Sexually Transmitted Infections: Outbreak Preparedness and Response Toolkit

October 2025

Disclaimer: The findings and conclusions in this Toolkit are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Introduction

The CDC developed this toolkit to assist state, tribal, local, and territorial health departments in preparing for and responding to sexually transmitted infection (STI) outbreaks. Informed by the expertise of disease intervention professionals, epidemiologists, health economists, and evaluators, the toolkit presents resources to address distinct challenges of STI outbreak preparedness, detection, and response. It is designed to help public health partners address key barriers, implement partner services, reduce stigma, manage coinfections, and improve healthcare access for affected populations. Given the significant health consequences and broad impact of STIs, timely identification and control of outbreaks is essential to protecting public health. Recognizing the unique complexities of STI outbreaks, the toolkit offers practical tools and strategies in surveillance, disease intervention, cost analysis, and evaluation. Each chapter can be used on its own, but collectively, they provide a comprehensive framework for effective outbreak response.

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Chapter 1: Surveillance

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Introduction

What is surveillance?

Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health data, closely integrated with timely dissemination of these data to those responsible for preventing and controlling disease. Surveillance data are crucial for monitoring the effectiveness of public health interventions, guiding programs and policies, and identifying emerging health threats and outbreaks.

How can surveillance be used in an outbreak context?

In general, an outbreak can be defined as occurring whenever disease levels exceed what is expected in a given community. The community can be defined as a facility or establishment, census tract, neighborhood, city, county, state, region, or population defined by any number of sociodemographic characteristics (e.g., adolescents, persons who inject drugs).

The same principles of public health surveillance apply during an outbreak and non-outbreak setting. The ability to detect an outbreak is an important feature of any surveillance system. Routine review of surveillance data identifies trends in the distribution of cases within a given community (as defined per the suggestions above) over time, facilitating identification of outbreaks. Being familiar with the systems that influence trends allows public health programs to differentiate between true anomalies (e.g., outbreaks) and artifacts (e.g., changes in reporting).

Routine surveillance

Standard data review

The routine review of data collected by surveillance systems is an important public health program activity. Routine data review can be done in statistical software (e.g., SAS, R) and in spreadsheet software (e.g., Excel). *The Sexually Transmitted Disease Surveillance Capacity Framework Guidance* (https://www.cste.org/resource/resmgr/std/Capacity_Framework_Survey.pdf) provides a systematic approach to routine data review in the "Data Analysis and Visualization" section. It includes foundational (i.e., core to understanding trends in STIs) and enhanced (e.g., that may be helpful for outbreak identification and response) activities. Some of the activities may require advanced statistical and mapping software. If needed, public health programs can consider developing partnerships with local colleges and universities for additional statistical support.

Table 1 is adapted from the "Data Analysis and Visualization" section of *The Sexually Transmitted Disease Surveillance Capacity Framework Guidance*. It lists foundational and enhanced STI surveillance activities, and highlights examples of how a health department can implement the activities.

Table 1: Foundational and enhanced STI surveillance activities with examples of how to implement

Foundational activities	Examples of how to implement
Conduct routine (i.e., weekly or monthly) descriptive analyses to determine trends in the number, distribution, and rate of reported cases by demographic variables at the health department and local levels.	■ Review case counts, by infection, sex, and week compared to the same time last year (see Table A). » If anomalies are noted, stratify by age, race/ethnicity, ZIP codes, types of diagnosing facility (e.g., emergency room, outpatient clinic) to identify trends. ■ Review trends in Electronic Laboratory Reporting (ELR) volume, by infection and week compared to the same time last year. » If anomalies are noted, stratify by testing laboratory, requesting facility, etc. to identify trends.
Identify changes in case counts by demographics, sexual behaviors (e.g., sex of sex partners), and/or geography to help: 1) identify outbreaks and to 2) determine whether changes are related to data collection or reporting artifacts (see "Factors that can affect observed case counts - reporting and other artifacts").	Review case counts stratified by sexual behaviors, pregnancy status, race/ethnicity, HIV status, and other social characteristics, and compare time periods (see Figure A).
Create charts, graphs and maps to display trends by infection, case counts, percentage distribution, and case rates.	■ Create epi-curves to show trends in cases over time (see Figure B). ■ Create maps with case rates by neighborhood.
Enhanced activities	**Examples of how to implement**
Create enhanced maps using address-level geocoding or multiple sources of data such as cluster, layered, or hot spot maps.	Create a series of maps that show monthly, early syphilis case counts by census tract over time to visualize which areas are experiencing the largest increases.
Link case report data to additional information (e.g., neighborhood characteristics, socioeconomic factors, poverty level, percent incarceration, high school graduation rate, male-to-female ratio, Department of Motor Vehicles registry).	Create a map that displays outbreak-related syphilis cases by neighborhood and overlay current service providers (e.g., STI clinics, syringe service programs, etc.) to identify areas that lack service providers, and which may benefit from increased resources for screening efforts (see Figure 1).
Conduct analyses of surveillance and partner services data to assist STI prevention programs with data-driven STI prevention and care resource allocation.	Review partner services data (e.g., where partners met, etc.) for outbreak-related cases to identify intervention opportunities.
Conduct social network analysis to help identify trends and to assist STI prevention program staff with investigation of and response to outbreaks.	Use partner services data to draw out a social network of outbreak-related cases and partners (see Figure 2).

Figure 1: Early syphilis case rates (per 100,000 women) and location of STI testing and treatment centers in the hypothetical city of Syphilopolis, 2024. *Accessible explanation on page 51.*

Data current as of 12/9/2024

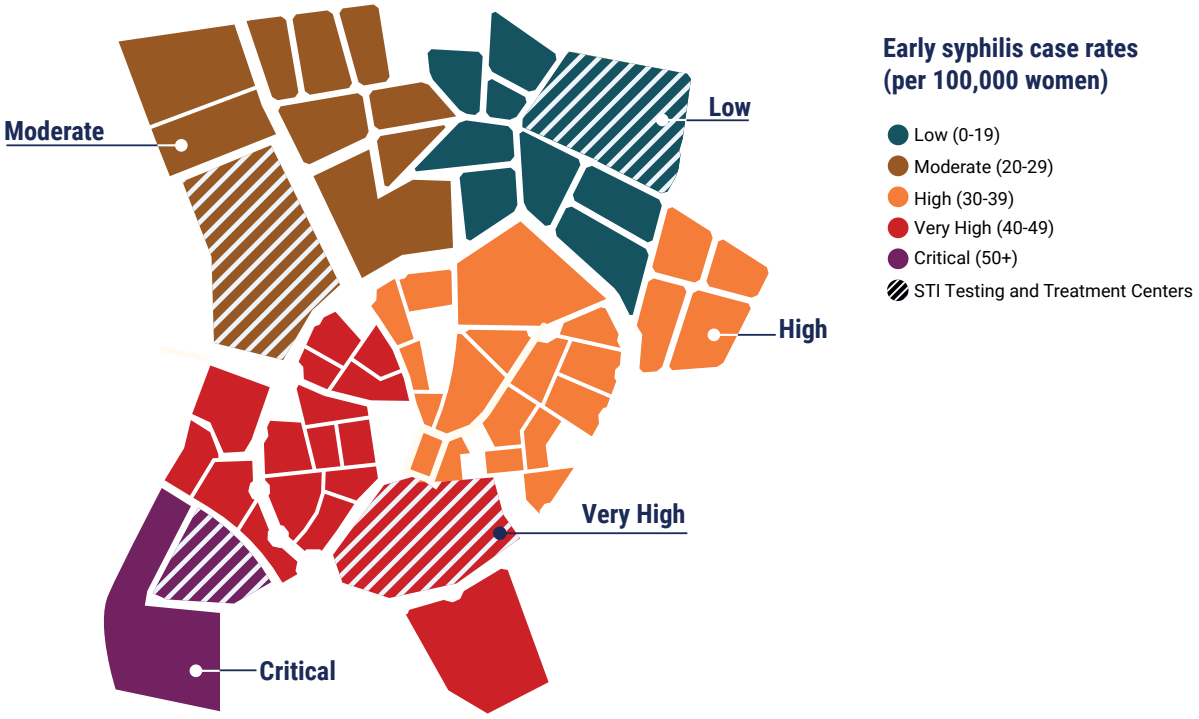
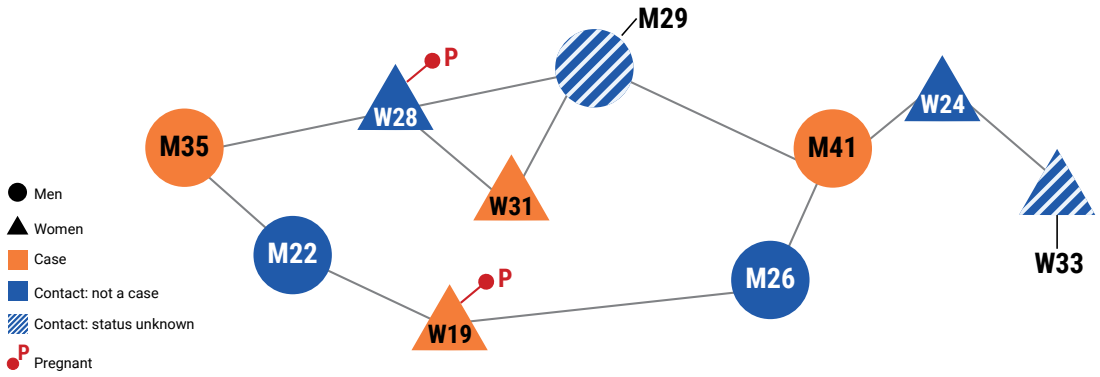


Figure 2: Sexual network of primary and secondary syphilis cases and contacts by status, sex, age, and pregnancy status in the hypothetical city of Syphilopolis, 2024. *Accessible explanation on page 51.*

Data current as of 12/9/2024



Data analysis in an outbreak setting

Continuous data review is crucial to help identify the who, what, where, when, and how of an outbreak. Ideally, a description of the outbreak's epidemiology begins early and is updated regularly as additional data are collected.

Analyze surveillance and partner services data to characterize the outbreak by person, time, and place, which may include the development of an epi-curve, geographic and social network maps, and descriptive summaries of demographic and behavioral characteristics.

Factors that can affect observed case counts - reporting and other artifacts

STI prevention programs may consider documenting policy/procedure changes, and contextual factors that can affect changes (increases and decreases) in observed case counts independent of changes in incidence or outbreak status. If changes in case counts are observed, the systematic factors listed in the following tables should be assessed as possible explanations before considering these changes to be true increases or decreases in incidence.

Changes in observed case counts, even if not caused by changes in incidence, can offer opportunities to improve quality assurance and workflows for more accurate case counts.

Table 2: Contextual factors as possible explanations for changes in observed case counts with examples

Possible explanations for changes in observed case counts	Examples
Changes in screening practices (see increased screening versus increased incidence on observed case counts).	■ Local jail implemented routine STI screening on intake resulting in an increase in reported STI cases. ■ A high-volume healthcare provider began routinely offering rectal chlamydia screening for men resulting in an increase of reported chlamydia cases among men. ■ A new HIV PrEP clinic opened resulting in more people receiving STI screening when taking HIV PrEP resulting in an increase in STI cases reported among persons who are on HIV PrEP.
New testing technology	■ A community-based organization received a grant to offer rapid syphilis testing in the community resulting in an increase in reported syphilis cases.
Capacity changes	■ STI staff were pulled to work on a measles outbreak, resulting in delays in syphilis case investigations and temporary decreases in weekly syphilis case counts. ■ The STI staff member who routinely de-duplicates gonorrhea laboratory results was on extended leave, resulting in temporary increases in weekly gonorrhea cases in the live data.
Test volume by laboratory and infection	■ A laboratory changed their Laboratory Information System (LIS) which caused them to delay sending test results for over a month, resulting in a temporary decrease in reported weekly STI cases. ■ A laboratory added a new test for chlamydia resulting in an increase in reported chlamydia cases from clinics using that laboratory. ■ A laboratory closed resulting in temporary reported decreases in STI cases in the population previously served by the laboratory.
Surveillance information system	■ An update to the surveillance information system inadvertently set all cases to default to sex=male, resulting in an observed decrease in cases where sex=female. ■ A new module was added to automatically link to eHARS and document HIV status for STI cases, resulting in an observed increase in STI cases among persons diagnosed with HIV.

