Is it possible to reduce syphilis and gonorrhoea incidence by 90%? A review of STI control in the WHO South-East Asia Region with an eye on 2030 global targets

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Abstract (346 words)

The WHO has set targets for 90% reductions of syphilis and gonorrhoea incidence by 2030. We review STI trends and country experience in the WHO South-East Asia Region (SEAR) to assess current status of STI control and feasibility of reaching global targets. Methods include literature review, trend analysis of routine data and structured interviews with programme managers.

The proportion of new STI cases estimated for SEAR has declined from a third of the total global estimate in the 1990s to 11% in 2012. Three countries – Sri Lanka, Thailand, Myanmar – have reported 90% or greater reductions in syphilis and/or gonorrhoea at some point between 1975-2010. Evidence from multiple sources suggest that smaller STI reductions over India’s large population have driven regional declines. In the other seven countries, STI trends remain high, are increasing, or data are not reliable enough to measure change. Most countries in the region, however, including those with good control, have seen some evidence of STI resurgence during the past decade.

STI programme structure, resources and performance also vary greatly across the region, with strong, multi-pronged programmes in Sri Lanka and Thailand, and targeted STI control efforts at scale in Myanmar and India. In other countries, limited STI activities are often subsumed by AIDS programmes, where programme managers report low priority and limited resources for STIs. A consistent programme component in countries with documented STI reductions is a focused approach to condoms and STIs among key populations. At national and sub-national levels, data show rapid STI declines when targeted STI services are scaled up to reach sex workers in large numbers, particularly where peers and communities are actively involved in implementation. The converse also appears to be true as STI outbreaks in underserved MSM networks are linked to rebounding STI trends.

The regional approach for SEAR prioritises ‘reducing STI transmission in highest transmission networks’, while also supporting progress towards universal access and reliable STI surveillance as endorsed in the global STI strategy. Regional experience argues that the former may be the critical link to achieving global STI control targets.

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The WHO has set targets for 90% reductions of syphilis and gonorrhoea incidence by 2030. We review STI trends and country experience in the WHO South-East Asia Region (SEAR) to assess current status of STI control and feasibility of reaching global targets.

STI estimates for SEAR have declined from a third of the global total in the 1990s to 11% in 2012. Sri Lanka, Thailand and Myanmar have reported 90% or greater reductions in syphilis and/or gonorrhoea between 1975-2010. Evidence suggest that smaller STI reductions over India’s large population have driven regional declines. In other countries, STI trends remain high, are increasing, or data are not reliable enough to measure change. Most countries in the region, including those with good control, have seen evidence of STI resurgence during the past decade.

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Key populations appear to be critical. At national and sub-national levels, data show rapid STI declines when targeted condom and STI services are scaled up to reach sex workers in large numbers, particularly where peers and communities are actively involved in implementation. The converse also appears to be true as STI outbreaks in underserved MSM networks are linked to rebounding STI trends.
**Background**

The World Health Organization (WHO) has set global targets calling for 90% reductions in the incidence of *Treponema pallidum* (Tp/syphilis) and *Neisseria gonorrhoeae* (Ng/gonorrhoea) by 2030. [1] We review sexually transmitted infection (STI) trends and country experience in the WHO South-East Asia Region (SEAR) to assess the current status of STI control and feasibility of reaching global targets. The primary focus is on control of common curable STIs – syphilis, gonorrhoea, chlamydia, chancroid and trichomoniasis.

Historically, STIs have been among the most serious public health problems in SEAR, with high associated morbidity, mortality, disability and adverse pregnancy outcomes. [2-4] The incidence and prevalence of curable STIs were extremely high in urban areas, along migrant and trucking routes, and closely linked – particularly ulcerative chancroid and syphilis – to rapid early spread of HIV. However, large-scale interventions to improve conditions and increase condom use in sex work led to large STI declines and slowing of HIV epidemics in several countries during the 1990s and early 2000s.

