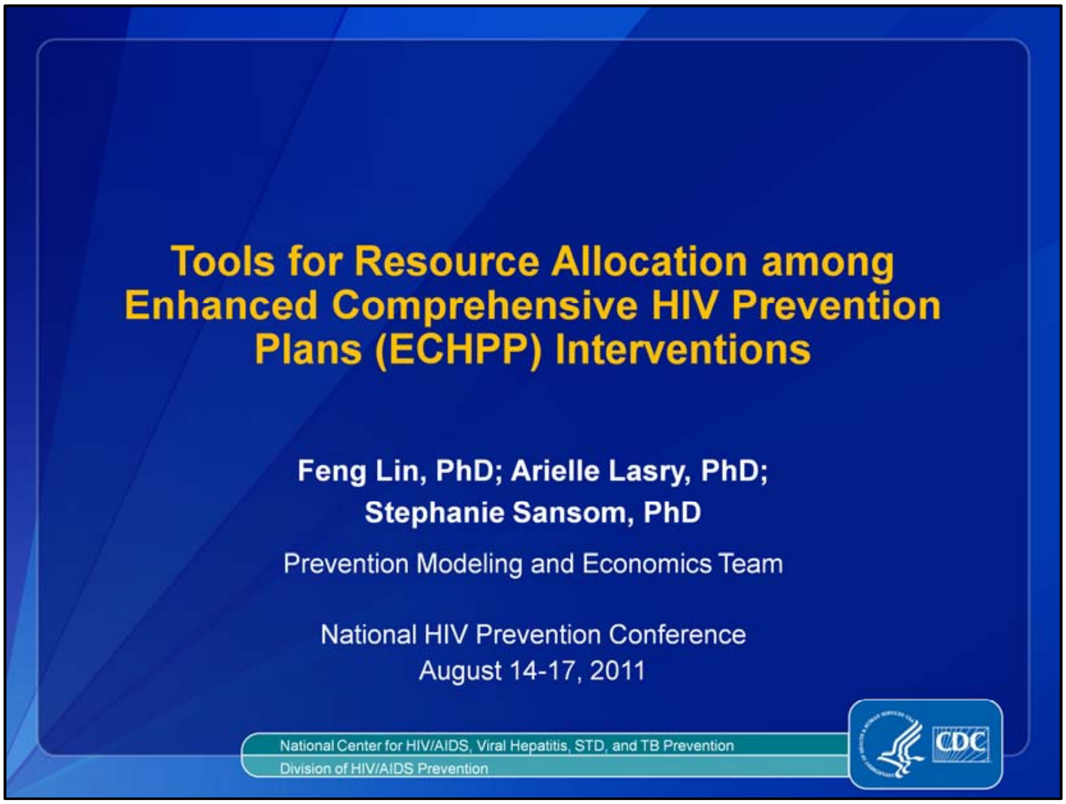
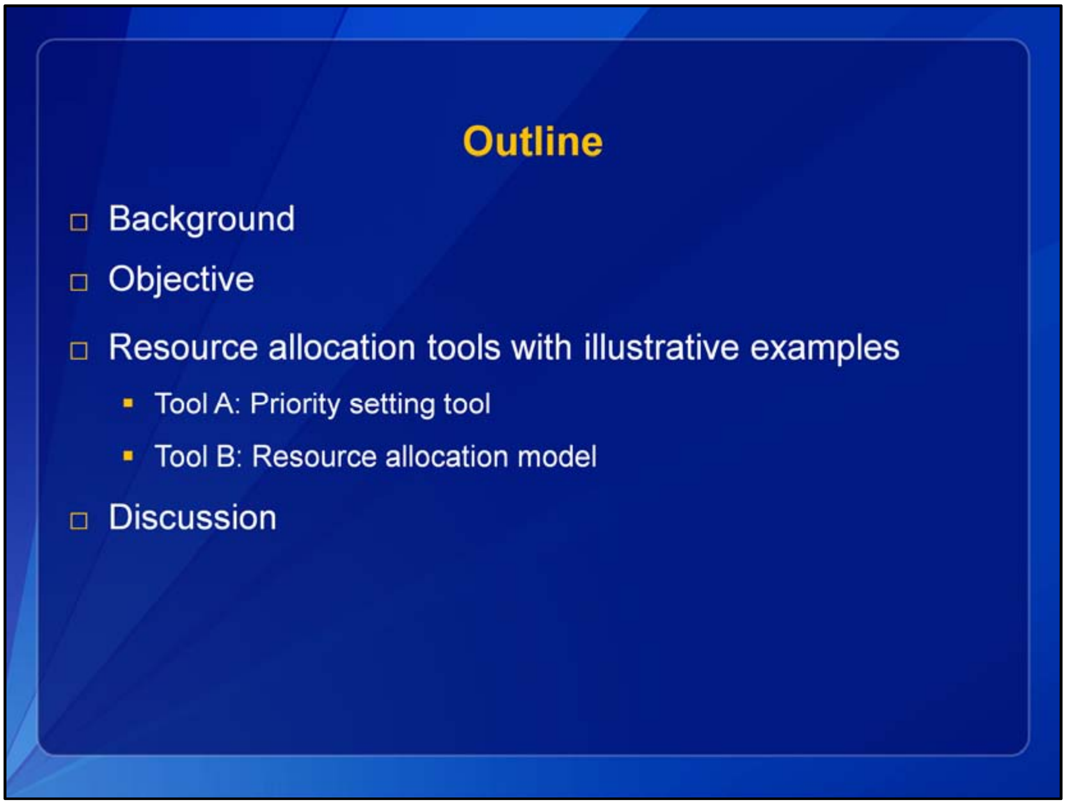


The title of the presentation is “Tools for Resource Allocation among ECHPP Interventions”.

