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MALAYSIAN HEALTH TECHNOLOGY ASSESSMENT SECTION

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MAHTAS
30 YEARS OF EVIDENCE & VALUE

Public Health Intervention Framework in Health Technology Assessment

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TABLE OF CONTENT

1.0 INTRODUCTION

Health Technology Assessment (HTA) is a multidisciplinary process that applies systematic and transparent evaluation procedures to report the most current and highest-quality scientific evidence on the technology being assessed. It is an ongoing activity throughout the health-technology life cycle, covering assessments at the pre-market stage, at market approval, post-marketing, and through to the disinvestment of the technology. The primary purpose of HTA is to empower evidence-informed decision making in the healthcare system. HTA reports support policymakers in developing and implementing policies or guidelines at national and international levels, thereby ensuring a more efficient and higher quality health system.

The rapid development of technology and the fast dissemination of information require MaHTAS to stay aligned with current advancements. The demand for HTAs increases each year. The scope of assessment includes effectiveness, safety, cost-effectiveness, as well as ethical issues and the appropriateness of the interventions in healthcare facilities.

One of the levels of intervention in HTA is at population level where public health interventions (PHIs) were conducted intended to enhance population health, particularly through preventive measures. In our context, a Public Health Intervention is defined as any intervention that is used at population level to promote health, prevent disease, enhance social well-being and prolong life. The field of public health involves prevention and health promotion for the general population to improve health and well-being while reducing health risks. It requires comprehensive and collaborative efforts from various sectors in disease prevention, healthcare delivery and health support.

The PHI technologies are crucial to ensuring the continuity, safety and effectiveness of healthcare services. However, the evaluation of these technologies is less frequently conducted due to methodological complexities and data limitations for assessing PHIs. Since 1997, 34% of the technology assessments conducted by MaHTAS have been related to public health issues (Table 1). In terms of report types, the majority of PHI technology assessments were produced in the form of Technology Review (TR) reports (55.52%), Information Briefs (IB; 27.92%), HTA (9.09%), Clinical Practice Guidelines (CPG; 1.95%), TechBriefs (3.25%), and TechScans (2.60%).

Table 1: Number and Percentage of Public Health Intervention Technology Assessment Reports by Report Type

Report Type	Assessment Period	Number of Public Health Titles	Total Reports Produced	Percentage (%)
Health Technology Assessment (HTA)	1997 – 2022	28	80	36.84
Technology Review (TR)	2001 – 2022	171	406	43.07
Information Brief (IB)	2009 – 2022	86	252	39.45
Clinical Practice Guidelines (CPG)	2003 – 2022	6	107	4.62
TechBrief	2015 – 2022	10	46	32.14
TechScan	2016 – 2022	8	78	13.79
TOTAL		**308**	**907**	

