

Development of the Systems Tool for Readiness, Implementation and malaria Elimination (STRIDE): an online Delphi study

Win Htike

win.htike@burnet.edu.au

Burnet Institute

Win Han Oo

The University of Melbourne

Kaung Myat Khant

Burnet Institute

Phone Si Hein

Asia Pacific Malaria Elimination Network

Paul A. Agius

Deakin University

Catherine M. Bennett

Deakin University

Kamala Thriemer

Charles Darwin University

Alyssa E. Barry

Deakin University

Freya J. I Fowkes

The University of Melbourne

Research Article

Keywords: assessment tool, Delphi study, Greater Mekong Subregion, health system readiness, malaria elimination

Posted Date: September 29th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10237971/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Countries in the Greater Mekong Subregion are committed to eliminating malaria by 2030. Despite the critical role of health system readiness in malaria elimination, there is no assessment tool available to comprehensively evaluate an area's readiness towards malaria elimination across six WHO health system building blocks which are service delivery, surveillance, elimination workforce, products and commodities, programme financing, and leadership and governance. The aim of this study is to develop a comprehensive health system readiness assessment tool for malaria elimination in the Greater Mekong Subregion.

Methods

Based on the findings from recent studies, a health system readiness assessment tool called STRIDE (Systems Tool for Readiness, Implementation and malaria Elimination) was drafted. Two rounds of modified Delphi consultation were conducted during May and September 2025 to finalise and endorse the STRIDE with a priori percent agreement of 70%. A panel of experts consisting of representatives from national programmes, donor organisations, technical agencies, and implementing partners and independent experts evaluated the proposed items for assessing the health system readiness for malaria elimination. Content validity of the final STRIDE was assessed by item-level and scale-level content validity indexes.

Results

The draft STRIDE was developed with two modules: the National Module and the Sub-National Module comprising 58 and 49 questions respectively. The draft STRIDE underwent two rounds of online Delphi consultation with 24 and 18 experts. Incorporating expert feedback, the STRIDE was finalised with 66 questions in the National Module and 55 in the Sub-National Module, each assessing readiness across service delivery, surveillance, elimination workforce, products and commodities, programme financing, and leadership and governance for malaria elimination. Item-level content validity indexes of the questions ranged from 0.83 to 1.00, while scale-level content validity indexes were 0.96 for the National Module and 0.97 for the Sub-National Module, indicating excellent content validity.

Conclusions

The STRIDE offers a comprehensive, validated framework to evaluate an area's readiness towards malaria elimination at multiple levels. It enables policymakers and programme managers to

systematically evaluate elimination efforts, identify critical gaps, and strengthen national and sub-national health systems, thereby accelerating progress towards malaria elimination.

Background

Countries in the Greater Mekong Subregion (GMS) – Cambodia, Lao People’s Democratic Republic, Myanmar, Thailand and Vietnam – have committed to eliminating malaria by 2030. To achieve malaria elimination by 2030, each GMS country developed its National Malaria Elimination Plan in the context of its existing health system capacity. In line with the Global Technical Strategy for Malaria [1], National Malaria Elimination Programmes (NMEPs) of the GMS countries have optimised the existing control phase interventions such as early diagnosis and prompt treatment of malaria cases, with special attention to high-risk areas and populations to ensure universal coverage of malaria services [2–6]. They also emphasise eliminating vivax malaria – which can relapse due to dormant liver stages and requires 8-aminoquinolines (primaquine or tafenoquine) for radical cure, drugs that may cause adverse events in patients with glucose-6-phosphate dehydrogenase enzyme (G6PD) deficiency [7–9] – by recommending mandatory G6PD testing before prescribing primaquine or tafenoquine (except in Myanmar). Additionally, in order to successfully interrupt onward transmission of malaria, the NMEPs have implemented time-bound reactive surveillance and response activities such as case notification, case and foci investigation and classification, and foci response activities [10].

While political commitment and technical strategies are required to galvanise and guide malaria elimination, health systems readiness for elimination will bring any political commitment into action. Lessons from countries that have achieved WHO malaria elimination certification show that effective implementation of these activities requires inputs from a well-prepared health system in terms of all six WHO building blocks namely service delivery, surveillance, workforce, products and commodities, financing, leadership and governance [11–14]. As countries accelerate progress towards malaria elimination, all health system building blocks must be ready to support upgraded testing, treatment, vector control and surveillance activities, underpinned by all three pillars of the WHO Global Technical Strategy framework [15–17].

A resilient and well-prepared health system is the foundation for successful malaria elimination and long-term sustainability. As countries transition from malaria control to elimination, the same health system must accommodate newly integrated elimination strategies alongside existing services [18]. This shift places additional demands on already stretched systems, making health system readiness a critical success factor. If pre-existing health system issues are not identified and resolved early, they can be exacerbated, undermining the effectiveness of elimination efforts [10, 19–23]. Therefore, it is essential to proactively strengthen the health system by identifying gaps in the health system building blocks. Introducing malaria elimination strategies without thorough assessment and preparation of the health system can impede implementation across all three pillars of the WHO Global Technical Strategy [1].

Despite the central importance of health system readiness for malaria elimination, no single standardised and comprehensive tool currently exists to assess whether health systems are adequately prepared to implement and sustain elimination activities [24]. Existing tools each offer partial insights. The WHO Malaria Elimination Audit Tool provides focused assessment of elimination-specific technical and operational domains but overlooks critical health system building blocks such as workforce planning, supply chains, and sustainable financing [25]. WHO-organised periodic malaria programme reviews offer holistic, context-sensitive evaluations but suffer from a lack of standardisation, limiting comparability over time and across settings [26, 27]. Broader health system assessments like the Service Provision Assessment and Service Availability and Readiness Assessment generate robust, standardised data but are insufficiently tailored to the unique demands of malaria elimination [28, 29]. Consequently, these tools cannot be used in isolation to assess health system readiness comprehensively across the three pillars of the WHO Global Technical Strategy for Malaria. Together, their limitations reveal a critical gap: the absence of a comprehensive, standardised framework capable of assessing health system readiness for malaria elimination across all six health system building blocks [24]. This study aims to fill that gap by developing a novel health system readiness assessment tool for malaria elimination called “*Systems Tool for Readiness, Implementation and malaria Elimination (STRIDE)*”.

Methods

The development of STRIDE involved the Delphi technique, a commonly used method that systematically combines expert opinion in order to arrive at an informed consensus on a complex problem [30]. It involves structured anonymous communication between experts on a certain topic in order to achieve consensus on policy, practice or organisational decision-making [31–33]. In this study, a modified Delphi technique – online Delphi consultation – was applied to enable broader expert participation by overcoming geographical distance and travel restrictions [34, 35]. Study reporting adheres to the Conducting and Reporting of Delphi Studies (CREDES) checklist (Supplemental material 1) [36].

