SAARC Agriculture Centre (SAC)
South Asian Association for Regional Cooperation

Policy Brief

Containment of Livestock Origin Antimicrobial Resistance (AMR) in South Asia

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The people of South Asian region are currently leading a better standard of living because of unprecedented growth and prosperity displayed during the past few decades through the implementation of inclusive developmental plan equipped with technologies and scientific interventions. On the highway of development, often the region encounters multiple challenges of diverse origin, which retards the pace of development and impacts adversely on health of human, animal and environment. Antimicrobial resistance (**AMR**) is one of those challenges currently faced by all Member States (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka) of the South Asian Association of Regional Cooperation (SAARC) along with the rest of the world. In light of the present status of AMR, the antibiotics are no more effective to kill the pathogenic microorganism either for routine treatment or after major surgical operation (WHO, 2015). Hence, the situation could push back the human society to an era of "Pre-Antibiotic Discovery". Albeit, the SAARC Member States have proven time and again in addressing the past conventional challenges through standard risk management approaches, nevertheless, the containment of AMR could be of bigger challenge as it is complex and interconnected with multiple sectors. Failure to take appropriate multisectoral activities for the containment of the livestock origin AMR at regional level could result into adverse impacts on food and livelihood security, veterinary healthcare system, public health, and environment leading to hindrances in achieving the several SDGs. Hence, the current endeavour has been made to highlight the comprehensive policy guidelines for fostering prudent usages of antimicrobials in livestock to control further emergence and spread of AMR.

Goals

The goal of the current policy brief is to promote and protect the livestock sector along with human health and environment keeping in mind the principles of "One Health". The "One Health" is the collective efforts of multiple disciplines working locally, nationally, regionally and globally to attain optimal health of people, animal and environment.

Antimicrobial resistance (AMR)

Since its discovery, the antibiotic becomes an integral part of healthcare system in both human and animals to kill or inhibit the growth of disease-causing bacteria. Later on, the antibiotic occupies significant niche in food producing animals as growth promoters and preventive measures (Samanta et al., 2015). Currently, the consumption of antibiotic by livestock sector is higher than its usages by human healthcare system and it is anticipated to increase by several folds in coming decades because of the intensification of livestock production among low and middle-income countries (Van Boeckel et al., 2017; Cuong et al., 2018). In fact, the AMR is a naturally occurring phenomena of microorganism through which it becomes resistant to antimicrobial compounds. The 13th edition of "The Global Risks Report 2018" also have taken into account the AMR challenge for two reasons: (i) the overuse and misuse of antibiotics in both human and food producing animals and (ii) no discovery of novel class of antibiotic since 1980s (World Economic Forum, 2018). Evidently, the growing population coupled with preference for animal sourced protein by the people of South Asia consequences to greater demands of livestock origin foods, which in turn caused intensification of animal farming. As a result, the current people of the SAARC region will have to face the permanent arm race with the disease-causing microorganisms owing to the ineffectiveness of available antimicrobials medicines.

Livestock wealth of South Asia

Livestock occupies significant place in the livelihood of South Asian population and plays an immense role for the region's food, nutritional security and economic prosperity. It shares almost 29% (ranges from 8 to 56%) of the agricultural gross domestic product (GDP) in different Member States and hold the potential to deliver both the agricultural-led growth and the socio-economic transformation. The diverse agroclimatic conditions coupled with untiring endeavours of livestock farmers, the South Asian region has emerged as the potential habitat for numerous world's best breeds of livestock species including cattle, buffalo, sheep, goat and poultry. The livestock wealth of South Asia is comprised of 273 million cattle, 153 million

Table 1 Livestock population of South Asian countries

Country	Population in number						
	Cattle	Buffalo	Sheep	Goat	Pig	Poultry	Camel
Afghanistan*	2854000	--	18018000	10445000	--	14543000	481000
Bangladesh@	24086000	1485000	3468000	26100000	--	337998000	--
Bhutan#	303250	550	10444	42689	18185	1118178	--
India $	192490000	109850000	74260000	148880000	9060000	851810000	250000
Maldives^	--	--	--	--	--	215027	--
Nepal!	6430397	3174389	612884	11225130	870197	47960000	--
Pakistan%	46100000	38800000	30500000	74100000	--	152180000	1100000
Sri Lanka?	1000880	283550	10389	287190	95120	21275820	--
Total (number)	273264527	153593489	126879717	271080009	10043502	1427100025	1831000
Total (million)	273.26	153.59	126.87	271.08	10.04	1427.1	1.83
Global (million) (FAO 2017)	1491.68	200.96	1202.43	1034.40	967.38	24856.22	34.82
SAARC share (%) of world	18.31	76.42	10.55	26.21	1.03	5.74	5.25

