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Time to deliver: accelerating more equitable access to better quality primary health-care services in the WHO South-East Asia Region

This issue of the WHO South-East Asia Journal of Public Health coincides with World Health Day 2019, which falls midway between the 2018 Global Conference on Primary Health Care and the forthcoming United Nations General Assembly High-Level Meeting on Universal Health Coverage in September 2019. The theme of this year’s World Health Day is again universal health coverage, this time with more focus on health equity and solidarity and on addressing gaps in health services through primary health care.

“There is now a near-tsunami of global, regional and national political commitment to universal health coverage, which, by definition, is about equity”

There is now a near-tsunami of global, regional and national political commitment to universal health coverage, which by definition is about equity.¹ This has been reinforced by the reaffirmation of the 1978 principles and values of primary health care of the Declaration of Alma-Ata,² in the 2018 Declaration of Astana.³ There is also plenty of evidence that well-functioning primary care is equitable and efficient. Front-line services tend to be geographically closer to patients than hospitals, especially in more remote areas.⁴ The majority of a person’s health needs throughout their life can be delivered by well-functioning primary care services,⁵ and the economic case for primary health care is based on sound evidence.⁶

But the fact remains that in the World Health Organization (WHO) South-East Asia Region, while essential services coverage has improved in the last 10 years, major inequities remain.⁷ Over 800 million people still do not have full coverage of essential health services. In-depth equity analyses in the region are limited but increasing, such as the 2017 study on health inequalities in Indonesia, which found significant inequalities on 11 health topics across eight dimensions of inequality, namely economic status, education, occupation, employment status, age, sex, place of residence and subnational region.⁸

One challenge is that use of front-line – or primary care – services is commonly quite low; it is often still associated with low-quality care, especially for women and children, and with services for the poor. Bypassing is common – even by the poor: the District Level Household and Facility Survey 2012–2014 in India found that 51% of households, poor as well as rich, bypassed their nearby public facility for usual care, with quality being a major concern.⁹ Poor-quality care is now a bigger barrier to reducing mortality than insufficient access, according to the recent Lancet Commission report on high-quality health systems.⁹ Improving access to poor-quality services is by any standard ineffective and wasteful, as well as unethical. The bottom line is that, to tackle inequities in health and health care, the quality of health care has to be addressed.

Given this situation, how should we see the future role of primary health care in South-East Asia, in the context of the 2030 Agenda for Sustainable Development¹⁰ and the desire to “Leave no-one behind”?¹¹ How can the current political momentum around the Sustainable Development Goals, universal health coverage and primary health care be used to make more progress on reaching the most vulnerable? What should we be doing differently with existing and new resources, given the rapid changes in the region: in health needs, in people’s expectations, in available technologies, and for new vulnerable groups such as the urban poor and migrants, alongside the long-recognized vulnerable – those who are poor or less educated, those with stigmatizing health conditions and others? As always, this is both a political and a technical agenda. This editorial highlights four areas for action.

Front-line services need to shift from episodic low-quality care to continuing, high-quality care

Front-line services need to respond both to new demographic and epidemiological challenges and to changing relations between service clients and service providers. They have to move beyond episodic care for women and children. Noncommunicable diseases and the multiple pathologies of ageing populations are increasingly part of the primary care case-load and require continuity of high-quality care. These tasks cannot just be added on to existing undertrained and underresourced front-line health workers. It is encouraging to see the growing number of new service-delivery models being introduced in countries in this region. It is imperative to begin now to document the difference these are making, to address access to needed, adequate-quality health care, especially for those “left furthest behind”.

Front-line and hospital services need to be addressed together, along with managed engagement of private providers

Primary care can no longer be seen in isolation. Under-used front-line services and overcrowded hospitals are common
across the region. A new look at ways to improve the quality and effectiveness of gate-keeping and referral by front-line services is needed, as are ways in which hospitals can better support the changing role of front-line facilities and staff. Indeed, a recent WHO paper on the transformative role of hospitals in the future of primary health care talks about “ending an outdated dichotomy”. Private providers should also not be ignored, given that they deliver a significant proportion of ambulatory care in this region. New approaches are needed to address the dual challenge of protecting patients from financial exploitation and poor-quality care on the one hand, while harnessing the extensive assets of the private sector for public health gains on the other.

Fresh approaches to community engagement deserve to be nurtured

Today, individuals and community and local-government representatives, are increasingly well informed on health issues, with the rapid increase in access to information via mobile phones, etc. Ways to make them key – and empowered – allies in building healthy families and communities, not simply channels for transmitting health messages, need to be nurtured. This is an explicit pillar in the Astana Declaration on Primary Health Care. Special efforts will be needed to actively engage vulnerable communities.

Moving from political commitments to equity – implementing practical solutions and measuring results

Accelerating progress towards universal access to quality health care, with financial protection, will involve securing rights, overcoming exclusion, measuring the results of interventions and improving accountability. It will involve mobilizing societal and political support. Practical technical interventions may involve a combination of legislation on entitlements; campaigns to promote greater awareness of those entitlements; more transparent information on performance for the general public so they can see the extent to which access is improving; and the creation of institutions responsible for “remedy and redress” that are open to all, including the most marginalized. It is encouraging to see parliamentarians across the region increasingly becoming engaged in the agenda for universal health coverage.

Conclusion

In conclusion, in the WHO South-East Asia Region, the technical legacy of primary health care needs a fundamental overhaul if there is to be real progress towards universal health coverage. Critically, front-line services still need to be seen as a priority if countries are to address new demographic and epidemiological challenges. They must not be seen in isolation, either from the broader health system of which they are part, or from issues such as health workers, financing and access to medicines, which are essential to their effectiveness.

Universal health coverage inherits the political mantle of primary health care: it maintains primary health care’s focus on equitable access, with equity further reinforced by adding financial protection to the agenda. The big challenge is to clearly recognize the many difficult and politically sensitive issues involved: securing rights and overcoming exclusion, as well as measuring the results of interventions, are integral to advancing universal health coverage.

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References


Building capacity for health equity analysis in the WHO South-East Asia Region

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Abstract
“Leaving no one behind” is at the heart of the agenda of the Sustainable Development Goals, requiring that health systems be vigilant to how interventions can be accessed equitably by all, including population subgroups that face exclusion. In the World Health Organization (WHO) South-East Asia Region, inequalities can be found across and within countries but there has been a growing commitment to examining and starting to tackle them. Over the past decade in particular, WHO has been developing an armamentarium of tools to enable analysis of health inequalities and action on health equity. Tools include the Health Equity Assessment Toolkit in built-in database and upload database editions, as well as the Innov8 tool for reorientation of national health programmes. Countries across the region have engaged meaningfully in the development and application of these tools, in many cases aligning them with, or including them as part of, ongoing efforts to examine inequities in population subgroups domestically. This paper reflects on these experiences in Bangladesh, India, Indonesia, Nepal, Sri Lanka and Thailand, where efforts have ranged from workshops to programme reorientation; the creation of assemblies and conferences; and collation of evidence through collaborative research, reviews/synthesis and conferences. This promising start must be maintained and expanded, with greater emphasis on building capacity for interpretation and use of evidence on inequalities in policy-making. This may be further enhanced by the use of innovative mixed methodologies and interdisciplinary approaches to refine and contextualize evidence, with a concomitant shift in attention, developing solutions to redress inequities and anchor health reform within communities. There are many lessons to be learnt in this region, as well as mounting political and popular will for change.

Keywords: equity, health equity assessment, health inequalities, South-East Asia

The case for looking at equity

Equity is at the heart of the agenda of the 2030 Sustainable Development Goals (SDGs), to “leave no one behind”, and encompassed in a number of goals and targets related to poverty, health, education, gender, equality and partnerships (SDGs 1, 3, 4, 5, 10 and 17).¹⁻⁴ Progressive realization of the SDGs – especially universal health coverage, as part of the health goal (SDG 3) – requires that health systems be continuously vigilant towards intervention coverage and outcomes for the population overall, and also that they specifically look at whether the situation is improving for population subgroups.⁵

This is especially important in light of what has been known for a long time about the relationship between equity and health reform. Victora and colleagues postulated the “inverse equity hypothesis” many years ago, whereby health reform interventions that are not expressly designed with an equity orientation “will initially reach those of higher socioeconomic status and only later affect the poor. This results in an early increase in inequity ratios for coverage, morbidity, and mortality indicators, followed later by a reduction when the poor gain greater access to the interventions and the rich reach minimum achievable levels for morbidity and mortality, beyond which there are unlikely to be substantial further improvements.”⁶

As various interventions are rolled out in service of the goals of universal health coverage, therefore, the inverse equity hypothesis is something that countries must assess in relation to various socioeconomic groups, but possibly in relation to other population subgroups, identified by sex, age, education and place of residence.⁷ Further, given the SDG goal to “leave no one behind”, it is essential to go beyond the common dimensions of inequality and look specifically from a country and regional context. Some dimensions of inequality are more context specific, such as migrant status, race, ethnicity, caste, religion or other characteristics that can differentiate minority subgroups.
Health-related inequalities exist within all countries, as well as across countries at varying degrees. Fig. 1 illustrates seven areas of health service coverage in the World Health Organization (WHO) South-East Asia Region, comparing three dimensions of inequality: income group, place of residence (urban/rural) and level of education. Understanding these differences, and how they vary over time and among geographic areas when benchmarked against each other, is the first step in acting with an equity orientation.

**Tools for equity analysis: contributions from WHO**

While WHO has been supporting Member States with health inequality monitoring for many years, the use and development of various tools to support this and linked processes has been given greater emphasis over the past 5 years. Across WHO regions, capacity-building workshops have been held; a package of resources, including a handbook, a step-by-step manual and an e-learning module, has been created; and numerous tools to facilitate analysis and visualization of health inequalities have been released. Countries of the WHO South-East Asia Region have played a pivotal role in shaping the nature of capacity-building on health inequality monitoring and the tools that have been created for this purpose.

A key milestone in this process has been development of the Health Equity Assessment Toolkit (HEAT), a free and open-source software package, updated in 2018, that displays disaggregated data and summary measures of inequality by six dimensions (economic status, education, place of residence and subnational region, as well as age and sex [where applicable]). HEAT draws from the WHO Health Equity Monitor database, which includes disaggregated health data based on re-analysis of over 330 demographic and health surveys, multiple indicator cluster surveys and reproductive health surveys carried out between 1991 and 2015, with as many as nine rounds of data for Bangladesh. In 2017, HEAT Plus was launched; this edition of the software allows bespoke data for any indicator (health or otherwise) to be uploaded into a simple template and used for analysis of disaggregated data and summary measures. HEAT Plus was developed based on extensive inputs from the WHO South-East Asia Region. Another long-standing effort has been the Innov8 package for...
review and reorientation of national health programmes aiming to "leave no one behind".19 Innov8 involves an eight-step process where baseline data on a programme are gathered, its theory of change is understood, and then redesign of this theory is collaboratively developed using an equity-oriented, rights-based, gender-responsive approach, mindful of the social determinants of health and measures to monitor, evaluate and ensure sustained attention to leaving no one behind.19 The Innov8 approach has been used to increase equity orientation of policies in a number of countries globally.19–21

Experiences of countries in the WHO South-East Asia Region

There has been a series of capacity-building events in the region related to health equity, supported by WHO. Table 1 illustrates the capacity-building activities carried out using WHO tools in the region. While efforts are under way throughout the region, this paper focuses on a few illustrative country examples with which the authors have greater familiarity and indicates the lessons they offer.

Bangladesh

The Government of Bangladesh has demonstrated its commitment to achieving universal health coverage by 2032.23 One of the three main objectives set is to improve equity. In 2017, WHO Bangladesh conducted a workshop on monitoring health inequalities. Prior efforts to look at health equity were already under way in the country, including a Health Equity Watch for which a bespoke survey was carried out in 2002.24 Following this, in 2006, the Bangladesh Health Watch (BHW) was launched to monitor health systems and equity-linked reform in the country. To date, BHW has produced analytical reports on health equity (2006); the health workforce (2007); governance of the health sector (2009); universal health coverage (2011); and urban health (2014). The most recent report in 2016 focuses on challenges raised by noncommunicable diseases for service provision at the primary health-care level; regulatory frameworks; and establishing a comprehensive and integrated surveillance system.25 Future steps in the country will seek to synergize these efforts and create momentum across government, academia and civil society for equity-oriented change in the country.

India

In India, an important stream of work on health equity began with a Health Equity Watch workshop held in collaboration with the WHO country office in Delhi in 2013, followed by regional capacity-building on monitoring health inequality. Following this, extensive case-study documentation of research and action on health equity and the social determinants of health was carried out, culminating in a series of publications,26–29 and the eventual formation, in 2018, of Health Equity Network India (HENI).30 Key findings from these publications include the greater emphasis on socioeconomic inequality in current Indian research; the overall disconnect between research and policy-making; and the fact that many models of concerted

Table 1. Timeline of capacity-building and development of tools for health inequality monitoring and programme reorientation in the WHO South-East Asia Region

<table>
<thead>
<tr>
<th>Dates</th>
<th>Activity</th>
<th>Location/scope</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2013</td>
<td>Health equity workshop</td>
<td>India</td>
<td>×</td>
</tr>
<tr>
<td>April 2014</td>
<td>Health inequality monitoring workshop</td>
<td>India</td>
<td>×</td>
</tr>
<tr>
<td>November 2014 to 2017</td>
<td>Development of Innov8 tool19</td>
<td>Various</td>
<td>×</td>
</tr>
<tr>
<td>January to July 2015</td>
<td>Development of HEAT12 (Beta)</td>
<td>WHO headquarters</td>
<td>×</td>
</tr>
<tr>
<td>June 2015</td>
<td>HEAT12 launch</td>
<td>United States of America</td>
<td>×</td>
</tr>
<tr>
<td>September to November 2015</td>
<td>Innov819 analysis</td>
<td>Nepal</td>
<td>×</td>
</tr>
<tr>
<td>June 2015 to March 2016</td>
<td>Development of HEAT Plus11 (Beta)</td>
<td>Indonesia</td>
<td>×</td>
</tr>
<tr>
<td>April 2016</td>
<td>HEAT (Plus)11 workshop</td>
<td>Indonesia</td>
<td>×</td>
</tr>
<tr>
<td>June 2016</td>
<td>Innov819 and AA-HA! programme22 to reach every adolescent</td>
<td>India</td>
<td>×</td>
</tr>
<tr>
<td>December 2016</td>
<td>Innov819 launch</td>
<td>WHO headquarters</td>
<td>×</td>
</tr>
<tr>
<td>January 2017</td>
<td>Health inequality monitoring workshop</td>
<td>Thailand</td>
<td>×</td>
</tr>
<tr>
<td>February 2017</td>
<td>HEAT12 and HEAT Plus11 workshop</td>
<td>India</td>
<td>×</td>
</tr>
<tr>
<td>July 2017</td>
<td>HEAT Plus launch</td>
<td>WHO headquarters</td>
<td>×</td>
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<tr>
<td>August 2017</td>
<td>HEAT Plus11 workshop</td>
<td>Bangladesh</td>
<td>×</td>
</tr>
<tr>
<td>December 2017</td>
<td>HEAT Plus11 workshop</td>
<td>Sri Lanka (with a delegation from Myanmar)</td>
<td>×</td>
</tr>
<tr>
<td>January 2018 – ongoing</td>
<td>Subnational application of HEAT Plus11</td>
<td>India</td>
<td>×</td>
</tr>
<tr>
<td>September 2018</td>
<td>HEAT Plus35 workshop</td>
<td>Nepal</td>
<td>×</td>
</tr>
<tr>
<td>October 2018</td>
<td>Subnational application of HEAT Plus11</td>
<td>Indonesia</td>
<td>×</td>
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</tbody>
</table>

AA-HA!: Global Accelerated Action for the Health of Adolescents;22 HEAT: Health Equity Assessment Toolkit;12 Innov8: tool for reviewing national health programmes to leave no one behind.19
action on social determinants of health do exist, but are not identified as such, not evaluated and not considered at scale. Various studies with hard-to-reach populations are under way. A programme of work to carry out health inequality monitoring at the district and subdistrict level in the state of Kerala, as part of monitoring comprehensive primary health-care reforms, was also initiated early in 2018. At the national level, the newly launched India Strategy for Women’s Adolescents’ and Children’s Health places emphasis on disaggregated data and has a separate set of recommendations on ensuring inclusion.

**Indonesia**

In Indonesia, there was enthusiastic adoption of health inequality monitoring, culminating in the creation of a *State of health inequality report* in 2017, followed by a special issue of the journal *Global Health Action* showcasing the various analyses undertaken as part of this exercise. In addition to HEAT Plus, the Innov8 tool was also used for analysis and reorientation of the country’s action plans for neonatal and maternal health and the *National Action Plan on School Aged Children and Adolescent Health 2017–2019*, to “leave no one behind”. Processes have revealed key geographic areas of the country that require additional attention, as well as emerging areas of emphasis (water and sanitation, adolescent smoking) where inequalities exist. Finally, a conversation around health inequalities has allowed more granular analysis of the Public Health and Development Index in the state, which was designed for programmatic priority-setting and can now be looked at in light of not just average index scores, but also inequalities in the score across regions. Currently, the government is looking at how to develop subnational analyses using the HEAT Plus toolkit and various other data sources that are relevant for more local decision-making.

**Nepal**

Through the Nepal Health Sector Strategy, the Government of Nepal has made a commitment to universal health coverage ensuring health for all. As Nepal is transitioning towards federalism, it provides an opportunity to restructure and centre the health systems around the principles of universal health coverage. In response to this, the WHO Nepal country office conducted a two-day workshop in 2018 to build local government staff capacity on health inequality monitoring and equity analysis, using HEAT Plus. This built on a pilot study in 2015 of Nepal’s adolescent sexual and reproductive health programme using the WHO Innov8 tool, which allowed identification of target subpopulations of adolescents who were either being missed by the national programme, or received suboptimal benefit from the programme. These recommendations were incorporated in the revised Adolescent Development and Health Strategy in 2017. Similarly, in 2016, the government established the Nepal Non-communicable Disease and Injuries Poverty Commission, which, in its 2018 report, identified 23 potential cost-effective interventions to be introduced and/or incrementally intensified by 2030, with an emphasis on the poor.

**Sri Lanka**

In Sri Lanka, there was interest around the upload database edition of the toolkit – HEAT Plus – and the possibility of using this for facility-based data that exist in the country. At the capacity-building event hosted by this Member State in December 2017, the health department was able to assemble a broad range of stakeholders, including individuals from the statistics, excise and police departments, demonstrating emerging demand for consideration of health equity across sectors. At the workshop, emphasis was placed on gains made in reducing wealth-related inequalities in satisfaction with modern methods of family planning between 2007 and 2016, while also noting growing inequalities across districts. For other indicators, like stunting among children aged under 5 years, district-level inequalities were highlighted and emphasis placed on regions of the country where tea estates dominated: it appeared that these communities needed greater emphasis in service coverage. Beyond family planning and child health, participants also discussed intimate partner violence, where it was observed that the poorest quintile was more likely than all other wealth groups to report violence in 2016. At this stage, it is unclear whether this is related to instrumentation (comprehension of the question), or operationalization of the indicator (which referred to never experiencing violence from an intimate partner), or truly reflects a phenomenon of concern. Whatever the case, it is clearly a key area for further study and policy action.

**Thailand**

Thailand has served as a frame of reference for many others seeking to bring greater equity considerations into routine programming, particularly in relation to universal health coverage. For example, the country’s model of national health assemblies represents a key framework within which public engagement with decision-making and priority-setting in health can take place. Academics from this country have served as trainers for regional workshops on health inequality monitoring. Further, the Prince Mahidol conference for various years has been related to equity – in the context of neglected diseases, underserved populations, transformative learning, the legacy of comprehensive primary health care, political economy/health-in-all/whole-of-society approaches, and more. The 2017 conference also featured training on health inequality monitoring. Thailand also uses several data sources to monitor three dimensions of universal health coverage: population coverage, service coverage and financial risk protection. There are many lessons for process and country stewardship here, not just for Thailand, but also for the region.

**Moving the equity agenda forward**

Rising inequities across the world have become a defining challenge of our time. They are putting sustainable development at risk, stirring social unrest, undermining social progress, threatening economic and political stability, and undercutting human rights. While evidence shows that income inequality between countries has been falling in recent decades, income inequality within countries (across income levels) has been rising, reaching unprecedented levels in the post-World War II period. A significant majority of households in developing countries – more than 75% of the population – are living today in societies where income is more unequally distributed than...
it was in the 1990s.42,43 Hence, in South-East Asia, improving capacity for equity analysis for health, by income and other intersecting stratifiers, is timely and needed as reforms are undertaken towards universal health coverage.

As these country experiences have revealed, there is great need, moving forward, to carry out more finely grained analyses of equity as an integral part of universal health coverage-relevant policy implementation and decision-making at national and subnational levels. Here, there is great value in indicator-based quantitative monitoring, as well as qualitative forms of monitoring, such as social audits, community-based monitoring and mixed methods barrier assessments. The use of qualitative evidence of strong quality can also help to move beyond discussions around magnitudes of inequalities to mechanisms, contexts, structures and strictures that allow inequities to both proliferate and perpetuate. In the WHO South-East Asia Region, there is growing recognition of this and demand for interdisciplinary approaches to understand and act on health inequities.

This being the case, as one member of the Health Equity Network India put it, “pathways to health inequities are different from pathways to health equity”. This is an important notion, not just in conceptual, but also in practical terms. Health inequality monitoring is but a first step in determining the root causes of inequities that can point towards, but are inadequate to fully determine, how equity may be promoted. Sustained and community-led research and programmatic activity on promoting health equity is an essential step in moving forward and must include the development and testing of approaches and processes that foster distribution of resources according to need and are accountable to outcomes at the population level. Equity must remain centre-stage – not just rhetorically, but de facto – in the emerging agenda of universal health coverage, anchored in the legacy of Alma-Ata and the continuing movement towards health for all. There are many lessons to be learnt in this region, as well as mounting political and popular will for change.

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References


Perspective

Achieving the targets for universal health coverage: how is Thailand monitoring progress?

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Abstract

Universal health coverage (UHC) is one of the targets within the Sustainable Development Goals that the Member States of the United Nations have pledged to achieve by 2030. Target 3.8 has two monitoring indicators: 3.8.1 for coverage of essential health services, for which a compound index from 16 tracer indicators has recently been developed; and 3.8.2 for catastrophic expenditure on health. The global baseline monitoring of these two indicators in 2017 shows that the progress in many low- and middle-income countries is unlikely to be on track and achieved by 2030. The monitoring and evaluation mechanism for UHC progress is a crucial function to hold governments accountable and guide countries along their paths towards UHC. This paper outlines key monitoring and evaluation tools that Thailand uses to track UHC progress; compares the strengths and limitations of each tool; and discusses monitoring gaps and enabling factors related to development of the tools. Thailand uses several data sources to monitor three UHC dimensions: population coverage; service coverage; and financial risk protection. The four key sources are: (i) national surveys; (ii) health facility and administrative data; (iii) specific disease registries; and (iv) research. Each source provides different advantages and is used concurrently to complement the others. Despite initially being developed to track progress for national health priorities, these tools are able to monitor most of the global UHC indicators. Key enabling factors of Thai monitoring systems are a supportive infrastructure and information system; a policy requirement for routine patient data records; ownership and commitment of the key responsible organizations; multisectoral collaboration; and sustainable in-country capacities. The areas for improvement are monitoring in the non-Thai population; tracking access to essential medicines; and maximizing the use of collected data. Lessons learnt from the Thai experience could be useful for other low- and middle-income countries in developing their UHC monitoring platforms.

Keywords: monitoring and evaluation, Sustainable Development Goals, Thailand, universal health coverage

Background

Universal health coverage (UHC) is central to health development in the post-2015 era, as it is the key platform for the achievement of health equity. UHC is an integral element of Sustainable Development Goal (SDG) 3, as Target 3.8, which includes ensuring that all people have “access to quality essential health services and safe, effective, quality and affordable essential medicines and vaccines” without suffering from financial hardship.1

There are two explicit indicators for global monitoring of the progress of UHC. Indicator 3.8.1 measures “coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health; infectious diseases; non-communicable diseases; and service capacity and access, among the general and the most disadvantaged population)”; and Indicator 3.8.2 measures the “proportion of people with large household expenditures on health as a share of total household expenditure or income”.1 Also relevant to UHC monitoring is SDG Target 3.b, which promotes access to medicines and vaccines in low- and middle-income countries (LMICs). For this target, Indicator 3.b.1 is for monitoring the proportion of people with access to affordable vaccines, while the proportion of health facilities having a “core set of relevant essential medicine available and affordable on a sustainable basis” is monitored by Indicator 3.b.3.

