International Journal of Health Technology and Innovation
An Official Journal of **Kalam Institute of Health Technology** | ISSN - **2583-8547**

REVIEW ARTICLE

SIDDHI: An Easy-to-use Web-based Trailblazing Software Tool for Developing Data-Driven Health Economics Models and Performing Cost-Effectiveness Analysis

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Received: 15th October, 2025; Revised: 08th November, 2025; Accepted: 20th November, 2025; Available Online: 08th December, 2025

ABSTRACT

Rapid advances in health technology occurring around the world have paved the way for improved patient care and healthcare systems. Decision tree-based modelling technique is often used to evaluate a new health technology that extrapolates the cost and effectiveness of competing interventions. With the rapid pace of health innovation, developing a decision tree model for the evaluation of the economic value of health interventions is key for timely use for mitigating health consequences, while reducing the cost of development and evaluation. In this study, components of a novel web-based software tool, SIDDHI (Solutions for user Interface models using Decision-trees for Developing Health Technology and Innovation), are described. SIDDHI is the first of its kind tool that revolutionizes the process of decision tree-based analysis during health economic evaluation. SIDDHI was created to assist in quick, automated data-driven cost-effectiveness analysis to generate a flexible graphical user interface (GUI) via decision tree models in a timely manner. SIDDHI has numerous advantages, including rapid cost-effectiveness analysis, seamless handling of multiscale data, accessibility for diverse stakeholders, data and modelling standardization for repeated use, and versatility in training and supporting users with varying skill levels. SIDDHI is expected to bring revolutionary changes in user interface platforms that will create a unique environment for all types of healthcare professionals and provide a complete satisfying user experience while accurately providing overall healthcare results of interest. The future features of the tool will include AI abilities to input and validate with data and extended modelling frameworks.

Keywords: SIDDHI, Software Tool, Developing Health Technology and Innovation.

International Journal of Health Technology and Innovation (2025)

How to cite this article: Nithiyavathani AJ, Keerthan RM, Moinudeen SAK, Mubayi A, Ramesh S, Harshitha S, Kachroo K. SIDDHI: An Easy-to-use Web-based Trailblazing Software Tool for Developing Data-Driven Health Economics Models and Performing Cost-Effectiveness Analysis. International Journal of Health Technology and Innovation. 2025;4(3):56-64.

Doi: 10.60142/ijhti.v4i03.10

Source of support: Nil.

Conflict of interest: None

Highlights

- Various cost-effectiveness web-based tools find widespread applications in healthcare, economics, and business sectors, serving as essential resources for evaluating the economic efficiency of interventions, programs, and investments through data analysis, modelling, and simulation. In contrast, the recently developed SIDDHI tool places a special emphasis on low and low-middle-income countries, which is a user-friendly, customizable tool. This tool is vital for decision-making, resource allocation, and policy development across public and private sectors, aiding professionals and researchers in cost-benefit analysis and informed decision-making based on economic factors.
- This is the first study on an India-based web tool developed exclusively for economic modelling with a particular focus on cost-effectiveness analysis in developing a decision tree model. This tool fosters in delivering a ease of use of multiscale data and sources, acts as a generate platform that is accessible to different stakeholders, standardizes data and modelling framework for recursive use, and can be used for training and support for different levels of users' skills.
- The paper's insights revolve around introducing a web-based cost-effectiveness tool, like SIDDHI, tailored for Low and lower-middle-income countries. It underscores the significance of adaptable, user-friendly tools for various contexts and stakeholders. This approach is particularly pertinent for healthcare decision-makers, allowing them to gauge the economic effectiveness of healthcare interventions and resource allocation in resource-constrained settings. The tool provides a structured framework for cost-benefit analysis, enhancing informed decision-making and healthcare service quality and accessibility in these regions.

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INTRODUCTION

Health economic modelling provides a structured approach for evaluating diverse healthcare interventions and assessing their cost-effectiveness. By employing health economic analysis, such as cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and budget impact analysis (BIA), decision-makers can make informed choices, prioritizing interventions that deliver optimal health benefits at a reasonable cost. The utilization of economic modelling empowers policymakers to select the most suitable interventions from a pool of available options, ensuring efficient resource allocation within healthcare systems[1,2]. However, modelling is a rigorous exercise, needs skilled analysts, and takes multiple types of resources and time. This study attempts to present a novel modelling tool that can enhance many of such challenges in health technology evaluation projects.[3]