Possible explanations for changes in observed case counts	Examples
Workload and staffing	■ Staffing shortages or other factors caused delays in data entry or interruptions to routine quality assurance activities that ensure data consistency (e.g., correcting implausible ages), resulting in temporary increased STI case counts among persons over 100 years of age. ■ New staff were hired who require additional training, resulting in less frequent processing of data and temporary observed decreases in weekly data.
Provider case reports	■ An HIV care facility implemented electronic provider reporting resulting in more complete reporting of HIV status, resulting in an observed increase in reported STI cases among persons with HIV. ■ New questions were added to the case report form to better capture substance use, resulting in an increase in reported cases among persons who reported using methamphetamine. ■ A high-volume clinic changed their electronic health record (EHR) and stopped sending cases to the health department for two months, resulting in a temporary decrease in observed STI cases reported in the population served by that clinic.
Programmatic approaches	■ A health department received a grant which enabled them to hire more Disease Intervention (DI) professionals allowing for the expansion of partner services and investigations, resulting in higher case-finding through more comprehensive outreach, testing, and follow-up. ■ A health department received notification that funds were rescinded which led to the scale-back of programmatic efforts—fewer investigations, reduced contact tracing, and limited outreach—resulting in under-detection and a decrease in reported cases.
Changes to surveillance case definitions (see https://ndc.services.cdc.gov/).	■ A change in the syphilis surveillance case definition caused confusion among staff on how to code cases, resulting in observed decreases in cases staged as primary and secondary syphilis.
Outbreaks of related conditions	■ The 2022 mpox outbreak likely affected STI case counts in multiple ways » People may have changed their sexual behaviors out of concern for acquiring mpox, resulting in decreased STI transmission and case counts (true decrease in incidence). » People may have accessed health care to rule out mpox or receive vaccination. These health care encounters were new opportunities to be diagnosed with an STI, resulting in potentially increasing case counts independent of changes in incidence.
Opportunities for changes in sexual networks	■ During break, some college students left campus to study abroad resulting in changes in sexual networks which led to temporary increases in case counts.

Increased screening versus increased incidence

It can be extremely difficult to disentangle the impact of increased screening from increased incidence, especially since traditional surveillance receives information on diagnosed and reported cases rather than robust, population-based screening data. Increased screening can reveal infections that exist in the population that would have been undiagnosed if not for new screening opportunities. Increased screening can and will likely result in increased cases being diagnosed and reported, but that is not necessarily indicative of an outbreak or an increase in incidence.

Example:

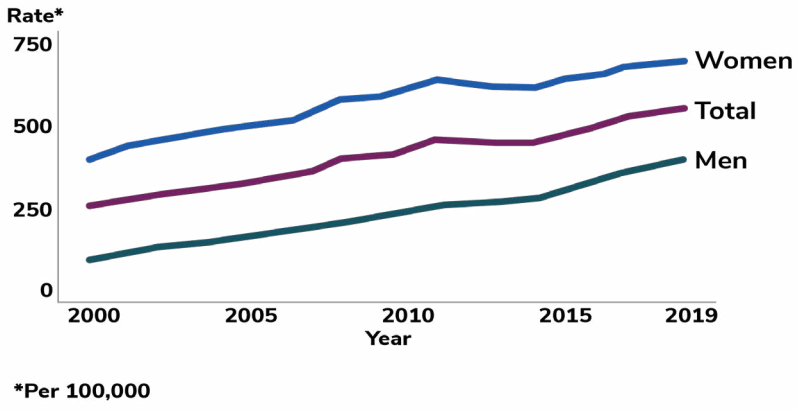
Since 2001, the US Preventive Services Task Force (USPSTF) has recommended chlamydia screening for all sexually active women aged 24 years or younger, as well as for women aged 25 years or older who are at increased risk for infection. Conversely, the USPSTF concludes that there is insufficient evidence to recommend chlamydia screening for men who have sex with women. Rates of reported chlamydia cases among women are generally higher than those among men, likely reflecting the larger number of women screened for this infection.

However, reported chlamydia cases among men increased by 32.1% during 2015 to 2019 (see Figure 3). This rise is likely due to increased screening for chlamydia among men which led to more chlamydia being diagnosed and reported rather than an increase in incidence. Some reasons for increased screening among men could include:

- Before urine-based tests for chlamydia became widely available (mid-2000's), healthcare providers often opted to empirically treat symptomatic males for chlamydia rather than perform invasive urethral swab testing, which was uncomfortable, costly, and yielded delayed results.
- When HIV PrEP was introduced in 2012, it was recommended that patients taking it, many of whom were and still are men, have quarterly STI screening– including chlamydia.
- In 2015, extragenital chlamydia screening was recommended for all men who have sex with men by CDC.

Although the rates of reported chlamydia cases among men have increased over time, this is more likely a reflection of improved case ascertainment through increased screening and testing than an increase in incidence.

Figure 3: Chlamydia – rates (per 100,000) of reported cases by sex, United States, 2000-2019[1]
Accessible explanation on page 51.



1 *Centers for Disease Control and Prevention, Sexually Transmitted Disease surveillance 2019 [Slides]* https://stacks.cdc.gov/view/cdc/105136

Data sharing and dissemination

After completing data analyses and visualization, it is crucial for the STI program to share and disseminate those findings to facilitate effective public health action.

Clear and consistent communication among the STI program and key partners, local healthcare providers, the media, and the public may enhance the effectiveness of the response, minimize rumors and mistrust, strengthen partnerships, and minimize stigmatization of affected communities.

In an outbreak setting, quick access to data tables and visualizations is vital, and thus the prompt production and dissemination of these data are important STI program activities.

- Routinely share, review, and discuss STI surveillance data with STI program staff, and local health departments to:
  - Plan and implement a timely public health response
  - Provide situational awareness
  - Allocate resources
  - Identify successful interventions
  - Evaluate programs
  - Disseminate surveillance information to affected populations, communities, public, providers and key partners

It may be helpful to develop dashboards and/or routine reports that are shared (e.g., New York's Sexual Health Dashboard: https://www.stidashboardny.org/).

Data security and confidentiality

When sharing public health data, including during an outbreak, it is critical to ensure that data are provided in alignment with the health department's data security and confidentiality policies. This includes ensuring practices are in place to protect the privacy and security of personally identifiable data, minimizing the number of persons and entities with access to identifiable data, and using data-use agreements when appropriate. When sharing information with media and the public about an outbreak, it is critical to minimize any risk to patient or population privacy.

For more information, see Data Security and Confidentiality Guidelines for HIV, Viral Hepatitis, Sexually Transmitted Disease, and Tuberculosis Programs: Standards to Facilitate Sharing and Use of Surveillance Data for Public Health Action (see https://www.cdc.gov/sti/media/pdfs/pcsidatasecurityguidelines.pdf).

How is an outbreak detected?

Outbreaks represent increases in infections above what is expected. There is no 'right' way to detect an outbreak, and each health department can consider their local epidemiology and capacity for response before deciding on a detection method. There are many ways to detect an outbreak, some examples can be found in CSTE's "Syphilis Outbreak Detection Guidance" http://www.cste.org/resource/resmgr/STD/SyphilisOutbreakDetectionGui.pdf.

One method to calculate an outbreak threshold is to use the average and standard deviation to highlight when the number of cases in a population is higher than what is typically expected.

Example:

STI surveillance staff are monitoring the number of gonorrhea cases in a particular region over several years. They find that on average, there are approximately 10 reported cases each month. However, the number of cases can fluctuate from month to month.

To establish what constitutes a "normal" range, staff calculate the average number of cases and assess the variability around that average, which is measured using standard deviation. Staff determine the standard deviation is 2 cases, noting that in most months, the number of gonorrhea cases will fall between 8 and 12 (the average of 10 plus or minus 2).

Staff observe that in March, the number of reported gonorrhea cases rises to 20, which is substantially higher than the expected range based on the average and standard deviation. Such a large increase warrants further investigation and it might suggest the occurrence of an outbreak and require public health intervention.

STI programs can consider testing different approaches to detecting an outbreak and adjusting as needed. However, 'knowing your data' by routine review and understanding the contextual factors contributing to the data, as discussed earlier in this section, can often be very effective at identifying anomalies. It is important to keep in mind that some potential outbreaks may be too small to be detected by statistical methods and are noticed by astute DI professionals who have their 'ears to the ground' and/or who present cases during "chalk talks". Discussions with DI professionals may be particularly helpful for understanding the affected population, as the DI professionals may notice trends or relevant factors that are not currently collected systematically. Often, the DI professionals will be able to identify a geographical area, or population with increased case investigations. Knowing the local context can help an STI program drill down in the data by those factors.

When is an outbreak over?

It can be difficult to determine when an outbreak is over. One approach to consider is when there are two consecutive incubation periods with a return to baseline or without new transmissions, as long as active case finding continues. For example, an outbreak of early syphilis could be considered over when case counts return to baseline for two incubation periods (180 days).

If case counts do not return to baseline, the infection may become endemic, establishing a new baseline. Future outbreaks would be recognized by a rapid increase above this new baseline.

Health departments can decide to end the outbreak response even before the outbreak is over. Health departments may consider reduced case counts, available resources, competing priorities, guidance from local/state leadership, and community acceptance when determining to end the outbreak response.

Surveillance and outbreak resources

Name: The Sexually Transmitted Disease Surveillance Capacity Framework Guidance

Link: https://www.cste.org/resource/resmgr/std/Capacity_Framework_Survey.pdf

Description: Describes an STI surveillance capacity framework for state, local, and tribal health departments.

Name: Syphilis Outbreak Detection Guidance

Link: http://www.cste.org/resource/resmgr/STD/SyphilisOutbreakDetectionGui.pdf

Description: Provides STI program a framework for understanding their epidemiology, determining if and when an outbreak might be occurring, and when additional resources and activities could be needed to prevent further STI transmission.

Name: Program Operation Considerations for STI Prevention

Link: https://www.cdc.gov/sti/media/pdfs/2025/06/Program-Operation-Considerations-for-STI-Prevention.pdf

Description: Provides STI program with suggestions and considerations for planning, implementing, and evaluating STI prevention program activities.

Name: STI Outbreak Response Plan Guide

Link: https://www.cdc.gov/sti/php/sti-program-resources/outbreak-preparedness-detection-and-response.html

Description: Provides an outline, considerations, and/or starting point for jurisdictions to develop their own STI outbreak response plan.

Name: STI Outbreak Prevention and Control Activities

Link: https://www.cdc.gov/sti/php/sti-program-resources/outbreak-preparedness-detection-and-response.html

Description: Provides a list of control and prevention activities to consider for implementation during STI outbreaks.

Name: Requesting EIS Services at CDC

Link: https://www.cdc.gov/eis/php/request-services/index.html

Description: Provides information on requesting services from CDC's Epidemic Intelligence Service (EIS) Officers who can assist with epidemiologic investigations with state, local, and tribal health departments, and other public health partners.

Name: Improving Tracking and Data Visualizations for Syphilis Outbreaks Using Tableau

Link: https://www.in.gov/mph/files/Improving_Data_Vis_for_Outbreaks.pdf

Description: Explains how the Indiana Department of Health visualized data during a syphilis outbreak.

Name: Sexually Transmitted Infections Surveillance, 2023

Link: https://www.cdc.gov/sti-statistics/annual/index.html

Description: Provides the most current and complete data for three nationally notifiable STIs: chlamydia, gonorrhea, and syphilis, including congenital syphilis.

Name: Surveillance Case Definitions for Current and Historical Conditions

Link: https://ndc.services.cdc.gov/

Description: Offers a set of uniform criteria used to define a disease for public health surveillance which enable public health officials to classify and count cases consistently across reporting health departments.