Without significant and sustained commitments by governments, many low- and middle-income countries are unlikely to be able to achieve UHC by 2030, given their current limited fiscal space for health.2 Data from the World Health Organization (WHO) show that in 2016 the share of general government health expenditure as a percentage of general government expenditure for low-, lower-middle-, upper-middle-
Monitoring and evaluation platforms for universal health coverage in Thailand

Thailand monitors three dimensions of its UHC progress, namely population coverage, service coverage and financial risk protection, and expands each of these in more detail. The main data sources are national surveys; health facility and administrative data; specific disease registries; and research conducted by different organizations across the public sector.

Monitoring population coverage

The National Health Security Office (NHSO) monitors population coverage for all public health insurance schemes on a regular basis, through the use of civil registration and vital statistics (CRVS). The CRVS mandates birth and death registration of the whole population, through 15-day and 24-hour mandatory notification of such events to local civil registries. According to the Survey of Population Changes 2005–2006, registration of births and deaths was 96.7% and 95.2% complete, respectively, at that time. All citizens are given a unique citizen ID (CID) at birth, which is a key reference for all legal or official transactions, such as education enrolment, health entitlement, opening a bank account and holding a driving licence. Every 2 weeks, the Bureau of Registration Administration of the Ministry of Interior shares the total number of births and deaths, including their CIDs, with the NHSO, allowing a real-time update of population coverage. In 2017, 99.95% of Thai people who were residing in Thailand were covered.

In addition to CRVS, population coverage is also monitored by the Health and Welfare Survey (HWS) – a nationally representative household survey, conducted biennially by the National Statistical Office (NSO). The survey asks whether respondents have any public or private health insurance. The latest survey in 2017 showed that 99.2% were insured. The benefits of this additional monitoring through survey are to confirm the CRVS data and also to ensure that people are aware of their insurance entitlements. The HWS provides more details than CRVS, such as the demographic, socioeconomic and wealth profiles of beneficiaries across three public health insurance schemes. It also links with service utilization and out-of-pocket payment. These independent parameters, which are not available from CRVS, facilitate equity assessment.

The HWS is responsive to country policy needs, as it can integrate additional modules of national interest, such as unmet health-care needs, citizens’ knowledge about antibiotics, and awareness of antimicrobial resistance. Box 1 describes the strengthening of HWS as a key M&E platform at household level.
Subsequently, a module for unmet health-care needs was added in 2015. A module on antimicrobial resistance was integrated in 2017, to assess the prevalence of use of antibiotics in the last month; clinical conditions and sources; knowledge of antibiotics; and awareness of antimicrobial resistance. In some years, modules on the responsiveness of the health system and on noncommunicable diseases were integrated. The HWS is an important tool to monitor various health aspects within and beyond SDG 3. Monitoring unmet need is critical to verify whether the low prevalence of catastrophic health spending among poor households is the result of forgoing health care that is needed.

Intensive engagement by the Ministry of Public Health on the design and use of the HWS (and other surveys such as multiple indicator cluster surveys; tobacco, alcohol and physical activity surveys; surveys of disability; surveys of the elderly), and long-term trust-based collaboration between health and statistics agencies, are key factors making the HWS a multipurpose platform for monitoring health and health policy achievements at household level.

Monitoring service coverage
Service coverage in SDG Indicator 3.8.1
This section describes national data sources that support the monitoring of service coverage as required by SDG Indicator 3.8.1. Thailand uses surveys, health facility and administrative data, and disease registries to track the 16 tracer indicators in the four categories of reproductive, maternal, newborn and child health; infectious diseases; noncommunicable diseases; and service capacity and access.

First, reproductive, maternal, newborn and child health services are monitored through multiple indicator cluster surveys (MICS). The NSO has conducted these surveys in collaboration with the United Nations Children’s Fund, as part of the global MICS programme, initially to track progress of the Millennium Development Goals, and subsequently to continue monitoring the SDGs and other health indicators. The NSO has taken full financial and technical responsibility for MICS.

Second, for monitoring infectious diseases, specific disease registries are available for patients with tuberculosis (TB) and HIV. Individual data on access to TB drugs or antiretroviral therapy (ART) and their treatment outcomes are entered to the electronic registry by facilities in real time. The registries facilitate continuity in medication by all facilities, as their records are accessed by authorized staff in hospitals throughout the country. By comparing with the estimated incidence of TB or people living with HIV, treatment coverage and effective treatment coverage can be calculated. The TB registry in Thailand reports to the Bureau of Tuberculosis, Ministry of Public Health (MOPH), and the ART registry reports to the NHSO. In Thailand, malaria is only problematic in provinces bordering Myanmar, Cambodia and Malaysia, with confirmed cases below 20,000 in 2016. Hence, there is no routine malaria survey. A survey on people at risk who sleep under insecticide-treated bednets is conducted periodically by the Bureau of Vector-Borne Diseases, Department of Disease Control, MOPH. The survey in 2015 showed the coverage of insecticide-treated bednets was 38.5% among the population at risk. For water and sanitation services, the basic sanitation accessed by households is monitored by MICS.

Third, the proxy indicators for noncommunicable diseases are monitored by NSO’s household surveys and facility data. The National Health Examination Survey (NHES) is managed by the Health Systems Research Institute, in collaboration with the MOPH, Thai Health Promotion Foundation and many universities, primarily to estimate the prevalence and trends of selected noncommunicable diseases (cardiovascular disease, diabetes, hyperlipidaemia, hypertension, stroke) and their risk factors. Despite its utility, the NHES is not conducted frequently; the first one was conducted in 1991–1992, with subsequent surveys in 1996–1997, 2003–2004, 2008–2009 and 2014. For tobacco control, a survey on cigarette smoking behaviour started in 1976 and has been conducted every 3 years since then, by the NSO. For cervical cancer screening, coverage in the targeted population is monitored by the MOPH and NHSO using routine administrative data.

Fourth, for service capacity and access, the numbers of hospital beds and health professionals per capita are reported by the Strategy and Planning Division of the MOPH, using administrative data. However, Thailand does not conduct surveys on access to essential medicines at its public and private facilities. The National list of essential medicines, covering over 700 active pharmaceutical ingredients and 74 herbal medicines, is the basic pharmaceutical benefit package for all Thai citizens. In the Thai district health-care delivery system, the MOPH’s district hospitals also perform drug procurement and oversee stock management for health centres within their district health system network, to ensure the availability and quality of essential medicines. The general monitoring mechanism, operated through periodic site visits and a consumers’ hotline, has not indicated any problems with drug adequacy at primary care level. Lastly, the International Health Regulations (IHR) core capacity index was assessed by the first joint external evaluation in 2017. The immunization coverage of essential vaccines in the national programme is monitored by the MOPH, using health facility data and, less frequently, immunization surveys using the 30-cluster technique.

Table 1 describes the data sources that Thailand uses to monitor the 16 essential services defined in SDG 3.8.1.

Service coverage beyond SDG Indicator 3.8.1
Beyond the SDG requirement of Indicator 3.8.1, Thailand’s mature M&E system also provides comprehensive evidence on service utilization, unmet health-care need and other services, in accordance with national policy priorities.

The overall utilization rates are monitored using two channels: a routine administrative data set generated from health facilities; and the HWS. The numbers of outpatient visits and hospital admissions are recorded and the utilization rates per person per year are calculated. For the Universal Coverage Scheme, which is the largest public insurance scheme covering 73% of the population, the annual utilization rates have shown an upward trend, from 2.416 to 3.821 visits per capita for outpatient visits and 0.100 to 0.125 admissions per capita for inpatient services between 2006 and 2017. This clearly shows improved access after introduction of UHC.

The HWS also provides information on the use of insurance entitlement, for outpatient, inpatient, health promotion and dental services, including the reasons for those who decided...
Table 1. National data sources for monitoring service coverage of SDG Indicator 3.8.1, together with the most recent values

<table>
<thead>
<tr>
<th>SDG 3.8.1 indicators</th>
<th>Tracer indicators</th>
<th>National data sources/main responsible agencies</th>
<th>Coverage or average: most recent value (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reproductive, maternal, newborn and child health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family planning</td>
<td>Demand satisfied with modern methods in women aged 15–49 years who are married or in a union (%)</td>
<td>Multiple indicator cluster survey/National Statistical Office</td>
<td>78.4% (2016)</td>
</tr>
<tr>
<td>Pregnancy and delivery care</td>
<td>Four or more visits to antenatal care (%)</td>
<td>• Multiple indicator cluster survey/National Statistical Office</td>
<td>• 90.8% (at least four visits, multiple indicator cluster survey, 2016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Facility data/Ministry of Public Health and National Health Security Office</td>
<td>• 53.3% (five visits, Ministry of Public Health and National Health Security Office, 2017)</td>
</tr>
<tr>
<td>Child immunization</td>
<td>Children aged 1 year who have received three doses of a diphtheria, tetanus and pertussis vaccine (%)</td>
<td>Multiple indicator cluster survey/National Statistical Office</td>
<td>87.6% (2016)</td>
</tr>
<tr>
<td>Child treatment</td>
<td>Care-seeking behaviour for children with suspected pneumonia (%)</td>
<td>Multiple indicator cluster survey/National Statistical Office</td>
<td>79.5% (2016)</td>
</tr>
<tr>
<td>Infectious diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuberculosis treatment</td>
<td>Effective treatment coverage for tuberculosis (%)</td>
<td>Tuberculosis Registry/Bureau of Tuberculosis, Ministry of Public Health</td>
<td>48.3% (2016)</td>
</tr>
<tr>
<td>HIV treatment</td>
<td>People with HIV receiving antiretroviral therapy (%)</td>
<td>HIV Registry/National Health Security Office and Bureau of AIDS, Tuberculosis and Sexually Transmitted Infections, Ministry of Public Health</td>
<td>68% (2016)</td>
</tr>
<tr>
<td>Malaria prevention</td>
<td>Population at risk who sleep under insecticide-treated bednets (%)</td>
<td>Periodic survey/Bureau of Vector-Borne Diseases, Department of Disease Control, Ministry of Public Health</td>
<td>38.5% (2015)</td>
</tr>
<tr>
<td>Water and sanitation</td>
<td>Households with access to at least basic sanitation (%)</td>
<td>Multiple indicator cluster survey/National Statistical Office</td>
<td>97.2% (2016)</td>
</tr>
<tr>
<td>Noncommunicable diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention of cardiovascular disease</td>
<td>Prevalence of non-raised blood pressure regardless of treatment status (%)</td>
<td>National Health Examination Survey/Health Systems Research Institute</td>
<td>75.3% (2014)</td>
</tr>
<tr>
<td>Management of diabetes</td>
<td>Mean fasting plasma glucose (mmol/L)</td>
<td>National Health Examination Survey/Health Systems Research Institute</td>
<td>98.1 mg/dL = 5.4 mmol/L (2014)</td>
</tr>
<tr>
<td>Cancer detection and treatment</td>
<td>Cervical cancer screening in women aged 30–49 years (%)</td>
<td>Facility data/Ministry of Public Health and National Health Security Office</td>
<td>34.6% in women aged 30–60 years (2017)</td>
</tr>
<tr>
<td>Tobacco control</td>
<td>Adults aged at least 15 years who had not smoked tobacco in the previous 30 days (%)</td>
<td>The cigarette smoking behaviour survey/National Statistical Office</td>
<td>80.9% (2017)</td>
</tr>
<tr>
<td>Service capacity and access</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital access</td>
<td>Number of hospital beds per person</td>
<td>Administrative data/Strategy and Planning Division, Ministry of Public Health</td>
<td>23.1 beds per personc</td>
</tr>
<tr>
<td>Health-care worker density</td>
<td>Number of health professionals per person: comprising physicians, psychiatrists and surgeons</td>
<td>Administrative data/Strategy and Planning Division, Ministry of Public Health</td>
<td>0.5 physicians per 1000 population, 2.5 nurses per 1000 population (2017)c</td>
</tr>
<tr>
<td>Access to essential medicines</td>
<td>Proportion of health facilities with availability of the World Health Organization recommended core list of essential medicine</td>
<td>Primary survey at public and private health facilities</td>
<td>Not available</td>
</tr>
<tr>
<td>Health security</td>
<td>International Health Regulations core capacity index</td>
<td>Joint external evaluation of International Health Regulations core capacities/joint external evaluation team</td>
<td>3.75 out of 5.00</td>
</tr>
</tbody>
</table>

*a* Effective coverage of tuberculosis treatment is calculated based on treatment outcome data from the Tuberculosis Registry and WHO tuberculosis incidence of 172/100,000 population for Thailand.26

*b* HIV treatment coverage was reported in the annual report of the Bureau of AIDS, TB and STIs based on data from HIV registry.27

*c* These reported values were converted from their original sources to match with reporting units in SDG 3.8.1 indicators.
not to use their entitlement and opted to pay for service elsewhere. In 2017, the data showed that the proportion of insured patients who used their insurance entitlement was 63.1%, 92.2%, 88.4% and 66.3% for outpatient, inpatient, health promotion and dental services, respectively. The top three reasons for not using health insurance entitlement were having minor illness, the long queue and the inconvenience of seeking healthcare during office hours.13

The HWS also monitors unmet health need. Since implementing UHC policy does not always mean all barriers to health service are removed, a module to assess unmet health need, adapted from the European Union Statistics on Income and Living Conditions survey, was incorporated as a module of the HWS in 2015.15,28 Unmet health needs and reasons for forgoing healthcare are monitored separately for outpatient, inpatient and dental services.15 The latest data from the 2015 HWS showed that unmet health need was 1.50% for outpatient, 0.14% for inpatient and 0.99% for dental services.15 The prevalence of unmet needs for outpatient and dental services is on a par with that of countries in the Organisation for Economic Co-operation and Development.15 The factors significantly associated with unmet health needs were age, entitlement to health insurance, economic status and residential area. The main reasons mentioned were not having time to seek care, the long queue and inconvenient transportation.15 Monitoring unmet health-care need is critical to verify whether the low prevalence of catastrophic health expenditure among the poorest quintiles is the result of forgoing necessary healthcare, which can result in disability or mortality. A high level of unmet need can explain a low level of out-of-pocket payment, as poor households forego treatment.

Through the MOPH and NHSO, Thailand monitors several indicators of service coverage for a wide range of services, using facility data. This covers proxy indicators for disease prevention and health promotion, curative care and rehabilitation service, for example influenza vaccine for elderly individuals; diabetes and hypertension screening; percutaneous coronary intervention; cataract surgery; renal replacement therapy; and rehabilitation care for people with disabilities and bedridden patients.12,25 Access to high-cost medicines, orphan drugs, antidotes and antivenoms is also monitored annually by the NHSO.15,29 Some of the proxy indicators are subject to adjustment, based on the country’s priorities and policy agenda for specific periods. Furthermore, a few specific disease registries have been established for various purposes, for example case management, monitoring treatment outcomes and financial reimbursement. These registries, such as those for renal replacement therapy and ART, benefit the monitoring of service coverage and treatment outcomes.

**Monitoring financial risk protection**

**Financial risk protection in SDG Indicator 3.8.2**

The SDG target indicator 3.8.2 measures financial risk protection in terms of the proportion of the population suffering catastrophic expenditures on health. Two thresholds are used: spending greater than 10% and greater than 25% of total household expenditure or income on health.5 The 2017 Global monitoring report also presented additional data on catastrophic spending defined as 40% of non-food consumption.4 Thailand monitors the incidence of both catastrophic health spending and medical impoverishment, using data from the socioeconomic survey (SES), and provides prevalence at national and regional levels.

The SES is another nationally representative household survey conducted routinely by the NSO. It was conducted 5-yearly when it was first introduced in 1957, then biennially from 1987, and it has become annual since 2006 as a result of the cabinet’s decision for more timely monitoring.30 Samples of all households are divided into 12 equal portions for monthly survey throughout the year, to minimize seasonal variation of both income and expenditure. Data on household spending are surveyed every year, whereas a module to assess household income is added every alternate year. These data show households’ monthly spending profile for both subsistence and non-subsistence categories.31

There are questions in the survey about spending on self-prescribed medicines and outpatient visits during the past month and spending on inpatient care during the past 12 months. The 2017 SES reported an average monthly health expenditure of 332 baht per household (self-prescribed medicines 108 baht, outpatient services 151 baht and inpatient services 73 baht), equivalent to 1.6% of total monthly expenditure, far below the 10% threshold for catastrophic health spending.32

Monthly health expenditures paid by households, recorded by the SES, are used to estimate the incidence of catastrophic health expenditure, using a threshold of 10% of total consumption expenditure.30 Overall, the percentage of households experiencing catastrophic health expenditure has gradually reduced, from 7.07% in 1990 to 2.06% in 2016.15 This low incidence has been enabled by a continued reduction of out-of-pocket expenditure as a percentage of current health expenditure, from more than 30% before 2000 to 12% in 2015.4 The reduction in out-of-pocket health payment is a result of expansion of benefit packages by public health insurance schemes.

The incidence of medical impoverishment is also estimated from the SES data against the national poverty line published by the National Economic and Social Development Board. The national and regional poverty lines specific to five geographical regions are calculated separately for rural and urban areas, based on the subsistence level of food and non-food consumption, adjusted by other economic factors.33 The difference in the numbers of households below the poverty line before and after health payment is the number of households that are pushed into poverty, as a result of out-of-pocket payment for health. Based on these data sets, the proportion of households experiencing impoverishment from health expenditure can be estimated.34

The national figure for health impoverishment has reduced from 2.34% in 1990 to 0.30% in 2016.15 Data at subnational level are also available for provincial policy utilities.

Thailand produces data on the incidence of catastrophic health expenditure and health impoverishment by socioeconomic stratifications such as geographical regions, urban/rural domiciles and wealth quintiles. This facilitates specific policy interventions to improve financial risk protection for the groups most affected.

**Financial risk protection beyond SDG Indicator 3.8.2**

The equity of health system financing and service use is also monitored through research using financial incidence analysis and benefit incidence analysis. Two series of analyses have been conducted, for the assessment periods of 2003–2009 and 2007–2017.35,36 Financial incidence analysis considers who in...
the rich or poor quintiles pays for health care and how equitable the contributions are in relation to their socioeconomic status.\textsuperscript{37} It is assessed using the data sources from the SES and the National Health Account.\textsuperscript{36} Benefit incidence analysis examines the distribution of benefits from using health services that are subsidized by the government. Benefit incidence analysis uses outpatient and inpatient utilization rates of public health service from the HWS multiplied by the unit costs of outpatient and inpatient services from the NHSO’s estimates, then subtracts the out-of-pocket payment.\textsuperscript{36} Although health equity analyses have previously been monitored on a research basis, the NHSO, which manages the Universal Coverage Scheme, has seen them as a positive development, and requested the International Health Policy Program to conduct health equity analyses as part of its routine monitoring, and to work with the NSO to maintain the contributions of the SES and HWS.

**Discussion**

Thailand uses four key tools to track UHC, namely (i) national surveys; (ii) administrative and facility data; (iii) specific disease registries; and (iv) research. These tools have different benefits and drawbacks, which should be considered in the design of appropriate national M&E platforms.

The strength of using national surveys to monitor service coverage is the availability of the country’s demographic profile and socioeconomic stratification, which can inform policy decisions to improve access in specific populations and promote equity. However, the downside of these surveys is their limited ability to explore access to services for specific clinical conditions. Provided that sufficient infrastructure is available, administrative/ facility data are a more appropriate platform for following up coverage of specific services. On the other hand, the downside of facility data is the lack of socioeconomic profiles. The NHES has comparative advantage in measuring biomarkers, but it is very costly and cannot be conducted frequently.

The key benefit of specific disease registries is that they can serve well in M&E, with comprehensive and specific details as appropriate for particular diseases or conditions, such as continued treatment for the mobile population. However, if these registries overlap with existing routine reporting systems, the overall information system becomes fragmented, which hampers data analysis and puts heavy burdens on frontline health workers who collect data. Hence, harmonization between routine reports and registries is required.

Monitoring through research can be useful for introducing an innovative method that can provide a high level of detail. Compared with facility data and national surveys, it requires fewer resources. However, research provides limited long-term monitoring and comparability across time, owing to changes in methodology, scope or definition and changing focus on certain aspects of health care. Some specific methods may require high technical skills and be difficult to institutionalize.

**The preconditions for monitoring and evaluation platforms: the Thai experience**

There are several enabling factors that make the M&E systems in Thailand feasible. Well-developed infrastructure in both the health and non-health sectors is the fundamental cornerstone for health development and UHC tracking. Building on supportive infrastructure, leadership and responsibility, good collaboration among stakeholders, and institutional capacities play important roles in functioning M&E systems.

First, the existence of a CRVS system with national identity mandated by the Ministry of Interior facilitates various kinds of individual data tracking. For health, the CID is linked to entitlement to public health insurance, and it is required in all transactions of service utilization. Another advantage is that the CID can be used as a reference across databases.

Second, patient clinical data are comprehensively recorded, owing to the full coverage of basic technology, including computers, universal internet access, and hospital software in all hospitals and health centres. The process for data entry is either made compulsory or promoted by the MOPH, as a national regulating body, as well as agencies managing public health insurance schemes, using various incentives such as quality indicators and conditions for fund reimbursement.

Third, there are a number of organizations with interests in the country’s health situation and other related determinants, notably the NSO, NHSO, MOPH and research institutes. In particular, the NSO is a key responsible organization for collecting household-level information through national representative surveys relating to several dimensions of development. On top of that, good collaboration between these organizations synergistically strengthens the power of knowledge and information by improving the utilization of data to meet policy demands.

Finally, the establishment and function of the M&E platforms require certain capacities and skills. For instance, collecting data through facilities and disease registries needs technical capacities in health information and IT systems, to design and maintain the programmes. To conduct surveys, especially at national level, staff to collect data in the field must be well trained. Undertaking research may require more advanced skills in specific areas. These capacities should be developed in the country. At first, this may need support from international partners and external experts but, in the long run, domestic capacities must be sustained and should not rely solely on external consultants.

It is worth noting that all of these enabling factors discussed were not purposively established to monitor the SDGs according to the global agenda, but had been developed long before the SDGs as routine monitoring for internal use at facility, subnational and national levels.

**Limitations and areas for improvement**

Although Thailand has a M&E mechanism to monitor most indicators in SDG 3.8, some limitations should be highlighted. Most, if not all, monitoring tools only capture data on Thai citizens, especially when health information links with individual CIDs. In Thailand, there are quite a number of migrant workers and stateless persons, for whom the registration system is not very effective. As a result, information on non-Thai citizens is often lacking. Monitoring of UHC in these populations is, however, important for both public health security, such as spread of tuberculosis and neglected tropical diseases, and humanitarian reasons. Another point is that not all collected information is fully analysed and utilized for improving health system performance, which means that the current health information system is not at the most efficient stage. The
country should either maximize the use of available information or reduce collection of unnecessary data.

One missing area of information in Thailand is monitoring access to medicines, which has not been well developed and put into practice. This may require primary work through research and development. For example, similar work to the analysis by WHO and Health Action International on the availability, price and affordability of medicines in 36 countries can be adapted with some methodology updates, to develop simplified and sustained monitoring as required by SDG 3.b.1 and 3.b.3. At global level, there is a need for methodological development to support country monitoring.

Conclusion

UHC is a top priority of Thailand’s government and health agenda. The country has gradually developed the tools required to monitor its health development. Despite initially being developed to track progress for national priorities, these tools are able to monitor most of the global UHC indicators. There are four key data sources: surveys; administrative and facility data; specific disease registries; and research. Each source has benefits and drawbacks that should be taken into account. Key enabling factors of Thai monitoring systems are a supportive infrastructure and information system; a policy requirement for routine records of patient data; ownership and commitment of the key responsible organizations; multisectoral collaboration; and sustainable in-country capacities. Some areas for improvement are monitoring in the non-Thai population; tracking access to essential medicines; and maximizing the use of collected data. Lessons learnt from the Thai experience could be useful for other LMICs in developing their UHC monitoring platforms.