Recent reports of rising syphilis and gonorrhoea incidence raise concerns about the adequacy of current STI prevention efforts as programmes focus increasingly on HIV-specific interventions such as antiretroviral therapy (ART) and pre-exposure prophylaxis (PrEP). [5-7] Declining condom use and behavioural risk compensation, particularly within key population networks, may facilitate resurgent STI transmission at a time when resources are insufficient for condom programmes and basic STI services.

This review aims to assess current STI epidemiology and control in SEAR with attention to recent trends and regional heterogeneity both across and within countries. Where STI control has improved, we look for evidence of what constitutes an effective response.

**Methods**

This review of the STI situation in SEAR comprises a broad assessment of available regional data, national STI programme capacity and performance, and sub-national examples. It was conducted in April-May 2018 using multiple methods including literature review, interviews and analysis of available country data (updated in July 2019). Interviews using a structured set of questions involved programme managers and WHO country focal points responsible for STI activities.

We examined trends in the published literature to see if publication bias might be a factor in assessing STI epidemiology and programme factors in SEAR countries. WHO global STI estimates are based mainly on review of prevalence studies reported in the published literature. [8-11] The WHO uses these methods for STI estimation partly due to a lack of reliable routine STI reporting from countries (this is only partially true for SEAR, as discussed below).

However, the publication of papers with an STI focus has fluctuated widely over past decades. Figure 1 summarises the number of papers from SEAR sites mentioning STIs as a main topic since 2000. The number of studies peaked from about 2005 to 2013, a period when donor
investment in STI control (including the large Avahan India AIDS Initiative) was highest. Studies reporting data on STI incidence or prevalence are a subset of the total and follow a similar pattern. [11]

Figure 1. STI literature – number of papers with STI as a major focus

Several limitations are apparent when estimating STI burden and trends from the literature. The number and distribution of studies with population-based prevalence data are few and poorly represent regional diversity. In addition, given fluctuations over time, the likelihood of publication bias is high, particularly as sites with donor-supported interventions (and related publications) may achieve better STI control than those without resources. Most published STI prevalence data in SEAR come from key populations (KP), male bridge groups or clinic-based samples, which are informative for those sub-populations but cannot be directly extrapolated to derive general population estimates.

Several countries in the region routinely monitor STI trends through national STI surveillance systems. In Thailand, Sri Lanka and Myanmar, surveillance data were assessed to be complete enough to permit analysis of STI trends at national level. Incomplete reporting in other countries precluded similar analysis.
Findings

WHO global estimates for four common curable STIs – syphilis, gonorrhoea, chlamydia and trichomoniasis – have shown little change over three decades. Yet, the proportion of new cases estimated for SEAR has declined from a third of the total global estimate in the 1990s to 11% in 2012. Despite limitations of methods used, such a large magnitude of change begs further analysis. An important possibility is that STIs have indeed declined dramatically in SEAR, more so than in other regions. Evidence for and against this hypothesis is examined from national and sub-national data, with special attention to the most populous countries, which have disproportionate influence on regional trends.¹

Figure 1. Global STI trends and proportion estimated for SEAR

Reported STI declines, routinely reported data from programmes

Routinely reported STI surveillance data vary greatly in completeness and reliability across the region. Yet, such data from several countries is sufficiently robust to examine long-term trends in common curable STIs. Table 1 summarises data from Sri Lanka, Thailand and Myanmar, which show >90% reduction in incidence or prevalence of select STIs over different but overlapping time periods. These data demonstrate the feasibility of achieving greater than 90% reductions in syphilis, gonorrhoea and chancroid.

