PriorityVax

A Platform to support priority-setting decisions for vaccines

User Guide

Sabin Vaccine Institute
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1 PriorityVax: A Primer

1.1 What is PriorityVax for?

PriorityVax is a tool to support priority-setting within vaccine-related decision-making. It is designed to help guide and structure your discussions, to clarify the impact of differing opinions about priorities and to capture a more explicit deliberative process. Going through the steps of PriorityVax encourages you to think about different, sometimes competing, issues that might shape a decision regarding vaccines. It will not make the decision for you, nor will it be a definitive mathematical prediction for every disease faced now, or in the future, but it will serve as a user-friendly tool to support your Evidence to Recommendation process (figure below).

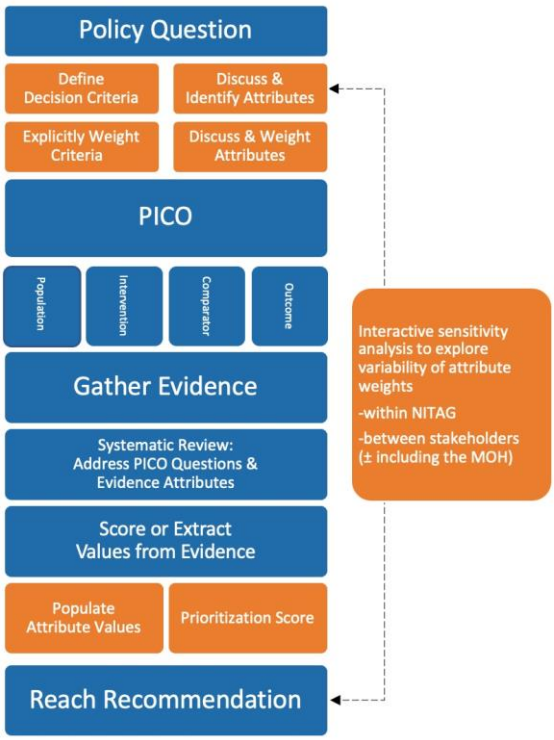


*Figure 1. Evidence to Recommendation framework, **PriorityVax** in orange. **PriorityVax** integrates into the framework to support the deliberative processes. Evidence is gathered outside of **PriorityVax**, for example through PICO questions and systematic literature reviews, although other sources of evidence can be entered, for example from Health Technology Assessments or collated data.*

There are often considerable resource constraints facing many health systems – especially in low- and middle-income countries. This demands well-informed processes for priority-setting. Why? Because, with limited resources, decisions have to be made about what to fund and what, by definition, not to fund. Demonstrably using evidence within a pre-defined and transparent process, builds credibility and confidence in the outcomes. With greater credibility comes buy-in and support.

Effective decisions and sustainable investments in new and existing vaccines require locally relevant data and decision-maker inputs that are aligned with the public health needs of the population (defined at the national level) and matched with a country's immunization infrastructure and programmatic and policy priorities. Sabin is piloting the tool with the aim of strengthening functional capabilities of National Immunization Technical Advisory Groups (NITAGs) and national decision-makers to support evidence-informed, priority-setting recommendations targeted at promoting country-ownership

of decision-making and improving political commitment to and effectiveness and expanded coverage of immunization programs.

1.2 How does PriorityVax work?

The calculation for PriorityVax follows a simple weighted sum model and is readily tractable. It can be described below (Section 1.3) using a *decision matrix* that captures the key decision criteria, their weights (relative importance) and evidence. All criteria are given a percent weight; the weights are then multiplied by evidence, which itself is scaled from zero to one based on a range of least to most favorable. The sum of the weighted evidence is the final score.

Before seeing a worked example, we shall introduce some terminology.

1.2.1 Attributes

Your committee or team will talk through each of the attributes (i.e., criteria) that influence your decision – likely you will want to include different ones to those that are currently pre-populated in the tool, which you can do with the "User Defined" attributes – and score them. The listed attributes in PriorityVax are based on extensive review from different stakeholders—both through consultations about PriorityVax and earlier versions of this tool—as well as a systematic review of vaccine prioritization literature. Some whole categories might not be considered important. That is OK, but by ruling them out (equivalent to giving them a low score if they are not relevant to a particular disease or low weight if they are not important to you) you can be explicit about your thought processes both for what is and equally, what is not considered important. As a guide for considering how you define your attributes, a review of the different themes highlighted in Figure 2 is recommended.

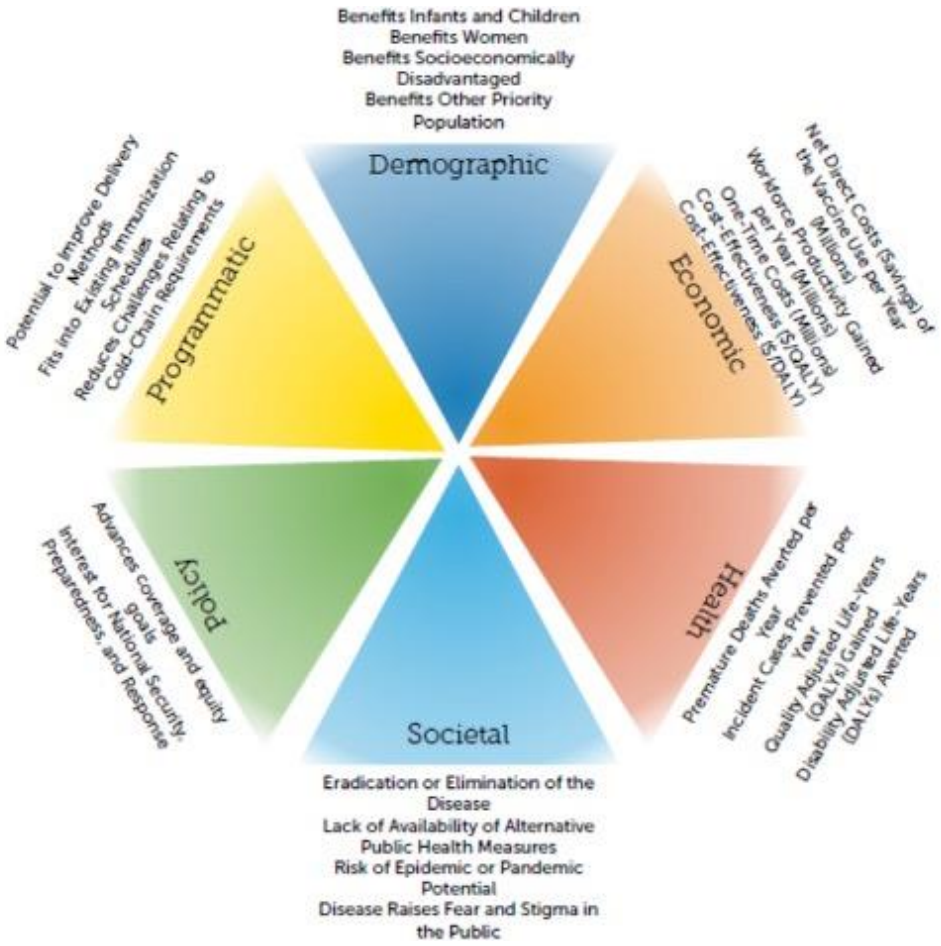


Figure 2. A schematic of the built-in attributes within **PriorityVax***. Crucially, you can create user defined attributes to capture issues that are tailored to your own circumstances and needs.*

1.2.2 Weights

Selecting and discussing the weighting of attribute criteria is a critical and engaging step in the prioritization discussion. Different stakeholders may have different views of the importance of these individual attributes/criteria. Communicating the underlying rationale for what the terms of reference are in the decision-making process is a key part of transparent priority setting.

Because these discussions are very important and can aid in building consensus, you might even want to allow people to look at how their weights change the outcome of the **PriorityVax** score. Doing this tests the sensitivity of the ranking to the underlying assumptions. Within **PriorityVax**, you can interactively update and test different weights, for example, to explore opinions within the committee, or evaluate different values for evidence—for example to reflect the range of published values or a confidence interval associated with a measure of cost or disease burden.

Multiplying the values associated with each attribute by their relative importance (weight) produces the final **PriorityVax** score. It is worth trying different weights to see how sensitive the overall score is to different

opinions. Equally, there might be different opinions within the committee and inputting these into PriorityVax can reveal the breadth of opinion. This is a key feature of PriorityVax and, because it can be done interactively, it can be done in real-time to visualize the sensitivity of recommendations to variability of evidence and opinion.

Each step in using the tool may be part of the discussion process that you already go through, but each one can be used to explicitly explain and display the logic used to reach the final decision.

