

# **User's Guide for the HIV Prevention Intervention Cost-Effectiveness Comparison Tool (CECT), Version 1**

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## 1. INTRODUCTION

The Cost-Effectiveness Comparison Tool (CECT) is designed to help community planning groups (CPGs) consider the cost-effectiveness of alternative interventions in setting priorities for HIV prevention. The CECT and user's guide are designed for use by CPG subgroups or consultants to a CPG who are interested in using results from cost-effectiveness studies to set priorities for interventions. Both assume that users have had some training in cost-effectiveness analysis and are familiar and comfortable with interpreting cost-effectiveness results.

### 1.1 Using the CECT in Community Planning for HIV Prevention

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*The Cost-Effectiveness Comparison Tool (CECT) is designed to help community planning groups (CPGs) consider the cost-effectiveness of alternative interventions in setting priorities for HIV prevention.*

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The CECT does not address the problem of lack of data on cost-effectiveness, but it can help CPGs make use of cost-effectiveness data from a variety of study settings.

Planning for HIV prevention is a collaborative process whereby CPGs identify target populations for HIV prevention and then select appropriate interventions for each "priority" population. CDC has recommended that CPGs consider several important factors when specifying interventions, including cost and cost-effectiveness (CDC, 2003).

Although explicitly recognized as a key factor to consider in choosing among interventions, the use of cost-effectiveness data has some practical limitations. Cost-effectiveness data may not be available for interventions of interest or, when data are available, users may worry that they are valid only for the population or community for which the cost-effectiveness study was conducted (e.g., a community with high HIV prevalence or African-American women). The CECT does not address the problem of lack of data on cost-effectiveness; however, it can help CPGs make use of cost-effectiveness data from a variety of study settings. The CECT can help CPGs identify effective and feasible interventions for each priority population and compare the cost-effectiveness of those interventions if implemented with their populations.

### 1.2 Objectives of the CECT

The CECT addresses a major obstacle to incorporating cost-effectiveness when CPGs are prioritizing interventions: uncertainty about whether cost-effectiveness results from the literature or from another community are likely to apply in the user's community.

The CECT calculates a “cost-effectiveness index,” which adjusts cost and effectiveness data from published studies to account for differences in three factors between the user’s community and the study community: cost of living, HIV prevalence, and density of the target population.

The CECT addresses this obstacle by translating cost and effectiveness results from various published or other completed evaluations into a “cost-effectiveness index.” The cost-effectiveness index calculated by the CECT adjusts cost and effectiveness data from published studies to account for differences in three factors between the user’s community and the study community: cost of living (COL), HIV prevalence, and density of the target population. If COL is higher (lower) in your community than in the community where the study was conducted, then an intervention is likely to be less (more) cost-effective when implemented in your community. Similarly, higher (lower) HIV prevalence is associated with a more (less) cost-effective intervention; and the more (less) concentrated the target population, the more (less) cost-effective an intervention.

The cost-effectiveness index calculated by the CECT is used to compare available interventions for each priority population based solely on cost and effectiveness factors. The cost-effectiveness index also allows users to estimate whether any of the possible interventions are likely to be far more or far less cost-effective than the other interventions under consideration when implemented in the user’s community.

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*Users should also be cautioned that the CECT is **not** a budgeting tool nor does it specify how to allocate HIV prevention funds across priority interventions or populations.*

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The CECT does not provide guidance for assessing the cost-effectiveness of an intervention; many other useful tools are available for this purpose (see, e.g., Emory University’s CD-ROM-based course, “Introduction to Cost-Effectiveness Analysis for HIV Prevention Programs”). Users should also be cautioned that the CECT is **not** a budgeting tool nor does it specify how to allocate HIV prevention funds across priority interventions or populations. The cost-effectiveness index is an estimate of the cost per HIV infection averted when an intervention is implemented in the user’s community and not an estimate of the amount of money needed to implement the intervention.

### **1.3 Overview of the CECT**

The CECT uses Microsoft Access, database software that comes with the Microsoft Office Professional Package. The tool stores information in three databases:

- **Geographic Areas.** When the CECT is first opened, the Geographic Areas database will be empty. Once you enter information about each geographic area for which you have

priority populations and intend to implement prevention interventions, the CECT will store this information. For each geographic area added, users must rate the COL (Low, Average, High, or Very High).

- **Priority Populations.** When the CECT is first opened, the Priority Populations database will be empty. Once you enter information about your priority populations, including risk behaviors, defining characteristics, population density, and estimated HIV prevalence, the CECT will store this information.
- **HIV Prevention Interventions.** When the CECT is first opened, information about several effective HIV prevention interventions will already be stored in this database. The information stored about each intervention includes characteristics of the intervention, such as cost and outcomes, and characteristics of the community in which the intervention was evaluated, such as COL and density of the study population (scattered or concentrated). You may enter additional interventions for which you have both effectiveness and cost data.

The CECT stores information in three databases: Geographic Areas, Priority Populations, and HIV Prevention Interventions.

The CECT uses information in each of the three databases to generate a report that helps users compare the cost-effectiveness of applicable HIV prevention interventions for each of their populations. For each population within a geographic area, the report provides a simple bar graph that allows users to compare the cost-effectiveness indices for available interventions. The graph can also be useful for considering whether expected differences in the cost-effectiveness indices are large enough to be meaningful.

The report should not be used to compare the cost-effectiveness index for an intervention across priority populations. For example, users should not attempt to compare the cost-effectiveness index for peer opinion leader interventions for men who have sex with men (MSMs) with the cost-effectiveness index for peer opinion leader interventions for high-risk pregnant women; comparisons of cost-effectiveness indices using the CECT are valid only for a single population. Moreover, the cost-effectiveness indices cannot be used to establish funding amounts since these indices are not estimates of the actual cost to implement an intervention. Finally, users should remember that many factors are important in setting priorities for interventions, such as effectiveness, feasibility, acceptability, and cost-effectiveness, but the CECT is useful only for considering cost-effectiveness. Many useful tools are already



available to help CPGs set priorities. As an example, see *Setting HIV Prevention Priorities: A Guide for Community Planning Groups* (AED, 2000).

In Section 2 of this guide, we provide brief instructions (including system requirements) for installing and using the CECT. In Section 3, we describe the tool and provide some tips for navigating the CECT. In Section 4, we describe each of the data inputs required to use the tool. In Section 5, we describe the reports generated by the CECT and explain how information in the Cost-Effectiveness Index Comparison Report is produced. At the end of each section or subsection, we provide tutorial exercises to give users an opportunity to master the CECT and to ultimately generate a cost-effectiveness comparison report.

The next sections of this guide are designed to walk you through the installation and use of the CECT. We recommend that you review the relevant parts of the CECT as you read through the remainder of the user's guide. You should then be able to begin using the CECT in the community planning process.

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## **2. CECT INSTALLATION AND SETUP**

To install and run the CECT program, you will need a computer that runs Microsoft Windows (Windows 95 or higher), version 97 or higher of Microsoft Access, and have at least one printer driver installed.

When you are ready to install and use the CECT for the first time, follow these steps:

1. Insert the CD into your CD reader.
2. Open Microsoft Explorer or My Computer to search the correct drive (typically the E: or D: drive).
3. Copy all files directly to your machine (or a network drive) by dragging and dropping them from the CD to the desired location. Be sure to store all files in the same location.
4. Open the CECT file (HIV Intervention CECT.mdb) by starting your Microsoft Access program and opening the file from the location to which it was saved (Select "File" and "Open" from the Access menu).

**Versions higher than Access 97.** If your version of Access is higher than Access 97, you will receive a message indicating that the file

was created in a previous version of Access. You will be given the option to convert or open the database. To ensure full functionality of the program:

1. Select “convert,” and then click on “OK.” A box will appear asking you to provide a file name and location for the converted database.
2. Provide a file name, such as “HIV Intervention CECT Template 2000.mdb” (you must use a different name), and verify that the file will be saved to the desired location.
3. Click on “Save.” A message will appear warning that the file can no longer be shared with Access 97 users once it is converted.
4. Click on “OK,” and the database will open to the Switchboard. Note that the original Access 97 file is unchanged by this process.

You are now ready to begin using the CECT.

## **2.1 Introductory Screen**

An introductory screen should be in view. Click on “Continue” to go to the Switchboard. From this Switchboard, you are able to enter or view information in the three databases.