Disclaimer: all data shown in the slides is for illustration purposes only, and does not represent any actual jurisdiction.

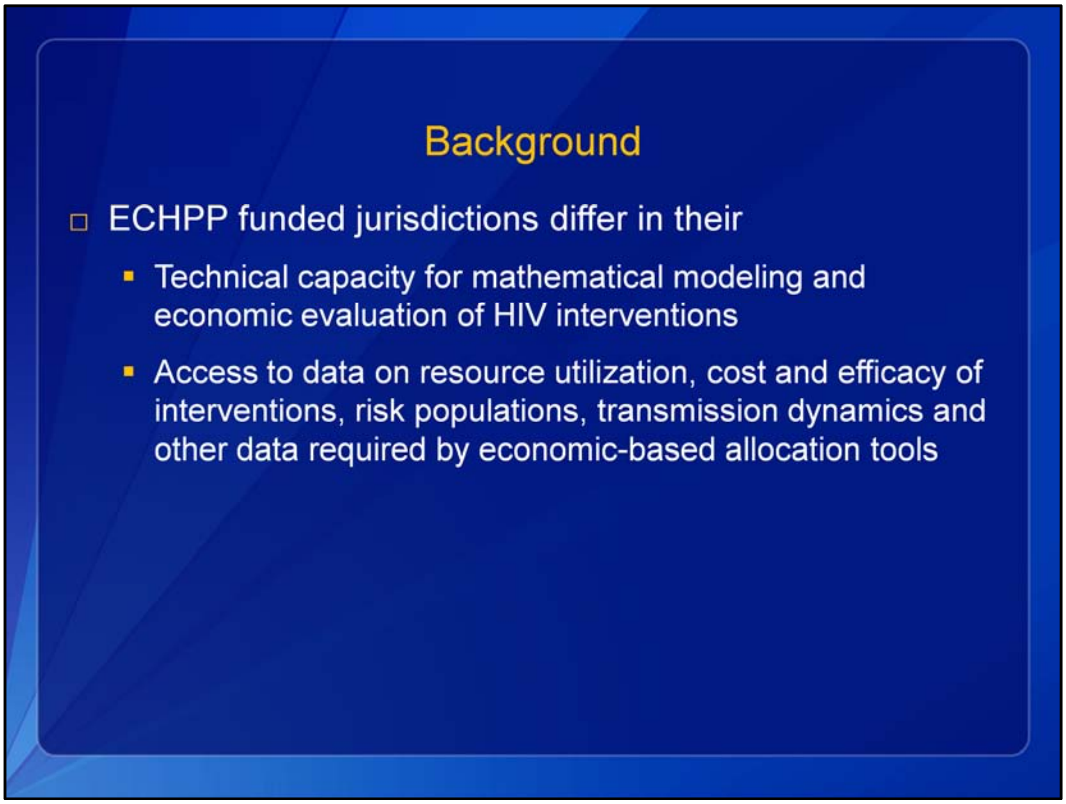


This is the outline of my presentation:

• First, a brief overview of the background and objective.

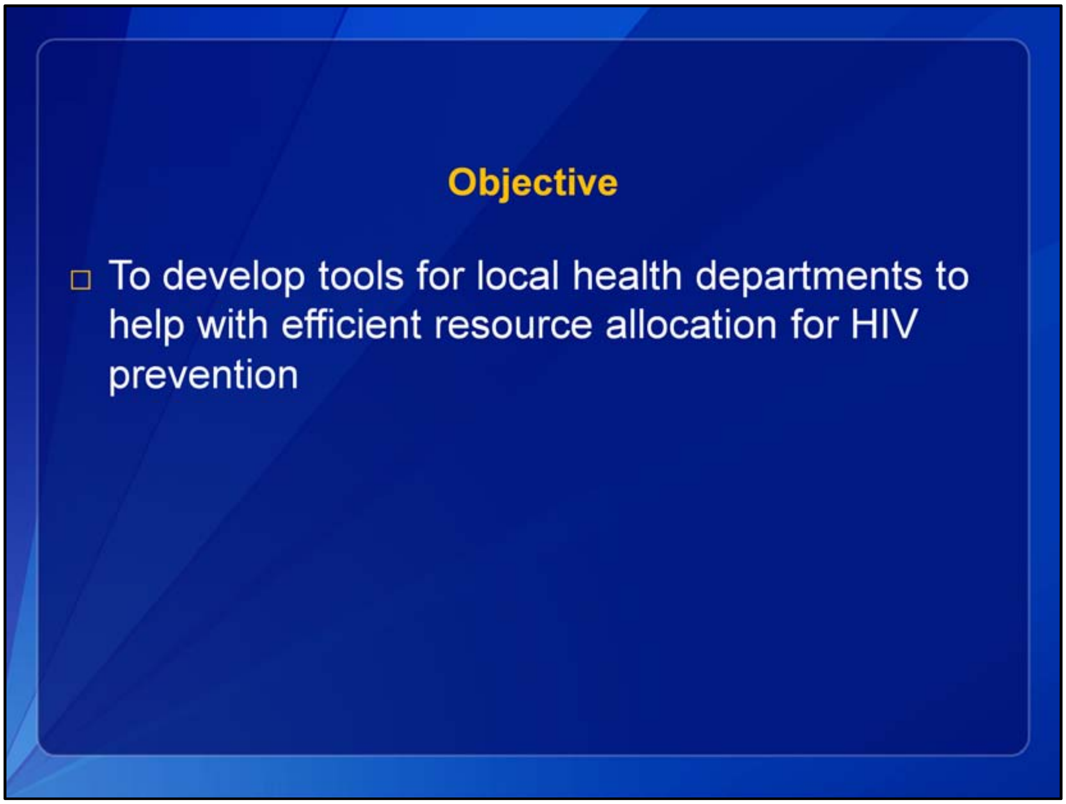
• Then we will introduce two tools that we developed to facilitate resource allocation, with hypothetical examples to illustrate how to use these tools.

