Antibiotic use in South East Asia and policies to promote appropriate use: reports from country situational analyses

Kathleen Holloway and colleagues discuss findings from a rapid assessment of antibiotic use and policies undertaken by South East Asian countries to drive further actions to reduce inappropriate use.

Inappropriate use of antibiotics is rampant in South East Asia and is a major contributor to antimicrobial resistance. However, data on antibiotic use are scant, few effective interventions to improve appropriate antibiotic use have been implemented, and implementation of policies for appropriate use of antibiotics is also poor. An analysis of secondary data on antibiotic use from 56 low and middle income countries found that countries reporting implementation of more policies also had more appropriate antibiotic use.

Effective policies included having a government health department to promote rational use of medicines, a national strategy to contain antimicrobial resistance, a national drug information centre, drug and therapeutic committees in more than half of all general hospitals and provinces, and undergraduate education on standard treatment guidelines. An updated essential medicines list and national formularies were also associated with lower antibiotic use.

Many high level forums have recommended that countries undertake routine monitoring of antibiotic use and use an integrated health systems approach to improve access to and use of medicines, including antibiotics. Most South East Asian countries lack the infrastructure for this, and the responsibility for medicines management is often divided between different government units with no clear accountability. Since 2010, South East Asian countries have been conducting national situational analyses on medicines management every four years, supported by the World Health Organization. This process involves rapid systematic data collection on use and availability of medicines, including antibiotics, and implementation of policies to ensure appropriate use. A multidisciplinary government team of four to eight people conducts this analysis over two weeks using a predesigned workbook tool. The process ends with a national workshop to identify priorities for action.

We present key findings from published reports of the situational analyses done during 2010-15 and propose next steps to improve antibiotic management.

Methods

We reviewed all the country reports of the situational analyses published on the website of the WHO Regional Office for South-East Asia (WHO/SEARO) and extracted data on antibiotic use in primary care facilities in the public sector, opinions of health workers on antibiotic use, and policies to encourage appropriate use. Box 1 summarises the methods for the country situational analyses.

All results presented here were taken from the country reports. For indicators of antibiotic use, the averages across all facility types are presented. Where possible (in the later second round situation analyses), we calculated the median, and the 25th and 75th centiles for each country. No further statistical analysis could be done because of the small sample sizes and convenience sampling.

For antibiotic management, we focus on policies known to be associated with more appropriate use. We present data from all countries to give a regional picture, but we have not made comparisons between countries or over time as the data are insufficient for this purpose.

Findings

National situational analyses were conducted in all 11 countries of the South-East Asia region during 2010-13 and repeated in eight countries during 2014-15. In India, the analysis was done in only two states. In the first round, the data collection tool was being developed by WHO, government staff were less involved, and it was not possible to visit the designated number of health facilities, or collect data on antibiotic use in upper respiratory tract infection in all facilities. In the second round, data collection was done by a full government team using the predesigned workbook tool, and it was possible to visit more facilities. The tool was useful for standardised data collection, and it may be further modified based on the experience in countries.

Overall, medicines management is under-resourced in terms of funding and human resources in most countries. Partner support from donors, bilateral and multilateral agencies, and non-governmental agencies is generally limited and fragmented. In most countries, drug management, centrally and at facilities, is done manually leading to poor forecasting, quantification and stock management. Only three of 11 countries reported any monitoring of antibiotic use, either by collecting prescribing data or monitoring antibiotic use in hospitals. Drug regulatory authorities are under-resourced and implementation of drug policies about supply, selection, use, and regulation is suboptimal.

Table 1 summarises antibiotic use in primary care facilities in the public sector, and the presence of policies to promote more appropriate use based on selected indicators from the most recent situational analyses. Antibiotic use was high in...
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Inappropriate since most cases of upper range of antibiotic use across facilities were available over the counter without prescription in all countries, even though inappropriate antibiotic use in 30 cases of upper respiratory tract infection was reviewed, although a lack of records on diagnosis made this difficult in some countries. The percentage of cases with upper respiratory tract infection receiving an antibiotic was calculated for each facility and used to calculate the average for each type of facility. The basis for a diagnosis of upper respiratory tract infection was recorded—for example, runny nose, rhinitis, cough, cold, sore throat, viral acute respiratory infection, acute laryngitis, acute bronchitis, earache, and otitis media.

