Antimicrobial resistance (AMR) in various disease causing pathogens has become a major challenge in combating communicable diseases. Resistance in microorganisms causing malaria, TB and HIV/AIDS can hinder the achievement of Millennium Development Goal 6 (MDG6). Recognizing the importance of antimicrobial resistance, the Health Ministers of the Member States of WHO South-East Asia Region gave a call in 2011 for concerted efforts to prevent and contain AMR through the Jaipur Declaration on AMR. This report summarizes the progress made in implementation of the Jaipur Declaration on AMR.
Report of Regional Workshop on Antimicrobial Resistance

Bangkok, Thailand 6–10 August 2012
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Regional Workshop on Antimicrobial Resistance

During the past seven decades, antimicrobial agents have played a critical role in reducing the burden of communicable diseases all over the world. The emergence of resistance and its rapid spread is negating the impact of these drugs, obstructing progress towards achievement of the Millennium Development Goals and hindering effective application of modern technologies in mitigating human misery. While appearance of resistance is a continuous phenomenon in microorganisms, its amplification and spread is through an array of practices employed by human beings. Improper utilization of antimicrobial agents, especially in high disease-burden settings (viz. hospitals) and for non-therapeutic use as in the veterinary sector, result in strong selection pressure that allows the resistant strain to grow and rapidly replace the susceptible isolates.

An effective response to antimicrobial resistance (AMR) is possible through treatment policies such as combination therapy, rational prescription, patient adherence, strong regulatory mechanism and educational activities, along with an efficient surveillance system that monitors the emergence and spread of resistance, as well as the utilization of antimicrobial agents.

To facilitate these activities at the country level, WHO/SEARO in 2010 developed a strategy that is simple, practical and easy to scaleup. The regional strategy aims to give particular attention to interventions involving the introduction of legislation and policies governing the use of antimicrobial agents, establishing laboratory-based networks for surveillance of resistance and ensuring the rational use of these drugs at all levels of healthcare settings.

The theme of World Health Day 2011 was prevention and containment of antimicrobial resistance. It resulted in huge advocacy all over the world on AMR and called upon the global community to combat the most important problem being faced in the area of communicable diseases.
In their Jaipur Declaration, the health ministers of the Region have given a call for prevention and containment of AMR. They have also requested WHO to monitor the progress made in this area and report back to the next meeting of the health Ministers in 2012. Accordingly, WHO/SEARO organized a regional workshop at Bangkok, Thailand from 6-10 August 2012 to review the work done in the Region, collate progress made and suggest appropriate actions for the prevention and containment of AMR in all Member States.

The programme of the workshop can be seen at Annex 1. Nominees of Governments of nine Member States attended this workshop. The facilitators were from Bangladesh, Sri Lanka and Thailand. The list of participants and facilitators can be seen at Annex 2.
Objectives

The objectives of the workshop were as follows:

1. To review the national response to prevention and containment of antimicrobial resistance, especially in the context of implementation of Jaipur Declaration on AMR;

2. To identify success stories and major gaps in prevention and containment of AMR, and

3. To develop follow up actions at the country level for strengthening national efforts for prevention and containment of AMR.
The participants of the workshop were welcomed by Dr Boonchai Somboonsook, Director-General of Department of the Medical Sciences, Ministry of Public Health, Thailand. He reiterated that an effective response to AMR was possible through multisectoral activities and rational use of antimicrobial agents by developing and using standard treatment guidelines appropriate to local and/or national needs.

He recalled that in World Health Day 2011 focussed attention on the rational use of antibiotics, resulting in great advocacy for AMR all over the world. This was followed by an agreement among the health ministers of Member countries of WHO/SEA Region that culminated in the “Jaipur Declaration on Antimicrobial Resistance” listing 18 important activities for implementation by countries.

Dr Boonchai highlighted the work being done in Thailand on laboratory-based surveillance of AMR. Though Thailand had a good AMR laboratory network, a more effective mechanism was being considered to identify additional stakeholders in the pathway.

He emphasized that this was the best time to start working together for implementation of the health ministers’ agreement to combat the AMR. He, however, cautioned that a solution to the problem of AMR required strong support from other partnerships such as other government institutions, academic and professional bodies, NGOs, media and civil societies as well.

In his message, read out by Dr Maureen Birmingham, WHO Representative to Thailand. Dr Samlee Plianbangchang, Regional Director, WHO Regional Office for South-East Asia, emphasized the role of antimicrobial agents in mitigating mortality, morbidity and misery caused by communicable diseases
all over the world. However, the emergence of resistance and its rapid spread was negating the impact of these drugs. Antimicrobial agents were the biggest drivers of this resistance through their irrational and indiscriminate use in both human and animal health sectors, Dr Samlee observed. He emphasized the impact of resistant organisms on prolonging the disease requiring toxic and expensive drugs for treatment. He said that though no comprehensive database on resistance was available in the Region, yet several studies had shown this to be a huge problem. Combating the problem of antimicrobial resistance warranted concerted efforts at national and international levels to preserve the efficacy of available antimicrobial agents.

Resistance is a biological, behavioural, technical, economic, regulatory and educational problem and required a comprehensive response. It is a major public health issue. Antimicrobial resistance has been an unrecognized and neglected problem which is not only cross-cutting but also has far-reaching implications as an emerging public health problem with massive risk to international health security. Newer drugs are being discovered at a slow pace. Dr Samlee strongly suggested that sustained efforts needed to be made to slow down or delay the resistance, thus preserving the available antimicrobials.

To facilitate these efforts at the country level, WHO/SEARO developed a strategy that is simple, practical and easy to scaleup. In the Sixty-third session of the Regional Committee, a resolution on prevention and containment of antimicrobial resistance was adopted.

The Regional Director informed that the theme of World Health Day 2011 was antimicrobial resistance. Subsequently, all health ministers of the Region called upon to combat the most important problem being faced in the area of communicable diseases.

The Regional Director noted that the workshop had been organized to review the progress made after the “Jaipur Declaration on prevention Antimicrobial Resistance”. He requested the participants to deliberate upon ways and means to contain antimicrobial resistance and also discuss mechanisms for implementation of this strategy at the country level in an effective and efficient manner. The ultimate objective of all efforts should be to minimize the morbidity and mortality caused by antimicrobial resistant infections and preserving the effectiveness of antimicrobial agents.
Regional approach to AMR

Dr Rajesh Bhatia, Director, Department of Communicable Diseases, WHO/SEARO briefed on the genesis of Jaipur Declaration on AMR as well as several activities undertaken by SEARO in the recent past in assisting countries to build their capacity to combat AMR. He informed that advocacy, technical and educational material developed by SEARO was available on, and freely downloadable from the website of SEARO (www.searo.who.int/AMR).