* Based on Central Statistics Organization, Islamic Republic of Afghanistan (2013-14)
@ Based on Livestock Economy at a glance, DLS (www.dls.gov.bd)
# DOL, Ministry of Agriculture and Forest, Bhutan (2017)
$ Livestock census, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India (2019)
^ Country Report on the State of Animal Genetic Resources, Ministry of Fisheries, Agriculture and Marine resources (2004)
! Livestock Statistics of Nepal, Ministry of Livestock Development, Government of Nepal (2017)
% Pakistan Economic Survey (2017 -18)
? Department of Census and Statistics, Sri Lanka (2017)

buffalo, 126 million sheep, 271 million goat, 10 million pig, 1.8 million camel, 1427 million poultry etc. Country wise livestock population of SAARC region is presented in Table 1. Therefore, the total headcount of both ruminants and non-ruminants is 2263.77 million (Samanta et al., 2019).

Evidently, the population growth, urbanization, changes of lifestyle, purchasing power coupled with globalization makes the headway for fuelling the "Livestock Revolution" in South Asia and offers the platform to the primary livestock producers to be linked with the emerging markets. The livestock production system of SAARC region is stirring up the production to meet the growing demands and adapting to satisfy the changing consumer's choice of next generation population. In that course, the livestock sector adopted several scientific interventions to enhance the nutrient utilization, productivity, product quality, management of disease outbreak, etc. Application of antimicrobials is one of the such interventions adopted by the livestock production system in South Asia (Samanta et al., 2019). Although, the productivity has been boosted by several folds as a result of using antimicrobial growth promoters, but it has been trailed with the development and transfer of AMR in the region.

Impact of AMR

The huge and escalating usages of antimicrobials in food producing animals, a consequence of increasing demand for animal sourced protein, is of great regional concern considering the emerging threat of AMR. Albeit, the usages of antimicrobials in human and animals are relatively comparable (118 vs. 133 mg/PCU - Population Correction Unit), but new resistant microbe appears to be more likely from animals owing to the aggregate biomass of food producing animals, which is far greater than the cumulative biomass of human being (Van Boeckel et al., 2017). Obviously, the impact of AMR on livestock production will be increased morbidity and mortality. It may also lead to lower productivity, lower supply of livestock products (domestic and international market), increased prices of animal sourced proteins such as milk, meat and eggs. As the livestock production system in South Asia is primarily overlooked and managed by small and marginal farmers, hence the adverse impact of AMR is immeasurable over their livelihood and food security. Even though, the true burden of AMR over South Asian region is unknown, nevertheless, the global livestock production could fall by 3% to 8% each year by 2050, leading to decline in the annual global gross domestic product of 1.1% to 3.8% (Goutard et al., 2017). It is predicted that about 10.2 million people will die globally every year by 2050 in the absence of appropriate measures against AMR and 90% will be from Asia and Africa. Applying dynamic, multi-country general equilibrium model, a report suggests that the losses of world output could exceed US $ 1 trillion yearly after 2030 and might reach as high as US $ 2 trillion yearly by 2050 under the "low AMR" scenario. In worse case i.e. under "high AMR" scenario, the absolute global economic losses could climb up to US $ 3.4 billion yearly by 2030 and rising further to US $ 6.1 trillion yearly by 2050 (World Bank, 2017).