¹ Any regional trends in SEAR are driven strongly by events in India, which accounts for about 68% of the region’s population.
Table 1. Reported country-level reductions in common curable STIs in SEAR since 1975

<table>
<thead>
<tr>
<th>Country</th>
<th>STI</th>
<th>Interval</th>
<th>Pre</th>
<th>Post</th>
<th>Reduction Rate</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>Gonorrhoea</td>
<td>1975-2000</td>
<td>61.6</td>
<td>3.5</td>
<td>94.3%</td>
<td>Cases per 100,000 population</td>
</tr>
<tr>
<td></td>
<td>Syphilis</td>
<td>1975-2000</td>
<td>21.5</td>
<td>1.4</td>
<td>93.5%</td>
<td>Cases per 100,000 population</td>
</tr>
<tr>
<td>Thailand</td>
<td>Gonorrhoea</td>
<td>1985-2005</td>
<td>445</td>
<td>7</td>
<td>98.4%</td>
<td>Cases per 100,000 population</td>
</tr>
<tr>
<td></td>
<td>Syphilis</td>
<td>1985-2005</td>
<td>32</td>
<td>2.1</td>
<td>93.4%</td>
<td>Cases per 100,000 population</td>
</tr>
<tr>
<td></td>
<td>Chancroid</td>
<td>1985-2005</td>
<td>93</td>
<td>0.4</td>
<td>99.6%</td>
<td>Cases per 100,000 population</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Gonorrhoea</td>
<td>1985-2005</td>
<td>15.4</td>
<td>1.4</td>
<td>90.6%</td>
<td>Cases per 10,000 male population</td>
</tr>
<tr>
<td></td>
<td>Syphilis</td>
<td>1996-2016</td>
<td>4.2</td>
<td>0.3</td>
<td>92.9%</td>
<td>Prevalence ANC screening</td>
</tr>
<tr>
<td></td>
<td>Chancroid</td>
<td>1985-2005</td>
<td>7.5</td>
<td>0.4</td>
<td>94.5%</td>
<td>Cases per 10,000 male population</td>
</tr>
</tbody>
</table>

Figures 2 and 3 show more detail on these declining STI trends in Sri Lanka and Thailand. Both countries have detected increases in syphilis and gonorrhoea during recent years through routine surveillance, and have used such data to inform and strengthen control efforts.

Figure 2. STI trends Sri Lanka, 1952-2016
Evidence of STI declines in India

India is the largest country in the region, accounting for over two-thirds of SEAR’s population. Geographically large and diverse, it has also demonstrated a large degree of heterogeneity in STI epidemiology and control over the years. [3,4] Historically, STI transmission, including the early AIDS epidemic, followed migrant pathways to large cities such as Mumbai, Delhi, Kolkata and Chennai, and early control efforts focused on large metropolitan areas. From about 2004 onwards, large-scale efforts were made to scale up interventions and services for KP, first in high-prevalence states and along major highways (Avahan), then nationwide (NACO). [12,13] STI prevention, screening and treatment were major programme components.

India lacks reliable national-level STI incidence or prevalence data. However, numerous epidemiological studies illustrate changing trends and patterns over several decades. Those from the 1990s describe similar patterns of poor control – high prevalence rates of bacterial, and particularly ulcerative STIs including chancroid, which were closely associated with HIV transmission in largely urban settings characterised by high vulnerability, migration and population mobility. [14-23] Later studies show very different epidemiological trends and patterns particularly after about 2005. Compared to studies from the 1990s, STI rates are commonly lower, with significant aetiological shifts from bacterial and ulcerative infections to chronic viral STIs. Figure 3 shows how this trend progressed for genital ulcers in Chennai with 73-92% declines in syphilis and chancroid over ten years. These patterns continued elsewhere during the first decade of the millennium [24-41] with data closely linked to ongoing intervention efforts. [13,35-41]
Among the earliest and largest declines were reported among female sex workers in Kolkata following implementation of targeted condom and STI interventions with active community involvement. Syphilis prevalence, assessed by sentinel surveillance, declined by more than 99%, from 25% in 1992 to 0.2% in 2005. [24] Another community-led intervention project in two districts of Karnataka reported significant reductions in prevalence of syphilis (45%), gonorrhoea (83%) and chlamydia (63%) between the start of the intervention in 2004 and 2009. with more recent routine clinic data showing near elimination of several common STIs. [25,26] Increasing condom use and significant STI/HIV declines were reported in surveys from several other districts in Karnataka. [27] In Tamil Nadu, genital ulcers declined two-thirds among FSW, from 13.1% in 1997 to 4.5% in 2008 (p<0.001). [28]