1.2.3 Evidence

Attributes can be made to accommodate any evidence selected to inform your priority-setting process (see examples in the Figure 4 below). Attributes can be a quantitative range, for example on a natural scale to represent disease cases, a count of deaths or costs of vaccine doses; they might be a percentage scale, for example vaccine effectiveness or the percentage of serotypes that are covered by the vaccine. Qualitative attributes can be added as *whether or not* (binary) or *to what extent* (Likert scale) the attribute has a positive or negative influence on the vaccine scenario.

Figure 3. Examples of different scales that attributes might take, from quantitative natural scales (i.e., the observed units), to percentages or qualitative scales like binary questions or a Likert range for example, expert judgement.

For example, one vaccine that protects against a disease that manifests at older ages will have little importance to child mortality even though infant mortality might be a primary driver of your decision-making. That sense of importance for different drivers of your decision is captured by the weights assigned to the attributes. For each attribute chosen, you give a percentage rank from most to the least important. These weights reflect how important you think an attribute is.

In the case of comparing two vaccines for two different diseases, for example, one which did and one that did not impact child mortality, you would have the same set of criteria applied to both, but only one vaccine scores high against the criterion of reducing child mortality. That is about the evidence. However, you might also have two attributes, one about child mortality and another about the cost per QALY (a measure of quality of life) and these attributes may be weighted so that the cost per QALY is the primary driver of recommendation. These weights describe an *a priori* sense of the relative balance of the decision criteria.

Some data will be readily available in the public domain (for example demographic characteristics), but it is likely that most information may need

to come from detailed surveys of literature, interviews of expert opinion, or data sources within your national health policy and health care system (e.g., MOH, EPI).

Gathering evidence is likely at the heart of your Evidence to Recommendation Framework (see Figure 1). It will probably be the most time-consuming activity you undertake within your process. A useful starting point is to adopt something like the PICO (Population, Intervention, Comparator and Outcome) questions strategy that will give a structure and specificity to identifying what sort of evidence you require — which will have been greatly informed by the criteria you have determined critical to your decision-making process. Armed with these questions, you can then conduct systematic reviews of published literature, and then apply a system such as GRADE or other metrics to evaluate the strength of the evidence. Other sources of information might include official statistics on disease burden and expert opinion. In some cases, you might have models that can be used to give you information, for example epidemiological models estimating disease burden, or economic models of costs: benefits that could come from Health Technology Assessments.

Vaccine data, in particular, is unique to the scenarios being assessed and so will be unique to each priority setting activity. Manufacturers may publish relevant details, for example the volumetric space requirements or whether a cold chain is required.

In selecting and reviewing evidence, recording where information comes from is key to producing a robust and tractable evidence-based decision.

1.2.4 Citations

As you enter data or update the existing defaults to more appropriate numbers - which is strongly encouraged - it is important to keep track of where information has come from. All entries into **PriorityVax** can be linked to any form of a citation (publications, websites, notes from the decision-group, Ministry or other NGO reports or statistics, etc.) As you add or change information, you can update your citations to keep a transparent audit trail of evidence. At most points in the process of specifying data or running an analysis you are able to add citations and these appear in the report that is generated by **PriorityVax**.

This audit trail establishes the chain of evidence and justification for how decisions were derived—promoting both transparency and confidence in the decision process.

1.3 Worked example

For a worked example of the calculations, we borrow from a case study that draws on an application from Papua New Guinea that was made to Gavi that requested support to introduce the Pneumococcal conjugate vaccine (PCV). In their application, they compared two presentations of the vaccine and we can mimic that here (using more recent evidence).

We can pick some points of difference between the two vaccines – PCV10 and PCV13.

First, we identify attributes: the percentage of serotypes of *Streptococcus pneumoniae* that are covered by each vaccine; the cost, and importantly we might consider the average costs for low- and middle-income countries who did not have Gavi funding; the storage requirements, which has implications for the within-country capacity; and protection against otitis media.

Second, each of the attributes are weighted to reflect their relative importance in the prioritization process. This is done separate from gathering or evaluating evidence. In this case, we might prioritize the disease burden, then cost, then storage requirements and last the tangential protection from otitis media.

The third step involves setting boundaries for what is the least to most favorable case. This is important, because this step determines how evidence is scaled. In this case, the serotype coverage was reported as a percentage, so that has boundaries already (0-100%). The cost is more complicated, and we have to set what we consider to be a viable range. In this case we might say that the best case is the cost assuming Gavi co-funding. For the least favorable case, we might take the 90th percentile of costs of any vaccine used in middle-income countries without co-funding. This represents a plausible cost, but still potentially an unaffordable one. The process is similar for storage, and in this case, we can look at the 10th to 90th percentiles for volume of storage per dose of vaccines on the UNICEF supply list (like costs, lower values are preferable). The otitis media question is binary, so that also has a natural range (yes or no).

The fourth step is to gather and evaluate evidence. In this case we can draw on published literature and can use more recent evidence than was available at the time of the application.

Vaccine	Attributes	Weight	Evidence	(least, best)	Scaled value	Weight * value	Score
PCV-10	Serotypes covered (%)	40	31 [1]	(0, 100)	0.31	12.4	43.9
	Cost (USD without co-funding)	30	21.41 [2]	(24.88, 3.5) [2]	0.16	4.9	
	Storage/dose (cm^3)	20	4.8 [3]	(16.8, 2.34) [4]	0.83	16.6	
	Protection against Otis media	10	Yes	(0, 1)	1.00	10.0	
PCV-13	Serotypes covered (%)	40	46 [1]	(0, 100)	0.46	18.4	26.3
	Cost (USD without co-funding)	30	23.99 [2]	(24.88, 3.5) [2]	0.04	1.2	
	Storage/dose (cm^3)	20	12 [5]	(16.8 2.34) [4]	0.33	6.6	

	Protection against Otis media	10	No	(0, 1)	0.00	0.0

Table 1. Example decision matrix illustrating prioritization between two Pneumococcal vaccines. The table shows the attributes, their weights and scales, the evidence (values) and then how the calculation is made to arrive at a final score.

1. Aho et al., 2016
2. WHO, 2019
3. WHO, 2013
4. UNICEF, 2020
5. WHO, 2013

Given the weights that we applied, and the evidence used, the overall score in the column on the right of the table is higher for PCV-10, and the recommendation would be to prioritize PCV-10 over PCV-13. That said, changing the weights will change the scores.

2 PriorityVax: Getting Started

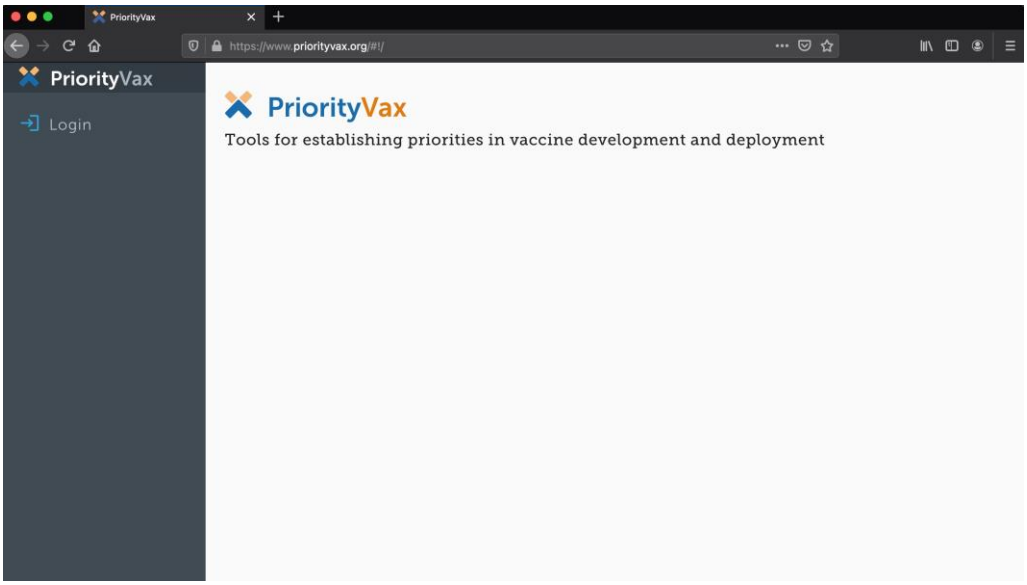
You can find the *beta* version of **PriorityVax** at:

https://www.PriorityVax.org/

and the link to the **PriorityVax** resource page at:

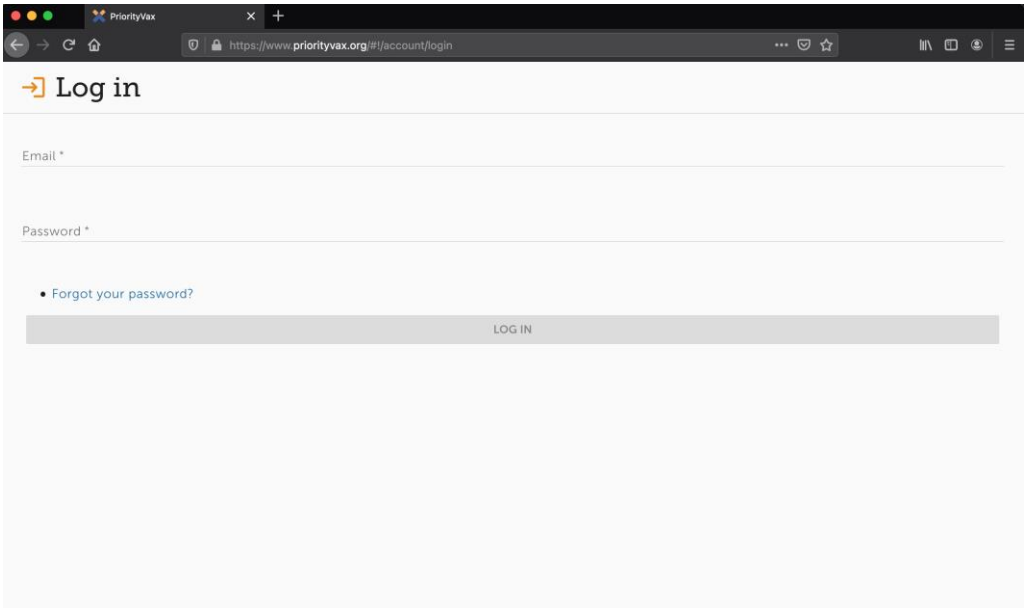
https://spark.adobe.com/page/7k8BDB1kHlp7Y/

PriorityVax should work with any web browser but it works the smoothest with Firefox and Chrome (both of which are freely available).



You can log in with a username and password. Accounts are locked to individual users. This means that data that are input by the user, changes to the defaults and saved analyses are only available to that individual account

holder. The long-term goal is to allow users to collectively compile their results with other users for more direct comparison, however for now users can share an account to collaborate, otherwise each user will only see their own work.



To use **PriorityVax** you will have to input information. This is the basis of an evidence-based decisions. You may find that data are incomplete or entirely lacking (for example, for a particular disease or vaccine), but if you have a flexible approach to systematically looking you can sometimes substitute data from another location or a related topic. In other cases, you might simplify the attribute to use experiential or qualitative data. A broad overview of the **PriorityVax** workflow is shown below:

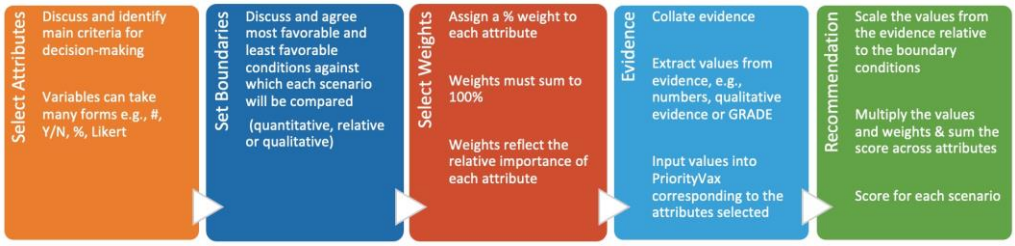


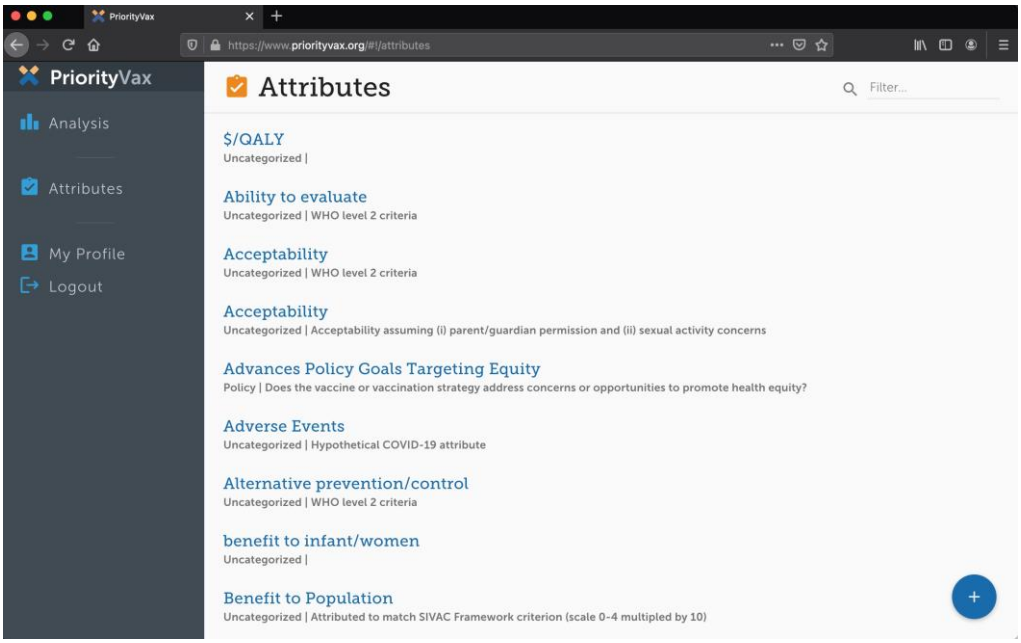
*Figure 4. Workflow for **PriorityVax** noting the order of the essential elements of an analysis.*

In the following steps we shall show you how to input information into **PriorityVax** to get to an analysis.

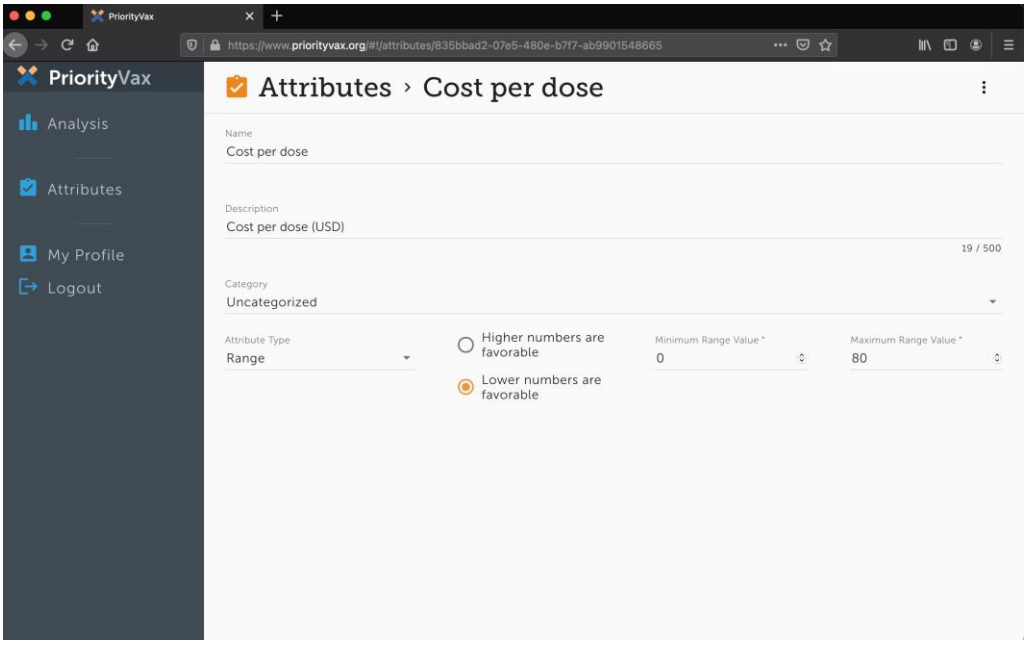
For computers with a smaller monitor size, the left-hand menu panel may be collapsed in which you see icons rather than text labels for the different options. To expand the menu and view the full list of options, click on the orange arrow symbol located on the lower left corner of the webpage.