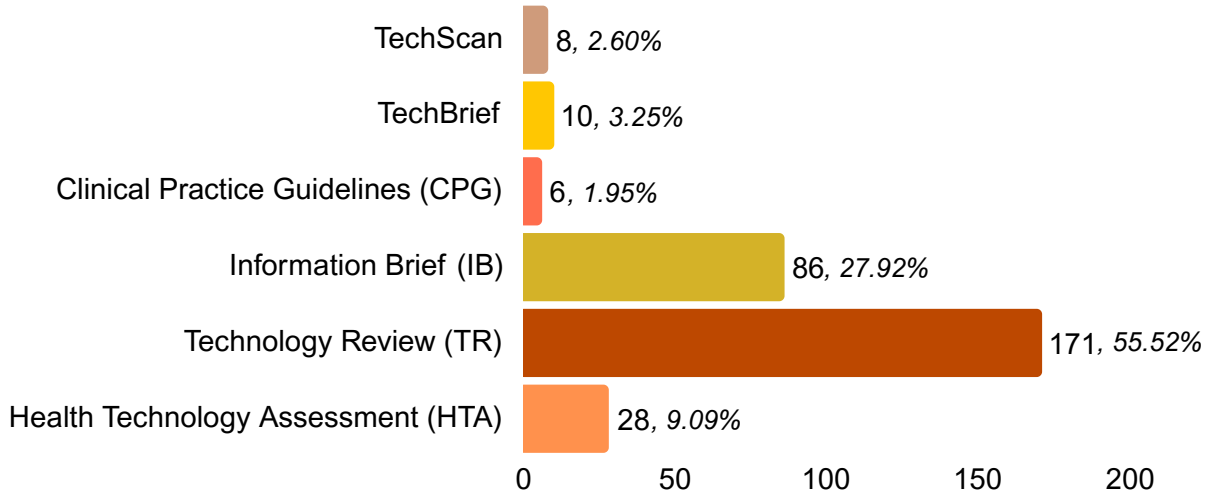

Figure 1: Number of Public Health Intervention Assessment Reports Prepared by MaHTAS

There is a need to further develop the evaluation of PHI technologies to inform professionals, stakeholders and policymakers, so that the findings can be adapted into the development of health programme policies and clinical services.

In light of this, MaHTAS has taken the initiative to enhance the methods and processes of conducting PHI technology assessments to produce high-quality and impactful reports. This initiative is aligned with the Strategic Plan of the Medical Programme, Ministry of Health Malaysia (2021 - 2025), as outlined in Strategy Two for Implementation Plan 24, which aims to encourage the use of HTA in decision-making and policy development toward value-based healthcare.

2.0 CHARACTERISTICS OF PUBLIC HEALTH INTERVENTION

The characteristic of PHI is different with other interventions assessed in HTA. The PHI involves population-level interventions where it is highly heterogenous between individual or groups assessed. Other than that, the goals of PHI are to determine whether the intervention is suitable as primary, secondary or tertiary prevention, for health promotion and also health protection. The targets of the intervention can be vastly different that other type of intervention as PHI focuses more on behavioural, environmental, policy and health systems. Furthermore, PHI assesses on the health and non-health as well as intended and unintended outcome.

These interventions are also deeply dependent on the context in which they are implemented. Contextual factors include geographical aspects e.g. physical environment, landscape and availability of resources. Epidemiological factors, e.g. disease burden and population health status, also play a crucial role in PHI assessment. Socio-cultural elements, including community norms, beliefs and practices, influence the effectiveness of interventions. Socio-economic conditions, e.g. income levels, education, and employment, further shape the outcomes. Ethical considerations, including fairness and equity, must be taken into account. Legal frameworks and regulations can either facilitate or hinder implementation. Political factors, including governance, policy priorities, and stability, also impact success.

In addition to context, the way an intervention is implemented also significantly affects its outcomes. The implementation process, including planning and execution, is critical. Strategies used to deliver the intervention determine the reach and uptake of the intervention within the population. Other factors e.g. the agents or implementers (healthcare workers, policymaker or community leaders) play key roles in PHI implementation. Finally, the outcomes of implementation, including fidelity, sustainability and scalability, are essential for long-term impact.

3.0 PUBLIC HEALTH INTERVENTION FRAMEWORK

The PHI framework is essential to provide a structured HTA approach for designing, implementing and evaluating interventions, ensuring they are evidence-based, context-specific and capable of addressing complex population health needs effectively and equitably. This framework involves five phases; prioritisation, planning, review, HTA recommendation and Council approval.

3.1 Prioritisation Phase

The number of health technologies needing evaluation far outweighs available resources. Therefore, all HTA agencies must set priorities for their research projects. Given very limited resources for assessment, hence, MaHTAS need to prioritise the issues for PHI. This prioritisation is usually done together with public health decision-makers and MaHTAS. The steps involve in prioritisation of issues is as follows:

a) Selection of criteria to be used in priority setting

Based on the examples of selection criteria that are used in setting assessment priorities by Goodman CS, the following criteria will be used by MaHTAS in considering issues for PHI:

