The impact of COVID-19 on essential health service provision for endemic infectious diseases in the South-East Asia region: A systematic review

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Summary
Background There is increasing evidence that the COVID-19 pandemic has impacted adversely on the provision of essential health services. The South East Asia region (SEAR) has experienced extremely high rates of COVID-19 infection, and continues to bear a significant proportion of communicable disease burden worldwide.

Methods We conducted a systematic literature review of quantitative evidence to estimate the impact of COVID-19 on the provision of essential prevention, detection, treatment, and management services for five high-burden infectious diseases across the SEAR.

Findings A total of 2338 studies were reviewed, and 12 studies were included in our analysis, covering six countries across the SEAR (Bhutan, Sri Lanka, Nepal, Myanmar, Thailand, and India) for three conditions of interest (HIV, TB, dengue fever). We identified significant disruption to TB testing (range=25% to 77.9%) and diagnoses (range=50% to 58%) in India, Nepal, and Indonesia; and similar disruptions were observed for screening, new diagnoses and commencing HIV treatment in India and Thailand. There was also drastically reduced case detection for dengue fever (range=75% to 90% disrupted) in Bhutan and Sri Lanka. No studies were identified for malaria nor hepatitis in any country, and nor for any service in the remaining six SEAR countries.

Interpretation We identified evidence of significant disruption to the prevention, diagnoses, treatment, and management of TB, HIV, and dengue fever due to the COVID-19 pandemic across multiple SEAR country settings. This has the potential to set back hard-fought gains in infectious disease control across the region. The lack of evidence for the impact of the pandemic on malaria and hepatitis services, and in the remaining six SEAR countries, is an important evidence gap that should be addressed in order to inform future policy for service protection and pandemic preparedness.

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The World Health Organisation declared the COVID-19 pandemic to be a global health emergency in January 2020. At the time of publication, the officially reported global death toll has surpassed 5 million, though the true figure is likely to be significantly higher. This pandemic has created enormous strain on health systems globally, and there is increasing evidence from multiple settings that it has impacted adversely on the provision of a wide range of essential health services. Those who are likely to be most affected by this disruption in health services are those in low-income and middle-income countries (LMICs), where health systems have high levels of unmet demand.

Management of the COVID-19 pandemic and the protection of essential health service provision is particularly challenging in the South East Asia region (SEAR), which has experienced extremely high levels of
COVID-19 disease burden and associated strain on fragile health systems.10-14 SEAR is a geographical bloc comprising 11 socially, politically, economically, and geographically diverse countries (India, Bangladesh, Myanmar, Maldives, Indonesia, Sri Lanka, Timor-Leste, Nepal, Bhutan, People’s Democratic Republic of Korea, and Thailand). This diversity has led to heterogeneity in levels of development and maturity of healthcare systems.15 Significant progress towards Universal Health Coverage (UHC) has been observed across SEAR countries over the last few decades, best evidenced by substantial expansion of primary care services, government-sponsored health insurance and assurance programs, and preventive and curative care services.15,16 However, the COVID-19 pandemic, and the measures put in place across the SEAR to control it, has significantly impacted UHC aspirations, setting many countries back against these hard-fought gains.17-19

Despite substantial progress in recent years, which has seen reductions in deaths from HIV and malaria and an increase in tuberculosis (TB) treatment coverage, the SEA region continues to bear a significant proportion of the communicable disease burden worldwide.20 South Asia has the third largest HIV epidemic globally and the highest TB burden, accounting for more than a quarter of the global burden.20 The second-highest incidence of malaria, amongst all WHO regions, occurs in the SEAR, and India bears the third-highest proportion of malaria cases globally.20 Recent estimates report that the global displacement of essential services for infectious disease could cause an increase in deaths due to HIV, tuberculosis, and malaria over 5 years by up to 10%, 20%, and 36%, respectively.6 Indeed, the WHO now estimates that half a million more people may have died from TB in 2020 alone.21