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References


Perspective

India’s health and wellness centres: realizing universal health coverage through comprehensive primary health care

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Abstract

In common with other countries in the World Health Organization South-East Asia Region, disease patterns in India have rapidly transitioned towards an increased burden of noncommunicable diseases. This epidemiological transition has been a major driver impelling a radical rethink of the structure of health care, especially with respect to the role, quality and capacity of primary health care. In addition to the Pradhan Mantri Jan Arogya Yojana insurance scheme, covering 40% of the poorest and most vulnerable individuals in the country for secondary and tertiary care, Ayushman Bharat is based on an ambitious programme of transforming India’s 150,000 public peripheral health centres into health and wellness centres (HWCs) delivering universal, free comprehensive primary health care by the end of 2022. This transformation to facilities delivering high-quality, efficient, equitable and comprehensive care will involve paradigm shifts, not least in human resources to include a new cadre of mid-level health providers. The design of HWCs and the delivery of services build on the experiences and lessons learnt from the National Health Mission, India’s flagship programme for strengthening health systems. Expanding the scope of these components to address the expanded service delivery package will require reorganization of work processes, including addressing the continuum of care across facility levels; moving from episodic pregnancy and delivery, newborn and immunization services to chronic care services; instituting screening and early treatment programmes; ensuring high-quality clinical services; and using information and communications technology for better reporting, focusing on health promotion and addressing health literacy in communities. Although there are major challenges ahead to meet these ambitious goals, it is important to capitalize on the current high level of political commitment accorded to comprehensive primary health care.

Keywords: comprehensive primary health care, India, health and wellness centres, health promotion

Background

In recent years, India has made significant gains in expanding coverage for maternal, newborn and child health and selected communicable diseases, although the burden of disease from diarrhoea, lower respiratory infections and tuberculosis, as well as neonatal disorders, continues to be very high in some states. Analyses from the recent India State-Level Disease Burden Initiative indicate that the burden due to noncommunicable diseases and injuries overall has overtaken that of communicable, maternal, neonatal and nutritional disorders in all states, albeit at varying rates. As a result, for India as a whole in 2016, an estimated 62% of deaths were due to noncommunicable diseases. The need to reconfigure national public health facilities to match this epidemiological transition was one of the drivers of India’s ambitious Ayushman Bharat initiative. Understandably, much attention has been given to one pillar of Ayushman Bharat, the Pradhan Mantri Jan Arogya Yojana (PMJAY) insurance scheme, covering 40% of the poorest and most vulnerable individuals in the country for secondary and tertiary care. However, less attention has been focused on the second pillar, announced by the Government of India in February 2018, which seeks to transform the existing peripheral health centres to health and wellness centres (HWCs) delivering universal, free comprehensive primary health care (CPHC).

The aim of CPHC is to provide a seamless continuum of care that ensures the principles of equity, quality, universality and no financial hardship. The announcement was made in the context of the annual budget presentation, assigning financial resources to the National Health Policy 2017, which commits two thirds of the budget to primary health care, and explicitly mandates a move from peripheral centres providing selective primary health care to 150,000 HWCs acting as the first point
of contact for an expanded set of health-care services closer to the community (see Box 1).

**Box 1. Comprehensive health-care services offered by health and wellness centres in India**

- Care in pregnancy and childbirth
- Neonatal and infant health-care services
- Childhood and adolescent health-care services
- Family planning, contraceptive services and other reproductive health-care services
- Management of communicable diseases, including national health programmes
- Management of common communicable diseases and outpatient care for acute simple illnesses and minor ailments
- Screening, prevention, control and management of chronic communicable diseases like tuberculosis and leprosy
- Care for common ophthalmic and ear, nose and throat problems
- Basic oral health care
- Elderly and palliative health-care services
- Emergency medical services
- Screening and basic management of mental health conditions

The need to expand and upgrade the primary health-care services provided was underscored by the National Sample Survey for 2014, which showed that only 11.5% of people in rural areas and 3.9% in urban areas accessed this vast network of peripheral public health facilities for health-care needs other than childbirth. The existing facilities targeted for upgrading to HWCs comprise (i) sub-health centres (SHCs), which cover a population of 5000 (or 3000 in geographically difficult areas), staffed by one or two multipurpose workers, instead of auxiliary nurse midwives (ANMs), largely delivering maternal and child health services; and (ii) primary health centres (PHCs), covering a population of 30,000 (or 20,000 in difficult areas), staffed by one or two medical officers, a nurse, a pharmacist and a laboratory technician. Currently, both SHCs and PHCs provide a limited package of services for reproductive and child health and communicable diseases. PHCs are expected to serve as the first point of referral for SHCs. HWCs at both levels are expected to provide primary health care – largely ambulatory – and public health services to the populations in their jurisdiction, and serve a gatekeeping function to medical officers or specialists at secondary facilities at the community health centre or district hospital. The first HWC was inaugurated in April 2018, and completion of roll-out across India is planned for the end of 2022.

**Paradigm shifts needed at many levels**

Making the HWCs fit for purpose to deliver high-quality CPHC requires a paradigm shift at many levels. This article focuses on four shifts that are likely to have an impact on efficiency, equity and quality. The first, and perhaps the most significant, is innovation in human resources. Services at the HWC at the most peripheral level, namely the SHC, will be delivered through a team, led by a new cadre of non-physician health worker, a mid-level health provider, supported by one or two multipurpose workers, and ASHAs – as India’s community health workers are called. Similar team-based models of community care in Brazil, and early work in South Africa, have shown promise. The mid-level health provider is either a nurse or an ayurvedic practitioner, trained in a 6 month Certificate Programme in Community Health and accredited for primary health care and public health competencies. India also has over 500,000 village health, sanitation and nutrition committees that will be leveraged for prevention and promotion efforts. The HWC team is expected to ensure coordinated care, including support to the community for navigating two-way referrals. The latter is important, particularly as it enables home- and community-based care for those using the PMJAY insurance programme. Provision of expanded services offered by HWCs is also intended to ease the burden on secondary and tertiary facilities.

The second shift is the dispensation of free medicines for chronic care, at the HWC, to avoid patient hardship, reduce out-of-pocket expenses and enable improvement in treatment adherence. Early results from the field demonstrate that this single measure has had positive outcomes. This is particularly the case in states with robust procurement and logistics systems for medicines and supplies.

The third shift relates to financial reforms, including capitation-based payments to HWCs and performance-linked payments to the mid-level health provider and to the team of front-line workers. The salary of the mid-level health provider is blended – consisting of a fixed component and an incentive component linked to key outcomes, which are measured using monitoring data captured through an IT system.

The fourth shift uses digital technology and information and communications technology (ICT) platforms to ensure continuity of care through universal population empanelment and registration to a particular HWC, enabling, inter alia, treatment adherence and tracking of referrals, facilitating performance payments and ensuring continuity of care.

**Challenges and opportunities**

The design of HWCs and the delivery of services builds on the experiences of India’s flagship programme for strengthening health systems, the National Health Mission. Most components in the design of HWCs leverage the investments in and implementation structures of the National Health Mission. Significantly, these include: (i) the ASHA and people’s participation through community collectives; (ii) the use of digital technology for tracking mothers and children for expanded coverage; (iii) using outreach to enable universal coverage for antenatal, postnatal, immunization and family planning services, including mobile units to expand coverage; (iv) instituting quality standards and ensuring use of treatment protocols; (v) supplying free medicines and increasing access to free diagnostics; (vi) creating systems for emergency referral and transport; and (vii) strengthening secondary care services. Increasing the scope of these components to address the expanded service delivery package will require reorganization of work processes, including addressing the continuum of care across facility levels – moving from episodic pregnancy and...
delivery, newborn and immunization services to chronic care services; instituting screening and early treatment programmes; ensuring high-quality clinical services; and using ICT for better reporting, focusing on health promotion and addressing health literacy in communities. The HWCs are intended to increase the focus on wellness and lifestyle modification, particularly related to chronic diseases. India has a mature community health worker programme and community structures cutting across sectors that could prove to be effective in mounting community-led health-promotion measures. Strategies for effective engagement and measurement need to be developed to enable successful implementation.

There are also multiple understandings of the composition and organization of primary health care among policy-makers and practitioners. Decades of implementing a primary health-care package for maternal and child health has narrowed the perspectives of implementers. Competing demands for attention to the emergent need for comprehensive services, especially chronic care in areas where maternal and infant mortality are high, require re-engineering of several work processes, from community to facility levels, among programme managers and service providers. Reconciliation of these views is important, for a successful move towards realizing the commitments of the Declaration of Alma-Ata, reinforced in the recent Declaration of Astana.11

As in all interventions, in a large federally structured country such as India, translation of the essential contours of a centrally funded programme into the institutional mandates and implementation processes of diverse state, district and subdistrict contexts requires consensus, joint learning efforts, sharing of lessons and drawing from successes. There is also some concern about organizational inefficiencies, a mismatch between resources and expectations, and a lack of preparedness. However, it is important to capitalize on the current high level of political commitment accorded to comprehensive primary health care, in conjunction with addressing concerns.12

We are entering uncharted territory for several of these components but, given a well-articulated design, derived through consensus, and building on selected existing institutional and implementation platforms and structures, it is urgent for India to move forward with implementation and demonstrate the critical role of primary health care in achieving universal health coverage.

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**References**


Perspective

Accelerating reforms of primary health care towards universal health coverage in Sri Lanka

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Abstract
Since the late 1920s, the Sri Lankan health system has been based on a firm foundation of primary health care, and it has been recognized internationally as a highly successful low-cost model. However, rethinking the future health-care model has been essential, owing to the country having one of the fastest ageing populations in the world, coupled with a high premature mortality from noncommunicable diseases. To sustain past gains and meet new challenges, several models centred on an expanded primary health-care system have been trialled and refined in the past decade. Primary health care was identified as a key priority in the National Health Strategic Master Plan 2016–2025, and in 2018 the Cabinet approved the Policy on healthcare delivery for universal health coverage. This policy introduces the “shared care cluster” system, whereby an apex specialist institution serves the local primary care referral institutions. The catchment population is divided into populations of approximately 5000, for which one family doctor is responsible. Strengthening and retaining human resources at these primary-level curative institutions will be essential, especially in rural locations. Also critical will be initiatives to orient the population’s health-seeking behaviours. Sustained political commitment, an effective communication strategy, a tailored health workforce policy, performance monitoring and evaluation, coordination mechanisms, and changes in administrative and financial regulations are some of the future factors that will be critical to realizing the full potential of primary health care and accelerating universal health coverage in Sri Lanka.

Keywords: health-care reform, noncommunicable diseases, primary health care, Sri Lanka

Background
Sri Lanka has achieved a relatively high level of health, despite being classified by the World Bank as a lower-middle-income economy.¹ In 2015, the life expectancy for women and men was 78.6 years and 72.0 years, respectively.² The neonatal, infant and under-5 mortality rates were 6.59, 9.16 and 10.0 per 1000 live births, and the maternal mortality ratio was 32.0 per 100 000 live births, with almost all labours being attended by a skilled provider and 94.6% of all live births taking place in a government hospital.² The country achieved many of the Millennium Development Goals at the national level and has eliminated malaria, filariasis, polio and neonatal tetanus, and controlled rubella.³ However, Sri Lanka’s achievements in health to date are threatened by increasing health demands associated with the rising burden of noncommunicable disease (NCD) and the growing population of elderly and disabled citizens. Sri Lanka has one of the fastest ageing populations in the world, coupled with a high rate of premature mortality from NCDs.⁴ In 2015, the World Health Organization (WHO) STEPwise approach to Surveillance (STEPS) survey of NCD risk factors estimated that 7.4% of adults either had raised blood glucose or were currently on medication for diabetes; 24.6% of men and 34.3% of women were overweight or obese; only 26.9% of men and 28.0% of women were consuming five or more servings of fruits and/or vegetables per day; 30.7% of adults had never had their blood pressure measured by a doctor or health worker; and 42% of the adults with raised blood pressure (>140/ 90 mmHg) were not on any medication.⁵

All citizens have access to free health care, through a system that has evolved since the late 1920s, based on a firm foundation of primary health care. The government health-care delivery system covers the entire island and comprises two streams of primary care services – preventive community health care and primary curative care. In common with other low- and middle-income countries, this system was put in place mainly to provide services for maternity care, child health and communicable diseases. The preventive stream of primary health care is organized to cover specific territories, administrative divisions or populations.

Curative primary medical care is provided via an extensive network of two types of institutions. First, primary medical care
units are relatively basic facilities staffed by medical officers that provide outpatient consultations and host field centres for immunizations, family planning and maternal care. The second type is divisional hospitals, which provide the same services as primary medical care units but with some inpatient facilities plus nursing and possibly laboratory staff. These institutions usually include healthy lifestyle centres for the screening of selected NCDs, such as hypertension and diabetes, and health education. Notably, unlike the preventive services, there are no boundaries for patients accessing curative institutions. Patients can choose freely which provider of curative care – from primary care medical unit to tertiary care facilities – they attend when sick. There is no requirement for patients to register and institutions are not responsible for a defined population or area. Patients commonly prefer to bypass primary care institutions, which often lack standard essential services, in favour of tertiary facilities. This situation means there is a lack not only of gate-keeping but also of accountability for patient care within any defined population or area.

**Business as usual is not an option**

During the past decade, it has been recognized that business as usual is not an option for Sri Lanka and that the health system needs to change to sustain its gains and progress towards universal health coverage. Specifically, the combination of an ageing population and increasing burden of NCDs required reorientation and reorganization of the otherwise historically successful health system, with development of service-delivery models focused more on disease prevention and health promotion, and on care more than treatment. This has required a paradigm shift in approach, design and service delivery.

As summarized in Box 1, initiatives have taken place since 2008 to inform and move towards a change of service delivery, including testing of different models of care. Evaluations of these interventions highlighted the need to have a broader and more comprehensive health-system reform, focusing on the primary care level. The impetus for reform came because of sustained...

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**Box 1. A timeline of events of primary health-care initiatives in Sri Lanka**

**2005**
- Sri Lanka Disease Specific Accounts Project, led by the Institute for Health Policy, allowed analysis of health spending in the public and private sectors, by disease and demographic group.  

**2008–2009**
- Revisiting the profile of primary health care in the Health Master Plan 2007–2016, i.e. rationalising primary health-care delivery structure.
- Rapid assessment of government curative facilities in the plantation sector was undertaken to study primary health-care facilities for vulnerable populations, i.e. the estate/plantation community. In parallel, the Ministry of Health was implementing measures to improve health access to the plantation community by taking over estate hospitals.
- A study was carried out in Galle District on health-seeking behaviour and the level of bypassing primary health care.
- A series of stakeholder consultations was carried out and secondary data were used in finalization of 10 advocacy posters on the need for a new model of primary care. The posters were used to communicate with health and non-health professionals, including senior officials of the health ministry, national planning officials and politicians. They were also used in postgraduate training in medical administration and community medicine.
- An analysis of the existing health service structure and policies was carried out by the policy analysis and development unit. This led to the understanding that major changes to the existing organization of health delivery were needed, as the system was not geared to providing continuity of care or to preventing or managing lifestyle-related diseases. The policy analysis unit suggested system changes, and a decision was taken to conduct pilot studies to test possible conceptual models.

**2010**
- Proposed system changes were discussed at the first national scientific and policy forum for strengthening primary care.
- The National Policy and Strategic Framework for Prevention and Control of Non-communicable Diseases was finalized, which also highlighted the strategy on health delivery organization change.
- The World Bank Human Development Network paper: Prevention and control of selected chronic NCDs in Sri Lanka: policy options and action was published.
- Several ongoing systems-strengthening pilots were discussed at the policy forum in the context of strengthening primary health care:
  - WHO Package of essential noncommunicable (PEN) disease interventions for primary health care in low-resource settings (WHO-PEN);
  - NCD Prevention Project (NPP), piloted by the Japan International Cooperation Agency (JICA) (NPP-JICA);
  - the community-based health-promotion component of the National Initiative to Reinforce and Organize General Diabetes Care in Sri Lanka (NIROGI Lanka) of the Sri Lanka Medical Association.
- An initiative for a change in primary health-care infrastructure was reviewed by the planning unit at the health centre in Samadhigama village in Hambantota, which was a post-tsunami construction. The review included a study of designing the internal layout for a primary care centre, analysing the health-seeking behaviour of the people using the facility, and planning and costing the range of further services needed.
2011
- The Ministry of Health identified 16 essential drugs to be made available for management of NCDs at the primary health-care level; the decision was communicated by official circulars.
- Budget was allocated to address NCDs through a primary care approach.

2012
- Guidelines for strengthening primary health care were developed for pilots.
- The personal health record was developed and introduced for the pilot.

2013
- Piloting of the initial system was carried out in three districts: Polonnaruwa, Nuwaraeliya and Hambantota. The piloting included empanelment of the local populations to the hospitals, first iteration of the personal health record, the family doctor/general practice concept of care, and streamlined referral pathways.

2014
- The concept of a “shared care cluster” system was put forward to the government.
- A common competency framework for doctors was developed, with the involvement of all medical faculties.
- The personal health record system was revised, based on the results from the pilot districts.

2015
- A survey was carried out by the policy analysis and development unit to identify requirements to improve residential facilities for health-care workers. Provision of quarters and accommodation has been used by the health authorities as a strategy for greater retention of health-care workers in rural settings, as well as improvement in the quality of care provided at these facilities (i.e. residential quarters have made possible the provision of 24*7 emergency care and inpatient admissions).
- Tools for supervision of and within primary curative care institutions were developed. The tools developed were compatible for the hospital to undertake supervision from within (by the hospital administration or professionals) and from outside (from regional/district supervision and administration teams).

2016
- Budget debate was conducted, with announcement of a “family doctor for all” and shared cluster system.
- Draft policy was presented to senior officials.
- Indicators for monitoring performance were developed.
- Primary care was identified as a priority in the *National Health Strategic Master Plan 2016–2025*.11

2017
- A draft policy was presented at the National Health Development Committee, followed by discussions with professional colleges on the reform; the draft policy was uploaded on the ministry website for comments.
- A roadmap was developed and used for advocacy of the draft policy.
- Project negotiations were conducted with the Asian Development Bank and the World Bank for loans in the health sector.
- Mapping of clusters and specialists’ locations was carried out.

2018
- A Cabinet memorandum was produced, with approval of the *Policy on healthcare delivery for universal health coverage*.12
- A nationally representative rapid outpatient morbidity survey was undertaken across five provinces and across all levels of care, including outpatient facilities in teaching hospitals – the highest level of primary care at the tertiary level – to primary medical care units – the lowest level primary care. This also included data from the private sector, including private hospitals and general practitioners. The results informed the development of the essential services package (ESP).
- A draft ESP was developed – the first Sri Lanka comprehensive ESP,13 integrating in a single package the existing explicit, well-known package of preventive services with a newly defined set of curative interventions to be delivered by primary medical care institutions, and part of the secondary level of hospital care.

High-level advocacy, health leadership and propitious timing. Advocacy and communication were instrumental – results of the initiatives were captured in posters and briefs that were widely disseminated to stakeholders. The resulting model of reformed primary-care-led health services was underpinned by the following key elements:
- a clear policy on universal health coverage, covering both primary health care and specialized care;
- a defined essential service package, together with a service-delivery model;
- the provision of human resources for primary health care to cater for a designated population, including identification of cadres, rescaling and retooling of human resources, equitable cadre placements, and retention of human resources in primary health care;
- strengthening of the health-care infrastructure and allied facilities and capital equipment, such as for delivery of

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laboratory services and provision of essential medicines and medical equipment;
● a referral mechanism that will give equal opportunity for all to access specialized care;
● a patient health information system to allow tracking of patients and monitoring and evaluation;
● advocacy to encourage the people to manage their own health care and to use primary health-care services.

Towards people-centred, integrated and equitable primary health care

The National Health Strategic Master Plan 2016–2025 noted: “Our vision is to develop … strong primary-led patient care services in the country where every citizen has access to a family doctor” and “Our mission is to achieve as far as possible universal health coverage for all citizens of Sri Lanka with doctors trained in the family practice approach working in state and private sector providing accessible cost-effective quality primary care services to all citizens of Sri Lanka.”

The plan underscored the pivotal roles of the “family doctor” and the “shared care cluster”, allowing these key elements of the reformed primary health-care structure to gain traction. In the shared care cluster system, the cluster comprises an apex institute, providing specialist investigations and treatment, together with the geographically surrounding primary care curative divisional and primary medical care units. The cluster provides a continuum of care between primary and specialist services. Thus, both the responsibility for the care of an individual patient and the resources required are shared between the different levels of care, to optimize the availability and utilization of services.

In 2018, the Cabinet approved the Policy on healthcare delivery for universal health coverage. The strategic directions in the policy for universal health coverage include the reorganization of health-care delivery to a nationwide network of shared care clusters; strengthening human resources at primary-level curative institutions, including provision of one family doctor per 5000 population, and allied health-care workforce cadres, including public health nurses; providing access to all essential medicines and laboratory tests; providing basic emergency care; and creating an environment in primary care hospitals that is conducive to improving their utilization by patients and retention of health-care personnel, especially in rural areas.

Each shared care cluster will be responsible for delivering the newly defined essential service package (ESP). Developed in 2018, this is the first comprehensive ESP in Sri Lanka, integrating into a single package the existing explicit, well-established suite of preventive services with a newly defined set of curative interventions to be delivered by the primary medical care institutions, and part of the secondary level of hospital care. In explicitly defining the primary care services that must be delivered to the whole population, the ESP informs the changes required in the various elements of the health system.

Phased implementation of these health-system reforms by the government is now actively under way, with a national steering committee set up in 2018 to monitor the progress in implementation and provide overall oversight and guidance. Examples through which development partners, including the Asian Development Bank, World Bank and WHO, are providing support appear below.

WHO is providing catalytic technical support on the health system work, such as for a health information system mapping and assessment, which will form the basis for developing the architecture of the health information system enterprise to monitor universal health coverage.

The Asian Development Bank will support nine clusters in nine districts, mostly located in underresourced or rural areas.

The World Bank is providing budget support to the whole country, in line with the goal of achieving a more people-centred and comprehensive model of primary health care service provision.

The Global Fund to Fight AIDS, Tuberculosis and Malaria has recognized that a strong, resilient health system is needed to end HIV, tuberculosis and malaria, and has invested in technical catalytic activity for primary health care with WHO, for example a cross-programmatic efficiency analysis and development of the ESP service-delivery model; policy dialogue and provincial consultations on reorganization of primary health care; and health information system mapping.

In Sri Lanka, what began as a search for primary care changes to address the burden of NCDs has evolved into a holistic model of primary health care that is people centred, integrated and equitable. Critical factors to realize the full potential of strengthening primary health care to accelerate achievement of universal health coverage in Sri Lanka are sustained political commitment, an effective communication strategy, a tailored health workforce policy, performance monitoring and evaluation, a coordination mechanism, and changes in administrative and financial regulations.

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References


Access to health care for migrants in the Greater Mekong Subregion: policies and legal frameworks and their impact on malaria control in the context of malaria elimination

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Abstract
The launch of the Global compact for safe, orderly and regular migration in December 2018 marked the first-ever United Nations global agreement on a common approach to international migration in all its dimensions. The global compact aims to reduce the risks and vulnerabilities migrants face at different stages of migration, by respecting, protecting and fulfilling their human rights and providing them with care and assistance. A key example of the intersection of the right to health and migration is seen in the Greater Mekong Subregion (GMS) – comprising Cambodia, Lao People's Democratic Republic, Myanmar, the People’s Republic of China (Yunnan Province and Guangxi Zhuang Autonomous Region), Thailand and Viet Nam. The GMS has a highly dynamic and complex pattern of fluctuating migration, and population mobility has been identified as an important concern in the GMS, since five of the six GMS countries are endemic for malaria. Based on the concept of universal health coverage, and as endorsed by the 61st World Health Assembly in 2008, migrants, independently of their legal status, should be included in national health schemes. This paper summarizes work done to understand and address the legal obstacles that migrants face in accessing health services in the GMS countries, and the impact that these obstacles have in relation to elimination of malaria and containment of artemisinin resistance. Despite efforts being made towards achieving universal health coverage in all the GMS countries, no country has current health and social protection regulations to ensure migrants’ access to health services, although in Thailand documented and undocumented migrants can opt for acquiring health insurance. Additionally, there is a lack of migrant-inclusive legislation in GMS countries, since barriers to accessing health services for migrants – such as language and/or socioeconomic factors – have been scarcely considered. Advocacy to promote legislative approaches that include migrants’ health needs has been made at global and regional levels, to overcome these barriers. Assistance is available to Member States for reviewing and adopting migrant-friendly policies and legal frameworks that promote rather than hinder migrants’ and mobile populations’ access to health services.