Name: Council of State and Territorial Epidemiologists (CSTE), STI Subcommittee

Link: https://www.cste.org/members/group.aspx?id=87602

Description: Offers resources for public health professionals interested in STI surveillance and epidemiology with the goal of informing and improving practices related to STI surveillance and data analysis in state, local, and tribal and territorial settings.

Name: Data Security and Confidentiality Guidelines for HIV, Viral Hepatitis, Sexually Transmitted Disease, and Tuberculosis Programs: Standards to Facilitate Sharing and Use of Surveillance Data for Public Health Action.

Link: https://www.cdc.gov/sti/media/pdfs/pcsidatasecurityguidelines.pdf

Description: Outlines recommended standards for HIV, Viral Hepatitis, Sexually Transmitted Disease, and Tuberculosis Programs at CDC to ensure secure data collection, storage, and use while maintaining confidentiality, based on ten guiding principles and addressing key areas such as program policies, data handling, and security, to support public health actions and evidence-based prevention services.

Training Name: CDC's Public Health 101 Series

Link: https://www.cdc.gov/training-publichealth101/php/index.html

Description:

- Introduction to Public Health: Learn about the history, mission, and core functions of public health.
- Introduction to Epidemiology: Learn about the study of how diseases emerge, move through populations, and how they are prevented.
- Introduction to Public Health Surveillance: Learn about collecting, analyzing, and interpreting health data and how it's used for prevention.

Training Name: Council of State and Territorial Epidemiologists (CSTE): Courses

Link: https://learn.cste.org/

Description:

- Emergency Preparedness and Response Training for Public Health Epidemiologists.
- Case-based Surveillance for Syphilis.

Training Name: Quick Learn: Create an Epi Curve

Link: https://www.cdc.gov/training/QuickLearns/CreateEpi/

Description: Ten-minute lesson on creating an epi curve.

Case study

An astute Disease Intervention (DI) Professional working in the local health department (LHD) in the hypothetical city of Syphilopolis brought a potential syphilis outbreak to the attention of the DI Supervisor after noticing a lot of field records being generated for women with an address of a women's shelter.

The DI Supervisor met with the LHD Surveillance Lead to do an in-depth review of the recent syphilis surveillance and partner services data where they observed that over the last seven weeks (see Table A, weeks 16-22, light blue boxes), there had been an increase in early syphilis cases among women, with more rapid increases in the last two weeks. They noted that during January-May 2023 (see Table A, weeks 1-22) there were 261 cases of early syphilis among women compared to January-May 2024 where there were 344 cases, a 31.8% increase. Cases among men appeared stable during this time.

Table A: Primary and secondary, and early non-primary non-secondary syphilis ("early syphilis") cases, by morbidity week, sex, and current and previous year, in the hypothetical city of Syphilopolis, 2023–2024.

Accessible explanation on page 52.

Primary and Secondary Syphilis								
Morbidity Week*	2023 Women	2024 Women	2023 ytd Women	2024 ytd Women	2023 Men	2024 Men	2023 ytd Men	2024 ytd Men
1	4	1	4	1	21	24	21	24
2	4	3	8	4	24	17	45	41
3	1	2	9	6	19	22	64	63
4	1	2	10	8	15	21	79	84
5	3	3	13	11	19	22	98	106
6	5	3	18	14	27	16	125	122
7	3	3	21	17	23	23	148	145
8	0	2	21	19	29	19	177	164
9	3	1	24	20	19	21	196	185
10	4	2	28	22	25	19	221	204
11	4	3	32	25	23	24	244	228
12	4	5	36	30	28	28	272	256
13	1	2	37	32	22	25	294	281
14	3	4	40	36	23	27	317	308
15	0	2	40	38	19	32	336	340
16	2	6	42	44	21	25	357	365
17	2	6	44	50	19	16	376	381
18	4	7	48	57	37	27	413	408
19	3	8	51	65	22	21	435	429
20	1	6	52	71	23	24	458	453
21	3	9	55	80	23	26	481	479
22	5	10	60	90	21	20	502	499
23	2	9	62	99	26	23	528	522
24	2	10	64	109	25	24	553	546
25	3	9	67	118	14	23	567	569
26	1	10	68	128	14	17	581	586
27	2	5	70	133	12	24	593	610
28	0	7	70	140	17	21	610	631
29	3	9	73	149	22	29	632	660
30	2	4	75	153	23	20	655	680
31	4	3	79	156	26	24	681	704
32	2	4	81	160	20	26	701	730
33	1	2	82	162	23	20	724	750
34	2	3	84	165	25	21	749	771
35	2	4	86	169	27	26	776	797
36	1	2	87	171	15	23	791	820
37	2	4	89	175	15	21	806	841
38	6	5	95	180	18	22	824	863
39	2	3	97	183	17	19	841	882
40	5	3	102	186	15	16	856	898
41	0	4	102	190	21	20	877	918
42	4	2	109	192	17	17	894	935
43	1	2	110	194	21	18	915	953
44	2	1	112	195	20	19	935	972
45	3	1	115	196	14	18	949	990
46	1	2	116	198	25	20	974	1010
47	1	2	117	200	12	18	986	1028
48	2	2	119	202	24	18	1010	1046
49	3	1	124	203	22	15	1032	1061
50	2	1	126	204	19	16	1051	1077
51	6		128	204	21		1072	1077
52	5		128	204	14		1086	1077
53			128				1086	
Total	132	204			1086	1077		

Early Non-Primary Non-Secondary Syphilis								
Morbidity Week*	2023 Women	2024 Women	2023 ytd Women	2024 ytd Women	2023 Men	2024 Men	2023 ytd Men	2024 ytd Men
1	11	8	11	8	59	83	59	83
2	13	7	24	15	89	85	148	168
3	7	6	31	21	87	60	235	228
4	9	9	40	30	66	79	301	307
5	5	6	45	36	65	72	366	379
6	12	9	57	45	52	77	418	456
7	11	8	68	53	57	61	475	517
8	6	8	74	61	56	72	531	589
9	16	8	90	69	86	74	617	663
10	8	9	98	78	72	59	689	722
11	6	7	104	85	68	65	757	787
12	8	9	112	94	65	73	822	860
13	12	11	124	105	65	65	887	925
14	11	13	135	118	71	66	958	991
15	12	16	147	134	73	87	1031	1078
16	10	14	157	148	78	63	1109	1141
17	9	15	166	163	52	70	1161	1211
18	10	16	176	179	69	75	1230	1286
19	6	16	182	195	65	61	1295	1347
20	5	20	187	215	64	77	1359	1424
21	9	18	196	233	70	56	1429	1480
22	5	21	201	254	46	51	1475	1531
23	9	15	210	269	66	53	1541	1584
24	5	11	215	280	45	64	1586	1648
25	7	14	222	294	63	51	1649	1699
26	6	11	228	305	65	58	1714	1757
27	6	15	234	320	44	60	1758	1817
28	6	9	240	329	62	60	1820	1877
29	11	8	251	337	67	65	1887	1942
30	8	11	259	348	60	61	1947	2003
31	11	14	270	362	57	64	2004	2067
32	6	8	276	370	62	59	2066	2126
33	11	13	287	383	46	66	2112	2192
34	12	9	299	392	55	73	2167	2265
35	3	6	302	398	44	62	2211	2327
36	5	7	307	405	39	56	2250	2383
37	2	4	309	409	59	67	2309	2450
38	8	3	317	412	63	65	2372	2515
39	6	6	323	418	44	54	2416	2569
40	5	3	329	421	59	57	2475	2626
41	5	5	334	426	60	55	2535	2681
42	4	7	345	433	57	52	2592	2733
43	6	2	351	435	53	52	2645	2785
44	8	8	359	443	54	53	2699	2838
45	7	7	366	450	59	54	2758	2892
46	6	9	379	459	54	45	2812	2937
47	3	7	382	466	31	41	2843	2978
48	6	7	388	473	49	30	2892	3008
49	6	3	395	476	46	21	2938	3029
50	7	8	405	484	62	32	3000	3061
51	4		409	484	60		3060	3061
52	3		412	484	28		3088	3061
53			412				3088	
Total	393	484			3088	3061		

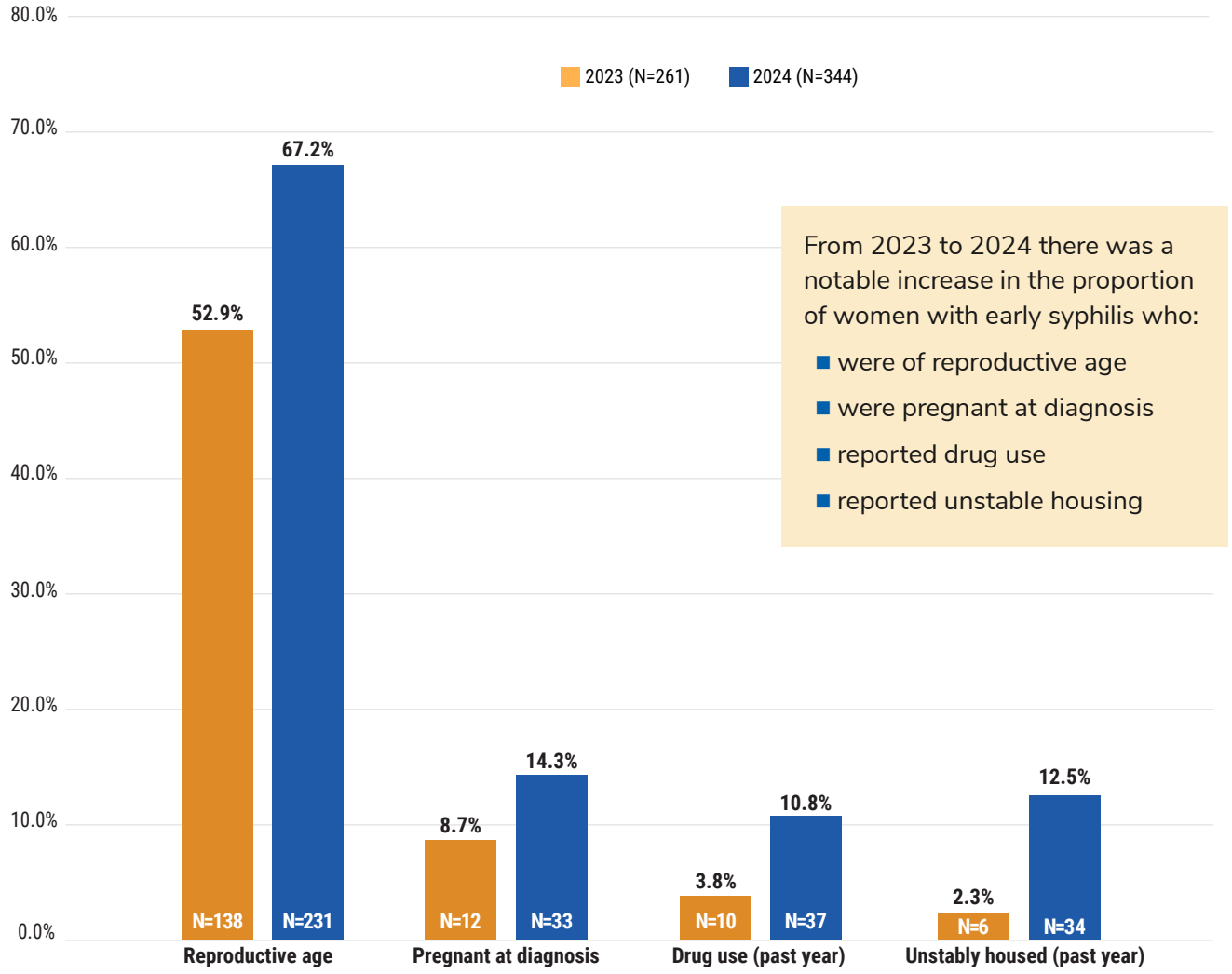
Data reflect cases reported as of 12/09/2024 | YTD: year-to-date