Numerous mathematical models have been produced in an attempt to estimate the potential impact of the pandemic on the provision of infectious disease services. These models combine demographic and epidemiological information with COVID-19 disease burden to estimate the impact of the pandemic on incidence and mortality across a range of infectious diseases under a range of scenarios.5,6,22-30 These models have relied on different structures, assumptions, and data sources, with varying precision and face validity. One primary source of data used in these models is the WHO National PULSE survey on continuity of essential health services during the COVID-19 pandemic.31,32 The WHO has now published three rounds of information capture from these surveys, which comprise questions of health service provision across approximately 25 condition areas, later narrowed to 10 tracer condition and service areas for rounds 2 and 3. Respondents provide crude ranges of estimated service disruption that broadly correspond to three categories: 5-10%, >10%, or completely disrupted. Information within the PULSE survey is usually provided by a single informant for each set of questions pertaining to a given condition or service area (e.g. non-communicable disease, or maternal and child health), raising questions regarding its validity and utility for the purpose of informing government health policy.

An evidence-based approach to understanding the true impact of the COVID-19 pandemic on the provision and potential displacement of infectious disease services across SEAR is essential to support efforts to mitigate its impact, restore and protect infectious disease service provision, and allocate resources accordingly. Here, we

### Research in context

**Evidence before this study**

It has been well-documented since the beginning of the pandemic that COVID-19 has had a devastating impact on the provision of essential health services, and that this is especially so in countries where health systems are under-resourced and overburdened. Estimates of essential service disruption have largely come from the PULSE survey distributed by the WHO to all member states, which reports crude single informant estimates of disruption across 4 broad categories (not disrupted – severely disrupted). Communicable disease services were broadly reported as moderately affected by the pandemic across the South East Asia Region (SEAR) in the PULSE survey. However, no comprehensive analysis of quantitative evidence documenting the displacement of communicable disease services from the SEAR has been undertaken to date. In this study, we reviewed 2338 studies and analysed data from nine peer-reviewed studies and three reports documenting quantitative pre-post estimates of communicable disease-related service disruption as a result of the COVID-19 pandemic. We identified substantial disruption to HIV, TB, and Dengue fever services in six SEAR countries. We did not identify any evidence for malaria or HCV service disruption, nor for any condition of interest in the remaining six SEAR countries.

**Added value of this study**

This study represents the first systematic review and evidence synthesis of published evidence to estimate the quantitative impact of the COVID-19 pandemic on essential service provision for high-burden communicable disease in the SEAR.

**Implications of all the available evidence**

Our findings highlight the significant disruption to HIV, TB, and Dengue fever service provision across the SEAR. This indicates a need for more extensive research to understand how communicable disease-related services have been impacted by the pandemic in subsequent waves of infection to estimate the potential long-term health and social impacts of this displacement and to inform future policy for pandemic preparedness.
review the published quantitative evidence on the impact of COVID-19, compared to pre-pandemic data, on the provision of essential prevention, detection, treatment, and management services for five infectious diseases across the SEAR: HIV, TB, malaria, hepatitis, and dengue fever. These diseases were selected on the basis of their being the highest infectious contributors to morbidity and mortality in adults in the SEAR for which a combination of continuous prevention, diagnosis, treatment, and management activities are essential.

**Methods**

**Approach and design of review**

A systematic review was conducted to identify quantitative evidence detailing essential health service provision post the emergence of COVID-19 in early 2020 as compared to service provision estimates from 2019 and earlier in each of the 11 countries within the SEA region. For reporting, we used the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.35

**Search strategy**

The detailed search strategy included all reasonable permutations of the three primary areas of interest: country/region (each of the aforementioned SEA countries); AND COVID-19; AND infectious disease (Tuberculosis, HIV, Hepatitis, Dengue fever, and malaria). Between 1st and 15th of December 2021, three scientific databases were searched: OVID (Medline), Embase, and Global Health. A manual search of reference lists and the websites of key multilateral organisations of interest (Global Fund, UNICEF, StopTB, UNAIDS, and the WHO) was performed to identify further relevant information. For specific strategies for database searches refer to Supplementary file 1.