## **2.2 Compacting the File**

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*The CECT requires that CPGs input data about the characteristics of their local communities and their priority populations in order to identify interventions that could be used with each population.*

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If after having used the CECT, you discover that the file becomes large (> 5 MB), you may reduce the file size by eliminating unnecessary elements following these steps:

1. When the CECT file is closed, open Microsoft Access.
2. Under “Tools,” select “Database Utilities.”
3. Choose to “Compact Database” or “Compact and Repair Database,” depending on the version of Access that you are using. You will be asked to select the file to compact.
4. Select your CECT file and provide a name for the file. We recommend using the same name and simply overwriting the uncompact file.
5. Click on “Save.” If you saved the file under the same name, you will be asked to verify that you want to replace the existing (uncompact) file, so select “Yes.”

Information that has already been entered into any of the three databases will not be lost or altered by this compacting process.

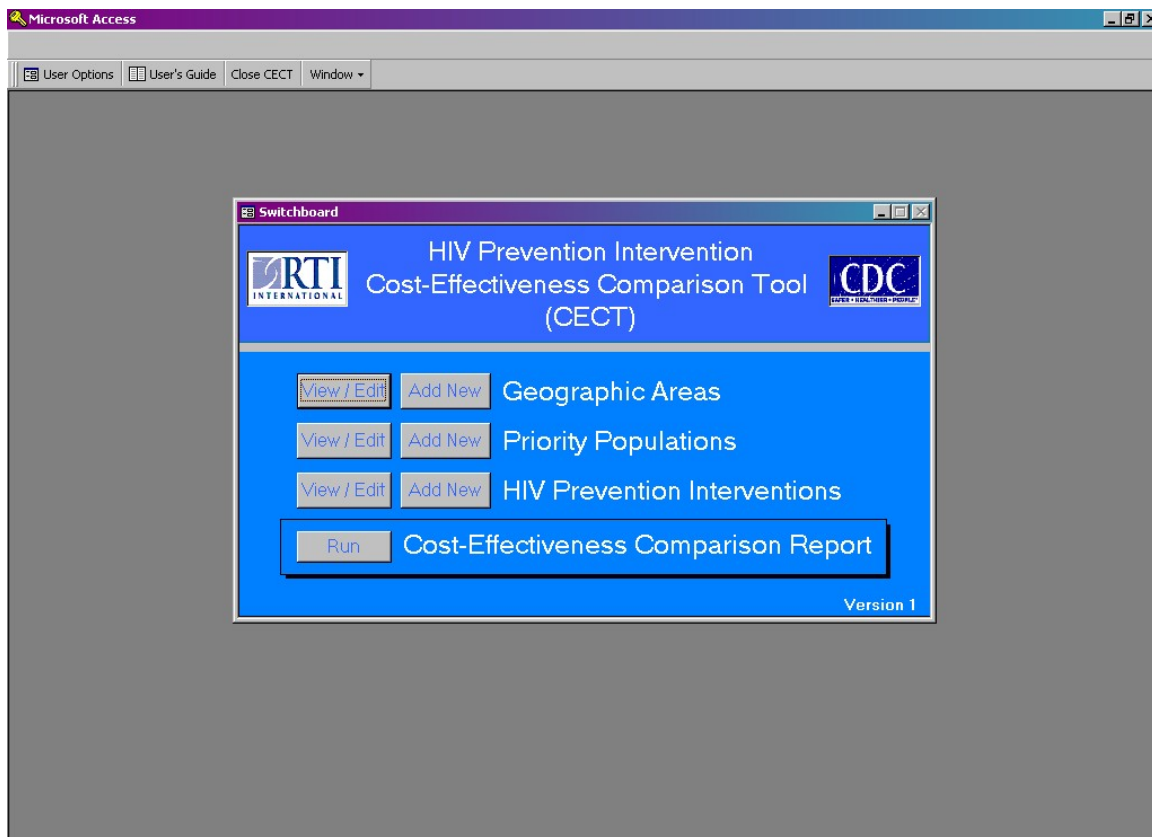
### 3. CECT OVERVIEW

The CECT requires that CPGs input data about the characteristics of their local communities and their priority populations in order to identify interventions that could be used with each population and to generate a report for comparing cost-effectiveness indices for those interventions.

#### 3.1 Instructions for Navigating the CECT

When the CECT is first opened, a Switchboard appears containing buttons that users may click to either “View/Edit” or “Add New” information to each of three databases: Geographic Areas, Priority Populations, and HIV Prevention Interventions (Figure 1). In this section, we provide some general instructions for using the CECT. These tips apply to all three databases; Section 4 of this guide contains detailed instructions for entering information into each separate database.

**Figure 1. The Three Databases Available from the Switchboard**



Whenever the Switchboard is open, a toolbar appears on the upper left corner of the page that contains four buttons: User Options, User's Guide, Close CECT, and Window. The following functions correspond to each of the buttons:

- ▶ **User Options**—Opens an interface with buttons for two different forms that allow the user to change the assumptions upon which CECT calculations are based:
  - ✓ *View/edit assumptions for calculation of infections averted.* Allows the user to view or change the default values for parameters used to estimate the expected number of infections averted by an intervention. These parameters include infectivity of transmission risk behaviors, effectiveness of protection pertaining to transmission risk behaviors, rate at which to discount effects over time (since, say, an infection averted today is more valuable than an infection averted 10 years from now), and the time horizon over which the behavior change is expected to be maintained.
  - ✓ *View/edit assumptions for how population density affects cost per infection averted.* Population density is one of three factors used to adjust cost-effectiveness estimates for differences between an intervention's study population and your priority population. In describing your priority populations, you will be able to select whether each population is "scattered" or "concentrated" (see Section 4.2). The values corresponding to these two density levels determine the degree of the cost-effectiveness adjustment (described in detail in Appendix A). This form allows the user to change the density level adjustment values. If you do make a change, note that the value associated with a scattered population should be at least as large as the value associated with a concentrated one.
- ▶ **User's Guide**—Opens an interface with a link to this User's Guide. Two versions are available: a pdf version ("User's Guide.pdf" requires Adobe) and a Microsoft Word version ("User's Guide.doc"). Both versions of the User's Guide should be located in the same folder as the database.
- ▶ **Close CECT**—Closes the CECT file.
- ▶ **Window**—Displays a list of all windows that are currently on.

Some conventions are used to aid navigation within the program:

- ▶ **View/Edit and Add New Modes.** View/Edit and Add New modes for each form are very similar in appearance. View/Edit is for editing existing records on geographic areas, populations, and interventions. Figure 2 presents the View/Edit screen for geographic areas. Add New is for entering information about geographic areas, populations, and interventions into the CECT. Figure 3 shows the Add New screen for priority populations.
- ▶ **Help.** By clicking on ? in any of the databases, you can see definitions or additional information about each of the data inputs needed for a form.
- ▶ **Moving Between Fields.** Use tab, enter, or mouse clicks to move between fields on each screen.
- ▶ **Pull-Down Menus.** An arrow to the right of an entry box indicates that you **must** select your record from an existing list.
- ▶ **Navigation Buttons.** These buttons are located on each database form (generally at the bottom) and allow users to easily move between and delete entries within each database, as well as to exit to the Switchboard. Navigation buttons differ depending on whether you are in "View/Edit" or "Add New" mode.
  - ✓ **View/Edit Mode**
    - **Record Navigation.** Arrows allow users to move between existing entries in each database or to quickly go to the first or last record. Interventions and geographic areas are stored in alphabetical order by name. Priority populations are stored in alphabetical order by geographic area, then by population name.
    - **Delete.** By clicking on this button, the record shown will be deleted upon user confirmation. In the case of deleting geographic areas, all priority populations associated with that area will also be deleted. An exception is for interventions that have been permanently saved (see Section 4.3 for more information about "permanently save").
    - **Close Form.** By clicking on this button, users are returned to the Switchboard, and changes made to any of the existing records are automatically saved.

**Figure 2. View/Edit Geographic Areas**
**Figure 3. Add New Priority Populations**

- ✓ **Add New Mode.** In the software, the buttons are actually labeled more specifically (e.g., “Add Another Area,” “Cancel New Population/Close Form,” “Save New Intervention/Close Form”) on the respective forms. In this guide, however, we will often refer to those buttons using the more general labels listed below.

- **Add Another.** By clicking on this button, a blank form will open for users to add and enter information for another new record. Information for the current record will be saved.
- **Cancel New/Close Form.** By clicking on this button, the addition of the new record (shown on the current screen) will be cancelled, and users will be returned to the Switchboard.