3 Attributes and Boundaries

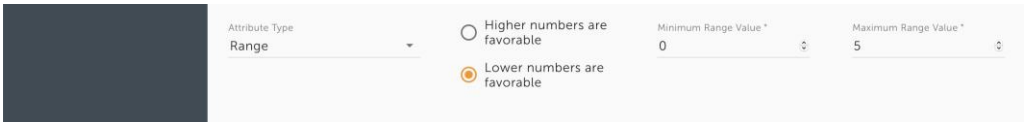
There is a list of built-in attributes if you follow the ***Attributes*** link. These include attributes that are qualitative and quantitative. Each built-in attribute has a page that describes whether it is a continuous variable ("Range", e.g., a measure like disease cases, the percentage efficiency of a vaccine or cost per dose or a qualitative scale such as an expert opinion) or a binary variable ("Switch", e.g., whether or not a vaccine protects children or fits within an existing schedule) and a short description. None of the built-in attributes can be edited because they are available to all users.



More important, is that you can define new attributes to reflect your priorities. The first page lists existing attributes (including any made in the same user account), and you can add new ones (using the + icon). It may be, for example, that the built-in attributes are not quite right for your circumstances or you want to input a different sort of evidence (for example a qualitative GRADE score from published literature. In which case, you can define a similar, but crucially, editable alternative. Equally, there might be nothing suitable as a default and you want to create an entirely new attribute.



New priorities can be either a range, in which case you define the favorable and unfavorable bounds…



or a binary switch (which is set in the ***values*** section of the analysis).

In defining or adapting an ***Attribute,*** you also set boundary conditions. These boundaries give the limits of adverse and favorable conditions for the health and economic options.

Defining boundaries is a critical step within a multi-criteria decision analysis and we strongly recommend discussion around determining boundaries that indicate the limits of how scores are calculated, for example what cost might be acceptable or unacceptable for each QALY saved? This is not to say that any adverse event is 'acceptable', but that there are best- and worst-case outcomes. Any new vaccine is considered in this context. You might, for example use an existing decision (or set of decisions) for comparison – what was an acceptable cost when the last vaccine was introduced? What reduction in mortality was considered a success for a past vaccine? You have the opportunity to define boundaries to your own user-defined attributes later when you create your attributes.

It should be noted that default boundaries you see for some attributes won't necessarily apply to your circumstances, but they do give some sense of tolerable relative conditions. The boundaries are a frame of reference and if you have data to evidence the choice of different boundaries then that is

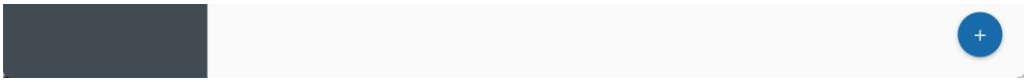
much better. Remembering to input citations is an excellent idea to keep the analysis transparent.

4 PriorityVax: New Analysis

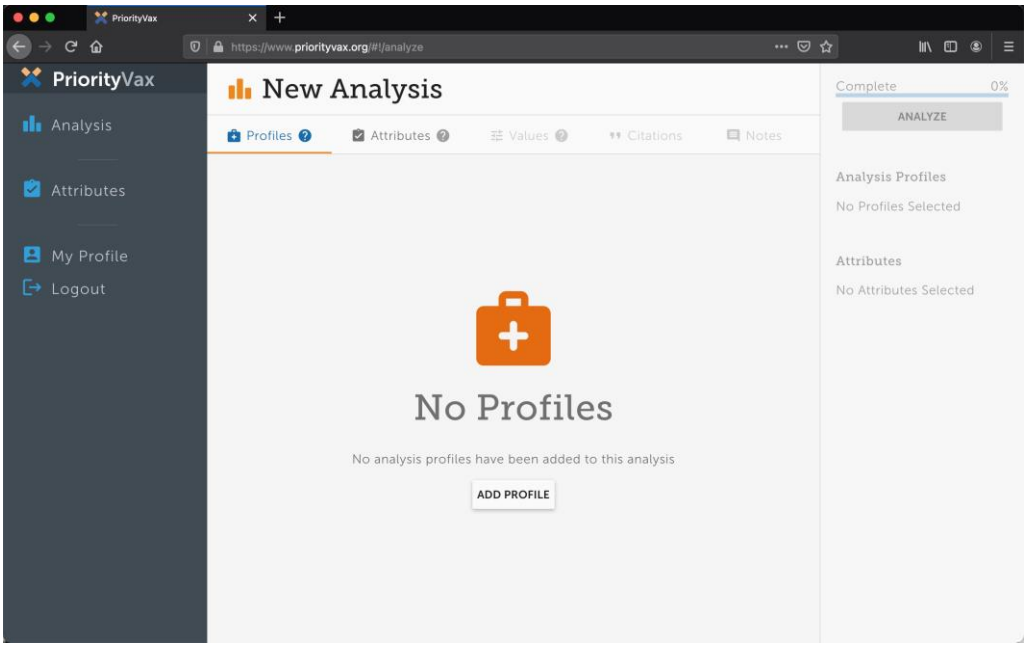
PriorityVax is designed to be easy to use and largely self-evident. This guide will help you navigate the process and over time hints and tips will be added to the options in the program to make it more intuitive.

4.1 New analysis

The central part of PriorityVax is contained within the New Analysis screen. Click on the blue (+) icon to open the New Analysis screen.

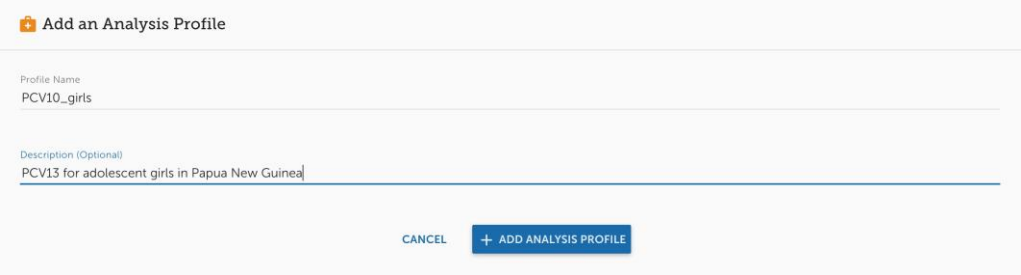


This starts the process of a new analysis and takes us through the steps of identifying the profiles, the attributes and their weights.



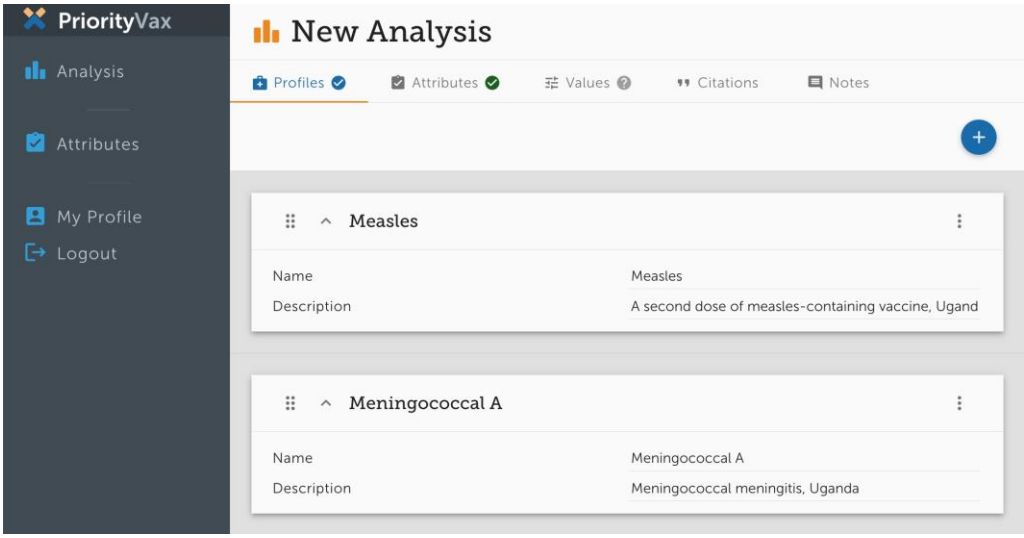
4.2 Profiles

For a new analysis, the first stage is to define a profile. In the simplest form, this is just the name of your vaccine (or risk group or other decision). It could record the PICO question (or similar) that you used to conduct your systematic review so that you can precisely describe the disease, vaccine and or population combination. You need to keep adding profiles (+ icon) for each of the vaccine scenarios you are considering.



The *Name* is a shorthand label so that you can keep track of each profile. The description is an optional, fuller label so that you can store all the relevant details attributed to the *Name*.

As profiles are typed in, for example examining a combined *meningococcal* vaccine to address *meningitis* in the *total populations* in *Uganda,* PriorityVax will display some summary information about each profile based on the information stored in each (which might or not be pertinent).