Dr Bhatia also provided regional representative data on resistance in different diseases including TB, typhoid fever and several hospital-acquired infections (Table 1).
**Table 1: Overview of antimicrobial resistance in SEA Region**

- **Tuberculosis**
  - Multidrug resistant (MDR)-TB < 3% : 130 000 cases annually
  - Extensive Drug Resistant (XDR)-TB: Reported from Bangladesh, India, Indonesia, Thailand

- **Kala-azar**
  - 60% resistance in pentavalent antimony and 25% in pentamidine

- **Typhoid fever**
  - MDR *Salmonella typhi* prevalent all over the Region
  - Causing 10% case-fatality ratio in children (preantibiotic era: 12.8%)

- **Acute respiratory infections (pneumonias)**
  - 69% of *Streptococcus pneumoniae* resistant to penicillin in Thailand

- **Staphylococcus aureus**
  - >50% isolates in hospitals are methicillin resistant

- **Acinetobacter baumannii**
  - >50% of patients infected with resistant strains die
Country reports were presented by participants from nine Member countries.

**Bangladesh**

**Current Situation:**
- No mechanism for AMR data collection and analysis existed at the national level.
- No uniform standard operating procedure (SOP) was established for culture and sensitivity for microbiological laboratories.
- No system of prescription audit at tertiary care hospital.
- No national antibiotic policy had been laid down.

**Progress Made:**
- National steering committee, national technical committee, and core working group have been constituted at Directorate General of Health Services for development and implementation of a national antibiotic policy.
- A core committee and working committee at Dhaka Medical College Hospital, Dhaka, have been established for development and implementation of institutional antibiotic policy.
• The drug regulatory authority has been strengthened in some aspects.
• Laboratory accreditation system has been drafted.
• Treatment guidelines for some infectious diseases have been prepared and implemented.
• Operational research is ongoing on malaria, kala-azar and fever.

**Future activities**

The following activities have been planned to be implemented in two phases:

**Phase I:**

• Development of SOP for culture and sensitivity for microbiological laboratories;
• Capacity building of laboratories;
• Introducing AMR surveillance systems to at least 10 laboratories;
• Development and implementation of antibiotic policy in at least 8 medical college hospitals;
• Strengthening of drug regulatory authority, and
• Implementation of laboratory accreditation system.

**Phase II:**

• Increasing the number of laboratories for AMR surveillance system;
• Development of national laboratory policy;
• Development of national antibiotic policy, and
• Development and implementation of treatment guidelines for infectious diseases.
Bhutan

Current Situation

- National data available is very minimal and is restricted only to the National Referral Hospital.
- Only three referral hospitals have the capacity to conduct microbiological investigations and test for resistance.
- Antibiotic resistance is a problem: Methicillin resistant Staphylococcus aureus (MRSA), extended spectrum beta lactamase (ESBL), MDR Acinetobacter, Pseudomonas, MDR-TB have all been detected.

Progress report

- National focal point for AMR has been designated.
- Activities to start national antibiotic surveillance have been initiated.
- AMR surveillance sites have been identified.
- Resistance pattern communication to prescribers is in place.
- Prescription audit (though not specific to antibiotics) in place.
- Public awareness activities have been carried out.
- National antibiotic guideline and Infection control guideline in place.
- Continuous medical education (CME) on rational antibiotic use is being done though not on a regular basis.

Future plans

- A multisectoral high level meeting is being convened shortly and a national steering committee and working committee will be established. Linkages will also be established with other sectors.
- The livestock and agriculture sector will be involved in discussions to control AMR.
• A national antibiotic policy will be developed and Antibiotic Committees set up in larger hospitals.

• Members of Antibiotic Committee will be trained and antibiotic control activities like Antimicrobial stewardship programmes started in these hospitals.

• Communication would be initiated with the Drug Regulatory authority to strengthen antibiotic control.

• Audits will be conducted on compliance to national guidelines.

• Antibiotic specific prescription audits will be undertaken.

• Laboratory personnel will be trained in Clinical Laboratory Standards Institute (CLSI) methods and WHO data analyses software (WHONET5).

• All new graduates will receive orientation on the national antibiotic guidelines before recruitment.

• Microbiological services will be extended to larger district hospitals.

• Public awareness activities will be intensified.

• Briefing of all school health in-charges will be undertaken to initiate school education on AMR.

• Awareness materials on AMR in local language will be produced and additional materials in English will be obtained from WHO for public distribution.

• Basic operational research on AMR, both in human and animal health will be started.

• Linkages with WHO Collaborating Centers will be established for testing and confirmation of the resistant isolates.

**India**

**Current Situation:**

Antimicrobial resistance in pathogens is causing important infectious diseases is a matter of great public health concern in India.
Table 2: Increasing trends of resistance

- **Cholera:**
  - Furazolidone (60-80%),
  - Co-trimoxazole (60-80%) and
  - Nalidixic Acid (80-90%)

- **Typhoid Fever:**
  - Chloramphenicol, Ampicillin, Cotrimoxazole (30-50%),
  - Fluoroquinolones (upto 30%)

- **Meningococcal Infections:**
  - Co-trimoxazole, Ciprofloxacin and Tetracycline (50-100%)

- **Gonococcal Infections:**
  - Penicillin (50-80%),
  - Ciprofloxacin (20-80%)

- **Kala-azar:**
  - Upto 70% cases non-responsive to current regimens.

- **Tuberculosis:**
  - MDR 12-17% in treated,
  - < 3% in new smear + cases

- **HIV:**
  - Primary and secondary low level resistance reported.

- **NDM-1 containing organisms: recently reported.**

**Progress report**

- A comprehensive plan on AMR including the national policy for antibiotic use in humans was finalized for implementation in 2011 and uploaded on www.ncdc.gov.in for wider accessibility and use.

- The National Centre for Disease Control (NCDC) was designated as the national focal point for AMR.
A national policy for antibiotic use in animals (for therapeutic and non-therapeutic/growth promotion purposes) is being developed and will be accessible on the web in due course of time.

A national programme for surveillance of AMR has been developed under the 12th Five Year Plan, to be implemented throughout the country in a phased manner.

A system of prescription audit at tertiary care hospitals is planned for implementation in due course.

Legislation for regulating production, distribution, sale and prescription of antimicrobial agents exists and is being further strengthened.

National guidelines on infection control are available on the Ministry of Health and Family Welfare (MOHFW) website.

Educational products were developed for the communities by the Hospital Infection Society; however, these need strengthening.

Research activity in support of developing new antibiotics is under way by the Department of Chemical Industry.

**Future Plans:**

This programme will be carried out by NCDC as the focal point with a network of 100 institutions, mostly medical colleges in India with the following key elements and activities:

- **Surveillance for containment of AMR in various geographical locations**
  - It is proposed to establish (1) Technical advisory group, (2) Working group, (3) Quality Assured Lab Network for AMR surveillance, and (4) Surveillance of antibiotic usage and operational research.

- **Rational use of antibiotics**

  Around 30 training workshops each will be conducted in the first two years by MOHFW and NCDC in partnership with some other identified institutions for trainers including laboratory professionals (microbiologists and technicians) and clinicians, addressing the issues of new antibiotic policy including rational use of drugs, hospital infection control guidelines.
• Development and implementation of national infection control guidelines

National hospital infection control guidelines will be developed by NCDC in collaboration with MOHFW, stakeholders and Hospital Infection Society of India and disseminated to hospitals for implementation.