- **Save New/Close Form.** By clicking on this button, information entered is automatically saved, and users are returned to the Switchboard. If any field within the record is left blank, the user receives a message indicating that information is missing from a record. The user may go back to the form (in some cases, in View/Edit mode) to fill in missing data or close the form and return to the Switchboard.

A few additional tips will help you as you add new data into the CECT:

- Enter data on geographic areas before entering data about the priority populations in those areas. This ensures that each population record can be linked to the appropriate geographic area.
- Unique names must be provided for each geographic area, population, and intervention.
- It is best if you do not leave any fields blank in the “Add New” screen. Sometimes this is not possible and a user may deliberately close the “Add New” screen without all information entered. The CECT alerts users of missing information in three instances:
  - ✓ when closing the “Add New” screen (the new record is checked),
  - ✓ when closing the “View/Edit” screen (all entries for that database are checked), or
  - ✓ when running the Cost-Effectiveness Index Comparison Report (all entries for all three databases are checked).
- At any of those times, the user may choose to ignore missing information or to return to the “View/Edit” screen to find the record and fill in missing fields. Only completed entries will be shown in the Cost-Effectiveness Index Comparison Report.

## 3.2 Tutorial Exercise 1

### *Familiarize Yourself with the Operation of the CECT.*

Become comfortable moving between each of the three database forms by opening the CECT, clicking on “Continue” after reading the introduction, and reviewing the options available from the Switchboard. Select the option to “Add New” for each of the three databases and review the information requested in each form and the navigational buttons at the bottom of the form. To return to the Switchboard (without adding new records to each), click on the “Cancel New/Close Form” icon. Once records are stored in the database, “View/Edit” existing entries in the HIV Prevention Interventions database to become familiar with the navigational buttons available in the “View/Edit” mode.

## 4. VIEWING AND ADDING DATA

In this section, we describe the information stored in each database form.

### 4.1 Geographic Areas

Both modes of the Geographic Areas form contain two fields: name of geographic area and cost of living (see Figure 2 for a copy of this form).

#### 4.1.1 Fields in the Geographic Areas Form

Table 1 summarizes the fields in the Geographic Areas form.

**Table 1. Fields in the “Geographic Areas” Form**

Field	What to Enter	Example(s)	Purpose
Name of Geographic Area	Unique name of each area for which you have priority populations	“North Carolina,” “Region V,” or “Catawba County”	Unique identifier for each geographic area with priority populations
Cost of Living	Select the COL level (Low, Average, High, or Very High) that best describes the area. Click on ? at the bottom of the form for a link to COL ratings for several U.S. communities. When selecting COL for an entire state or region, use your best guess of the COL in areas where priority populations live.	Low, Average, High, or Very High	To compare with COL in the study community and adjust cost-effectiveness accordingly. For example, if your area has a higher COL than the area where the intervention was evaluated, costs are expected to be higher, resulting in a worse cost-effectiveness measure.



**Name of Geographic Area.** This field is for the name of each area for which you have priority populations. Some CPGs may have only one area—the entire state or city—while others may prioritize populations for every county within the state or for several “regions” in the state. Because each geographic area will be matched to the priority populations for that area, it is important that you enter information about all areas for which you have priority populations. This field cannot be changed in the “View/Edit” screen; it is permanently saved in “Add New.”

**Cost of Living.** Data about the COL in each geographic area are stored in the second field. Options available for the COL field are Low, Average, High, or Very High.

To help determine the most appropriate COL for your areas,

- ▶ click on the ? symbol at the bottom of the form, and
- ▶ then click the icon next to “View COL ratings of many US cities.”

These ratings were developed from the Accra COL indices for the second quarter of 2000 (Accra, 2000). Cities with COL indices less than 95 percent of the national average were rated “Low,” those that were at least 95 percent but less than 105 percent were rated “Average,” those greater than 105 percent but less than 115 percent were rated “High,” and those 115 percent or more were rated “Very High.”

#### **4.1.2 Tutorial Exercise 2**

The exercise in this and later subsections is provided to walk users through the process of entering data into each of the three main forms and generating the Cost-Effectiveness Index Comparison Report. These exercises use hypothetical data on populations and interventions for two geographic areas in the fictional state of “Anywhere.” Pretend that you are part of a CPG that wishes to consider cost-effectiveness in prioritizing interventions for the priority populations in each geographic area in Anywhere.

### **Add Geographic Areas Information.**

The two geographic areas in Anywhere are Red City and Browntown. The cost of living is average in Red City and low in Browntown. Add this information to the database:

1. Click on "Add New" geographic areas.
2. Type "Red City" in the box for "Name of Geographic Area."
3. Select "Average" in the pull-down box beneath "Cost of Living."
4. Click on "Add Another Area."
5. Add Browntown ("Name of Geographic Area"), which has a low cost of living.

Help is available by clicking on the ? icon at the bottom of the form.

Click on "Save New Area/Close Form" to return to the Switchboard.

## **4.2 Priority Populations**

Information stored in this database is used to identify possible interventions for each of your priority populations. An example of the Add New Priority Populations form was presented in Figure 3. Figure 4 illustrates View/Edit.

**Figure 4. View/Edit Priority Populations**

**View/Edit Priority Populations**

Population: **MSM/IDUs in Browntown**

Transmission Risk Group (Choose one)	Races / Ethnicities	Genders	Age Groups	Population Density
Men who have sex with men <input type="checkbox"/>	Select all races and ethnicities	Select all genders	Select all age groups	Scattered Concentrated
Intravenous drug users <input type="checkbox"/>	American Indian / Alaska Native <input checked="" type="checkbox"/>	Male <input checked="" type="checkbox"/>	0 - 12 years <input checked="" type="checkbox"/>	HIV Prevalence <b>0.080</b>
<b>MSM/IDUs</b> <input checked="" type="checkbox"/>	Asian and Pacific Islander <input checked="" type="checkbox"/>	Female <input type="checkbox"/>	13 - 24 years <input checked="" type="checkbox"/>	
Heterosexuals <input type="checkbox"/>	Black / African-American <input checked="" type="checkbox"/>	Transgender <input type="checkbox"/>	25 - 44 years <input checked="" type="checkbox"/>	
Mother with or at risk for HIV <input type="checkbox"/>	Hispanic <input checked="" type="checkbox"/>	Entire Population is HIV Infected <input checked="" type="checkbox"/>	45 - 64 years <input checked="" type="checkbox"/>	
	White <input checked="" type="checkbox"/>		65+ years <input checked="" type="checkbox"/>	

Record Navigation: 1 of 1 | Delete Population | Close Form | Help

### **4.2.1 Fields in the Priority Populations Form**

Table 2 summarizes the fields in the Priority Populations form.

**Name of Population (Add New mode only).** Enter a unique name in this field for each priority population that you wish to consider. Because the name is used to identify the population in all reports created by the CECT, it is important that every priority population in the database has a different name. For example, if two of your priority populations are Puerto Rican MSMs in Red City and Cuban MSMs in Red City, the names for each of these populations should differ although demographic characteristics may be the same. There should be some reason why you are considering them as two separate groups, however, such as differences in estimated HIV prevalence.

**Geographic Area (Add New mode only).** The options in this pull-down menu are the names of areas stored in the Geographic Areas database. This field links the priority population to the selected area.

**Population (View/Edit mode only).** This field cannot be changed. It is used to identify the population to be viewed or edited.

**Transmission Risk Group.** Select the risk group that best describes HIV transmission risks for this priority population. Check only one risk group to allow the CECT to identify relevant interventions for your population.

**Races/Ethnicities, Genders, and Age Groups.** For each field, check all boxes that could potentially describe your population. If entering information and no particular group is targeted, check on all possible values by clicking on "Select all." The purpose of this information is to identify relevant interventions for your population. Characterize the demographics of your populations as broadly as possible. If none of the characteristics listed adequately describes your priority population, click on "Select all" to ensure that interventions that could potentially work with your population are identified. Note that you will have an opportunity to eliminate interventions that you do not wish to consider prior to generating a Cost-Effectiveness Index Comparison Report.