Study procedure

STRIDE was developed in four steps: preparation, recruitment of panel members, two rounds of online Delphi consultation, and dissemination.

Preparation

We recently conducted a qualitative study with malaria stakeholders to explore health system needs and issues related to implementing elimination activities across the GMS [37]. These qualitative findings, together with existing literature, and WHO guidelines [1, 18], enabled development of the draft STRIDE (Supplemental material 2). The draft STRIDE consisted of two modules – the National Module for national-level users (e.g. NMEP managers), and the Sub-National Module for sub-national-level users

(e.g. field team leaders). Each module was divided into six sections, designed to enable evaluation of the malaria elimination readiness of the national or sub-national health system in relation to one of the six WHO health system building blocks – service delivery, surveillance, elimination workforce, products and commodities, programme financing, and leadership and governance [38]. The National Module focuses on policy dimensions of malaria elimination, including quality assurance and strategic planning to strengthen national progress, while the Sub-National Module focuses on the operational components (Supplemental material 2). In the first draft of the assessment tool, the National Module had 58 items, and the Sub-National Module had 49 (Supplemental material 2).

Recruitment of panel members

For the Delphi consultation, experts (panel members) were defined as people with knowledge and experience of malaria elimination and health systems in the GMS. More specifically, those with professional experience of more than 10 years in the field of malaria elimination and/or health systems, especially in the GMS, were considered eligible for the Delphi consultation. Eligible experts were identified through formal and informal networks [39], and invited to participate via email, telephone or in person. There is no definitive minimum number of experts for a Delphi consultation [40], but previous studies and literature suggest that a panel of 15 is sufficient [30, 41]. Given the likely difficulty of maintaining full participation of all panel members throughout the process [41], 29 experts were recruited to ensure adequate representation. During recruitment, the objectives, procedures and expected outputs of the Delphi consultation experts were explained thoroughly, as described in the Participant Information and Consent Form.

Online Delphi consultation

In this study, two rounds of Delphi consultation were conducted, in line with the relevant literature [34, 42]; more than two rounds increases panel attrition [40]. In addition, conducting only two rounds of consultation avoids reaching a “false consensus” due to exhaustion of the experts [34].

In the first round of Delphi consultation, experts reviewed both modules of the draft STRIDE (the National Module and the Sub-National Module) (Supplemental material 2). Each module included proposed item and response measures for expert evaluation. For each proposed item, experts were asked to rate its relevance in assessing the readiness of the respective WHO health system building block using a 5-point Likert scale: "strongly relevant," "relevant," "neither relevant nor irrelevant," "irrelevant," or "strongly irrelevant." Additionally, experts were asked to comment on whether the proposed response measure for each item was appropriate. The experts were also allowed to suggest new items for the draft STRIDE or comment on the existing items [34]. A four-week turnaround time was given for experts to complete their review.

After the first round of Delphi consultation, based on the level of consensus between experts, each item was evaluated and either endorsed or discarded from the assessment tool, or proceeded through to another round of consultation. In this study, a priori percent agreement of 70% was used as the consensus threshold [43]. In addition to percentage agreement, experts' qualitative feedback was considered in evaluating the items of the draft STRIDE. A summary table of the first round results, including aggregated summary statistics, was prepared and shared with panel members before starting the second round (Supplementary material 3); this provided controlled feedback and an aggregated group response, two important characteristics of the Delphi technique [44].

The second and final round of Delphi consultation was conducted using the same procedures as the first. Based on the experts' review and feedback, items were endorsed or discarded from STRIDE. The final version of STRIDE was checked for its content validity by calculating an item-level content validity index (I-CVI) and a scale-level content validity index using an averaging estimation method (S-CVI/Ave), using the following formulas [45].

$$I-CVI = \frac{\text{Number of experts responded "strongly relevant" or "relevant" to the item}}{\text{Total number of experts responding to the item}}$$

$$S-CVI/Ave = \frac{\sum I-CVI \text{ for all items}}{\text{Total number of items}}$$

Dissemination plan

The final version of STRIDE was shared with all experts who participated in the Delphi consultation and with additional stakeholders from GMS countries, including representatives from NMEPs, donor agencies, and technical agencies through formal channels and platforms (e.g. regional and international conferences, webinars).

Data management and analysis

The Delphi materials for expert consultation were developed in REDCap (<https://www.project-redcap.org>) and sent to experts via email. Data from the REDCap server was immediately transferred to a password-protected computer after collection, and was only accessible to research team members. Once the quality of the electronic data files was confirmed, the original files in the REDCap server were erased. No personal identifiers were recorded on the questionnaires. Data was exported and saved as a Stata data file (.dta), and descriptive statistics (frequency, percentage, mean with standard deviation, median with interquartile range) and CVIs of the assessment tool were calculated using Stata version 18 (StataCorp, Texas). The experts' comments were analysed manually and thematically in Microsoft Word.

Results

Characteristics of experts participated in two rounds of Delphi consultation

Of the 29 experts recruited initially, 24 participated in the first round of Delphi consultation. Table 1 shows their demographic characteristics, level of regional representation, and organisation type. The panel constituted a mixture of experts from regional (7/24, 29%), national (12/24, 50%) and sub-national levels (5/24, 21%). Experts participated in the first round of Delphi consultation represented national programmes (5/24, 21%), donor organisations (3/24, 13%), technical agencies (6/24, 25%), and implementing partners (5/24, 21%), and independent experts (5/24, 21%). Of the 24 experts who participated in the first round, 18 participated in the second and final round (75% retention) (Table 1).

Table 1
Characteristics of experts who participated in each round of Delphi consultation

Characteristic	First round	Second round
Total number of experts participated	24	18
Gender, n (%)		
Male	12 (50.0)	9 (50.0)
Female	12 (50.0)	9 (50.0)
Age in years, median (IQR)	49 (16.5)	47 (18.0)
Years of experience in malaria and/or health system, median (IQR)	19 (10.5)	17 (9.0)
Level of representation, n (%)		
Regional	7 (29.2)	5 (27.8)
National	12 (50.0)	9 (50.0)
Sub-national	5 (20.8)	4 (22.2)
Type of organisation represented, n (%)		
National Programme	5 (20.8)	3 (16.7)
Donor organisation	3 (12.5)	3 (16.7)
Technical agency	6 (25.0)	4 (22.2)
Implementing partner	5 (20.8)	4 (22.2)
Independent expert	5 (20.8)	4 (22.2)
<i>Note.</i> IQR = interquartile range.		