CEA and BIA stand as the cornerstone of most economic evaluations, enabling policymakers to compare interventions based on their cost-effectiveness ratios and overall budget needed, respectively. CEA measures the cost per unit of health outcome, such as cost per life year gained or cost per case cured. Through this metric, decision-makers can prioritize interventions that offer the greatest health benefit for a given level of resources, thus optimizing the allocation of limited healthcare funds.[4] BIA, which serves as a complementary tool to well-established forms of economic evaluations, focuses on evaluating the financial implications of introducing a new medical technology within a specific context over the short to medium term, which aids in decisions regarding the reimbursement of new healthcare technologies.[5]

SIDDHI, an acronym for *Solution for User Interface Models Using Decision Tree Design for Health Technology and Innovation*, is an advanced web-based tool designed to expedite complex economic computations in health economic modelling. This innovative platform offers one-stop continuous access to comprehensive examples of economic analyses of existing models while providing tailored training and support to meet individual client modelling needs. Thus, significantly saving time and resources, such as hiring a skilled computer analyst who also has an extensive modelling background, for the user's organization. Time constraints in health economic modelling have also been a major obstacle, impeding a thorough understanding of relevant topics and potentially compromising the identification of critical model weaknesses for policymakers. However, SIDDHI's cutting-edge capabilities offer the potential to substantially shorten the duration needed for a comprehensive economic analysis, allowing individuals to concentrate on collecting critical parameter data and thereby improving the trustworthiness of Health Technology Assessment (HTA) reports for well-informed policy decision-making.

SIDDHI represents a transformative advancement in health economic modelling and analysis as:

- It provides a web-based solution to expedite complex economic computations and generate thorough economic analysis reports.
- It is a valuable resource for health economists, offering one-stop continuous accessibility for data and models and giving personalized support to cater to clients' unique requirements.
- It enables policymakers to gain detailed visualization of comprehensive insights for evidence-based decision-making.
- It has an ability to carry out model sensitivity analysis, thus providing a prompt assessment of a range of
- Interventions empower policymakers to optimize healthcare outcomes while efficiently managing available resources.

This subscription-based platform enables the clients to obtain the user services for short-term and long-term enabling them to utilise the software tool for their convenient period. All the health economic modelling services could be accessed through the individual user profile. Extrapolating desired results outside the scope of a clinical study is made easier with the SIDDHI. Health economic models developed using the SIDDHI platform can be included in the HTA dossier submission or given to specific payers (insurance firms, health funds, or other decision-makers in charge of listing or allocating funding for new medications) independently, as it ensures the highest level of data accuracy and data integration. To assess a certain result, such as an incremental cost-effectiveness ratio, modelling is used to combine clinical, epidemiological, and economic information from relevant (and various) sources into an evaluation framework. Overall, this article underscores the significance of health economics and economic modelling as essential approaches in shaping evidence-based healthcare policies and resource allocation strategies.

Key Characteristics of the SIDDHI Tool

A Web-Based

SIDDHI stands out among the array of health economics modelling software as it is a web-based tool that doesn't require the installation of extra software or applications. It can be accessed from any device with a basic internet connection, making it highly accessible.

A Time Saver

Using SIDDHI is a significant time-saver when compared to creating an economic model in Microsoft Excel, where constructing such models demands a substantial amount of time and technical expertise. In contrast, SIDDHI simplifies the process by handling the backend work, eliminating the need for users to input complex formulas when developing cost-effectiveness analysis models. Moreover, it allows users to easily construct a decision tree structure by simply adding new nodes, enhancing the tool's flexibility and usability.

Requires Minimal Computational Skills:

SIDDHI is user-friendly, making it accessible to individuals with basic computational skills. In contrast, creating a single model in Excel can be a time-consuming process, often taking two to three months, and necessitating advanced Excel proficiency to effectively compute and develop the model. With

SIDDHI, however, advanced skills are not a prerequisite; even those with basic computer skills can obtain the desired output with ease. This emphasizes the tool's accessibility and lowers the barrier to entry for users.

Flexible Models and Implementation Support

The SIDDHI could develop a flexible model of a user's choice. SIDDHI not only offers state-of-the-art economic analysis capabilities but also provides tailored training and support at every level. This personalized approach ensures that users can maximize the tool's potential, enhancing its usability and effectiveness. As the policy makers require robust and reliable HTA reports to make informed decisions regarding healthcare interventions and resource allocation, SIDDHI will foster a deeper understanding of complex economic computations and strengthen the integrity of the resulting HTA reports.