**Eligibility criteria**

In this systematic review, articles were considered for inclusion if the title and/or abstract indicated the report of results of original research that used a pre-post design to report comparative cross-sectional data on the provision of screening or prevention programs, the number of new diagnoses, those seeking treatment, or engagement with the health service for ongoing condition management from 2019 and prior as compared to the start of the COVID-19 pandemic in 2020 in a SEA setting. Studies in non-SEAR countries or studies that reported only qualitative results were excluded, as were commentaries, opinions, and clinical guidelines. Electronic citations, including available abstracts of all articles retrieved from the search, were screened by two authors (LD and TG) to select articles for full-text review. Duplicates were removed from the initial search. Thereafter, full-texts of potentially relevant studies were reviewed to determine eligibility for inclusion. A full list of inclusion and exclusion criteria for the studies is provided in Table 1. All articles identified in the searches were imported into the Covidence systematic review software (version 2, Veritas Health Innovation, Melbourne, VIC, Australia), and title and abstract screening, full text review, data extraction, and quality assessment were all performed in Covidence.

**Quality appraisal**

We used the six-item Joanna Briggs Institute (JBI) Critical Appraisal Checklist for analytical cross-sectional studies (Supplementary file 2). The JBI is an international, membership-based research and development organization within the Faculty of Health Sciences at the University of Adelaide. The instrument was developed by the JBI before being reviewed by an international methodological group. Quality appraisal was undertaken by a single reviewer (LD) and any points of uncertainty were addressed through discussion and consensus with a second reviewer (TG).

**Data extraction**

Data were extracted in Covidence using a standard template that was modified to include key parameters of interest. Key information extracted for each paper included the following: country; setting; condition of interest; service of interest; population details; data sources; % change in service delivery metrics from pre-COVID to peri-COVID. The following COVID-19 related information was also extracted from papers where possible: whether data collection coincided with a ‘peak’ of infection and/or lockdown; whether any service protection/mitigation measures were in place during the period of data collection; the reported efficacy of the mitigation measures; and reported consequences of forgone or displaced health services as a consequence of COVID-19. Essential health services were divided into the following categories of interest, in line with patient pathways of care: health promotion/prevention; screening; diagnosis; pharmacological treatment; inpatient treatment; outpatient care; and ongoing management.

**Evidence synthesis**

Given the heterogeneity in setting, population, condition, and service area, meta-analyses were not undertaken. A narrative synthesis was conducted following the ‘synthesis without meta-analysis (SWIM)’ in systematic review reporting guidelines34 to explore, describe, and interpret key findings related to the impact of COVID-19 on the provision of essential health services for TB, HIV, hepatitis, malaria, and dengue fever during 2020 and 2021 in the SEA region.
Role of the funding source

This study was funded by the World Health Organisation Sri Lanka (WHO-SL) Country Office. The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The WHO-SL office and the WHO South East Asia Regional Office (WHO-SEARO) have reviewed and approved this manuscript for publication.

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Ethical approval

Ethical approval was not required for this review as all information collected was available in the public domain.

Results

Figure 1 presents the PRISMA flowchart of the review. From 4326 records initially detected (2338 after duplicates were removed), 2314 were excluded after abstract review, primarily due to the study reporting directly on pathology or epidemiology of COVID-19 infection rates and not those conditions/services of interest, taking place outside of the pre-defined list of SEA countries, or reporting on non-infectious chronic conditions outside of those pre-diseases of interest. After abstract review, 27 full texts were deemed eligible, of which 12 papers were included and 15 were excluded. Primary reasons for exclusion included a lack of quantitative data (primarily survey data reporting clinicians’ comments on level of survey disruption; 9), inappropriate study design (reporting on pre ‘wave’ of COVID-19 infection as compared to during or post wave of infection, rather than pre-COVID-19 as compared to during pandemic; 3), duplicates (2); or reporting on outcomes outside of the scope of this review (1).