**Table 2. Fields in the “Priority Populations” Form**

Field	What to Enter	Example(s)	Purpose
Name of Population (Add New Mode)	Enter unique name for each priority population.	“African-American MSMs” or “Asian needle-sharing drug users”	Unique identifier for each priority population
Geographic Area (Add New Mode)	Select the geographic area for this priority population from the pull-down menu. The menu includes those areas that you entered into the database via the Geographic Areas form.	“North Carolina,” “Region V,” or “Catawba County”	Links the population to the geographic area for which it is a priority population.
Population (View/Edit Mode)	N/A (Not changeable)	“African-American MSMs in Region V” or “Suburban Teenagers in North Carolina”	Identifies which population is being viewed or edited.
Transmission Risk Group	Select the one risk group that best describes HIV transmission risks for this priority population.	“MSMs,” “IDUs,” “MSM/IDUs,” “Heterosexuals,” or “Mothers with or at Risk for HIV”	Matches each population to interventions stored in the database that are designed to target the same type of risk groups.
Races/ Ethnicities	Select all that apply for this priority population. If the population is not race/ethnicity-specific, select all categories.	“American Indian/Alaska Native” or “Black/African American”	Matches each population to interventions in the database that could be used with the selected race(s)/ethnicity(ies).
Genders	Select all that apply for this priority population. If the population is not gender-specific, select all categories.	“Male,” “Female,” or “Transgender”	Matches each population to interventions in the database that could be used with the selected gender(s).
Age Groups	Select all that apply for this priority population. If the population is not age group-specific, select all age groups.	“0-12 years” or “25-44 years”	Matches each population to interventions that could be used with the selected age group(s).
Entire Population is HIV Infected	Check this box if the population is made up only of persons infected with HIV.	N/A	Matches HIV-infected populations with interventions that could be used with that group.
Population Density	Select the one density level that best describes the density of this priority population in this geographic area.	“Scattered” or “Concentrated”	Used to adjust the cost per infection averted of matching interventions for differences in density between your community’s population and the study community’s population. A higher population density is associated with an improvement in cost-effectiveness.
HIV Prevalence	Enter an estimate of HIV prevalence in this priority population in this geographic area. The value must be between 0 and 1.	“0.005” or “0.88”	Used to adjust the cost per infection averted of matching interventions for differences in prevalence between your community’s population and the study community’s population. A higher prevalence is associated with an improvement in cost-effectiveness.

Characterize the demographics of your populations as broadly as possible. You will have an opportunity to eliminate interventions that you do not wish to consider prior to generating a Cost-Effectiveness Index Comparison Report.

**Entire Population is HIV Infected.** Check this box if the population consists exclusively of HIV-infected individuals. HIV prevalence is automatically set to one.

**Population Density.** In this field, provide a subjective description of the density of the priority population in the selected geographic area. For example, if the Cuban MSM population is highly concentrated in one of your geographic areas, you should select "Concentrated." The CECT uses this information to generate an estimate of the cost per infection averted if implemented with this population (i.e., a cost-effectiveness index). For example, if your population is concentrated and if the study population for an intervention was also concentrated, the CECT makes no adjustment to the cost per infection averted because there are no differences in population density. However, if the study population was scattered, the CECT would adjust the cost per infection averted to account for the likelihood that the intervention would be less costly to implement in a more concentrated population. For details on this adjustment calculation, see Appendix A.

**HIV Prevalence.** Enter a value for the estimated HIV prevalence in the priority population. The CECT uses this information to generate a cost-effectiveness index for relevant interventions if implemented with this population. Even relatively small differences in HIV prevalence between your community's population and the study community's population may have a large impact on the adjusted cost per infection averted, or the cost-effectiveness index. In fact, the adjustment to the cost per infection averted to account for differences in prevalence is likely to far outweigh adjustments for COL or population density differences.

The prevalence value entered should reflect your best estimate of HIV prevalence in the specific population you have identified (i.e., as narrowly as you intend to apply the intervention). One potential source of information on HIV prevalence is the CPG's Epidemiological (Epi) Profile. However, if prevalence values are unknown, enter a reasonable initial value and run the Cost-Effectiveness Index Comparison Report using this value. You may then consider whether and to what extent alternative values would alter the cost-effectiveness indices by entering those prevalence values and rerunning the Cost-Effectiveness Index Comparison Report.

### 4.2.2 Tutorial Exercise 3

#### **Add Priority Populations Information.**

Because the CECT links information stored in the Geographic Areas database to information about priority populations, you must complete Tutorial Exercise 2 before beginning this exercise.

Suppose that the priority populations in Red City are known and that one of the CPG workgroups has provided prevalence information for each. Also suppose that the CPG has discussed whether each population tends to be concentrated in a particular section of Red City or scattered all around town. Required input data for each priority population in Red City are shown in the table below.

<b>Name of Priority Population</b>	<b>Estimated HIV Prevalence</b>	<b>Population Density</b>
MSM/IDUs	0.40	Concentrated
Heterosexuals	0.04	Concentrated
Chinese HIV+ IDUs	1.00	Scattered

Add this information to the database:

1. Click on "Add New" priority populations.
2. Provide a unique name for each population in the box to the right of "Name of Population." Begin by adding "MSM/IDUs."
3. Select "Red City" in the pull-down box for Geographic Area.
4. Under Transmission Risk Group, select "MSM/IDU."
5. Choose "Select all" for Races/Ethnicities and Age Groups.
6. Click on "Male" for Genders.
7. Click on "Concentrated" under the Population Density box.
8. Enter the estimated HIV prevalence of 0.40.
9. Click on "Add Another Population" and complete the priority population form for "Heterosexuals," then for "Chinese HIV+ IDU" using the information provided in the table (be sure to click on the box next to "Entire Population is HIV Infected" when entering information about HIV+ IDUs).

Help is available by clicking on the ? button at the bottom of the form.

Click on "Save New Population/Close Form" to return to the Switchboard.

### 4.3 HIV Prevention Interventions

*Several interventions for which cost-effectiveness results are available are stored in the HIV Prevention Interventions database.*

Several interventions for which cost-effectiveness results are available are stored in the HIV Prevention Interventions database. CPGs may add new interventions if data on costs, pre- and post-intervention behaviors, and the implementation site where the effectiveness was established (including prevalence among those targeted) are known. Each intervention added to the database must be well-defined, with a given protocol, duration, and dosage. Users should obtain guidance from CDC for adding interventions to ensure that cost and outcome data entered are consistent with the cost and outcome data already stored in the HIV Prevention Interventions database. Figures 5 and 6 show an example intervention entered in Add New mode.

**Figure 5. Add New Intervention, Top of Screen**

**Figure 6. Add New Intervention, Scrolled Down**

**Add New Intervention**

Name of Intervention:  Permanently Save?  Help ?

---

**Estimation of Effectiveness** Help ?

*ON AVERAGE, the risk behaviors of the members of the study population within a one-year period can be described by the following:*

	Pre-Intervention	Post-Intervention
Number of Needle-Sharing Partners	<input type="text" value="8"/>	<input type="text" value="8.2"/>
Number of Needles Shared per Partner	<input type="text" value="3.5"/>	<input type="text" value="2.6"/>
Frequency of Bleaching Shared Needles (0-1)	<input type="text" value="0.15"/>	<input type="text" value="0.32"/>
-----		
Estimated Number of Infections	...Pre-Int'n	43,166
	...Post-Int'n	- 27,915
...Averted by Intervention		<b>15,251</b>

**Estimation of Costs** Help ?

Personnel	<input type="text" value="\$0"/>	Details
Facilities	<input type="text" value="\$0"/>	Details
Equipment	<input type="text" value="\$0"/>	Details
Supplies	<input type="text" value="\$0"/>	Details
Travel	<input type="text" value="\$0"/>	Details
+ Other	<input type="text" value="\$106,400"/>	Details
<b>Total Cost</b>	<b>\$106,400</b>	
<b>Total Cost in Year 2001 \$</b>	<b>\$117,405</b>	

---

**Estimation of Cost-Effectiveness** Help ?

Estimated Cost per Infection Averted =  $\frac{\text{Total Cost in 2001 \$}}{\text{Estimated No. of Infections Averted by Intervention}} = \frac{\$117,405}{15,251} = \$7,698$

#### 4.3.1 Fields in the HIV Prevention Interventions Form

**Name of Intervention.** The upper box in the Interventions form stores a unique name for the intervention, such as “VOICES” or “Condom distribution.”

**Permanently Save?** If this box is checked, information about the intervention cannot be edited, nor can the intervention be deleted after moving on to another record or closing the form. All interventions that were originally stored in the CECT are permanent.

#### 4.3.2 Target Population and Intervention Structure

Table 3 summarizes the fields in the “Target Population and Intervention Structure” box. Information stored in this section of the form is used primarily to match interventions with your priority populations.