• Training and capacity building of professionals in relevant sectors

Training and capacity building of professionals in relevant sectors under the programme will be undertaken for microbiologists, laboratory technicians, clinicians pharmacists, data managers and data entry operators.

• IEC for dissemination of information about rational use of antibiotics

IEC material will be produced to disseminate information on rational antibiotic usage.

• Development of repository of strains at NCDC

NCDC shall provide facilities for storage of strains on long term basis.

Indonesia

Current Situation

(a) Governance

Designation of the national focal point for AMR is still under process. In the meantime, the Directorate-General of Health Effort Care (HEC) and Directorate of Pharmaceutical Services and Medical Devices are in charge of this subject. So far, a national multisectoral steering committee for AMR has not been constituted; however, several meetings have been held with Ministry of Agriculture (MoA) to develop this proposal.

Indonesia established its National Medicine Policy in 2006, which is not specific for antimicrobial agents. Standard Treatment Guidelines (including antibiotics) in Primary Health Care have been in existence since 2007. In
2009, national programmatic management of drug resistant TB (PMDT) and treatment guidelines were developed and MDR-TB diagnostic and treatment services commenced at two pilot sites (in Surabaya city and in Jakarta at the Persahabatan Hospital). Recently, Regulation No. 2406/2011 regarding the General Guidelines for the use of Antibiotics was issued by Minister of Health. The National Agency of Drug and Food Control (NADFC) also issued the Good Manufacturing Practice including the production of antibiotics.

Act no 18/2009 on Livestock/poultry and Animal Health, regulates the use of medicine for therapeutic and non-therapeutic use. However, antibiotic as a growth promoter has not been prohibited yet.

(b) Surveillance

A national programme of surveillance on AMR has not yet been established. Several surveys of AMR have been conducted in some hospitals, separately e.g. surveillance of Severe Acute Respiratory Infection (SARI), TB and TB-MDR, Neisseria gonorrhoeae and bacteria causing diarrhoea. Mostly, referral or teaching hospitals developed their local system. However, the results showed an increasing MDR organisms e.g. MRSA, MDR gram-negative bacilli. Surveillance of TB Drug Resistance has been conducted in several areas: Mimika district (2004), showing 2% MDR-TB cases among newly diagnosed TB cases, Central Java province (2006) showing MDR rate of 1.8% among the new cases and 16.7% among re-treatment cases, in Makassar (2007) it was found to be 4.1% and 19.2% respectively and in East Java results of which have not officially been published.

A programme of AMR containment (PPRA) was established at 20 teaching hospitals. The core team and the initiator of PPRA is Sutomo hospital, Surabaya, started since 2006. The main activities are: controlling the use antimicrobial agents in a rational way to prevent AMR and to test AMR to determine the appropriate use of antimicrobial agents. At Sutomo hospital, PPRA has successfully reduced the inappropriate use of antimicrobial agents. Director General of Pharmaceutical has undertaken the monitoring of the use of antibiotics as routine activities for non pneumonia and diarrhoea. Rapid assessment conducted by WHO on medicine use in two provinces showed that the use of antimicrobial agents was 33-55% at outpatient hospitals, health centers and prescription from retail pharmacies.
(c) **Research**

There are several ongoing basic research projects e.g. development of new antibiotics from local Ascomycetes and Actinomycetes (Indonesian Institute of Sciences), Herbal Anti-Tuberculosis, Herbal anti-Dengue and Herbal Anti-Hepatitis. In contrast, there is no operational research conducted especially in AMR.

(d) **Community Empowerment and Health workers**

DG of Pharmaceutical since 2008 has been trying to incorporate the concept of rational use of medicine (RUM) in the basic curriculum of Faculty of Medicine and Pharmacy.

Currently, the community empowerment programme has been disseminated to 33 provinces. DG of Pharmaceutical conducts campaign and competition in RUM and promotion of generic medicine for school children, students, community, every year - national health day.

Education to the community and professionals is also carried out by the family physicians, clinical pharmacologists, private sectors, professional associations such as Association of Voluntary Health Service Indonesia.

Standard methodology should be reassessed to support obtaining national data.

**Proposed activities**

(1) A national focal point is being appointed as soon as possible, with structure and responsibility as follows:

(a) The coordinator is DG of HEC: prudent use of the antimicrobial agents

(b) Sub coordinator:

- DG of Pharmaceutical: monitoring of antimicrobial agents consumption (quantity)
- DG of Communicable Disease: national surveillance
- National Institute of Health Research and Development (NIHRD) and university laboratories: operational research
Multisteering committee should be developed by including interministrial e.g Ministry of Agriculture for the use of antimicrobial agents in veterinary medicine.

(2) Strengthening the capacity of microbiology laboratory

(a) Standardization of the test (CLSI) and reporting (WHONET)

(b) Networking → national and regional laboratories should be appointed

(c) Enhanced budget for procurement and maintenance of the laboratory

(d) External quality assurance

(e) Capacity building

(3) Establishment of PPRA/ARCP (Antimicrobial Resistance Control Programme) as a national programme

(4) Improvement of Regulation No. 2406/2011 regarding the General Guidelines for the use of Antibiotics issued by Minister of Health

(5) Encouraging prescribers (medical and hospital) to not accept any gift, promotion, rewards from pharmaceutical company for unethical use of antibiotics

(6) Development of Antimicrobial Guidelines for community acquired infection and public access to them

(7) Development of regulations for antibiotic use in veterinary practices

(8) Strengthening the implementation of the production, distribution, sale and prescription of antibiotics e.g unavailability of antibiotics over the counter in pharmacies

(9) Empowerment:

(a) Community through NGO, foundation, medical faculty

(b) Health workers through MoH, professional organizations

(c) Pharmacist through Director General of Pharmaceuticals

(d) Medical students through inclusion of rational use of antimicrobials in curriculum.
Maldives

Current situation

Antimicrobial resistance is a global burden and Maldives is no exception. However, no data on antimicrobial resistance or prevalence is available in the country and hence the impact of the situation is not evaluated, even though we know that there is resistance among the microbial population.

Progress report

In 2011, a prescription audit was undertaken to evaluate the prescription and consumption patterns of antibiotics. The result showed that 40% of prescriptions contained an antibiotic and 22% is prescribed for flu, cough and fever. The most frequent antibiotic prescribed was Augumentin. This data, together with data on communicable disease surveillance and import of antibiotics to the country can be a basis for development of an intensive antimicrobial resistance study. Such a is very much needed to the country in order to convince policy makers that antimicrobial resistance is indeed a major problem in Maldives and warrants immediate containment measures.

So far, with the addition of the prescription audit for antibiotic use, media campaigns, audio spots and video spots as well as pamphlets, leaflets and posters were developed and disseminated to the public, prescribers and pharmacists. Prescription audits and public awareness programmes should be an ongoing process.

No national focal point has been officially designated for antimicrobial resistance, however the task has been assigned to Maldives Food and Drug authority in collaboration with Center for Community Health and Disease Control (CCHDC) and Indira Gandhi Memorial Hospital (IGMH) Male.