Among MSM in Maharashtra, reactive syphilis declined from 8.8% in 2004 to 1.1% in 2008. [29] Syphilis also declined significantly in Tamil Nadu among both high-risk MSM (14.3 percent to 6.8 percent) and transgenders (16.6 percent to 4.2 percent) [30] Significantly decreased STI incidence (p-value for trend<0.001) between 2005 and 2008 was also reported from a study of Bangalore STI clinics. [31] The association of STI declines and Avahan scale-up between 2004 and 2009 is supported by studies in different states (Table 2). During this period, KP outreach and service provision increased rapidly, and a study of STI service quality indicators reported three- to seven-fold improvement. [13,32]

Strikingly different STI patterns were being reported for symptomatic men seeking care from STI clinics compared to the 1990s. Among 121 men with laboratory-confirmed GUD from 8 STI clinics in 4 states, 48% were found to have HSV-2, 23% syphilis with only one case of chancroid. [33] In a busy Mumbai STI clinic, 53% of STIs seen in 1994 were assessed to be bacterial, dropping to 28% in 2006. [34] HSV-2 was the most commonly identified pathogen among adult males and females presenting with genital ulcer disease at clinics in Karnataka. [35] This aetiologic shift from bacterial to viral STIs was also reported in a general population sample from Andhra Pradesh where sero-incidence of HSV-2 was estimated to be 25.6 per 1000 person-years, while only 3.0 for syphilis. [36]
In many cases, papers reported STI reductions linked to large-scale intervention efforts that were being implemented, particularly in four large southern states which account for almost a third of India’s population (see Table 2). [36-45]

Table 2. Reported large-scale (state-level or higher) STI reductions in India under Avahan 2004-2009

<table>
<thead>
<tr>
<th>State(s)</th>
<th>STI</th>
<th>Interval</th>
<th>Pre</th>
<th>Post</th>
<th>% decline</th>
<th>Notes</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>Syphilis</td>
<td>2006-2009</td>
<td>10.8</td>
<td>6.1</td>
<td>44%</td>
<td>Consistent condom use increased with regular (63.6% to 83.4%; p&lt;0.001) and occasional clients (70.8% to 83.7%; p&lt;0.001). The prevalence of lifetime syphilis decreased (10.8% to 6.1%; AOR=0.39; p&lt;0.001)</td>
<td>Rachakulla [37]</td>
</tr>
<tr>
<td>Karnataka</td>
<td>Syphilis (high titre)</td>
<td>2004-2009</td>
<td>5.9</td>
<td>3.4</td>
<td>42%</td>
<td>Over 85% of FSW reported contact by a peer educator and having visited a project STI clinic. Reductions in prevalence of high-titre syphilis (5.9% vs 3.4%, p=0.001); and chlamydia and/or gonorrhoea (8.9% vs 7.0%, p=0.02).</td>
<td>Ramesh [43], Ramakrishnan [44]</td>
</tr>
<tr>
<td></td>
<td>Ng and/or Ct</td>
<td>2004-2009</td>
<td>8.9</td>
<td>7.0</td>
<td>21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maharasthra</td>
<td>Syphilis</td>
<td>2004-2007</td>
<td></td>
<td></td>
<td></td>
<td>Among FSW, the FPP intervention was significantly correlated with lower probability of STI seropositivity.</td>
<td>Gutierrez [41]</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Syphilis</td>
<td>2006-2009</td>
<td>9.7</td>
<td>2.2</td>
<td>77%</td>
<td>Reactive syphilis declined significantly (p=0.001) as programme coverage and consistent condom use rose with occasional (72% to 93%; p=0.001) and regular clients (68% to 89%; p=0.01).</td>
<td>Thilakavathi [38]</td>
</tr>
<tr>
<td>Avahan (6 intervention states)</td>
<td>STI syndromes</td>
<td>2005-2009</td>
<td>39</td>
<td>11</td>
<td>72%</td>
<td>Proportion of STI syndromes diagnosed amongst female sex workers as proportion seeking regular STI check-ups increased.</td>
<td>Gurung [39]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>3</td>
<td>75%</td>
<td>Proportion of STI syndromes diagnosed amongst high-risk MSM as proportion seeking regular STI check-ups increased)</td>
<td></td>
</tr>
<tr>
<td>Avahan (highway intervention areas)</td>
<td>Syphilis</td>
<td>2007-2010</td>
<td>3.2</td>
<td>1.7</td>
<td>47%</td>
<td>With increased exposure to interventions and consistent condom use with paid female partners, proportion testing positive for syphilis reduced from 3.2% to 1.7% (p&lt;0.05).</td>
<td>Pandey [40]</td>
</tr>
<tr>
<td>Avahan (4 intervention states - Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu)</td>
<td>Syphilis</td>
<td>2006-2008</td>
<td>4.8</td>
<td>2.6</td>
<td>46%</td>
<td>Clients of sex workers significant decrease p&lt;0.001. Increased FSW coverage associated with reduced incidence of syphilis.</td>
<td>Rajaram [45]</td>
</tr>
</tbody>
</table>
Large changes were also reported among lower-risk populations. Syphilis prevalence among pregnant women declines steadily from 3% in 1995 to 0.8% in 2005. [46] In Mysore district in Karnataka, where STIs were virtually eliminated among female, male and transgender sex workers, and an eight-fold reduction in HIV prevalence was measured among pregnant women. [26]