Scope of the evidence included

Nine peer-reviewed research papers, all published in 2021, met the inclusion criteria. Of these, 4 focused on tuberculosis (TB), 2 on dengue fever; and 3 on Human Immunodeficiency Virus (HIV). (Table 2). The papers covered 6 countries across the SEA region (Bhutan, Sri Lanka, Nepal, Myanmar, Thailand, and India). There were no relevant papers identified for malaria or hepatitis, nor for services in Bangladesh, Indonesia, North Korea, Maldives, or Timor-Leste. A further 3 non-peer-reviewed reports that contained comparative quantitative data from SEAR countries on TB and HIV were identified from one government source (Table 2). Government
of Nepal), and 2 multilateral sources (45; The Global Fund for HIV, TB, Malaria, and the WHO Global TB report).

Impact of COVID-19 and associated mitigation measures on essential health service provision for endemic infectious diseases

Tuberculosis (TB). Table 3 provides a summary of each of the four included peer-reviewed studies that report information on the displacement of TB-related services due to the COVID-19 pandemic. Three studies report from India and one from Nepal.

In one study, the authors compared testing and diagnoses of TB in a single hospital in Haryana, Northern India using Hospital data from pre-COVID 19 (March to December 2019), compared to data from January to October 2020. A 25% reduction in the number of tests conducted (2019: 644; 2020: 484) was reported. However, the authors reported a higher positivity rate in 2020 as compared to 2019 (2019: 19.7%; 2020: 30.1%, 127 cases in 2019 and 146 cases in 2020). The authors postulated that the forced lockdown across the state has increased close contact in enclosed spaces amongst family members, increasing risk of transmission. In a second study, the authors compared absolute numbers of monthly paediatric TB notifications in India from January to September 2019 to the same period in 2020, where Jan to March is represented as pre-lockdown, April to May as lockdown, and June to Sept as post lockdown. While paediatric TB notifications were 32% higher in the pre-lockdown period compared to 2019 (2019 = 5359; 2020 = 7334), these drastically reduced to 24% lower (2019 = 3888; 2020 = 2953) during lockdown and 36% lower post lockdown (2019 = 9821; 2020 = 6251) compared to the same months in the previous year. The authors also reported a 23% and 13% reduction in routine BCG immunization during and post-lockdown, respectively, in 2020 compared to the same months in 2019. In a third study, the authors examined...
programmatic data for Nepal from March to December 2019 and compared these to data obtained from the same period in 2020. A 16.9% reduction in individuals screened for TB was reported (2019 = 175,402; 2020 = 145,735), a 77.9% reduction in individuals who were tested for TB (2019=6,276; 2020=2,045), and a 58.9% decrease in individuals identified as TB positive (2019 = 550; 2020 = 226). Finally, in a fourth study authors examined data from a single hospital in South India to compare total number of suspected and confirmed cases of TB pre vs during COVID-19. The authors reported a 54.8% reduction in the number of people screened for TB (2019 = 8963; 2020 = 4052) and a 50.8% reduction in the number of positive TB cases detected (2019 =1173; 2020 = 597).

**Human immunodeficiency virus (HIV).** Table 4 provides a summary of each of the three included peer-reviewed studies that report information on the