Global focused

SIDDHI is globally oriented, with a particular emphasis on addressing the needs of low and low-middle-income countries. Additionally, it provides a comprehensive instructional manual available on the web, offering detailed guidance on both the conceptual understanding and practical implementation of the web-based tool. This educational resource underscores SIDDHI's commitment to facilitating the use of its platform for a wide range of users, especially those in resource-constrained settings, by ensuring they have access to valuable learning materials.

Types of analysis available in the SIDDHI tool (e.g., Cost-effectiveness analysis)

For instance, CEA aids in determining whether to continue an existing program with the allocated budget, allocate additional funds for a more effective new program, or sustain an already effective program while considering the welfare of the community. To ensure reliable decision-making for community well-being, the calculation of the Incremental Cost-Effectiveness Ratio (ICER) value, derived from the cost-effectiveness analysis, becomes invaluable.[6]

Traditionally, calculating the ICER value and running a cost-effectiveness analysis decision tree model have been time-consuming processes[7]. To overcome this challenge, the Kalam Institute of Health Technology (KIHT) team developed the innovative SIDDHI web-based application tool. SIDDHI streamlines cost-effectiveness analysis by incorporating a decision tree structure, significantly reducing the time required for complex computations and enabling more efficient policy decision-making. With SIDDHI, the KIHT team has provided a valuable resource that empowers researchers, policymakers, and healthcare professionals to perform timely and reliable cost-effectiveness analyses, ultimately promoting evidence-based healthcare interventions and resource allocation strategies.

Components of SIDDHI

The following sections outlines some of the major components of the dashboard in the tool:

Section 1

The 'Homepage/ Dashboard' of the SIDDHI website, which explains it as a project management tool that helps users to create, manage, and track their projects, outlined in Figure 1. It shows the dashboard of the user, where it has any active projects now, timelines of the projects, and the nature of the subscription plan.

Section 2

This 'Manage Profile' section in SIDDHI allows you to update your profile information, including your name, email address, and contact information outlined in Figure 2. You can also change your password in this section.

Section 3

The "Manage Project" feature in SIDDHI allows users to create, manage, and track their projects. To create a new project, users can click on the "Create New Project" button and enter the project name, title, and description. This is the most crucial section of the SIDDHI website. It is further divided into subcategories based on the workflow. The components involved in section 3 are:

The subcategory in section 3 is the Create New Project subcategory is a very important feature of the Manage Project section because it allows users to create new projects and keep track of all their projects in one place.

To create a new project, users can follow these steps:

- Go to the "Manage Project" page.
- Click on the "Create New Project" button.
- Enter a name and image for the project.
- Click on the "Create" button.

The components involve in section 3 are:

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- Go to the "Manage Project" page.
- Click on the "Create New Project" button.
- Enter a name and image for the project.
- Click on the "Create" button.

Once a project has been created, users can search for it by using the search bar at the top of the Manage Project page.

Section 4

The "Introduction" section of the economic model for the decision tree dashboard provides a model introduction, assumptions, and limitations outlined in Figure 3. Under "Model Introduction", there are flows a detail of detailed Model Information and Cost Effectiveness Acceptability Curve. The components involved in section 4 are:

Model Information

The Model Information section includes the following information:

Model introduction

This is a brief overview of the economic model for decision trees, including its purpose, how it works, and its limitations.

PICO format of the model

This is a summary of the model's population, intervention, comparator, and expected outcomes in the PICO format. Under PICO, the following data are also captured.

- Time horizon: This is the period that the model covers.
- Perspective of the study: This is the perspective from which the model is being conducted, such as the payer perspective, the patient perspective, or the societal perspective.
- Currency: This is the currency in which the model is considering.

Cost Effectiveness Acceptability Curve Inputs

The cost-effectiveness Acceptability curve inputs section includes the following information:

- Minimum and maximum values: These are the minimum and maximum values for the cost and effectiveness parameters in the model.
- Difference: This is the difference between the cost and effectiveness parameters of the intervention and the comparator.
- Cost-Effectiveness Threshold: This is the threshold at which the intervention is cost-effective.

Assumptions

The Assumptions section includes any assumptions that were made in developing the model mentioned in Figure 5. For example, the model may assume that all patients in the population have the same disease severity or that all patients respond to the intervention in the same way.

Limitations

The Limitations section discusses the limitations of the model outlined in Figure 5. For example, the model may be limited by the availability of data or by the fact that it does not consider all the relevant factors that could affect the costs and effectiveness of the intervention.