- Effects on infrastructure and other services (include training, accreditation, education issues, resources, space)
- Prevalence of disease (include disease burden, number of people affected)
- Availability of competing technologies (other technologies currently available for the same purpose)
- Possibility of changing health status (include significance of technology - efficacy/ effectiveness, safety, and implication of introduction e.g. reduction in morbidity, mortality, early detection)
- Cost (include direct cost or cost-effectiveness, or other cost implication)

b) Assigning relative weights to the criteria

Weights would be assigned to the criteria.

c) Preliminary screening of issues

Preliminary screening of issues is to be conducted internally to determine its appropriateness for conducting PHI assessment. Issues would be considered inappropriate if it falls into these categories: i) an established technology/ intervention; ii) issue is more appropriate for the conduct of primary research; and iii) HTA or TR (Mini-HTA) report is already available.

d) Preliminary search for scientific evidence

As soon as the issue is identified as a possible issue for PHI assessment, it should be clarified whether there is sufficient existing knowledge in the area, and whether this knowledge is available. Hence, preliminary search for scientific evidence should be conducted to assist for rating according to the criteria.

The following information should be retrieved in the initial literature search: description of the technology/intervention, effect of the technology/ intervention on infrastructure, the number of people whom is applicable, the availability of competing technology/intervention, the significance of technology/intervention which may include its effectiveness and safety, the economic impact, level of usage and whether there are already HTAs/ PHIs or other types of reports available nationally or internationally. The following searches are recommended:

- HTA database
- INAHTA website
- Cochrane Library
- Medline
- EMBASE
- Pubmed

e) Priority setting exercise

The priority setting exercise is to be carried out by the HTA Technical Advisory Committee (TAC) committee using the Round Robin Technique. For each issue, each member of the HTA/ PHI expert committee would assign a score for each of the criteria. The priority score for each issue would then be calculated. The issues would then be rank according to their priority scores. The priority issues would be reviewed to ensure there are sufficient research findings available upon which to base the assessment, and that assessment of these issues would be consistent with the Malaysia Health Plan.

f) Approval of issues for PHI

Issues that have been prioritised would be presented in the HTA TAC meeting and the HTA-CPG Council for approval. Official feedback would be given to all PHI requestors after the HTA-CPG Council meeting.

3.2 Planning Phase

The planning phase serves as the foundational stage for all PHI assessments, ensuring that subsequent activities are grounded in strategic clarity, contextual relevance, and scientific robustness. It encompasses a series of interdependent steps - each purposefully designed to facilitate comprehensive scope definition, stakeholder alignment, theoretical framing, and methodological preparedness.

This phase is critical not only for establishing the technical and logistical direction of the assessment, but also for ensuring the work is policy-responsive, ethically sound, and operationally feasible. The following components constitute the core of the planning phase.

3.2.1 Scoping and Stakeholder Engagement

At the initiation of the planning process, a detailed scoping document is developed to define and communicate the parameters of the intended assessment. This document serves as a strategic blueprint, articulating the policy objectives, research questions, target population, contextual setting, desired outcomes, and proposed timelines.

a) Essential Elements of the Scoping Process

- Definition of Objectives: Establishing clear objectives and intended use for the assessment, framed around pressing public health challenges and policy considerations
- Identification of the Target Population and Setting: Outlining the specific demographic, geographic, or institutional contexts in which the intervention is to be implemented or evaluated
- Clarification of Outcomes of Interest: Specifying both health-related and non-health outcomes (e.g. equity, economic impact, behavioural change) that will inform the assessment
- Timeline and Deliverables: Mapping out the temporal structure and key milestones to guide project execution and accountability

b) Stakeholder Engagement

To ensure the assessment is both relevant and implementable, engagement with a broad range of stakeholders is conducted at this early stage. This includes professionals and representatives from:

- National and subnational public health programme leadership
- Policy-making bodies and regulatory authorities
- Subject matter experts including epidemiologists, health economists, social scientists
- Frontline implementers e.g. health care workers and programme administrators
- Community leaders and advocacy groups, where applicable

Such engagement facilitates the co-creation of priorities and scope, strengthens support across sectors, and allows diverse perspectives to inform the conceptualisation and design of the intervention assessment.