**Table 3. Fields in the “Target Population and Intervention Structure” Box**

Field	What to Enter	Example(s)	Purpose
Behavior (Add New mode)	Select the best description of primary risk behavior targeted by this intervention from the pull-down menu.	“Anal sex,” “Intravenous drug use,” or “Vaginal sex”	Determines the infectivity rate used to estimate the number of infections potentially averted by the intervention.
Behavior (View/Edit mode)	N/A (Not changeable)	“Anal sex,” “Intravenous drug use,” or “Vaginal sex”	Identifies the behavior of interest of the intervention being viewed or edited.
Transmission Risk Groups	Check all groups with which the intervention could be applied and result in similar participation rates and effect sizes as in the study population.	“MSMs,” “IDUs,” “MSM/IDUs,” “Heterosexuals,” or “Mothers with or at Risk for HIV”	Used to identify populations with which the intervention may be applicable and effective.
Race/Ethnicity, Gender, and Age Groups	Check all relevant groups with which the intervention could be applied and result in similar participation rates and effect sizes in the study population.	“Hispanic,” “Male,” “45–64 years”	Used to identify populations with the demographic characteristics checked.

**Behavior.** Select the best description of the risk behavior of the target population from the pull-down list. The behavior selected will determine the infectivity rate used to estimate the number of infections potentially averted by the selected intervention.

**Transmission Risk Groups.** Check the box next to the groups with which the intervention could be applied and result in similar participation rates and effect sizes as in the study population.

**Race/Ethnicity, Gender, and Age Groups.** Select the races/ethnicities, genders, age groups, and HIV status for which this intervention could be used and result in similar participation rates and effect sizes as in the study population.

#### **4.3.3 Original Implementation Setting**

Table 4 summarizes the fields in the “Original Implementation Setting” box. This section contains information about the community and specific study population with which the intervention was evaluated. This information is used to make

**Table 4. Fields in the “Original Implementation Setting” Box**

Field	What to Enter	Example(s)	Purpose
Does the Population Density of the Target Population Affect Implementation Costs?	“Yes” if there is evidence that population density in the study population affected costs; “No” otherwise	Yes/No	Used to indicate if population density should be used to calculate the cost-effectiveness index when applied to other populations.
Population Density of Study Population	Your best description of population density in the study community if density had an impact on estimated costs.	“Scattered” or “Concentrated”	Used to calculate a cost-effectiveness index that adjusts for differences in density between your population and the study population.
HIV Prevalence in Study Population	Estimated prevalence in the study population (a number between 0 and 1).	“0.0004” or “1.0”	Used to calculate a cost-effectiveness index that is adjusted for differences in prevalence between your population and the study population.
Year Costs Incurred	The year in which study costs were either measured or reported.	“1991”	Used to adjust costs to constant 2001 dollars.
Cost of Living	Select the COL level that best describes the study community.	Low, Average, High, or Very High	Used to calculate a cost-effectiveness index that adjusts for differences in COL between your community and the study community.
Study Population Size	The number of study participants (both intervention and control groups) for which an evaluation was completed.	“250” or “35”	Used to generate an estimate of the number of infections averted by the intervention.

adjustments to the cost per infection averted based on a comparison of population density, COL, and HIV prevalence in your community’s population and in the study community’s population.

**Does the Population Density of the Target Population Affect Implementation Costs?** Select the button for “Yes” if there is evidence that population density in the study population affected costs; otherwise, select the button for “No.”

**Population Density of Study Population.** If density affected costs in the study population, select the most appropriate density level—scattered or concentrated.

**HIV Prevalence in Study Population.** This box is for the estimated HIV prevalence in the specific study population from an evaluation of the study. Although this value may be estimated, it should be the best estimate available for the participants in the study.

**Year Costs Incurred.** This box is for information about the year in which study costs were measured and/or reported. Because inflation may lead to differences in intervention costs from one time period to another, the CECT adjusts all intervention costs from their current dollar value (i.e., the value in the year in which the costs were measured) to 2001 constant dollars to ensure that cost data are comparable across interventions.

**Cost of Living.** This box is for an estimate of the COL of the study community. The ? box provides COLs for a number of U.S. communities to aid users in selecting among Low, Average, High, or Very High. See Section 4.1.1 for additional information about the COL.

**Study Population Size.** This box is for the number of study participants for which an evaluation was completed.

#### **4.3.4 Estimation of Effectiveness**

In this section, an estimate of the number of infections averted within the study population by the intervention is generated. This estimate is based on the risk behaviors (as defined in “Behavior”) of the study population both pre- and post-intervention (equal to control and treatment groups, respectively). Behavior input measures are all for a 1-year period. The calculated number of infections is for the time horizon defined in the “View/Edit assumptions for calculations of infections averted” screen (link from “User Options” button).

The CECT uses the same methods and assumptions to estimate effectiveness for all interventions, thus producing a consistent measure of effectiveness across interventions. You must have pre- and post-intervention data on one or more of the factors described below (number of partners, number of encounters, or frequency of

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*The CECT uses the same methods and assumptions to estimate effectiveness for all interventions, thus producing a consistent measure of effectiveness across interventions.*

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protective behavior) for the CECT to produce a consistent estimate of the number of infections averted by the intervention.

**Number of Partners.** Enter pre- and post-intervention data on the number of sexual partners for risky sexual behavior (anal or vaginal sex) or the number of needle sharing partners for intravenous drug use behavior. Note that the risk behavior shown in this box is automatically chosen by the CECT to match the behavior that was selected in the “Target Population and Intervention Structure” box above.

**Number of Encounters.** Enter pre- and post-intervention data on the number of sexual encounters per partner for risky sexual behavior or the number of needle exchanges per partner for risky drug use behavior.

**Frequency of Protective Behavior.** Enter pre- and post-intervention data on the frequency of condom use for risky sexual behavior or the frequency of needle bleaching for risky drug use behavior.

**Estimated Number of Infections...Averted by Intervention.** This calculation is simply the difference between the expected number of infections without (pre) the intervention and the expected number with (post) the intervention (as calculated by the CECT). These values are recalculated every time one of the contributing factors is changed. Those factors include

- behavior,
- study population size,
- HIV prevalence in study population,
- number of partners (pre- and post-intervention),
- number of exchanges per partner (pre- and post-intervention), and
- frequency of protection use (pre- and post-intervention).

If you enter information about an intervention that is not effective, then the estimated number of infections averted calculation will not be shown because it would be zero or a negative number. Interventions that are not effective should not be entered into the CECT.

The estimated number of infections averted is calculated using a Bernoulli process formula (Pinkerton and Abramson, 1998) and is based on simplifying assumptions about the infectivity rates

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*The effectiveness measure calculated by the CECT should not be used for evaluating the intervention in question; rather, it provides a consistent index that is useful primarily for comparing the cost-effectiveness of possible interventions for the same priority population.*

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associated with particular risk behaviors and the protection provided by specific averting behaviors (e.g., condom use). The formula considers both primary and secondary infections (equations 5 and 8, respectively, from Pinkerton and Abramson, 1998).

The effectiveness measure calculated by the CECT should not be used for evaluating the intervention in question; rather, it provides a consistent index that is useful primarily for comparing the cost-effectiveness of possible interventions for the same priority population. Any intervention that is entered into the CECT should have statistically significant impacts on HIV risk behaviors. However, the CECT does not help you evaluate an intervention to determine whether changes in risk behaviors are statistically significant.

#### **4.3.5 Estimation of Costs**

In this box, the CECT generates an estimate of the economic costs to produce the intervention effects in the study population. “Economic costs” are the value of the resources used (regardless of who paid for them) to provide the intervention to the number of study participants over which you are reporting the pre- and post-intervention data. This estimate should not include start-up costs, such as staff training.

It is critical that all costs for each intervention in the CECT are computed in a consistent and standardized manner. Without this assurance of comparable cost information, the comparisons provided will not be appropriate and may be misleading.

Enter the full (economic) costs for **Personnel, Facilities, Equipment, Supplies, Travel and Other**. These should be unadjusted from the costs reported in the study’s evaluation, where the costs represent the dollar value of all resources in the year in which costs were incurred (as indicated in the “Original Implementation Setting” box above). If only the total costs are available, place this value in the “Other” category. As you enter data for each category of costs (Personnel, Facilities, Equipment, Supplies, Travel, and Other), you may click on the “Details” button to add information about how the costs were estimated, what resources are included, and the source (a published study or unpublished evaluation).

**Total Cost.** The CECT calculates total costs as the sum of the above categories. The estimate should not include start-up costs, such as the purchase of reusable intervention materials or staff training.