* The MMWR week is the week assigned by health departments for reporting cases of disease to the National Notifiable Diseases Surveillance System (NNDSS). https://ndc.services.cdc.gov/wp-content/uploads/MMWR_week_overview.pdf

For additional information about this table, see page 52

Figure A: Percent of women with early syphilis with selected characteristics, in the hypothetical city of Syphilopolis, Jan–May 2023 and Jan–May 2024. *Accessible explanation on page 52.*

Data reflect cases reported as of 6/15/2024



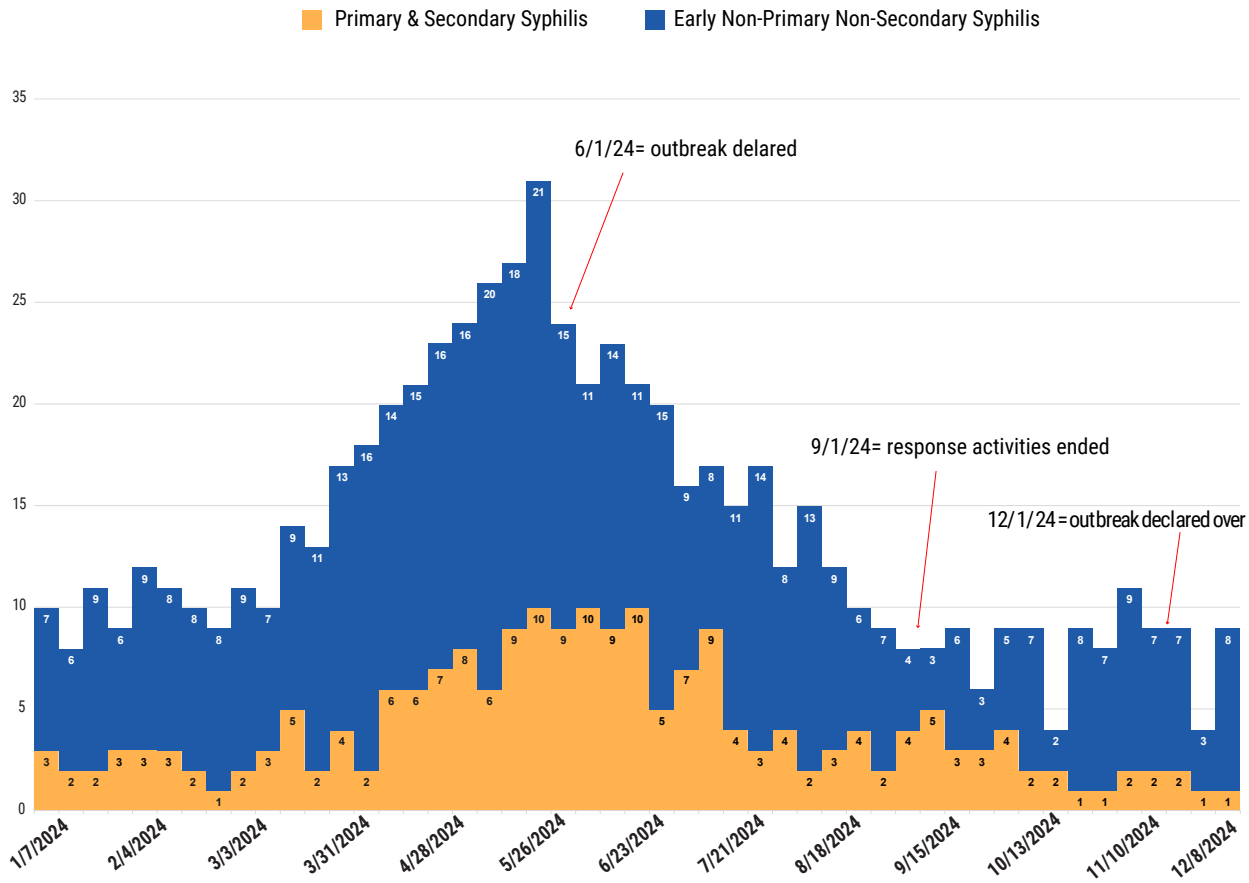
From 2023 to 2024 there was a notable increase in the proportion of women with early syphilis who:

- were of reproductive age
- were pregnant at diagnosis
- reported drug use
- reported unstable housing

Additionally, partner services data revealed that for the first five months of 2023 compared to 2024, there was an increase in the proportion of women with early syphilis who were of reproductive age, were pregnant at diagnosis, reported drug use, and being unstably housed (see Figure A). Furthermore, many of the cases were identified in the partner services notes as living in a women's shelter and had an unknown HIV status. The DI Supervisor and the LHD Surveillance Lead noted that there had been no known changes to their surveillance information system, no documented changes in screening efforts in the area, and no changes in partner services staff.

Figure B: Early syphilis cases among women by week, in the hypothetical city of Syphilopolis, 2024.
Accessible explanation on page 52.

Data reflect cases reported as of 12/9/2024



Results from the data review confirmed what the DI Professional had suspected, and the HIV/STI Director was informed of these findings. A local official was notified, and a syphilis outbreak in Syphilopolis was declared on June 1, 2024 (see Table A, week 23, red boxes, and Figure B). The DI Supervisor, who served as the Response Coordinator, requested that the State Health Department (SHD) deploy three DI professionals from other health departments to help support the outbreak response in Syphilopolis for one month, with the possibility to extend. The SHD agreed to the request.

A multi-pronged approach was used to address the outbreak, including increasing HIV/STI screening at numerous locations in Syphilopolis. As part of the outbreak response, during the month of June, a mobile clinic van was deployed to the women's shelter (the same as discussed above) in Syphilopolis for three evenings to offer free mobile HIV/STI screening and pregnancy testing. A public health nurse would return to the shelter in the mobile clinic van two evenings a week for three weeks to offer treatment to anyone who had positive laboratory results and hadn't been treated. The Public Health Nurse would also provide referrals as needed to HIV care, obstetrics care, needle exchange, and drug diversion programs.

The four (one local and three deployed) DI Professionals went to the women's shelter prior to the mobile clinic van's arrival to discuss logistics and operations with the shelter staff and to obtain the shelter census. The shelter staff stated that the census was currently at 100 women.

During the three evenings of HIV/STI screening, using rapid syphilis and HIV tests, and urine gonorrhea and chlamydia tests, 49 (49%) women were screened, of whom 4 (8%) had positive pregnancy tests. All patients with positive rapid syphilis and/or HIV tests had blood draws taken for confirmatory testing.

Laboratory results confirming new diagnoses of chlamydia, gonorrhea, syphilis and HIV from the screening events at the women's shelter are in Table B.

After one month, the three DI Professionals who were deployed to Syphilopolis returned to their regular positions.

Table B: New diagnoses during women's shelter screening events among women screened for STIs/HIV by pregnancy status (n=49)

New diagnoses	Among non-pregnant women	Among pregnant women	Total
Chlamydia	7 (14%)	0	7 (14%)
Gonorrhea	4 (8%)	0	4 (8%)
Syphilis	1 (2%)	2 (4%)	3 (6%)
HIV	1 (2%)	0	1 (2%)

Treatment and linked to care outcomes from six evenings (over three weeks) are in Table C.

Table C: Mobile clinic van treatment/linked to care outcomes for women newly diagnosed by pregnancy status

New diagnoses	Number of non-pregnant women who were treated/linked to care	Number of pregnant women treated/linked to care	Total
Chlamydia (n=7)	5 (71%)	0	5 (71%)
Gonorrhea (n=4)	2 (50%)	0	2 (50%)
Syphilis (n=3)	1 (100%)	1 (50%)	2 (67%)
HIV (n=1)	1 (100%)	0	1 (100%)

The screening events at the women's shelter were part of a broader outbreak response effort led by Syphilopolis, which included multiple community-based screening initiatives. Throughout the response, the DI Supervisor and the Surveillance Lead closely monitored many key data points to understand the trajectory of the outbreak, including:

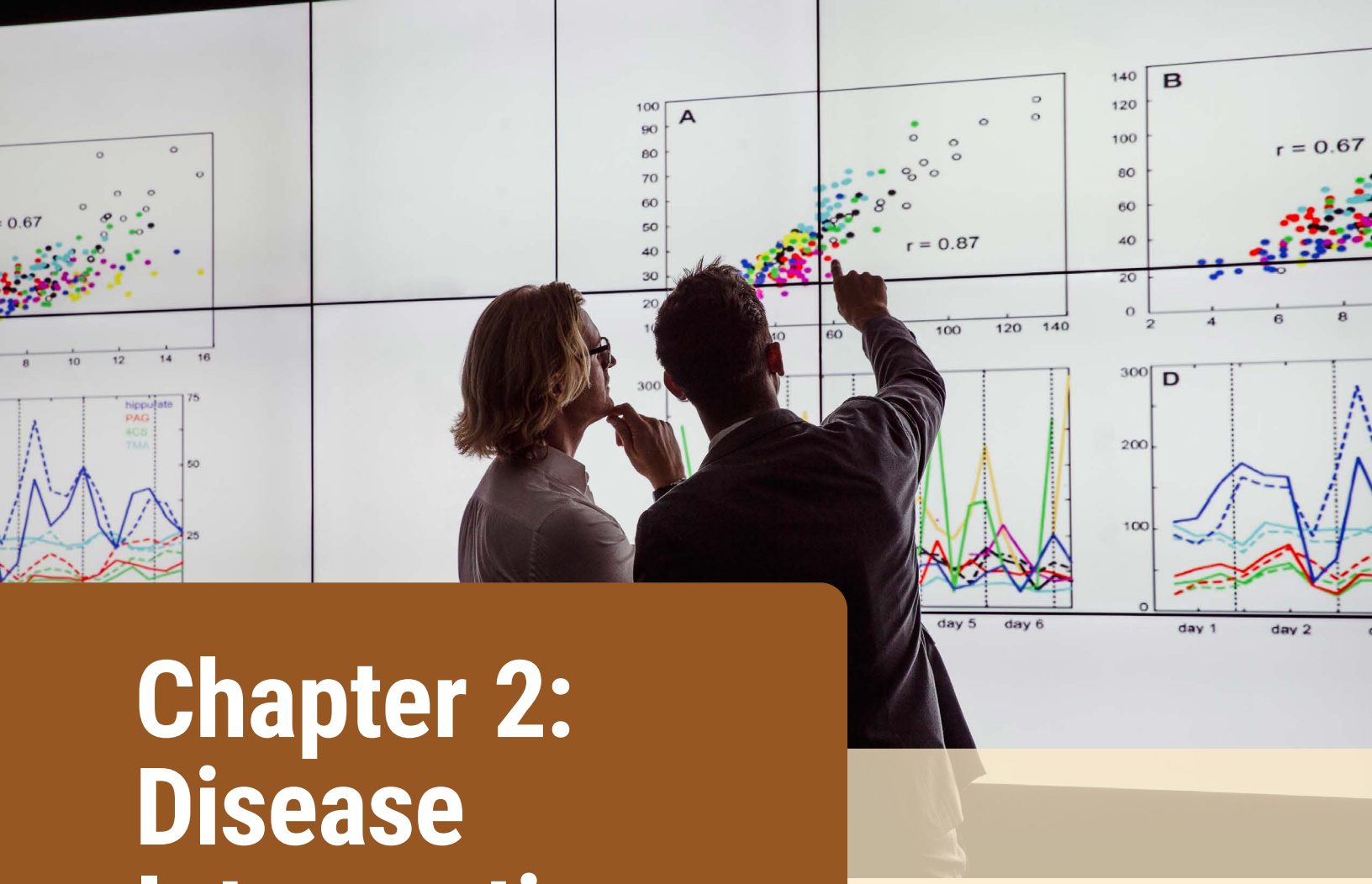
1. **New case identification:** the percentage of new syphilis cases identified through the events to assess whether the efforts were reaching the appropriate population—specifically, the sexual networks affected by the outbreak. Continued identification of new cases at screening events indicated ongoing transmission and confirmed that screening was being conducted in the correct population and setting. Conversely, when no new cases were detected, the STI Program evaluated whether the events needed to be adjusted to better reach the population at risk for syphilis, expanded to other settings (such as prenatal care, hospitals, or drug diversion programs), or if there was evidence that most undiagnosed cases had been identified.
2. **Syphilis staging:** primary and secondary syphilis cases were prioritized for interviews, treatment and partner services, as these cases indicate recent transmission.
3. **Epidemiological links:** the number of interviewed cases without epidemiological links to other known cases was reviewed. A high proportion of unlinked cases increased the likelihood that undiagnosed cases remained in the community, suggesting continued transmission risk.