3.2.2 Integration of Conceptual Frameworks

Public Health Intervention is inherently complex, shaped by diverse factors and varying contexts. To ensure a structured and comprehensive planning process, conceptual frameworks are integrated early on to guide the analysis of how interventions operate, under what conditions they are effective, and for whom they yield meaningful outcomes. These frameworks play a critical role in clarifying the components of an intervention, outlining causal pathways, informing implementation strategies, and identifying contextual influences. Among these, the INTEGRATE-HTA framework is particularly notable for its relevance to complex interventions. It incorporates key dimensions e.g. contextual factors, stakeholder values, system dynamics, and implementation processes. Widely recognised for its robustness, this framework enables a deeper understanding of the mechanisms behind PHIs and their practical relevance. When embedded at the planning stage, it allows for the systematic mapping of variables and interdependencies, identification of assumptions and uncertainties, and explicit consideration of implementation and contextual factors. This integration not only strengthens analytical rigour and transparency but also ensures policy relevance by aligning assessment outcomes with the realities of public health practice.

3.3 Protocol Development Phase

Following the establishment of the assessment scope and theoretical orientation, a comprehensive study protocol is developed. This protocol standardises the methodological approach to be employed throughout the assessment, ensuring internal consistency and transparency for external review.

3.3.1 Key Components of the Protocol

- Definition of the Intervention and Comparator(s): Detailed descriptions of the intervention under assessment and any alternative or baseline approaches for comparison
- Inclusion and Exclusion Criteria: Clear specifications of which studies, data sources, or populations will be considered
- Outcome Measures: Selection of quantitative and qualitative indicators aligned with the objectives of the assessment
- Assessment Methods and Data Sources: Identification of methodologies (e.g., literature review, surveys, modelling) and relevant datasets

3.3.2 Types of Protocols

Depending on the complexity and nature of the intervention, the protocol may encompass multiple methodological strands:

- Systematic Review Protocol: For the synthesis of existing evidence
- Economic Evaluation Protocol: To examine cost-effectiveness, budget impact, and economic sustainability
- Epidemiological Modelling Protocol: Where projections of population-level outcomes are required
- Qualitative or Implementation Protocol: Designed to explore dimensions e.g. acceptability, feasibility, and barriers to uptake

Where warranted, a mixed-methods approach is adopted to holistically capture both quantitative performance metrics and qualitative insights into implementation dynamics. In cases involving primary data collection, formal ethical approval is sought through recognised institutional review processes.

3.3.3 Formation of Expert Review Committee

To uphold scientific integrity, contextual sensitivity, and methodological excellence, a multidisciplinary Expert Review Committee is convened. This committee is responsible for providing strategic guidance, validating methodological choices, and ensuring that the outputs of the assessment are both accurate and relevant.

Typical Composition of the Committee:

- Public Health Experts: Offering insights on epidemiological trends and policy implications
- Epidemiologists: Contributing expertise on study design, disease burden, and population health dynamics
- Health Economists: Advising on modelling approaches, costing methodologies, and value-based outcomes
- Implementation Scientists or Social Scientists: Supporting analysis of real-world feasibility and behaviour-based dynamics
- HTA Methodologists: Ensuring rigorous appraisal and consistency with international best practices

The Expert Committee plays a vital role not only during planning but throughout the assessment lifecycle, providing feedback on emerging findings, endorsing analytical methods, and supporting the interpretation and communication of results to decision-makers.

3.4 Review Phase

The phase serves as the empirical backbone of the PHI assessment. In this stage, evidence is systematically identified, critically appraised, and methodologically synthesised to inform sound decision-making. Given the inherent complexity of PHIs, which are often marked by multi-component designs, varied delivery settings, and diverse outcomes, this phase is conducted with a strong emphasis on both scientific rigour and relevance to real-world contexts.

3.4.1 Evidence Retrieval and Selection

The first analytical step involves a structured and transparent search for relevant evidence, conducted in accordance with recognised best practices in HTA. The goal is to ensure comprehensiveness and objectivity in capturing data that reflect the effectiveness, implementation feasibility, and real-world impact of the intervention under review.