First round of Delphi consultation

During the first round of Delphi consultation, experts reviewed the 58 and 49 items included in the National Module and the Sub-National Module of the draft STRIDE respectively. Overall, the experts perceived STRIDE as a comprehensive tool with relevant items for assessing health system readiness for malaria elimination. However, they provided some valuable comments about terminology and the structure of the items. During the first round, experts suggested using specific operational definitions to avoid confusion. For example, in the draft STRIDE, users were asked whether there are targeted interventions for high transmission areas. Experts pointed out that the term “high transmission” is arbitrary and subject to individual interpretation, and suggested using a more specific definition. Based on expert suggestion, the term “high transmission area” was replaced with “areas with unmanageable caseload”, accompanied by an operational definition of “unmanageable” being “an area with more than three reported malaria cases per health facility per week at any given time”, as described in WHO guidelines [18]. Subsequently, the entire draft STRIDE was checked for unclear terminology and replaced by specific operational definitions, and the revised items were included in the second Delphi round to be re-evaluated by the experts.

During the first Delphi round, experts recommended improving the clarity of several STRIDE items. For example, users were originally asked, “Does your country have a mandatory G6PD testing policy or guideline for vivax cases?” Experts highlighted that this question was composite (double-barrelled) and could confuse STRIDE users. One expert noted that a “mandatory policy” and “guidelines” represent two distinct attributes and should therefore be separated into more specific items. Another expert stressed that asking only about the existence of policies or guidelines was insufficient, because actual field practice may differ substantially. In response to these comments, the original item was disaggregated into the following components regarding G6PD testing in vivax malaria cases: “Mandatory G6PD testing policy (Yes/No)”; “G6PD testing guidelines (Yes/No)”; “Training of health staff on G6PD testing (Yes/No)”; “Availability of G6PD test kits at health facilities (Yes/No)”; and “Field monitoring to ensure compliance to G6PD testing guidelines (Yes/No)”. The revised items were then re-evaluated during the second Delphi round.

During the first round, the experts reviewed the proposed response measures of the draft STRIDE and provided their feedback. They suggested that most of the response measures proposed in the draft STRIDE were subjective. For example, users were asked to rate how frequently the national programme provided feedback to its lower levels and partners regarding the quality of routine malaria surveillance data, on a scale of 0 to 5 points (0 = no feedback provided and 5 = feedback always provided). The experts pointed out that such a scale was open to interpretation. Based on expert feedback, the item was revised to “What is the frequency of providing feedback to the lower levels and partners regarding the quality of routine malaria surveillance data?” with responses levels of “weekly”, “monthly”, “quarterly”, “six-monthly”, and “yearly”. Other similar response measures of the draft STRIDE were reviewed, revised and included in the second round of consultation.

After the first round of the Delphi consultation, 53 items – 30 from the National Module and 23 from the Sub-National Module – underwent major revisions and were re-evaluated by the expert panel in the second round. In addition to these revised items, 36 new items (21 from the National Module and 15 from the Sub-National Module) were added based on expert suggestions and included in the second-round assessment. Meanwhile, 36 items that required no change or only minor adjustments (such as wording or language improvements) – 18 from each module – were endorsed after the first round. A further 18 items (10 from the National Module and 8 from the Sub-National Module) were discarded because experts considered them unfit for purpose, duplicative or irrelevant (Figs. 1a and 1b). Detailed statistics for each item are described in Supplementary material 3.

Second round of Delphi consultation

During the second round of Delphi consultation, experts agreed that most of the revised items were relevant to be included in STRIDE. Experts recommended minor refinements to improve both the clarity and comprehensiveness of the items. Some experts suggested including WHO-endorsed definitions for some technical terms such as “receptivity”. Experts expressed their concern that some non-malaria-specific user groups (e.g. basic health staff) might not be familiar with these technical terms, and that this might lead to confusion among users and introduce discrepancies in the results. Based on expert’s suggestions, technical terms were accompanied by the standard WHO definitions (e.g. “receptivity is defined by WHO as the ability of an ecosystem to allow transmission of malaria [18]”).

Additionally, experts suggested including some guidance on estimating the percentages of service delivery coverage. Based on that, numerators and denominators of coverage were defined where relevant, alongside the respective items, to reduce differences in interpretation among users. For example, when asking about the percentage of receptive areas where targeted interventions for malaria elimination were applied, the following instruction was provided: “Estimate the percentage by taking “total number of smallest administrative unit (e.g. village) that are receptive to malaria” as denominator, and “total number of smallest administrative unit where targeted intervention was applied” as numerator.”

After the second round of Delphi consultation, 48 of 51 (94%) items in the National Module and 37 of 38 (97%) items in the Sub-National Module were endorsed. Three items from the National Module and one item from the Sub-National Module were discarded based on experts’ suggestions. Two items from the National Module – asking national level users to estimate the percentage of health facilities reporting unmanageable caseload (i.e. reporting more than three cases per health facility per week), and about presence of specialised intervention in those areas – were discarded because the expert panel considered that they were about operational aspects and would not produce useful responses from national-level users. Additionally, two items assessing the readiness of the elimination workforce in the National Module and two items assessing the readiness of the surveillance system in the Sub-National Module were considered duplicated, and were discarded from the final version of STRIDE (Figs. 1a and 1b).

Final version of STRIDE

The final versions of the National Module and the Sub-National Module have 66 and 55 items respectively (Supplemental material 4). These items assess the readiness for malaria elimination across the six WHO health system building blocks – service delivery, surveillance, elimination workforce, products and commodities, programme financing, leadership and governance – at both national and sub-national levels. The I-CVI and S-CVI/Ave values for the items in both the National Module and the Sub-National Module demonstrate that each individual item is strong and relevant, and that the instruments as a whole are judged to have excellent content validity (Table 2).

Table 2
Number of items under each domain of the final version of STRIDE with content validity indexes

Domain	National Module (for national level users)	Sub-National Module (for sub-national level users)
Service delivery	14	15
Surveillance	15	13
Elimination workforce	5	5
Products and commodities	12	11
Programme financing	7	7
Leadership and governance	13	4
Total number of questions	66	55
I-CVI (range)*	0.83 to 1.00	0.83 to 1.00
S-CVI/Ave	0.96	0.97
<i>Note.</i> I-CVI = item-level content validity index, S-CVI/Ave = scale-level content validity index using averaging estimation method [45]; * I-CVI of each item is described in Supplemental table S1.		

The National Module focuses on policy dimensions of malaria elimination, including quality assurance and strategic planning to strengthen national progress (Supplemental material 4). The section on service delivery (n = 14) measures the coverage of targeted interventions for high-risk areas and populations, the availability of policies, guidelines, trained personnel, and test kits for mandatory G6PD testing, as well as the coverage of both G6PD testing and radical cure for *P. vivax* cases. It also measures the existence of specialised strategies to enhance community awareness and engagement. The surveillance component (n = 15) measures laws or regulations for mandatory malaria case reporting and sectoral compliance, mechanisms for updating reactive surveillance and response strategies, reporting performance across sectors, systems for monitoring vector bionomics, insecticide and drug resistance, approaches for ensuring surveillance data quality, and procedures for malaria record keeping.