| Author, Year | Country | Study setting | Data source | Condition | Service of interest | Total population size | Data Collection period T<sub>pre-COVID-19</sub> | Data Collection period T<sub>COVID-19</sub> |
|--------------|---------|---------------|-------------|------------|---------------------|----------------------|---------------------------------|---------------------------------|
| Tsehen, 2021 | Bhutan  | National      | National surveillance data | DF         | Diagnosis           | 2,310                | 2016-2019                       | 2020                            |
| Niriella, 2021 | Sri Lanka | National      | National surveillance data | DF         | Diagnosis           | 16,741               | Apr-Jun 2019                    | Apr-Jun 2020                   |
| Srivastava, 2021 | India | Single site | Hospital case data | TB         | Diagnosis           | 1,128                | Mar-Dec 2019                    | Jan-Oct 2020                   |
| Golandaj, 2021 | India | National      | HMIS        | TB         | Diagnosis           | 16,072               | Jan-Mar * 2020                  | Apr-Sept * 2020                |
| HtunNyunt, 2021 | Myanmar | National      | National surveillance data | HIV, Prevention, Diagnosis, Treatment | 20,000 | Jan-Jun 2019 | Jan-Jun 2020 |
| DruttiHazra, 2021 | India | Single Site | Hospital lab data | TB         | Diagnosis           | 13,015               | Jan-Dec 2019                    | Apr-Dec 2020                   |
| Sah, 2021 | Nepal | National | Programmatic data | TB, Prevention | Diagnosis, Treatment | 321,137            | Mar-Dec 2019                    | Mar-Dec 2020                   |
| Maurya, 2021 | India | Single Site | Hospital record data | HIV         | Diagnosis           | 12,154               | 2016 – 2019                     | 2020                            |
| Amatavete, 2021 | Thailand | Single Site | Programmatic data | HIV | Treatment | 1,728 | Mar-Aug 2019 | Mar – Aug 2020 |

**Table 2: Included study information.**

*Note that population size refers to the total population for which the study authors assessed and collected data within the confines of the reported study, and not the total population served by the health facility/facilities of interest. Abbreviations: HMIS, health management information system; Abbreviations: DF, Dengue Fever; HIV, Human Immunodeficiency virus; TB, tuberculosis. Key * = author compares pre-COVID-19 lockdown, during COVID-19 lockdown, and post COVID-19 lockdown. Note: All included studies used a pre-post cross-sectional study design.

| First Author and Date | Country | Population characteristics | Type of service | NT<sub>pre-COVID-19</sub> | NT<sub>COVID-19</sub> | Change in service provision (%) |
|-----------------------|---------|----------------------------|-----------------|--------------------------|----------------------|---------------------------------|
| Srivastava 2021       | India   | Population of a North Indian State suspected of TB who presented to a single hospital | Diagnostic testing | 644 | 484 | -25% |
| Golandaj, 2021        | India   | Indian paediatric population data for notification of TB in National HMIS | Case notification (during lockdown) | 3888 | 2953 | -24% |
| Sah, 2021             | Nepal   | Population of two districts in Nepal | Screening | 175, 402 | 145, 735 | -16.9% |
| Hazra, 2021           | India   | Population of a Southern Indian State suspected of TB who presented to a single hospital | Diagnostic testing | 8963 | 4052 | -54.8% |

**Table 3: Included peer-reviewed studies and main findings for tuberculosis.**

*Abbreviations: TB = Tuberculosis; HMIS = Health management information system; T = time.*
displacement of TB-related services due to the COVID-19 pandemic in Thailand, India, and Myanmar, respectively.

In one study from Thailand, the authors reported on changes in service provision and uptake of a same-day antiretroviral (ARV) service initiated in 2017 using a blended in-person and telehealth service model. The authors compared programmatic data from pre-first wave of COVID-19 infection to during the first wave and post the first wave of infection. The authors reported an 80% and 65.19% reduction in those screened during and post the first wave of COVID-19, respectively, as compared to before the first wave period (pre-COVID = 922; during = 183; post = 321). A 78.8% reduction and 64.3% reduction in those who tested positive during and post the first wave of COVID-19, respectively, as compared to the pre-first wave period was reported (pre-COVID = 829; during peak = 176; post peak = 296). A 78.1% reduction and 68.5% reduction in those who were put on ARV during and post the first wave of COVID-19, respectively, as compared to the pre-first wave period was reported (pre-COVID = 730; during peak = 160; post peak = 281).