Table 3. Other sub-national STI declines reported from India

<table>
<thead>
<tr>
<th>Location</th>
<th>STI</th>
<th>Interval</th>
<th>Pre</th>
<th>Post</th>
<th>% decline</th>
<th>Notes</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mysore</td>
<td>Syphilis</td>
<td>2004-2009</td>
<td>24.9</td>
<td>13.6</td>
<td>45%</td>
<td>Prevalence FSW</td>
<td>Isac [25]</td>
</tr>
<tr>
<td></td>
<td>Gonorrhoea</td>
<td></td>
<td>5.4</td>
<td>0.9</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chlamydia</td>
<td></td>
<td>10.8</td>
<td>4.0</td>
<td>63%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Several STIs</td>
<td>2006-2014</td>
<td>586.0</td>
<td>5.0</td>
<td>99%</td>
<td>Routine STI clinic screening data (cases detected)</td>
<td>Reza-Paul [26]</td>
</tr>
<tr>
<td>Karnataka</td>
<td>District surveys</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Increasing condom use and significant STI/HIV declines</td>
<td>Boily [27]</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Genital ulcers</td>
<td>1997-2008</td>
<td>13.1</td>
<td>4.5</td>
<td>66%</td>
<td>FSW (p&lt;0.001)</td>
<td>Charles [28]</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>Reactive syphilis</td>
<td>2004-2008</td>
<td>8.8</td>
<td>1.1</td>
<td>87%</td>
<td>MSM</td>
<td>Ramanathan [29]</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Syphilis</td>
<td></td>
<td>14.3</td>
<td>6.8</td>
<td>52%</td>
<td>MSM significant decline</td>
<td>Subramanian [30]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.6</td>
<td>4.2</td>
<td>75%</td>
<td>Transgender significant decline</td>
<td></td>
</tr>
<tr>
<td>Bangalore STI clinics</td>
<td></td>
<td>2005-2008</td>
<td></td>
<td></td>
<td></td>
<td>Significantly decreased STI incidence (p-value for trend&lt;0.001)</td>
<td>Souverein [31]</td>
</tr>
<tr>
<td>Chandigarh hospital</td>
<td>Syphilis</td>
<td>1996-2005</td>
<td>3.0</td>
<td>0.8</td>
<td>72%</td>
<td></td>
<td>Sethi [46]</td>
</tr>
<tr>
<td>Madras Medical College STD Clinic</td>
<td></td>
<td>1993-2003</td>
<td>813</td>
<td>221</td>
<td>73%</td>
<td>Genital ulcer trends, STI clinic (cases detected)</td>
<td>Usman [42]</td>
</tr>
<tr>
<td></td>
<td>Chancroid</td>
<td></td>
<td>360</td>
<td>29</td>
<td>92%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data on STI epidemiology elsewhere in the region