The DI Supervisor continued to monitor the two pregnant women who were newly diagnosed with syphilis. The woman who was unable to be located by the Public Health Nurse for treatment had a stillbirth that met the CSTE case definition for congenital syphilis. The other woman who received timely treatment had a healthy baby with no complications.

Given competing priorities, limited resources, and evidence that the outbreak was trending in the right direction, Syphilopolis ended the outbreak response after three months on September 1, 2024 (see Table A, week 36, purple boxes, and Figure B).

After the response ended, the DI Supervisor decided to prioritize any new cases identified among the outbreak population for immediate follow-up. Additionally, the LHD STI/HIV Director urged community groups and healthcare providers to offer targeted screening to patients at increased likelihood of infection and provided regular internal and external updates on the status of the outbreak.

Per Syphilopolis' STI Outbreak Response Plan, a return to baseline transmission is used to determine when to close a STI outbreak. For Syphilopolis, the number of new cases returned to baseline for two incubation periods (180 days total for syphilis), so the outbreak was declared over on December 1, 2024 (see Table A, week 49, green boxes, and Figure B).



Chapter 2: Disease Intervention

Table of Contents

Introduction

This chapter of the toolkit offers five one-page tools designed to assist DI professionals in effectively preparing for and responding to STI outbreaks. These quick-reference resources provide practical guidance on a range of outbreak response activities. Together, these concise tools support timely, informed, and coordinated field response efforts at the state, tribal, local, and territorial levels.

How can I use STI picture cards and fact sheets during an outbreak?

Illustrative STI picture cards and fact sheets can help people with a recent STI exposure recall signs and symptoms they might have experienced, or they might have noticed among sexual and/or needle sharing partner(s). These tools are also helpful during outbreak preparedness and response work to educate people on the most common STI signs and symptoms.

The following table includes links to picture cards and fact sheets by infection.

STI	Picture card*	Fact sheet
Gonorrhea	Penile discharge, gonorrhea	About Gonorrhea | Gonorrhea | CDC
Chlamydia	Colposcopic view of a female patient's cervix	About Chlamydia | Chlamydia | CDC
Acute Salpingitis/PID	Acute Salpingitis (PID)	About Pelvic Inflammatory Disease (PID) | Pelvic Inflammatory Disease (PID) | CDC
Primary Syphilis	Penile chancre, shaft Penile chancre, underside glans Perianal chancre Oral chancre, upper lip Oral chancre, lower lip	About Syphilis | Syphilis | CDC
Secondary Syphilis	Palmar and plantar rash Plantar rash Palmar rash Alopecia (1) Alopecia (2) Generalized body rash Condylomata lata, labia Condylomata lata, penis Mucous patches, oral	
Congenital Syphilis	Congenital syphilis exhibiting classic skin rash	About Congenital Syphilis | Syphilis | CDC

***Warning:** Picture cards depict clinical presentations of STIs. They are designed for use by health care providers and health educators and may not be suitable for all audiences.

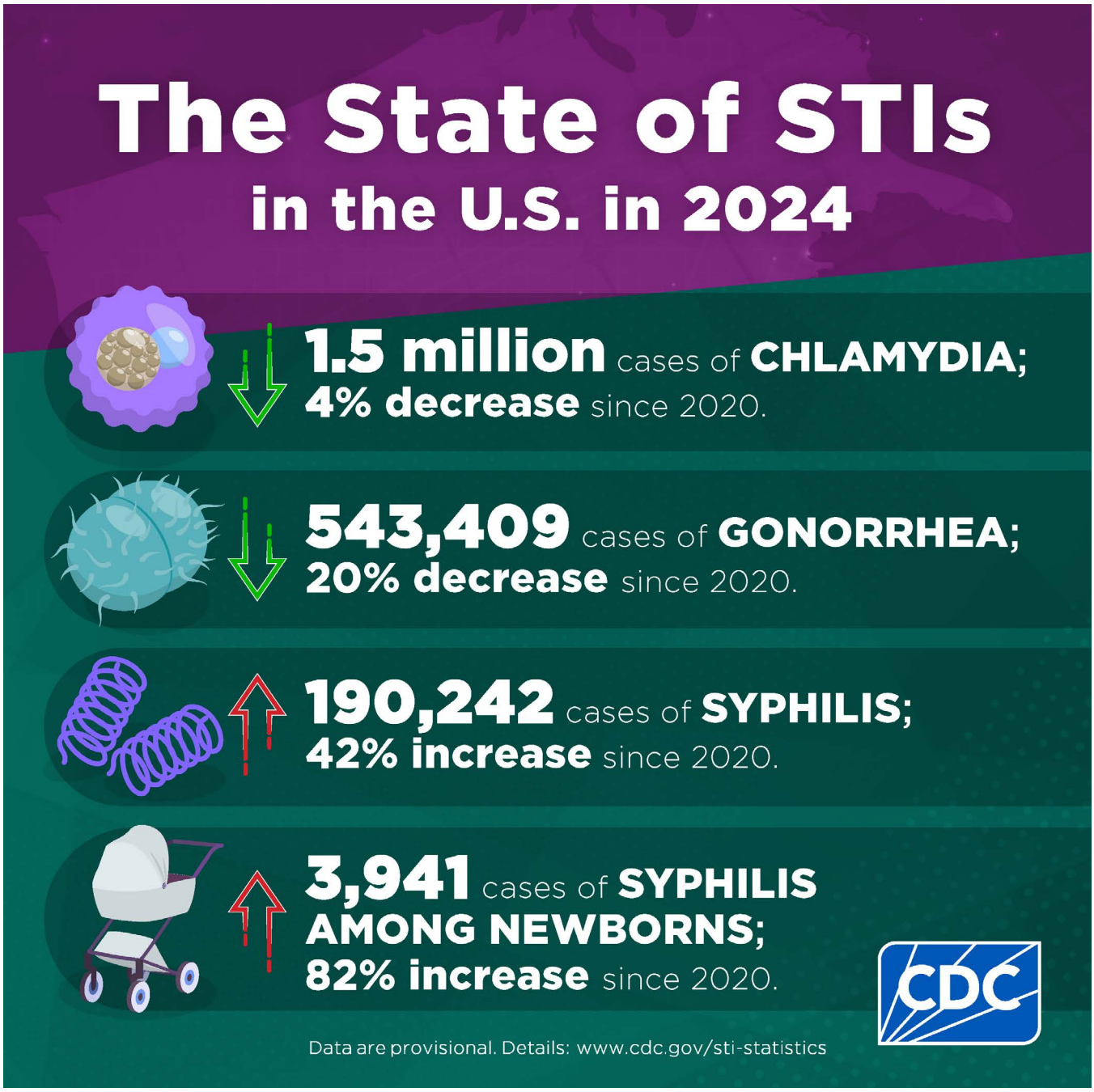
Additional resources

Female Reproductive System
Male Reproductive System
https://www.cdc.gov/sti/communication-resources/index.html

How can I visually communicate local STI data?

Use CDC's STI Surveillance Report graphics to communicate your local burden. A full infographic, as well as several versions sized for social media, can be downloaded using these customizable infographics. DI professionals and STI/HIV program staff can effectively communicate local data using these easy-to-read and visually appealing graphics! All you do is follow these instructions.

Figure 1: The state of STIs in the United States in 2024[2]. *Accessible explanation on page 53.*



[2] Source: https://www.cdc.gov/sti/php/communication-resources/the-state-of-stis.html

Where can I find nearby STI testing, treatment, vaccine and other services?

You can find STI, HIV, viral hepatitis, and mpox testing, treatment, vaccines, and other services near you by clicking on the link or scanning the QR code below.

- Organizations by Location: For information on organizations providing specific services (including STI/HIV/hepatitis testing, capacity building, HIV/STI prevention, care & treatment) in your location of interest by entering a zip code.
- Find HIV Services Near You: For information on STI, HIV, and hepatitis testing services, HIV post-exposure prophylaxis (PEP), HIV pre-exposure prophylaxis (PrEP), doxycycline post-exposure prophylaxis (doxy PEP), housing assistance, health centers and other service providers near your current location.
- PrEP Locator: A database of PrEP providers in the United States: For information on healthcare providers prescribing PrEP when ZIP code or full address is entered. Search options include PrEP for uninsured and PrEP access assistance.
- State HIV/AIDS Hotlines | Ryan White HIV/AIDS Program: For information on HIV/AIDS hotlines by state. Contact information varies by state and may include a STI/HIV hotline, national hotline, and/or AIDS Drug Assistance Program (ADAP) hotline.
- Find Doxy PEP Near You: For information locating where doxy PEP is available.

How do I conduct STI/HIV case debriefings?

Key participants: Disease Intervention (DI) professionals, supervisors, facilitator, and team lead

1. **Purpose of case debriefings:** communication and exchange of STI/HIV intelligence information to advance the DI process and meet established goals. Ensure DI staff safe return safely from field at end of day
2. **Goals:** established by the Team Lead with input from key participants
   - Linkage of cases
   - Development of relevant action plans to enhance case management
   - Identification of screening and outreach opportunities
3. **Expectations:** established by the Team Lead with input from key participants
   - Professional meeting environment
   - Clear objectives
   - Prepared presenters to summarize case(s)
   - Active participation from participants
4. **Case summary given by DI professional, would ideally include the following:**
   - Index patient's
     - Name (first, middle, last, maiden, also known as)
     - Age, race, ethnicity, sex, and sexual orientation
     - Living situation (housed/unhoused, best address)
     - Employment status (if employed, best address)
     - Diagnosis (and stage) and treatment (dosage/regimen)
     - Method of case detection
     - Reason for exam
     - Signs and symptoms
     - Serologic test results for syphilis
     - Past STI history
     - Co-infection status
     - Pregnancy history (number and outcome of pregnancies, if/where prenatal care was obtained)
     - Current pregnancy status (if currently pregnant, where patient is receiving prenatal care)
     - Hangouts
     - Drug use history including type, frequency, and partners
     - Username, partner email addresses and smart phone app avatar/name
   - Regular partner(s) name (first, middle, last, maiden, also known as) and sexual exposure information (e.g., last sexual exposure)
   - Casual partner(s) name (first, middle, last, maiden, also known as)
   - Additional source/spread candidates, including social/sexual networks/marginal/anonymous partners; name when available (first, middle, last, maiden, also known as); location (sex venue, etc.)
   - Impressions of information gathered after case interview might include:
     - Truthful
     - Cooperative
     - Withholding of information and/or inconsistencies in the information provided
   - Next steps, including if the DI professional has any identified need for assistance with this case
5. **Trends, safety, and other updates presented by facilitator and/or team lead**

Note: After each case presentation, meeting participants are encouraged to offer specific recommendations and feedback to advance disease intervention outcomes, referrals, and linkage of cases. Ideally, meeting length and time should be announced in advance of the meeting to avoid unnecessary disruptions.

How do I ascertain pregnancy status among women aged 15-44 years?

While investigating women aged 15-44 years with a syphilis/HIV field record, ascertaining their pregnancy status is essential to preventing congenital syphilis and preventing perinatal HIV transmission, regardless of the reason for testing. Ascertaining pregnancy status is also essential for women with previous positive syphilis/HIV tests or women re-entering care.