When the combinations have been selected we click on the *Add Analysis Profile* (or the + icon as new profiles are added).

PriorityVax is ideally suited to comparing different permutations of diseases, vaccines and populations. We can therefore add more than one profile for comparison.

Note that as options are added, a progress bar on the right-hand side of the screen gives a running summary of both your progress and your selections.

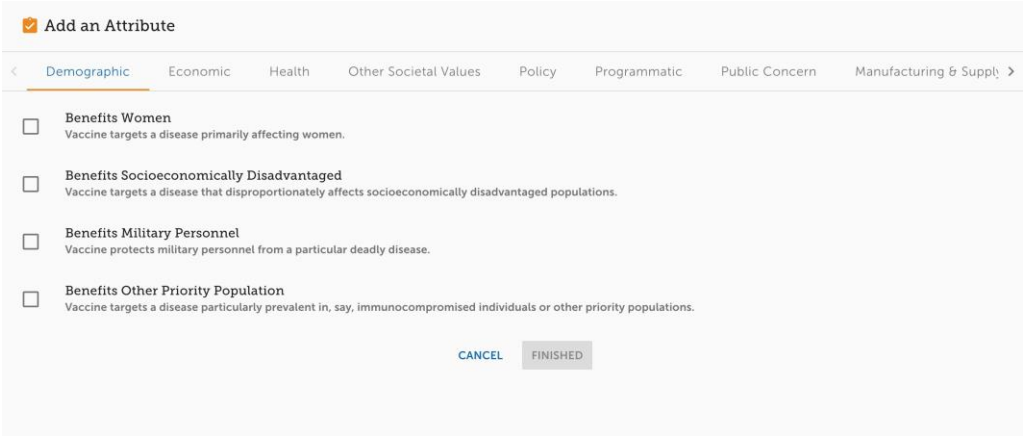
Profiles can be deleted by clicking on the drop-down menu (⋮) icon and clicking the *Remove Profile*.

4.3 Attributes

The next step is to select attributes. These attributes are the different considerations or criteria that contribute to a prioritization decision. You can select as many as you think are important, however we recommend limiting this to around 5 or fewer. The reason is that as more attributes are selected,

the less their individual contribution and discriminating power will be because the overall score is divided up between more and more factors.

There are 9 themes (the tabs along the top) that contain 27 defined attributes, but you can add as many new attributes as needed to help you define and consider different priorities. Consideration for the attributes that you *did not* select may be as valuable for the prioritization discussion as the justification for the smaller number of attributes you did select. Stakeholders may have a different sense of what is important, and therefore addressing their concerns will be useful in addition to explaining your own thought processes.



Select between the themes by clicking on the tabs at the top – above you can see the pre-populated demographic attributes. User-defined attributes are listed under the right-most tab.

Once you have selected as many attributes as you think are appropriate, click on the ***Add attributes*** button. You can move between tabs as you check attributes that you require before adding them all, or you can add them one at a time (using the + icon from the main attributes page).

4.4 Weights

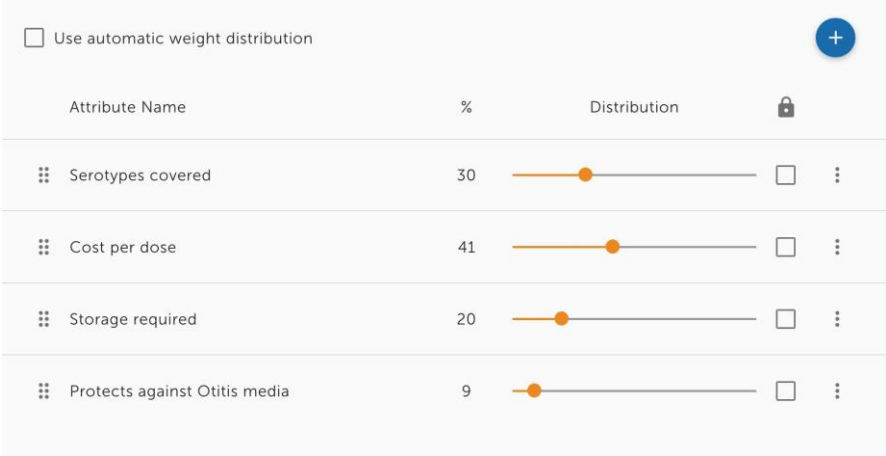
Once attributes are selected, they are given weights. These give the contribution of a given priority to the overall **PriorityVax** score and are applied to the attributes and apply equally across all the scenarios.

There are three ways to add weights:

The starting point is that they all have equal weight (distribution).

You can give them different weights according to your own priorities, which is the best selection of weights. The total must add to 100 (%). Weights are informative, but ultimately subjective. You first select weights but must justify them in the discussion of prioritizing. Weights reflect the importance of different factors to the decision making and unlike the evidence that contributes to numerical values (e.g., the % coverage of a vaccine, the duration of immunity or cost per dose), weights apply the same to all vaccine-disease-population scenarios and reflect what is important for a decision.

Note that in order to change the weight of an attribute, the attribute needs to be unlocked for editing. Clicking on the checked box under the lock icon unlocks the attribute for editing the weight. Two or more attributes are required to be unlocked in order to edit their respective weights.

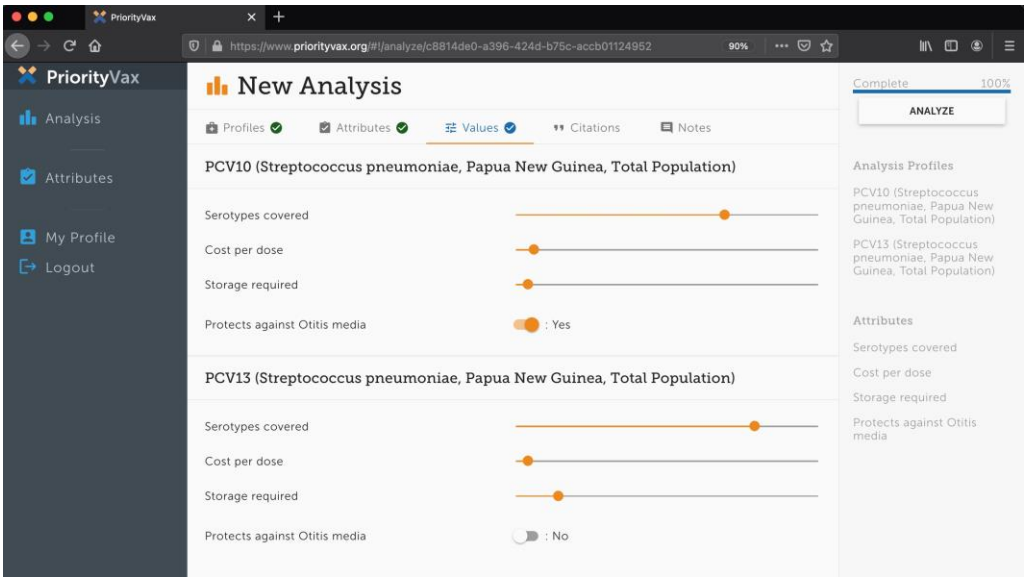


The third way to assign weights is based on an algorithm that gives a discriminatory weight based on the rank-order of priorities. You can select this option by checking the ***Use automatic weight distribution*** checkbox. This gives the first priority the bulk of the weight, and then the second, third and so on. You can change the order of the attributes by dragging them up and down (using the 3 bars to the left of the name). That means that even after you have selected the attributes, you can reorder them if you are using the option to automatically assign weights. To reorder the attributes, click on the (⠿) icon and drag the attribute to the desired priority position.

As noted, dividing the 100% between a lot of attributes results in very little discrimination between them. Therefore, the rank order option becomes increasingly homogenous as more attributes are selected, or highly skewed toward the first attribute if only a small number are selected.

4.5 Values

Your evidence is entered in the ***Values*** screen. This might come from literature, from expert opinion, your own models and tools or other sources. Each vaccine will require evidence that you have gathered outside of PriorityVax to address each of the criteria. Each attribute has a sliding scale or binary switch, and you can set the value by moving the circle along the range. The units and the range are defined by the boundary conditions that you described when making the user-attribute.