Among the remaining seven countries in the region, Bangladesh, Indonesia and Nepal have medium to large-sized populations and documented STI epidemics. However, routine STI surveillance is neither complete nor reliable enough to assess trends, and few studies are reported in the literature. Table 4 summarises the limited regional data in the published literature for countries other than India.
Where STI declines have been documented in a few specific locations, these are linked to programmes that have increased condom use in sex work while improving STI clinical services. STI declines are also associated with specific STI interventions such as periodic presumptive treatment (PPT). [47-49]

**Programme response and challenges**

The programme response to STIs varies greatly across the region, from highly effective to almost non-existent. Many countries are struggling to scale up outreach to key populations, support basic clinical services, maintain stocks of effective STI treatments, conduct STI surveillance and monitor antibiotic resistance. On the other hand, Thailand and Sri Lanka have maintained strong commitment and funding for STI control over many years, and have documented high levels of control over STI/HIV transmission. Thailand and Maldives have recently been certified as having eliminated mother-to-child transmission of both syphilis and HIV, while Sri Lanka is undergoing validation for the same.

Several reasons for this diversity in STI programme capacity and response across the region are evident from review of programme reports and interviews with programme managers. In many countries, STI and HIV programmes merged in the 1990s for greater efficiency, and to leverage higher levels of funding for HIV. In a few countries like Thailand and Sri Lanka, high levels of support for STI control activities were maintained. In most others, attention to scale-up of HIV testing, ART and other HIV-specific services increasingly consumed most human and financial resources. Little or no funding or personnel were left for STI diagnostics, treatment and related control activities such as contact tracing and surveillance. Even basic STI services such as routine syphilis screening in pregnancy were interrupted or abandoned in some countries due to lack of basic commodities, including test reagents and benzathine penicillin. Meanwhile, pre-exposure prophylaxis (PrEP) absorbs a greater share of prevention resources, yet has been associated with behavioural risk compensation and increasing STI trends. [50]
One indirect way of assessing STI programmes is through GARPR/GAM reporting. From 2009 through 2016, only three SEAR countries reported over 90% ANC syphilis screening during any one year, three others reported almost no ANC screening and the remaining five countries ranged from about ten to seventy percent. Reporting itself was sporadic, with only about a third of countries on average reporting on this indicator each year.

Multiple gaps in STI control efforts in the region were identified through questionnaires and interviews with programme managers. Perhaps most significant is the lack of an identifiable STI control ‘programme’ in several countries. With the merging of HIV and STI programmes, and increasing focus on HIV-specific activities, attention to a number of key STI prevention and control activities has been diluted or lost. Strategic and operational planning in most countries is dominated by HIV priorities and targets, with staff and resources allocated accordingly. Low perceived priority and programme funding were cited by most countries as the main reasons for declining attention to STI control and surveillance. Important gaps in core STI control programme activities were identified (Table 5).