Following are potential approaches to consider in pregnancy status ascertainment:

- **Field record/Interview record**
  - Review the notes/narrative to determine if pregnancy status or last menstrual period (LMP) is documented.
- **Health management/Information system**
  - Search laboratory results and progress notes, if accessible, to determine if pregnancy status or LMP is documented.
- **Provider**
  - Contact the ordering laboratory provider, private provider, infection control nurse, corrections health services, etc., to attempt to ascertain the pregnancy status at the time of the specimen collection.
- **Hospital Electronic Medical Record (EHR)**
  - Search the patient's EHR for chief complaints, laboratory results, and progress and discharge notes to determine if pregnancy status or LMP is documented. Document the locating information for emergency contact too.
- **Client follow-up**
  - Contact the patient to obtain information on pregnancy status or LMP.
- **Incoming out-of-jurisdiction (OOJ) (in-state)**
  - Request an investigation and pregnancy status update from the initiating area.
- **Electronic Laboratory Report**
  - Review the details under the patient demographics section in all available laboratory reports to see if pregnancy status is listed; if not, call the laboratory to learn whether a pregnancy test was done.
- **Electronic Fax (E-Fax)**
  - Review the laboratory reports to learn whether a pregnancy test result was found.
- **Helpful Tip:**
  - Encourage STI/HIV prevention partners who perform syphilis and HIV testing at outreach venues, mobile testing sites, and research centers to collect and report the pregnancy status for women aged 15 – 44 years.

Chapter 3: Cost Analysis

Table of contents

Introduction

Why cost analysis?

Public health interventions have potential to improve lives and save money. A cost analysis estimates the cost of implementing a program, intervention, or outbreak response. Knowing what a response costs is vital context for understanding its value. When used alongside the tools in Chapter 4: Evaluation, a cost analysis can reveal how much it costs per evaluation outcome achieved (e.g., dollars per person screened or dollars per person brought to treatment). Below are two examples of ways these cost analysis tools can be used:

1. To compare the costs and outcomes of different response-related activities to ensure the most effective use of limited public health resources;
2. To compare the cost of an outbreak response with the costs saved by the response through reduced morbidity, so that program managers and decision makers can demonstrate the value of a public health program, intervention, or outbreak response.

How to do cost analysis

There are four steps needed to conduct a cost analysis. While the examples used here focus on STI outbreak response activities, the content applies equally well in many public health settings. The steps include:

- Step 1: Framing a cost analysis
- Step 2: Data collection
- Step 3: Analysis
- Step 4: Communicating findings

Step 1: Framing a cost analysis

Purpose

First ask yourself:

1. What is the purpose of the cost analysis?
2. What questions are you trying to answer?

Examples of ways in which a cost analysis can be used are listed in the introduction. Typically, a cost analysis is conducted to estimate the true (full) cost of an outbreak response, across all sources of support or payers. **Note that a response's budget and a response's true cost are not necessarily the same thing**. For example, resources that have already been paid for, such as computers or vehicles, might not be included in a response budget but are nonetheless part of the response's true costs if they were at least partially consumed by the response. A response can also end up being under or over budget as some resources not anticipated during the budgeting phase may end up being required.

Analysis period

Before data collection can begin, determine an analysis period. The analysis period is the period of time for which costs will be collected. Depending upon the context, an analysis period might be the entire duration, or more likely, a subset, of an outbreak response. The analysis period chosen should be as generalizable as possible, free from bias introduced by seasonality or other shocks to either costs or evaluation outcomes (e.g., an unrelated public health emergency). **Note that it is best practice to align the analysis periods for evaluation and cost analyses; this will allow for straightforward comparisons between costs and evaluation outcomes**.

Cost perspective

Before conducting a cost analysis, it is important to be intentional about choosing **whose costs are going to be analyzed**, which is known as "the cost perspective". Costs are different depending upon the perspective. Consider the example of a human papillomavirus (HPV) vaccination program. The costs to the local health department, the healthcare system, and society, are all different.

Table 1: Example of HPV vaccine program costs from varying cost perspectives

	Cost perspective		
Cost	**Local health department**	**Healthcare system**	**Society**
HPV vaccine costs	X	X	X
Patient time/travel costs			X
Averted cervical cancer costs		X	X

Cost domains

It is helpful to think about costs as the "ingredients" needed to make an outbreak response happen. These ingredients can be framed in terms of distinct categories or cost domains. Some common cost domains include personnel, travel, supplies, equipment, contracted services, utilities, buildings, or laboratory expenses. Not all these domains will be relevant for every cost analysis. Select the cost domains relevant to the context. For a complete micro cost analysis, which includes all costs, however small, consider whether the domains you have selected fully capture all the ingredients required for the outbreak response to take place. For a quicker, high-level cost analysis, focus on the domains that are likely major cost drivers such as personnel or laboratory expenses.

Step 2: Data collection

Data on costs incurred during the specified analysis period should be collected for all relevant cost domains identified during Step 1: Framing. Below are some key factors to keep in mind when collecting cost data:

- **Allocation:** Many resources, including personnel, may not be allocated 100% to the outbreak response. For these personnel, estimate the percentage of their time allocated to the response during the analysis period.
- **Source of support:** For a true (full) accounting of cost, include all resources required for the outbreak response to function, regardless of who paid for them. For each cost ingredient, record who paid for it or the percentage that different payers contributed (e.g., 40% local health department, 40% state, 20% federal grant). Having this information available allows for analyzing costs from multiple payers, which may be needed in the future. Note that source of support is not necessarily equivalent to the

cost perspective discussed in Step 1. For example, consider an outbreak response involving a federal DI professional embedded in a local health department. The federal government pays the federal DI Professional's salary and is therefore the source of support. However, the cost of deploying that DI Professional during an outbreak response would still be included in the cost perspective of the local health department because deploying the embedded federal DI professional cost the local health department the opportunity to apply the value of that labor elsewhere.

- **Cost by activity:** Costs for distinct outcomes should be recorded as separately as possible.
  - For example, if an outbreak response involved DI professionals bringing people to testing and/or treatment and training other DI professionals, then the percent of time spent on each activity should be recorded separately (e.g., 15% syphilis testing, 15% HIV testing, 35% connecting patients to treatment, 25% training, 10% other). Doing so allows the eventual calculation of cost per person brought to treatment separate from the cost per additional DI professional trained.
- **Supplies versus equipment:** A distinction should be made between supplies and equipment. Supplies are single or limited use items (e.g., gloves). Equipment include larger, more durable items that have a useful life beyond the outbreak response (e.g., computers, laboratory equipment, or vehicles). Because equipment has a useful life prior to and/or following a response, only the portion of equipment consumed by the response should be counted as a response cost. This can be done by using an amortization. For example, if a response involved a $2,000 computer with a useful life of 5 years, then the computer could be thought of as costing about $400 per year.

Step 3: Analysis

- **Review** the cost data and ensure that all costs are expressed in terms of the relevant analysis period.
  - For example, if the analysis period is 6 months, then personnel salary should be adjusted from annual to 6 months. If a year's worth of supplies were purchased, then the value should be adjusted down to the share of those supplies used during the 6-month analysis period. Similarly, any equipment with a useful life outside of the outbreak response should have its value amortized to reflect only the portion of the value consumed by the response during the analysis period.
- **Multiply** the cost of each ingredient used during the analysis period by the percentage of that item that was allocated to or used by the outbreak response to compute allocation adjusted costs. The resulting product can then be further multiplied by the share paid for by difference sources of support (which was identified during Step 2 in "Source of Support") to determine the cost to various payers. Additionally, the product can be multiplied by the percentage of that item used in furtherance of each outcome or activity (noting that categories should be mutually exclusive and the percentage across all outcomes or activities must add to 100%).
- **Add** all allocation adjusted costs to calculate a grand total. Add costs by source of support to calculate the total cost to different payers. Finally, to the extent possible, add costs by distinct activity or outcome category to calculate the total cost of each activity.
- **Divide** costs specific to certain outcomes by the number of the given outcome (where possible) to calculate the cost per outcome.
  - For example, if it costs $20,000 to screen 100 people, the cost per person screened is $200, calculated as $20,000 divided by 100. In instances where costs are not separable across outcomes, costs should be contextualized by listing all associated outcomes.
  - For example, as in the case study below, it cost $26,333 to screen 49 people and treat two cases of syphilis, five cases of chlamydia, two cases of gonorrhea, and link one person newly diagnosed with HIV to care.

- **Compare** the costs calculated to the estimated costs averted by prevention activities using tools such as CDC's STIC Figure 2.0[3]. Subtract the costs averted by response activities from the response costs to calculate the net cost. In some cases, the costs averted or saved will be greater than the cost of the response, resulting in a negative net cost. In such instances, the response is said to be cost saving. (Note that while frequently mistakenly used interchangeably, the terms "cost saving" and "cost effective" have different meanings; both are defined below).

Step 4: Communicating findings

Key terms

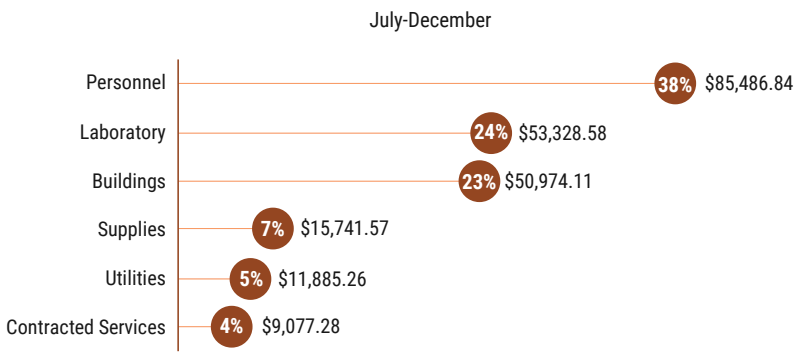
- **Net cost:** the response's cost minus the costs averted by the response (e.g., direct medical costs averted through reduced morbidity).
  - For example, if an HIV outbreak response cost $70,000 and averted $50,000 in HIV-related medical costs, then the net cost of the response would be $20,000.
- **Cost saving:** when the net cost of a program, intervention, or outbreak response is negative. That is, if the cost of implementing a given response was less than the costs averted by the response.
  - For example, if an HIV outbreak response cost $40,000 and averted $50,000 of HIV-related medical costs, then the net cost of the response would be -$10,000. In this case, the HIV response would be cost saving.
- **Cost effective:** while often confused with cost saving, cost effectiveness is a distinct concept dealing with comparisons between an intervention and another intervention (or the status quo). Something is said to be costeffective if the outcome achieved is worth the cost.
  - For example, suppose Program A screens 500 people for HIV at a cost of $100 per person screened. Program A would be considered cost-effective by those who think it is worth $100 or more to screen a person for HIV.

Visualization

Visualizations can communicate data in a way that is intuitive and easy to understand. Consider visualizations depicting the relative share of costs attributable to different cost domains or payers. The following examples were generated using Microsoft Excel.

- **Bar graphs or lollipop graphs** are a good way to depict the relative size of different cost domains.