Sources of Evidence:

- Biomedical Literature Databases: Cochrane Library, MEDLINE, PubMed, EMBASE
- HTA Databases: INAHTA database, EUnetHTA repository
- Grey Literature: Government reports, NGO programme documentation, unpublished studies
- Real-world Evidence: Observational studies, registry data, implementation reports

Search strategies are explicitly documented, including terms, inclusion and exclusion criteria, screening procedures, and rationale for database selection. The use of dual screening and independent review helps minimise selection bias.

3.4.2 Evidence Synthesis

Upon retrieval, relevant data are synthesised using theory-based, mixed-method approaches that accommodate the multifaceted nature of PHIs. This process integrates diverse forms of evidence, including clinical efficacy, cost-effectiveness, social acceptability, and implementation consistency, to ensure that assessments are both comprehensive and contextually grounded.

Types of Synthesis Techniques:

- Quantitative Synthesis: Meta-analyses, decision-analytic modelling, epidemiological projections
- Qualitative Synthesis: Framework synthesis, realist review, narrative summaries
- Mixed-Methods Integration: Convergent or sequential synthesis combining numerical and thematic findings

The synthesis process emphasises not only the estimation of effect sizes and comparative outcomes but also the understanding of contextual mechanisms, unintended effects, system readiness, and population equity impacts. Explicit documentation of assumptions, limitations, and uncertainties ensures analytical transparency.

3.4.3 Quality Appraisal

The credibility of any assessment is dependent on the critical appraisal of its underlying evidence. Each source is assessed using validated tools appropriate to its design, thereby establishing confidence levels in the generated findings.

Appraisal Instruments by Study Type:

- Randomised Controlled Trials (RCTs): Cochrane Risk of Bias (RoB) 2.0 tool
- Observational and Quasi-experimental Studies: ROBINS-I or equivalent
- Qualitative Studies: Critical Appraisal Skills Programme (CASP)
- Economic Evaluations: Consolidated Health Economic Evaluation Reporting Standards (CHEERS)
- Evidence Certainty Ratings: GRADE and CERQual frameworks

Additional considerations include assessment of implementation consistency, generalisability across diverse settings, sustainability of outcomes, and vulnerability to bias introduced by context-specific factors.

3.4.4 Contextual and Implementation Assessment

The PHIs derive their effectiveness not only from technical merit but also from their fit within broader social, political, and cultural contexts. Accordingly, the review phase includes an in-depth evaluation of the external and internal factors shaping implementation success.

a) Contextual Dimensions Assessed

- Geographic distribution and infrastructure capacity
- Cultural beliefs, norms, and community values
- Legal and regulatory frameworks
- Policy coherence and political will

b) Implementation Attributes Examined

- Delivery channels and platforms
- Role and capacity of implementers (e.g., health personnel, NGOs)
- Adoption barriers and enabling factors
- Monitoring and accountability systems

This multi-dimensional analysis helps to map complex inter-relationships and enhances the transferability of recommendations across varied settings.

3.5 HTA Recommendation Phase

The HTA Recommendation Phase consolidates all the insights and evidence from the PHI assessment, delivering its most practical and decision-ready outcome. At this stage, evidence is translated into targeted guidance for decision-makers through deliberative processes, governance reviews, and policy translation activities. The ultimate aim is to develop recommendations that are not only grounded in scientific evidence, but also aligned with strategic health system goals, resource capabilities, and population values.

3.5.1 Technical and Peer Review

Prior to recommendation formulation, the draft report undergoes multi-level review process to ensure its methodological rigour, analytical robustness, and contextual relevance. This process involves several coordinated mechanisms.

- An Internal Technical Review is conducted by MaHTAS reviewers and HTA experts to verify methodological integrity and alignment with international standards.
- The Expert Review Committee provides an additional layer of evaluation, drawing on multi-disciplinary expertise to assess the depth of analysis and the relevance of findings within specific contexts.
- An External Peer Review is also undertaken, engaging independent subject-matter experts across relevant disciplines to provide impartial feedback and validate findings.