The availability and procurement prices of essential medicines was also checked.

Additionally, antibiotic use in 30 cases of upper respiratory tract infection was reviewed, although a lack of records on diagnosis made this difficult in some countries. The percentage of cases with upper respiratory tract infection receiving an antibiotic was calculated for each facility and used to calculate the average for each type of facility. The basis for a diagnosis of upper respiratory tract infection was recorded—for example, runny nose, rhinitis, cough, cold, sore throat, viral acute respiratory infection, acute laryngitis, acute bronchitis, earache, and otitis media.

The availability and procurement prices of essential medicines was also checked.

The team interviewed health workers (including the health facility manager, a prescriber in the outpatient department, the head of diagnostic facilities, training, appropriate implementation of regulations, as well as availability of drugs, staffing policies, and diagnostic terminology varied, and the drugs available were different. However, the lowest antibiotic use for upper respiratory tract infection was in Bhutan and Thailand, both of which had excellent availability of drugs at the facilities.

Implementation of recommended policies to reduce inappropriate use of antibiotics was poor. Antibiotics were available over the counter without prescription in all countries, even though this is illegal in all countries except Thailand and East Timor.

Qualitative information on possible causes of inappropriate antibiotic use was collected by interviewing healthcare workers in all countries. Between three and 10 health workers from each of 200 facilities (depending on size) were interviewed. Many health workers were aware that antibiotics were misused and cited various reasons, including patient demand, poor drug supply, and lack of diagnostic facilities, training, appropriate information, and time. Box 2 gives some examples of the views of the health workers taken from the country reports.

Antibiotic use was heavily influenced by availability of drugs, staffing policies, and implementation of regulations, as well as the knowledge, beliefs, and qualifications of the health workers. Private pharmacy owners and dispensers in many countries stated that if they did not sell antibiotics without prescription, they would lose business because the patients would simply go elsewhere. These views may not be representative of practice in the entire country or region, but previous studies have reported all these causes.

The process ended with national workshops to develop recommendations based on the findings with participation from government officials, health workers, and partner organisations. Recommendations were made in all countries to establish and strengthen hospital drug and therapeutic committees; undertake public education on antibiotic use; enforce prescription only availability for newer antibiotics; and establish a government unit with direct responsibility for monitoring use of medicines and coordinating implementation of policies to encourage rational use.

In eight countries where two situational analyses were done, the action taken on the recommendations made in the first situational analysis was assessed. Table 2 summarises antibiotic use in public sector primary care in these eight countries in the first and second analyses, and the measures that were taken to improve appropriate use.

Antibiotic use in primary care remained high in all countries, apart from in Thailand where it appeared to have decreased substantially. Thailand was also the only country to report specific nationwide
**Table 1 | Antibiotic use in public sector primary care facilities and presence of selected policies in South East Asian countries**

| Country Year | No. of Facilities with Antibiotic Data (N=number of facilities surveyed)* | Total No. of Cases Revieweda | Average % (range) given antibiotics across facility type | Total No. of Cases Revieweda | Average % (range) given antibiotics across facility type | National AMR Strategy | National State Rational Use of Medicines Unit | National State Drug Information Centre | DTCs in Most Hospitals | National or State Guidelines Updated in Past 5 Years | Year of Latest National or State Essential Medicines List | Public Education on Antibiotics in Past 2 Years | Antibiotics Available without Prescription |
|--------------|-------------------------------------------------|-------------------------------|--------------------------------------------------------|-------------------------------|--------------------------------------------------------|----------------------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------------------|--------------------------------------|--------------------------------------|
| Bangladesh 2014 | 10 (6) | 300 | 31 (19-56) | 183 | 34 (26-42) | No | Yes | Yes | Yes | No | 2013 | No | Yes |
| Bhutan 2015 | 13 (12) | 390 | 41 (33-69) | 360 | 34 (26-42) | No | Yes | Yes | Yes | Yes | 2013 | No | Yes |
| DPR Korea 2012 | 10 (9) | 300 | 35 (18-51) | 110 | 65 (58-81) | No | No | No | No | No | 2014 | No | Yes |
| Rajasthan, India 2013 | 10 (10) | 300 | 62 (53-67) | 198 | 94 (81-100) | No | Yes | Yes | Yes | Yes | 2013 | No | Yes |
| Karnataka, India 2013 | 13 (6) | 390 | 32 (23-45) | 167 | 70 (64-78) | No | Yes | Yes | Yes | Yes | 2013 | No | Yes |
| Indonesia 2011 | 8 (34) | 240 | 45 (34-55) | 30 | 72 | 2011 | Yes | No | Yes | Yes | 2013 | No | Yes |
| Maldives 2014 | 8 (8) | 240 | 24 (15-34) | 215 | 43 (34-48) | No | No | No | No | No | 2014 | No | Yes |
| Myanmar 2016 | 14 (1) | 420 | 47 (36-54) | 360 | 87 (73-96) | No | No | No | No | No | 2015 | No | Yes |
| Nepal 2016 | 10 (17) | 300 | 44 (39-66) | 350 | 66 (63-71) | No | No | No | No | No | 2014 | No | Yes |
| Sri Lanka 2015 | 10 (8) | 300 | 56 (65-75) | 271 | 70 (67-85) | No | No | No | No | No | 2014 | No | Yes |
| Thailand 2015 | 14 (13) | 420 | 12 (11-14) | 485 | 43 (20-52) | 2011 | No, buts committee | No | Yes | No | 2015 | No | Yes |
| East Timor 2015 | 16 (15) | 480 | 43 (39-50) | 334 | 55 (47-66) | No | No | No | No | No | 2015, but 2010 version followed | Only in 2016 | Yes |

