Title: Antibiotic Use in South East Asia and Policies to Promote Appropriate Use: Reports from Country Situational Analyses


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More details/abstract

Inappropriate use of antibiotics is rampant in South East Asia1-6 and is a major contributor to antimicrobial resistance.7-9 However, data on antibiotic use are scant, few effective interventions to improve appropriate antibiotic use have been implemented,10 11 and implementation of policies for appropriate use of antibiotics is also poor.12 13 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.14 15 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.15 An updated essential medicines list and national formularies were also associated with lower antibiotic use.

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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 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...
Box 1: Summary of methods for AMR situational analysis

The workbook tool used for the situational analysis built on other tools19 and was developed by WHO/SEARO in the first round of situational analyses in all 11 countries during 2010–13. The tool was piloted for use by government staff in the second round of analyses in eight countries during 2014–15.

The situational analysis approach was developed in the WHO South-East Asian region at the request of member states20,21 but is suitable for use in other low and middle income countries.

Methods

Over two weeks the analysis team visited all major ministry of health departments and agencies responsible for drug supply, selection, use, regulation, drug policy, insurance, and health professional training to understand what each unit did, and what policies were in place. The team also visited healthcare facilities, with the aim of visiting at least 20 facilities, two of each type of public health facility (primary care centres, secondary, and tertiary hospitals) plus private pharmacies in at least two provinces/regions, as selected by the ministry of health.

Data collection and analysis

Data were collected using a predesigned workbook tool19 (see supplementary data on bmj.com) by a team of four to eight staff nominated by the government, with at least one team member from each of the government departments responsible for drug supply, selection, use, regulation, and policy. Staff at the central level were interviewed using the open questions in the workbook tool about the health system and policies in place.

At each health facility, the team reviewed 30 primary care outpatient encounters (using documentation available at the facility, such as prescriptions held in the pharmacy or by the patient, paper slips in the pharmacy, patient records, or outpatient registers). The means for standard indicators of medicines use22 (including the percentage of patients receiving an antibiotic) were calculated for each facility and each category of facility.

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 the pharmacy, a dispenser, a nurse, and sometimes other staff) using the open questions in the workbook about management of medicines and implementation of policies, and any problems.

Cross-cutting descriptive analysis was done each day and presented by the team at a national workshop at the end of the two weeks. The teams wrote country reports in the workbook tool format, which were published on the WHO/SEARO website after government approval. WHO facilitated and supervised the entire process, including preparation, data collection and analysis, conducting the national workshop, and writing and publishing the country reports.
Table 1 | Antibiotic use in public sector primary care facilities and presence of selected policies in South East Asian countries

<table>
<thead>
<tr>
<th>Country year</th>
<th>No of facilities with antibiotic data (No with URTI data)*</th>
<th>Total No of cases reviewed*</th>
<th>Average % (range) given antibiotics across facility type</th>
<th>Total No of cases reviewed*</th>
<th>Average % (range) given antibiotics across facility type</th>
<th>National or state guidelines on antibiotic use</th>
<th>National or state rational use of medicines strategy</th>
<th>National or state drug information centre</th>
<th>DST sin most hospitals</th>
<th>National or state essential medicines list 2008</th>
<th>Year of latest national or state antibiotic stewardship guidelines update in past 5 years</th>
<th>Public education on antibiotic use in past 2 years</th>
<th>Antibiotics available without prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh 2014</td>
<td>10 (6)</td>
<td>300</td>
<td>31 (19-56)</td>
<td>183</td>
<td>34 (26-42)</td>
<td>No</td>
<td>Yes, but small</td>
<td>Yes</td>
<td>Referral hospitals only</td>
<td>Yes</td>
<td>2014</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Bhutan 2015</td>
<td>13 (12)</td>
<td>390</td>
<td>41 (33-69)</td>
<td>360</td>
<td>34 (26-42)</td>
<td>No</td>
<td>Yes, but small</td>
<td>Yes</td>
<td>Referral hospitals only</td>
<td>Yes</td>
<td>2014</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>DPR Korea 2012</td>
<td>10 (9)</td>
<td>300</td>
<td>35 (18-51)</td>
<td>110</td>
<td>65 (58-81)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Rajasthan, India 2013</td>
<td>10 (10)</td>
<td>300</td>
<td>62 (53-67)</td>
<td>198</td>
<td>94 (81-100)</td>
<td>No</td>
<td>Yes, in supply unit</td>
<td>No</td>
<td>Yes, but monitor only</td>
<td>EML compliance</td>
<td>Yes</td>
<td>2013</td>
<td>No</td>
</tr>
<tr>
<td>Karnataka, India 2013</td>
<td>131 (6)</td>
<td>390</td>
<td>322 (234-5)</td>
<td>167</td>
<td>70 (64-78)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>2013</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Indonesia 2011</td>
<td>8 (34)</td>
<td>240</td>
<td>45 (34-55)</td>
<td>30</td>
<td>7 (2)</td>
<td>2011</td>
<td>Yes, but small</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2008</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Maldives 2014</td>
<td>8 (8)</td>
<td>240</td>
<td>24 (15-34)</td>
<td>215</td>
<td>43 (34-48)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>2013</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Myanmar 2014</td>
<td>14 (11)</td>
<td>420</td>
<td>47 (33-54)</td>
<td>360</td>
<td>87 (73-96)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>2010</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Nepal 2014</td>
<td>101 (7)</td>
<td>300</td>
<td>44 (39-66)</td>
<td>350</td>
<td>66 (63-71)</td>
<td>2001</td>
<td>No</td>
<td>No</td>
<td>Referral hospitals only</td>
<td>No</td>
<td>2011</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Sri Lanka 2015</td>
<td>10 (8)</td>
<td>300</td>
<td>56 (42-67)</td>
<td>271</td>
<td>70 (47-85)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Started in 2015</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Thailand 2015</td>
<td>14 (13)</td>
<td>420</td>
<td>12 (11-14)</td>
<td>485</td>
<td>43 (20-52)</td>
<td>2011</td>
<td>No, by health committee</td>
<td>No</td>
<td>Yes</td>
<td>No, but many protocols</td>
<td>2015</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>East Timor 2015</td>
<td>16 (15)</td>
<td>480</td>
<td>43 (39-50)</td>
<td>336</td>
<td>55 (47-66)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>National hospital only</td>
<td>No</td>
<td>2015, but not 2010 and 2015</td>
<td>Only in 2016</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*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.