Future plans:

1. An intensive study on national antimicrobial resistance will be undertaken.
2. Legal framework will be strengthened and necessary regulations developed with penalty for defaulters.
3. Public, prescriber and pharmacist awareness programme and a system to monitor its feedback are ongoing.
(4) Prescription audits will be continued.

(5) Strong political and top management commitment will be built up.

(6) Networking and strengthening of the clinical laboratories will be completed.

(7) A coordination mechanism between the relevant stakeholders will be established.

(8) The National Health Laboratory will be strengthened in the area of antibiotic testing for its safety, efficacy and quality.

(9) Infection control guidelines will be developed at the hospitals.

**Myanmar**

**Current status**

According to the second nation-wide drug resistance survey (2007-2008), 4.2% and 10% of MDR cases in new and previously treated TB cases respectively were found. Regarding Neisseria gonorrhoeae, 86% were resistant to penicillin, 73% were resistant to ciprofloxacin and 50% resistant to tetracycline (STI Survey-211 from National Health Laboratory). In 2011, National Health Laboratory pointed out that Vibrio cholerae are 100% resistant to Cotrimoxazole and 71% resistant to tetracycline. 2010 data from North Okkalapa General Hospital showed that Acinetobacter species were 92% resistant to ampicillin, 76% resistant to ceftazidime, 60% resistant to gentamycin, 59% resistant to ciprofloxacin and 50% resistant to levofloxacin. But augmentin and amikacin resistance were limited to 29% & 23%. Concerning E coli, it was found that 88% were resistant to ampicillin, 77% to aprofloxacin, 69% to levofloxacin, 65% to cefoperazone/sulbactam, 60% to gentamycin, 52% to ceftazidime & 40% to augmentin. Klebsiella species were 100% resistant to ampicillin, 65% resistant to levofloxacin & cefotaxime, 55% resistant to gentamycin, 54% resistant to ceftazadine, 47% resistant to ciprofloxacin & 41% to augmentin. Pseudomonas isolates were 100% resistant to ampicillin & ceftazidime. Augmentin resistance was 94%. Sixty percent were resistant to gentamycin, 46% to levofloxacin, 36% to ciprofloxacin, 34% to amikacin & 33% to cefotaxime. Staphlococcal species were 83% resistant to ampicillin, 45% to levofloxacin, 44% to oxacillin, 43% to ciprofloxacin & 36% to gentamycin. Vancomycin resistance was 9%.
Myanmar has a comprehensive plan on AMR. There is a legislation that regulates the production, distribution, sale and prescription of antimicrobial agents. A national programme for surveillance of in TB and malaria cases is AMR operational in the country. The operational research projects on AMR are being supported using research grants. National health laboratory, state and regional hospitals and some private hospitals are competent to ascertain AMR using standard methodology. National treatment guidelines for TB, HIV, malaria, leprosy etc. are available.

A national focal point for AMR is being considered and country has planned to constitute national multisectoral steering committee for AMR. National policy for antibiotic use in humans and animals is under preparation.

**Nepal**

**Current Status**

AMR programme started in Nepal in 1999 with technical assistance from ICDDR, Bangladesh. National Public Health Laboratory (NPHL) is the focal point for AMR. The programme is now supported by WHO. The NPHL is working in close coordination with 18 governmental hospitals, mission hospitals and private medical college hospitals.

NPHL receives the local isolates from the participating laboratories, check the susceptibility, stores and sends the isolates for EQAS every three months. The participating laboratories send the testing reports to NPHL and the NPHL sends the feedback.

NPHL conducts quality assurance training, refresher training, workshop to enhance the diagnostic capacity of the participating laboratories.

NPHL has conducted surveillance of 7 microorganisms viz, Salmonella, Shigella, V. cholerae, S. pneumoniae, H. influenzae, N. gonorrhoeae and ESBL E.coli. A total of 1346 isolates were reported in 2011. Among the isolates reported Salmonella is the highest (1018). It is found that in Salmonella there is an increase in the resistance against Nalidixic acid (S. paratyphi A 98%; S. typhi 91%). Among the total isolates of Shigella, 75% were resistant to Co-trimoxazole, 70% resistant to amoxicillin and 44% to nalidixic acid. Among the total isolates of S. pneumoniae, 22% were found to be resistant to multiple drugs. H. influenzae has been found to be resistant to co-trimoxazole (53%), which is included in the treatment guideline in the treatment of ARI. All the isolates of
the ESBL E. coli showed 100% resistance to the quinolones followed by 99% to ciprofloxacin and 99% to ceftriaxone. ESBL E. coli resistance is increasing towards the combination of third generation cephalosporins (cefotaxime, ceftazidime) with clavulanic acid.

The Drug Act, 1978 and the rules thereunder have a provision for restriction of sales of antimicrobial agents without the prescription of medical practitioners. Some minor antimicrobials are authorized to be prescribed by other healthcare professionals. The National Drug Policy 1995 has addressed these issues regarding the use of antimicrobial agents in humans and animals. However, the implementation is very poor. National Antibiotic Treatment Guidelines have been drafted but not yet finalized. Treatment Protocol for TB, leprosy, ARI, HIV/AIDS, malaria and childhood illness are available.

The National Health Laboratory Policy has been finalized and is in the process of approval.

Though very little importance has been given to community empowerment for AMR, some activities such as posters, pamphlets, publication of bulletin have been carried out by the government and NGO sectors. No programme for school children for AMR awareness exists.

**Future Plans**

AMR has now become a challenge for the nation. The Government plans the following steps to fight against AMR:

1. Formation of National Steering Committee for AMR;
2. Development and implementation of National Antibiotic Policy;
3. Effective enforcement of Drug Act, 1978 and the rules thereunder;
4. Development of standard treatment guidelines for different levels of health care facilities and strict adherence by the practitioners to them;
5. Effective implementation of National Drug Policy;
6. Drafting of Health Laboratory Act and Regulation;
7. Strengthening of existing NPHL and other laboratories up-to the district level for surveillance of AMR;
Public awareness about AMR through the involvement of media;

Generating awareness in school children by inclusion of AMR in the syllabus, and

Restricting the use of antibiotics in sub-therapeutic doses.

**Sri Lanka**

**Current Status**

Overview of the present problem of AMR in Sri Lanka for antibiotic resistance can be given as hospital-based data and multicentre surveillance data.

MRSA prevalence in Teaching Hospital Kandy (2008) is 63.6% and 36.4% in ICU and wards respectively.

Prevalence of multidrug resistant gram negative bacilli in ICU setting in Teaching Hospital, Kandy is 60.1% and includes multidrug resistant coliform (including ESBL) 80.5%, MDR-pseudomonas 40% and MDR-Acnetobacter spp 57.6%.

Of streptococcus pneumoniae isolated from invasive pneumococcal diseases in children from 2004-2009, 92.5% were resistant to penicillin.