Section 5

The "Model," which outlines the model details subcategory of the economic model for the decision tree dashboard, is used to provide inputs to the SIDDHI software outlined in Figure 4. This subcategory is crucial for setting up the model correctly, as any discrepancies can have a significant impact on the results. The components involved in section 5 are:

The following are the different sections of the model details subcategory:

Patient Flow

This section provides a schematic representation of the events in the model. This is useful for visualizing the model and understanding the different pathways that patients can take.

Start Page

This section allows the user to specify whether the model should be represented in a deterministic or probabilistic way. A deterministic model assumes that all of the probabilities and costs in the model are known with certainty. A probabilistic model considers the uncertainty in the probabilities and costs by using distributions to represent these values.

Model Structure

This section allows the user to define the structure of the decision tree. The decision tree is a graphical representation of the different decisions that can be made in the model and the possible outcomes of those decisions.

Decision Tree Inputs

This section allows the user to input the transition probabilities and costs of the pathway, based on the utility value. The transition probabilities are the probabilities that patients will move from one state to another in the model. The costs are the costs associated with each state and transition. The utility value is a measure of the value that patients place on different outcomes.

Model Parameters

This section allows the user to see the model parameters. The model parameters are the values that are used to calculate the costs and effectiveness of the intervention. The mean is the average value of the parameter. The standard error is a measure of the uncertainty in the mean. The alpha and beta values are the parameters of the distribution that is used to represent the parameter. It is important to carefully consider all of the inputs in the model Details subcategory when setting up an economic model for decision trees. By taking the time to set up the model correctly, users can ensure that the results are accurate and reliable.

Section 6

The "Model Results", which eventually represent the sections of base case results, Probabilistic Sensitivity Analysis (PSA) results, and One Way Sensitivity Analysis (OWSA) results outlined in Figure 5.

Base Case Results

In this section, there is a representation of cost, outcomes, and Net Monetary Benefit (NMB) from both intervention and comparator and the resultant values of incremental cost, incremental outcome, incremental net monetary benefit and finally, the important value of Incremental Cost Effectiveness Ratio (ICER) will be displayed. Based upon that, we can infer the cost-effectiveness of the intervention over the comparator or Vice versa.

Probabilistic Sensitivity Analysis (PSA) Results

Probabilistic sensitivity analysis (PSA) is a quantitative method that is used to assess the uncertainty in the results of a health economic evaluation. PSA is conducted by sampling the values of the model parameters from probability distributions, and then running the model multiple times to generate a distribution of outcomes. This distribution of outcomes can then be used to calculate the probability that the intervention is cost-effective at different willingness-to-pay thresholds. PSA is a valuable tool for health economic evaluations because it allows decision-makers to understand the risks and uncertainties associated with the evaluation.

One-Way Sensitivity Analysis (OWSA) Results

Finally, there will be a one-way sensitivity analysis (OWSA) Results, which represents a tornado plot. OWSA is a quantitative method that is used to assess the sensitivity of a health economic model to changes in the values of its input parameters. OWSA is conducted by varying the values of one input parameter at a time, while keeping the values of all other input parameters constant. The model is then run to see how the results change.

Section 7

References: The last subcategory of the project represents the references, where we can enter the reference from which the calculation for probabilities and costs is considered.

Section 8

The Manage Subscription Plan; log out to complete the session. This section includes the following information:

- Subscription details: The dates on which the subscription begins and ends.
- Subscription type: Whether the subscription is monthly or annual.
- Package amount: The total cost of the subscription.
- This section allows you to log out of your account and end your session.
- Before logging out, be sure to save any information that you have not yet saved.

Additional Aspects related to SIDDHI

SIDDHI Functionality

SIDDHI, a web-based program developed by the Kalam Institute of Health Technology (KIHT) in India, first emerged with its initial version (1.0) in 2022. Presently, the first version of "Solutions for User Interface Models using Decision Trees for Developing Health Tech" is slated for release in August 2023. However, the focus of this review is on the existing version of SIDDHI, which was created in 2022 and is currently utilized and supported by KIHT.

To access SIDDHI, users require a high-bandwidth network and any standard web browser (e.g., Google, UC, Microsoft Edge) on their devices. It is equally compatible with the Apple Mac operating system (macOS). For individual licenses, KIHT allows users to access SIDDHI on a separate device, ensuring ease of use and accessibility.