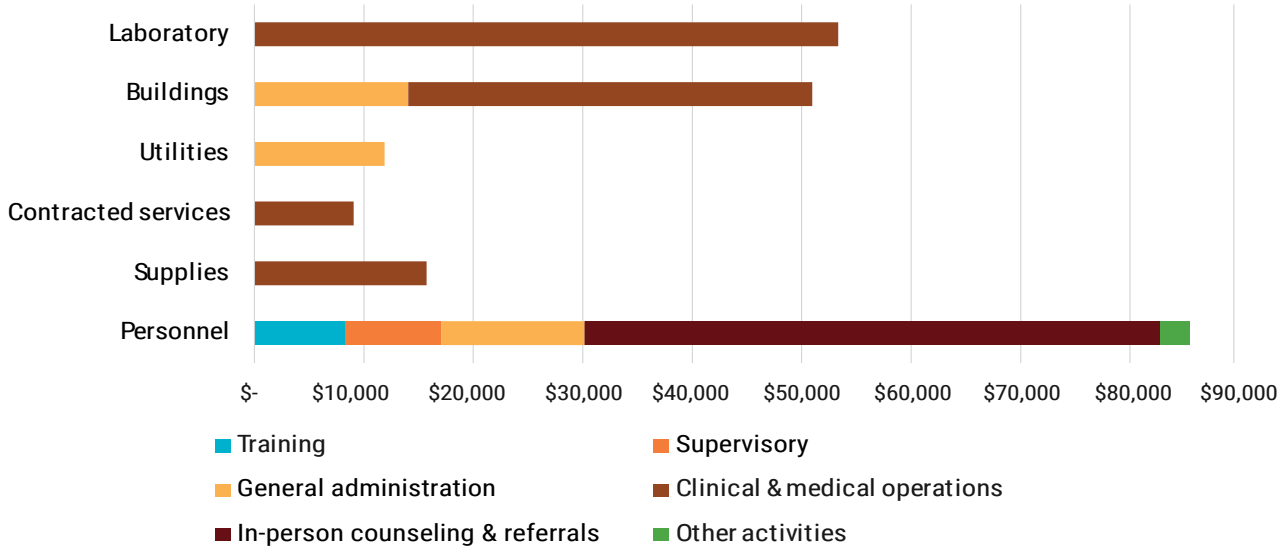
Figure 1: Example costs by domain. *Accessible explanation on page 53.*



3 Chesson HW, Williams AM, Ansari B, Islam MH, Johnson BL, Collins D, Gift TL, Martin EG. An Updated Spreadsheet Tool to Estimate the Health and Economic Benefits of STI and HIV Prevention Activities. Sex Transm Dis. 2025 Mar 3. doi: 10.1097/OLQ.0000000000002147. Downloadable from https://www.cdc.gov/sti/php/sti-program-resources/stic-figure.html.

- **Stacked bar graphs** have the added benefit of being able to communicate how subcategories (e.g., sources of support or activities) make up each cost domain.

Figure 2: Example costs by domain and programmatic activity. *Accessible explanation on page 53.*



Case study

An astute Disease Intervention (DI) Professional working in the local health department (LHD) in the hypothetical city of Syphilopolis brought a potential syphilis outbreak to the attention of the DI Supervisor after noticing a lot of field records being generated for women with an address of a women's shelter.

The DI Supervisor met with the LHD Surveillance Lead to do an in-depth review of the recent syphilis data. Results from the data review confirmed what the DI Professional had suspected, and the LHD HIV/STI Director was informed of these findings. A local official was notified, and a syphilis outbreak in Syphilopolis was declared on June 1, 2024. The DI Supervisor, who served as the Response

Coordinator, requested that the State Health Department (SHD) deploy three DI Professionals from other health departments to help support the outbreak response in Syphilopolis for one month, with the possibility to extend. The SHD agreed to the request.

A multi-pronged approach was used to address the outbreak, including increasing HIV/STI screening at numerous sites in Syphilopolis. As part of the outbreak response, during the month of June, a mobile clinic van was deployed to the women's shelter (the same as discussed above) in Syphilopolis for three evenings to offer free mobile HIV/STI screening and pregnancy testing. A Public Health Nurse would return to the shelter in the mobile clinic van two evenings a week for three weeks to offer treatment to anyone who had positive lab results and hadn't been treated. The Public Health Nurse would also provide referrals as needed to HIV care, obstetrics care, needle exchange, and drug diversion programs.

The four (one local and three deployed) DI Professionals went to the women's shelter prior to the mobile clinic van's arrival to discuss logistics and operations with the shelter staff and to obtain the shelter census. The shelter staff stated that the census was currently at 100 women.

During the three evenings of HIV/STI screening, using rapid syphilis and HIV tests, and urine gonorrhea and chlamydia tests, 49 (49%) women were screened, of which 4 (8%) had positive pregnancy tests. All patients with positive rapid syphilis and/or HIV tests had blood draws taken for confirmatory testing.

Laboratory results confirming new diagnoses of chlamydia, gonorrhea, syphilis and HIV from the screening events at the women's shelter are in Table A.

Table A: New diagnoses during women's shelter screening events among women screened for STIs/HIV by pregnancy status (n=49)

New diagnoses	Among non-pregnant women	Among pregnant women	Total
Chlamydia	7 (14%)	0	7 (14%)
Gonorrhea	4 (8%)	0	4 (8%)
Syphilis	1 (2%)	2 (4%)	3 (6%)
HIV	1 (2%)	0	1 (2%)

Treatment and linked to care outcomes from six evenings (over three weeks) are in Table B.

Table B: Mobile clinic van treatment/linked to care outcomes for women newly diagnosed by pregnancy status

New diagnoses	Number of non-pregnant women who were treated/linked to care	Number of pregnant women treated/linked to care	Total
Chlamydia (n=7)	5 (71%)	0	5 (71%)
Gonorrhea (n=4)	2 (50%)	0	2 (50%)
Syphilis (n=3)	1 (100%)	1 (50%)	2 (67%)
HIV (n=1)	1 (100%)	0	1 (100%)

The screening events at the women's shelter were part of a broader outbreak response effort led by Syphilopolis, which included multiple community-based screening initiatives. Throughout the response, the DI Supervisor and the Surveillance Lead closely monitored many key data points to understand the trajectory of the outbreak. After one month, the three DI professionals who were deployed to Syphilopolis returned to their regular positions.

The DI Supervisor continued to monitor the two pregnant women who were newly diagnosed with syphilis. The woman who was unable to be located by the Public Health Nurse for treatment had had a stillbirth that met the CSTE case definition for congenital syphilis. The other woman who received timely treatment had a healthy baby with no complications.

Syphilopolis declared the outbreak over on December 1, 2024.

During the mobile clinic van portion of the outbreak response from June 1-July 1, 2024, the DI Supervisor had an annual salary of $75,000 funded entirely by the LHD and spent about half their time on the syphilis response. During the same period, the local DI Professional, with an annual salary of $55,000, worked on the syphilis response full time plus an additional 8 hours of overtime valued at 1.5 times their regular hourly wage equivalent. The three additional SHD DI Professionals, each with an annual salary of $45,000, spent four of their five workdays each week on the mobile clinic portion of the response (i.e., 80% of their time) during the entire month of June. Fringe benefits for all personnel cost about 20% of their salary. Half of the local DI Professional's time was paid for by the LHD and half was paid for by a grant from the SHD. The three additional DI Professionals were paid entirely by the SHD for the duration of the mobile clinic portion of the response. State and local DI Professionals used three boxes of latex gloves ($20 each) and administered pregnancy tests ($15 each), rapid syphilis tests ($10 each), rapid HIV tests ($9 each), and GC/CT urine tests ($16 each) to 49 women. Those with positive rapid syphilis or rapid HIV tests received confirmatory testing ($30 each for syphilis and $20 each for HIV). Supplies, including all tests, were purchased by the LHD.

The mobile clinic van utilized was provided by the SHD. At the beginning of the syphilis response, the van was already an older vehicle worth about $8,000 with an estimated seven years of useful life remaining.

A Public Health Nurse with an annual salary of $65,000 employed by the LHD accompanied the mobile clinic van to administer syphilis, chlamydia, and gonorrhea treatment on two 8-hour evening shifts per week for three weeks (i.e., six of 21 workdays between June 1- July 1, or 28.6% of their time). By the end of the mobile clinic portion of the response, one woman who was not pregnant and one woman who was pregnant had been treated for early syphilis ($568.16 for one dose of penicillin G benzathine each), five women had been treated for chlamydia ($37 for one course of doxycycline each), and two women had been treated for gonorrhea ($35 for one dose of ceftriaxone each). DI Professionals were also able to link one woman newly diagnosed with HIV to care. All treatment was paid for by the LHD.

Step 1: Framing the analysis

- **Purpose:** To determine how much the mobile clinic portion of the response cost in total and how much the LHD spent on each cost domain.
- **Analytic period:** The entire duration of the mobile clinic portion of the response, from June 1- July 1, or 1/12 a year.
- **Cost perspective:** The full monetary cost of the mobile clinic portion of the response, regardless of source of support. (The cost to different payers can be calculated during

Step 3: The analysis, if source of support for each costed item is recorded in Step 2: Data collection).

- **Cost domains:** List the cost ingredients. The response required staff, including DI Professionals, a Public Health Nurse, and a DI Supervisor (who also worked as the Response Coordinator). Supplies, such as gloves, test kits, and medication should be counted and the value of the mobile clinic van utilized by the response will also need to be included. Therefore, in this situation, the relevant cost domains are personnel, supplies and equipment. Note that for simplicity, this case study uses cost values for illustrative purposes and omits several cost domains that might be relevant to an outbreak response, such as travel, building space and utilities, computers and other equipment.

Step 2: Data collection

Table C: Personnel cost data

Position	Annual salary (without 20% fringe benefits)	Overtime cost	Allocation	Source of support
DI Professional #1	$55,000	$317.31	100%	50% LHD; 50% SHD
DI Professional #2	$45,000	0	80%	100% SHD
DI Professional #3	$45,000	0	80%	100% SHD
DI Professional #4	$45,000	0	80%	100% SHD
Public Health Nurse	$65,000	0	28.6%	100% LHD
DI Supervisor	$75,000	0	50%	100% LHD

Note: *Here, overtime costs were computed using an hourly wage equivalent assuming a 2080-hour work year (40 hours per week for 52 weeks). However, users might opt to apply a work year of fewer than 2080 hours to account for paid vacation time.*

Table D: Supplies cost data

Item	Unit cost	Number of units	Source of support
Box of gloves	$20	3	100% LHD
Pregnancy test	$15	49	100% LHD
Rapid syphilis test	$10	49	100% LHD
Syphilis confirmatory test	$30	3	100% LHD
Rapid HIV test	$9	49	100% LHD
HIV confirmatory test	$20	1	100% LHD
GC/CT urine test	$16	49	100% LHD
Syphilis treatment	$568.16	2	100% LHD
Chlamydia treatment	$37	5	100% LHD
Gonorrhea treatment	$35	2	100% LHD

Table E: Equipment costs data

Item	Length of time used	Value	Useful life	Allocation	Source of support
Mobile clinic van	1 month	$8,000	7	100%	100% SHD

Step 3: Analysis

Table F: Personnel cost analysis

Personnel	Annual salary		Length of response (in years)		20% fringe benefits		Overtime		Allocation		Mobile clinic response cost
DI Professional #1	($55,000	×	(1/12)	×	1.20	+	$317.31)	×	100%	=	$5,817.31
DI Professional #2	($45,000	×	(1/12)	×	1.20	+	$0)	×	80%	=	$3,600
DI Professional #3	($45,000	×	(1/12)	×	1.20	+	$0)	×	80%	=	$3,600
DI Professional #4	($45,000	×	(1/12)	×	1.20	+	$0)	×	80%	=	$3,600
Public Health Nurse	($65,000	×	(1/12)	×	1.20	+	$0)	×	28.6%	=	$1,859
DI Supervisor	($75,000	×	(1/12)	×	1.20	+	$0)	×	50%	=	$3,750
Total											$22,226.31

Table G: Supplies cost analysis

Item	Cost per unit		Number of units		Mobile clinic response cost
Box of gloves	$20	×	3	=	$60
Pregnancy tests	$15	×	49	=	$735
Rapid syphilis tests	$10	×	49	=	$490
Syphilis confirmatory test	$30	×	3	=	$90
Rapid HIV tests	$9	×	49	=	$441
HIV confirmatory test	$20	×	1	=	$20
GC/CT urine tests	$16	×	49	=	$784
1 dose penicillin G benzathine (syphilis treatment)	$568.16	×	2	=	$1,136.32
1 course of doxycycline (chlamydia treatment)	$37	×	5	=	$185
1 dose ceftriaxone (gonorrhea treatment)	$35	×	2	=	$70
Total					$4,011.32

Table H: Equipment cost analysis

Item	Remaining value		Useful life remaining (in years)		Length of use (in years)		Mobile clinic response cost
Mobile clinic van	$8,000	÷	7	×	(1/12)	=	$95.24

Note: *This amortized value assumes the van will be worth $0 at the end of its useful life. If, for example, the van could be sold for parts for $1,000, then the amortized value would be about ($8,000 - $1,000) / 7. This is a simplified formula ignoring a discount rate (typically 3%).*

Table I: Total mobile clinic response cost and cost by source of support

Ingredient	Total	Cost to LHD	Cost to SHD
DI Professional #1	$5,817	$2,909	$2,909
DI Professional #2	$3,600	$0	$3,600
DI Professional #3	$3,600	$0	$3,600
DI Professional #4	$3,600	$0	$3,600
Public Health Nurse	$1,859	$1,859	$0
DI Supervisor	$3,750	$3,750	$0
Gloves	$60	$60	$0
Pregnancy tests	$735	$735	$0
Rapid syphilis tests	$490	$490	$0
Syphilis confirmatory test	$90	$90	$0
Rapid HIV tests	$441	$441	$0
HIV confirmatory test	$20	$20	$0
GC/CT urine tests	$784	$784	$0
Syphilis treatment	$1,136	$1,136	$0
Chlamydia treatment	$185	$185	$0
Gonorrhea treatment	$70	$70	$0
Mobile clinic van	$95	$0	$95
Total	$26,333	$12,529	$13,804

Note: *Totals do not match exactly due to rounding.*

Evaluation outcomes and costs averted

By conducting this cost analysis in conjunction with an evaluation (see Chapter 4: Evaluation), we can frame costs in terms of outcomes achieved. It cost $26,333 to treat one case of syphilis in a non-pregnant woman, one case of syphilis in a pregnant woman, five cases of chlamydia, and two cases of gonorrhea, as well as link one woman newly diagnosed with HIV to care.