The elimination workforce domain (n = 5) measures staffing vacancies, capacity building mechanisms for health staff across key malaria elimination functions, processes for updating training materials, and the presence of long-term human resources plans. The products and commodities section (n = 12) measures the accuracy of commodity forecasting systems, logistics management across national and sub-national levels, storage conditions of malaria related supplies, supply chain systems, and quality assurance mechanisms. Programme financing (n = 7) measures funding gaps, domestic financing status, fund management capacity, and accountability. Finally, the leadership and governance domain (n = 13) measures high-level commitment to malaria elimination, intersectoral engagement and coordination, availability of essential documents and guidelines, the research agenda, and the governance structures overseeing elimination and research activities (Supplemental material 4).

The Sub-National Module focuses on the operational components of malaria elimination (Supplemental material 4). The service delivery section (n = 15) measures the accessibility and coverage of vector control, malaria testing, and treatment services for high-risk areas and populations, as well as local practices related to G6PD testing and the provision of radical cure for *P. vivax*. The surveillance component (n = 13) measures adherence to mandatory case notification across sectors, the timeliness and completeness of reactive surveillance and response activities, and routine practices for data quality assurance, reporting, and record-keeping.

The elimination workforce domain (n = 5) measures whether staffing levels and technical capacity are sufficient to support essential elimination and programme management activities, and whether clear job descriptions exist for staff categories. The products and commodities section (n = 11) measures the availability of key commodities required in elimination settings, systems in place to prevent stock-outs and product expiry, and practices related to storage and overall commodity management. Programme financing (n = 7) measures the availability of adequate funding for planned activities, the presence of flexible funding mechanisms for outbreaks and emergencies, as well as fund management capacity and accountability structures. Lastly, the leadership and governance section (n = 4) measures high-level commitment to malaria elimination, intersectoral engagement and coordination, and the availability of essential documents, standard operating procedures, guidelines, and reporting formats necessary to support elimination efforts (Supplemental material 4).

Discussion

STRIDE provides a structured framework to systematically measure an area's readiness for malaria elimination in terms of service delivery, surveillance, elimination workforce, products and commodities, programme financing, and leadership and governance structures at both national and sub-national levels. Moreover, based on consensus from a panel of experts, it is both qualitatively and quantitatively valid, providing robust findings that can support policymakers and programme managers to identify health system gaps and prioritise interventions within resource-limited settings.

Comprehensiveness of STRIDE in assessing health system readiness towards malaria elimination

Malaria elimination is a multifaceted process that requires support from a well-prepared health system [24]. All health system building blocks must function harmoniously to maximise coverage and quality of malaria services and achieve the intended goal of elimination [38]. A gap in one building block can affect others, hindering overall progress toward malaria elimination [38]. As countries accelerate their efforts to eliminate malaria, it is critical to comprehensively assess health systems against the WHO defined building blocks for health system readiness [24]. Currently, no comprehensive tool exists to perform such an assessment; STRIDE was designed to fill this gap.

Despite high-level commitments to malaria elimination, strong readiness at the national level does not necessarily translate into equivalent preparedness across sub-national levels, because gaps in health system readiness often exist at both levels [46]. Our recent study in the GMS highlighted operational gaps at sub-national levels, including service disruptions, workforce shortage, and lack of essential items (e.g. rapid diagnostic tests, medicines, long-lasting insecticidal treated nets), equipment (e.g. mobile phones for reporting), and infrastructure (e.g. electricity, storage facilities) [47]. These deficiencies could hinder the effective implementation of malaria elimination activities. To avoid this, it is important to assess health system readiness at both national and sub-national levels. STRIDE has two modules – one for national-level users and one for sub-national-level users. The National Module focuses on higher-level policy aspects of elimination, such as the presence of essential policies, strategies, guidelines, standard operating procedures, and plans for capacity building. The Sub-National Module emphasises operational aspects, including service coverage, timeliness and completeness of response activities, and availability of essential items, equipment, and infrastructure required to implement upgraded malaria prevention, testing, treatment, and surveillance activities. When used together, these two modules complement each other and can help strengthen health systems at both levels.

STRIDE identifies health system issues across the six WHO building blocks that challenge the effective implementation of malaria elimination activities in the GMS. The tool highlights critical gaps such as delays in surveillance and response activities, funding shortfalls, insufficient technical knowledge and skills in the health workforce, and inadequate cooperation among stakeholders. For instance, as transmission declines, malaria cases become concentrated among certain populations (“hot pops”, such as mobile and migrant populations [MMPs]) and in specific geographical areas (“hotspots”, such as border areas) [48]. In such settings, WHO recommends that NMEPs tailor elimination interventions to local epidemiological and operational contexts [1]. STRIDE can support this process by identifying gaps in surveillance systems, including whether reactive surveillance and response strategies are regularly reviewed and updated at the national level to address evolving transmission patterns.

Filling these gaps will enable the NMEPs and Ministries of Health to benefit from a vigilant surveillance and response system, sustained domestic investment in healthcare, constant capacity building, and multisectoral cooperation – key health system requirements for prevention of reintroduction of disease [49, 50]. Furthermore, STRIDE can support NMEP programme managers in strengthening record-keeping

practices to demonstrate successful interruption of onward transmission and to meet the documentation requirements of the WHO malaria elimination certification committee [18].

How to strengthen health systems and accelerate progress towards malaria elimination in the GMS

In GMS countries, malaria elimination efforts have relied heavily on international funding [51–53]. Recently, major international donors such as the United States President’s Malaria Initiative and the Global Fund have either ceased or significantly reduced their malaria budgets [54, 55]. As international funding declines, resulting funding gaps often weaken national malaria elimination efforts, leading to service disruptions and delays in implementing reactive surveillance and response activities [56, 57]. In such resource-limited contexts, strengthening the existing health system is crucial to overcome foundational weaknesses that hinder effective healthcare delivery and to advance progress toward universal health coverage [58, 59]. Therefore, NMEPs of the GMS countries, in collaboration with health policymakers from Ministries of Health, should conduct comprehensive assessments of health system readiness for malaria elimination. STRIDE will help NMEP programme managers in identifying and filling gaps in health system building blocks to ensure efficient resource utilisation and sustain malaria elimination efforts [53, 56, 60, 61].

Health systems and infrastructures vary widely across countries, and even neighbouring nations with similar contexts can differ significantly in healthcare structures, processes and outcomes [62–64]. Given these differences, as well as the context-specific nature of malaria transmission, STRIDE must be adaptable to local epidemiological conditions, institutional arrangements and population needs. For example, when assessing the readiness of the malaria elimination workforce, users are required to estimate vacancy rates at national, provincial, district and health facility levels. Because workforce structures and job categories often vary between countries, the tool should be tailored to include all relevant cadres before implementation. Similarly, the relevance of certain indicators may differ across settings. For instance, a question on stock-outs of G6PD test kits is applicable in countries where G6PD testing is recommended before radical cure (e.g. Lao PDR and Vietnam), but not in Myanmar, where national guidelines do not require this practice. To ensure alignment with country-specific health system contexts, a practical approach is to conduct in-country stakeholder consultations to adapt and refine STRIDE prior to implementation. Such a participatory process promotes NMEP ownership, enhances contextual relevance, and facilitates the integration of STRIDE into national planning, monitoring and evaluation processes [65–67].