In its current state, SIDDHI facilitates data input by researchers, generating a decision tree structure with two nodes and only two branches at the initial bifurcation. However, the tool does not yet support three nodes at this stage. Nonetheless, SIDDHI offers a valuable tool for researchers and practitioners in the healthcare domain, streamlining decision tree development and enabling efficient analysis and modelling of health technology interventions. As SIDDHI continues to evolve and new versions are released, it is expected to further enhance its capabilities, contributing to evidence-based healthcare decision-making and resource allocation in the future.

Facilitating Data Management and Analysis

The SIDDHI import tool presents a powerful feature enabling users to efficiently import numerical values, digital files, and even scanned images. This cutting-edge capability offers a smarter way to project and analyse a diverse range of data types within the platform. Health economics researchers frequently encounter various data types during their analysis process, and SIDDHI's ability to organize and store such data and document types proves invaluable for streamlined data preparation, analysis, visualization, and reporting. Researchers can seamlessly incorporate numerical data into SIDDHI, facilitating straightforward quantitative analysis. Moreover, the platform's ability to import digital files and scanned images provides a more comprehensive view of healthcare interventions and outcomes, supporting a deeper understanding of the data at hand.

With the flexibility to develop multiple SIDDHI projects and files within a single user interface, researchers gain enhanced organization and efficiency. This multi-project approach fosters a well-structured workspace, allowing users to seamlessly switch between different analyses and securely store data for future reference. By harnessing SIDDHI's diverse import capabilities, health economics researchers can confidently tackle complex analyses and data processing tasks with ease. The platform's capacity to handle various data types optimizes the preparation phase, streamlining subsequent analysis, visualization, and reporting processes. Ultimately, SIDDHI empowers researchers with a robust toolkit for evidence-based decision-making, supporting impactful and well-informed healthcare policy recommendations.

Software and Tools used for Health Economics Modelling compared with SIDDHI.

The most similar health economics software is given above, including a few free and some premium versions. Fortunately, there is published literature demonstrating that Microsoft Excel and Tree Age Pro are suitable applications for instructional purposes and for conducting the kinds of studies normally required by health technology assessment agencies. The dependability and validity benefits of programming languages like MATLAB and R, however, become more important when more intricate analyses are required[8]. Even though certain software offers higher application ease and high flexibility, training and software investment needs to be taken into consideration[9].

Uniqueness of SIDDHI from other tools and software

SIDDHI represents a pioneering contribution to the field of health technology through its innovative user interface design. As the first web-based application developed in India, it specifically targets developing and low-income countries. The primary motivation behind designing this tool is to streamline and simplify the process of economic modelling, reducing complexity, time, and human errors.

While other established software options exist for economic modelling, many low- and middle-income countries

Table 1: Comparison of software and tools with SIDDHI

	Microsoft Excel & VBA	*Tree Age Pro*	*Arena*	*ICER Analytics*	*SIDDHI*
Programming skills	Moderate	Low	High	Moderate	Low (GUI)
Downloading & Installation	Yes	Yes	Yes	No (web application	No (web-based)
Licence Cost	High	Moderate	High	Moderate	Low (easy access to LMIC)
One place hosting (data & model)	No	No	Yes	Yes	Yes (individual user account)
Training and support	Moderate	Moderate	Moderate	Moderate	High
Default Sensitivity analysis	No	No	No	Yes	Yes
Advanced technical skills	No	No	Yes	Yes	No
Access for multiple stakeholders	Yes	No	No	No	Yes
Results visualization	No	No	No	Yes	Yes
Sharing & distribution	Yes	No	No	Yes	Yes
Automated report generation	No	No	No	Yes	Yes

(LMICs) continue to rely on Excel as their primary tool for cost-effectiveness analysis[10]. While Excel can provide ICER results, it may not be the most suitable tool for the effective communication of the findings. SIDDHI, on the other hand, offers a smarter and more advanced approach to presenting results tailored to the user's needs, enhancing the communication and interpretation of analysis outcomes. The benefits of SIDDHI extend to pharmaceutical companies, as it significantly reduces the time required for developing a decision tree model. Additionally, it serves as an ideal solution for the majority of emerging and LMIC countries, addressing their specific needs in the evolving healthcare landscape.

Furthermore, SIDDHI plays a role in fostering technological advancements in health economics models, laying a foundation for future generations to appreciate and build upon more advanced and sophisticated tools in this domain. Despite its commendable features, SIDDHI has certain limitations, primarily revolving around its focus solely on the decision tree model and cost-effectiveness analysis. As of version 1.0, the decision tree model structure allows only two extant sub-branches, limiting comparisons between more than two interventions and a comparator. However, the developers at Kalam Institute of Health Technology (KIHT), India, are committed to future enhancements and advanced modifications to overcome these limitations, ensuring that SIDDHI remains at the forefront of health economic modelling tools.