Initiatives by SAARC

Realizing the consequences of AMR on public health, food and livelihood security of South Asian people, the SAARC Secretariat is continuously guiding the SAARC Agriculture Centre (SAC) to play a proactive role on the livestock origin AMR challenges. Accordingly, the SAC undertakes consultation meeting/ training/ workshop on different issues of AMR including the alternative growth promoters for livestock. In view of the commitment against the challenges of AMR in South Asia, recently concluded 4th Meeting of SAARC Agriculture Ministers released the statement on "SAARC's Cooperation on Antimicrobial Resistance (AMR)". It stated as follows:

We, the Agriculture Ministers of SAARC Member States during the 4th Meeting of SAARC Agriculture Ministers held in Thimphu on 27th June, 2019, have taken into account the considerations and specifications set forth below and agreed to declare our support and commitment in advancing the SAARC's cooperation on AMR for mutual benefits:

1. Noting that antimicrobial resistance includes bacterial, viral, parasitic, and fungal infections that no longer respond to antimicrobial medicines, but is of particular concern with regard to antibiotic resistance bacteria, which can transfer between and among animals, human and the environment; with special emphasis on the food animal production as an important originating point and reservoirs of antibiotic resistance to certain antibiotics that are also medically important, and dissemination via food production and distribution system;
2. Understanding the need for an effective "One Health" approach for preventing antimicrobial resistance in the region with the adoption of the "Global Action Plan on Antimicrobial Resistance" on May, 2015 by the World Health assembly, which was also adopted by the 39th session of the FAO's Governing Conference and the 83rd General Session of the World Assembly of OIE delegates;
3. Keeping in view the "Global Action Plan on Antimicrobial Resistance" by WHO, OIE and FAO as tripartite members; noting the overall goal of the "Global Action Plan on Antimicrobial Resistance" to ensure continuity of the availability and effectiveness of antibiotics that are quality assured to treat and prevent infectious bacterial disease in food animals by using it in a responsible way by the competent veterinary oversight and recognizing the significance of the SAARC's cooperation on antimicrobial resistance in the sustainable economic development of the region;
4. Recognizing the need for developing SAARC good animal health practice guidelines for ensuring food safety and quality, animal health and welfare as well as public health safety throughout the livestock value chain from farm to consumer;
5. Concerned with the possible expansive and devasting impact of AMR on the livelihoods, food and nutritional security and safety, health of the people of the SAARC and considering significant steps made in its prevention and control through the collective efforts by all stakeholders of Member States;
6. Convinced of the need for strengthening national policies and regulatory capacities related to the use and disposal of antimicrobials in livestock, poultry, aquaculture and companion animals;
7. Recognizing the need for a comprehensive animal health legislation and governance as a key element for veterinary authorities to enforce disease control programs;
8. Convince of the need for building and strengthening capacities for AMR surveillance and antimicrobial usages (AMU) monitoring in food animal value chain system;
9. Convinced of the need for increasing awareness and advocacy for commitment and collective action by SAARC member States, to consider AMR as one of the important issues at the human-animal interface;
10. Understanding the need for an effective "One Health" approach for preventing AMR in the region with the adoption of the "Global Action Plan on Antimicrobial Resistance";
11. Hereby direct the relevant sectors of the SAARC Member States to:
    - Raise awareness and advocacy on AMR issues and on promoting prudent use of antimicrobials;
    - Develop economic models through cost benefit analysis on the impact of AMR to advocate support in addressing AMR in the region;
    - Conduct a review of national policies and recommend a regional policy framework to support work on AMR prevention;
    - Continue the development or adoption of the relevant standards, guidelines and manuals to harmonize field and laboratory surveillance on AMR and AMU;
    - Enhance cooperation and collaboration with relevant sectors such as public health, animal health and trade, environment, science and technology, education, private sector including international partners, and donor agencies;
    - Link and synergies national activities on AMR with the existing initiatives in the region;
    - Establish platform for networking and information sharing such as research, surveillance data, etc. (maximize the existing mechanism);
    - Support the link with the existing global database to monitor the use of antimicrobial agents in animals;
    - Enhance technical capacities on surveillance, diagnosis, and research on AMR and AMU;

- Promote Good Animal Husbandry/ Aquaculture Practices and the development of viable alternative to AMU to reduce the antimicrobial use.