Content validity of STRIDE

This study examined the content validity of STRIDE, an essential aspect of determining whether the tool has an appropriate set of items (questions) that represent the construct being measured (i.e. health system readiness) and a key step in scale development more generally [68]. First, finalisation of STRIDE was conducted through a Delphi consultation, an effective technique for achieving expert group consensus [30]. During this process, content validity of STRIDE was assessed by experts and potential

users with relevant backgrounds and theoretical knowledge of the domain of interest, as recommended in scale development literature [69].

Second, content validity was evaluated quantitatively by estimating CVIs [70, 71]. In this study, both item-level (I-CVI) and scale-level (S-CVI) indices were calculated, as recommended by Polit and Beck [45]. The scale development literature suggests a tool with excellent content validity should exhibit an I-CVI of 0.78 or higher and an S-CVI of 0.90 or higher [45, 72–74]. In this study, the I-CVI ranged from 0.83 to 1.00, and the S-CVI/Ave of the National Module and the Sub-National Module were 0.96 and 0.97 respectively, demonstrating excellent content validity.

Establishing content validity is an important first step in determining the overall validity and reliability of an assessment tool [75]. It is equally critical to establish construct validity – such as convergent, divergent, factorial, criterion, and known-groups validity – and perform reliability testing [76]. Due to time limitations in this project, the STRIDE tool was not validated in terms of external or construct validity, nor was its performance assessed using real-world or end-user data. As the next step, the STRIDE should be subjected to comprehensive psychometric evaluation, including construct validity testing, reliability assessment and real-world performance studies, to ensure its robustness and applicability across diverse settings.

Limitations of the study

In this study, STRIDE was finalised and validated through an expert panel review using the Delphi technique. Because estimates of content validity are highly dependent on the quality of the expert panel, limited diversity or heterogeneity in members' experience and expertise may have influenced the resulting content validity of the tool. Although expert retention was relatively high (75%), attrition is an expected and commonly reported challenge in Delphi studies. Taken together, these factors introduce the possibility of selection bias, which may have affected aspects of STRIDE's development.

To ensure that STRIDE is robust and applicable across diverse settings, further studies and additional forms of validation are required. STRIDE should undergo comprehensive psychometric evaluation – including construct validity testing, reliability assessment, and real-world performance studies. Due to time and resource constraints, we were unable to pilot test STRIDE with intended user groups to assess its practical performance. Such piloting would have been highly valuable, enabling refinement of the tool, assessment of usability, and adaptation for varied contexts. Therefore, a pilot study should be undertaken as a next step to evaluate STRIDE's performance, acceptability and operational feasibility. This process would also help identify potential implementation barriers and facilitators, allowing adjustments that enhance relevance and scalability. Ultimately, piloting and iterative refinement are essential to making STRIDE not only theoretically sound but practical and impactful in real-world settings.

Conclusions

Development of STRIDE – a comprehensive tool for assessing the readiness of each WHO health system building block – is a critical step in reorienting programmes from control to elimination. STRIDE incorporates health system needs and issues identified through exploratory qualitative research with malaria stakeholders, ensuring inclusion of essential parameters for successful elimination strategies in the GMS. It evaluates readiness at both national and sub-national levels, enabling identification of challenges that hinder the translation of high-level political commitment into actionable measures. STRIDE will enable health policymakers and programme managers to systematically evaluate the readiness of national and sub-national health systems for malaria elimination. By using STRIDE, programme managers and health stakeholders can identify health system gaps and implement targeted actions to prevent these weaknesses from undermining malaria elimination efforts. Ultimately, STRIDE supports health system strengthening at multiple levels and enhances preparedness for malaria elimination and broader health challenges.

Abbreviations

CVI content validity index

G6PD glucose-6-phosphate dehydrogenase

GMS Greater Mekong Subregion

IQR interquartile range

NMEP National Malaria Elimination Programme

STRIDE Systems Tool for Readiness, Implementation and malaria Elimination

WHO World Health Organization

Declarations

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Alfred Hospital Ethics Committee, Melbourne, Australia (199/23) and the Deakin University Human Research Ethics Committee, Melbourne, Australia (2023-233). Informed consent was obtained from all panel members involved in Delphi consultation. As with other research methods, Delphi consultation needs to maintain strict security conditions to maintain the anonymity of the panel members [34]. Measures were taken to ensure privacy, respect and dignity of all the panel members (experts). Identifying features of experts in the Delphi consultation was not used in any publications or reports.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This study was funded by a Deakin-Burnet PhD scholarship and the Australian Centre of Research Excellence in Malaria Elimination Research Seed Grant (awarded to WH), and the National Health and Medical Research Council of Australia (Leadership Fellowship (2017485) and the Australian Centre for Research Excellence in Malaria Elimination (1134989)) awarded to FJIF. The authors gratefully acknowledge the contribution to this work of the Victorian Operational Infrastructure Support Program received by the Burnet Institute. The funders have no input on the design of the study, collection, analysis, interpretation and publication of the study results.

Authors' contributions

WH conceptualised and designed the study under the guidance of FJIF, AB, CB, PAA, WHO and KT. WH, KMK and PSH conducted panel recruitment, preparations and online Delphi consultation under supervision of FJIF, AB, CB, PAA, WHO and KT. WH performed quantitative and qualitative data analysis under supervision of PAA, CB and WHO. Finalisation of the tool was done by WH, FJIF, WHO, and PA. WH prepared the first draft of the manuscript; and all authors reviewed and contributed to the final manuscript. All authors approved and read the final manuscript.

Acknowledgements

We would like to thank Burnet Institute staff Chad Hughes, Julie Tartaggia and Phone Myint Win for coordination and management support; and Katherine O'Flaherty and Ellen Kearney for technical advice in preparing the manuscript.