Keywords: access to health care, Greater Mekong Subregion, migrants, migration, malaria, universal health coverage

Background
The launch of the Global compact for safe, orderly and regular migration in December 2018 marked the first-ever United Nations global agreement on a common approach to international migration in all its dimensions.¹ The global compact aims to reduce the risks and vulnerabilities migrants face at different stages of migration, by respecting, protecting and fulfilling their human rights and providing them with care and assistance. The compact underscores migrants' right to health and delineates the policies and process through which states might make this a reality. The compact in turn reflects the central aim of the United Nations 2030 Agenda for Sustainable Development to "leave no one behind".² Meeting many targets of the 17 Sustainable Development Goals will positively impact the health of migrants, but Target 3.8 is perhaps the most direct: "Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all".³

The Greater Mekong Subregion (GMS) has experienced consistent economic development over the last decade, and thus is a key example of the intersection of the right to health and migration. Multilateral agreements, such as the
have contributed to improved economic collaboration among GMS countries – Cambodia, Lao People’s Democratic Republic, Myanmar, the People’s Republic of China (Yunnan Province and Guangxi Zhuang Autonomous Region), Thailand and Viet Nam – through improvements in infrastructure and promotion of trade and investment. This development has brought a marked overall increase in human mobility within the region, which varies among the countries. Thailand is by far the main receiving country in the region, hosting between three and four million migrants from other GMS countries.

Economic growth in the region has been promoted by the development of a transport network linking economic hubs creating active trade and labour markets in cities along economic corridors that integrate the regional economy. As a result, cross-border mobility in the GMS is highly dynamic and complex, with migration fluctuating on a daily or weekly basis in the border towns of the economic corridors. Either seasonal or long-term, labour migration constitutes the main type of migration in the GMS. Irregular migration (movement that takes place outside the regulatory norms of the sending, transit and receiving countries) remains widely spread throughout the region, and is the reason why it is difficult to obtain reliable migration data for the GMS. Recent estimates report over 5 million international migrants within the region, including 4.9 million in Thailand (of which 3.9 million are migrant workers from Cambodia, Lao People’s Democratic Republic, Myanmar and Viet Nam).

Human mobility has been described as a risk factor for control and elimination of malaria. Migration from areas of high transmission can cause the reintroduction of malaria in low-malaria or malaria-free areas. On the other hand, migrants from non-endemic areas have little immunity to malaria, showing an increased risk of developing high parasitaemia and clinical malaria and of death. Also, studies have shown that migrants can have a higher prevalence of malaria than the resident population in certain situations, which could be related to the higher exposure to areas that are endemic for malaria as a result of their work (forestry, agricultural); their lack of knowledge about the disease in terms of transmission and prevention; and their lack of knowledge about the location of health services and their right to access them.

Five of the six GMS countries are endemic for malaria. Even though the region is marked by population mobility, the incidence of malaria has reduced in the past two decades. However, despite the efforts made, the region still faces a concerning malaria situation. The emergence and spread of multidrug-resistant malaria parasites in the GMS represents a threat to efforts for prevention, control and elimination of malaria. In this context, population mobility has been identified as an important concern in the GMS, especially along national borders where the burden of malaria is higher and in locations where antimalarial multidrug resistance, including artemisinin resistance, has been detected or suspected.

Thus, for the aim of achieving elimination of malaria, human mobility and antimalarial multidrug resistance, including artemisinin resistance, remain issues of key concern in the GMS. The World Health Organization (WHO) Global technical strategy for malaria 2016–2030 and the Strategy for malaria elimination in the Greater Mekong Subregion have recognized the need for targeting migrants and mobile populations to achieve this goal. Both documents advocate providing migrants with access to health services, including access to protection measures, early diagnosis and treatment. The WHO Emergency response to artemisinin resistance in the Greater Mekong subregion: regional framework for action 2013–2015, launched in 2013 to contain the spread of the resistance, advocates expanding the provision of health services to include migrants.

In 2008, the World Health Assembly recognized the need to address the health of migrants in its Resolution 61.17, which calls governments to take action on promoting equal access to health care for migrants and include them in national and regional health strategies. In 2017, the World Health Assembly ratified a further Resolution 70.15 on promoting the health of refugees and migrants and reaffirming the health-related commitments for refugees and migrants in the development of the Global compact on refugees and the Global compact for safe, orderly and regular migration.

One of the four key themes of the Operational Framework on Migrant Health developed at the first Global Consultation on Migrant Health and based on the World Health Assembly Resolution 61.17, is to assess and address policy and legal frameworks related to migrant health (see Box 1). Specifically, this involves adopting relevant international standards on the protection of migrants and respect for rights to health in national law and practice; implementing national health policies that promote equal access to health services for migrants; and

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**Box 1. World Health Assembly Resolution 61.17 on migrant health: key themes**

**Monitoring migrant health**
- Develop health information systems, collect and disseminate data
- Assess and analyse migrants’ health
- Disaggregate information by relevant categories

**Policy and legal frameworks**
- Promote migrant-sensitive health policies
- Include migrant health in regional/national policies
- Consider the impact of policies on other sectors

**Migrant-sensitive health systems**
- Strengthen health systems; fill gaps in health service delivery
- Train the health workforce on migrant health issues; raise cultural and gender sensitivities

**Partnerships, networks and multicountry frameworks**
- Promote dialogue and cooperation among Member States, agencies and regions
- Encourage a multisectoral technical network

extending social protections in health and improving social security for all migrants.

Policies and frameworks on migrants’ access to health services and elimination of malaria

In order to provide an evidence base and guidance for malaria programme managers at national level in addressing the policy and legal framework elements of migrants’ access to malaria services, the International Organization for Migration (IOM) and WHO partnered to collaborate on a review of policies and legal frameworks in five GMS countries (Cambodia, Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam), to provide recommendations for malaria programme managers on the technical implementation and policy implications of addressing malaria. The objective was to contribute to understanding and addressing the legal obstacles that migrants face in accessing health services and the impact that these obstacles have for elimination of malaria and containment of artemisinin resistance in the region. This paper describes key results and findings from the review and highlights the collaborative process that was undertaken to conduct the review and subsequent report publication.

Approach

The review was undertaken, and the subsequent report produced, through a collaboration between IOM country offices, IOM’s Regional Office for Asia and the Pacific and the WHO Country Office for Thailand (Emergency Response to Artemisinin Resistance [ERAR]-GMS). The review was undertaken in 2015, with subsequent analysis, review and checking with respective ministry of health counterparts before being completed in 2016, and published by WHO in 2017. It is important to note that, as the data collection and review were undertaken in 2015, the review describes the laws and policies in place at that time.

The methods used included (i) reviews of existing documentation, electronic databases and publications, detailing how Cambodia, Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam have addressed the health of inbound, outbound and internal migrants and responded to the global and regional migration and/or health frameworks, such as ASEAN resolutions, memoranda of understanding and other agreements; and (ii) supplementary informal discussions with key actors, such as the International Relations Division of the Ministry of Health and other ministries of Myanmar and Cambodia, and the Ministry of Health and Ministry of Foreign Affairs of Lao People’s Democratic Republic, as well as other experts in the field of malaria in Thailand.

Each country review was conducted by in-country consultants or IOM country offices and further reviewed by the IOM Regional Office for Asia and the Pacific. A regional consultant was responsible for gathering applicable regional data and integrating all country reports. Technical review of the report was conducted by the Migration Health Unit of the IOM Regional Office for Asia and the Pacific, with inputs from the WHO ERAR focal person for malaria and border health, based at the WHO Country Office for Thailand.

The review process also considered a range of international and regional instruments and their application in the context of malaria elimination and artemisinin resistance; these instruments covered areas including universal health coverage, conventions on occupational health and safety, the International Health Regulations (2005), World Health Assembly resolutions, and health and human rights.

Furthermore, the review identified gaps and opportunities affecting the implementation of health policies and laws. By use of available data, reports, studies and publications to identify the trends in migration within and between countries, the review considered their implications not only for malaria but also for advancement of the right to health for all in the GMS. Selected illustrative findings are presented next.

Labour laws enabling migrant workers’ access to health care

According to the International Labour Organization (ILO) Conventions (No. 97, 143 and 155), countries hosting migrant workers should have labour and social laws that protect their rights, especially concerning working conditions and occupational health and safety. Also, migrant workers should be provided with access to health services, including access to emergency care. Both medical care and safety and health protection should be equal to that provided to nationals.

Thailand

Thailand’s Workmen’s Compensation Act establishes rights for workers to access medical treatment in the event of work-related injury or illness; the associated medical expenses must be covered by employers, who are also obliged to compensate workers for lost income. Employers can use the Workmen’s Compensation Fund (to which they have the duty to pay contributions) to cover all these costs. However, although migrant workers have the same rights as Thai nationals, this Act only applies to workplaces with 10 or more employees.

Cambodia and Lao People’s Democratic Republic

Cambodia and Lao People’s Democratic Republic also afford documented migrants’ protection under their labour laws. In Cambodia, the Labour Law, which covers all workers regardless of their nationality, except domestic or household servants, states that employers “must provide the primary healthcare for their workers” (art. 238). Occupational illnesses and work-related accidents must also be covered by employers, who should provide their workers with medical assistance, including medical treatment and hospitalization, and compensation if temporary incapacitation or permanent disability occurs. Additionally, employers are required to cover expenses related to chemical prophylaxis or vaccination against epidemics.

In Lao People’s Democratic Republic, the Labour Law, which applies to all employees, including foreigners, includes a specific section on migrant labour that grants legal protection to foreign workers according to the laws of the Lao People’s Democratic Republic (art. 69). In the case of occupational diseases and/or work-related accidents, employers must take responsibility for treatment and rehabilitation costs.

Viet Nam and Myanmar

Viet Nam and Myanmar have few labour regulations ensuring health rights for migrant workers. Viet Nam has minimum health...
and safety regulations contained in the Law on Vietnamese Guest Workers and in Decree No. 44/2013/ND-CP. The Decree states the responsibility for participation in compulsory medical, social and unemployment insurance of employers and employees with labour contracts. The regulation also provides for minimum responsibilities of employers in the event of employees suffering occupational accidents or illnesses. These obligations consist of payment of first-aid expenses, full salary for the duration of treatment and compensation.

Myanmar’s labour laws are over 60 years old and are limited in scope, not providing health rights for migrant workers. The Department of Labour is currently leading an internal process of drafting laws in this area. However, as the main sending country in the GMS, protection to Myanmar citizens working abroad has been provided for in the Law of Overseas Employment, which aims to ensure that overseas workers have access to medical treatment free of charge in cases of work-related injury or illness.

Health and social protection laws promoting access to health services for migrants: universal health coverage and non-occupational health schemes

Based on the principles of universal health coverage – ensuring that all people obtain the health services of adequate quality that they need without risk of financial ruin or impoverishment – and as stated in World Health Assembly Resolution 61.17, 17 migrants, independently of their legal status, should be included in national health schemes. Cambodia, Lao People’s Democratic Republic, Myanmar and Viet Nam lag far behind Thailand regarding universal health coverage.

Thailand

When analysing how far GMS countries have gone towards achieving universal health coverage, and thus including migrants in their health systems, it was found that Thailand is the only GMS country that has established a universal health-care scheme. The scheme was introduced in 2002 after promulgation of the National Health Security Act that sets the legal basis for the country’s Universal Coverage Scheme. Data from 2008 estimated that the scheme covers 75% of Thai citizens. The remaining Thai population is covered by the Social Security Scheme, covering private sector workers (7%), or by the Civil Servant Medical Benefit Scheme, covering civil servants (16%). In 2001, in order to provide health coverage to documented migrant workers, Thailand established a Migrant Health Insurance Scheme that includes services for prevention, diagnosis and treatment. Payment of fees for annual membership for a compulsory annual medical examination is required to benefit from the scheme (1600 baht and 500 baht, respectively, in 2018). This scheme allows undocumented migrants to purchase health insurance membership. With this system, Thailand is a pioneer in providing access to health services for migrants; however, the access is restricted to the health facility where migrants were first registered. Regular migrant workers employed in the formal sector are able to join the Social Security Scheme with the same entitlements as Thai citizens, where employers and workers each contribute 5% of the worker’s salary, and the government contributes an amount equivalent to 2.75%. As of November 2018, it was reported that in Thailand approximately 64% of documented migrant workers from GMS countries who were eligible for health insurance coverage were enrolled. This proportion falls to 51% if all eligible migrants (documented and undocumented) are considered.

Cambodia

In Cambodia, health-care services are mainly provided by the private sector. With the aim of increasing the use of public health services and promoting better access for the poor, health equity funds have been implemented across the country since 2000. These funds are run by a third party, normally a local nongovernmental organization, which operates with selected public health facilities. The government also has its own subsidy scheme, which is used to reimburse public health facilities for exempted user fees. A social security system for private sector workers is outlined in the Law on Social Security Schemes for persons defined by the provisions of the Labour Law. With compulsory contributions from employers, the National Security Fund ensures that employees can benefit from a pension scheme, health insurance scheme and employment injury insurance. The Law applies to all workers regardless of nationality. The draft of a Social Health Insurance Master Plan, based on the Strategic Framework for Health Financing 2008–2015, aims to further develop and expand universal coverage of social services – aimed at Cambodian nationals only – and group the existing schemes under a national social protection system. Although efforts have been made to improve access to health services for poor and disadvantaged groups (National Social Protection Strategy for the Poor and Vulnerable), migrants are not included under this strategy.

Lao People’s Democratic Republic

Lao People’s Democratic Republic currently has four social protection schemes moving towards achievement of universal health coverage: a mandatory Civil Servants’ Scheme, a Social Security Office Scheme, a voluntary community-based health insurance and a Health Equity Fund (fund for the poor). However, as of 2012, only 18% of the Lao population was covered by these schemes. Workers and their dependents are provided with health coverage under the social security office scheme; however, no specific mention is made of migrant workers. Given the provisions of the Labour Law, which suggest that documented migrant workers are afforded protection and access to health care, it could be inferred that documented migrant workers are entitled to health services under the Social Security Office Scheme. Lao People’s Democratic Republic lacks health-care laws in which migrants have been specifically considered; the country’s Law on Health Care 2014 states that all citizens are entitled to receive health care when ill; however, no reference is made to migrants.

Myanmar and Viet Nam

In Myanmar and Viet Nam, commitment has been made to attain universal health coverage by 2030. Myanmar’s National Health Plan 2011–2016 recognizes the importance of migration with respect to communicable diseases and health status in border areas. While migrants have been mentioned in initial planning meetings, there are no formal legislative or legal policy frameworks to ensure the inclusion of migrants in activities related to universal health coverage. In 2008, the Government of Viet Nam promulgated the Law on Health
Insurance,\textsuperscript{51} to expand its national Social Health Insurance programme, and thus facilitate access to health services to, eventually, the entire population.\textsuperscript{54} Under this Law, migrant workers can participate in the national health insurance. However, access to health services for migrants is restricted by the Law on Residence,\textsuperscript{55} which links household registration status with the right to health and social services. Migrants typically possess temporary registration status and, under this type of registration, they cannot access certain health and social services, or they can access them only where they are permanently registered.

**Malaria frameworks promoting access to health services for migrants**

Two main malaria frameworks are in place regarding malaria control in the GMS: the *Strategy for malaria elimination in the Greater Mekong Subregion: 2015–2030*\textsuperscript{53} and the *Emergency response to artemisinin resistance in the Greater Mekong subregion: regional framework for action 2013–2015*.\textsuperscript{24} Both frameworks emphasize that provision of services for mobile and migrant populations is essential. The frameworks were supported by a series of practical guides, from the Mekong Malaria Elimination programme, on assisting countries to identify priorities surrounding population mobility and take action to develop proactive initiatives to respond to emerging population mobility and malaria trends in the region.\textsuperscript{56}

The five GMS countries reviewed have adopted national strategies for malaria elimination in line with the frameworks; all of them recognize migrants as a vulnerable group.

**Cambodia**

Notably, Cambodia has the best initiative to target migrants in the context of malaria elimination. In addition to its *National Strategic Plan for Elimination of Malaria*,\textsuperscript{57} it has designed the *Strategy to Address Migrant and Mobile Populations for Malaria Elimination in Cambodia (2013)*.\textsuperscript{58} The document analyses migrants’ malaria vulnerability and describes the associated risks according to movement patterns and work type. Relevant proposed interventions targeting migrants are described, including implementation of prevention measures such as health education through mass media, videos in buses and taxis, or information, education and communication materials; distribution of long-lasting insecticidal nets; early diagnosis and treatment; and increased surveillance and research to track malaria and migration hotspots.

**Myanmar and Thailand**

In their national malaria strategies, both Myanmar and Thailand mention the need to provide clinical services for malaria for migrants. In Myanmar, migrants are recognized in the *National Strategic Plan for Malaria Prevention and Control 2010–2016* as a vulnerable group,\textsuperscript{59} and are explicitly referenced in its section on “Directions for malaria prevention”. The plan includes action points targeting migrants, such as establishing malaria clinics in strategic and hard-to-reach areas with large numbers of migrant workers, and providing specific information, education and communication materials for migrants. In its national strategy, Thailand has also acknowledged migrants as a target population for malaria control.\textsuperscript{56} The strategy calls for specific programmes to control malaria in migrants and considers this a key group for containment of the spread of artemisinin-resistant malaria parasites. Decreasing the annual parasite incidence in migrants is one of the targets of the strategy. To that end, cross-border screening and treatment of migrant workers should be provided.

**Lao People’s Democratic Republic**

The *Lao National Strategy for Malaria Control and Pre-elimination 2011–2015* also recognizes migrants, especially temporary and seasonal workers, as a key risk group for malaria. Development of specific information, education and communication, such as roadside bill-boards targeting migrant workers, and mass media campaigns is mentioned in the objectives of the strategy.\textsuperscript{60}

**Viet Nam**

Viet Nam’s national strategy for malaria control suggests increasing research activities on vector-control measures for migrant workers but does not specifically recognize migrants as a vulnerable group.\textsuperscript{61} Nevertheless, Viet Nam’s *Action Plan to Prevent Artemisinin Resistance Malaria* for the period of 2015–2017 targets seasonal workers, specifically cashew and cassava farm labourers, as a risk group. The plan provides for ensuring rapid diagnosis and malaria treatment for migrants.\textsuperscript{62}

**Strategies and cooperation: ensuring inclusion of migrants**

At the time the review was undertaken, all GMS countries are committed to, among others, the *WHO Global technical strategy for malaria 2016–2030*,\textsuperscript{8} and the *WHO Strategy for malaria elimination in the Greater Mekong Subregion (2015–2030)*,\textsuperscript{11} launched in May 2015. In May 2007, the countries signed memoranda of understanding to continue indefinitely with the Mekong Basin Disease Surveillance project, through which the countries have been working together since 2001 to progressively build local capacity, share information and cooperate in outbreak response and pandemic preparedness.\textsuperscript{63} All are signatories to the ASEAN Declaration on Strengthening Social Protection.\textsuperscript{64} All have also entered into bilateral agreements with one another regarding migration or trafficking in persons, which include cooperation on health matters, such as focal points for health services at border crossings; healthcare assistance; health insurance; occupational health and safety; and even a trilateral cooperation for health between Myanmar, Thailand and the United States Cross-Border Partnership, which provides a platform for cities along the border to synchronize malaria-control activities.\textsuperscript{65} As of 2015, all GMS countries have adopted national strategies for the elimination of malaria, in line with the *WHO Global technical strategy for malaria 2016–2030* and the World Health Assembly Resolution WHA68.2 for 2016–2030, which specifically recognize migrants and mobile populations as a vulnerable group.\textsuperscript{86} In 2017, WHO published *A framework for malaria elimination*,\textsuperscript{67} providing malaria-endemic countries with further guidance for national strategic plans for malaria elimination, specifically on the tools, activities and dynamic strategies required to achieve interruption of transmission and to prevent re-establishment of malaria. In November 2017, recognizing the need for high-level political commitment, the ministers of health of all Member States in the WHO South-
East Asia Region made a commitment towards a malaria-free region by 2030, through signing the Ministerial declaration on accelerating and sustaining malaria elimination in the South-East Asia Region,68 with a Regional Action Plan 2017–2030,69 along with a framework for a South-Asia subregional cross-border collaboration network to eliminate malaria.63 A Ministerial call for action to eliminate malaria in the Greater Mekong Subregion before 2030 was also adopted by GMS countries at a high-level meeting in December 2017.70

Although migrant workers are specifically mentioned in some of the policy documents and legal frameworks reviewed, it remains unclear whether the term “migrant” refers to international or internal migrants or both. Inconsistent use of the term has been observed across the GMS countries, together with a lack of specific health legislation directly addressing inbound migrants. This lack of specificity leaves much room for subjective interpretation, which may result in inconsistent legal protection for migrants in the region. The use of the term “migrant and mobile populations” appears to have been interpreted in national malaria strategies as exclusively including internal migrants or citizens, but specific reference to inbound migrants is not made.

Findings show that all GMS countries except Myanmar have minimum occupational health and safety regulations. However, malaria has not been specifically considered as an occupational health concern in any of the existing regulations, even though, owing to the nature of the work, some workers such as those involved in agricultural or forest activities, are considerably exposed to the parasite. It could be argued that malaria should fall under these regulations in cases where there is a foreseeable risk of contracting malaria in a work setting. Provision of malaria prophylaxis and treatment medications for at-risk workers could be included in occupational health and safety policies in the same way that the Cambodia Labour Law requires employers to cover expenses related to chemical prophylaxis or vaccination against epidemics.34 Also, other protective measures for malaria, such as insecticide treatment kits, long-lasting insecticidal nets, or personal protective equipment could be then provided and covered by employers if stipulated by labour laws.

Although efforts are being made towards achieving universal health coverage in the GMS countries, migrants are not included in health financing schemes, apart from in Thailand, and existing laws and policy documents do not refer to migrants in their roadmaps towards universal health coverage. Current regulations for health and social protection do not ensure migrants’ access to health services, except in Thailand, where documented and undocumented migrants can opt for acquiring health insurance. Additionally, there is a lack of migrant-inclusive legislation in GMS countries, since barriers to accessing health services for migrants – such as language and/or socioeconomic factors – have been scarcely considered. Advocacy to promote legislative approaches that include migrants’ health needs have been made at global and regional levels,27 to overcome these barriers.

Although migrants have been mentioned and frequently identified as a vulnerable group in national strategies for malaria in the GMS, not all the strategies address migrants similarly. While interventions such as information, education and communication campaigns and early diagnosis and treatment for migrants have been acknowledged in all strategies, malaria surveillance and mapping of migrants have not always been considered. The report based on this review provides detailed short- and long-term recommendations for internal, inbound and outbound migrants.28

**Conclusion**

While there is now uniform recognition of the need to include migrants and mobile populations in elimination and control of malaria in GMS countries, there remain discrepancies in the adoption and implementation of legal and policy frameworks that promote migrants’ and mobile populations’ access to health and malaria services in the GMS. All GMS countries have adopted national malaria strategies in line with the current WHO Global technical strategy for malaria 2016–2030,9 and the WHO publication A framework for malaria elimination;87 however, there remain multiple legal and policy-level barriers for migrants in accessing health and malaria services across the GMS.

In line with current efforts at global, regional and national levels to improve the health of migrants, including via the Global compact for safe, orderly and regular migration,1 the WHO Global action plan to promote the health of refugees and migrants and refugees,71 drafted in preparation for the 72nd World Health Assembly in 2019, and other relevant initiatives, IOM and WHO stand ready to continue to collaborate and assist Member States in reviewing and adopting migrant-friendly policies and legal frameworks that promote rather than hinder migrants’ and mobile populations’ access to health services. This successful collaboration between IOM, WHO and Member States to review international, regional and national policies and legal frameworks for GMS countries can serve as an example and template for other countries and for other programmes where the health of migrants is critical to achieving national, regional and global health goals.