Multicentre surveillance done in 2009-2012 involving three provinces had shown salmonella paratyphi A as the predominant serotype of salmonella isolated from the blood cultures accounting for 88.2% and was 91.6% resistant to ciprofloxacin.

Sri Lanka has commenced on national laboratory-based surveillance from laboratories supervised by consultant microbiologists in the country. The national focal point is identified as Deputy Director-General/ Laboratory Services (DDG/LS). A national multisectoral steering committee for AMR has been established under the chairmanship of DDG/LS which includes human, animal health and agriculture sectors. The National Laboratory for Quality Assurance Board was established in 2011 to standardize the laboratories in Sri Lanka. The Sri Lanka College of Microbiologists together with the Ministry of Health is in the process of formulating national antibiotic guidelines and policy. A national Advisory committee on Infection Control is also being established as a central monitoring body.
Future Plans

(1) Strengthening the laboratory component on identification of antibiotic resistant organisms at the central level;

(2) Regulating prescribing practices at all levels;

(3) Establishment of a methodology for monitoring of prescription policies, and

(4) Introduction of comprehensive community and healthcare personnel education on rational use of antibiotics with national coverage.

Thailand

Current Status

Antimicrobial resistance prevalence in Thailand has been studied in health care and community settings. Data are collected from nationwide hospitals network at the Department of Medical Sciences, Ministry of Public Health and from operational researches. For gram-positive bacteria, the prevalence of penicillin resistance S. pneumoniae is 40-60%, community-associated S. aureus is low at <1% but healthcare-associated S. aureus is 30-70%. For gram-negative bacteria, the prevalence of quinolone resistant N. gonorrhoeae is >80% and quinolone resistant Salmonella spp. is <10% and ESBL producing Enterobacteriaceae in community infection is <20% whereas in hospital infection the prevalence varied 30%-70%. The carbapenem resistant Enterobacteriaceae is <1% but the prevalence of carbapenem resistant P. aeruginosa is 10-30% and carbapenem resistant A. baumanii is 60-85% for hospital infection.

Achieved so Far

The containment and prevention of antimicrobial resistance in Thailand has been committed. In 2008, the National Drug System Development Committee, chaired by the Prime Minister identified the function to contain and prevent antimicrobial resistance. In 2009, the Thailand Health Assembly passed a resolution on emerging infections including antimicrobial resistance. The National Drug Policy on Rational Use of Medicine and AMR Containment was launched in 2011.
After the Jaipur Declaration on AMR, the Health Systems Research Institute, the Ministry of Public Health appointed a Committee on Research & Development on AMR Containment and Prevention in January 2012. The Committee coordinated with relevant stakeholders to organize a national workshop on AMR in May 2012, brainstorming to synthesize desirable structures, systems and measures for AMR containment and related to antimicrobial resistance such as strategy for AMR treatment, implementation of infection control bundles, antibiotics stewardship is still limited and should be encouraged. The National Alliance against AMR is established. Measures include AMR surveillance, regulatory measures and educational and social measures. Examples of actions are strengthening National Antimicrobial Resistance Surveillance Center Thailand (NARST), modification of Drug Act 1967 or propose new Drug Act that has been officially drafted to have more restricted use of antibiotics for human and animals, add criteria on AMR for hospital accreditation done by Thailand Healthcare Accreditation Institute, expanding educational programmes such as “Antibiotics Smart Use” and “Thai FDA Youth Programmes”.

**Future Plans**

Although Thailand has measures to contain and prevent AMR, they need to be integrated and cooperated among several stakeholders. Programmes should be maintained or expanded to national level and adapted into policy for sustainability with system monitoring. Research and development related to antimicrobial resistance such as strategy for AMR treatment, implementation of infection control bundles, antibiotics stewardship is still limited and should be encouraged.

**Follow up of Jaipur Declaration on AMR by Health Ministers of SEA Region**

In 2011, the health ministers of WHO SEA Region articulated their commitment to combat AMR through the Jaipur Declaration on AMR (Annex 3). Since then, there has been a growing awareness in all Member States that containment of AMR depends on coordinated interventions that simultaneously target the behaviour of providers and patients and change important features of the environment in which they interact. Accordingly, Member States initiated establishment of coherent, comprehensive and integrated national approaches
Drafting and finalization of National Antibiotic Policy is on the agenda of the Member States while several national treatment guidelines are now available to promote rational use of antimicrobial agents. Regional and national training courses have been organized to build capacity for undertaking laboratory-based surveillance of AMR. This would be utilized not only in generating evidence-based treatment guidelines, but also in understanding the impact of the national efforts on mitigating AMR. Few operational research studies have already commenced.

Special attention is being paid to reduce health care associated infections by improving infection control practices. Building capacity of the prescribers for rational and evidence-based use of antimicrobial agents in humans as well as animals is also under consideration of the Member countries.

A summary of the progress made is shown in Table 3.

Table 3: Progress made in implementation of Jaipur Declaration on AMR in countries of SEA region

<table>
<thead>
<tr>
<th>Key element</th>
<th>Feature</th>
<th>Jaipur Declaration Action Point</th>
<th>BAN</th>
<th>BHU</th>
<th>KRD</th>
<th>IND</th>
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</table>
### Governance issues:

There has been some progress in strengthening governance of response to in the Region. All Member States have legislations in the form of Drug Acts. Specific guidelines for treatment of selected priority diseases viz. TB, malaria, and HIV/AIDS are available.

Many countries have established national multisectoral steering committee for antimicrobial resistance. The process for drafting of national antibiotic policy has also begun, with India already publishing its first version. Efforts have also begun for ensuring efficient coordination between the Ministries of health and agriculture. National focal points for AMR have been/are being designated in all countries.
Incentive is being given in Thailand for adhering to national guidelines on use of antibiotics under the Pay-for-performance scheme. AMR is being put on agenda for all related public policies. It was felt that the Regulation (top-down) should be accompanied with bottom-up approaches (e.g. operational research and community projects).

A need was expressed for effective and stronger implementation of Drug Act by strengthening the National Regulatory Authority. The awareness and capacity to practise the standard treatment guidelines is poor in almost all the countries. People can buy antibiotics over the counter without any prescription. Patient compliance with utilization of antimicrobials is generally very poor. Self medication is also adding to the problem.

The national regulatory laboratories do not have adequate infrastructure to ascertain the quality of drugs being produced or imported into the country. Laboratory-based surveillance of AMR also suffers from inadequate access and quality of laboratories that can generate laboratory-based surveillance data for instituting evidence-based treatment guidelines as well as understanding trends in antimicrobial resistance.

The current medical curriculum while adequately covering the management of individual communicable disease, does not comprehensively address the issue of AMR. It is important to inculcate the importance of rational prescription and preservation of antibiotics amongst students while they are pursuing their medical, veterinary, pharmacy and dental courses at graduate level.

Antimicrobial resistance requires greater attention and priority at the national level. Comprehensive efforts are needed to address this issue in both public and private sectors in health and animal health areas for rational therapeutic use of these agents. Greater awareness amongst communities is urgently needed.