12. We further recognize the increasing challenges, posed by AMR to the animal and public health related issues, necessitate strategic partnership and cooperation with relevant development partners and donor agencies, to maximize our synergies and complementarities in laying the foundation for sustainable animal health and public health system in the region; and

In line with the statement released during the 4th Meeting of the SAARC Agriculture Ministers, well defined regional action plan with timeframe was formulated for fulfilling each objective of Global Action Plan on AMR (WHO, 2015) and shared among the Member States of SAARC to move forward (Table 2, 3, 4, 5, and 6).

Table 2 Regional action plan of SAARC for containment of AMR for improving awareness and understanding

Objective 1 Improve awareness and understanding of AMR through effective communications, education and training				
Output/Activity	**6 months**	**1 year**	**>1 year**	**Responsible entity**
Awareness/communication				
➢ Gap analysis/Knowledge, attitudes and practices.				FAO, OIE, SAARC CVO, SAC
➢ Regional approach to AMR awareness and advocacy of key stakeholders (Religious Leaders, Animal Producers, Senior Ministers and Bureaucrats).				FAO, OIE, SAARC CVO, SAC
➢ Regional branding of communication and education materials on AMR.				FAO, OIE, SAARC CVO, SAC
➢ Use of mass and social media for AMR campaign.				FAO, OIE, SAARC CVO, SAC
Education				
➢ Statutory bodies to ensure AMR communication/ education is integrated in primary education.				OIE, SAARC CVO
➢ Awareness campaign in primary schools, colleges (both general and technical) and universities.				SAARC CVO
Training				
➢ Training of trainers on AMR.				FAO, OIE, SAC
➢ Strengthening of extension services on AMR education and training capacity.				SAARC CVO
➢ Training of veterinarians, para- veterinarians and pharmacists.				OIE, SAC
➢ Training on following topics:				FAO, OIE
❖ Good veterinary practices.				FAO, OIE, SAC
❖ Good animal production practices.				FAO, OIE, SAC
❖ Good animal products manufacturing practices.				FAO, OIE, SAC
➢ Continuing education for animal health officers/field officers.				SAARC CVO
➢ Classification and responsible use of anti-microbials.				OIE, FAO

Table 3 Regional action plan of SAARC for containment of AMR for strengthening knowledge, surveillance and research

Objective 2 Strengthen the knowledge and evidence base through surveillance and research				
Output/Activity	**6 months**	**1 year**	**>1year**	**Responsible entity**
➢ Establish laboratory protocols: Common laboratory approaches, perhaps at a Regional Reference Laboratory (RRL), would include a common antimicrobial susceptibility testing methodology to enable comparisons with country programs within SAARC countries as well as other countries.				FAO, OIE
➢ Establish a baseline of AMR prevalence in key bacteria (animal disease pathogens and food borne bacteria) to evaluate effectiveness of planned interventions.				SAARC CVO
➢ Conduct specialized research on bacterial isolates such as genetic characterization, identification of emerging AMR or trends.				FAO, OIE
➢ Conduct testing of key foods for antibiotic residue to be considered for inclusion in the RRL capacity since it requires specialized equipment, laboratory space and personnel.				FAO, OIE, SAARC CVO
➢ Sharing of information from regional AMR surveillance data (e.g. with SAARC member countries, OIE, stakeholders and informing Awareness actions of Objective 1). [Sharing of surveillance data at a regional level can lead to identification of key intervention targets ("hotspots") for needed vaccines, opportunities for "alternatives" or improved animal production or veterinary medicine practices or food hygiene. Information exchange on a regional level can include exchange visits of scientists, training].				SAARC CVO, SAC
➢ Apply a One Health approach where food borne bacteria that are found on farms, food and ill people can be tested with the same antimicrobial susceptibility test method and antibiotics as well as characterized for relatedness).				FAO, OIE, WHO
➢ Conduct research on "alternatives" which could be located in a university setting that could serve as a regional focal point for information, research and communication to SAARC members.				SAC

Table 4 Regional action plan of SAARC for containment of AMR for reducing infection through effective sanitation, hygiene and infection prevention measures