• Lastly, we will discuss the strength and weakness of these tools.

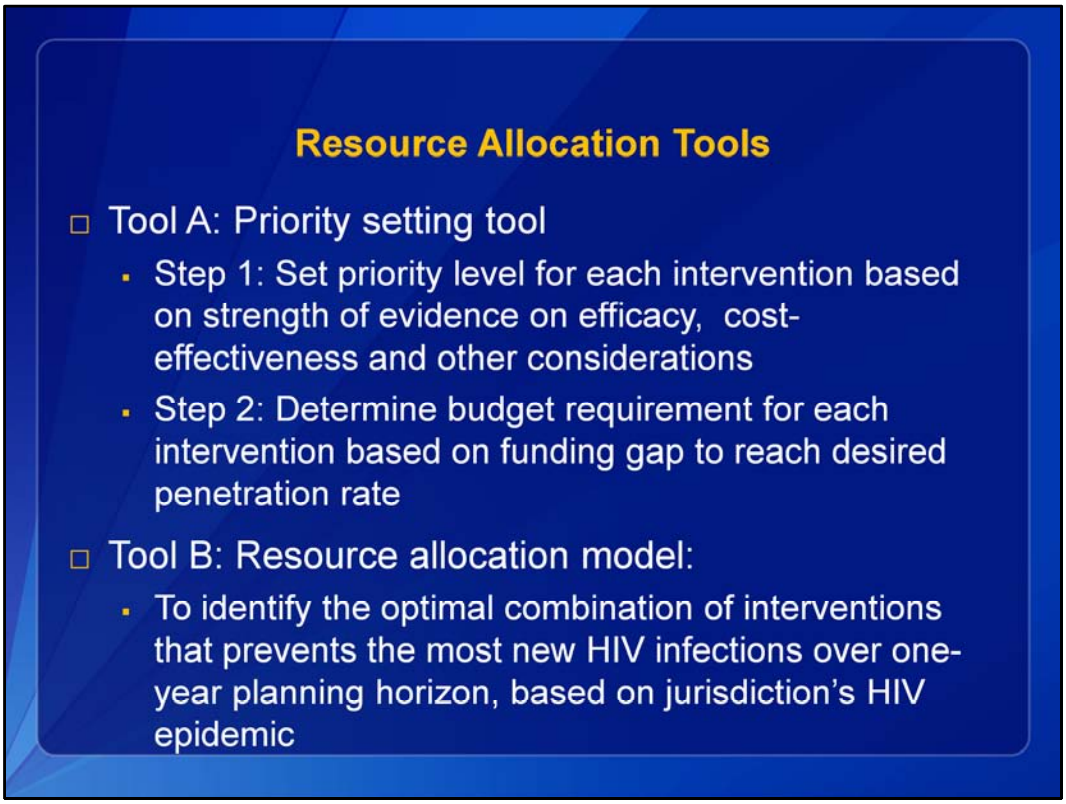


ECHPP grantees are required to identify the optimal combination of 14 required and 10 recommended interventions that will prevent the most number of new infections. The grantees are required to justify their HIV budget allocations and demonstrate how these decisions affect their local epidemic.

The funded jurisdictions differ in terms of their technical capacity and access to data, including programmatic data on the costs and effectiveness of prevention interventions in their jurisdictions and HIV epidemic data from their communities.



We developed two tools that differ in their input data requirements and level of complexity.