References

1. World Health Organization. Global technical strategy for malaria 2016–2030, 2021 update. World Health Organization; 2021.
2. Center for Malaria Parasitology and Entomology. *Malaria National Strategic Plan 2021–2025*. Vientiane Capital. Lao PDR: Ministry of Health; 2020.
3. Department of Disease Control. National Malaria Elimination Strategy Thailand 2017–2026. Bangkok: Ministry of Public Health; 2016.
4. Department of Public Health. National Strategic Plan for Malaria Elimination 2021–2025. Nay Pyi Taw: Ministry of Health and Sports; 2019.
5. Ministry of Health Vietnam. National Strategic Plan on Malaria Control and Elimination: 2021–2025. Ha Noi: Minsitry of Health; 2020.
6. National Center for Parasitology Entomology and Malaria Control. The National Strategic Plan For Elimination of Malaria in the Kingdom of Cambodia 2011–2025. Phnom Penh, Cambodia: Ministry of Health; 2011.
7. Schäfer C, Zanghi G, Vaughan AM, Kappe SHI. Plasmodium vivax Latent Liver Stage Infection and Relapse: Biological Insights and New Experimental Tools. *Annu Rev Microbiol*. 2021;75:87–106.
8. Manjurano A, Lyimo E, Kishamawe C, Omolo J, Mosha J, Donald M, Kazyoba P, Kapiga S, Chagalucha J. Prevalence of G6PD deficiency and submicroscopic malaria parasites carriage in malaria hotspot area in Northwest, Tanzania. *Malar J*. 2023;22:372.
9. Nascimento JR, Brito-Sousa JD, Almeida ACG, Melo MM, Costa MRF, Barbosa LRA, Ramos RN, Silva-Neto AV, Balieiro P, Figueiredo EFG, et al. Prevalence of glucose 6-phosphate dehydrogenase deficiency in highly malaria-endemic municipalities in the Brazilian Amazon: A region-wide screening study. *Lancet Reg Health Am*. 2022;12:100273.
10. Aye Tun WHO, Kaung Myat N, Thu, Cutts JC, Htike W, Ei Phyu Htwe, May Chan Oo, Aung Khine Zaw, Agius PA, Fowkes FJL. Implementation and fidelity of reactive surveillance and response strategies for malaria elimination: a systematic review and meta-analysis. *BMJ Public Health* 2025, 3:e001180.
11. World Health Organization. Malaria-free Maldives. India: WHO Regional Office for South-East Asia; 2016.
12. World Health Organization. Eliminating Malaria Case Study 3: Progress towards elimination in Sri Lanka. World Health Organization; 2012.
13. World Health Organization. Eliminating Malaria Case Study 10: Successful elimination and prevention of re-establishment of malaria in Tunisia. World Health Organization; 2015.
14. Lu G, Liu Y, Beiersmann C, Feng Y, Cao J, Müller O. Challenges in and lessons learned during the implementation of the 1-3-7 malaria surveillance and response strategy in China: a qualitative study. *Infect Dis Poverty*. 2016;5:94.
15. Weiner BJ, Amick H, Lee SY. Conceptualization and measurement of organizational readiness for change: a review of the literature in health services research and other fields. *Med Care Res Rev*. 2008;65:379–436.

16. Weiner BJ. A theory of organizational readiness for change. *Implement Sci.* 2009;4:67.
17. Colombini M, Alkaiyat A, Shaheen A, Garcia Moreno C, Feder G, Bacchus L. Exploring health system readiness for adopting interventions to address intimate partner violence: a case study from the occupied Palestinian Territory. *Health Policy Plan.* 2020;35:245–56.
18. World Health Organization. A framework for malaria elimination. Geneva: Global Malaria Programme; 2017.
19. Htike W, Linn NYY, Win KM, Lae Shwe Sin Myint, May Chan Oo, Ei Phyu Htwe, Zaw AK, O'Flaherty K, Agius PA, Kearney EA et al. Reactive surveillance and response strategies for malaria elimination in Myanmar: a literature review. *Malar J* 2023, 22:140.
20. Htike W, Win Han Oo, Aye Tun N, Khamlome B, Vilay P, Banouvong V, Chindavongsa K, Thet Lynn, Vathanakoune S et al. May Chan Oo, : Comprehensive evaluation of malaria reactive surveillance and response strategies in Lao People's Democratic Republic: a mixed-methods study. *BMJ Open* 2024, 14:e083060.
21. Win Han Oo, Nguyen XT, Ngo TVA, Ngo DT, Htike W, Aye Tun N, Thu KM, Cutts J, Nguyen THP et al. May Chan Oo, : Performance and feasibility of reactive surveillance and response strategies for malaria elimination in Vietnam: a mixed-methods study. *Malar J* 2023, 22:229.
22. Roobsoong WHO, Aye Tun W, Kaung N, Khant M, Htike W, Kengganpanich M, Agius PA, Sattabongkot J, Fowkes FJI. Evaluating Thailand's malaria reactive surveillance and response strategies for malaria elimination: a mixed-method study. *Infect Dis Poverty.* 2025;14:109.
23. Xuan Thang N, Win Han Oo, Htike W, Van Thi N, Duc Thang N, Son Ha D, Thi Luan B, Tuan Anh V, Ha Nam N et al. May Chan Oo, : Facilitators, barriers and acceptability of malaria reactive surveillance and response strategies in Vietnam: a mixed-methods study. *BMJ Public Health* 2024, 2:e000961.
24. Htike W, Win Han Oo, Bennett CM, Agius PA, Barry AE, Fowkes FJI. Health System Readiness—The Neglected Catalyst in Malaria Elimination. Under review process.
25. Ministry of Health and Population Nepal. Self-audit of the National Malaria Program using the Malaria Elimination Audit Tool 2021. Kathmandu: Department of Health Services, Ministry of Health and Population Nepal; 2021.
26. World Health Organization. External evaluation of the National Malaria Control Programme Myanmar: 6–19 March 2016. New Delhi: World Health Organization; 2017.
27. World Health Organization. External Evaluation of the National Malaria Control Programme Myanmar 30 July-9 August 2012. India: WHO Regional Office for South-East Asia; 2013.
28. SPA Overview. [<https://dhsprogram.com/methodology/Survey-Types/SPA.cfm>].
29. World Health Organization. Service Availability and Readiness Assessment (SARA): An annual monitoring system for service delivery (Implementation Guide version 2.2). World Health Organization; 2015.
30. Linstone HA, Turoff M. The Delphi Method: Techniques and Applications. Addison Wesley Publishing Company; 1975.