In a second study from a single hospital in India, the authors reported data on HIV testing and diagnosis in 2020 compared to preceding years to examine how the COVID-19 pandemic-related restrictions impacted HIV services. The authors reported a 57% reduction in the number of people tested in 2020 compared to an annual average of 2016-2019 (2016/19 avg = 2769, 2020 = 1182). The diagnosis of new HIV infections was reported to decrease by 52% compared to 2019 and reduced by 12% in condom distribution (2019 = 15.85 million; 2020 = 13.87 million). The authors report no difference in number of people tested for HIV, nor in people initiated on ARV between the two study periods. The authors conclude that the detailed National Action Plan for HIV/AIDS was successful in protecting HIV services during the first wave of COVID-19 in Myanmar. It should be noted that this study was rated of very low quality (Supplementary file 2), primarily due to the lack of reporting of raw data.

Dengue fever

Two studies were identified that reported on disruption of Dengue fever-related services as a result of the COVID-19 pandemic in Bhutan and Sri Lanka, respectively. This information is summarised in Table 5.

One study from Bhutan examined the number of reported cases of dengue fever in 2019 compared to the same period in 2020 to examine the impact of COVID-19 on dengue fever case detection. The authors reported a 90% reduction in dengue fever case detection between the two periods of interest (2019 = 16.09 million; 2020 = 16.2 million), and a 12% decrease in condom distribution (2019 = 15.85 million; 2020 = 13.87 million). The authors report no difference in number of people tested for HIV, nor in people initiated on ARV between the two study periods. The authors conclude that the detailed National Action Plan for HIV/AIDS was successful in protecting HIV services during the first wave of COVID-19 in Myanmar. It should be noted that this study was rated of very low quality (Supplementary file 2), primarily due to the lack of reporting of raw data.
June 2019 compared to data from the same period in 2020. The authors reported a 75% reduction in reported cases of dengue fever between the two study periods (2019 = 13,249; 2020 = 3,492). The authors speculate that the deceased movement as a result of COVID-19 related lockdowns may be responsible for the decrease in active cases. However, the authors also note that dengue fever and COVID-19 have similar presentations and that underreporting of dengue may be present.

Non-peer reviewed sources of information for HIV and TB
Three non-peer reviewed information sources were identified from 2 multilateral organisations (The Global Fund and the World Health organisation) and 1 Government report (Government of Nepal) that reported on changes to service provision for TB, HIV, or both as a consequence of the COVID-19 pandemic.

The Government of Nepal convened a team of officials to collect data on TB testing, diagnoses, and treatment provision in 45 centres across the country in order to assess the impact on TB service provision of COVID-19. Data on sputum testing, diagnoses, and treatment provision was compared for the 3 months prior to (Dec 2019 to Feb 2020) and after the first national COVID-19 lockdown to during the first COVID-19 lockdown (April-June 2020). The authors reported a 67.3% reduction in the mean number of sputum samples collected, a 45.5% reduction in the mean number of active TB cases enrolled on treatment, and a 41.7% decline in the mean number of follow-up appointments of TB patients during the COVID-19 lockdown. Less than half of all facilities (49%) were regularly reporting TB data to the HMIS.

The Global Fund reports that 0.4m less tests for TB were conducted in India in 2020 compared to 2019, translating to a 20% reduction. In India treatment numbers for TB in 2020 also dropped by 20% compared to 2019. The Global Fund also reports that 12 million fewer HIV tests were taken in India in 2020 compared to 2019.

Finally, the WHO Global TB report outlines that the countries that contributed most to the global drop in TB case notifications between 2019 and 2020 were India with a 41% reduction in case notifications, and Indonesia with a 14% reduction in case notifications.

Discussion
This systematic review summarises the available quantitative data from across South East Asia on the effects of the COVID-19 pandemic on essential health service provision for non-COVID-19 infectious diseases. We found highly disrupted testing and diagnoses for TB in India, Nepal, and Indonesia; and for screening, new diagnoses and those put on treatment for HIV in India and Thailand. We also found drastically reduced case detection of dengue fever in Bhutan and Sri Lanka. We found no quantitative pre-post evidence for the impact of COVID-19 on services for malaria, nor hepatitis, nor for any infectious disease-related health services in Bangladesh, the People’s Democratic Republic of Korea, Maldives, or Timor-Leste. This finding suggests an absence of evidence for infectious disease essential health service provision, rather than evidence of an absence of displacement of these services across the SEAR. Only five of the identified studies presented National data, and all studies were rated as low to moderate quality, covering a short time period from pre-pandemic (2019 and prior) as compared to the first wave of COVID-19 infection in 2020 across the SEAR. Together, these findings highlight an urgent need for further high-quality research across SEA country settings to investigate the impact of COVID-19 on the provision of essential infectious disease services as compared to pre-pandemic service provision and across multiple time points.