In conclusion, SIDDHI's novel approach through user interface design has marked a significant milestone in health technology, particularly in the context of LMICs and developing nations. By simplifying and expediting economic modelling processes, SIDDHI emerges as a valuable resource for effective decision-making and resource allocation in the healthcare sector. With the potential for further improvements, SIDDHI's impact is expected to grow, positively influencing health economics research and policy formulation in the years to come.

Cost

SIDDHI, an innovative web-based program developed by KIHT in India, offers users the opportunity to explore its capabilities through a free trial. For individuals seeking continued access to this powerful tool, the individual license is available at an annual subscription cost of INR 50,000, or a monthly subscription cost of INR 5,000 for a specified period, granting usage of the 1.0 version of the web application. As well as for an institutional license, the subscription cost would be around INR 1.5 lakh per annum. It's important to note that while the individual license offers great flexibility, there are additional expenses associated with upgrades to newer versions of SIDDHI. However, for institutions with multiple users, the cost of institutional licenses varies based on the number of users, providing a tailored solution to meet their specific needs.

For those seeking the most cost-effective option, the annual subscription proves advantageous as it includes the cost of any upgrades that may be released during the subscription period. This ensures users can seamlessly benefit from the latest features and improvements without incurring additional charges. SIDDHI's pricing structure caters to individual and institutional needs, allowing users to choose the subscription plan that best aligns with their requirements. Whether opting for a monthly or annual subscription, SIDDHI empowers researchers, policymakers, and healthcare professionals with a sophisticated and accessible tool for cost-effectiveness analysis and decision-making in the healthcare sector.

Training and Support

KIHT, India, goes the extra mile to ensure users of SIDDHI 1.0 receive comprehensive training and support. The homepage prominently features Training and Support assistance resources, providing easy access to a wealth of valuable information. Users can access a wide array of tutorials and guides, empowering them to make the most of SIDDHI's capabilities. In case users encounter any challenges or

require further assistance, KIHT offers a dedicated contact information link. This ensures that troubleshooting questions can be promptly addressed by the knowledgeable support team, providing users with a smooth and hassle-free experience.

Excitingly, KIHT is gearing up to launch a research network, offering an exclusive opportunity for licensed users to join for free. Being part of this vibrant network grants access to sporadic webinars, enriching users with the latest insights and updates in health economic modelling and cost-effectiveness analysis.

Moreover, KIHT is set to introduce a certificate program, specially curated for licensed users seeking in-depth and extensive training. This program, while offered at an additional cost, promises to elevate users' expertise and proficiency, enabling them to harness SIDDHI's full potential and excel in their health economics research endeavours.

LIMITATIONS

While SIDDHI offers an accessible and rapid platform for decision-tree–based cost-effectiveness modeling, its current version has important limitations that restrict broader application. The tool is confined to a two-arm decision tree structure with a binary first split, preventing its use in multi-arm comparisons or conditions requiring more complex state-transition models such as Markov, semi-Markov, or discrete-event simulations. Additionally, the GUI-driven design, although user-friendly, limits the flexibility and analytical depth available in conventional coding environments such as R, Python, or MATLAB, where users can customize distributions, embed complex logic, and conduct advanced uncertainty analyses. Data handling remains basic, with no automated validation checks, dynamic linking to real-world datasets, or scalable capacity for large-volume inputs. Moreover, the platform is not yet aligned with global HTA reference case standards (NICE, CADTH, ISPOR), which constrains international applicability. Sensitivity analysis options are limited to PSA and one-way OWSA, with no value-of-information or structural sensitivity analysis. Practical usability constraints, such as dependence on high-bandwidth internet and lack of collaborative editing or version control, further restrict adoption in institutional settings.