**Surveillance of AMR**

In the recent past, several countries have undertaken national surveys for resistance in TB. For many years, an efficient national AMR surveillance programme has been operational in Thailand with 60 laboratories/hospitals participating in it. Similar networks are operational in Nepal and India for laboratory-based surveillance. However, several institutes, especially teaching hospital laboratories and good laboratories in the private sector are not being fully utilized in ascertaining representative national data. The capacity for such surveillance within conventional public health laboratories remains limited. The
testing protocol in different laboratories are not comparable. No such system or mechanism is available to understand the trends of resistance in veterinary sector. The surveillance of the use of antibiotics in health facility set-up is virtually non-existent.

**Rational prescription of antimicrobial agents**

Most countries have national antibiotic guidelines, standard treatment guidelines and infection control guidelines, though these are only partly implemented except for major diseases such as TB, HIV/AIDS and malaria. Many countries have started imparting training to prescribers but there was a need to scale it up to reach all prescribers and also to sustain it through CMEs. Some hospitals in Thailand have good antibiotic control programmes/antibiotic stewardships including through the use of computer-assisted antibiotic prescription. Few hospitals in some countries have initiated the process of interdisciplinary consultations on AMR as well as prescription auditing for use of antibiotics.

However, in most of the settings, there is no system to audit prescriptions; prescribers do not follow the guidelines; antimicrobial agents are available over the counter in pharmacies, and the prescribers are influenced by the pharmaceutical industry in their choice of antibiotics.

Information on the quality of antimicrobials used in the countries is limited, since facilities to verify the same are extremely limited. Extensive and unregulated use of antibiotics in the veterinary sector is a big challenge and difficult to surmount because of economic aspects.

Teaching and training of potential prescribers in medical, dental, pharmacy and veterinary schools must be emphasized using standard presentations on the lines of one prepared by WHO and available on its website (www.searo.who.int/AMR).

Good microbiological support was essential for rational prescriptions and there was an urgent need for the countries to augment their capacity for it. Efforts need to be made to ensure phase-wise removal of OTC antibiotics as well as ethical promotion mechanisms.

**Operational Research**

Nationwide data collection is ongoing in Thailand and being utilized to understand trends in antimicrobial resistance and develop antibiotic policy of AMR. Many countries have similar data collection mechanisms at central or
regional levels. In-vitro diagnostic devices for diagnosis at point of care of few priority diseases are being evaluated. Some studies on therapeutic efficacy of few drugs, especially against malaria are being carried out.

Studies are being planned to estimate the cost of treatment due to hospital acquired infections including prolonged length of hospital stay and use of expensive drugs. Maldives and some other countries are undertaking studies on prescription pattern through prescription audits.

The research capacity in few countries was limited. Bhutan, Maldives and Timor Leste need support to build their operational research (OR) capacity and some hand holding for few years. It is essential to first identify the research needs and the scientists/institutes who can undertake this research. It may also be possible in some countries to undertake OR at the peripheral health services level to understand issues that hamper efficient implementation of plans.

Some areas that were identified as possible subjects for OR in SEAR include:

- Magnitude of AMR in the country;
- Impact of AMR on individual economy and at national level;
- Role of rapid diagnostics tests (RDTs) in decision making;
- Conflict of interest and ethics in prescribing medicines for incentives;
- Utility of the Drug Information Unit in hospitals; and
- Understanding the behaviour of communities and prescribers through audit on implementation and adherence to the national guidelines.

Community Empowerment

Thailand has community participation for antibiotic use through a grass root level programme called “antibiotics smart use – ASU). The observation of World Health Day on AMR in 2011 had very good impact on the community. All countries have several vertical programmes (HIV/STI, TB, malaria, leprosy etc) with built-in component of health education. However, the use of these activities to address the overall situation of AMR was limited. In schools where health programmes and hand washing programmes have been in operation, substantial success has been seen.
NGOs in most countries are involved in different health and education programmes. Their role in reaching out to the communities can be scaled up with right messages and implementation of the practice and principles of rational use of drugs. NGOs can also be roped in for planning and implementing operational research projects to find solutions to the local problems.

On the pattern of several other important issues of global interest, it may be worthwhile exploring the possibility of having a day each year dedicated to the “Rational Use of Antimicrobials” for community awareness.
Conclusions and Recommendations

Subsequent to the Jaipur Declaration on AMR, there is greater awareness and some progress has been already made or activities initiated in several Member countries. It is essential that this tempo is maintained and national plans to combat AMR quickly developed in consonance with the Regional Strategy on AMR and Jaipur Declaration on AMR and vigorously implemented.

Participants opined that given the complexity of the problem of AMR, its multifactoral causation, the impact of economic and behavioural factors on spread of resistance and the fact that it has been neglected for a long time, sustained efforts need to be made in all countries.

Participants made the following recommendations:

**Recommendations to Member Countries**

Member countries should:

1. Accord higher priority to AMR at the national level in the true spirit of Jaipur Declaration of Health Ministers on Antimicrobial Resistance.


3. Strengthen national regulatory authorities to assure quality and rational use of antimicrobial agents as well as effective implementation of the Drug Act. Sale, distribution and use of
antimicrobial agents both in formal and informal sectors should be regulated.

(4) Discourage, and if possible ban, the use of antimicrobial agents for non-therapeutic use in animals, and encourage use of antibiotics for treating infections in animals rational.

(5) Scale up all disease control efforts (specific national plans, immunization, infection control, healthy life style, safe water and sanitation) to reduce the disease burden and minimize use of antibiotics.

(6) Improve accessibility to diagnostic support including validated RDTs at all levels for accurate diagnosis for mounting specific antimicrobial intervention.

(7) Ensure ethical promotion of pharmaceutical products.

(8) Scale up the training of prescribers so that all prescribers in the country follow national standard treatment guidelines or the principles of rational and evidence-based prescription of appropriate antimicrobial agents. Regular prescription audits should be undertaken to assure compliance. CMEs for antimicrobial prescribers should be regularly undertaken utilizing the national professional bodies/organizations.

(9) Establish drug information units in all levels of health care centres.

(10) Augment laboratory-based surveillance through national protocol, training, strengthening infrastructure of laboratories and in conjunction with the veterinary sector.

(11) Empower the communities on the rational use of antimicrobial agents, especially adherence to the recommended regimen, as avoidance of self-medication should be done on priority using NGOs as well as the existing agencies in health and veterinary sectors. School health programmes and curriculum should highlight rational use of antibiotics.

(12) Share the information on trends in AMR and occurrence of unusual events with WHO CC on AMR for analyses of regional situation and dissemination to all countries.
Recommendations to WHO

**WHO should**

(1) Continue to advocate with the highest level of national decision makers on the importance of urgent response to the threat of AMR.

(2) Forge a network of laboratories that can assist in assuring the quality of essential antimicrobial agents and also build national capacity in this area.

(3) Assist Bhutan, Maldives and Timor-Leste in building their capacity for planning, undertaking and using operational research in the context of AMR.

(4) Assist in building capacity for reliable quality assured laboratory based surveillance of AMR.