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

Fig 1 | Median % of patients receiving antibiotics (%). Median % of patient encounters receiving antibiotics (%): Bangladesh (N=/six.tf, n=/one.tf/three.tf), Bhutan (N=/one.tf, n=/zero.tf), Malaysia (N=/one.tf, n=/zero.tf), Nepal (N=/one.tf, n=/zero.tf), Thailand (N=/one.tf, n=/zero.tf), East Timor (N=/one.tf/three.tf).

Fig 2 | Median (25th to 75th centiles) of percentage of outpatients prescribed antibiotics across all surveyed public primary care facilities in eight South East Asian countries (n=number of facilities surveyed).
Although the data are limited, and not generalisable to the national situation, they have identified serious problems, and provided evidence to advocate for feasible solutions. The data highlight to governments ongoing antibiotic misuse in primary care, possible reasons for misuse, and the urgent need to implement policies to encourage more appropriate use. 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. The quality of the data may have been affected by time changes, and scaling up the project. Activities vary across institutions. The 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 need for appropriate antibiotic use, and ensuring that in the public sector.

The situa-tional 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. 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.
- 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

<table>
<thead>
<tr>
<th>Country</th>
<th>No of public facilities, patient encounters (No with URTI data)</th>
<th>Average % (range) of outpatients given antibiotics across facility type</th>
<th>Average % (range) of patients with URTI given antibiotics across facility type</th>
<th>New policies implemented between 2010–12 and 2014–15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>4, 120 (0)</td>
<td>48 (34-74)</td>
<td>31 (19-54)</td>
<td>59 (59-60)</td>
</tr>
<tr>
<td>Bhutan</td>
<td>8, 240 (0)</td>
<td>33 (31-34)</td>
<td>41 (33-49)</td>
<td>34 (26-42)</td>
</tr>
<tr>
<td>Maldives</td>
<td>5, 150 (0)</td>
<td>38 (35-43)</td>
<td>24 (15-34)</td>
<td>43 (34-48)</td>
</tr>
<tr>
<td>Myanmar</td>
<td>10, 300 (8, 90)</td>
<td>38 (37-56)</td>
<td>67 (54-94)</td>
<td>83 (72-100)</td>
</tr>
<tr>
<td>Nepal</td>
<td>13, 390 (9, 110)</td>
<td>42 (31-54)</td>
<td>64 (59-66)</td>
<td>77 (77-97)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>6, 180 (0)</td>
<td>49 (22-66)</td>
<td>56 (65-67)</td>
<td>70 (47-85)</td>
</tr>
<tr>
<td>Thailand</td>
<td>9, 270 (6, 73)</td>
<td>30 (23-45)</td>
<td>12 (11-14)</td>
<td>43 (20-52)</td>
</tr>
<tr>
<td>East Timor</td>
<td>10, 300 (8, 153)</td>
<td>50 (42-75)</td>
<td>43 (39-50)</td>
<td>55 (47-66)</td>
</tr>
</tbody>
</table>

URTI=upper respiratory tract infection.

*Includes one medical college in Nepal offering some public services.

**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 need for appropriate antibiotic use, and ensuring that in the public sector.

†Antibiotic smart use 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. KA 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 public health pharmacist who has been working as the regional adviser in essential drugs and other medicines in the WHO Western Pacific, and now in South-East Asia regional office. She participated in the initial meeting in July 2010, and in the regional consultation in 2013, and assisted in the interpretation of the data, and writing the manuscript.

Competing interests: We have read and understood BMJ policy on declaration of interests, and declare that all five authors were recruited by WHO to facilitate one or more country situational analyses and one or more of the meetings described in the manuscript. KA is a former regional adviser in essential drugs and other medicines at WHO/SEARO. WHO/SEARO funded all the national situational analyses.

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