CONCLUSION

In conclusion, SIDDHI stands as an innovative web-based tool that revolutionizes health economic modelling. By accelerating health economic computations and reducing time, SIDDHI allows health economists to focus on data for critical parameters, thereby enhancing the reliability and precision of HTA reports. Policymakers can leverage evidence-based insights generated through SIDDHI to make informed decisions that optimize healthcare interventions and resource allocation. It allows researchers to manage, analyse, and visualize health economics data and documents systematically and individually. It is user-friendly for researchers who are familiar with health economics data analysis strategies. There is a little upfront learning about the web-based tool for beginner researchers. However, KIHT, India, has helpful resources and support for those who need it, as well as colleagues who are using and teaching it. This description recommends SIDDHI 1.0 as one of the powerful health economics web-based tools to use for experienced health economics researchers and as a learning tool for students of health economics research methodologies. In addition to that, SIDDHI will assist decision-makers and organisational leaders in anticipating future costs and managing potential trade-offs. Economic decision models quantify the clinical and economic advantages and harms associated with treatments. The tool enables health care professionals, especially from LMICs, to get access to automated health economic modelling, thereby improving the accuracy of the modelling exercise significantly without them being experts in programming and modelling. Soon, with an advanced version, it could be modified as an AI-based tool that can help in multiple types of modelling. With its continuous accessibility and personalized support, SIDDHI promises to significantly advance health economic practices, contributing to improved healthcare policy outcomes and ultimately benefiting populations worldwide.

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APPENDICES

Appendix 1

Cost Effectiveness Analysis

Difference between the Classic and SIDDHI Model

Appendix 2

SIDDHI features and usage

SIDDHI is an innovative web-based tool designed for cost-effectiveness analysis in health economic modelling, offered through a subscription-based service. The model type offers two options: deterministic and probabilistic, allowing users to choose the most suitable approach for their analyses.

In developing the decision tree model, the model structure guides users to input data for each arm, producing two nodes. Parameters such as probabilities, costs, and values like mean, SD, α, and β are captured in the model, enabling users to generate base case results by inputting the required data. Beyond base case results, SIDDHI offers advanced capabilities, including probability sensitivity analysis (PSA) and one-way sensitivity analysis (OWSA). These features enhance decision-making by providing insights into the uncertainty and robustness of the economic evaluation results.

Overall, SIDDHI's ability to generate cost-effectiveness analysis values significantly supports decision-makers in efficiently allocating scarce healthcare resources. Its application has witnessed substantial growth in developing nations over the past decade, reflecting its effectiveness in informing evidence-based healthcare policies.

It illustrates a decision tree model developed using SIDDHI, exemplifying the tool's proficiency in economic evaluation. SIDDHI's user-friendly interface and diverse functionalities empower researchers and policymakers alike to make informed decisions for optimal resource allocation, ultimately enhancing healthcare outcomes in the global context.

Appendix 3

Appendix 3.1 (Section 1)

The components involve in section 1 are:

Manage Profile: Users can update their profile information, including their name, email address, and contact information.

Manage Project: Users can create, manage, and track their projects.

Manage Subscription: Users can manage their subscription plans and payments.