4.6 Citations and Notes

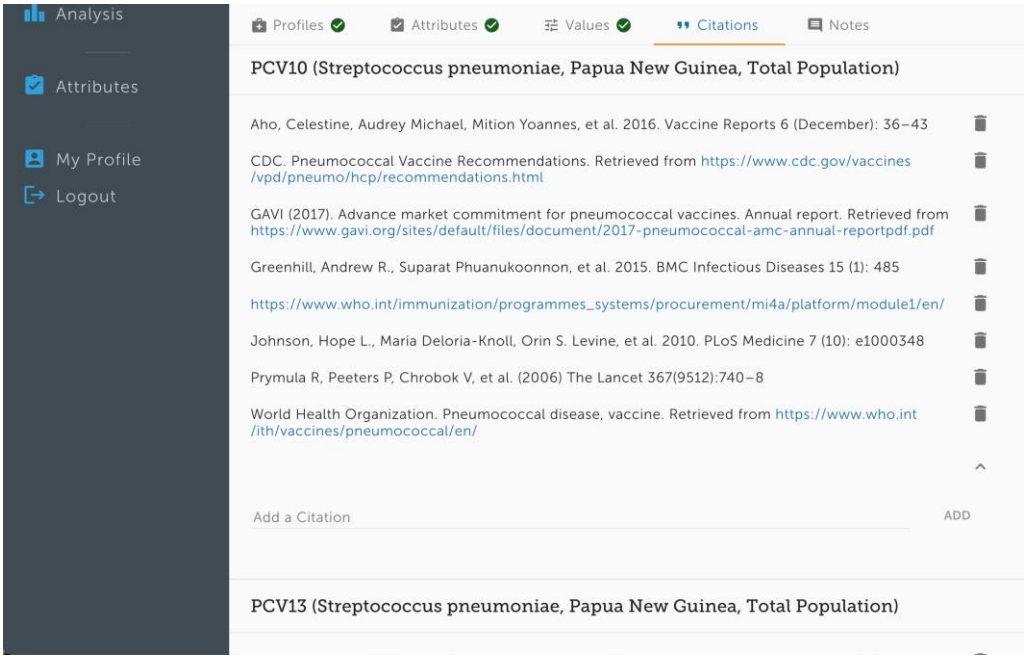
To add a citation, click the *Citations* tab and navigate to the corresponding profile. In the empty line that reads "Add a citation." You can type an

appropriate citation, for example using a reference style of your choice or URL to the relevant source. Add each citation as a separate entry because if you need to change a citation, you delete the old entry and type in an update. You might find it helpful to preface each citation with a note to say what it refers to, for example a publication on vaccine efficacy might be prefaced with "efficacy", or a webpage detailing the current number of cases of a disease.

You have the option of recording any notes relating to a particular analysis. These notes might be there to remind you of why you were testing particular values, to give context to an analysis, note who was involved in the decision-making process (for example, to pick the attributes or set boundaries) or to add some context to the choice of values.

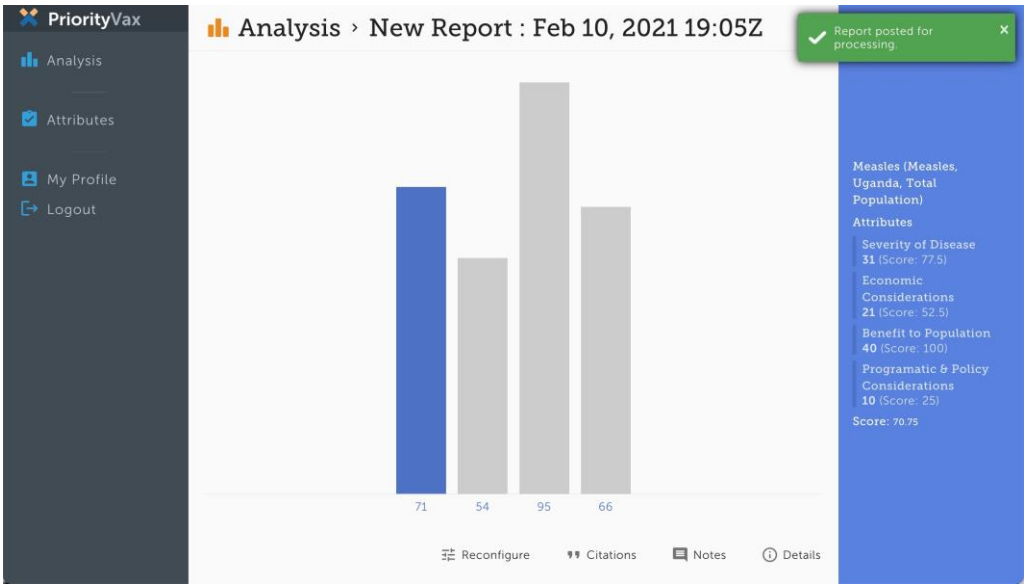
Click on the ***Notes*** button to record your notes. As with citations, enter each note as a separate entry.

To delete Notes or Citations, for example, if you want to update information, navigate to the ***trash*** icon to the right of the entry.



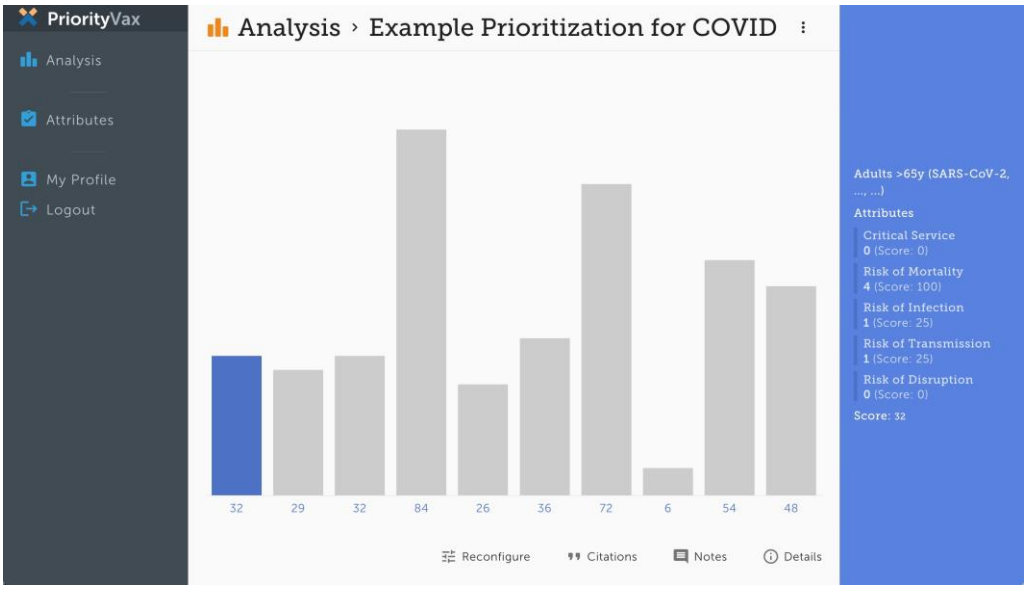
4.7 Analyze

Once all the appropriate options have been selected you will see that the progress bar in the top right-hand corner shows 100% completed. The *Analyze* button will then become active. Clicking on this button will start the analysis. In general, this will be quick, and you might see a green bar to indicate progress. This is usually very quick!



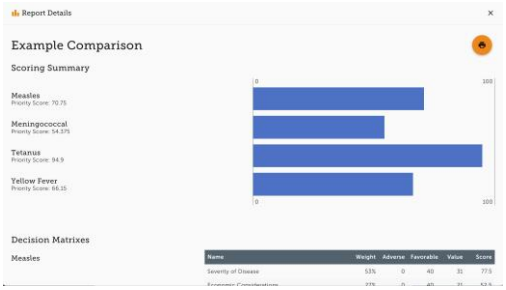
4.8 Results

The results appear as a graph. Each bar is a different vaccine-disease profile, and below it is the total score for that specific profile. If you hover over or click on a bar (the bar will turn blue), the details of that scenario are presented in the panel to the right. These summary details show the profiles selected and provide a breakdown of the total scores in terms of the attributes and values that contributed.



4.9 Details

Reporting the results of the **PriorityVax** process offer more details than just the graph and the summary. All the appropriate details can be seen in the *Details* link at the bottom of the page.



Immediately under the graph are the decision matrices for each vaccine. These describe the weights for each attribute, the boundary conditions you input for your user-defined criteria, the values your derived from the evidence and then the score for each attribute.

