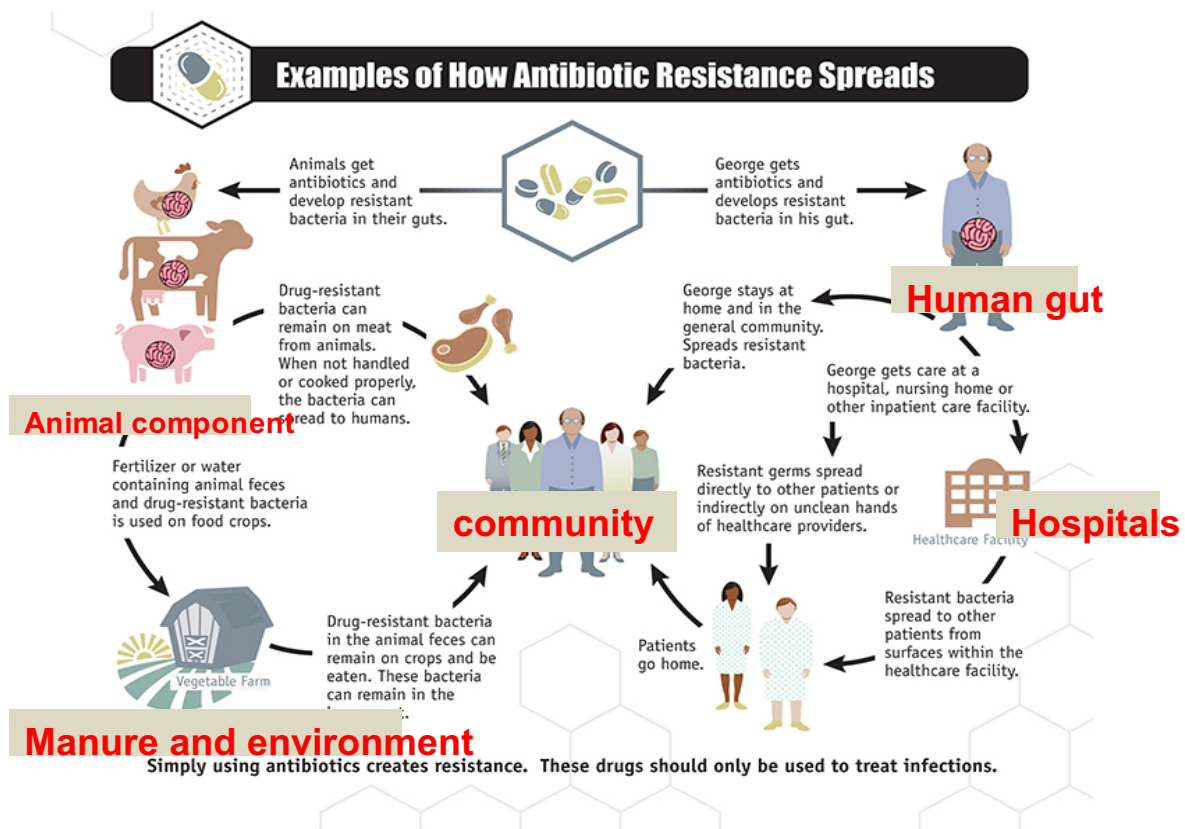


Figure 1: Schematic illustration of the emergence and spread of AMR in human and animal systems (Figure adapted from Dr. John Kiiru's symposium presentation¹⁹).

Pastoralist communities have been relegated to fending for themselves in as far as healthcare is concerned. They procure antibiotics on open market to treat their animals without prescription from a Veterinary doctor (Vet). For example, 100% of the Basongora pastoralists in Western Uganda administered antibiotics without consulting a Vet, 87% and 64% for the Bahima (western Uganda) and the Maasai (southern Kenya & northern Tanzania). “Ngombe does not work anymore, we now have to use twice the amount previously used”, said a Musongora pastoralist in Kasese, Uganda²⁰. Ngombe: Swahili for Cow is a nickname given to the antibiotic Oxytetracycline by cattle keepers in East Africa. This is one of the overused antibiotic among livestock farming communities in East Africa with consequent rise of resistance and now farmers are using twice as much of the antibiotic. Such overuse will drive antimicrobial resistance even higher.

¹⁹ Kiiru NJ (2017). Antimicrobial resistance In East Africa. Trends, Drivers, Challenges and Future Outlooks. Expert presentation given at the AAP symposium, 31st March 2017, Bujumbura, Burundi.

²⁰ Asiimwe B (2017). The Human-Animal Interface: Impact on the Use of Antimicrobial Agents and Spread of Antimicrobial Resistance. Expert presentation given at the AAP symposium, 31st March 2017, Bujumbura, Burundi.