**AMR=antimicrobial resistance, DTC=drug and therapeutic committee, URTI=upper respiratory tract infection.**

*30 patient records were reviewed per health facility from which the % receiving an antibiotic was calculated. 30 cases of URTI were reviewed in health facilities which recorded URTI diagnoses from which the % of URTI cases receiving an antibiotic was calculated.†Includes private outpatient facilities offering some public sector services: two medical colleges in Karnataka, one medical college in Nepal and one military hospital in Indonesia.‡Analysis of only 30 prescriptions from three primary care facilities.
Although the data are limited, and not generalisable to the national situation, they have identified serious problems, and the urgent need to implement policies to promote more appropriate use.\textsuperscript{15} The analyses have also allowed some monitoring of progress. Since the assessment is completed within two weeks, it is cheap and flexible. Involvement of government staff in data collection helps build their capacity to assess antibiotic use and policy implementation, and increases the likelihood of government follow up. It remains to be seen if greater government involvement guarantees action.

Data collection in the private and hospital sectors was too limited for useful regional analysis. A substantial proportion of antibiotic use occurs in primary care, however, and we expect private sector antibiotic prescribing to be similar to that in the public sector.\textsuperscript{23} The quality of the data may have been affected by time and resource constraints. However, error was minimised by WHO staff supervising all data collection. Furthermore, similar results about antibiotic management in South East Asia have been reported elsewhere.\textsuperscript{1-2, 10-13}

### Developing political will and an enabling environment

The situational analyses would not have been possible without political will. Developing a mandate for action took six years, and involved two regional meetings with experts and senior government officials to finalise the process.\textsuperscript{26-27} The recommendations of each meeting were incorporated into two WHO regional resolutions adopted by the governments of member states of the South-East Asia region.\textsuperscript{26, 28}

Even with a mandate, many government officials feared that they might be blamed for any negative findings, and this may have led to a reluctance to collect and share data on antibiotic management. However, constant reassurance by WHO that the purpose of the situation analyses was not to find fault but to identify weaknesses in the healthcare system, and possible solutions, reduced staff fears, and resulted in free and frank discussions in the national workshops.\textsuperscript{19}

In conclusion, inappropriate use of antibiotics is high, and implementation of policies to encourage more appropriate use is poor in many South-East Asian countries. We recommend that countries take the following actions:

- Undertake regular situational analyses to monitor antibiotic use, and policy implementation as already mandated by WHO member states\textsuperscript{26}
- Develop a national coordinating mechanism, and establish a government unit to regularly monitor the use of medicines and antibiotics, and policy implementation
- Strengthen hospital drug and therapeutics committees, and update and