(5) Explore the possibility of designating a day on AMR to enhance advocacy and awareness amongst prescribers and users of antimicrobial agents.

(6) Disseminate ongoing best practices in prevention and containment of AMR to all countries in the Region.

(7) Coordinate with WHO Collaborating Centres for facilitating information exchange between Member States.

The workshop concluded with participants thanking WHO for this timely activity. On behalf of WHO, Dr Rajesh Bhatia expressed gratitude to the Royal Government of Thailand for hosting this workshop in Bangkok.
## Programme

### Day 1

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<thead>
<tr>
<th>0800-1200 hrs</th>
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<tbody>
<tr>
<td>• Registration</td>
<td>• Review of status of national response to AMR</td>
</tr>
<tr>
<td>• Inauguration</td>
<td><strong>Session 2</strong></td>
</tr>
<tr>
<td>• WHO and Antimicrobial Resistance</td>
<td><strong>Governance and Regulatory issues (Introduction by Prof. Faiz)</strong></td>
</tr>
<tr>
<td>• Jaipur Declaration by Health Ministers of SEAR countries on AMR (2011): genesis and implementation</td>
<td>• Group Discussions</td>
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<td><strong>Session 1</strong></td>
<td>• Identify what has worked well</td>
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<tr>
<td><em>(Chair Dr Faiz)</em></td>
<td>• Integration of vertical programmes (HIV, TB, malaria) in national response to AMR</td>
</tr>
<tr>
<td>• Review of status of national response to AMR</td>
<td>• Major gaps and way forward</td>
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<td>• Presentation of group work</td>
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### Day 2

**Session 3**
• Capacity building of prescribers for rational use
• Group Discussions
• Identify what has worked well
• Major gaps, needs and way forward
• Presentation of group work

**Session 4**
• Surveillance of AMR
• Group Discussions
• Identify what has worked well
• Major gaps, needs and way forward
• Presentation of group work
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**Session 5**
- Community participation
- Group Discussions
- Identify what has worked well
- Role of NGOs
- Major gaps, needs and way forward
- Presentation of group work

**Session 6**
- Operational Research for AMR
- Group Discussions
- Identify what has worked well
- Major gaps, needs and way forward
- Presentation of group work

**Session 7**
- Where do we stand vis a vis implementation of Jaipur Declaration
- Recommendations and way forward
- Possible WHO support
Annex 2

List of participants

**Bangladesh**
Prof. KM Shahidul Islam
Department of Microbiology
Dhaka Medical College
Dhaka
Email: kmshahid2000@yahoo.com

Prof. Selim Mohammed Jahangir
Principal and Professor of Pharmacology
Chittagong Medical College
Chittagong
Email: selim45@gmail.com

**Bhutan**
Dr Tshokey
Microbiologist
Jigme Dorji Wangchuk National Referral Hospital
Thimpu
Email: doc_tshokey@yahoo.com

**India**
Dr Megha P. Khobragade
Assistant Director
National Centre for Disease Control
22, Shammath Marg,
Delhi-110054, India
Email: drmegha1603@gmail.com

Dr. Shashi Khare
Additional Director and Head (Microbiology)
Division of Microbiology
National Centre for Disease Control
22, Shammath Marg
Delhi 110054
Email: shashi.khare@hotmail.com

**Indonesia**
Ms Indri Rooslamiati
Sub Division Head of Basic Technology, Pharmaceutical & Medical Devices Centre for Biomedical and Basic Technology of health
National Institute of Health Research and Development
Ministry of Health
Jakarta
E-mail: indri.r@gmail.com/
indri_r@litbang.depkes.go.id

Dr Anis Karuniawati
Head
Department of Microbiology
Faculty of Medicine
University of Indonesia
Jakarta
Email: akaruniawati@yahoo.com
Maldives
Ms Aishath Mohamed
Director, Pharmaceutical
Maldives Food and Drug Authority
Male
E-mail: aishathmohamed@health.gov.mv

Mynamar
Dr San Mya
Assistant Director
National Health Laboratory
Yangon
Email: dr.sanmya@gmail.com

Dr (Ms) Latt Latt Kyaw
Microbiologist
National Health Laboratory
Yangon
Email: llkmartu@gmail.com

Nepal
Mr Pan Bahadur Kshetry
Senior Pharmacist
Department of Drug Administration
Madan Bhandari Path-4,
Bijulibazar, New Baneshwor
Kathmandu
Email: dda@healthnet.org.np

Dr Mukunda Sharma
Senior Consultant Pathologist
National Public Health Laboratory
Department of Health Services
Teku, Kathmandu
Email: mukubhattarai@yahoo.com.sg

Sri Lanka
Dr K. M. D. Dharmapriya
Medical Superintendent
Provincial General Hospital
Ratnapura
Email: tharindukonara@gmail.com

Dr Lilani Karunanayake
Consultant Microbiologist
Medical Research Institute
Colombo 8
Email: lilani_k@hotmail.com

Thailand
Dr Visanu Thamlikitkul
Chairman, Department of Research and Development
Faculty of Medicine, Siriraj Hospital
Mahidol University
Ministry of Education
Bangkok
Email: visanu.tha@mahidol.ac.th

Dr Nithima Sumpradit
Pharmacist, Professional Level
International Health Policy Programme
Office of the Permanent Secretary
Ministry of Public Health
Bangkok
Email: nithima@ihpp.thaigov.net

Temporary Advisors

Dr Trihono
The Director General
National Institute for Health Research and Development
Jakarta
Email: trihono@litbang.depkes.go.id / trihono@centrin.net.id

Dr Surang Dejsirilert
Director
WHO Collaborating Centre on Antimicrobial Resistance
National Institute of Health
Email: surang.d@dmsc.mail.go.th

Dr Panadda Silva
Senior Adviser Quality
Department of Medical Sciences
Ministry of Public Health
Nonthaburi
Email: panaddasilva@gmail.com

Dr M G P Samarasinghe
Deputy Director General (Laboratory Services)
Ministry of Health
Colombo 10
E-mail: gamani53@gmail.com
Prof. Md. Abul Faiz  
Professor of Medicine (Retired) &  
Former DGHS Bangladesh  
House 83 ,Flat A1  
Road 12A  
Dhanmond 1 Residential Area  
Dhaka  
E-mail: drmafaiz@gmail.com  

Assist. Prof. Dr Kumthorn Malathum  
Head Division of Infectious Diseases  
Faculty of Medicine, Ramathibodi Hospital  
Mahidol University  
Ministry of Education  
Bangkok  
Email: mkumthorn@yahoo.com  

**List of Observers**  

Dr Jurai Wongsawat  
Medical Office, Expert Level  
Bamrasnaradura Infectious Diseases Institute  
Department of Disease Control  
Ministry of Public health  
Nonthaburi  
Email: juraiw@hotmail.com  

Dr Piyarat Suntarattiwong  
Medical Officer  
Senior Professional Level  
Queen Sirikit National Institute of Child health  
Department of Medical Services  
Ministry of Public Health  
Nonthaburi  
Email: drjunesunta@yahoo.com  