This is the first review, to the best of the authors’ knowledge, to systematically identify all evidence pertaining to the quantitative comparison of pre-pandemic and post pandemic onset of essential health service provision for infectious diseases in the SEAR. We used a narrative synthesis without meta-analyses methodology to ensure that all relevant data were captured and to allow for comparison across country settings. We included both peer-reviewed published literature and estimates of service provision from global multilateral reports of the WHO and the Global Fund to Fight AIDS, TB, and Malaria.

The main limitations of this review are the retrospective design of the included studies, the heterogeneity of the study populations and exclusions of qualitative survey data, thereby limiting the breadth of results. Nonetheless, the focus on quantitative pre-post empirical data is also a
The significant reduction in notification of cases of dengue fever reported in Bhutan and Sri Lanka, and the implications of this service displacement on the health and mortality of this cohort of immunocompromised individuals.

The lack of evidence for malaria-related service provision in any country within SEAR is very concerning. The second highest incidence of malaria, amongst all WHO regions, occurs in the SEAR, and India bears the third-highest proportion of malaria cases globally. Despite this, we identified no quantitative evidence estimating the effect of COVID-19 on malaria-related services across the SEAR. The latest data from the Global Fund to Fight AIDS, Tuberculosis and Malaria shows that for April to September 2020, compared to the same six-month period in 2019, malaria diagnoses fell 56% and malaria treatment services plummeted by 59% in Bangladesh, Cambodia, India, Indonesia, Lao, Pakistan and the Philippines, with the deepest disruption reported in rural areas where the more vulnerable and harder-to-reach communities live. The precise estimates of malaria service displacement are likely to vary between each of these countries, though data disaggregated by country was not available in the Global Fund report. Nevertheless, the findings of this review, combined with the overarching findings of the Global Fund, indicate that further research into the impact of COVID-19 on malaria across the SEAR is required as a matter of urgency to better understand how malaria-related services have been impacted by the pandemic, and the implications of this service displacement on health and mortality.

The reductions in screening, testing, diagnoses, and treatment provision for TB and HIV across the SEA region are likely to be the result of a complex interplay between both supply and demand-side factors. On the supply-side, authors of multiple studies included in this review highlight that laboratories for testing blood and sputum samples were diverted to testing of suspected COVID-19 samples; hospitals, clinics, and community outreach services that usually provided infectious-disease-related services were similarly either diverted to provide COVID-19-related services or temporarily closed. Doctors, nurses, community and allied health workers were also either infected themselves by COVID-19, or redeployed to support pandemic-related service, thus limiting or temporarily ceasing usual business. On the demand-side too, changes in population behaviour were raised as important drivers of reduced service provision and uptake. Social distancing and stay at home orders are hypothesized to have had a small positive impact on reducing transmission of TB and HIV, though some have also speculated that by forcing groups of people off the streets and into enclosed spaces for long periods of time, transmission may have also increased. Fear of contracting COVID-19, or of using health services and inadvertently displacing the care of someone perceived to need it more, were also cited as reasons why some may not seek care or engage with the health service during the pandemic. Finally, we cannot discount the possibility that the reduction in individuals seeking treatment might in fact be capturing, at least in part, the direct impact of COVID-19 on mortality among this cohort of immunocompromised individuals.
the National Centre for Vector Borne disease Control, and similarly worrying statistics have been reported across Asia. Authors of the two included papers cite the social distancing and lockdown measures imposed to curb the spread of COVID-19 as having a positive impact on reducing incidence of dengue in both countries. However, in the absence of any significant reported changes in weather patterns or Aedes mosquito larvae, coupled with the similar clinical presentation of COVID-19 and dengue fever, it is certainly plausible that the high reduction in case notification was also influenced by a reduction in diagnosis and treatment-seeking behaviour by individuals. The emerging nature of the dengue outbreak across India warrants further attention, and countries across the SEAR should be on high alert for a similar spike in cases. According to the annual statistics published by the National Centre for Vector Borne disease Control, the annual case numbers dropped by close to 70% in 2020 compared to 2019, then increased by almost 270% by the end of 2021. As countries across the SEA region begin to recover from COVID-19 and resume normal service delivery, a similar spike in dengue fever may be on the horizon. Vector control measures should be resumed and/or scaled up as a matter of urgency to prevent catastrophic consequences.