**Table 5. Common STI programming gaps**

<table>
<thead>
<tr>
<th>Programmatic area</th>
<th>Status</th>
<th>Gaps/constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic planning</td>
<td>National strategic plans (NSP) for HIV/STI programmes increasingly oriented towards HIV-specific targets, with little attention to STI control.</td>
<td>STI generally low priority, may include some provision for STI treatment services. Recent interest in ‘Triple Elimination’ may be opportunity to improve ANC syphilis screening.</td>
</tr>
<tr>
<td>Resources</td>
<td>Resource allocation aligned to NSP, including for GFATM and other donors, few resources for STI activities.</td>
<td>Budgets lack separate line items for core STI control activities.</td>
</tr>
<tr>
<td>Staffing</td>
<td>Few or no staff with STI-specific responsibilities in many countries.</td>
<td>Often lacking STI programme manager and staff with responsibility for even basic clinical services and surveillance.</td>
</tr>
<tr>
<td>Commodities</td>
<td>Condom promotion and distribution for HIV also work for STIs, yet resources for condom programming diminishing. STI drugs and diagnostics often overlooked.</td>
<td>Gaps include reliable supply of condoms, STI diagnostics and treatment, logistics and supply management to avoid stock-outs.</td>
</tr>
<tr>
<td>Outreach</td>
<td>Outreach to KP and bridge groups works for both HIV and other STIs, yet programming support limited.</td>
<td>Outreach with single focus (ie HTC only) misses opportunities for broader STI prevention and risks alienating KP.</td>
</tr>
<tr>
<td>Clinical service delivery</td>
<td>Variable attention across countries.</td>
<td>Variable, often lacking monitoring, supervision, refresher training, etc.</td>
</tr>
<tr>
<td>Contact tracing</td>
<td>Neglected in most countries.</td>
<td>Lacking dedicated staff to follow up contacts of index cases.</td>
</tr>
<tr>
<td>Guidelines development, training, supervision</td>
<td>Some countries have not updated STI case management guidelines in last 5 years.</td>
<td>Guidelines updates, training and supervision required to maintain effective STI case management.</td>
</tr>
<tr>
<td>STI surveillance</td>
<td>Neglected in most countries.</td>
<td>Requires dedicated staff to ensure complete, accurate and timely reporting, analyse and disseminate data, etc.</td>
</tr>
<tr>
<td>Anti-microbial resistance (AMR) monitoring</td>
<td>Neglected in most countries.</td>
<td>Requires planning, funding and technical assistance for periodic AMR surveys.</td>
</tr>
</tbody>
</table>
Discussion

The proportion of new STI cases estimated for SEAR has declined from more than a third of the total global estimate in the 1990s to 11% in 2012. Global estimates, however, are based on a small and decreasing number of published STI prevalence studies, which poorly capture regional heterogeneity and fail to reflect trends over time. Yet, these same limitations and biases pertain to other regions as well, prompting further questions. Why has the proportion of incident STIs from SEAR fallen more than three times relative to other regions? Are these relative STI declines plausible? Do they point to successful STI control programmes that can inform action towards reaching global targets elsewhere?

In fact, three regional countries – Sri Lanka, Thailand, Myanmar – have reported 90% or greater reductions in syphilis and/or gonorrhoea during the period 1975 to 2010. The routine reporting data supporting these declines is robust, and more geographically representative and timely than information from the published literature. In absolute terms, syphilis and gonorrhoea incidence reported from Thailand and Sri Lanka are comparable to those reported from western Europe (2012 ECDC reported 4.5 syphilis cases per 100,000 population. Thailand reported 3.2 and Sri Lanka 5.4 cases per 100,000). With respect to the two primary global STI targets – 90% reductions in syphilis and gonorrhoea incidence – these examples provide solid evidence of feasibility.

Evidence from multiple sources suggest that smaller STI reductions over India’s large population – more than two-thirds of the region’s total – have driven regional declines. Yet, STI reporting on a national level in India is neither reliable nor consistent enough to discern trends as in Sri Lanka, Thailand or Myanmar. Evidence for large STI declines from the 1990s to 2010 comes instead from a large number of surveys conducted across India, which report STI prevalence among key populations, male bridge groups and pregnant women. Taken together, these studies suggest declining prevalence trends, as well as a marked epidemiological transition from predominately bacterial to viral STIs. The strongest intervention-linked data documents STI declines of at least 21-77% across several large Indian states between approximately 2004 and 2010.