3.0 POLICY RECOMMENDATIONS FOR ACTION AGAINST AMR IN THE EAC

The recommendations were drawn from the submissions made by the expert presenters, panel discussion and the audience. Appendix 1 lists the recommendations received from the audience, expert presentations and panel discussion.

3.1 Governance and financing

a) Embrace the one health approach: This will ensure that adequate resources are allocated for both human and animal healthcare. Nurturing Inter-ministerial cooperation of health, education, agriculture and environment sectors will ensure that no gaps are left in policy implementation, monitoring and evaluation.

b) Adequate financing to strengthen health systems by ensuring optimal staffing levels, adequate equipment and medicines for diagnosis and treatment and support for preventive programmes such as hygiene and infection control.

c) Legislate, enact and enforce laws against misuse of antimicrobial agents. Stamp out corruption and medicines theft in medical practice. Allocate adequate funds for the medicines regulators to effectively monitor and apprehend the law breakers. This will prevent over-the-counter sells or sell of low quality counterfeit antimicrobials.

d) Allocate adequate funds to develop clinical microbiology and pharmaceutical analysis laboratory capacity, establishment and maintenance of high performing surveillance systems.

e) Implement Universal health care coverage by subsidizing health insurance premiums to increase access to professional healthcare and prevent suboptimal consumption of antimicrobials.

3.2 Increasing awareness

a) Education of the public on the risks of contracting and impact of AMR health outcomes. Packaging messages in the language understood by the people is critical to the success of any awareness campaign. The symposium therefore recommends that every AMR literature should be translated to local and national languages to increase understanding.

b) Sensitize pupils and students in both lower and higher education institutions to become agents of change in their home communities.

c) Establish a refresher training programme for medical and veterinary practitioners to update them their knowledge of AMR. Establish a peer mechanism to monitor and evaluate their prescription practices.

d) Invest in interdisciplinary – inter-sector forums to discuss AMR, network and increase inter-sector cooperation on implementing policy actions against AMR.

3.3 Regulatory framework

- a) Enact and implement the no prescription no antimicrobial policy. This will restrict access to antimicrobials thus limiting microbial exposure to antimicrobials, a recipe for emergence of drug resistance.
- b) Implement antimicrobial stewardship programme (ASP). The ASP should be tagged with refresher training and awareness building among healthcare practitioners.
- b) Revise and update laws to give the regulators strong legal mandate to deal with medicines abusers. Increase the regulators' human resource capacity to effectively reach all service users, monitor prescription and sales of antimicrobials.
- c) Harmonize medicines regulations across East Africa to ensure standard operation among member State. "There should be an East African regulatory body that guides on medicines quality, safety, and prescription", said a member of the audience.

3.4 Training

- a) Train and retain clinical microbiologists, laboratory technologists and Infectious disease experts. This will ensure appropriate administration of antimicrobials and sustainability of good antimicrobial prescription practices.
- b) The medical and laboratory training curricula should be updated with current knowledge of AMR, diagnostic and treatment approaches. The curriculum should be harmonised across the East African Community. This can be better achieved through the East African Medical council. However, the council should be diversified to include laboratory practice, and so a name: East African Medical and Laboratory Technology Council would be most appropriate.
- c) Make good use of post graduate training and research to address AMR issues. Collaborate with academics in the EAC institutions of higher learning to align master and doctoral research with the EAC AMR action agenda so that the findings obtained add to the knowledge for addressing AMR in the region.

3.5 Laboratory capacity building

- a) Staff and equip clinical microbiology laboratories for effective execution of diagnostic tests, antimicrobial susceptibility testing and management of surveillance systems.
- b) Establish strong information systems to ensure effective communication between the clinic and the laboratory and national surveillance systems.
- b) Establish, staff and equip pharmaceutical analysis laboratories to examine quality of antimicrobials pre- and post- market registration.

3.6 Research and Development (R&D)

- a) Conduct coordinated research to determine burden and drivers including socioeconomic and cultural factors of AMR in the region.

c) Conduct routine surveillance to inform R&D for new diagnostics, drugs and vaccines as well as informing policy.

b) Invest in research that leads to discovery of new rapid diagnostics, vaccines and medicines. A diagnostic that effectively distinguishes for example bacteria from virus, will be critical in preventing use of antimicrobial against wrong infection.