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**References**


Access to health services by informal sector workers in Bangladesh

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Abstract
According to the constitution of Bangladesh, health is a right and, in 2012, initial work towards universal health coverage was marked by introduction of a health-care financing strategy. However, for 2016, Bangladesh’s domestic general government health expenditure was only 0.42% of gross domestic product, making it one of the lowest-spending countries in the world, with 72% of current health expenditure coming from out-of-pocket spending. One factor that is key to the challenge of providing universal health coverage in Bangladesh is the large proportion of the population who work in the informal sector – an estimated 51.7 million people or 85.1% of the labour force in 2017. Most workers engaged in the informal sector lack job security, social benefits and legal protection. The evidence base on the health needs and health-seeking behaviours of this large population is sparse. The government has recognized that increased efforts are needed to ensure that the country’s notable successes in improving maternal, neonatal and child health need to be expanded to cover the full range of health services to the whole population, and specifically the more marginalized and impoverished sectors of society. In addition to the universal need to increase funding and to improve the availability and quality of primary health care, workers in the informal sector need to be targeted through an explicit mechanism, with enhanced budgetary allocation to health facilities serving these communities. Importantly, there is a clear need to build an evidence base to inform policies that seek to ensure that informal sector workers have greater access to quality health services.

Keywords: Bangladesh, health financing, informal workers, quality, universal health coverage

Background
Since independence in 1971, Bangladesh has had notable successes in health, despite significant challenges. As a “good health at low cost” exemplar, Bangladesh has used a number of innovative approaches and achieved significant improvements, notably in lowering the total fertility rate and the rates of infant and under-5 mortality. However, progress has been uneven in recent years. According to the most recent analysis of progress on universal health coverage and the health-related Sustainable Development Goals in the World Health Organization (WHO) South-East Asia Region, only half of its population is covered by essential health services, while the average for countries in the region is 64%. This low coverage exists despite a large network of health facilities throughout the country.

Health planning in Bangladesh
Between 2016 and 2017, the government revised its essential health service package (ESP) to expand the scope of services to include noncommunicable diseases and to focus on strengthening provision at the district level. The ESP is part of the Strategic Investment Plan of the Fourth Five-Year Health Sector Programme, which is being implemented between January 2017 and June 2022. The goal to roll out an expanded ESP package for all is challenging, since the Bangladesh Demographic and Health Survey 2017–2018 showed very wide variations in coverage both by type of service – from only 2.2% coverage for female sterilization to 82.5% for BCG vaccination – and by delivery channel, with an estimated weighted average of 20.4% coverage in the public sector. According to the constitution of Bangladesh, health is a right. However, public investment is yet to match the constitutional commitment: for 2016, Bangladesh’s domestic general government health expenditure was only 0.42% of gross domestic product (GDP), making it one of the lowest-spending countries in the world, with 72% of current health expenditure coming from out-of-pocket spending.
Informal employment and associated health costs in Bangladesh

As with all low- and middle-income countries, employment in Bangladesh is largely informal. Although definitions of informal employment differ, it is generally recognized as being an unregistered, unincorporated (i.e. not a separate legal entity from the owner) activity that involves selling at least some of the goods or services produced.\(^7\)

The Fourth Five-Year Health Sector Programme explicitly recognizes the need to expand existing services to groups that are currently underserved;\(^6\) however, the evidence as to who is actually covered by health services and who is left behind is sparse. The national health management information system only captures data from the public sector at an aggregated level. Therefore, the extent to which workers in the informal sector are covered with health services is largely unknown; yet this large group of 51.7 million people constitutes 85.1% of the labour force.\(^6\) The sectoral distribution of this group is 97.9% in the agricultural sector, 90% in the industry sector and 70.6% in the service sector. Their profile is mixed, ranging from daily labourers, piece-rate workers, farmers, self-employed persons and others. Most workers engaged in the informal sector lack the benefits of secure contracts, social benefits and legal protection. This group is more likely to have a hazardous working environment; to be more exposed to exploitation and loss of income when ill; and thus to be less likely to seek formal health services and instead resort to informal health providers or self-medication through pharmacies and drug sellers.

Although the informal sector contributes the most to the economy of Bangladesh, the workers in this sector have hardly any financial protection. A study among three occupational groups of informal workers – rickshaw pullers, shopkeepers and restaurant workers – revealed that 57% had experienced an episode of illness in the previous 6 months that led to considerable direct and indirect costs.\(^7\) The average health expenditure incurred for their treatment accounted for 8.9% of their annual income, while income loss for the periods of absence from work due to illness during the study period accounted for 28.5% of their overall income – i.e. a total loss of 37.4% of their overall income.

In a community-based cross-sectional study of rural households in Bangladesh, there was some evidence to suggest that patients engaged in agricultural or daily labour occupations were more likely to seek treatment from informal providers or paramedics (e.g. village doctors, medical assistants and community health workers), while patients engaged in the service sector were more likely to seek treatment from qualified health professionals.\(^10\)

With respect to urban informal sector workers, a study on the health-care-seeking behaviour of street dwellers in Dhaka city showed only 11% used government health facilities, with pharmacies and drug sellers being the preferred point of contact for those seeking health care.\(^11\) The female street dwellers were mainly domestic helpers, pickers and sellers, day labourers and sex workers, with 48% unemployed. The male street dwellers were day labourers and rickshaw/ van pullers. Among the reasons for not seeking care, street dwellers of both sexes cited lack of money as the main reason, while men also considered that treatment was not necessary. Other reasons included lack of knowledge about the location of health facilities and neglect of service providers.\(^10\)

A household survey demonstrated a similar pattern among 3000 slum dwellers in Dhaka City, who were mainly employed in the informal sector. Almost 70% used pharmacies or drug stores as their main source of health care. About 33% had used allopathic health facilities, of which only 14% were government services.\(^12\) This is in line with the high share of spending on medicines and medical goods (through pharmacies) in the country, which accounts for almost half of the total (public and private) health spending, at 43.3%.\(^13\)

The way forward

As Bangladesh seeks to contribute to the global commitment of “health for all”, and improve the health of its population, more inclusive policies are needed to ensure workers in the informal sector are not left behind. To this end, there is need to:

- Target informal sector workers through an explicit mechanism that ensures they benefit from the ESP as a set of priority interventions. Geographical targeting could be introduced, seeking to reach informal workers in the poorest areas, through enhanced budgetary allocation to health facilities in those areas. Moreover, demand-side financing is another option to incentivize the uptake of services by this population group.
- Improve the evidence base to inform policies that seek to ensure workers in the informal sector have greater access to quality health services. This should be achieved by supporting enhancements of the routine information and population-based systems to better capture data from both the public and private sectors, which are disaggregated by income, gender, geography, etc., while assisting capacity-development to analyse, interpret and disseminate evidence generated through these systems. At the same time, it is important to ensure regular mechanisms to review the evidence base and monitor courses of action and policies, for instance, through a sector-wide approach.
- In view of rapid urbanization, strengthen the primary healthcare delivery system for populations in urban and slum areas, to address the health problems of this vulnerable and marginalized group.

Targeting of the informal workforce in Bangladesh needs to be done in concert with overall strengthening of healthcare delivery to the whole population. To that end, there is a clear need to increase the government budget allocation to the health sector. As noted previously, with less than 1% of GDP spent on health by the government, Bangladesh is among the countries that spend least on health. Whether this will be pursued through an increased tax base or through a larger share of the budget for health, the bottom line is that health needs more public investment. In addition, there is a recognized need to increase the number of qualified healthcare providers posted to lower-level health facilities, prioritizing quality in front-line services. More mid-level cadres such as nurses should be trained (with improved quality standards for their education as well) and posts created to absorb them at union and community levels.
Finally, as noted explicitly in the Fourth Five-Year Health Sector Programme, there is a need to enhance the quality of services provided. This should include the quality of clinical services, which needs to closely adhere to evidence-based practices, with supervision and monitoring systems introduced, particularly for front-line services. It is important to ensure regular supplies of medicines in public facilities and to improve rational prescribing and use, which would contribute to both quality objectives and reducing out-of-pocket spending.

In parallel, improved responsiveness of health workers and facilities in line with a people-centred approach to services is needed.

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References


Adolescents left behind by migrant workers: a call for community-based mental health interventions in Nepal

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Abstract
Over the past two decades, the unique health needs associated with the second decade of life have been recognized, not least the mental health of adolescents. In parallel, the negative health impacts of parental migration on the children and adolescents who are “left behind” in low- and middle-income countries (LMICs) is beginning to be acknowledged. Nepal is a growing supplier of labour migrants – an estimated 3.5 million Nepali individuals are working abroad – resulting in families being separated and thousands of adolescents being left behind. This can increase psychological and emotional stress and feelings of loneliness and abandonment, and reduce self-esteem among left-behind adolescents, which in turn may have a negative impact on their psychosocial health. Globally, mental health and neurodevelopmental disorders are one of the top three causes of disability-adjusted life-years lost among adolescents. The devastating earthquake in Nepal in 2015 brought into sharp focus the lack of prioritization of mental health services and spurred development of the Community mental health care package Nepal, 2074 in 2017. This package, together with the upcoming revised National Mental Health Policy, emphasizes the need to (i) ensure the availability and accessibility of basic mental health and psychosocial support services for all; and (ii) facilitate integration of mental health services into the primary health-care system. Recognizing that mental health and psychosocial support services have been predominantly focused on the adult population only, the package includes a component on childhood and adolescent mental and behavioural disorders. It will be essential for policy-makers to ensure that strategies are in place to ensure that left-behind adolescents, especially those who are not in school, have access to these community-based services. Given the paucity of research on mental health interventions among adolescents in LMICs in general, monitoring and assessment of what works for this special group of young people in Nepal may have broader implications for implementation in other countries where migration has resulted in significant populations of left-behind adolescents.

Keywords: adolescents, Asia, developing countries, left behind, migration, stress, young people

Background
Over the past two decades, the unique health needs associated with the second decade of life have been recognized, not least the mental health of adolescents. With respect to burden of disease, self-harm was the third-ranked global cause of adolescent deaths in 2015, with almost half of these deaths occurring in the World Health Organization (WHO) South-East Asia Region. For the same year, self-harm and depressive disorders were, respectively, the third- and fourth-leading causes of disability-adjusted life-years among adolescents in the region.1

As reported by the WHO Mental health atlas 2017, large disparities exist for child and adolescent services – globally, the median number of child and adolescent mental health beds is less than 1 per 100,000 population and ranges from below 0.2 per 100,000 in low- and lower-middle-income countries to over 1.5 per 100,000 in high-income countries.2 In addition, among the 78 (out of a total of 177 responses) countries that reported the percentage of government mental health workers providing child and adolescent mental health services, the median provision was below 9%.2 In Nepal, as in many low- and middle-income countries (LMICs), mental ill-health is still a “taboo”, as it is commonly believed to be synonymous with “insanity” and
linked to "sins perpetrated in the past life". This stigmatization prevents adolescents and their parents discussing mental health problems and seeking appropriate treatment.

Labour migration and “left-behind adolescents” in Nepal

For a particular subset of adolescents, parental support is limited, because of migration. Owing to limited employment and other opportunities, international and internal migration are considered as a livelihood strategy for many people. Labour migration is an important phenomenon in Nepal and other LMICs, where one or both parents migrate for work, either internally within the same country or abroad, leaving their adolescent dependents (known as “left-behind adolescents”) at home. An estimated 3.5 million Nepali are working abroad, primarily in India, Malaysia and the Middle East. This has led to families being separated, and thousands of adolescents are left behind in Nepal as a spouse, child or sibling. This can increase psychological and emotional stress and feelings of loneliness and abandonment, as well as reducing self-esteem among left-behind adolescents, which in turn may have a negative impact on their psychosocial health.

Evidence on the mental health of left-behind adolescents

Much of the evidence to date on the mental health of left-behind adolescents has been gathered in China and focuses on internal migration. For example, a systematic review in 2014 of studies of children aged under 18 years who were left behind in rural China reported that depression and anxiety in left-behind children was higher than in those not left behind. More recently, a 2018 systematic review and meta-analysis on the health impact of parental migration on left-behind children and adolescents concurred with previous reviews showing that, although parental labour migration might have economic benefits for families, there may also be hidden costs for the health of children and adolescents who are left behind. Again, most of the studies included focused on internal migration in China and the meta-analysis indicated that left-behind children and adolescents have worse outcomes than children of non-migrant parents, especially with regard to mental health and nutrition. Compared with children of non-migrants, left-behind children and adolescents had a 52% increased risk of depression, 70% increased risk of suicidal ideation and 85% increased risk of anxiety. A global school-based student health survey among Nepali adolescents aged 13–21 years showed that lower perceived parental engagement was significantly associated with higher odds for suicide attempt and anxiety in both boys and girls. These findings suggest a need for focused mental health-related interventions aimed at left-behind adolescents.

Psychological health of adolescents in Nepal

Data from the Nepal Adolescents and Youth Survey (NAYS) 2010/11, a nationally representative survey of 11 477 Nepali adolescents (aged 10–19 years), suggested alarming levels of poor psychosocial health: 14% (n = 1570) reported at least one perceived psychosocial problem in the previous 12 months. Of these 1570, this manifested as feeling anxious and restless in 73.1%, feeling “fed up with life” in 39.2%, the occurrence of negative thoughts and loss of self-confidence in 38%, feelings of hopelessness in 32.1% and suicidal ideation in 12%. Another retrospective study, based on police records and thus likely to represent an underestimate, noted that the annual incidence of cases of completed suicide among adolescents (defined as aged 13–21 years) in the country had increased threefold from 5.1 per 100 000 in 2005 to 15.7 per 100 000 in 2009.

Mental health governance in Nepal and the role of community

In recent years, Nepal has made some attempt to improve mental health governance. The National Mental Health Policy 1997 was revised in 2017 by a task force and is under the process of approval. The revised policy aims to provide community-level mental health and psychosocial services at selected places, in collaboration with community-based and nongovernmental organizations. In addition, the Multisectoral action plan for the prevention and control of non-communicable diseases (2014–2020) incorporates a mental health action plan, which outlines several community-based strategies, such as scaling up community mental health programmes in all districts; fostering partnerships with influential community groups; integrating mental health in school health programmes; and training female community health volunteers to identify people with mental illness. A community mental health-care package was developed in 2017, aimed at facilitating the implementation of the National Mental Health Policy by integration of basic mental health and psychosocial support services into the community health-care system. Based on the WHO Mental Health Gap Action Programme (mhGAP), it envisages a community role in areas such as awareness and mass sensitization; stigma reduction; implementation of a community informant detection tool; providing basic psychosocial and emotional support; and mobilizing self-help groups.

The role of community in prevention, detection and management of mental illness has become increasingly important in Nepal, owing to the increasing burden of mental health problems and poor availability of skilled mental health workforce. The latest data showed that there are only 150 psychiatrists, 70 psychiatric nurses and 28 clinical psychologists to serve 28 million people in the country. In addition, mid-level health workers (nurses, health assistants, auxiliary nurses, female community health volunteers), who could play a significant role to reduce the gap in mental health care in the community, receive no or minimal training on mental health in their education, and the training they receive is often without practical exposure. In light of this situation, the Ministry of Health, together with WHO and nongovernmental organizations active in mental health, adopted the mhGAP training course for health workers and doctors. A standard treatment protocol was developed and put in to practice in 2017, together with the mhGAP training package.

A number of studies and programmes in Nepal and in other countries have demonstrated the effectiveness of
a community-based approach to address mental health challenges. For example, use of the community informant detection tool is not only effective for detection of mental health cases in the community, but has also been shown to have increased utilization of mental health services in Nepal. Another good example of community mental health activities is the “community mental health and psychosocial support programme” carried out by the Centre for Mental Health and Counselling—Nepal, which has trained more than 2000 health workers, 8000 female community health volunteers and 250 doctors, and these trained workers have subsequently provided mental health services to more than 50,000 individuals, from government health facilities. In India, a study assessed the effect of a community-based mental health literacy intervention on the demand for care resulting from enhanced mental health literacy. An intervention for depression was led by community-based workers and non-specialist counsellors and done in collaboration with facility-based general physicians and psychiatrists. The intervention was associated with a six-fold increase in the proportion of people with depression who sought treatment.

Nepal has achieved remarkable results from community-based interventions promoting sexual and reproductive health in adolescents and young people, as well as improving maternal and neonatal health outcomes. This track record, as well as existing evidence on community mental health interventions and programmes in Nepal and other countries, suggests that there are promising opportunities for cost-effective and sustainable community-based mental health interventions for adolescents, including left-behind adolescents. The vast majority of the existing evidence on mental health interventions among adolescents comes from high-income countries, of which a significant number have been school-based interventions. However, school-based interventions alone may not be adequate for LMICs like Nepal where the net enrolment rate for secondary school is still low (for example 55.3% nationally in 2017).

Conclusion

Taking account of the existing evidence, we strongly urge that (i) future mental health-related research in Nepal (and also in LMICs) should aim to test the effectiveness of community-based interventions in adolescents; and (ii) in light of the global evidence suggesting heightened mental health risk among left-behind adolescents, this special group of adolescents, particularly those from LMICs, deserves priority in mental health research. Population-wide awareness programmes, psychoeducation, skills training, psychosocial rehabilitation, and psychological treatments are currently the most common community mental health-care activities worldwide. Community-based interventions among Nepali adolescents (including left-behind adolescents) may include empowering local community organizations in relation to adolescent mental health. This would involve mobilizing them to help raise awareness, as well as public discourse activities. Wider use of the community informant detection tool, and raising the participation of service users and family members will be vital. It will also be important to train local mental health professionals on mental health issues for adolescents, including left-behind adolescents, and share good practices in this area. These interventions are likely to be cost effective, acceptable and sustainable. In several LMICs, community-based interventions can help address the double burden of poor health system capacity alongside the increasing number of adolescents (including left-behind adolescents) with mental health problems. We believe that improving the mental health of adolescents in general, and specifically that of left-behind adolescents in LMICs, will contribute significantly to achieving the health-related milestones of the Sustainable Development Goals.

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References


10. Mental Health Policy, Nepal. Sagun’s blog 10 October 2017


Prescribing, dispensing and administration indicators to describe rational use of oral dosage forms of medicines given to children

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Abstract

Background Owing to lack of indicators, researchers are compelled to use non-specific indicators to assess rational use of medicines in children. Thus, paediatric-specific issues are poorly described. This study aims to develop a set of indicators to describe rational use of oral dosage forms of medicines given to children.

Methods A modified RAND/UCLA Appropriateness Method was used. A comprehensive draft list of 40 indicators was compiled, based on the results of a literature review. Twelve experts rated these indicators in two rounds, using a nine-point Likert scale, first in an online survey, for clarity, necessity and scientific merit, and secondly in a face-to-face meeting, for necessity, feasibility and predictive value. An overall panel median score of ≥7 and agreement within the experts were used in indicators. The indicators were ranked independently by the research team and a final list of indicators was prepared. These indicators were pilot-tested for acceptability and interrater reliability.

Results Nine prescribing indicators, such as weight, appropriate dose and age-appropriate dosage form; five dispensing indicators, such as adequacy of labelling and inappropriate manipulation by pharmacists; and five administration indicators, such as inappropriate manipulation by parents and full completion of dose, were finalized in the second round.

Conclusion This novel approach has provided a set of indicators to describe the use of oral dosage forms of medicines given to children, which can be used by researchers as a supplement to the World Health Organization’s drug use indicators when investigating rational use of medicines in children.

Keywords: children, indicators, medicines, oral dosage forms, rational use

Background

The World Health Organization (WHO) defines rational use of medicine (RUM) as patients receiving “medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community”.1 RUM reduces risks, improve benefits, saves money, prevents wastage of resources and helps equity.2 It is not limited to selecting the right medicine, but it also involves selecting the right dose, dosage form, route of administration, dosing interval and duration of treatment.3

Appropriate prescribing, dispensing and administration practices are core components in ensuring RUM.4 WHO encourages its Member States to establish programmes to promote RUM.5

The first step in promoting any strategy is to assess the current situation. Difficulties in measuring RUM quantitatively prompted WHO to develop core and complementary drug use indicators to measure use of medicines.6 Many researchers worldwide have used the WHO drug use indicators to describe RUM.7 These drug use indicators are “time-tested” over three decades and have been found by researchers to be useful, user-friendly, reproducible, valid, reliable and applicable to multiple settings, and can be used with limited data and by individuals who are not specifically trained.8 One drawback of the WHO drug use indicators is that their generic nature means they were designed neither to measure RUM in a particular age group or special population, nor to describe the potential challenges for RUM in those groups. This is a major limitation in employing the WHO drug use indicators alone to measure RUM in a paediatric age group. RUM in children has many distinctive challenges, not least because children are not just small adults.9 It is not limited to selecting the suitable medicine...
for the child but also extends to selecting the appropriate dose and suitable dosage form. In addition, administering medicines to children poses special challenges. The generic WHO drug use indicators cannot identify the unique challenges in paediatric pharmacotherapy, as they lack the ability to assess the issues related to dose, dosage form, administration, palatability and acceptability: all of these are key obstacles for RUM in children. While paediatric studies using the WHO indicators have described generic issues related to medicine use in children, they have failed to identify the specific challenges for RUM in this population. These challenges are most notable for oral dosage forms of medicines, owing to the overall lack of “child size” medicines and suitable paediatric dosage forms. Medicine use is rational (appropriate, proper, correct) when patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost both to them and to the community. Irrational (inappropriate, improper, incorrect) use of medicines is when one or more of these conditions is not met. To be effective in children, medicines must be available in formulations that allow doses to be easily adjusted to reflect a child’s size, stage of development and condition. The lack of availability of medicines that fit these criteria for children is a major reason for irrational practices. Examples include splitting tablets or opening capsules and estimating the dose to be administered.

To the best of the authors’ knowledge, there are no indicators for RUM in children in the world literature. Hence, the objective of this study was to develop a set of indicators to measure RUM of oral dosage forms of medicines given to children.

**Methods**

The RAND/UCLA Appropriateness Method was employed to develop the indicators. This method depends on finding the most appropriate indicators for conditions that cannot be measured by numerical scale. Unlike the Delphi method, which involves multiple questionnaire-driven rounds to obtain the opinion, the RAND/UCLA Appropriateness Method involves a round of individual rating, followed by a round of face-to-face discussion with experts. It is the only systematic method of combining expert opinion and evidence, as well as having inter-panelist discussion. A literature review is done and sent to the panelists so they can base their opinion on scientific evidence. This method has also been shown to have predictive, face and content validities, and a high level of reproducibility. It also includes a rating of the feasibility of collecting data, a key requirement in the application of indicators. The design comprises two key components: (i) identification of indicators; and (ii) a two-round consensus process.

**Identification of indicators: literature review**

As described in best practice documents for the RAND/UCLA Appropriateness Method, a literature review was conducted to locate articles on use of oral dosage forms of medicines in children. The key research questions used as the basis for developing the search strategy for the literature review were: (i) what are the irrational ways of prescribing, dispensing and administering oral dosage forms of medicines to children?; (ii) what is the level, nature and quality of the research evidence for drug manipulations at the point of prescribing, dispensing and administration of oral dosage forms?; (iii) what are the effects of prescribing adult oral dosage forms to children?; and (iv) what are the effects of manipulating oral dosage forms, using methods employed at the point of drug dispensing and administration, on dose accuracy, palatability, bioavailability and stability? In the context of this project, “irrational” practices were defined as manipulation of oral dosage forms of medicines for children, such that they are inappropriately, improperly or incorrectly prescribed, dispensed or administered. The word “irrational” therefore does not reflect on an individual’s action but is used as a general term to contrast with “rational” use of medicines.


Titles and abstracts were screened initially to identify all English-language guidelines, reports and articles on oral dosage forms of any drug in children. Duplicate studies were identified and deleted. When studies met the inclusion criteria or when a decision to include a study could not be made based solely on review of the title or abstract, full-text copies were obtained. Selected full-text articles were carefully reviewed to identify the articles that were aimed at answering the key questions. As per the RAND/UCLA-recommended good practices, the first author extracted all relevant information from the articles and summarized the literature search with links to full articles (or the print version of full articles) for the expert panel.

From these data, the first draft of indicators to measure rational use of oral dosage forms of medicines in children was developed by the authors, after several rounds of discussion. The indicators were grouped into three categories, namely prescribing, dispensing and administration.