Miss Wantana Paveenkitporn  
Medical Scientist  
Senior Professional Level  
National Institute of Health  
Department of Medical Sciences  
Ministry of Public Health  
Nonthaburi  
Email: wantana.p@dmsc.mail.go.th  

Mr Varavoot Sermsinsiri  
Pharmacist, Professional Level  
Bureau of Drug  
Food and Drug Administration  
Ministry of Public Health  
Nonthaburi  
Email: varavoot@hotmail.com  

Dr Chenphop Sawangmake  
Veterinarian  
Bureau of Drug  
Food and Drug Administration  
Ministry of Public Health  
Nonthaburi  
Email: chenphop@gmail.com  

Dr Sasi Jaroenpoj  
Veterinarian, Senior Professional Level  
Bureau of Livestock Standards and Certification  
Department of Livestock Development  
Ministry of Agriculture and Cooperatives  
Bangkok  
Email: sasijaroenpoj@yahoo.com  

Mr Panumart Phumart  
Lecturer  
Faculty of Pharmacy  
Mahasarakham University  
Ministry of Education  
Bangkok  
Email: geniusarms@hotmail.com  

Dr Sookruetai boonmasawai  
Lecturer  
Faculty of Veterinary Science  
Mahidol University, Puthamonthon 4 road, Salaya, Nakon Pathom 73170  
Email: sookruetai@gmail.com  

**WHO Secretariat**  

**SEARO**  

Dr Rajesh Bhatia  
Director  
Department of Communicable Diseases  
Email: bhatiaraj@searo.who.int
Annex 3

Jaipur Declaration on Antimicrobial Resistance

We, the Health Ministers of Member States of the WHO South-East Asia Region participating in the Twenty-ninth Health Ministers’ Meeting in Jaipur, India, appreciate the efforts being made by Member States and partners in the South-East Asia Region to adopt a holistic and multidisciplinary approach towards prevention and containment of antimicrobial resistance to improve public health. We also recognize that it is imperative that national governments accord utmost priority to this hitherto neglected problem to preserve efficacy of the antimicrobial agents - in our fight against microbial diseases.

Concerned that emergence and spread of antimicrobial resistance is negating the achievements made in protecting human life and health from microbial diseases; especially newly emerging infectious diseases;

Aware that the most important driver of antimicrobial resistance is irrational use of antimicrobial agents;

Recognizing that antimicrobial resistance can be a critical impediment in global efforts towards achieving UN Millennium Development Goals (MDG), specially MDG 6 that addresses containment of HIV/AIDS, tuberculosis, malaria and other diseases;

Considering that while antimicrobial resistance is a global public health problem, its major brunt is being borne by people in the developing countries;

Acknowledging that in spite of significant technological advances, development of new antimicrobial agents is negligible;
Aware that non-therapeutic use of antimicrobial agents in the veterinary and fishery sectors has a profound effect on emergence of resistance in microorganisms and their spread to human beings through the food chain;

Noting that health care facilities featuring the combination of highly susceptible patients, intensive and prolonged antimicrobial use, and inadequate infection control practices are potential “hot spots” for the emergence of highly resistant micro-organisms;

Concerned at the impact of resistant organisms in the efficient utilization of modern technological and scientific advances in improving human health through complex surgeries and transplantation procedures;

Further noting the inadequate regulatory mechanisms that allow unauthorized prescription of antimicrobial agents;

Aware of extensive irrational prescription of these medicines by physicians and poor adherence by the communities themselves; and

Recognizing that resistance in microorganisms leads to loss of lives, long-term suffering, disability, reduced productivity and earnings, and also threatens to undermine the effectiveness of health delivery programmes in all Member States;

We, the Health Ministers of Member States of the WHO South-East Asia Region agree to:

(1) acknowledge antimicrobial resistance as a major global public health issue;

(2) institute a coherent, comprehensive and integrated national approach to combat antimicrobial resistance;

(3) develop national antibiotic policy and formulate multisectoral national alliances against antimicrobial resistance;

(4) advocate for a multidisciplinary approach by all sectors of the government, with the private health sector providing desired information and following national guidelines;

(5) study the emergence and spread of antimicrobial resistance and assess accurately its impact on public health;

(6) regulate the use of antimicrobial agents, both in public and private sectors to prolong and preserve their efficacy;
(7) strengthen legislation to prevent the manufacture, sale and distribution of spurious and substandard/not-of-standard-quality and poor quality antimicrobial agents and the sale of antibiotics;

(8) promote behavioural change in prescribers and communities through continuous training, educational campaigns with process and outcome measures for rational use of antimicrobial agents and emphasizing antimicrobial resistance in medical, dental, veterinary and pharmacy curricula;

(9) build increased capacity for efficient surveillance of antimicrobial resistance and its effective use in modifying antibiotic policy;

(10) strengthen diagnostic facilities for microbial diseases to facilitate evidence-based antimicrobial prescription;

(11) strengthen infection control practices in health care facilities to reduce the burden of microbial diseases and health-care associated infections;

(12) ensure use of antimicrobial agents included in National Essential Drugs List, regulate non-therapeutic use of antimicrobial agents and irrational use in the veterinary and fishery sectors;

(13) encourage basic and operational research in areas that enhance application of various measures to combat antimicrobial resistance;

(14) support research and development of new antimicrobial agents especially for neglected tropical diseases and facilitate their cost-effective production in the public sector and making them affordable for the poor;

(15) advocate healthy lifestyle, cost-effective and essential immunization and other non-pharmaceutical measures to reduce the disease burden due to microbial diseases;

(16) develop national and regional mechanisms for regular data sharing, regulating cross-border transfer of infectious materials and bacterial isolates, sharing best practices of laboratory-based surveillance of antimicrobial resistance and practices promoting rational use of antibiotics;
(17) set up a regional mechanism for sharing of mutually agreed antimicrobial resistance data of public health importance relevant to policy making; and

(18) develop a regional mechanism for a regular intercountry consultative process for reviewing issues related to antimicrobial resistance including tracking of international movement of resistant organisms both within the Region and among regions.

We, the Health Ministers of Member States of the WHO South-East Asia Region, urge all other WHO Member States as well as the Director-General and the Regional Director to continue to provide leadership and technical support in building partnerships between governments, the United Nations agencies and the relevant global health initiatives and with academia, professional bodies, nongovernmental organizations, related sectors, the media and civil society, to jointly advocate and effectively follow-up on all aspects of this Jaipur Declaration on Antimicrobial Resistance.

6 September 2011
Antimicrobial resistance (AMR) in various disease causing pathogens has become a major challenge in combating communicable diseases. Resistance in microorganisms causing malaria, TB and HIV/AIDS can hinder the achievement of Millennium Development Goal 6 (MDG6). Recognizing the importance of antimicrobial resistance, the Health Ministers of the Member States of WHO South-East Asia Region gave a call in 2011 for concerted efforts to prevent and contain AMR through the Jaipur Declaration on AMR. This report summarizes the progress made in implementation of the Jaipur Declaration on AMR.