**Total Cost in Year 2001\$.** This value is computed by the CECT to update cost estimates from years 1980 to 2000 to 2001 dollars using the Consumer Price Index for all urban consumers (CPI-U) (U.S. Department of Labor, 2003). For 2002 and later years, a 3 percent inflation rate is assumed. The estimate reflects price changes due to inflation between the year in which costs were measured and 2001.

#### **4.3.6 Estimation of Cost-Effectiveness**

<p>Cost per infection averted =  estimated cost of the  intervention (in 2001\$) ÷  estimated number of  infections averted</p>
-------------------------------------------------------------------------------------------------------------------------------------------------

The estimated cost per infection averted shown in this box is calculated by the CECT as the estimated cost of the intervention (in 2001 dollars) divided by the estimated number of infections averted. If you enter information about an intervention that is not effective, this cell will appear blank even after all required information has been added to the form (see Section 4.3.4 for further details).

#### **4.3.7 Extra Notes and Reference**

The two lower boxes on the form are for any additional comments about the study and its relevance in alternative settings and a full citation to the published article or unpublished source from which all information was drawn.

### **4.3.8 Tutorial Exercise 4**

#### ***Add an HIV Prevention Intervention.***

Suppose you have information about a needle exchange intervention for intravenous drug users (IDUs), and you want to be able to consider this intervention. The intervention was evaluated in an average cost-of-living area with a group of 450 IDUs. The study was conducted over a 12-month period in 1997. Treatment and control groups were observed.

The evaluation indicated that the average number of needle exchange partners over a 1-year period went from 8 to 8.2 and the number of dirty exchanges per partner from 3.5 to 2.6. The probability of bleaching the exchanged needle went from 0.15 to 0.32. Total intervention costs were \$106,400.

Add this intervention to the database as follows:

1. Click on "Add New" HIV prevention interventions.
2. Provide a name for the intervention—"Needle Exchange in Our Town."
3. In the box for "Target Population and Intervention Structure," choose "Intravenous drug use" as the behavior.
4. Click on the following transmission risk groups: Intravenous drug users and MSM/IDUs.
5. Select all "Races/Ethnicities," "Genders," and "Age Groups."
6. In the "Original Implementation Setting" box, indicate that the population density of the target population did not appear to affect implementation costs.
7. In the same box, enter "1997" into the box for years that costs were incurred, select "Average" cost of living, and enter the appropriate values for HIV prevalence (0.032) and study population size (450).
8. In the "Estimation of Effectiveness" box, fill in the appropriate information for pre- and post-intervention values.
9. In the "Estimation of Costs" box, enter \$106,400 as the value for "other" costs, since the breakdown of costs across resource categories is unknown.
10. Note that the form provides an estimate of the cost per infection averted of \$7,698 in 2001 dollars.

Help is available at any time by clicking on the ? button within the selected box of the Interventions form. Figures 5 and 6 show what this example intervention will look like on the screen.

Click on "Save New Intervention/Close Form" to return to the Switchboard.

## 5. GENERATING AND UNDERSTANDING THE COST-EFFECTIVENESS INDEX COMPARISON REPORT

Once you have finished entering data on your geographic areas and priority populations (and HIV prevention interventions, if applicable), you can run a report that compares the cost-effectiveness of alternative interventions for each of your priority populations by clicking on the “Run” button from the Switchboard. In this section, we briefly describe the reports produced by the CECT and describe how these reports are generated.

### 5.1 Feasible List

After you click on “Run” report, the CECT will produce a list that indicates all of the interventions that could potentially be used with each of your priority populations. This list is generated based on a match between the characteristics of your priority populations and the characteristics of the target population for each intervention. The list gives you an opportunity to remove any interventions that are not feasible in your community.

The feasible list is generated based on a match between the characteristics of your priority populations and the characteristics of the target population for each intervention. You may remove any interventions that are not feasible in your community from the list.

#### **5.1.1 Which of these Intervention/Priority Population Matches Do You Wish to Consider?**

Review the list to decide whether you wish to eliminate any of the interventions from consideration prior to running the Cost-Effectiveness Index Comparison Report. For any intervention that you wish to remove from consideration, click on the box next to that intervention in the “Consider?” column to uncheck.

For example, if needle distribution is one of the matching interventions but your CPG has already decided to rule out needle distribution based on factors other than cost-effectiveness, then you may not wish to consider needle distribution in the Cost-Effectiveness Index Comparison Report.

After you have selected the interventions that you wish to consider in the Cost-Effectiveness Index Comparison Report, click on “Continue to Final Report” to proceed. You also have the option to return to the Switchboard or to print out the complete list of population intervention matches.



### **5.1.2 Priority Populations with No Applicable Interventions**

If no matching interventions are identified for one or more of your priority populations, the following error message will appear: “FYI: These priority populations do not have any applicable interventions in the database: ....” This message indicates that the CECT was unable to identify a match between the characteristics of the priority populations shown and the interventions stored in the database. After reviewing the list of priority populations for which no interventions are available in the database, close the form to proceed.

## **5.2 Cost-Effectiveness Index Comparison Report**

This report provides cost-effectiveness “comparison scores” that allow users to compare available interventions for each priority population in an area based solely on the anticipated cost per infection averted of those interventions if implemented in the user’s community. The comparison scores are calculated as the cost-effectiveness index for an intervention (the cost per infection averted adjusted for differences in HIV prevalence, COL, and population density across communities) divided by the lowest cost-effectiveness index among available interventions for the priority population.

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*The lower the cost-effectiveness comparison score, the more cost-effective the intervention is likely to be when implemented in your community.*

---

The intervention with the lowest cost-effectiveness index (between those matched to population) will be assigned a cost-effectiveness comparison score of 1; all others have a comparison score of more than 1. An intervention with a cost-effectiveness comparison score of 4 has a cost-effectiveness index that is 4 times higher than the comparable intervention with the lowest cost-effectiveness index. The lower the cost-effectiveness comparison score, the more cost-effective the intervention is likely to be when implemented in your community. The intervention with the lowest score (shortest bar) is the most cost-effective option for your specified priority population.

The bar graph also helps users assess just how big the differences in cost-effectiveness are. If all available interventions have a cost-effectiveness comparison score close to 1, then it is unlikely that any one of the interventions would be far more cost-effective than the others when implemented in your community.

### **5.2.1 Print Report**

By selecting the “Print Report” option from the top of the page, the Cost-Effectiveness Index Comparison Report will be printed on the user’s default printer. This report will be printed for all priority populations and all geographic areas.

### **5.2.2 Close Report/Return to Switchboard**

When this option is selected at the top of the page, the Cost-Effectiveness Index Comparison Report is closed and users are returned to the Switchboard.

### **5.2.3 Open Cost-Effectiveness Index Calculation Report**

By clicking on the option to “Open C-E Index Calculation Report,” users are able to see how the cost-effectiveness indices used in the Cost-Effectiveness Index Comparison Report are calculated.

In this mode, you can

- print the report by clicking on the button “Print Report” at the top of the screen, or
- go back to the Cost-Effectiveness Index Comparison Report (the bar graph report) by clicking on the button “Close Report/ Return to Comparison Report” at the top of the screen.

For each population within each geographic area, the estimated cost per infection averted is shown in 2001 dollars (“Estimated Cost per Infection Averted”). This value is taken directly from the HIV Prevention Interventions database. The estimated cost per infection averted is computed by dividing the estimated cost of the intervention (in 2001 dollars) by the estimated number of infections averted. This value is then adjusted to reflect differences in HIV prevalence, population density, and COL between your population and the study population to create what the CECT refers to as a “cost-effectiveness index.” The derivation of these adjustment factors is explained in detail in Appendix A. Adjustments are multiplicative, meaning that the cost-effectiveness index is calculated by multiplying the estimated cost per infection averted by adjustment factors for HIV prevalence, population density, and COL. The resulting cost-effectiveness index provides an estimate of

the cost per infection averted if the intervention were implemented in your community with the specified population.

If the target population in your community has a much higher prevalence of HIV than the study population, then an intervention is likely to be more cost-effective when implemented in your community (because the intervention is likely to be more effective). The CECT creates a cost-effectiveness index by multiplying the Estimated Cost per Infection Averted by an adjustment factor that is less than 1 if HIV prevalence in your target population is higher than prevalence in the study population. Recall that a lower cost-effectiveness index indicates a better value. If HIV prevalence in your population were lower than in the study population, the CECT would generate a cost-effectiveness index by multiplying the Estimated Cost per Infection Averted by an adjustment factor greater than 1. This adjustment reflects the possibility that the intervention may be less cost-effective if implemented with your target population because the prevalence of HIV is lower.