31. Birdsall IA. It seemed like a good idea at the time: The forces affecting implementation of strategies for an information technology project in the Department of Defense. Virginia Polytechnic Institute and State University, Faculty of the Center for Public Administration and Policy; 2004.
32. Dalkey N, Helmer O. An Experimental Application of the DELPHI Method to the Use of Experts. *Manage Sci.* 1963;9:458–67.
33. Habibi A, Sarafrazi A, Izadyar S. Delphi technique theoretical framework in qualitative research. *Int J Eng Sci.* 2014;3:8–13.
34. Romero-Collado A. Essential elements to elaborate a study with the (e)Delphi method. *Enferm Intensiva (Engl Ed).* 2021;32:100–4.
35. Gustafson DH, Shukla RK, Delbecq A, Walster GW. A comparative study of differences in subjective likelihood estimates made by individuals, interacting groups, Delphi groups, and nominal groups. *Organizational Behav Hum Perform.* 1973;9:280–91.
36. Jünger S, Payne SA, Brine J, Radbruch L, Brearley SG. Guidance on Conducting and REporting DELphi Studies (CREDES) in palliative care: Recommendations based on a methodological systematic review. *Palliat Med.* 2017;31:684–706.
37. Htike W, Win Han Oo, Bennett CM, Agius PA, Barry AE, Fowkes FJI. Strengthening the health systems at national level for malaria elimination in the Greater Mekong Subregion countries: a qualitative study. *BMC Infect Dis Poverty.* 2026;15:18.
38. World Health Organization. Everybody business: Strengthening Health Systems To Improve Health Outcomes: WHO's Framework for Action. Geneva, Switzerland: World Health Organization; 2007.
39. Hennink M, Hutter I, Bailey A. *Qualitative Research Methods*. 2nd ed. London: SAGE Publishing; 2020.
40. McMillan SS, King M, Tully MP. How to use the nominal group and Delphi techniques. *Int J Clin Pharm.* 2016;38:655–62.
41. Toronto C. Considerations when conducting e-Delphi research: a case study. *Nurse Res.* 2017;25:10–5.
42. Hall DA, Smith H, Heffernan E, Fackrell K. Recruiting and retaining participants in e-Delphi surveys for core outcome set development: Evaluating the COMiTID study. *PLoS ONE.* 2018;13:e0201378.
43. Humphrey-Murto S, Varpio L, Gonsalves C, Wood TJ. Using consensus group methods such as Delphi and Nominal Group in medical education research(). *Med Teach.* 2017;39:14–9.
44. von der Gracht HA. Consensus measurement in Delphi studies: Review and implications for future quality assurance. *Technol Forecast Soc Chang.* 2012;79:1525–36.
45. Polit DF, Beck CT. The content validity index: Are you sure you know what's being reported? critique and recommendations. *Res Nurs Health.* 2006;29:489–97.
46. Sahu M, Tediosi F, Noor AM, Aponte JJ, Fink G. Health systems and global progress towards malaria elimination, 2000–2016. *Malar J.* 2020;19:141.

47. Htike W, Win Han Oo, Bennett CM, Agius PA, Barry AE, Fowkes FJL. Exploring sub-national health system readiness for malaria elimination in the Greater Mekong Subregion: A qualitative study. Under consideration.
48. Hemingway J, Shretta R, Wells TN, Bell D, Djimdé AA, Achee N, Qi G. Tools and Strategies for Malaria Control and Elimination: What Do We Need to Achieve a Grand Convergence in Malaria? *PLoS Biol.* 2016;14:e1002380.
49. Feng X, Huang F, Yin J, Wang R, Xia Z. Key takeaways from China's success in eliminating malaria: leveraging existing evidence for a malaria-free world. *BMJ Glob Health* 2022, 7.
50. Karunasena VM, Marasinghe M, Koo C, Amarasinghe S, Senaratne AS, Hasantha R, Hewavitharana M, Hapuarachchi HC, Herath HDB, Wickremasinghe R, et al. The first introduced malaria case reported from Sri Lanka after elimination: implications for preventing the re-introduction of malaria in recently eliminated countries. *Malar J.* 2019;18:210.
51. Por I, Sovannaroeth S, Moran A, Dysoley L, Nguon S, Bunthy O, Meas MS, Barat L, Slot R, Thangadurai S, et al. Cost-effectiveness of malaria elimination in Sampov Loun Operational District, Cambodia. *Malariaworld J.* 2020;11:2.
52. Ottoho E, Omangand DI, John GE. Evaluation of the administrative, coordination and financing capacity of the sub-national malaria elimination programs in Nigeria: a case study of cross river state. *J Public Health Afr.* 2023;14:2276.
53. Gosling J, Case P, Tulloch J, Chandramohan D, Wegbreit J, Newby G, Gueye CS, Koita K, Gosling R. Effective program management: a cornerstone of malaria elimination. *Am J Trop Med Hyg.* 2015;93:135–8.
54. The Global Fund. GC7 Programmatic Reprioritization Approach: Protecting and enabling access to lifesaving services. The Global Fund; 2025.
55. US foreign aid cuts. threaten decades of progress on driving down malaria
[<https://edition.cnn.com/2025/06/11/africa/malaria-us-foreign-aid-cuts-africa-intl>]
56. Sudathip P, Kongkasuriyachai D, Stelmach R, Bisanzio D, Sine J, Sawang S, Kitchakarn S, Sintasath D, Reithinger R. The Investment Case for Malaria Elimination in Thailand: A Cost-Benefit Analysis. *Am J Trop Med Hyg.* 2019;100:1445–53.
57. Murhandarwati EE, Fuad A, Sulistyawati, Wijayanti MA, Bia MB, Widartono BS, Kuswantoro, Lobo NF, Supargiyono, Hawley WA. Change of strategy is required for malaria elimination: a case study in Purworejo District, Central Java Province, Indonesia. *Malar J.* 2015;14:318.
58. Mills A. Health Care Systems in Low- and Middle-Income Countries. *N Engl J Med.* 2014;370:552–7.
59. Agyekum EO, Kalaris K, Maliqi B, Moran AC, Ayim A, Roder-DeWan S. Networks of care to strengthen primary healthcare in resource constrained settings. *BMJ.* 2023;380:e071833.
60. Kumar K, Pigazzini A, Stenson B. Financing for malaria elimination. San Francisco: Cambridge Economic Policy Associates and UCSF Global Health Group; 2013.
61. Shretta R, Avanceña AL, Hatefi A. The economics of malaria control and elimination: a systematic review. *Malar J.* 2016;15:593.

62. Kumbhar ST, Bhatia M, Patel V. Health-care Systems around the World: Diversity, Challenges, and Innovations. *Archives Med Health Sci.* 2025;13:95–9.
63. Leslie HH, Sun Z, Kruk ME. Association between infrastructure and observed quality of care in 4 healthcare services: A cross-sectional study of 4,300 facilities in 8 countries. *PLoS Med.* 2017;14:e1002464.
64. Schwettmann L, Hamprecht A, Seeber GH, Pichler S, Voss A, Ansmann L, Hoffmann F. Differences in healthcare structures, processes and outcomes of neighbouring European countries: the example of Germany and the Netherlands. *Res Health Serv Reg.* 2023;2:17.
65. Vargas C, Zorbas C, Longworth GR, Ugalde A, Needham C, Sunil A, Venegas Hargous C, Bennett R, Forrester-Bowling T, Cardoso Richter AP, Allender S. Exploring co-design: a systematic review of concepts, processes, models, and frameworks used in public health research. *J Public Health (Oxf)* 2025.
66. Liang Z, Zhang H. Adopting an Integrative and Co-Design Process to Contextualize Management Capacity Building in Hospitals. *J Healthc Leadersh.* 2025;17:721–36.
67. Gheduzzi E, Savarese M, Mangini A, Mitidieri S, Paleologo M, Masella C, Graffigna G. Co-producing and co-assessing a new service solution for enhancing health and social care integration: a participatory research protocol. *BMC Health Serv Res.* 2024;24:1103.
68. Anastasia A. Psychological testing. 6th ed. New York: Macmillan Publishing; 1988.
69. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quinonez HR, Young SL. Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. *Front Public Health.* 2018;6:149.
70. Del Pozo-Herce P, Martínez-Sabater A, Chover-Sierra E, Gea-Caballero V, Satústegui-Dordá PJ, Saus-Ortega C, Tejada-Garrido CI, Sánchez-Barba M, Pérez J, Juárez-Vela R et al. Application of the Delphi Method for Content Validity Analysis of a Questionnaire to Determine the Risk Factors of the Chemsex. *Healthc (Basel)* 2023, 11.
71. Bull C, Crilly J, Latimer S, Gillespie BM. Establishing the content validity of a new emergency department patient-reported experience measure (ED PREM): a Delphi study. *BMC Emerg Med.* 2022;22:65.
72. Waltz CF, Strickland OL, Lenz ER. Measurement in nursing and health research. 3rd ed. New York: Springer Publishing Co.; 2005.
73. Shi J, Mo X, Sun Z. [Content validity index in scale development]. *Zhong Nan Da Xue Xue Bao Yi Xue Ban.* 2012;37:152–5.
74. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nurs Health.* 2007;30:459–67.
75. Haynes S, Richard D, Kubany E. Content Validity in Psychological Assessment: A Functional Approach to Concepts and Methods. *Psychol Assess.* 1995;7:238–47.
76. Streiner DL, Norman GR, Cairney J. Health Measurement Scales: A practical guide to their development and use. Oxford University Press; 2024.