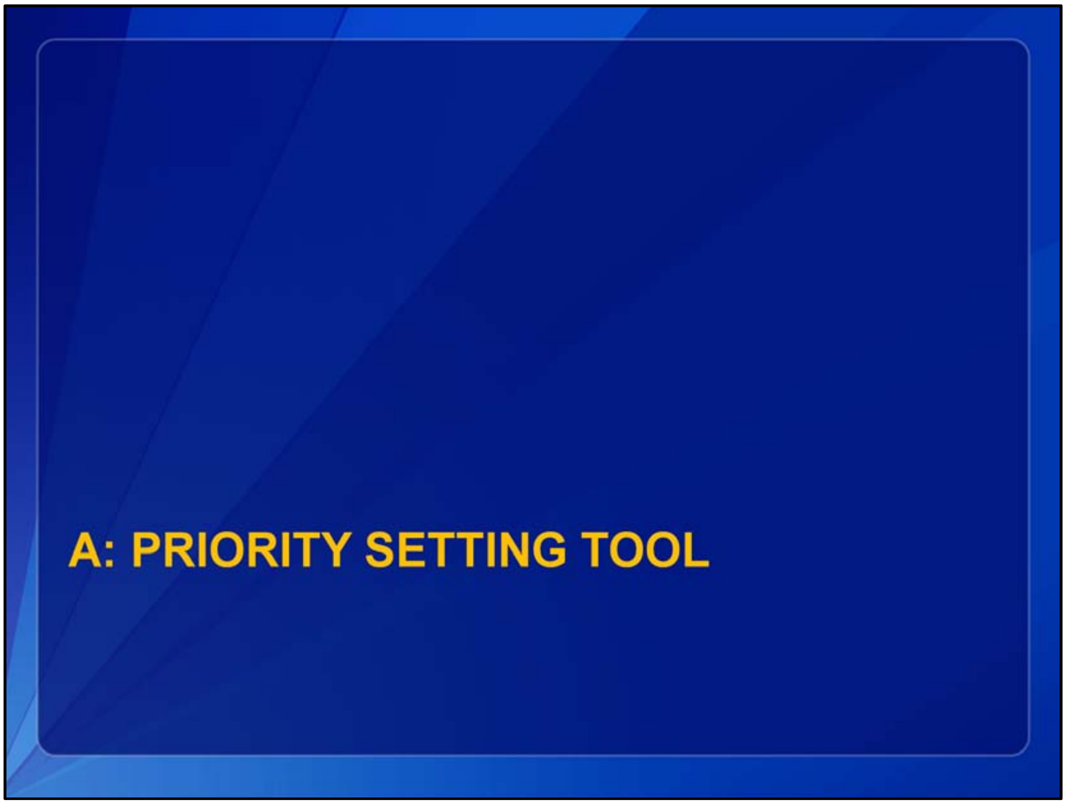


• Tool A, the priority setting tool, provides a process to prioritize each intervention.

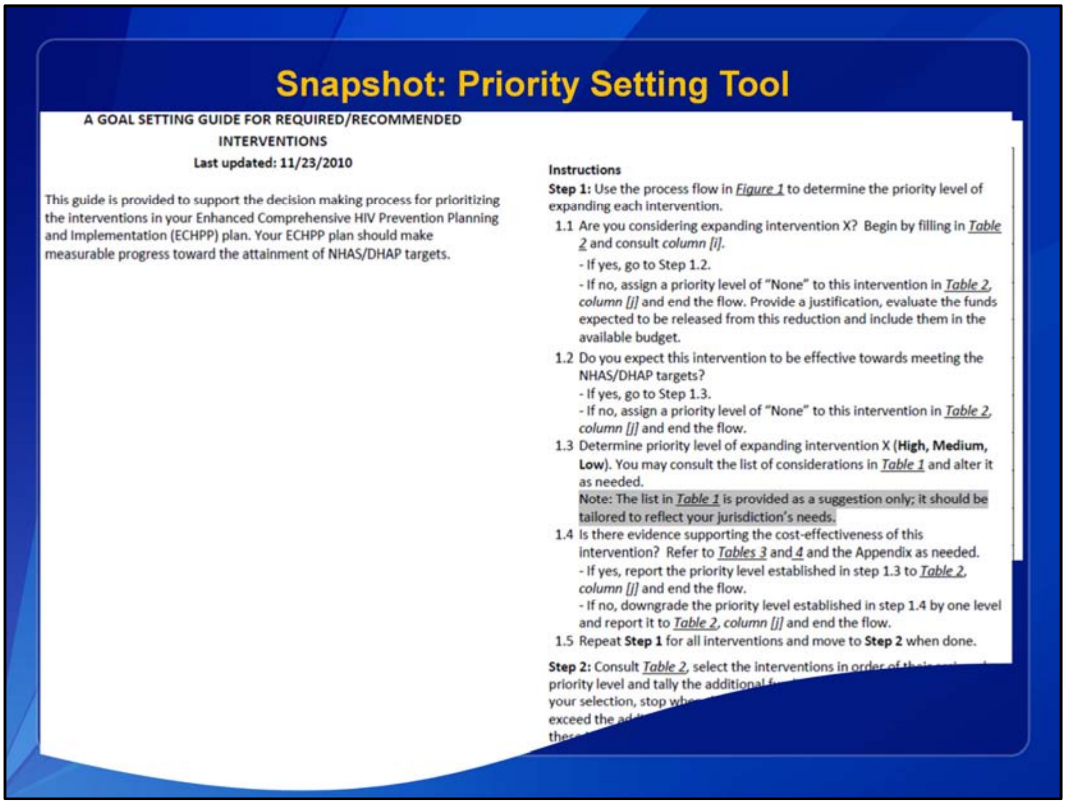
In Step 1, decision makers work through several questions to help them determine the priority of each intervention.

In Step 2, decision makers establish the budget for each intervention.

• Another tool we developed is a mathematical model that identifies the optimal combination of interventions to prevent the most new infections in a particular jurisdiction. It is a one-year epidemic model with an optimization component.



Let’s first take a look at the priority setting tool.



The tool includes step-by-step instructions; a process flowchart for priority setting, and a summary table that helps grantees establish funding requirements.

The document is called "A Goal Setting Guide for Required/Recommended Interventions" and it was disseminated to all ECHPP grantees last year.

Illustrative Example: Step 1: Priority setting for testing in clinical settings

Considerations	Yes	No
Does strong scientific evidence exist that this intervention is effective towards meeting NHAS targets?	☒	☐
Does this intervention have the potential to identify the desired number of unaware PLWHA compared with alternative strategies?	☒	☐
Is it feasible to expand this intervention?	☒	☐
Can you expand the intervention to the desired penetration rate?	☒	☐
Is there evidence supporting the cost-effectiveness of this intervention?	☒	☐
Priority level: ☒ High ☐ Medium ☐ Low ☐ None: Maintain or reduce the investment in this intervention		

We will give an hypothetical example to illustrate how this tool can be used to assign a priority for testing in clinical settings. This is just an example, individual health departments may determine a different priority.