**Two-round consensus process**

A multidisciplinary panel of 12 experts, in the fields of clinical pharmacology, pharmacology, paediatrics, pharmacy, nursing and community medicine were selected. The local experts (n = 10) were nominated by relevant postgraduate institutes and societies; the international experts (n = 2) were selected by writing to experts in the field.
Round one: online survey
Ratings for metrics using a nine-point Likert scale were prepared to assess the clarity, necessity and scientific merit (see Table 1) of each indicator in the first draft. These were converted to an online form using SurveyMonkey. The following were sent to the panelists: (i) a rater form for the list of indicators; (ii) instructions for rating; (iii) a summary of the literature review; (iv) a detailed summary of articles with citations; and (v) a covering letter that explained the purpose, process and outcomes of the study.

Round two: face-to-face meeting
Before the meeting, panelists were given a personalized form giving the panelist’s own rating and the rating by the panel as a group. During the meeting, panelists discussed each indicator in terms of given criteria. After the discussion, panelists independently rated feasibility and predictive value and reiterated necessity on a nine-point Likert scale (see Table 1).

Analysis of criteria
Rates given by the panelists for the five criteria, namely clarity, necessity, scientific merit, predictive value and feasibility, were computed and the median score for each criterion was calculated. When the overall panel median score was ≥7 for all criteria, with agreement within the panelists, and when no more than two panel members rated the statement outside a three-point distribution around the median for any of the criteria, the indicators were considered as appropriate. These selected indicators were subjected to further scrutiny by the authors.

Final list of indicators
Similar to the WHO drug use indicators, the authors decided to limit the indicators of each category to fewer than 10. The research team ranked the important indicators independently and the final list of indicators was prepared. Open comments made by the experts were also taken into consideration when the final list was prepared. As per the method adopted, this list of indicators satisfies content validity, predictive value, reproducibility, feasibility, necessity and clarity.

Pretesting of the indicators
Acceptability to users
To refine the finalized list further, the indicators were also tested for acceptability, defined as whether “the indicator is acceptable to both those being assessed and those undertaking the assessment.” Since these indicators will be administered by researchers, prescribers, pharmacists and parents, eight participants were selected from each category.

For the professionals, selection was via nominations from the postgraduate institute/society. The parents were selected with the help of the in-charge medical officer of a child welfare clinic. Participants were given rating forms with the Likert scale of 1–9 and were requested to rate relevant indicators for acceptability (score of 1–3 not accepted; 4–6 uncertain acceptability; and 7–9 acceptable). When participants' scores were analysed, indicators with a median score of less than 7 and indicators with non-agreement (2 members marking 3 points away from the median) were either removed or amended.

Use in health-care settings
In order to apply in health-care settings, the indicators were converted to user-friendly interviewer-administered data-collection instruments, mainly in the form of checklists and data-collection sheets. The data-collection instruments and the measurement of indicators were pretested in a paediatric ward, clinic and outpatient department of a teaching hospital, to determine whether they allow calculation of all the indicators and user-friendliness. Information for prescribing and dispensing indicators were collected from patients' records; for administration, indicators were collected via interviews with parents.

Interrater reliability
Interrater reliability was also assessed during this pilot study. Interrater reliability was defined as the relative consistency of the judgements that are made of the same stimulus by two or more raters. In order to determine interrater reliability, two raters independently reviewed each indicator in the records of children who were given oral dosage forms of medicines in the study setting during the pilot study. Cohen’s kappa was calculated to determine the interrater reliability. A kappa value above 0.7 was considered as good agreement.

Minor amendments were made to the data-collection instruments and indicators. Since the set of indicators will be unique in identifying different issues in paediatric prescribing, dispensing and administration practice, it was decided to leave them as stand-alone indicators similar to WHO drug use indicators, rather than scoring each indicator and determining a cut-off value.

This concluded assessment of the validity of indicators.

Ethical considerations
Ethical approval was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka. Parental informed consent and assent from children were obtained.

Table 1. Criteria assessed in rounds 1 and 2 by the expert panel

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Description</th>
<th>Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity</td>
<td>This indicator is clear to the reader in the context of the content and language</td>
<td>1. Online survey</td>
</tr>
<tr>
<td>Necessity</td>
<td>This indicator will drive the rational use of oral paediatric dosage forms of medicines in children</td>
<td>1. Online survey and 2. face-to-face meeting</td>
</tr>
<tr>
<td></td>
<td>This indicator can detect the current gaps in rational use of oral paediatric dosage forms of medicines in children</td>
<td></td>
</tr>
<tr>
<td>Scientific merit</td>
<td>The evidence supports the indicator</td>
<td>1. Online survey</td>
</tr>
<tr>
<td></td>
<td>This indicator represents the concept being assessed</td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td>Valid, reliable and consistent data are available and collectable for this indicator</td>
<td>2. Face-to-face meeting</td>
</tr>
<tr>
<td>Predictive value</td>
<td>Use of this indicator has the capacity for predicting outcomes for rational use of medicine</td>
<td>2. Face-to-face meeting</td>
</tr>
</tbody>
</table>
Results

Identification of indicators: literature review

Literature review

Paediatric clinical pharmacology is a relatively new discipline, and thus there were relatively few reports of problems of oral dosage forms in children. There were no existing indicators in the literature for measurement of RUM in children. There were 1229 publications on the theme of challenges faced by children in RUM, mostly around issues of prescribing, dispensing and administration.

Of the 80 records identified as being relevant to answering the key questions, 66 were journal articles and 14 were guidelines/reports. The full details of the results of the literature review, as presented to the expert panel, are available on request from the corresponding author. The results, which were grouped into 12 topics, are summarized in Box 1.

Two-round consensus process

All 12 experts participated in the first-round online survey. Seven of the 12 panellists attended the second-round face-to-face meeting. Of the five panellists who could not attend the face-to-face meeting, two international experts contributed to the second round.

Box 1. Summary of results of literature review for developing indicators

1. The need for a prescribing dose that is adequate for the age and weight

Children respond to medicines differently. Pharmacodynamic differences could affect the action and toxicity of medicines, as in warfarin and ciclosporin. Pharmacokinetics influence the efficacy, toxicity and dosing regimens of medicines. Some adverse effects occur only in children and not in adults. Medicines should be tailored to children’s age, body weight and physiological conditions.

2. Manipulation of solid oral dosage forms

Owing to non-availability of suitable paediatric dosage forms, and inability to swallow certain dosage forms, health-care providers and parents tend to give the medicine by various methods, such as crushing the tablets, dissolving the tablet in solvents or giving the powder contained inside a capsule.

3. Clinical and pharmacokinetic outcome of manipulation of oral dosage form

Manipulation of oral dosage forms affects the dissolution rate and thereby changes the bioavailability of manipulated dosage forms from the intact dosage form for some drugs. Health-care professionals should be aware of the consequences of manipulating oral dosage forms, especially with drugs that have a narrow therapeutic range.

4. Quality of manipulated dosage forms

Manipulation leads to inaccurate dosing and uneven distribution of drug and excipient in the manipulated segments. There are also quality issues for the stability of the manipulated dosage forms. Sex, age, education and prior experience in tablet splitting do not have a predictive effect on the manipulation.

5. Effect of use of a splitting device

Different devices split tablets in different proportions. The quality of the split tablet varies with the device used.

6. Co-administration with food/drink

The drug is mixed with food or drink to improve adherence to the therapy, but interaction of food or drink with drugs can alter the effect of the drug.

7. Palatability of drugs

The palatability of a drug plays an important role in paediatric oral dosage form. Preference of taste varies with age, sex and disease type.

8. Liquid volumes and dosing devices

The volume of the liquid used must be acceptable to the child, and the dosing device should be able to measure the volume accurately. Dose amounts vary with different devices. Dosing errors are also associated with the type of device used. Inaccurate dosing can result in a potentially serious risk to the health of children.

9. Formulation preferences and issues

Children prefer different types of dosage forms. Uncoated mini-tablets seem to be a very promising alternative to liquid dosage forms and could be used in paediatric drug therapy at an earlier age than previously anticipated.

10. Health-care professionals’ knowledge of rational use of oral dosage forms in children

Health-care professionals from different disciplines displayed a variety of perspectives on manipulation and of knowledge about the consequences of medication manipulation.

11. Problems faced by nurses/caregivers when administering oral dosage forms of medicines

Rejection of drugs due to bad taste, size and shape were some of the problems experienced during administration. Lack of appropriate equipment for administering the drugs also caused difficulty during administration.

12. Cost of manipulated dosage forms

Tablet splitting is used as a method of reducing the cost of prescription drugs. Splitting of tablets has usefulness as a cost-reduction strategy, but there are hidden costs arising due to splitting, such as wastage of drug during splitting.
Box 2. Draft set of 40 indicators shared with the expert panel

A. Prescribing indicators
1. % of oral dosage forms (ODFs) of medicines prescribed in a dose that is adequate for the weight of the child
2. % of ODFs of medicines prescribed in a dose that is adequate for the age of the child
3. % fixed solid ODFs of medicines prescribed for children aged 5 years or under
4. % of tablets prescribed for children aged ≤5 years
5. % of capsules prescribed for children aged ≤5 years
6. % of flexible ODFs (e.g. dispersible tablets) of medicines prescribed for children aged ≤5 years
7. % of ODFs prescribed with a written direction of use
8. % of age-appropriate ODFs prescribed for children
9. % of occurrences where the prescribed liquid oral dose volume is not in a multiple strength of 5 mL
10. % of liquid ODFs prescribed as drops
11. % of occurrences where the prescribed liquid oral dose needs an oral syringe to measure the volume
12. % of occurrences where the number of solid ODFs to be taken is five or more at a time for a child aged 12 years or under
13. % of occurrences where the volume of liquid dosage forms to be taken is 10 mL or more at a time for a child aged 12 years or under
14. % of prescribed oral paediatric dosage forms of medicines registered under the national drug regulatory authority

B. Dispensing indicators
1. % of correct doses dispensed as per prescription
2. % of correct dosage forms dispensed as per prescription
3. % of tablets split and dispensed
4. % of tablets/capsules manipulated and powder dispensed as sachet
5. % of liquid ODFs reconstituted as liquid by the pharmacist before dispensing
6. % of ODFs dispensed with correct reconstitution advice by the pharmacist
7. % of ODFs dispensed with manipulation by the pharmacist
8. % of ODFs for which the pharmacist instructed the parent/guardian to manipulate
9. % of ODFs dispensed with written directions/labelling for use
10. % of occurrences where the pharmacist advised the parent/guardian to use an administration device
11. % of occurrences where the pharmacist advised the parent/guardian about the storage conditions

C. Administration indicators
1. % of tablets split and administered
2. % of capsules opened and content administered
3. % of ODFs mixed in water and administered
4. % of ODFs mixed in other liquids (fruit juices/milk, etc.) vehicles and administered
5. % of ODFs mixed with other medicines and administered
6. % of ODFs mixed with food and administered
7. % of ODFs that were difficult for the child to swallow during administration
8. % of ODFs where the child vomited soon after administration
9. % of ODFs the child refused to take
10. % of liquid ODFs administered with an appropriate measuring device
11. % of solid ODFs swallowed using boiled cooled water
12. % of occurrences where there was a need to repeat the dose
13. % of occurrences where accurate dosing was administered
14. % of occurrences where the frequency and duration of dosing interval were maintained
15. % of occurrences where the ODF was hygienically administered

the process electronically and rated the indicators through an online survey and another two were met on a different day by the research team; one panellist did not participate in round two.

Analysis of criteria
In round one, the 40 draft indicators were graded by the expert panel in terms of clarity, necessity and scientific merit. The expert panel considered all of them appropriate to assess rational use of oral dosage forms of medicines in children (overall panel median rating of 7–9 with agreement). In the second-round, face-to-face meeting, the 40 indicators were graded by the expert panel in terms of feasibility and predictive value, and regraded in terms of necessity. Again, the panel rated all indicators as appropriate (median score ≥7 with none marked 3 points away from the median), but it noted several instances where several
indicators on the same theme could be consolidated into a single overarching indicator. The panel also recommended the way in which indicators could be rephrased.

Final list of indicators
After consolidating groups of indicators on the same themes and incorporating the suggested rephrasing, 19 indicators were finalized. The logistics of applying the indicators in health-care facilities were also taken into consideration when compiling the final list of nine prescribing, five dispensing and five administration indicators to measure rational use of oral dosage forms of medicines for children (see Table 2).

Pretesting of the indicators
Acceptability to users
Each of the 19 indicators in the finalized list was scored as acceptable (median ≥7) in each group of participants: researchers, prescribers, pharmacists and parents.

Use in health-care settings
The data-collection instruments were used by the first author to collect data on 30 instances of prescribing, dispensing and administration of oral dosage forms of medicines in 20 children in a paediatric ward, clinic or outpatient department of a teaching hospital. It was found that numerators and denominators could be readily obtained, allowing efficient calculation of all indicators.

Interrater reliability
The records of the 20 children who were given 30 oral dosage forms of medicines from the pretesting were reviewed independently by the first author and an independent rater. The kappa value was above 0.7, indicating high agreement between the two raters.

Finalized list of indicators
The finalized list of the indicators, their purpose and the numerator and denominator for the calculation of each are given in Table 2.

Discussion
This study followed an extensive well-tested process to develop indicators to describe the use of oral dosage forms of medicines given to children. To the best of the authors’ knowledge, this is the first time that a set of evidence-based indicators has been developed to measure rational use of oral dosage forms of medicines in children.

Since the WHO core drug use indicators are generic, their use will detect broad issues of RUM in children that are common to RUM in adults. We therefore suggest that the indicators from this study can serve as supplementary indicators to the WHO core indicators. Researchers interested in rational use of oral dosage forms of medicines in children should also consider using these supplementary indicators. These indicators will be useful for researchers, paediatricians, clinical pharmacologists, clinical pharmacists, medical administrators and policy-makers. They can be used at a national, regional, hospital or even ward level, to understand the issues in rational use of oral dosage forms of medicines in children. The indicators will allow quantification of the issue, as well as determining the type of irrational use, finding out the reasons and explaining the contributing factors. This will facilitate implementation of interventions to improve the existing practice, if it is deficient, and reassessment after some time to measure the outcome of implementation. The indicators cover the entire cycle of medicine issues in children, namely prescribing, dispensing and administration. Since they are stand-alone indicators, researchers can use a particular group of indicators that are relevant to them; for example, the chief pharmacist of a hospital can use dispensing indicators to investigate issues related to dispensing practices.

It is interesting to note that almost all the prescribing indicators are related to dosing of medicines in children. In addition, the majority of articles identified during the literature review related to prescribing and dosing accuracy in children. It is the authors’ perception that awareness of the need “to scale the dose to function and not to size” and that “one size does not fit all” is quite high in Sri Lanka, and this may also be true of other resource-limited settings. This may be the result of initiatives such as the WHO campaign “Make medicines child size”, which was launched in 2007 to raise awareness of and accelerate action to meet the need for improved availability and access to child-specific medicines. The expertise and up-to-date knowledge of the expert panel, it is unsurprising that this issue was strongly represented.

The majority of dispensing indicators were focused on quantifying the problem of non-availability of paediatric strengths and dosage forms. Studies have reported that lack of paediatric strength and dosage forms is a major problem in resource-limited settings. The indicators from the present study can be used to quantify and describe the different type of issues related to this problem in dispensing oral dosage forms of medicines to children. This can be done at national level, as a survey when a representative sample is studied, or even as a hospital-level audit. Results will not only quantify the issues but also describe different types of issues related to rational dispensing practice of oral dosage forms of medicines in children. The indicators can also be used to compare the problem in different settings (for example, different levels of hospitals in the public sector, provincial differences, public versus private sector and even intercountry).

The need to ensure appropriate administration of medicines to children has become more represented in the published literature in recent years. Most of the publications are from resource-rich countries, with few from resource-limited countries. It is a relatively new topic for many resource-limited countries, which are struggling to improve the availability and affordability of medicines for children. However, the acceptability of medicines is also a component in access to medicines. Even if affordable medicines are made available, the objective of treatment can be met only if the medicines are given to children properly. Hence, the set of administration indicators will be a useful tool to assess this neglected area of rational use of oral dosage forms of medicines in children in resource-limited countries. The indicators mainly focus on issues in administration, which may lead to dosing errors. Since antibacterial agents are the commonly prescribed medicines in children, dosing errors have many implications, including emergence and spread of antibiotic resistance.

Interestingly, all 40 indicators developed by the authors were found to be appropriate in terms of feasibility, necessity and
Table 2. Finalized indicators and their purpose and calculation method

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Purpose</th>
<th>Indicator measurement</th>
<th>Denominator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribing indicators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Mean number of ODFs of medicines per child</td>
<td>To measure the degree of medicines burden in children</td>
<td>Total number of ODFs prescribed to children</td>
<td>Total number of children to whom ODFs were prescribed</td>
</tr>
<tr>
<td>2. % of ODFs of medicines prescribed in a dose that is appropriate for the weight of the child</td>
<td>To measure the tendency for prescribing to be based on the weight of the child</td>
<td>Number of ODFs of medicines prescribed in a dose appropriate for the weight of the child</td>
<td>Total number of ODFs prescribed</td>
</tr>
<tr>
<td>3. % of solid ODFs of medicines prescribed</td>
<td>To measure the tendency to prescribe a solid ODF to a child</td>
<td>Number of solid ODFs of medicines prescribed</td>
<td>Total number of ODFs prescribed</td>
</tr>
<tr>
<td>4. % of ODFs of medicines prescribed as tablets</td>
<td>To measure the tendency to prescribe tablets to a child</td>
<td>Number of ODFs of medicines prescribed as tablets</td>
<td>Total number of ODFs prescribed</td>
</tr>
<tr>
<td>5. % of ODFs of medicines prescribed as capsules</td>
<td>To measure the tendency to prescribe capsules to a child</td>
<td>Number of ODFs of medicines prescribed as capsules</td>
<td>Total number of ODFs prescribed</td>
</tr>
<tr>
<td>6. % of ODFs of medicines prescribed as a dosage form that is suitable for the child’s age</td>
<td>To measure the tendency to prescribe a dosage form based on the age of the child</td>
<td>Number of ODFs of medicines prescribed that were suitable for age</td>
<td>Total number of ODFs prescribed</td>
</tr>
<tr>
<td>7. Mean number of tablets prescribed per child</td>
<td>To measure the degree of tablet burden</td>
<td>Total number of tablets prescribed</td>
<td>Total number of children to whom ODFs were prescribed</td>
</tr>
<tr>
<td>8. Mean number of capsules prescribed per child</td>
<td>To measure the degree of capsule burden</td>
<td>Total number of capsules prescribed</td>
<td>Total number of children to whom ODFs were prescribed</td>
</tr>
<tr>
<td>9. Mean volume of liquids prescribed per child</td>
<td>To measure the degree of liquid medicine burden</td>
<td>Total volume of liquids prescribed</td>
<td>Total number of children to whom ODFs were prescribed</td>
</tr>
<tr>
<td>Dispensing indicators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. % of instances where alternative ODFs (to what was prescribed) were dispensed</td>
<td>To measure the degree to which health-care facilities are able to provide the dosage forms that were prescribed</td>
<td>Number of instances where alternative ODFs (to what was prescribed) were dispensed</td>
<td>Total number of ODFs dispensed</td>
</tr>
<tr>
<td>2. % of ODFs adequately labelled</td>
<td>To measure the degree to which pharmacists document essential information on the medicine packages they dispense</td>
<td>Number of ODFs that were adequately labelled</td>
<td>Total number of ODFs dispensed</td>
</tr>
<tr>
<td>3. % of solid ODFs irrationally manipulated by the pharmacist before dispensing</td>
<td>To measure the irrational dispensing of medicines</td>
<td>Number of solid ODFs irrationally manipulated by the pharmacist before dispensing</td>
<td>Total number of solid ODFs dispensed</td>
</tr>
<tr>
<td>4. % of solid ODFs that need manipulation before administering a single unit</td>
<td>To measure the degree to which health-care facilities are able to provide the required prescribed dose with manipulation</td>
<td>Number of solid ODFs that need manipulation before administering a single unit</td>
<td>Total number of solid ODFs dispensed</td>
</tr>
<tr>
<td>5. % of instances where ODFs were dispensed with correct advice on storage</td>
<td>To measure the degree to which pharmacists correctly advise on storage</td>
<td>Number of instances where ODFs were dispensed with correct advice on storage</td>
<td>Total number of children to whom ODFs were prescribed</td>
</tr>
<tr>
<td>Administration indicators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. % of instances where the child swallowed the intact tablet/capsule</td>
<td>To measure the degree to which a child can swallow the intact tablet/capsule</td>
<td>Number of instances where the child swallowed the intact tablet/capsule</td>
<td>Total number of solid ODFs administered</td>
</tr>
<tr>
<td>2. % of instances where crushed tablet was dissolved and administered</td>
<td>To measure the irrational administration of ODF</td>
<td>Number of instances where crushed tablet was dissolved and administered</td>
<td>Total number of solid ODFs administered</td>
</tr>
<tr>
<td>3. % of liquid ODFs administered using an oral syringe</td>
<td>To measure the degree to which the correct dose amount is administered</td>
<td>Number of liquid ODFs administered using an oral syringe</td>
<td>Total number of liquid ODFs administered</td>
</tr>
<tr>
<td>4. % of instances where safe water was used in preparing the medicine</td>
<td>To measure the availability of safe water for preparing the medicine</td>
<td>Number of instances where safe water was required to prepare the medicine for the child</td>
<td>Number of instances where water was required to prepare the medicine for the child</td>
</tr>
<tr>
<td>5. % of instances where the prescribed dose is correctly completed</td>
<td>To measure the degree of dose completion</td>
<td>Number of instances where the prescribed dose is correctly completed</td>
<td>Total number of ODFs prescribed</td>
</tr>
</tbody>
</table>

ODF: oral dosage form.

* In the context of this project, "irrational" practices were defined as manipulation of ODFs of medicines for children, such that they are inappropriately, improperly or incorrectly prescribed, dispensed or administered. The word "irrational" in this context does not reflect on an individual’s action but is used as a general term to contrast with "rational" use of medicines.

* Safe water: water that does not cause any significant risk to health after consumption, e.g. boiled water, bottled water.
predictive value. The number of indicators remained the same even after two rounds of expert review. This could be due to the extensive search done by the authors before developing the initial set of indicators and shortlisting to 40 indicators from a longer list. Since the authors also represent the same expertise as the panel members, it is perhaps unsurprising that the panellists found all 40 shortlisted indicators appropriate. The authors nevertheless reduced the number of indicators to 19, considering the time required to complete the data-collection form; this was aided by open comments given by the panellists and consolidating indicators, which were variations of the same theme. Finally, these indicators are not meant to measure the appropriateness of prescribed medicines for children. They were developed for health-care settings; further validation is needed if they are to be used in the community setting.

Conclusion
This study developed a set of indicators to measure rational use of oral dosage forms of medicines in children, using a standard method. The indicators satisfied the criteria for appropriateness. They can be used together with the WHO drug use indicators to identify issues in rational use of oral dosage forms of medicine in children.

Acknowledgements: The authors thanks the expert panel members for their participation in the development of the indicators.

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Conflict of interest: None declared.

Authorship: All authors were involved in the research conception. AN was responsible for data acquisition and analysis and, with SSR, for manuscript preparation; GS and AP read the manuscript and provided comments for improvement; SSR gave final approval for the manuscript.


References
Hepatitis C virus infection among people who inject drugs in Bangkok, Thailand, 2005–2010

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Abstract

**Background** Approximately 1% of adults in Thailand are infected with hepatitis C virus (HCV). New direct-acting antiviral agents achieve sustained virologic responses in >95% of HCV-infected patients and are becoming available in countries around the world. To prepare for new HCV treatment options in Thailand, this study characterized HCV infections among people who inject drugs (PWID) in Bangkok.

**Methods** The Bangkok Tenofovir Study (BTS) was a pre-exposure prophylaxis trial conducted among PWID, 2005–2013. Blood specimens were randomly selected from PWID screened for the BTS, to test for anti-HCV antibody and HCV RNA. The HVR1 region was amplified by polymerase chain reaction, using multiplex primer sets with unique identifier sequences; amplification products were pooled in sets of 25; and consensus sequencing was performed to characterize individual HCV genotypes.