Below these important decision matrices are any citations and notes that you made to identify sources of information or capture discussions, for example:

Report Details

Yellow Fever

Name	Weight	Adverse	Favorable	Value	Score
Severity of Disease	53%	0	40	28	70
Economic Considerations	27%	0	40	20	50
Benefit to Population	14%	0	40	38	95
Programatic & Policy Considerations	6%	0	40	15	37.5

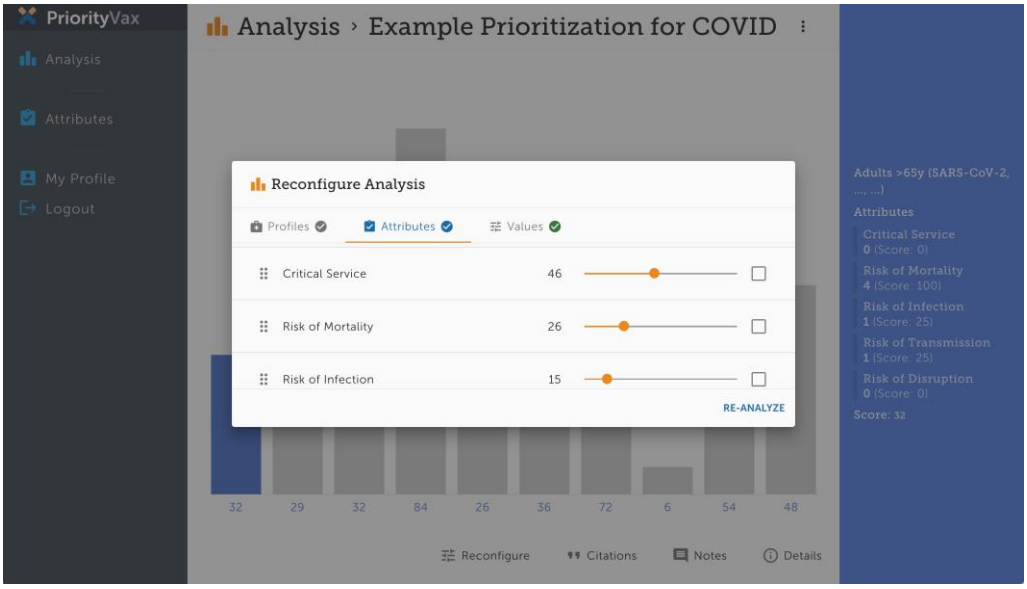
Citations

Measles

1. Baliraine, F. N., J. Bwogi, H. Bukenya, R. Seguya, T. Kabaliisa, A. Kisakye, W. B. Mbabazi and S. B. Smit (2011). "Possible interruption of measles virus transmission, Uganda, 2006-2009." Emerg Infect Dis 17(1): 110-113.
2. WHO (2009). Measles vaccines: WHO position paper. Weekly epidemiological record. No. 35, 2009, 84, 349–360. http://www.who.int/wer.
3. WHO (2011). Rubella vaccines: WHO position paper. Weekly epidemiological record. No. 29, 2011, 86, 301–316. http://www.who.int/wer.
4. WHO (2013). A guide to introducing a second dose of measlesvaccine into routine immunisation schedules.
5. Tulchinsky, T. H., G. M. Ginsberg, Y. Abed, M. T. Angeles, C. Akukwe and J. Bonn (1993). "Measles control in developing and developed countries: the case for a two-dose policy." Bull World Health Organ 71(1): 93-103.
6. Ministry of Health (2014). Uganda Comprehensive EPI, Surveillance, Immunization Financing Review and Post introduction evaluation of Pneumoccocal vaccine. Unpublished.
7. Mupere, E., C. Karamagi, G. Zirembuzi, M. Grabowsky, R. L. de Swart, M. Nanyunja and H. Mayanja (2006). "Measles vaccination effectiveness among children under 5 years of age in Kampala, Uganda." Vaccine 24(19): 4111-4115.
8. Mbabazi, W. B., M. Nanyunja, I. Makumbi, F. Braka, F. N. Baliraine, A. Kisakye, J. Bwogi, P. Mugyenyi, E. Kabwongera and R. F. Lewis (2009). "Achieving measles control: lessons from the 2002-06 measles control strategy for Uganda." Health Policy Plan 24(4): 261-269.
9. Helfand, R. F., D. Witte, A. Fowlkes, P. Garcia, C. Yang, R. Fudzulani, L. Walls, S. Bae, P. Strebel, R. Broadhead, W. J. Bellini and F. Cutts (2008). "Evaluation of the immune response to a 2-dose measles vaccination schedule administered at 6 and 9 months of age to HIV- infected and HIV-uninfected children in Malawi." J Infect Dis 198(10): 1457-1465.

5 Sensitivity

After running an analysis, you might consider some adjustments to inputs. These are possible with the *Reconfigure* button on the results page.



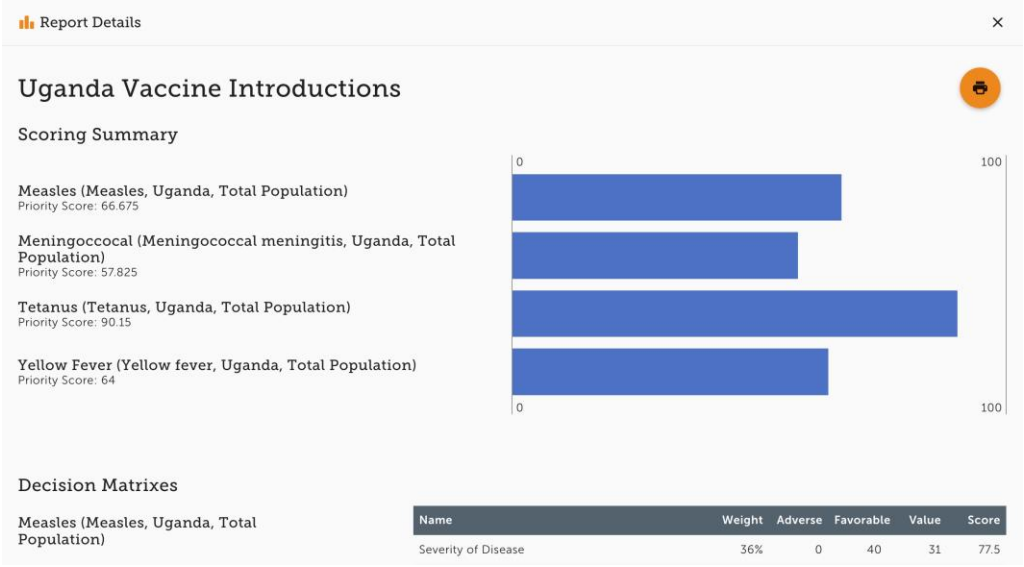
You can review or re-order (e.g., for presentation or categorization) the profiles, or adjust the weights of attributes and examine differences in the attribute values. This is a critical feature to explore subtle changes to scenarios, for example uncertainty around some values, without having to re-specify underlying data (e.g., the population demographics).

A particularly useful motivation for the *Reconfigure* feature is that you might want to compare the weights from different stakeholders. Even having reconciled the selection of attributes through deliberation, individual stakeholders might have subtly different priorities. Such a sensitivity analysis can be a useful addition to examine the variability of scores.

You can also delete Citation and Note entries as necessary, after running an analysis. Click on the *Citations* and/or *Notes* buttons, located to the right of the *Reconfigure* button to do so.

6 Reporting

The *Details* screen is printable to generate a compiled PDF file that can be shared. As noted above, the report has a summary visual representation and the decision matrix for each vaccine that can be used to unpack the final scoring. At the bottom of the file are all the citations that were input during the process and are collected in this document as well to ensure that the analysis is transparent.