Adjustments for COL and population density are made in a similar way. If the COL in your community is higher than in the study community, the intervention is likely to be less cost-effective if implemented in your community (because costs will be higher). In this case, the CECT calculates a cost-effectiveness index by multiplying the Estimated Cost per Infection Averted by an adjustment factor greater than 1. If population density in your community is lower than in the study community, an intervention is likely to be less cost-effective if implemented in your community. The CECT will then create a cost-effectiveness index by multiplying the Estimated Cost per Infection Averted by an adjustment factor greater than 1.

Suppose that an intervention had an Estimated Cost per Infection Averted of \$10,000 in the study community. If HIV prevalence in your community's target population is 100 percent higher than in the study community, then the prevalence adjustment factor used by the CECT to generate a cost-effectiveness index for this intervention is 0.36. Suppose also that COL and population density are the same as in the study community (High and Scattered, respectively). Then the adjustment factor for COL is 1 and for population density is 1, since no adjustments to the Estimated Cost per Infection Averted are needed when there are no differences

between your community and the study community. The overall adjustment factor for this intervention is  $0.36 * 1.0 * 1.0 = 0.36$ . To generate a cost-effectiveness index for your community (an estimate of the cost per infection averted if the intervention were to be implemented in your community), the CECT multiplies the Estimated Cost per Infection Averted by 0.36 to generate an estimate of  $0.36 * \$10,000 = \$3,600$ . The cost-effectiveness index for this intervention is then \$3,600.

When reviewing results in the Cost-Effectiveness Index Calculation Report, always remember that the cost-effectiveness indices calculated in the report

- are useful only for purposes of comparing interventions for the same population,
- should not be used to make comparisons across populations, and
- are not estimates of what it would cost to implement the intervention and cannot be used for budgeting purposes.

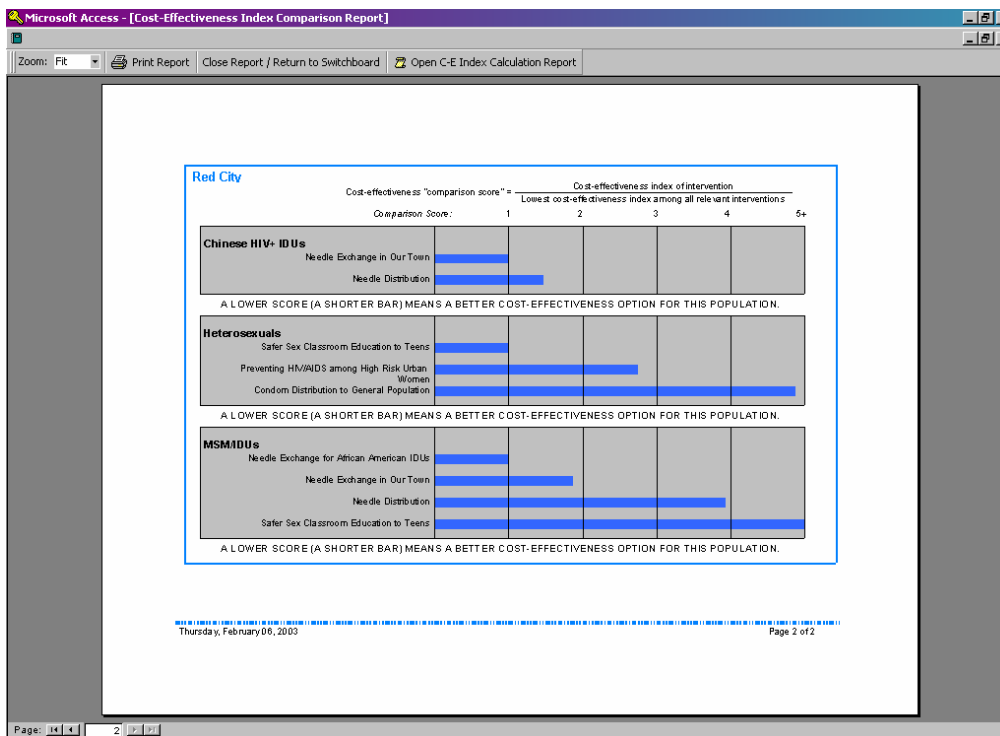
#### **5.2.4 Tutorial Exercise 5**

Because data from each of the three databases are needed to run the Cost-Effectiveness Index Comparison Report, you should complete all previous exercises before starting Tutorial Exercise 5.

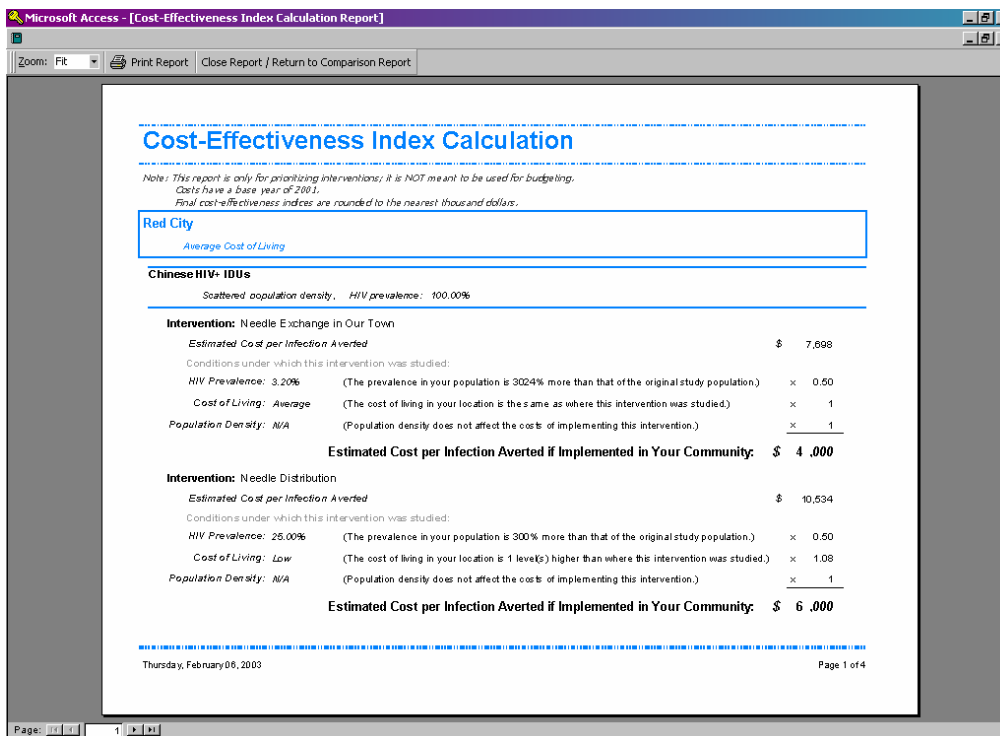
#### ***Run Cost-Effectiveness Index Comparison Report.***

1. Click on "Run Cost-Effectiveness Comparison Report."
2. If you receive a message indicating that you have missing information, use the arrows at the bottom of the box to either return to the appropriate forms to add data or delete the area, population, or intervention, or if you do not wish to consider the populations, areas, or interventions for which you have missing information, click on "Yes" (indicating that yes, you do want to continue).
3. A list of feasible interventions will be provided. Consider all of the possible interventions, and click on "Continue to Final Report" at the bottom of the box.
4. The Cost-Effectiveness Index Comparison Report should appear. The first page explains how to interpret the report. The following page(s) provide a graph of cost-effectiveness comparison scores for each available intervention by geographic area and by population. Page 2 of an example report is shown in Figure 7.
5. Click "Open C-E Index Calculation Report" to view the calculation of the cost-effectiveness indices for each intervention. Figures 8 and 9 show one example of this report.
6. Close both reports using the appropriate buttons. You will be returned to the Switchboard.