4.0 POLICY ACTIONS

We recommend a 10-year USD \$20 - 50 million fund to conduct the following:

- a) Establish a state-of-the-art AMR surveillance system with headquarter in on one of the EAC member States supported by a network of surveillance nodes across the region. The head quarter should be empowered with a secretariat staffed with experts in microbiology, epidemiology, social sciences, health economics, public communication and information technology.
- b) Build both microbiological and pharmaceutical analysis laboratory capacity to ensure rapid diagnosis of microorganisms and assessment of medicines quality and safety. The laboratory capacity development should include development of critical mass of experts to run and sustain high quality service delivery.
- c) Research to determine the burden and drivers of AMR. In addition, investment should be made to research leading to discovery of medicines and diagnostics by research institutions in the EAC.
- d) Conduct a well-planned coherent public awareness programme to reach every community in the EAC. Invest in creative means of communication both print, digital and audio-visual media such as Radio, Television etc. Effort should be made to translate messages into languages that understood by the target community (ies).

The above interventions should take a health systems approach to ensure full integration and sustainability.

APPENDIX 1: LIST OF RECOMMENDATIONS FROM AUDIENCE, EXPERT PRESENTATION AND PANEL DISCUSSION

Appendix 1.1: Recommendations from the audience

#	TITTLE	RECOMMENDATIONS
1	Dr. Twizerimana, Burundi	<ol style="list-style-type: none"> 1. Make a rule to reduce the number of people who get tablets without a medical prescription 2. Make a regulatory board which can work for all countries of EAC. 3. Clinical practitioners should reduce prescribing antibiotics without (proper) diagnosis
2	Not given, Burundi	Government should find a way to deal with informal mobile pharmacies because these are potentially dangerous in creating drug resistance and causing disease epidemics for which there is no treatment
3	Not given, Burundi	<ol style="list-style-type: none"> 1. Providing new and high techniques, materials and equipment 2. Fight corruption in the medical section 3. Refresh training for lab personnel 4. Publish stats (presumably on AMR) and advertisements
4	Laboratory scientist, Zanzibar ministry of Health	<ol style="list-style-type: none"> 1. More research should be focused on extended spectrum beta Lactamase producing bacteria in clinical, environmental and food animals sample 2. The concept of MDR needs to be kept more elaborated by experts 3. Laboratory analysis of pharmaceutical products to investigate substandard drugs in each country is necessary 4. National drug regulatory agencies should be supported and involved in controlling AMR
5	LAB TECHNOLOGIST, Burundi	To eliminate AMR will be possible when the doctors prescribe antibiotics which have been confirmed to be susceptible through antibiograms
6	STUDENT, Burundi	To regulate the circulation of antibiotics by forbidding the pharmacies to deliver drugs without prescriptions from doctors
7	Not given, Burundi	Increasing the number of vet professionals so that animals (and or people) are treated properly by specific drugs

8	Student, Burundi	1. Antibiotics must be prescribed by doctors 2. Selection of antimicrobials should be determined by susceptibility tests 3. All drugs sells should be forbidden, pharmaceutical companies should be the only ones selling
		4. patients must be informed on the importance of finishing doses as per prescriptions
9	Student, Burundi	1. EAC should establish a clear policy to control entry of antimicrobials, if possible make the research agency control the quality of imported drugs 2. Fight against overuse and misuse of antimicrobials by mobilizing everyone including health agents 3. Antimicrobials should not be sold without doctors prescriptions 4. To establish annual guidelines in east Africa that will guide medical practitioners when and how to prescribe antimicrobials 5. Financial support
10	Not given, Burundi	Inform the public the risks of overusing and misusing antimicrobials
11	Student, Burundi	1. Governments should make a law that would not allow antibiotics to be sold without prescriptions 2. Discourage self-medication 3. The public should be informed about antimicrobial resistance, the extent of the problem, how it can be avoided
12.	Student, Burundi	1. Enhance the skills of doctors and healthcare workers 2. The governments should regulate sell of drugs in pharmacies across the region 3. Presidents should honor the agreements of the UN assembly meeting of 23 rd September: Commitment to combat AMR
13	Doctor, Burundi	Antimicrobials should only be sold with prescriptions from doctors
14	Not given, Burundi	1. Performing drug susceptibility testing before prescribing to patients 2. Improving labs and working conditions in laboratories
15.	Student, Burundi	1. Antimicrobials should only be sold with prescriptions from doctors 2. Pharmacies should be regulated to not sell drugs irrationally