In the other seven regional countries, STI trends remain high, are increasing, or data are simply inadequate to detect change. Without reliable routine STI reporting – and with fewer than ten papers per country reporting STI prevalence data since 2000 – it remains difficult to characterise STI epidemiology or describe trends over time.

Current STI programme structure, resources and performance also vary greatly across the region, with well-staffed, multi-pronged programmes in Sri Lanka and Thailand, and targeted STI control efforts at scale in Myanmar and India. Elsewhere, national STI responses vary greatly, with many countries struggling to support basic clinical services, maintain stocks of effective STI treatments, conduct outreach to key populations, maintain basic STI surveillance and monitor antibiotic resistance. Limited STI activities are often subsumed by HIV programmes, where programme managers report low priority and limited resources for STIs. As national programmes and donors increasingly promote HIV-specific services like ART and PrEP, there is growing risk of behavioural
disinhibition, erosion of condom use and rebounding STI transmission. Unfortunately, in many countries STI surveillance is not sufficiently operational or reliable to detect increasing trends, when and where they may occur. To a large extent, STIs other than HIV have fallen off the radar. Echoing this, programme managers described multiple gaps and constraints related to STI control and surveillance, mainly linked to low perceived priority and insufficient resources.

What then are the most important programme components in countries that have documented STI reductions? At national and sub-national levels, data show rapid STI declines when targeted condom and STI services are scaled up to reach sex workers and other key populations in large numbers, particularly where peers and communities are actively involved in implementation. The converse also appears to be true as recent STI outbreaks in underserved MSM networks are linked to rebounding STI trends.

In fact, evidence of STI declines at sub-national level points to similar interventions that drove national declines in Sri Lanka, Thailand, India and Myanmar. Evidence strongly supports attribution to programmes that have increased condom use in sex work, while maintaining good clinical services – for both key populations and the general population – and reliable STI surveillance. STI services specific to key populations – including quarterly medical checkups, presumptive treatment for asymptomatic infections and regular syphilis screening – have resulted in rapid STI declines in diverse settings. [26,47-49]

Yet, a high degree of heterogeneity in STI control, particularly in large countries like India, Indonesia and Bangladesh, hamper national STI control efforts. Without a scaled-up response and reliable data, STI control remains an elusive target for many countries.

With this in mind, and in light of global targets, several opportunities can be seen moving forward. Regional experience shows that 90% global targets are feasible, particularly for syphilis, for several reasons. Data on syphilis declines are more available and reliable than for other STIs, and useful as markers of sexual transmission trends in general. Evidence of declining syphilis, as well as progress in eliminating mother-to-child transmission (eMTCT) in some countries, supports the feasibility of regional elimination of syphilis as a public health problem. Weak STI surveillance and limited syphilis screening among key populations and pregnant women are current barriers to regional elimination. Recent increases in syphilis among MSM in several countries underline the importance of routinely screening key populations for syphilis, and monitoring prevalence trends.

Data on other STIs are less reliable but combinations of syndromic and aetiologic reporting, that have proven useful in guiding control efforts in several countries, can be adapted elsewhere. Reliable data on gonorrhoea are routinely reported from Sri Lanka and Thailand, which use affordable microscopy with Gram stain to distinguish gonococcal from non-gonococcal infections.

Despite these opportunities, recent reports and surveillance data raise concerns. Most countries in the region, including those with good control, have seen some evidence of STI resurgence during the past decade. STI control is volatile, with evidence of increasing syphilis and gonorrhoea mirroring global trends. Such outbreaks and rebounding trends pose new challenges for countries aiming to reach global STI elimination targets.
References


29. Ramanathan S, Deshpande S, Gautam A, Pardeshi DB, Ramakrishnan L, Goswami P, et al. Increase in condom use and decline in prevalence of sexually transmitted infections among...


42. Personal communication; Dr Usman, Madras Medical College.