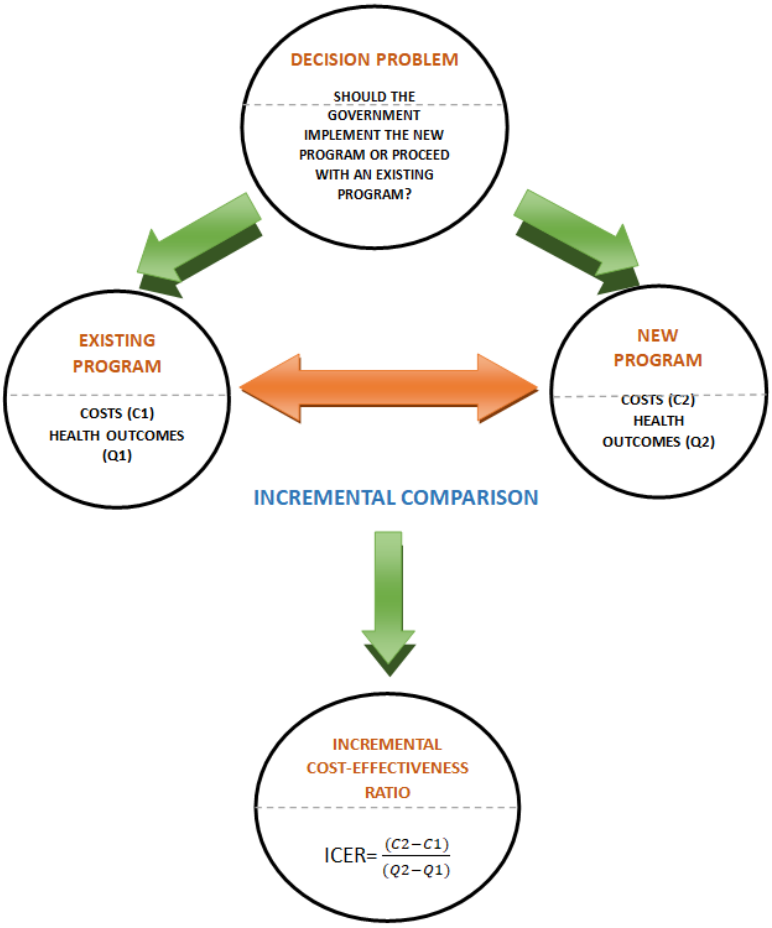

Figure 1

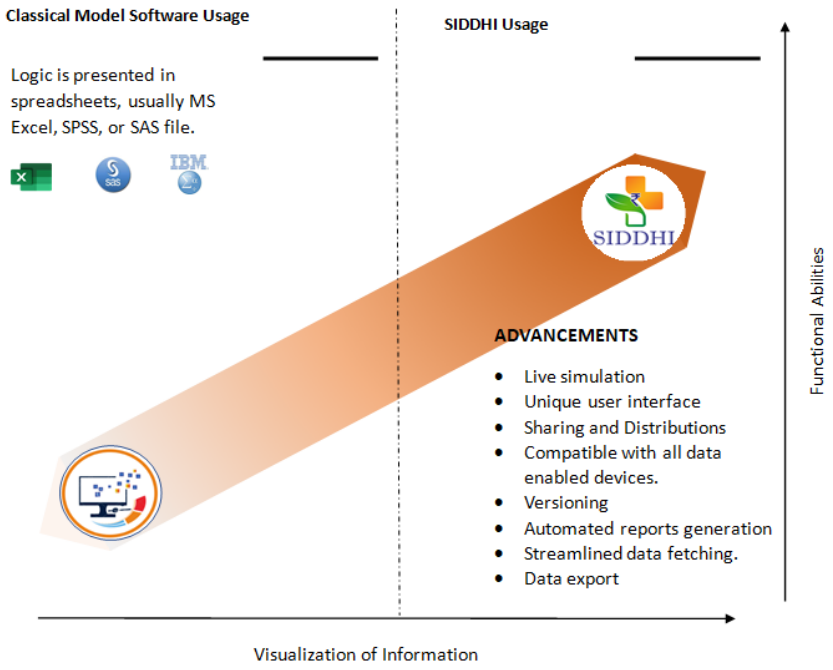

Figure 2

Logout: Users can log out of SIDDHI.

Concisely, the SIDDHI dashboard is a simple and easy-to-use tool for managing projects. It provides users with a quick overview of their projects, their progress, and their subscription status.

Appendix 3.2 (Section 2)

The components involve in section 2 are:

To **update your profile information**, click on the "Update Profile" button. This will open a form where you can edit your demographic details, such as your name, address, and phone number.

To **update your password**, click on the " change your password " button. This will open a form where you can enter your current password and your new password.

Once you have finished updating your profile information or changing your password, click on the "Save" button to confirm your changes.

Appendix 3.3 (Section 6)

The components involve in section 6 are:

Probabilistic Sensitivity Analysis (PSA) Results

For example, PSA can be used to calculate the probability that the intervention is cost-effective at a given willingness-to-pay threshold, even if there is uncertainty in the values of the model parameters.

Here 1000 iterations will be done using monte carlo simulations and the resultant values will be plotted and represented in a Cost effectiveness ICER Plot which will be infer the values. Besides to this cost effectiveness acceptability curve will be displayed which represents a graph that shows the probability that a health intervention is cost-effective at different willingness-to-pay thresholds. The willingness-to-pay threshold is the maximum amount that a decision-maker is willing to pay for a one-unit increase in effectiveness.

CEACs are constructed by running a probabilistic sensitivity analysis (PSA) on a health economic model. A PSA is a quantitative method that is used to assess the uncertainty in the results of a health economic evaluation. PSA is conducted by sampling the values of the model parameters from probability distributions, and then running the model multiple times to generate a distribution of outcomes. The CEAC is constructed by plotting the probability that the intervention is cost-effective at different willingness-to-pay thresholds. The probability that the intervention is cost-effective is calculated by dividing the number of PSA iterations in which the intervention is cost-effective by the total number of PSA iterations.

One way Sensitivity Analysis (OWSA) Results:

OWSA is a valuable tool for health economic evaluations because it allows decision-makers to identify the most important model parameters and the parameters that have the greatest impact on the results of the evaluation. OWSA can also be used to assess the robustness of the results of the evaluation to uncertainty in the model parameters. The tornado plot can be used to identify the most important model parameters and the parameters that have the greatest impact on the results of the evaluation. The tornado plot can also be used to assess the robustness of the results of the evaluation to uncertainty in the model parameters.