		3. People should be informed about the dangers of misusing and overusing antimicrobials
16.	Student, Burundi	Make a policy to control activities of pharmacies
17	Student, Burundi	1. Each country should make a list of drugs which can be sold without prescription and those which must be sold with prescription 2. Inform the public to avoid (symptomatic) self-prescription of drugs
18	Student, Burundi	1. Antimicrobials should only be sold with prescriptions from doctors 2. Once antimicrobial resistance is detected, stop it for one year and reintegrate it after that delay
19	Student, Burundi	1. Implement a rule aimed to control antimicrobial sells 2. Antimicrobials should not be sold without prescriptions
20	Student(PhD)	1. Inform the public through media (radio, television, regular programs) on necessity of buying drugs following doctor's prescription 2. People should stop self-medicating
21	Not given, Burundi	1. Antimicrobials should not be sold without prescriptions 2. Antimicrobials should not be given without susceptibility testing
22	Not given, Burundi	Antimicrobials should not be sold without prescriptions
23	Student, Burundi	Antimicrobials should not be sold without prescriptions
24	Student, Burundi	1. Antimicrobials should only be given until the infecting organism (bacteria) is known 2. Labs should have the facilities to perform susceptibility tests 3. Antimicrobials should not be sold without prescriptions
25	Student	1. Policies should be implemented against misuse and overuse of drugs 2. Ban non therapeutic use of antimicrobials
26	Not given	1. Establish policies to control antimicrobial sells 2. Increase research on AMR 3. Establish control mechanisms on antimicrobial production
27	Lab scientist, Tanzania	EAC should establish AMR monitoring system

28	Not given, Burundi	Don't ignore French when leading such conferences because you know there are many French speakers in our community
29	General practitioner, Burundi	<ol style="list-style-type: none"> 1. Governments should control buying of antimicrobials in villages 2. Providing education to medical practitioners on the dangers of irrational prescription of drugs 3. Improving lab conditions so that they give accurate results for every disease 4. Empowering health systems and make treatment accessible to everyone (medical insurance)
30	Student, Burundi	<ol style="list-style-type: none"> 1. Services to control antimicrobial resistance 2. Antimicrobials should not be sold without prescriptions
31	Student, Burundi	<ol style="list-style-type: none"> 1. Control the use of antibiotics for treatment 2. Policies or programs to fight against AMR 3. Improve environmental hygiene 4. Follow up to patients developing AMR
32	Student, Burundi	<ol style="list-style-type: none"> 1. Increase salaries of healthcare workers 2. Initiation of AMR surveillance program
33	Researcher, Uganda	<ol style="list-style-type: none"> 1. Develop innovative education models so as to invest in the young generation to fight AMR 2. Technology utilization- social media, and data collection tools
34	Not given	<ol style="list-style-type: none"> 1. Antimicrobials should not be sold without prescriptions 2. Each pharmacy should have a qualified pharmacist for good management of drugs 3. More research on AMR 4. EAC should provide financial aid on AMR research
35	Not given, Tanzania	<ol style="list-style-type: none"> 1. Optimize access to antimicrobials and diagnostics 2. Promote optimal use of effective antimicrobial medicines and diagnostics in humans 3. Strengthen surveillance of antimicrobial medicines and diagnostics use 4. Promote appropriate antimicrobials use by the public 5. Promote access to and appropriate use of effective antimicrobials and diagnostics in animal health and agriculture

		6. regulate and promote the use of quality, safe and effective antimicrobial agents and diagnostics
36	Dr Pascalina, Burundi	<p>1. Healthcare professionals and especially doctors-doctors should be well paid to devote their time to the care of patients, because financial satisfaction is encouraging and allows the stability of the latter in their profession!</p> <p>2. Health education towards the population and diagnosis-prevention. The main diseases must occupy the first place in the management of problems related to health in general population. In this sense, the peasant / citizen should know about malaria as well as the doctor, and rapid malaria tests should be done at frequencies to eradicate malaria at the country level</p> <p>3. HIV / AIDS should be diagnosed and treated in all cases of HIV. Papiloma virus, hepatitis B and C virus should disappear from future generations through vaccines and treatments</p>
37	Student, Burundi	<p>1. Make an inventory: show the scale of the problem</p> <p>2. Awaken the consciences of the nursing staff, the population and the leaders in particular</p> <p>3. Investing sufficient resources for research (efficiency of imported medicines), laboratory equipment and rational use of anti-microbials</p>
38	Not given, Burundi	<p>1. I would like to ask the authorities of the countries of the East African Community to fight against self-medication based on antibiotics, which has become a habit for many people here in Burundi.</p> <p>2. The other problem that causes antibiotic resistance to fight is ignorance and there are people who do not finish the dose of medication prescribed by a doctor either because of poverty or 'ignoring. They take antibiotics 1 or 2 days and they stop without respecting the total of necessary days..</p>