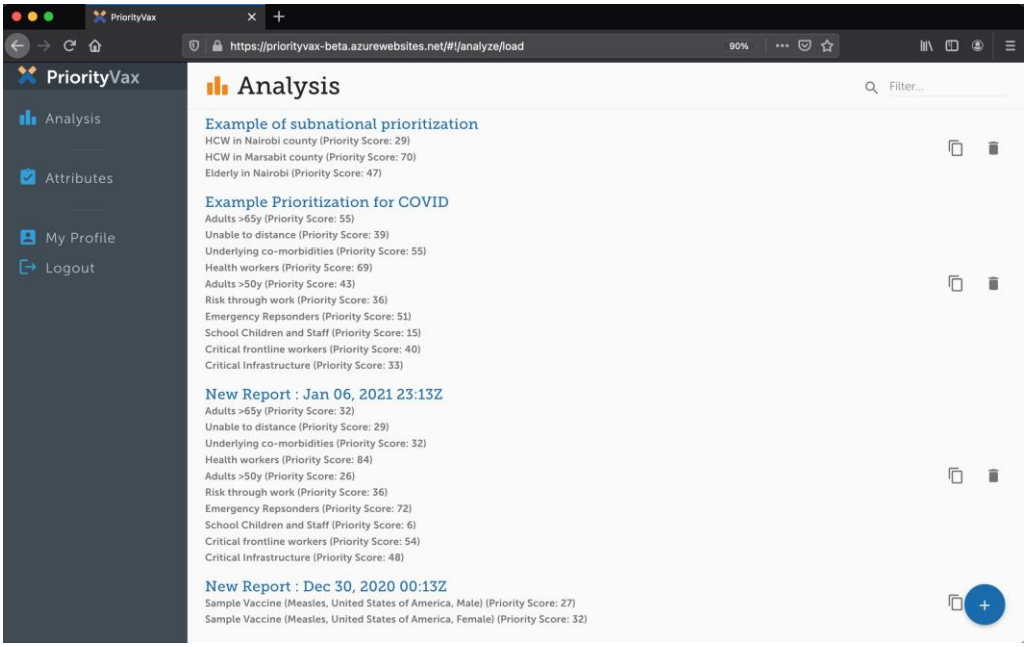


7 PriorityVax: Load Analysis

Every time a user generates a new analysis PriorityVax will save the details and the results. These can be found in the *Analysis* tab. They are listed with the most recent analyses at the bottom of the list and opening one will take you to the results page.

The default is for each analysis to be named using the date and time of creation, however these can be changed to something more meaningful using the drop-down menu (⋮) icon on the right of the name when the analysis is selected.

Analyses can also be duplicated using the icon (overlapping pages) to the left of the saved analyses. This allows an analysis to be run and then any edits can be saved in a second copy without over-writing the original. This is a very useful feature if you want to explore sensitivity to the original assumptions, but you also want to save every permutation that is examined.


PriorityVax
https://priorityvax-beta.azurewebsites.net/#!/analyze/load
90%
PriorityVax
Analysis
Attributes
My Profile
Logout
Analysis
Filter...
Example of subnational prioritization
HCW in Nairobi county (Priority Score: 29)
HCW in Marsabit county (Priority Score: 70)
Elderly in Nairobi (Priority Score: 47)
Example Prioritization for COVID
Adults >65y (Priority Score: 55)
Unable to distance (Priority Score: 39)
Underlying co-morbidities (Priority Score: 55)
Health workers (Priority Score: 69)
Adults >50y (Priority Score: 43)
Risk through work (Priority Score: 36)
Emergency Repsonders (Priority Score: 51)
School Children and Staff (Priority Score: 15)
Critical frontline workers (Priority Score: 40)
Critical Infrastructure (Priority Score: 33)
New Report : Jan 06, 2021 23:13Z
Adults >65y (Priority Score: 32)
Unable to distance (Priority Score: 29)
Underlying co-morbidities (Priority Score: 32)
Health workers (Priority Score: 84)
Adults >50y (Priority Score: 26)
Risk through work (Priority Score: 36)
Emergency Repsonders (Priority Score: 72)
School Children and Staff (Priority Score: 6)
Critical frontline workers (Priority Score: 54)
Critical Infrastructure (Priority Score: 48)
New Report : Dec 30, 2020 00:13Z
Sample Vaccine (Measles, United States of America, Male) (Priority Score: 27)
Sample Vaccine (Measles, United States of America, Female) (Priority Score: 32)

Annex

A brief history of PriorityVax

The **PriorityVax** decision-support platform has evolved from the early multi-criteria decision-analysis concepts and constructs recommended by the U.S. Institute of Medicine (IOM) Committee on Identifying and Prioritizing New Preventive Vaccines for Development. It was further informed by decision-support approaches associated with programmatic and policy-related decision-making for vaccines, inclusive of the WHO-SAGE Evidence-to-Recommendation Framework, Gavi's Vaccine Investment Strategy, and the SIVAC Initiative.

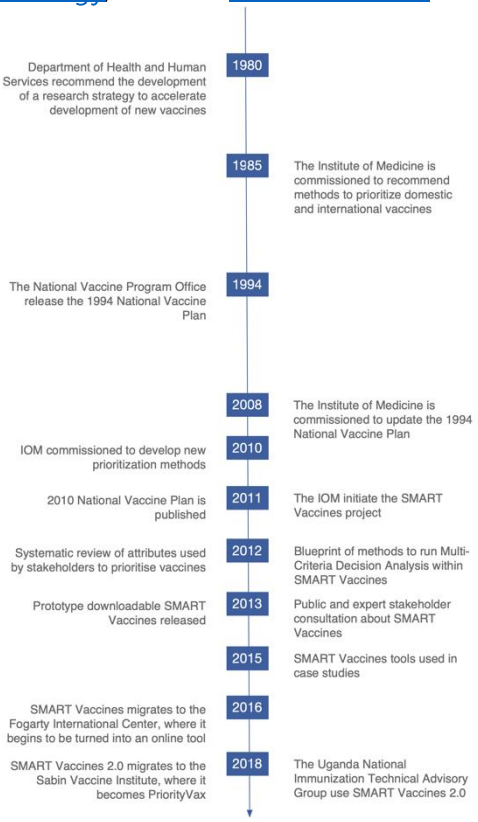


*Figure 5. Timeline illustrating the development of **PriorityVax**.*

In the early IOM prioritizations of vaccines, the principal two criteria were considered the reductions in morbidity and mortality and an estimate of the effectiveness of the vaccine ($/QALY). However, few of the recommended vaccines were introduced (or developed), stimulating an increasing recognition that other criteria played a significant role in how decisions were made. Consequently, a multi-criteria approach was developed, the Strategic Multi-Attribute Ranking Tool for Vaccines – SMART Vaccines. The Department of Health and Human Services initiated the IOM efforts in the 1980s and continued to contract them through the National Vaccine Program Office (NVPO). In 2008 the IOM responded to the NVPO request to review the 1994 National Vaccine Plan and update the recommendations leading to a commissioned to develop a validated prioritization model in time for the 2010 National Vaccine Plan.

Wide consultation with an array of stakeholders, from federal and policy advisory groups, professional societies, international governments, industry and trade groups, and philanthropic organizations, together with a review of relevant literature expanded the initial drivers of prioritization from disease burden and cost-benefit to a shortlist of around 29 attributes. A multi-criteria utility model was designed that was flexible enough to be used by different stakeholders and to accommodate a selection of many different vaccine attributes, whilst remaining easily tractable and adaptable to different prioritization questions.

The SMART Vaccines team had a series of stakeholder engagements across a range or modalities and culminating in an international meeting covering topics including the usefulness, usability, data needs, development, and opportunities for outreach of SMART Vaccines. There was consensus that the concept was useful, however, in addition to concerns around data requirements, pertinent questions included who might be expected to use the tool both in terms of an audience and in terms of the technical proficiency needed to gather evidence and interpret the outputs.

The consequence was that SMART Vaccines was refocused. The Fogarty International Center at the U.S. National Institutes of Health took on the development of a prototype web-based interface that could overcome issues of operability that impeded access to the tool. This served as the precursor to the web based **PriorityVax** that is now hosted by the Sabin Vaccine Institute.

Further reading

For more information on how **PriorityVax** works and the background how and why the software was created we refer you to these reports:

Institute of Medicine. 2012. Ranking Vaccines: A Prioritization Framework: Phase I: Demonstration of Concept and a Software Blueprint. Edited by Guruprasad Madharan, Kinpritma Sangha, Charles Phelps, Dennis Fryback, Tracy Lieu, Rose Marie Martinez, and Lonnie King. Washington (DC): The National Academies Press. https://doi.org/10.17226/13382.

Institute of Medicine. 2013. Ranking Vaccines: A Prioritization Software Tool: Phase II: Prototype of a Decision-Support System. Edited by Guruprasad Madhavan, Kinpritma Sangha, Charles Phelps, Dennis Fryback, Rino Rappuoli, Rose Marie Martinez, and Lonnie King. Washington (DC): The National Academies Press. https://doi.org/10.17226/13531.

Institute of Medicine. 2015. Ranking Vaccines: Applications of a Prioritization Software Tool: Phase III: Use Case Studies and Data Framework. Edited by Guruprasad Madhavan, Charles Phelps, Rino Rappuoli, Rose Marie Martinez, and Lonnie King. Washington (DC): National Academies Press. https://doi.org/10.17226/18763.

Knobler, Stacey, Karin Bok, and Bruce Gellin. 2017. Informing Vaccine Decision-Making: A Strategic Multi-Attribute Ranking Tool for Vaccines-SMART Vaccines 2.0. Vaccine 35 Suppl 1: A43–45. https://doi.org/10.1016/j.vaccine.2016.10.086.