We came up with a list of factors to consider. These include evidence of effectiveness, feasibility, scalability, and cost-effectiveness. The list of considerations can be modified to reflect additional considerations in specific health departments.

We answer all these questions in this example as Yes, and we gave testing in clinical setting a high priority.

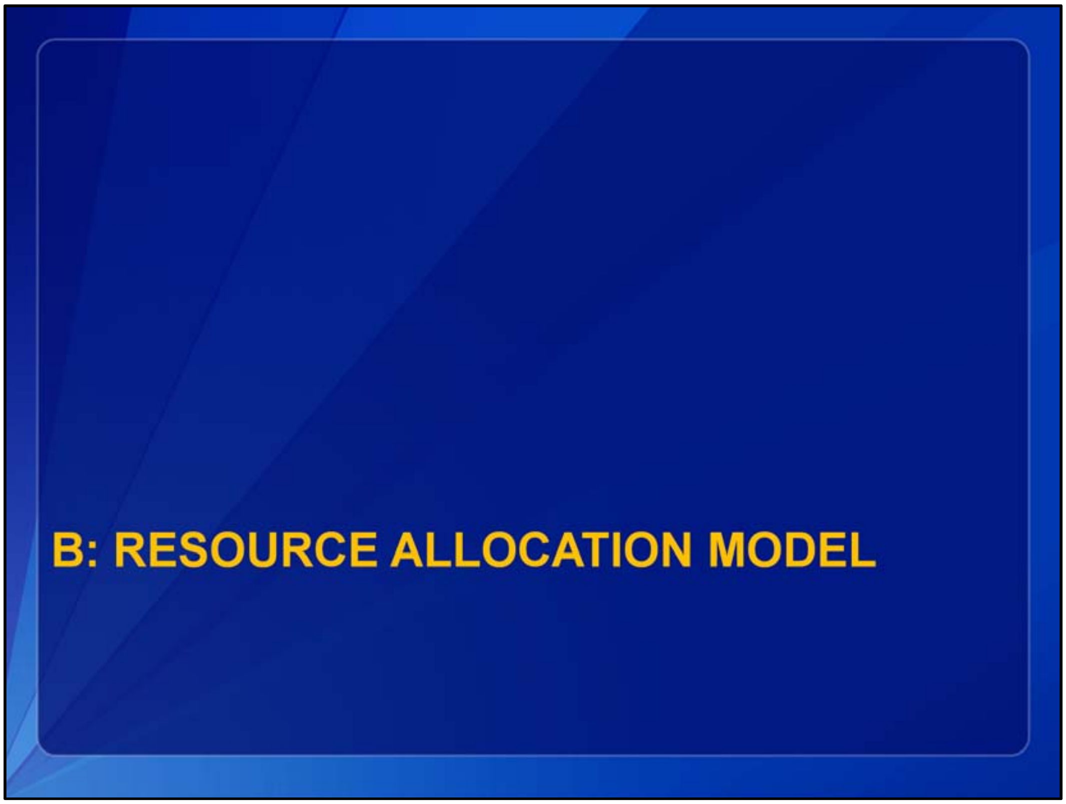
Illustrative Example:
Step 2: Establish funding requirement for testing in clinical setting

	Measure	Estimation/Calculation	Example
[a]	Current budget	Current annual budget	750,000
[b]	Number of persons served	Program data	10,000
[c]	Budget per person	[c]=[a]/[b]	75
[d]	Maximum capacity	Estimated maximum number of people that can be served, assuming no resource constraints	100,000
[e]	Penetration rate	[d]=[b]/[d]	10%
[f]	Desired penetration rate	Consensus among key stakeholders	15%
[g]	Gap in penetration rate	[g]=[f]-[e]	5%
[g']	Additional people served	[g']=[g]*[d]	5,000
[h]	Other funding identified	Additional funds beyond [a]	125,000
[i]	**Additional funding required**	**[i]=[c]*[g']-[h]**	**250,000** =75* 5,000 - 125,000