39	Not given, Burundi	<ol style="list-style-type: none"> 1. Do an antibiogram before the introduction of an antibiotic treatment to determine the effective antibiotic on the germ involved. 2. Sensitize the population on the harmful effects of self-medication with antibiotics and thus encourage them to abandon this practice and instead consult a doctor. 3, Sensitize pharmacies so that they do not give antibiotics to people without medical prescriptions
40	Not given, Burundi	For the next session (conference), it is also necessary to include French because the majority of the participants of the Burundian participants are much at ease when they speak French.
41	Student, Burundi	<ol style="list-style-type: none"> 1. Avoid selling drugs to avoid giving medications to people who do not have the prescription 2. There must also be public awareness about taking medicines because there are some people when they feel better, they stop treatment immediately, and this leads to resistance.
42	Not given, Burundi	<ol style="list-style-type: none"> 1. Verification of medicines sold in the pharmacy expiry date 2. Do not give medication for people who do not have the prescription (avoid self-medication) 3. Sensitize the population on how to take the prescribed medication and that the patient should continue until healing, do not stop the medicines when the cure is not finished because this can lead to resistance.
43	Medical Officer of Health District, Burundi	<ol style="list-style-type: none"> 1. To the police: <ul style="list-style-type: none"> * Stop and seriously punish sellers of illicit drugs. *Burn all drugs sold outside government-recognized structures and pharmacies. 2. At the Ministry of Public Health and the Fight against AIDS <ul style="list-style-type: none"> *Close private pharmacies and structures that sell medicines without a prescription

Appendix 1.2: Recommendations from Expert presentations

Session 1

Presenters Key points

Antimicrobial resistance has hit a crisis.

1. Disease spread

- Disease spread (strains resistant to most antimicrobials) in hospitals
Are we pushing resistance faster than we should? There is a link between NCDs and misuse /overuse of antibiotics that leads to Obesity.

2. Burden of Disease at human –animal interface

- It is predicted that in 2017, animals will consume more antibiotics than humans. Misuse of antimicrobial drugs to both animals and humans varies in different communities and is extremely high in certain communities.

Major vulnerabilities

- Water sources
- Late response to diseases in both animals and humans leads to overuse of antimicrobials

3. Prevention is Key

- Regulate access to antimicrobials
- Support industry to innovate on Medicines, diagnostics and Vaccines

Interventions

- Studies to inform biotechnology
- Develop vaccines, new drugs
- Enact and enforce policies against over the counter drugs
- Ban non curative (growth promotion) drugs in livestock

Overall

- Increase resilience to vulnerabilities
- Lobby for Political commitment and encourage community involvement
- Multi sectoral collaboration/approach Involving line ministries, law enforcement, academia and others
- Disease prevention (e.g. hand wash)
- Regulate access to antimicrobials.

Knowledge transfer and Exchange

- There is need to involve parties involved for buy- in at the onset. Physical visits and clear explanation was found necessary in the TWENDE study- Kenya for improved participation in the online questionnaire. Working internet at the participating sites is critical.
- Communicate in a language that is clear and understandable to the target audience.

Session 2

Discussion guide; Discuss the magnitude of AMR in East Africa. How can we prevent it?

Whatever we do, bear in mind that AMR is already here (in EA) with us.

There is no one bullet solution for control of AMR

Suggestions:

- Give it a regional approach- involve all East African countries to seek a solution together
- Enforce/encourage rational use of medicines, balance between access and restriction
- Aim at vaccine development
- Improve surveillance, Lab capacity enhancement and behavioural change
- Multi-sectoral multidisciplinary approach
- Use of standardized procedures for all east African countries
- Strengthen Healthcare system including access to healthcare for all through Health insurance
- Motivation for good results by regulating procedures such as lab and drug quality
- Sanctions for poor/ unethical processes
- Increase awareness to citizenly to push for governments to respond to antimicrobial resistance through; enacting/enforcing regulatory mechanisms, Enhancement of healthcare systems by prioritizing healthcare.
- Capacity building to improve reporting systems; quality assessment of imported drugs, data for research use
- Learn from other EA on what they are doing right e.g. learn from Tanzania on; Register of medicines, import/export controls, inspections, random tests, restrictions on key medicines such as anti-TB drugs. AIM at one East African Community drug licensing Authority. It was noted that national AMR surveillances are in place in most East African countries. Efforts should be made to ensure that all countries have.
- Clinical –lab collaboration is essential to ensure good patient management.
 - Use It to relay results
 - Budget to ensure smooth operations
 - Improve communication between clinic and lab
 - Avail periodical Drug susceptibility reports to guide treatment by clinicians