### Table 2 | Antibiotic use in public sector primary care facilities and policy changes in eight countries for which a situational analysis was done twice during 2010-15

| Country | No of public facilities, patient encounters (No with URTI data) | Average % (range) of outpatients given antibiotics across facility type | Average % (range) of patients with URTI given antibiotics across facility type | New policies implemented between 2010-12 and 2014-15 |
|---------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| Bangladesh | 4,120 (0) 10,300 (6,183) | 48 (34-74) 31 (19-54) | 59 (5-96) | None. Viable drug availability in terms of supply and type |
| Bhutan | 8,240 (0) 13,390 (12,360) | 33 (31-34) 41 (33-49) | 34 (24-42) | Some monitoring and continuing medical education, updated essential medicines list and standard treatment guidelines, and good drug availability |
| Maldives | 5,150 (0) 8,240 (8,215) | 38 (35-43) 24 (15-34) | 43 (34-48) | None. Decreased drug availability |
| Myanmar | 10,300 (8,90) 16,420 (11,360) | 38 (37-56) 67 (44-94) | 83 (72-100) 87 (73-96) | None. Increased drug availability |
| Nepal | 13,390 (9,110) 10,300 (7,350) | 47 (33-54) 64* (59-66) | 73 (72-74) 66 (68-71) | Non-governmental organisations rational use of medicine projects in a few districts. Variable drug availability |
| Sri Lanka | 6,180 (0) 10,300 (8,271) | 49 (22-66) 56 (45-67) | 70 (47-85) | Drug and therapeutic committees started in 2015. Variable drug availability |
| Thailand | 9,270 (6,70) 14,420 (13,485) | 30 (23-45) 12 (11-14) | 37 (54-62) 71 (69-88) | Monitoring use, updated essential medicines list, drug and therapeutic committees, and antibiotic smart use and PLEASE projects\textsuperscript{11} |
| East Timor | 10,300 (8,15) 16,480 (15,334) | 50 (62-75) 43 (39-50) | 77 (69-88) 55 (47-66) | None. Decreased drug availability |

*URTI=upper respiratory tract infection.
\textsuperscript{t}Antibiotic smart use project, started in 2007, consists of multifaceted interventions at the individual, organisational, network, and policy levels aimed at changing behaviour, maintaining the changes, and scaling up the project. Activities vary across institutions. \textsuperscript{f}PLEASE project, started in 2014 in 71 hospitals. It consists of pharmacy and therapeutics committee (P), labelling and leaflet (L), essential tools for rational use of medicines (E), awareness of rational use among prescribers and patients (A), special population care (S), and ethics in promotion (E).
implement national standard treatment guidelines by training health staff, monitoring the use of medicines, and ensuring that the drug supply matches what is recommended in the guidelines.

- Invest in public education, and regulate over-the-counter availability of newer antibiotics.

While the member state resolutions have enabled the country situational analyses on medicines management to be done, constant follow up by governments, WHO and partners, and appropriate investment will be needed to make progress.

Contributors and sources: The situational analysis approach described in this article was developed in response to international calls for a systematic, holistic, health systems approach to promote rational use of medicines at the country level. KAH is a public health doctor, who formerly worked as regional adviser in essential drugs and other medicines in the WHO South-East Asia regional office, and as medical officer in charge of promoting rational use of medicines in WHO Geneva. She developed the methods for the situational analyses, facilitated the situational analyses, organised both meetings held in 2010 and 2013, analysed the data, and wrote the manuscript. AK is a professor of pharmacology with international expertise in drug use, medicines pricing and access. She participated in the initial meeting in July 2010, supported three situational analyses during 2015, reviewed the methods, and helped with the analysis and writing the manuscript. GB was a professor and head of pharmacology with international expertise in drug selection and use. She participated in the initial meeting in July 2010, and in the regional consultation in 2013, supported a situational analysis in 2015, reviewed the methods, and helped write the manuscript. MP is a junior public health professional who worked in the WHO South-East Asia regional office. She assisted in data analysis, and developed the graphical presentation. KT is a health professional who worked in the WHO South-East Asia regional office. She assisted in data analysis, and developed the graphical presentation. KA, KT, GB, and MP were all recruited to WHO to facilitate international expertise in drug selection and use. KA, KT, GB, and MP were all recruited to WHO to facilitate and help write the manuscript. MP is a junior public health professional who worked in the WHO South-East Asia regional office. She assisted in data analysis, and developed the graphical presentation. KT is a health professional who worked in the WHO South-East Asia regional office. She assisted in data analysis, and developed the graphical presentation.

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