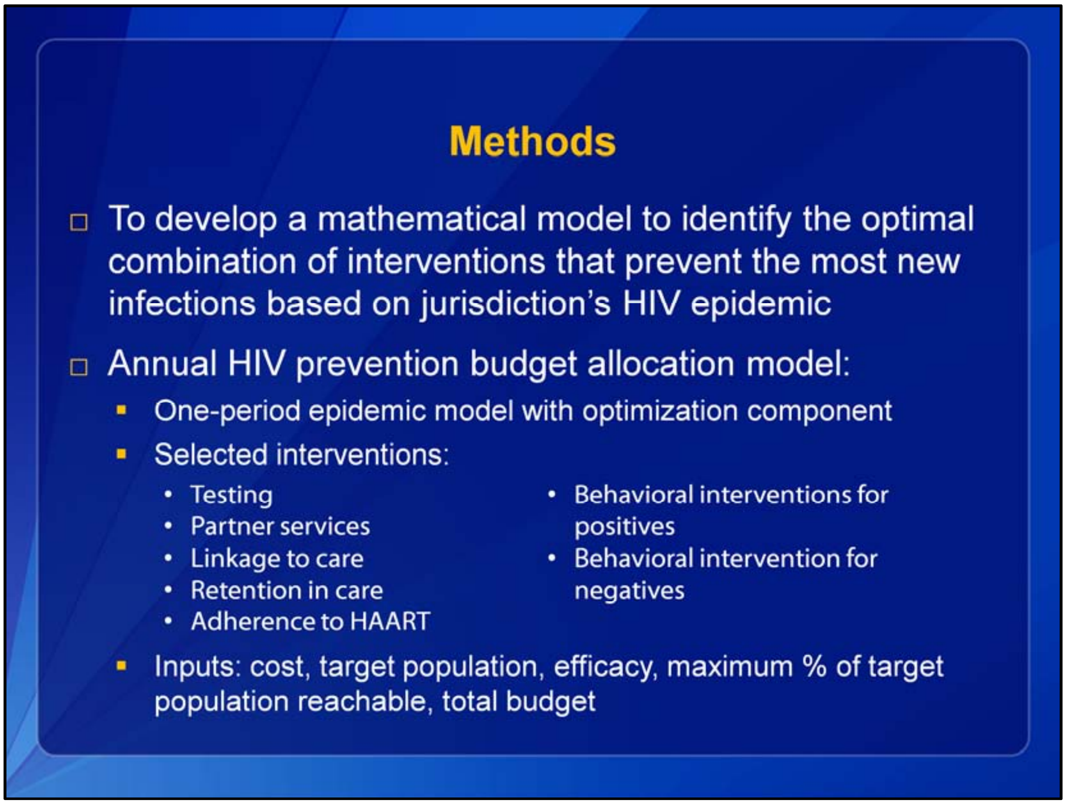
Once we assign the priority level, we determine by how much budget we would like to expand this intervention and how much the expansion would cost.

• Assume in 2009 we had $750 thousand for testing in clinical settings and we tested 10 thousand people. We put the budget in item [a] and the number of people served in [b]. Then item [c] the budget per person served is equal to 750,000 divided by 10,000, equal to $75.
• Assume there is no resource constrained in our hypothetical jurisdiction, we could perform 100,000 tests. We put 100,000 in item [d].
• Then the current penetration rate is equal to 10,000 divided by 100,000, which is equal to 10%.
• As we would like to expand testing, we set the target penetration rate to 15%. The decision makers can use consensus among experts or key stakeholders to determine this rate.
• The gap in penetration rate, item [g], is equal to 15%-10%=5%, that is, we would like to test 5,000 more people next year.
• We had identified that other than the current $750 thousand we had, we would receive $125 thousand more for testing next year. Then we can calculate the additional amount we need to reach our desired penetration rate. The additional funding required is equal to (the budget per person) * (Maximum capacity) * (Gap in penetration rate) – Other funding identified.
• Again, the decision makers need to go through this calculation for all selected interventions and then tally the additional funding requirements according to the priority they set for each intervention.

To summarize, the priority setting tool provides a structural mechanism to facilitate priority setting and to document the rationale of how the decision is made. This tool requires moderate amount of data, such as budget, service level, and size of target population.



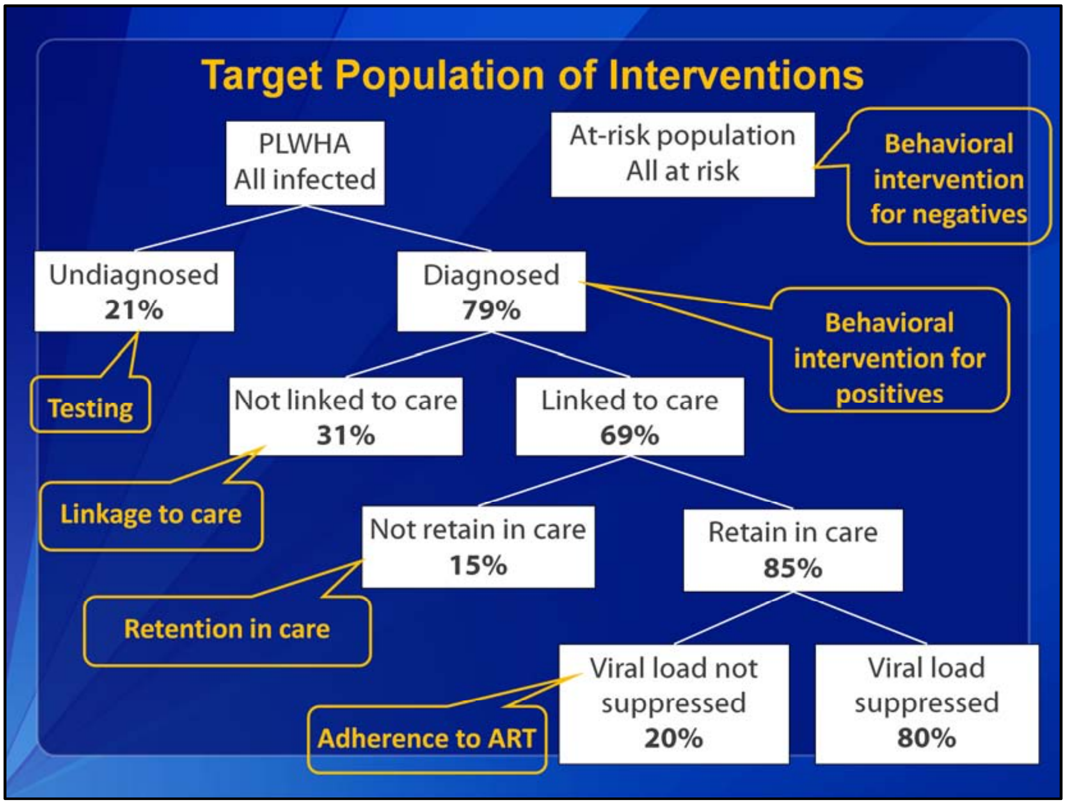
For jurisdictions that have sufficient data and technical capability of mathematical modeling, they can also use mathematical model to inform their resource allocation decisions.