Figures

Figure 1a

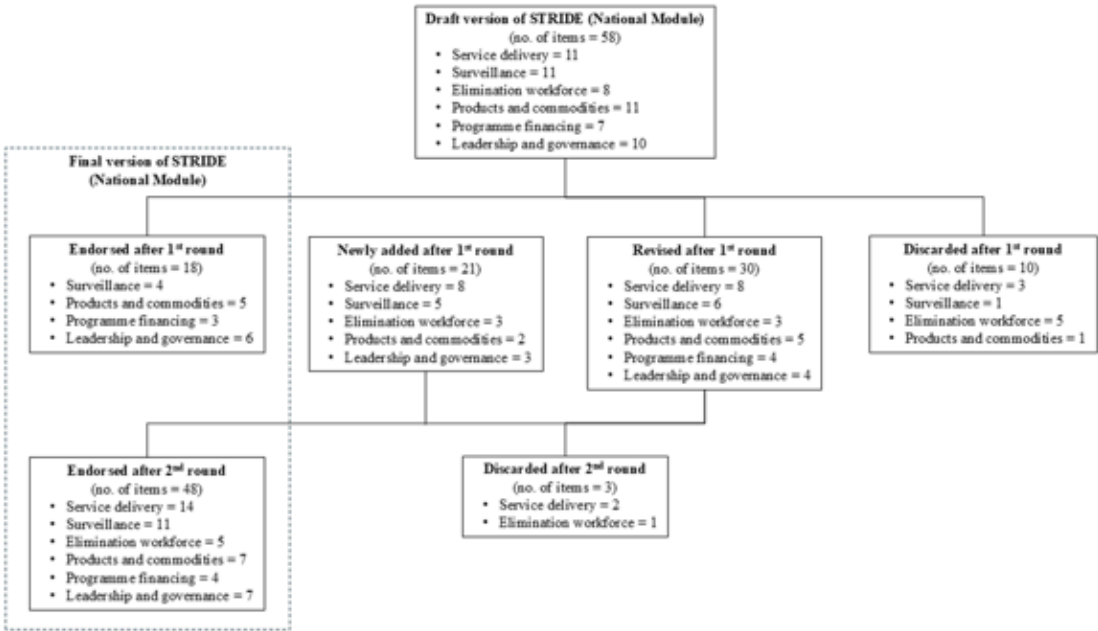


Figure 1b

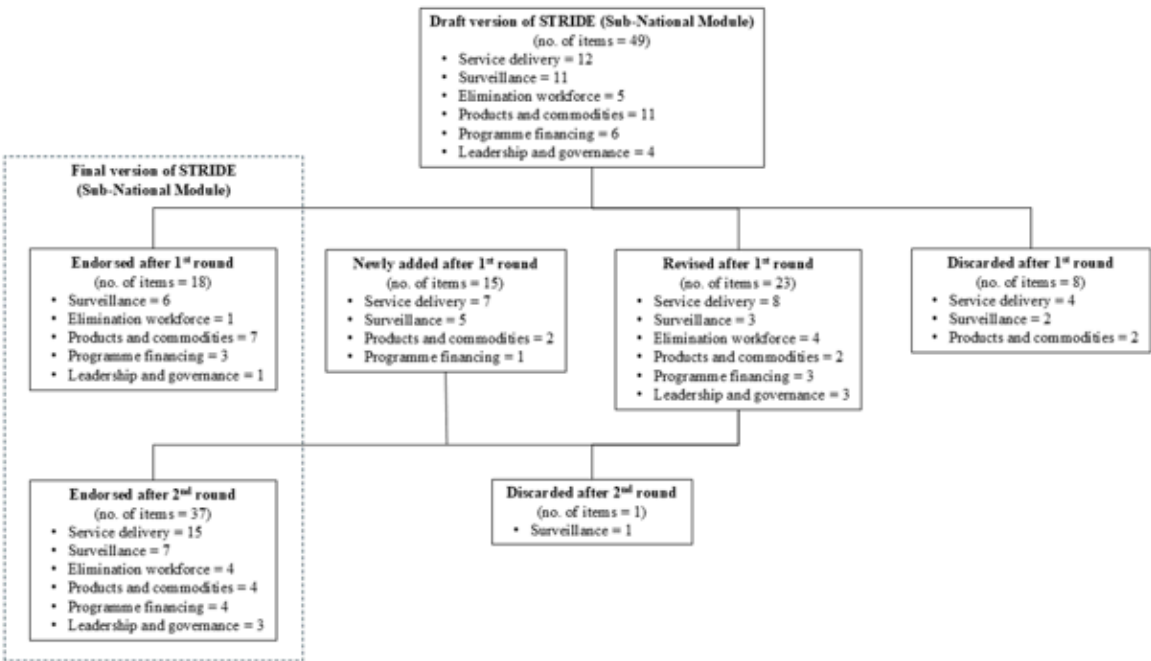


Figure 1

Figure 1a: Process for finalising STRIDE (National Module), after two rounds of Delphi consultation

Figure 1b: Process for finalising STRIDE (Sub-National Module), after two rounds of Delphi consultation

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SM1CompletedCREDESChecklist.docx](#)
- [SupplementaltableS1.docx](#)
- [SM2DraftversionofSTRIDE.docx](#)
- [SM4FinalversionofSTRIDE.docx](#)
- [SM3ReportonDelphiconsultationround1final.pdf](#)