Feedback from these reviews is systematically collated and used to refine findings, clarify interpretations, and ensure balance representation of uncertainties and divergent viewpoints. Together, these mechanisms reinforce the credibility of the assessment and enhance its relevance for sound, evidence-informed decision-making.

3.5.2 Governance Review and Endorsement

Following the completion of the review process, the HTA report is submitted for evaluation and endorsement by formal governance structures responsible for overseeing HTA activities.

Governance Oversight Includes:

- HTA Technical Advisory Committee (TAC) which evaluates the report for completeness, methodological soundness, and strategic alignment with national priorities.
- HTA & Clinical Practice Guidelines (CPG) Council provides a policy-level endorsement and grants formal approval of the recommendations.

This governance oversight enhances transparency, ensures accountability, and promotes coherence with the Ministry of Health's broader objectives. Upon endorsement, the outcomes are formally communicated to the original requestor and relevant programme leads, marking a critical step in moving toward informed policy action.

3.5.3 Stakeholder Deliberation

To ensure meaningful uptake and system integration, a deliberative dialogue is convened with stakeholders and decision-makers. This process enables collaborative interpretation of findings, examination of practical implications, and negotiation of potential trade-offs.

Key considerations explored during this dialogue include:

- Anticipated population-level benefits and risks
- Ethical and legal implications of adoption
- Feasibility and system readiness for implementation
- Equity implications, including differential impact across subgroups

Such inclusive dialogue fosters shared ownership of decisions and strengthens trust in both the HTA process and its outcomes.

3.5.4 Formulating Recommendations

Recommendations are formally developed based on the synthesis of evidence, insights from stakeholder deliberation, and consideration of implementation feasibility. They are designed to be actionable, scalable, and sensitive to both system capabilities and population needs.

Types of Recommendations:

- Immediate Adoption: For interventions supported with strong evidence and operational readiness
- Conditional Adoption/Pilot Testing: Where adaptation or phased implementation is appropriate.
- Further Research Required: In cases with potential benefit but limited supporting evidence.
- Not Recommended for Adoption: Due to concerns on safety, cost-effectiveness, or strategic misalignment.

Recommendations are supported by policy briefs, executive summaries, and visual aids to enhance accessibility, and are disseminated to stakeholders via appropriate platforms.

3.6 Council Approval Phase

The proposed PHI framework is a critical component in ensuring evidence-based and cost-effective strategies are implemented within the healthcare system. Endorsement by the HTA and CPG Council, chaired by the Director General of Health, is essential to formalise the framework at the national level. The Council's endorsement will provide strategic legitimacy, enabling the framework to be adopted across relevant healthcare agencies and public health institutions.