We developed a mathematical model to determine the annual allocation of an HIV prevention budget that prevents the most infections.
The model is a one-period epidemic model with an optimization component. It determine s the allocation to specific interventions based on cost-effectiveness.

We considered a subset of interventions for which there are reasonably robust data on costs and effectiveness, including testing, partner services, linkage to care, retention to care, adherence to ART, and behavioral interventions.

Among the data required for the model are programmatic data on costs and efficacy in reducing HIV transmission, epidemic data on risk populations, and jurisdiction-specific data on the HIV prevention budget and the proportion of each risk population that can be reached by specific intervention.



This chart illustrates the target population for each intervention.

As you can see, some interventions apply to many people, for example, everybody at-risk for HIV is eligible for behavioral intervention for negatives. Whereas, adherence to ART only applies to the diagnosed positives who are linked and retained in care, and who are insufficiently adherent to treatment to achieve viral load suppression (corresponding to 79%*69%*85%*20% = 9% of PLWHAs)

Illustrative Example:
Sample of inputs to resource allocation model

Intervention	Annual cost per effective outcome: 2009$	Efficacy: Reduction in transmission	Duration of effect	Max % of target population reachable
Testing in clinical	5,000 Cost per new diagnosis	0.0903	Assume 5-years	10%
Testing in non-clinical	11,073 Cost per new diagnosis	0.0903		10%
Partner services	15,768 Cost per new diagnosis	0.0903		5%
Linkage to care	4,377 Cost per additional person linked	0.0572	Assume 1- year	20%
Retention in care	4,377 Cost per additional person retained	0.0673		20%
Adherence to HAART	3,650 Cost per additional person adhere	0.0841		20%
Behavioral intervention for HIV+	514 Cost per client served	0.0141		20%
Behavioral intervention for HIV-	322 Cost per client served	0.0006		10%

This table provides a sample of inputs that go directly into the resource allocation model.

The key inputs include cost for each key outcome in the 2nd column, efficacy in terms of annual HIV transmission reduction in the 3rd,the duration of the effect in the 4th, and the maximum % of target population reachable in the 5th.

These data could change from health department to health department.

Illustrative Example:
Result: budget allocation

Intervention	Budget ($ in million)	Nb. of infections averted
Testing in clinical	2.7	52
Testing in non-clinical	5.9	52
Partner services	4.2	26
Linkage to care	2.5	32
Retention in care	1.8	28
Adherence to HAART	1.7	40
Behavioral intervention for HIV+	1.1	30
Behavioral intervention for HIV-	-	0
Total	**20**	**260**

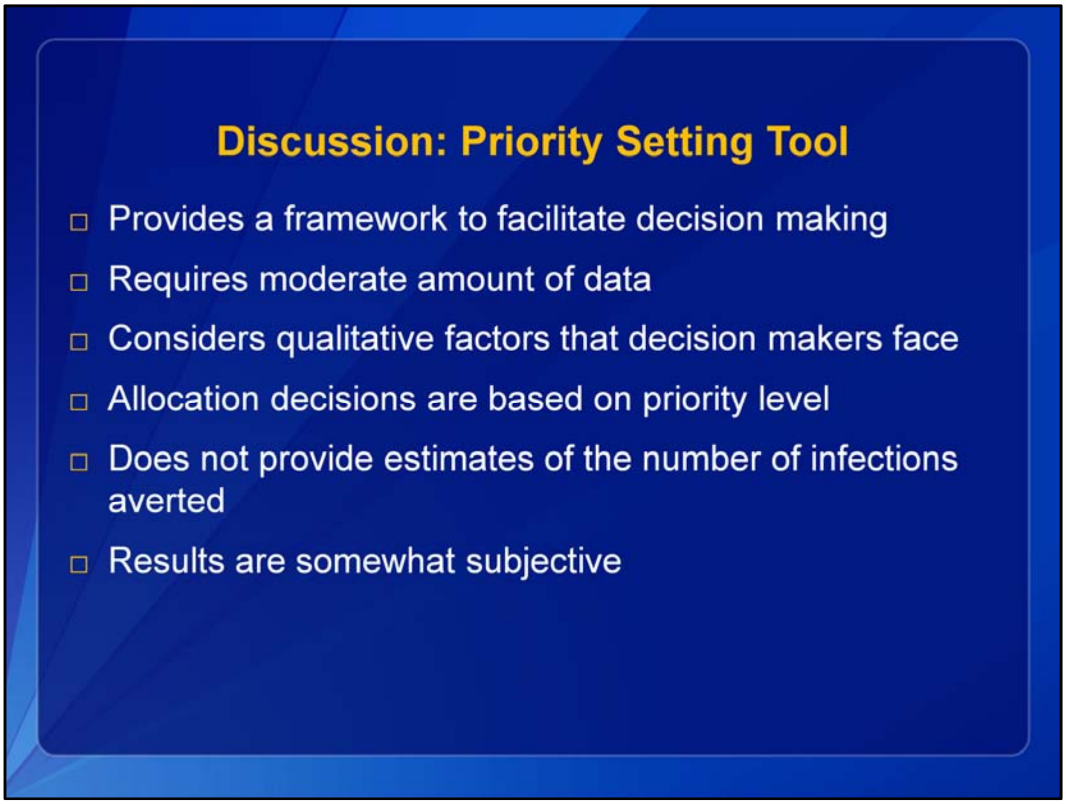
Using the hypothetical inputs shown in the previous slide, we run the model to determine its suggested allocation of $20 million in prevention funds and corresponding number of infections prevented.