**Results** The median age of 3679 participants tested for anti-HCV antibody was 31 years, 3016 (82.0%) were male and 447 (12.2%) were HIV infected. The prevalence of anti-HCV antibody was 44.3%. The adjusted odds of testing positive for anti-HCV antibody were higher in men (adjusted odds ratio [aOR] 3.2, 95% confidence interval [CI] 2.4–4.3), those aged 40 years or older (aOR 2.7, 95% CI 2.1–3.5), those who had more than a primary school education (aOR 1.7, 95% CI 1.4–2.1), and those who tested HIV positive (aOR 5.2, 95% CI 3.7–7.4). HCV RNA was detected in 644 (81.3%) of the 792 anti-HCV antibody-positive specimens, yielding an HCV RNA-positive prevalence of 36.0% (95% CI 33.8–38.2). Among a random sample of 249 of the 644 specimens, 218 could be characterized, and the most common HCV subtypes were 1a (30.3%), 1b (12.8%), 3a (35.8%), 3b (6.9%) and 6n (8.7%).

**Conclusion** The prevalence of anti-HCV antibody among PWID was 44.3% and more than one third (36.0%) were HCV RNA positive. Genotypes 1, 3 and 6 accounted for all typable infections. As the government of Thailand considers introduction of direct-acting antiviral medications for people with hepatitis C, it will be important to ensure that the medications target these subtypes.

**Keywords:** direct-acting antivirals, hepatitis C, people who inject drugs, Thailand, viral hepatitis

Background

Hepatitis C virus (HCV) infection is a leading cause of liver disease, cirrhosis and cancer. The World Health Organization estimates that, in 2015, 1.0% of the world’s population was infected with HCV, corresponding to 71 million people chronically infected with HCV. In Thailand in 2015, an estimated 0.7% of the population was infected with HCV. Injection drug use is a common mode of HCV transmission. A study in Bangkok among people who inject drugs (PWID) during the 1990s found an HCV prevalence greater than 90%. Since 2012, the Thai government has funded the use of pegylated interferon and ribavirin to treat HCV. Clinical trials...

In Thailand in 2015, an estimated 0.7% of the population was infected with HCV. Injection drug use is a common mode of HCV transmission. A study in Bangkok among people who inject drugs (PWID) during the 1990s found an HCV prevalence greater than 90%.

Since 2012, the Thai government has funded the use of pegylated interferon and ribavirin to treat HCV. Clinical trials...
have shown sustained virologic responses, a result that is indicative of virologic cure, in 50–60% of chronically HCV-infected participants using pegylated interferon and ribavirin, but therapy is complicated by the length of treatment (24–48 weeks) and side-effects that cause 10–14% of participants to stop treatment. New, once-daily direct-acting oral antiviral agents, which achieve sustained virologic responses with limited adverse events in >95% of chronically infected HCV patients, are becoming available in low- and middle-income countries as the cost of generic formulations declines. Some of these agents are more effective against specific HCV genotypes, but combinations of agents can effectively treat most or all HCV genotypes.

To prepare for new HCV treatment options, this study characterized HCV infections among the population of PWID attending drug-treatment clinics, from whom participants in an HIV pre-exposure prophylaxis trial in Bangkok, Thailand, were drawn.

**Methods**

The study population was PWID attending the 17 drug-treatment clinics serving the Bangkok Metropolitan Administration area during 2005–2010, who provided a blood sample for eligibility screening for the Bangkok Tenofovir Study (BTS) after signing informed consent. BTS was a randomized, double-blind, placebo-controlled HIV pre-exposure prophylaxis trial of daily oral tenofovir disoproxil fumarate. Of 4094 PWID screened for the BTS, blood specimens were not available for 415 (10.1%) (see Fig. 1). Thus, there were 3679 blood samples from PWID available for analysis.

**Fig. 1. Flow of people who inject drugs assessed for hepatitis C infection, Bangkok, Thailand, 2005–2010**

HCV: hepatitis C virus; PWID: people who inject drugs.

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*a* The random selection of 1600 specimens should have been done among all 3679 samples. However, after randomization, it was discovered that 385 specimens had not been included in the randomization, because the specimens had been identified as anti-HCV antibody negative in a prior evaluation and mistakenly excluded from the randomization. The 1600 specimens had therefore been randomly selected from 3294 PWID samples. To estimate HCV prevalence and determine predictors of HCV infection, a weighted analysis was carried out, with a sampling probability of 1 for the 385 known anti-HCV antibody-negative specimens, and a sampling probability of 0.49 (i.e. 1600/3294) for the 1600 anti-HCV antibody-unknown specimens.

*b* Other reasons include: non-Thai nationals; those younger than 20 years or older than 60 years; people who left the clinic before blood was drawn; and people who provided a blood specimen but the specimen was insufficient or could not be used.
HCV antibody testing was only possible for 1600 blood samples and genotyping of 249 samples, owing to limited resources. To maximize the accuracy of the prevalence estimates, samples were randomly selected for antibody testing and genotyping, using a computer-generated random number sequence. The random selection of samples for antibody testing should have been applied to all 3679 samples. However, after randomization, it was discovered that 385 specimens had not been included in the randomization, because the specimens had been identified as anti-HCV antibody negative in a prior evaluation and mistakenly excluded from the randomization (see Fig. 1). The 1600 blood samples had therefore been randomly selected from 3294 PWID samples. To estimate HCV prevalence and determine predictors of HCV infection, a weighted analysis was carried out, with a sampling probability of 0.49 (i.e. 1600/3294) for the 1600 samples and 1/5 for the 385 known anti-HCV antibody-negative specimens, and a sampling probability of 0.49 (i.e. 1600/3294) for the 1600 anti-HCV antibody-negative specimens. Weighted multivariable logistic regression was used to determine factors associated with HCV infection, and SAS version 9.3 (SAS Institute, Cary, NC, United States of America [USA]) was used for analyses.

To provide context for the study findings, PubMed was searched for reports of HCV genotyping in Thailand from 2000 to 2016 and the search included reports that examined HCV RNA-positive specimens from 100 or more people (see Table 1). The search terms used were “genotyping”, “HCV”, “HCV RNA” and “Thailand”.


<table>
<thead>
<tr>
<th>Provinces</th>
<th>Population</th>
<th>Year</th>
<th>Samples with HCV RNA sequenced, n</th>
<th>Hepatitis C genotypes and subtypes, n (%)</th>
<th>Non-typable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangkok</td>
<td>PWID</td>
<td>2005–2010</td>
<td>249</td>
<td>1a: 66 (26.5) 1b: 28 (11.2) 3a: 78 (31.3) 3b: 15 (6.0) 6f: 7 (2.8) 6i: 1 (0.4) 6j: 3 (1.2) 6n: 19 (7.6) 6v: 1 (0.4) 31 (12.4)</td>
<td>31 (12.4)</td>
</tr>
<tr>
<td>Chiang Mai</td>
<td>PWID</td>
<td>1999–2000</td>
<td>168</td>
<td>1a: 37 (22.0) 1b: 15 (8.9) 3a: 42 (25.0) 3b: 24 (14.3) 6a: 43 (25.6) 7 (4.2)</td>
<td>7 (4.2)</td>
</tr>
<tr>
<td>Chiang Mai</td>
<td>HCV-infected patients</td>
<td>2003–2010</td>
<td>158</td>
<td>1a: 20 (12.7) 1b: 29 (18.4) 3a: 71 (44.9) 3b: 15 (9.5) 6a: 1 (0.6) 6b: 20 (12.7) 6i: 1 (0.6) 6n: 1 (0.6)</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td>Chiang Mai, Chiang Rai, Lamphun, Mae Hong Son</td>
<td>Blood donors</td>
<td>1998–2000</td>
<td>126</td>
<td>1a: 18 (14.3) 1b: 16 (12.7) 1c: 1 (0.8) 3a: 42 (33.3) 3b: 8 (6.3) 6a: 39 (31.0) 2 (1.6)</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td>Pattani, Songkla</td>
<td>PWID</td>
<td>2000</td>
<td>290</td>
<td>1a: 3 (1.0) 1b: 52 (17.9) 3a: 219 (75.5) 3b: 4 (1.4) 6a: 10 (3.5) 2 (0.6)</td>
<td>2 (0.6)</td>
</tr>
<tr>
<td>Bangkok, Phetchabun</td>
<td>HCV-infected patients</td>
<td>2003–2009</td>
<td>356</td>
<td>1a: 75 (21.1) 1b: 49 (13.8) 2a: 2 (0.6) 3a: 137 (38.5) 3b: 20 (5.6) 6a: 1 (0.3) 6b: 39 (11.0) 6i: 7 (2.0) 6j: 7 (2.0) 6n: 17 (4.8) 2 (0.6)</td>
<td>2 (0.6)</td>
</tr>
</tbody>
</table>

HCV: hepatitis C virus; PWID: people who inject drugs.

a Percentages rounded to one decimal place; thus, totals may not exactly equal 100.

b HCV RNA was detected by qualitative methods, but amplicons for sequence analysis could not be generated using HCV-specific primers previously described.9
Results

From June 2005 to July 2010, 4094 people were assessed for enrolment; 415 (10.1%) individuals were excluded before blood was collected. Among the 415 excluded, 241 (58.1%) completed the demographic questionnaire and did not differ significantly in age from the 3679 people assessed who provided specimens (median age of those excluded, 32 years; median age of those included, 31 years; Wilcoxon rank sum $P = 0.54$), sex distribution (200 [83.0%] males in the excluded group, 3016 [82.0%] males in the included group; Chi-squared $P = 0.79$), or education level (45 [18.7%] of those excluded and 699 [19.0%] of those included had more than a primary school [grade 6] education; Chi-squared $P = 0.36$).

The median age of the 3679 individuals tested was 31 years (interquartile range, 27–38 years); 3016 (82.0%) were male and 447 (12.2%) were HIV infected. The weighted prevalence of anti-HCV antibody was 44.3% (95% confidence interval [CI] 42.1–46.6%). In multivariable logistic regression including sex, age, education level and HIV status, the odds of testing anti-HCV antibody positive were higher in men (adjusted odds ratio [aOR] 3.2, 95% CI 2.4–4.3, $P < 0.0001$), those aged 40 years or older (aOR 2.7, 95% CI 2.1–3.5, $P < 0.0001$), those who had more than a primary school (grade 6) education (aOR 1.7, 95% CI 1.4–2.1, $P < 0.0001$), and those who tested HIV positive (aOR 5.2, 95% CI 3.7–7.4, $P < 0.0001$) (see Table 2).

Among the 1600 randomly selected specimens, anti-HCV antibody was detected in 158 (76.0%) of the 208 HIV antibody-positive specimens and 634 (45.5%) of the 1392 HIV antibody-negative specimens (not shown in Fig. 1). HCV RNA was detected in 644 (81.3%) of the 792 anti-HCV antibody-positive specimens, yielding an HCV RNA-positive prevalence of 36.0% (95% CI 33.8–38.2%). Among the 249 randomly selected HCV RNA-positive specimens, 29 (11.6%) could not be amplified and two (0.8%) yielded short sequences that could not be characterized (see Fig. 1). Among the 218 specimens that could be characterized, the most common subtypes were 1a ($n = 66$ [30.3%]), 1b ($n = 28$ [12.8%]), 3a ($n = 78$ [35.8%]), 3b ($n = 15$ [6.9%]) and 6n ($n = 19$ [8.7%]) (see Fig. 1 and Table 2).

Participants enrolled in the BTS were asked about medication use at enrolment and each study visit. There were no reports of use of interferon, ribavirin or any of the new direct-acting anti-HCV agents.

Discussion

Among PWID screened for the BTS, the prevalence of anti-HCV antibody was 44.3%. This is lower than the 95.6% prevalence reported among PWID in Bangkok in 1995–1996. Declines in HIV incidence have been noted among PWID in Bangkok, and these declines in HIV and HCV prevalence may reflect changes in drug use (e.g. increasing use of methamphetamines and midazolam that do not require injection) and decreased needle sharing. Despite the lower prevalence of HCV antibody, the present analysis found that more than one third (36.0%) of PWID screened for the study were positive for HCV RNA. Using respondent-driven sampling, investigators estimated there were 4200 PWID in Bangkok in 2009, suggesting that, at the time of samples being taken, approximately 1500 PWID in Bangkok were chronically infected with HCV and in need of treatment.

The HCV genotype distribution among PWID screened for the BTS is similar to the distributions reported for other cohorts of PWID, blood donors and HCV-infected populations in Thailand, with genotypes 1, 3 and 6 accounting for most or all infections (see Table 1). A study in Southern Thailand found a higher proportion of genotype 3, predominantly subtype 3a, and studies in Northern Thailand found higher proportions of genotype 6. As the government of Thailand considers various antiviral medications and combination therapies, it will be important to ensure that the medications target these subtypes.

Table 2. Results of weighted logistic regression analyses to evaluate characteristics associated with the presence of hepatitis C antibody in 1985 people who inject drugs, Bangkok, Thailand, 2005–2010

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>Bivariate analysis (weighted)</th>
<th>Multivariable analysis (weighted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Unadjusted odds ratio (95% CI)</td>
<td>$P$ value</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>381</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1604</td>
<td>3.3 (2.5–4.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Age at enrolment, years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–39</td>
<td>1562</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>≥40</td>
<td>423</td>
<td>2.3 (1.8–2.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school (grade 6) or less</td>
<td>984</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>More than primary school</td>
<td>1001</td>
<td>1.5 (1.3–1.8)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>HIV status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>1777</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>208</td>
<td>4.7 (3.4–6.6)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

CI: confidence interval.
There are a number of limitations to this analysis. Only HIV-uninfected PWID were allowed to enrol in the BTS; thus, people with known HIV-positive status may have chosen not to screen for the trial. Because HCV infection is correlated with HIV infection, the prevalence of HCV among PWID in Bangkok may, therefore, have been underestimated. Complete information on the 415 people who began the screening process but did not provide blood specimens was not available. Although 241 (58.1%) of the 415 who completed the screening questionnaire did not differ by age, sex or education from those who provided a blood specimen, there may have been differences that could not be assessed. The findings of this study may not be generalizable to all PWID or all HCV-infected people in Thailand, but a large population of PWID was sampled and the results are consistent with those of other studies in Thailand, suggesting the HCV genotype and subtype distribution will be a useful guide for policy-makers. The initial sampling did not include all PWID screened for the study, so a weighted analysis was used to provide accurate prevalence estimates.

The antiviral combination sofosbuvir and velpatasvir has achieved sustained virologic responses in >95% of people infected with HCV genotypes 1, 3 and 6, and other combinations such as sofosbuvir and ledipasvir have shown high levels of efficacy against genotypes 1 and 6. The appropriate antiviral regimen for an individual may vary if the patient has cirrhosis or if the virus has antiviral mutations, but newer antiviral medicines have simplified and shortened treatment regimens, substantially reduced adverse events, and increased chances for sustained viral suppression and cure.

These effective and safe antiviral medicines hold much promise for people who are chronically infected with HCV in Thailand; however, these individuals will not benefit unless the medicines are accessible. More than 60% of chronically HCV-infected people live in middle-income countries like Thailand. Pursuing licensure and developing innovative pricing strategies for these new antiviral medicines would help to increase their availability to patients in need.

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Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the US Centers for Disease Control and Prevention.


References

5. Ghany MG, Strader DB, Thomas DL, Seeff LB; American Association for the Study of Liver Disease. Diagnosis, management, and treatment of


Forecasting the future need and gaps in requirements for public health professionals in India up to 2026

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Abstract

Current ambitious reforms in India mean that public health professionals (PHPs) will become an increasingly vital component of the health workforce. Despite a rapid growth in schools of public health in India, uptake of places by students without a medical background is low. This paper reports the results of an exercise to estimate the baseline supply of, and need for, PHPs in India in 2017 and to forecast possible supply–need scenarios up to 2026. Supply was estimated using the stock and flow approach and the service–target approach was used to estimate need. The additional need resulting from development of a new public health cadre, as stated in the National Health Policy 2017, was also included. Supply–need gaps were forecast according to three scenarios, which varied according to the future intensity of policy intervention to increase occupancy of training places for PHPs from a non-medical background: “best guess” (no intervention), “optimistic” (feasible intervention), and “aspirational” (significant intervention) scenarios. In the best guess scenario in 2017, i.e. with a low non-medical place occupancy of 60%, there is a supply–need gap of around 28,000 PHPs. In the absence of any intervention to increase place occupancy, this shortfall is forecast to increase to 45,000 PHPs by the year 2026. By contrast, in the aspirational scenario, i.e. with a high place occupancy of 75% for non-medical places, the baseline gap for 2017 of almost 26,000 PHPs reduces by 2026 to around 21,000 PHPs. By 2026, most new PHPs will be produced by public health training programmes offered by institutions other than medical colleges. Without significant interventions, India is likely to have a significant shortfall in PHPs in 2026. Policy-makers will have to carefully examine issues surrounding the current low uptake of non-medical public health seats and review the current framework regulating training of PHPs, in order to respond adequately to future requirements.

Keywords: India, Master of Public Health, MPH, public health, public health education, public health professional

Background

A strong health system is essential for achieving the Sustainable Development Goals (SDGs). Designing, implementing and monitoring health programmes is also central for delivering quality health services and ensuring universal health coverage. Health systems across the globe are dependent on the health workforce in improving health outcomes, and public health professionals (PHPs) form a key part of this workforce. A report from the Institute of Medicine notes that PHPs play a pivotal role in the creation and maintenance of a healthy community, defining a PHP as “a person educated in public health or a related discipline who is employed to improve health through a population focus”. Thus, public health is a combination of many cross-cutting disciplines, including but not limited to: medicine, behavioural and social sciences, statistics, management, communication, environment, nutrition, law and public policy. As estimated in a recent study, by the year 2030, global demand for health workers may rise to 80 million, which would require a doubling of the estimated stock of health workers in 2013. The supply of health workers is expected to reach only 65 million over the same period, leaving an estimated worldwide net shortage of 15 million health workers. Efforts to scale up health services to achieve universal health coverage and the other health aspects of the SDGs are confronted by acute shortages and inequitable distributions of skilled health workers in many low- and middle-income countries; in turn, this constrains efforts to deliver essential health services.

The health workforce in India comprises broadly eight categories, namely: doctors (allopathic, alternative medicine); nursing and midwifery professionals; PHPs (medical, non-medical); pharmacists; dentists; paramedical workers (allied health professionals); grass-root workers (front-line workers); and support staff. This paper focuses on one
of these categories, namely PHPs from both medical and non-medical backgrounds. PHPs include professionals from several disciplines and diverse fields, encompassing behavioural sciences/health promotion and communication; biostatistics; medical health sciences; environmental health; epidemiology; health services administration/management; international/global health; maternal and child health; nutrition; public health laboratory practice; public health policy; and public health practice. Public health researchers, practitioners and educators work with communities and populations and contribute towards prevention of health problems, by implementing health programmes, developing policies, administering services, regulating health systems and conducting research. PHPs are thus a component of the overall health workforce and play a vital role in the creation and maintenance of a healthy community.

Keeping communities healthy through the prevention of disease and promotion of health and wellness has historically been a low priority in India. However, priorities are changing and the need to shift focus to health promotion has been recognized at the highest levels, in initiatives such as Ayushman Bharat, with a roll-out of 150,000 health and wellness centres. India’s National Health Policy 2017 notes that a prerequisite is an empowered public health cadre to address the social determinants of health. The policy also proposes the creation of a public health management cadre, with an appropriate career structure and recruitment policy to attract young and talented multidisciplinary professionals. This proposal is also underscored in the 2018 NITI Aayog report, Strategy for New India@75, which describes the development milestones to be achieved by 2022, the 75th anniversary of India’s independence. Noting that there is no single authority responsible for public health in India that is legally empowered to enforce compliance from other public authorities and citizens, the strategy recommends including the creation of national and state public health agencies. The strategy also underscores the need for a dedicated cadre for public health at the state, district and block levels. In addition, recommendations on training of the relevant workforce include the need for officials qualified in disciplines including epidemiology, biostatistics, demography and social and behavioural sciences, and a mandated master’s level qualification, in addition to specified training, for officials taking on leadership positions.

Thus, public health education is expected to play an increasingly important role in India. Traditionally, public health education in India was imparted through medical schools and was open only to medical graduates. However, this landscape is changing and the past two decades have witnessed an emergence of institutions, including schools of public health, offering public health programmes to non-medical graduates.

To plan for the ambitious reforms in public health delivery in India, valid and reliable information on the supply, need and gaps in the number of qualified professionals is needed. However, limited information is available. This paper reports the results of an exercise to estimate the baseline supply of, and need for, PHPs in India in 2017 and forecasts possible supply–need scenarios up to 2026. Owing to the lack of baseline data, the aim was not to provide granular, detailed forecasts but rather to give an overarching view of possible directions of change, in order to inform policy-making.

Overall approach

For the purposes of this research, “supply” refers to trained PHPs from Indian educational institutions; “need” is the normative need for PHPs; and a “public health professional” is a person educated in public health or a related discipline who is employed to improve health through a population focus.

Measurement of the health workforce for the purposes of policy and planning is not an exact science. Several approaches exist. For example, a 2013 working paper reviewed the main characteristics and results from 26 health workforce projection models in 18 Organisation for Economic Co-operation and Development countries. However, these focused primarily on physician models and also some nurse models. An impediment to developing the methodology for this project was the absence of any formal body or council for regulating public health education in India, limiting the information available on worker stock numbers and their trends. This, combined with the broad range of qualification routes in the different, and sometimes overlapping, disciplines and fields makes capturing baseline data from which to extrapolate projections challenging.

One particular feature in India is that programmes offering the Master of Public Health (MPH) qualification – a source that might reasonably be expected to provide a significant number of PHPs in India – are relatively new and increasing, but their attractiveness to students is debatable. Specifically, between 1997 and 2016–2017, the number of institutions offering MPH programmes increased from 2 to 44. However, in the 2016–2017 academic year, 1190 places were being offered on these MPH programmes but only 704 students were enrolled – that is, a place occupancy of 59%.

For estimating the supply of PHPs, the traditional approach was used, which attempts mathematical simulation of workforce supply projections based on a stock and flow model, where people entering and exiting the workforce (flows) periodically adjust the initial number in the workforce (stock). For need estimates of PHPs, the service–target approach was used, looking at the need within a range of public health disciplines individually, to get a total 2017 baseline. Based on current data on vacancies in sanctioned posts, the proportion of this total need that was filled in 2017 was estimated, giving a benchmark value for the number of PHPs per 100,000 population.

Since the National Health Policy 2017 explicitly proposes the creation of a public health cadre in all states, the researchers were obliged to add the estimated need for PHPs that this policy, if implemented, will incur. An implementation timeline of the cadre starting in 2020 was used, with roll-out until 2026; the estimated numbers needed for this cadre was derived from previous work done to estimate the number of posts required at the state, district and block levels.

The results of the methods above were used to estimate the annual gaps between supply of and need for PHPs from 2017 to 2026. As noted above, based on MPH course data, the number of non-medical professionals attracted to training and careers in public health is only 59%, making future projections uncertain. Therefore, three different scenarios were modelled, based on the occupancy rates of the projected number of places available for non-medical public health qualifications and the related level of policy intervention. This approach was inspired by work done by Ridoutt et al. to model scenarios.
in the public health physician workforce in Australia, which graded three scenarios according to different levels of policy intervention. The scenarios used in this study were as follows:

1. low place occupancy, i.e. current occupancy rates of non-medical PHP courses – the “best guess” scenario, which is most likely to happen without any interventions;
2. moderate place-occupancy rates of non-medical PHP courses – the “optimistic” scenario, which could happen with feasible policy and administrative interventions;
3. high place-occupancy rates of non-medical PHP courses – the “aspirational” scenario, which is unlikely to happen without significant advocacy and appropriate intervention.

Owing to the lack of data and uncertainties outlined, this modelling necessitated a series of assumptions and estimates. To ensure that these are clear, the methods and results are presented separately for each of the supply, need and supply–need gap analyses.

Supply of public health professionals in India up to 2026

Supply estimation – methodology

For the supply of both medical and non-medical PHPs, the baseline number of training places offered in 2017 was first estimated. The forecast supply up to 2026 was then calculated, based on assumptions on place numbers, place occupancy and attrition. The forecasts for medical and non-medical PHPs were done separately, owing to differences in the assumptions made. Worked estimates were done for the start point/baseline (2017), midpoint (2022) and endpoint (2026) for the forecasting period.