Level of service displacement is directly impacted by measures put in place to mitigate service disruption due to COVID-19. A number of the studies that we identified in this review describe measures taken to rapidly restructure essential health services and deliver care remotely using diverse models, including telephone or video-based appointments. Although telemedicine has been reported to provide a COVID-19-secure path to continuity of essential health services, including for infectious disease services, the screening and diagnostic services that form the backbone of communicable disease care do require in-person samples to be provided in most circumstances. These kinds of remote consultations also require reliable access to internet and/or telephone services that are not always available to the most vulnerable to these forms of disease. Health-care providers across SEAR planning for service delivery reconfiguration in the ongoing pandemic must consider how to establish inclusive and robust infectious disease care pathways that explicitly reach out to vulnerable individuals and communities, such as that described by the authors in Myanmar. Preventative health services for infectious disease must not cease or decrease during times of health system strain, or this creates further strain on the health service and greater morbidity and mortality later down the line. Public health messaging must also emphasise the importance of care seeking behaviour for suspected infectious disease and provide numerous and varied avenues of support for those at risk so that no one is left behind. National governments and the international bodies that support them should also consider how to effectively prioritise resources and allocate financial support or incentives to those most vulnerable to infectious disease, considering that each individual case averted in turn averts many more. Protecting infectious disease services is in the interest of everyone, not only those most vulnerable to them.

There remains a significant and highly important opportunity to address the primary evidence gap in health service provision for infectious diseases across the SEA region. This evidence gap is likely to be exacerbated in many SEA countries due to under-reporting of data. While each country is mandated to report case numbers for specified infectious diseases annually under their duty as a member state of the WHO, there is well-established evidence that LMICs that depend on under-resourced and often antiquated information architecture are ill-equipped to accurately report case numbers or services provided. This is likely to be exacerbated in times of great system stress, such as during the COVID-19 pandemic. Indeed, one study included in this review reported that a number of sites had stopped reporting TB case numbers during the pandemic. Therefore, the true impact of essential health service displacement for infectious diseases is likely to be far greater than what is reported at the national level to Government and to bodies such as the WHO and the Global Fund. It is noteworthy that all studies included in this review were published after the first ‘peak’ of COVID-19 infection across Asia, when the second ‘peak’ was reported to be more severe in terms of number of infections and hospitalisations in comparison. There is an urgent need to conduct timely, comprehensive local research on the provision of prevention, screening, diagnostic, management, and ongoing care services for those at risk, suspected of, or living with infectious diseases across the SEA region to inform evidence-based decisions regarding efforts for service provision and protection towards future health system resilience and pandemic preparedness.

Contributors
Conception or design of the work: LD, SJ, DP, VDRV, TG; Data collection: LD, TG; Data analysis and interpretation: LD, TG, SJ; Drafting the article: LD, TG, SJ; Critical revision of the article: DP, VDRV

Declaration of interests
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Data sharing
All data generated or analysed during this study are included in this published article (and its supplementary information files).
Supplementary materials

Supplementary materials associated with this article can be found in the online version at doi:10.1016/j.lancet.2022.04.007.

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