Objective 3 Reduce the incidence of infection through effective sanitation, hygiene, and infection prevention measures				
Output/Activity	**6 months**	**1 year**	**>1year**	**Responsible entity**
➢ Good husbandry practices/ farm biosecurity.				FAO, OIE, SAC
➢ Develop standards/ guides on drug use in animals.				OIE
➢ Vaccination for prevention (identify essential vaccines, routine vaccination).				FAO, OIE, SAARC CVO
➢ Advocacy/education (prudent use, sanitation).				FAO, OIE
➢ Disease control plans.				FAO, OIE, SAARC CVO, SAC
➢ Cross border regulations.				FAO, OIE, SAARC CVO, SAC

Table 5 Regional action plan of SAARC for containment of AMR to optimize the use of antimicrobials in human and animal health

Objective 4 Optimize the use of antimicrobial medicines in human and animal health				
Output/Activity	**6 months**	**1 year**	**>1year**	**Responsible entity**
Regional support to strengthen legal frameworks and tools (or: "Development of region-specific policies and guidelines on antimicrobial use").				
➢ Legal provisions for prescribing antimicrobials. ➢ Legal boundaries on antibiotic use initiated. ➢ To regulate inventory of antibiotic import and export (Setting up of regional committee to review). ➢ Stop, discourage sub-therapeutic use of antimicrobials. ➢ Impose penalties for violators of the law. ➢ Prohibition over the counter sale.				FAO, OIE
Regional support to improvement in diagnostics and its applied use				
➢ Prescribe antibiotics only after laboratory confirmation. ➢ Practice of antibiotics test before deciding the antibiotics for therapy. ➢ Improve diagnostics through research and development. ➢ Research programs of antibiotic sensitivity test should perform in regional countries in bacteria strains. ➢ Animal doctors or DVs should always emphasize to antibiograms test before comparing the antibiotic on animals. ➢ Strengthen regional laboratories.				FAO, OIE
Regional support to ensuring quality of antimicrobials in the region				
➢ Mechanism to ensure the quality of drugs available in the market. ➢ Access to adequate antimicrobials. ➢ Mechanism/tools for screening quality of antimicrobials (particularly at border areas).				SAARC CVO
Regional support to explore alternatives to antimicrobials				
➢ Research on alternatives of antibiotics initiated. ➢ Regional inventories of alternatives of antibiotics.				FAO, OIE, SAARC CVO
Regional support to data/information sharing on AMR/AMU				
➢ Sharing of regional data. ➢ Access to regional information.				SAARC CVO

Table 6 Regional action plan of SAARC for sustainable investment to contain AMR

Objective 5: Develop the economic case for sustainable investment to take into account the requirements of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions				
Output/Activity	**6 months**	**1 year**	**>1year**	**Responsible entity**
➢ Development of new vaccines and increasing access to existing vaccines. This recommendation included regional and national guidelines on regulation of vaccines and enabling countries to produce their own vaccines.				
➢ Policies to promote the use of alternatives to antibiotics including promoting traditional forms of medicines, as a key component to reducing antimicrobial resistance.				SAARC CVO
➢ More effective policies on AMR surveillance and building laboratory capacity for AMR testing.				FAO, OIE
➢ Funding support was mentioned as a key need for building this capacity.				FAO
➢ Analysis on the economic impact of AMR at the national level.				SAC, SAARC CVO
➢ Developing SARRC level policy recommendations to inform governments on adapting country specific policies to address AMR.				FAO, OIE, SAC

The SAARC region is lagging other parts of the world regarding the adoption of policies pertaining to containment of livestock origin AMR particularly surveillance, training of stakeholders, regulatory body for production, distribution and marketing of veterinary antimicrobials, research on alternative growth promoters (prebiotic, probiotic, synbiotic and other nutraceuticals), traceability, good livestock production practices etc. Given the current livestock production practices under small holder farming system coupled with inadequate awareness on AMR risks among stakeholders, it will be a challenging task for the SAARC Member States to fully comply with the guidelines particularly over the counter sales and its usages as growth promoters in livestock. At the same time, preferential consumption of animal sourced protein, rising income, intensive food animal production system, inappropriate disposal of pharmaceutical waste are converging to create an ideal atmosphere for large scale selection and dissemination of AMR genes in South Asia. At this juncture, adoption of appropriate policy measures followed by strict compliance of guidelines could make strong foundation towards the containment of livestock origin AMR in South Asia.

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