Estimation of 2017 baseline data for seats available for medical programmes

For medical colleges, the supply was estimated from the data available on the website of the Medical Council of India (MCI). The 2017 supply for various Diploma of National Board (DNB) programmes being offered by the National Board of Examinations (NBE) was obtained from the NBE website. DNB is the degree awarded by the NBE, an autonomous academic body under the Ministry of Health and Family Welfare, Government of India, to candidates who successfully complete their postgraduate or postdoctoral medical education under the NBE.

Estimation of 2017 baseline data for places available for non-medical programmes

Institutions other than medical colleges, including schools of public health offering public health programmes in 2017, were identified in the Google search engine, using keywords such as “public health programs”, “public health courses”, “public health”, “BPH”, “MPH” and “schools of public health”. The search was limited to programmes offered in India and to collaborations between Indian and foreign institutions, if any. Additionally, the websites of the All India Council of Technical Education, University Grants Commission, universities and institutions were also searched, as well as education supplements of leading newspapers and education-based websites, including shiksha.com, targetstudy.com, getmyuni.com, and webindia123.com. Experts in the field of public health education were also contacted and related literature was also identified through Google Scholar and PubMed. Faculty and staff of several institutes/universities across India offering public health programmes were also contacted. The number of places available was also estimated through various public health domains; information was collected through the internet and education-related websites. Details were also collected from websites, prospectus and admission notifications; finally, experts, faculty and staff of institutes/universities offering these programmes were also contacted.

Estimation of 2017–2026 supply of medically qualified public health professionals

It was assumed that the number of public health places offered by medical colleges will double in the forecast period. MCI data show there were 28349 Bachelor of Medicine Bachelor of Surgery (MBBS) places in 2005 and 57138 MBBS places in 2015; it was assumed that this rate of expansion will continue because of the current “pull” factors in India resulting from the recent government health initiatives and policies regarding public health and the professional cadre described previously.

A place occupancy of 95% was assumed for these public health programmes for medical doctors. There are no formal data on this level of occupancy, but the anecdotal value of 95% has been used in other workforce estimates, and so is used here for consistency. It was also assumed that the 95% occupancy would be constant for the forecast time period.

An annual attrition rate of 8.1% for medically qualified PHPs was applied. This was based on (i) the annual death rate of 3.1% population in the age group 15–59 years, as per the 2010 census; and (ii) an estimated annual migration of doctors from India of 5%. Other reasons for attrition, such as change of profession and retirement, were not included.

Estimation of 2017–2026 supply of non-medically qualified PHPs

The number of MPH places available in 2010 doubled from approximately 573 (23 institutions) to 1190 (44 institutions) in 2016–2017. Since, in the same time period, two out of 46 institutes offering the MPH closed down, it was assumed that expansion in the number of places would continue because of the “pull” factors related to recent government health reforms, but at a lower rate. A doubling of the number of places for non-medical institutions during 2017–2026 was therefore assumed.

As noted earlier, three estimated supply forecasts were carried out for non-medically qualified PHPs, based on place-occupancy levels at the training stage. These were:

1. A low place occupancy of 60% of available places. This is the “best guess” scenario most likely to happen without any intervention. It was used because previous work showed that, in the 2016–2017 academic year, 1190 places were being offered on MPH programmes but only 704 students were enrolled; i.e. a place occupancy of 59%.
2. A moderate seat occupancy of 68% of available seats. This is the “optimistic” scenario that it was estimated could happen, with feasible policy and administrative interventions.
3. A high seat occupancy of 75%. This is the “aspirational” scenario that was estimated to be unlikely to happen without significant advocacy and appropriate intervention.
An annual attrition rate of 6.1% for non-medically qualified PHPs was applied. As for medical professionals, this was based on the annual death rate of 3.1% population in the age group 15–59 years, as per the 2017 census. It was assumed that annual migration would be lower than that of medical professionals and an estimate of 3% was used. Other reasons for attrition, such as change of profession and retirement, were not included.

Supply estimation – results

Baseline number of training seats offered in 2017

Medical programmes. The courses identified as contributing to medical PHPs were in two categories: via medical colleges (Doctor of Medicine [MD] and other postgraduate programmes) and via the NBE. For 2017, it was estimated that 1128 of these medical public health training places were offered (see Table 1).

Non-medical programmes. The courses identified as contributing to non-medical PHPs were via public health programmes – Bachelor of Public Health (BPH) and MPH – and via public health domains. The results are provided in Table 2. For 2017, it was estimated that 14 477 of these non-medical public health training places were offered.

<table>
<thead>
<tr>
<th>Scenario-based supply projections</th>
</tr>
</thead>
</table>
Based on the assumptions made on projected growth in the number of places and the three place-occupancy scenarios for

### Table 1. Medical public health training places: data for 2017

<table>
<thead>
<tr>
<th>Category</th>
<th>Courses</th>
<th>Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD – Social and Preventive Medicine/ Community Medicine, PhD – Community Medicine, MD – Hospital Administration, MD – Community Health Administration, MD – Tropical Medicine, MD – Hospital Administration, Master of Hospital Administration, Diploma in Public Health, Diploma in Community Medicine, Diploma in Health Administration, Diploma in Health Education, Diploma in Industrial Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Board of Examinations</td>
<td>Diplomate of National Board programmes in: Family Medicine, Social and Preventive Medicine, Health and Hospital Administration, Field Epidemiology, Maternal and Child Health</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>All</td>
<td>1128</td>
</tr>
</tbody>
</table>

MD: Doctor of Medicine; PhD: Doctor of Philosophy.

### Table 2. Non-medical public health domains and programmes and training places: data for 2017

<table>
<thead>
<tr>
<th>Category</th>
<th>Courses</th>
<th>Places</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health programmes</td>
<td>BPH and MPH</td>
<td>1370</td>
</tr>
<tr>
<td>Public health domain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biostatistics</td>
<td>PhD, MSc, Advanced PGD, PGD, Certificate</td>
<td>356</td>
</tr>
<tr>
<td>Demography</td>
<td>PhD, MPhil, MSc, MPS, MA, PGD, Diploma, Certificate</td>
<td>1153</td>
</tr>
<tr>
<td>Occupational and environmental health</td>
<td>PhD, MSc, PG Certificate, PGD in Industrial Safety, AFIH</td>
<td>675</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>PhD, MPhil, MSc, PGD</td>
<td>194</td>
</tr>
<tr>
<td>Public health engineering</td>
<td>ME/MTech, BE/BTech, Diploma</td>
<td>1100</td>
</tr>
<tr>
<td>Entomology</td>
<td>PhD, Integrated Masters &amp; PhD, MSc, PGD</td>
<td>100</td>
</tr>
<tr>
<td>Public health laboratory</td>
<td>MSc, BSc, Advance Diploma, Certificate</td>
<td>500</td>
</tr>
<tr>
<td>Health management/administration</td>
<td>PhD, Master of Health Administration, MBA, BBA, PGDPMH, Diploma</td>
<td>2096</td>
</tr>
<tr>
<td>Hospital management/administration</td>
<td>MBA, Master of Hospital Administration, BBA, MHM, PGDHM</td>
<td>1454</td>
</tr>
<tr>
<td>Health and hospital management/administration</td>
<td>PhD, MPhil, MBA, BBA, PGDHMM, Diploma</td>
<td>1179</td>
</tr>
<tr>
<td>Health economics, health-care financing and health policy</td>
<td>PhD, MPhil, MA, PGD</td>
<td>130</td>
</tr>
<tr>
<td>Monitoring and evaluation</td>
<td>Diploma, Certificate</td>
<td>250</td>
</tr>
<tr>
<td>Public health nutrition</td>
<td>PhD, MScMA (Dietetics &amp; Food Service Management), MSc Foods and Nutrition, PGDAND, PGDPHN, Diploma, Certificate</td>
<td>350</td>
</tr>
<tr>
<td>Health promotion</td>
<td>PGDHP, DHPE, DNHE</td>
<td>240</td>
</tr>
<tr>
<td>Public health law</td>
<td>Mental Health Law and Human Rights, PGD in Law and Medicine, PGD in Medical Law and Ethics, PGD in Health Science in Medico Legal Practice</td>
<td>300</td>
</tr>
<tr>
<td>Veterinary public health</td>
<td>PhD, MVSc, MVPH, BVSc&amp;AH, PGCCVH</td>
<td>2000</td>
</tr>
<tr>
<td>Ethics</td>
<td>PGD, Diploma, Advanced Certificate, Certificate</td>
<td>200</td>
</tr>
<tr>
<td>Maternal &amp; child health</td>
<td>PGDMRCH, PGDMCH, Diploma in MCH&amp;FW, Certificate</td>
<td>800</td>
</tr>
<tr>
<td>Total</td>
<td>All</td>
<td>14477</td>
</tr>
</tbody>
</table>

AFIH: Associate Fellow of Industrial Health; BBA: Bachelor of Business Administration; BE: Bachelor of Engineering; BSc: Bachelor of Science; BTech: Bachelor of Technology; BVSc&AH: Bachelor of Veterinary Science and Animal Husbandry; DNHE: Diploma in Nutrition and Health Education; DHPE: Diploma in Health Promotion Education; MA: Master of Arts; MBA: Master of Business Administration; MCH&D&FW: Maternal and Child Health and Family Welfare; MHM: Master of Hospital Management; ME: Master of Engineering; MPhil: Master of Philosophy; MSc: Master of Science; MTech: Master of Technology; MVPH: Master in Veterinary Public Health; MVSc: Master of Veterinary Science; PGCCVH: Postgraduate Certified Course in Veterinary Homeopathy; PGD: Postgraduate Diploma; PGDAND: Postgraduate Diploma in Applied Nutrition and Dietetics; PGDHHM: Postgraduate Diploma in Hospital and Health Management; PGDHM: Postgraduate Diploma in Hospital Administration; PGDMCH: Postgraduate Diploma in Maternal and Child Health; PGDMRCH: Postgraduate Diploma in Management of Reproductive and Child Health; PGDPHN: Postgraduate Diploma in Public Health Management; PGDPH: Postgraduate Diploma in Public Health Nutrition; PhD: Doctor of Philosophy.
non-medical PHPs, the estimated supply of PHPs produced annually for the years 2017, 2022 and 2026 is shown in Table 3.

### Need for public health professionals in India up to 2026

#### Need estimation – methodology

**Estimation of public health professionals by service–target approach**

First, the normative need for PHPs in 2017 was calculated using the service–target approach for PHPs in the areas of practice, research and education for 15 public health domains. Standards were created and assumptions made by interacting with public health experts and by review of the literature. The need for PHPs working in maternal and child health and health promotion was not included, owing to the cross-cutting nature of these domains. The methodology for estimating the normative need in 2017 for each domain depended on the extent and nature of work done to date on workforce needs in that domain. The detailed description of these estimates will be published elsewhere and is available from the corresponding author on request. In brief, where previous work directly estimated the service–target need in that domain, the methodology was repeated and updated to provide an estimate for 2017. For some domains, however, the only previous research available was on training provision and landscaping the main employment roles in that domain. In these instances, the data on training were used to estimate the teaching faculty portion for each domain, based on the faculty:student ratios stipulated by the University Grants Commission.

The non-teaching component for each of these domains was calculated based on the main employment roles available. For illustration, for biostatistics the normative need was calculated from the following estimates: 474 (faculty for each of the 474 medical colleges’ departments of preventive and social medicine/community medicine, as per Medical Council of India recommendations) + 4 (faculty for doctoral programmes) + 92 (faculty for masters’ programmes) + 229 (for health management, hospital administration, public health programmes) + 1000 (professionals for national research and training institutes) + 1500 (for academic/research organizations) + 500 (in international organizations) + 1080 (in pharmaceutical

#### Table 3. Estimated supply of public health professionals (PHPs) produced annually for the years 2017, 2022 and 2026

<table>
<thead>
<tr>
<th>Year/forecast point</th>
<th>Scenario/place occupancy</th>
<th>Medical colleges offering public health programmes</th>
<th>Institutions (other than medical colleges, including schools of public health) offering public health programmes</th>
<th>Total PHPs produced annually – assuming 100% completion rate of occupied places in each scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Places offered</td>
<td>Places occupied and completed</td>
<td>Medical PHPs produced after 8.1% attrition after qualification</td>
</tr>
<tr>
<td>2017/baseline</td>
<td>Best guess/low (95% occupancy for medical; 60% for other institutions)</td>
<td>1128</td>
<td>1072</td>
<td>985</td>
</tr>
<tr>
<td></td>
<td>Optimistic/moderate (95% occupancy for medical; 68% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aspirational/high (95% occupancy for medical; 75% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2022/forecast; midpoint</td>
<td>Best guess/low (95% occupancy for medical; 60% for other institutions)</td>
<td>1755</td>
<td>1667</td>
<td>1532</td>
</tr>
<tr>
<td></td>
<td>Optimistic/moderate (95% occupancy for medical; 68% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aspirational/high (95% occupancy for medical; 75% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2026/forecast; endpoint</td>
<td>Best guess/low (95% occupancy for medical; 60% for other institutions)</td>
<td>2256</td>
<td>2143</td>
<td>1969</td>
</tr>
<tr>
<td></td>
<td>Optimistic/moderate (95% occupancy for medical; 68% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aspirational/high (95% occupancy for medical; 75% for other institutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
companies/contract research organizations). This gave a total estimated need for 5879 PHPs in the biostatistics domain in 2017. The estimated normative need in each of the 15 domains is shown in Table 4.

Second, in addition to the estimates described above, the additional need deriving from the strategy outlined in the National Health Policy 2017, which explicitly proposes creation of a public health management cadre in all states, was also estimated.7

Third, the estimated number of the 2017 PHP workforce was used to calculate the number of PHPs per 100,000 population, based on the World Bank population estimates and projections for 2017–2026.21 This is a simple, standard measure of health workforce coverage.

Need estimation – results
Normative baseline need for 2017 based on service–target approach
Table 4 shows the estimated normative need for each of the 15 domains studied, giving a total of 180,916 PHPs for the baseline year of 2017. For forecasting, the need:population ratio was assumed to be constant and applied to the World Bank population projections to estimate the service–target need for the years 2018 to 2026 (see Table 5).

Table 5. Projected population, service–target need and public health management cadre need for public health professionals (2017 to 2026)

Additional public health management posts from 2020 onwards
For the additional need to fulfil the strategy of developing a public health management cadre outlined in the National Health Policy 2017,7 the recommended number of posts required was applied, based on previous work; this was 9 at each state/union territory level, 14 at each district level, and 4 at each block level.12 This gave a need of 33,236 additional public health management posts by 2026 (i.e. 9 × 36 states/union territories + 14 × 640 districts + 4 × 5988 blocks; see Table 5). With respect to roll-out of this public health management cadre, it was assumed that one third of the states/union territories will implement the cadre by 2020, another one third by 2023 and all by 2026 (see Table 5).

Public health professionals per 100,000 population ratio
Data on the prevalence of occupational vacancies in the health-care system in India overall are scarce. For example, government statistics for 2008, based on vacancies in sanctioned posts, showed 18% of primary health centres were without a doctor, about 38% were without a laboratory technician and 16% were without a pharmacist.37 For PHPs, it was assumed that the number of vacant posts would be lower, at 15%, because their role is largely non-clinical, and that elements relevant to attrition of clinical staff, such as fear of occupational infection, are less likely to apply. Thus, for the estimated 180,916 posts in 2017, it was estimated that 153,779 (i.e. 85%) were occupied. Therefore the number of PHPs per 100,000 population based on the 2017 World Bank estimate for the population of India (i.e. 1,339,180,000)21 is 11.

Supply–need gap for public health professionals up to 2026

Gap estimation – methodology
The number of PHPs currently in the workforce was assumed to be 85% of the estimated need for PHPs for the baseline year 2017. For subsequent years, the net number of PHPs in the health workforce was estimated as the sum of the number of PHPs in the health workforce and PHPs produced annually, minus the number of PHPs exiting the workforce (medical PHPs exiting at 8.1% – through death [3.1%] and migration...
non-medical PHPs exiting at 6.1% – through death [3.1%] and migration [3%]). It was assumed that the current composition of the PHP workforce, based on National Sample Survey Office (NSSO) estimates, would remain constant at 20% medical and 80% non-medical PHPs.

**Gap estimation – results**

In the “moderate place occupancy (95% medical and 68% non-medical PHPs) – optimistic scenario” – in the year 2017 there was an gap of almost 27 000 PHPs; however, if PHPs are produced annually at a similar rate of 11 PHPs per 100,000 population and additionally if the public health cadre is instituted – assuming that one third of the states will implement the public health cadre by 2020, another one third by 2023 and all states by 2026 – then in the year 2026 this gap will have gone up to more than 32 000 PHPs (see Fig. 1).

**For the year 2017**

The 2017 population of India was 1.33 billion and the normative need was estimated to be 180,916 PHPs (see Table 5). It was assumed that, of these 180,916 positions for PHPs in India, around 85% of positions are currently occupied; hence, the number of PHPs in the health workforce is 153,779. Additionally, as per the moderate scenario, 10,210 PHPs are produced (see Table 3). As per NSSO estimates, 20% of India’s health workforce has a medical background/are physicians. Thus, if the medical PHPs are exiting the workforce at 8.1% and non-medical PHPs are exiting at 6.1%, 9,996 PHPs are exiting the workforce that year. Thus, the net number of PHPs in the health workforce (HWF) for 2017 is estimated as: net PHPs in HWF = number of PHPs in HWF + PHPs supplied – PHPs exiting HWF (moderate place occupancy), i.e. 153,779 + 10,210 – 9,996 = 153,993.

The additional need for PHPs for this year (net number of PHPs deducted from the total need, i.e. 180,916 – 153,993) is therefore 26,923 PHPs. Since the public health cadre has not yet been initiated, its need has not been accounted for until the year 2020.

**For the year 2018**

For 2018, with a population of 1.35 billion and total need of 182,925 (see Table 5), the number of PHPs in the health workforce was assumed to be the net number in the previous year, i.e. 153,993. As per the moderate scenario, 11,344 PHPs are produced. At an 8.1% exit rate of medical PHPs and 6.1% exit rate of non-medical PHPs, 10,010 PHPs leave the workforce. Thus, the net number of PHPs in the health workforce is estimated as: net PHPs in HWF = number of PHPs in HWF + PHPs supplied – PHPs exiting HWF (moderate place occupancy); i.e. 153,993 + 11,344 – 10,010 = 155,327.

Thus, if this net number of PHPs is deducted from the total need (i.e. 182,925 – 155,327), then there is an additional need

![Fig. 1. Forecast shortfall in the number of public health professionals (PHPs) in three scenarios, according to level of policy intervention](image-url)
for 27,598 PHPs. Again, the need for the public health cadre has not been accounted for until the year 2020.

Similarly, in the best guess scenario, i.e. with low non-medical place occupancy of 60% for the year 2017, there is a gap of around 28,000 PHPs; this increases to 45,000 PHPs by the year 2026. By contrast, in the aspirational scenario, i.e. with a high place occupancy of 75% for non-medical places, the baseline gap for 2017 of almost 26,000 PHPs reduces to around 21,000 PHPs in the year 2026. Fig. 1 illustrates the three scenarios.

Discussion

For a lower-middle-income country like India, with a huge population base but without a public health council, standardized definition of PHPs, or valid and reliable estimates, estimating and bringing together information regarding the supply and need aspects of PHPs was a substantial challenge. The aim was not to provide granular, detailed forecasts but rather an overarching view of possible directions of change to inform policy-making. Since so many aspects of public health education and work in India are unknown, a series of assumptions was necessary, as was curtailment of the number of influencing factors considered. For example, reasons for workforce attrition, such as change of profession or retirement, were not included; no attempt was made to adjust for the different lengths of courses considered; the possibility of individuals working in more than one discipline was not counted; and any change in the technology (increasing efficiency) of current public health services was not considered for the projections.

Notably, the need for PHPs working in maternal and child health and health promotion was not accounted for, owing to the cross-cutting nature of these domains; as important areas, this omission means the gaps are much wider than indicated. Another limitation during the study was the lack of clarity regarding educational programmes to be included/excluded from this work while estimating the supply of PHPs in the absence of a public health council or body; there is a need for specifying the names and details of professionals (their educational qualifications) to be included or excluded in the broader definition of PHPs for India. Also, the numbers obtained for service statistics do not distinguish between roles in the public and private sectors.

It may be possible to include these, and other refinements and updated and more informed assumptions, in future analyses that build on this work and will become particularly important when forecasting at the state or lower local levels.

For supply estimation, a mathematical simulation of workforce supply projections in academic programmes being offered various public health domains was a suitable methodology. For need estimation, adopting the traditional service–target approach was important to capture the critical information in various specialist domains nationwide. Additionally, considering the uncertainty of the future, it was essential to provide estimates for possible future scenarios. It was estimated that the number of PHPs in India in 2017 was 11 per 100,000 population, substantially below the Association of Schools of Public Health recommendation of 220 PHPs per 100,000 population.40

The forecast from this study is based on an assumption that the number of both medical and non-medical public health course places will double between 2017 and 2026. Thus, to meet the existing and forecast shortage of PHPs in the health workforce, increasing the number of places from both medical colleges and institutions offering public health programmes (including schools of public health) will be necessary. If, for subsequent years, it is assumed that, instead of 100% growth in the supply of places for PHPs, growth is only 50%, then in the optimistic scenario of moderate non-medical place occupancy of 68%, the gap of 27,000 PHPs for 2017 will increase up to 54,000 PHPs by 2026. If growth in the supply of places is only 50%, similarly, in the best guess scenario with a low non-medical place occupancy of 60%, the gap of 28,000 PHPs in 2017 will increase to 64,000 PHPs and in the aspirational scenario with high place occupancy of 75%, the gap of 26,000 PHPs in 2017 will increase to 45,000 PHPs in the year 2026.

Increasing capacity alone, however, will not be sufficient. Public health programmes are already undersubscribed and students are not currently trained according to an explicitly stated, standardized competency framework that is tailored to the Indian context. Policy-makers will have to examine issues surrounding low uptake of existing places, and review the current framework regulating education of PHPs, in order to adequately respond to future PHP requirement.

Increased clarity on the role of public health graduates in India’s public health infrastructure would help institutions to adjust their programmes and ensure graduates are equipped with the required skill sets. The Government of India has recently undertaken efforts towards designing a model for a MPH qualification.41 Tackling these issues will be essential, since 90% of the public health graduates who will work in public health across the country will come from a non-medical background.

The need for a public health cadre has been recognized for many years. In 2005, the National Commission on Macroeconomics and Health identified that failure to develop a public health cadre and widen the eligibility criteria to include clinicians, without making public health training a mandatory requirement for working in posts that need public health skills, had adversely affected the implementation of public health programmes.42 As stated by Datta in 2009, the demand for public health education depends on the career options available for PHPs with medical and non-medical backgrounds, in a balanced way in the central, state, district and local government health organizations and in academic and research institutions.43 Currently, public health graduates in India are employed in the public, private and nongovernmental sectors, in teaching, research and implementation roles. However, there are no well-defined career pathways, which is a significant barrier for MPH graduates who wish to work in the public sector.44 Thus, to generate demand for the public health programmes and increase their place occupancy, there is a need to create more job opportunities for PHPs with a non-medical background, to encourage the workforce serving the Indian public health system. Revamped designations and clarity of roles must be worked out for appropriate job responsibilities.45 If no intervention to influence the supply side is undertaken, then the probability is that market forces might lead to mushrooming of public health institutions in an
unregulated manner, to cater for the demand for PHPs in the country.

Formal recognition of the need to remedy this situation came in the National Health Policy 2017 and 2018 NITI Aayog report, Strategy for New India@75. With respect to a defined career structure, there is also a need to revise the salary brackets of PHPs in India. PHPs are expected to work in tough terrains on poor pay packages by most of the organizations working in the field of public health. Adequate remuneration is essential to ensuring higher place occupancy for training in public health. The government needs to ensure a good quality of life for PHPs entering the public system if the projected shortfalls are to be averted. The projections for the aspirational scenario are only likely to be realized through concerted advocacy and action in several areas by policy-makers and by the Government of India.

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References


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