**Figure 7. Cost-Effectiveness Index Comparison Report**



**Figure 8. Cost-Effectiveness Index Calculation Report, Screen 1**



**Figure 9. Cost-Effectiveness Index Calculation Report, Screen 2**

Heterosexuals	
Concentrated population density, HIV prevalence: 4.00%	
<b>Intervention: Safer Sex Classroom Education to Teens</b>	
Estimated Cost per Infection Averted	\$ 37,874
Conditions under which this intervention was studied:	
HIV Prevalence: 1.00%	(The prevalence in your population is 300% more than that of the original study population.) × 0.50
Cost of Living: High	(The cost of living in your location is 1 level(s) lower than where this intervention was studied.) × 0.91
Population Density: Scattered	(The density of your target population is 1 level higher than that of the original study population.) × 0.727
<b>Estimated Cost per Infection Averted if Implemented in Your Community: \$ 13 ,000</b>	
<b>Intervention: Preventing HIV/AIDS among High Risk Urban Women</b>	
Estimated Cost per Infection Averted	\$ 75,791
Conditions under which this intervention was studied:	
HIV Prevalence: 1.40%	(The prevalence in your population is 185% more than that of the original study population.) × 0.50
Cost of Living: High	(The cost of living in your location is 1 level(s) lower than where this intervention was studied.) × 0.91
Population Density: Concentrated	(The density of your target population is the same as that of the original study population.) × 1
<b>Estimated Cost per Infection Averted if Implemented in Your Community: \$ 34 ,000</b>	
<b>Intervention: Condom Distribution to General Population</b>	
Estimated Cost per Infection Averted	\$ 30,378
Conditions under which this intervention was studied:	
HIV Prevalence: 15.00%	(The prevalence in your population is 73% less than that of the original study population.) × 1.87
Cost of Living: Low	(The cost of living in your location is 1 level(s) higher than where this intervention was studied.) × 1.08
Population Density: Concentrated	(The density of your target population is the same as that of the original study population.) × 1
<b>Estimated Cost per Infection Averted if Implemented in Your Community: \$ 61 ,000</b>	

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Congratulations! You have successfully entered data into and used the CECT program to generate indices for comparing the cost-effectiveness of alternative interventions if implemented with your priority populations.

If you are an advanced user of Microsoft Access, you may view the CECT's underlying tables, queries, and forms by pressing F11 on your keyboard.

## 6. REFERENCES

Academy for Educational Development (AED), Center for Community Based Health Strategies. 2000. *Setting HIV Prevention Priorities: A Guide for Community Planning Groups*. Prepared for the Centers for Disease Control and Prevention.

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# **Appendix A: Calculation of Adjustment Factors for HIV Prevalence, Cost of Living, and Population Density**



The Cost-Effectiveness Index Calculation Report (available from the Cost-Effectiveness Index Comparison screen by clicking on “Open C-E Index Calculation Report”) uses adjustment factors for HIV prevalence, COL, and population density to adjust each intervention’s estimated cost per infection averted (in 2001 dollars) for differences in the three factors between your population and the study population. The three adjustment factors are multiplied by the estimated cost per infection averted in the study population (in 2001 dollars) to generate a cost-effectiveness index for each intervention that is matched to your priority populations. This index is an estimate of the cost per infection averted if the intervention were implemented in your community. In this subsection, we describe how the adjustment factors used by the CECT for HIV prevalence, COL, and population density are calculated.

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## **A.1 HIV PREVALENCE**

Information from sensitivity analyses in the HIV interventions cost-effectiveness literature was used to estimate the impact of a 1 percent change in prevalence on the estimated cost-effectiveness ratio for an intervention. We reviewed the sensitivity analyses reported in eight recent published cost-effectiveness analyses. Four of these studies included sensitivity analyses that examined the impact of changes in HIV prevalence on the estimated cost per case of HIV averted (see Bedimo et al., 2002; Holtgrave, Pinkerton, and Valdiserri, 1997; Kahn et al., 2001; Wang et al., 2000). Among these four studies, on average, a 50 percent decrease in prevalence was associated with a 67 percent increase in the cost per HIV infection averted, and a 50 percent increase in prevalence was associated with an approximately 20 percent decrease in the cost per case averted.

We used these values to estimate a linear relationship between the percentage difference in HIV prevalence and the percentage difference in the cost per infection averted. The linear relationship used for calculations in the CECT is given by

$$c = 0.23 - 0.87 * p, \tag{A.1}$$

where  $c$  represents the estimated percentage difference in the cost per infection averted between your community and the study

community and  $p$  denotes the percentage difference in HIV prevalence between your population and the study population. Because this linear relationship may not apply over the entire range of values for  $p$ , we assumed a maximum value for  $c$  of 1.25 and a minimum value of  $-0.5$ .

The HIV prevalence adjustment factor used by the CECT is calculated as follows:

$$\text{HIV prevalence adjustment factor} = 1 + c. \quad (\text{A.2})$$

Upper and lower bounds on this adjustment factor are 2.25 and 0.5, respectively. These bounds imply that the impact of differences in HIV prevalence on the estimated cost per infection averted will never be less than  $\frac{1}{2}$  of the cost per infection averted in the study population and will never exceed  $2\frac{1}{4}$  times the cost per infection averted in the study population.

As an example, suppose that HIV prevalence in your population is 25 percent lower than in the study population for a given intervention. Using Equation A.1, the CECT will calculate that the percentage difference in estimated cost per infection averted if the intervention is used with your population is  $0.23 - 0.87 * (-0.25) = 0.45$ . In other words, the estimated cost per infection averted is 45 percent higher than when the intervention was used with the study population.

The corresponding HIV prevalence adjustment factor is calculated by the CECT using Equation A.2 as  $1 + 0.45 = 1.45$ . This is the factor shown in the far right calculations column of the Cost-Effectiveness Index Calculation Report. This factor is multiplied by the estimated cost per infection averted in the study population as well as the adjustment factors for COL and population density to produce a cost-effectiveness index for each intervention matched to your priority populations.

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## **A.2 COST OF LIVING**

Information from the Accra COL indices for the second quarter of 2000 (Accra, 2000) was used to estimate the COL adjustment factor. As described in Section 4.1.1, cities for which the Accra index indicated a COL that was less than 95 percent of the national

average were rated “Low,” those that were at least 95 percent but less than 105 percent were rated “Average,” those that were greater than 105 percent but less than 115 percent were rated “High,” and those that were 115 percent or more were rated “Very High.”

Among those cities with a low COL rating, we calculated the mean percent of national average to be 93 percent; among those with an average rating, the mean was 100 percent; among those with a high rating, the mean was 110 percent; and among those with a very high rating, the mean was 127 percent. We then used these mean COL values for each category to calculate the COL adjustment factor, as follows:

$$\text{COL adjustment factor} = b_i \div b_j \quad (\text{A.3})$$

where  $b_i$  represents the mean COL value for your community, and  $b_j$  denotes the mean COL value for the study community where the intervention was evaluated.

As an example, suppose that the community in which an intervention was implemented had a high COL. If COL in your community is low, the COL adjustment factor for the intervention is  $0.93$  (the mean COL value for a community with a low COL)  $\div$   $1.10$  (the mean COL value for a community with a high COL) =  $0.85$ . This COL adjustment factor is shown in the far right column of the Cost-Effectiveness Index Calculation Report. The CECT multiplies this factor by the estimated cost per infection averted in the study population as well as the adjustment factors for HIV prevalence and population density to produce a cost-effectiveness index for each intervention matched to your priority populations.

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### **A.3 POPULATION DENSITY**

The calculation of the population density adjustment factor is described in some detail in the CECT (see User Options, then select “View/Edit assumptions for how population density affects cost per infection averted”). Although information is available from the HIV prevention literature or other sources to estimate the impact of differences in HIV prevalence or COL on the cost per infection averted for an intervention, we were unable to identify information that could be used to estimate the impact of differences in population density on the cost per infection averted. Nonetheless,

members of CPGs and others involved in HIV prevention indicated that population density may have a very large impact on intervention costs.

When using the CECT, you have the option of considering the likely impact of differences in population density between your community and the study community on cost per infection averted. The default values assigned to population density in the CECT are 1.1 for "Scattered" population density and 0.8 for "Concentrated." These values may be changed as described in the CECT User Options (see Section 3.1). If you choose not to consider the impact of population density on cost per infection averted, simply type the same value (e.g., 1.0) in the box for each population density level. If you make changes to these values, make sure that the value assigned to "Scattered" population density is at least as large as the value assigned to "Concentrated."

The population density adjustment factor is calculated as follows:

$$\text{Population density adjustment factor} = q_i \div q_j \quad (\text{A.4})$$

where  $q_i$  represents the value associated with population density in your population, and  $q_j$  represents the value associated with population density in the study population.

As an example, suppose that the study population for an intervention had a concentrated density, but density for your priority population is scattered. The population density adjustment factor that is calculated by the CECT is then  $1.1 \div 0.8 = 1.38$ . This adjustment factor is shown in the far right column of the Cost-Effectiveness Index Calculation Report. The CECT multiplies this factor by the estimated cost per infection averted in the study population as well as the adjustment factors for HIV prevalence and COL to produce a cost-effectiveness index for each intervention matched to your priority populations.