Under the assumptions of this hypothetical case, allocating the $20 million in this way is expected to prevent the most number of new infections.

Illustrative Example:
Result: budget allocation

Intervention	Optimal allocation		Equal allocation	
	Budget ($ in million)	Nb. of infections averted	Budget ($ in million)	Nb. of infections averted
Testing in clinical	2.7	52	2.5	48
Testing in non-clinical	5.9	52	2.5	22
Partner services	4.2	26	2.5	15
Linkage to care	2.5	32	2.5	33
Retention in care	1.8	28	2.5	28
Adherence to HAART	1.7	40	2.5	40
Behavioral intervention for HIV+	1.1	30	2.5	30
Behavioral intervention for HIV-	-	0	2.5	5
Total	**20**	**260**	**20**	**221**

To compare the optimal allocation with a different approach, this table show the number of infections that would be prevented if the $20 million were distributed evenly among the interventions. Here the expected number of infections prevented is 221 or 15% less than under the model's suggested optimal allocation.

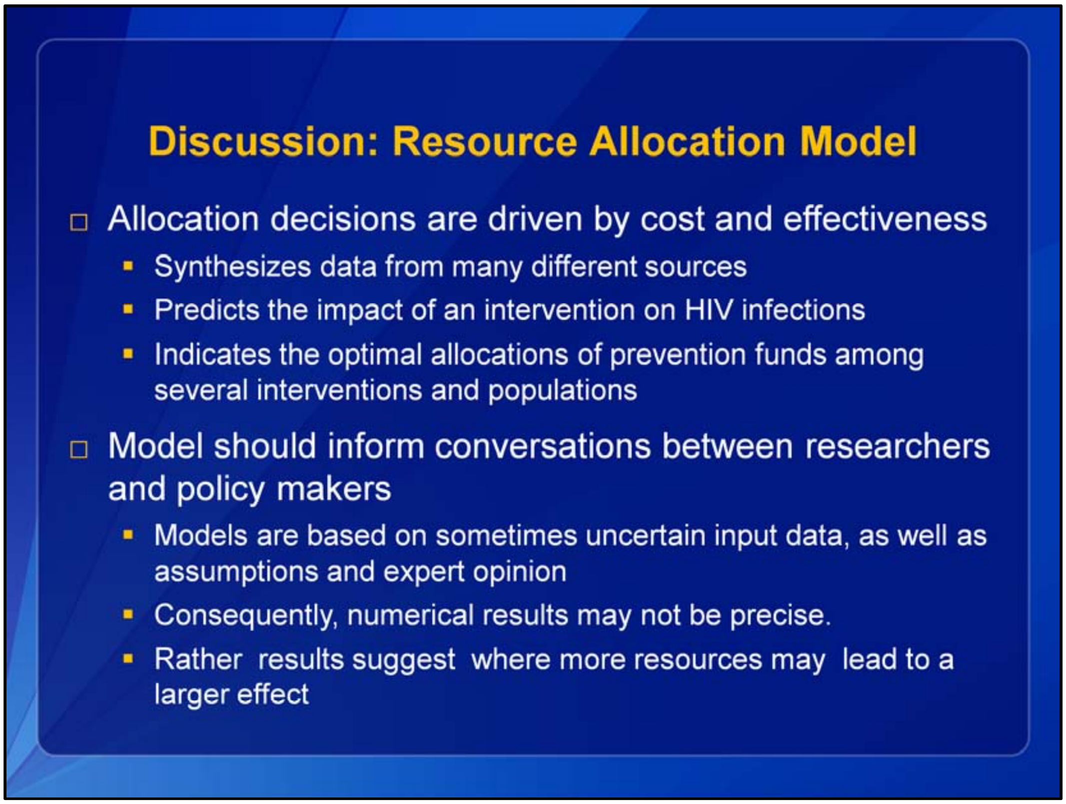


To conclude, the priority setting tool provides a framework to guide resource planning.

This tool requires a moderate amount of data, such as the local budget and an estimate of service level.

It also takes qualitative realities into consideration, such as the feasibility of implementing an particular intervention and its scalability.

The allocation decisions are based on priority level instead of quantitative estimates of intervention impact. Thus, the results may be more subjective.



For the resource allocation model, the decisions are driven by the cost and effectiveness of the considered interventions.
•The model synthesizes data from many different sources, including literature, results of randomized control trial or cohort studies, and sometimes expert's opinions.
•It can predict the impact of an intervention on both cost and HIV infections averted over a certain period of time.
•The result of resource allocation model indicates the best allocation of prevention funds among several interventions and populations.

Note that mathematical models provide simplified version of complex reality and they are based on assumptions and uncertain data.
Therefore, models should be used to inform conversations between researchers and decision makers and we need to be careful in interpret the results of a model.

Acknowledgements

- ECHPP team; Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention
- AIDS Activities Coordinating Office, Philadelphia Department of Public Health
- Prevention Modeling and Economics Team, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention

Thank you

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