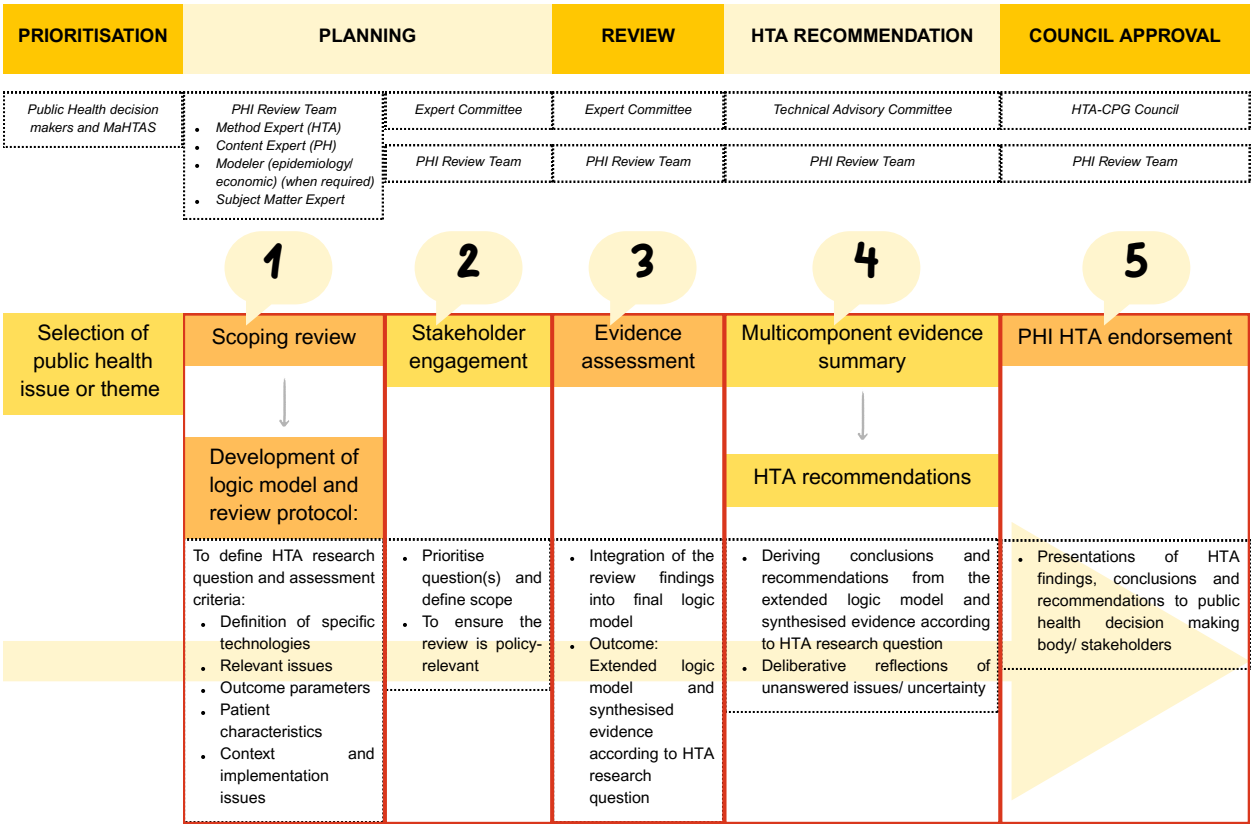

Figure 2: Health Technology Assessment Framework for Public Health Interventions.

4.0 Issues and Challenges

The conduct of integrated mixed-method reviews poses significant challenges due to the limited number of professionals with relevant experience in this area. Reviewers often struggle to determine how best to approach research questions that require the integration of diverse methodologies, while simultaneously ensuring a rigorous and coherent assessment process. Applying theoretical frameworks in such assessments involves a steep learning curve, especially under tight project timelines, as large and complex mixed-method reviews typically demand extended durations to complete. This highlights the urgent need for capacity-building efforts through targeted training.

Additionally, the review process itself is hindered by high heterogeneity in methodologies, statistical approaches, Population; Intervention; Comparator; Outcome (PICO) elements, settings and contexts, alongside the use of varied analytical methods. These factors complicate the evaluation of primary study sustainability. Barriers to reaching informed decisions or recommendations further include the lack of relevant data to conduct assessments, conflicting stakeholder priorities and prevalent methodological gaps, particularly in the absence of clear frameworks for evaluating PHI through a HTA lens. Assessing the cross-sectoral impact and resource reallocation implications of complex public health programs is also challenging, and these are further compounded by underlying political considerations.

5.0 Conclusion

The application of HTAs to PHIs remains limited, primarily due to their inherent complexity. This complexity arises from factors such as heterogeneous target populations, diverse methodological approaches, multifaceted intervention components, and varied implementation contexts. Conducting PHI assessments also demands extensive expertise, particularly in human resources, and are often associated with prolonged timelines, although the duration of such assessments is seldom documented in the literature.

To date, only HTA agencies with well-established systems and sufficient resources have undertaken PHI evaluations. Moreover, these assessments must account for broader considerations, including ethical implications, health equity, legal frameworks, and cross-sectoral impacts. These additional dimensions further compound the methodological and operational challenges.

To advance the effective evaluation of PHIs and facilitate their integration into evidence-informed public health decision-making, it is essential to strengthen institutional capacity, enhance methodological frameworks, and foster collaboration among relevant stakeholders.

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