Plugging our evaluation outcomes into CDC's STIC Figure 2.0 tool (see https://www.cdc.gov/sti/php/sti-program-resources/stic-figure.html) yields the following estimated medical costs averted.

Table J: Evaluation outcomes and direct medical costs averted

	Estimated direct medical costs averted*		
Evaluation outcome	**Base**	**Low**	**High**
1 syphilis case treated (non-pregnant woman)	$2,287	$1,116	$2,924
1 syphilis case treated (pregnant woman)	$9,573	$6,100	$11,718
5 chlamydia cases treated	$1,476	$828	$1,836
2 gonorrhea cases treated	$519	$274	$649
1 newly diagnosed HIV case linked to care	$5,093	$4,093	$5,892
Total	$18,948	$12,412	$23,018

** Dollar estimates were obtained by entering each outcome into STIC Figure 2.0 one at a time. Outcomes for pregnant and non-pregnant women were obtained by setting the "% of females with syphilis who are pregnant" parameter under Advanced Options to 100% and 0%, respectively.*

Note: *Totals do not match exactly due to rounding.*

Step 4: Communicating findings

Key findings

The mobile clinic portion of the response cost an estimated $26,333. The major cost driver was personnel, accounting for 84% of total costs. The LHD and SHD contributed 48% and 52% of the mobile clinic response costs, respectively. By screening and treating people for syphilis, chlamydia, gonorrhea, as well as screening and linking people with newly diagnosed HIV to care, the response averted an estimated $18,948 in direct medical costs. The net cost of the mobile clinic portion of the response, calculated as the cost of the mobile clinic portion of the response minus the direct medical costs averted, was $7,385.

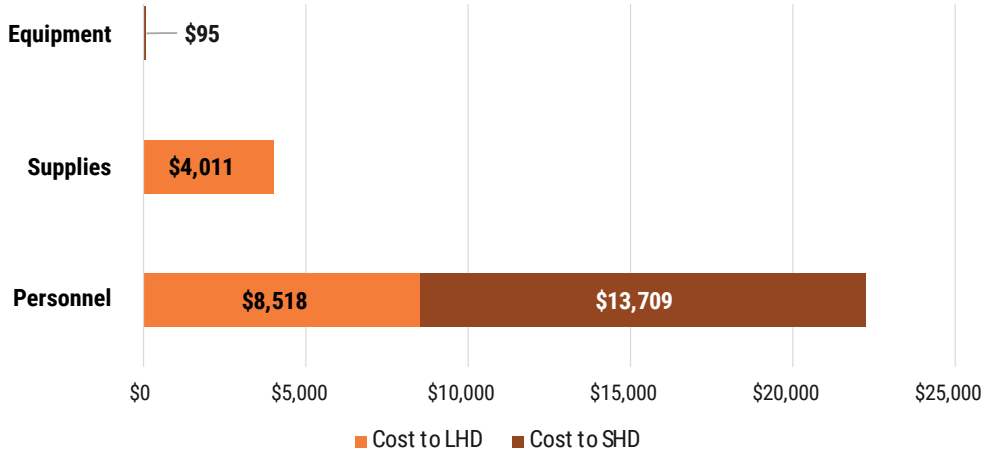
Table K: Summary table

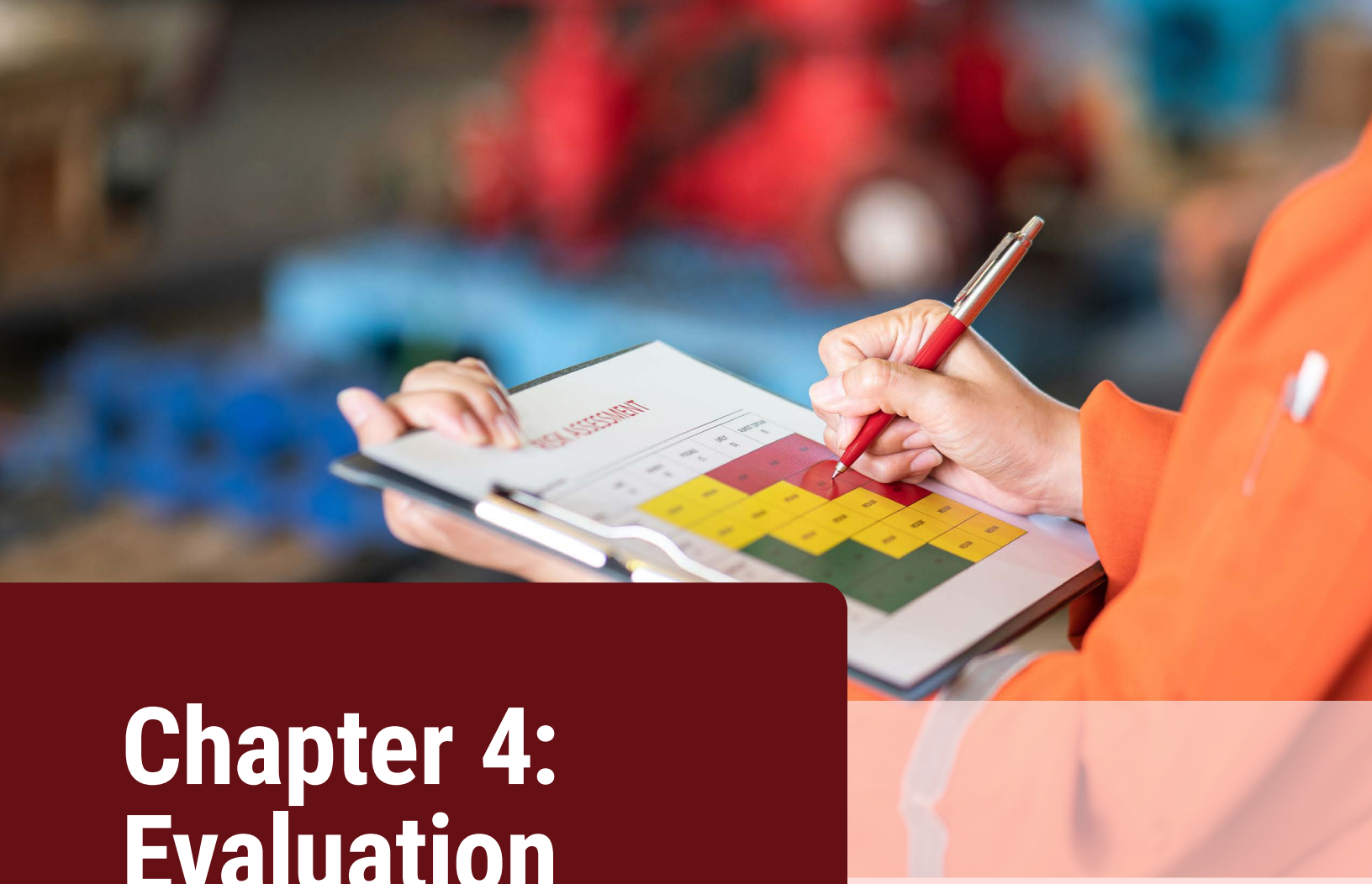
Cost domain	Mobile clinic response cost	Cost to LHD	Cost to SHD
Personnel	$22,226	$8,518	$13,709
Supplies	$4,011	$4,011	$0
Equipment	$95	$0	$95
Total	$26,333	$12,529	$13,804

Note: *Totals do not match exactly due to rounding.*

Visualization

Figure A: Mobile clinic response cost by source of support. *Accessible explanation on page 53.*





Chapter 4: Evaluation

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Introduction

What is evaluation?

Evaluation is using program data to analyze the efficiency or efficacy of a program. Evaluation can be used for quality improvement, decision-making, or to describe program outcomes.

There are multiple evaluation types. The most common are process and outcome evaluations. A process evaluation looks at how a program operates, while an outcome evaluation looks at the results of a program or intervention. Process evaluation can help assess whether activities or job duties occurred as planned and if program elements were implemented on time. Other evaluation types include formative, summative, impact, developmental, and cost-effectiveness.

What is evaluation in an outbreak context?

The same principles of evaluation in a regular program context apply to an evaluation in an outbreak context. Evaluation can help STI programs and health departments assess the processes that might have contributed to the outbreak to identify opportunities for improvement. It can also evaluate the outbreak response itself – lessons learned, successes, and service gaps found.

Evaluation questions

What is an evaluation question?

An evaluation question is a type of research question.

- A research question attempts to generate new knowledge about a topic and can be broad.
  - For example: "What social and behavioral factors contribute to the spread of STIs among young adults in urban areas?"
- Evaluation questions assess a program or intervention, and often focus on topics like relevance, suitability, or effectiveness.
  - For example: "How effective was the recent public health campaign in increasing testing rates for STIs among young adults in urban areas?"

Sample outbreak evaluation questions[4]

- Which outbreak response activities resulted in success, e.g., highest increase in testing or treatment?
- Which of the pre-determined outbreak response goals were accomplished?
- What key factors led to success in reaching the response goals?
- What key challenges prevented response goals from being met?
- To what extent were additional services implemented/expanded as planned?
- What would we change when responding to future outbreaks?

[4] Adapted from HIV Cluster Detection Response Toolkit

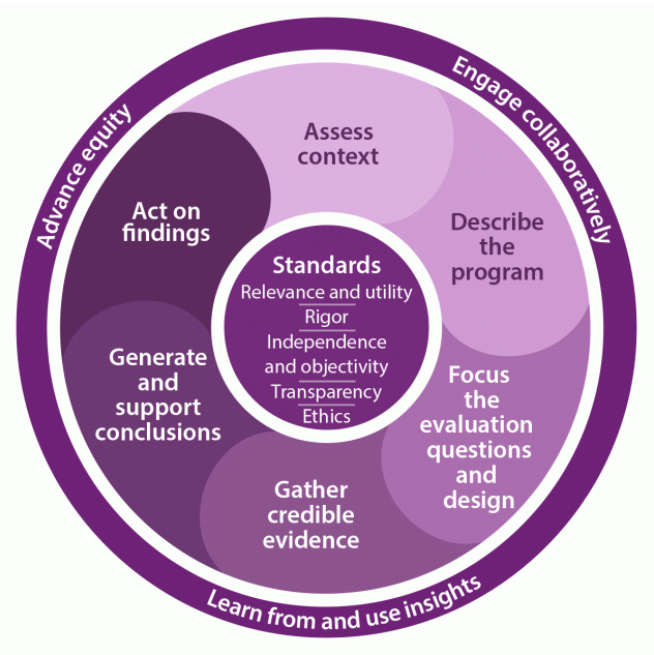
How to conduct an evaluation using the CDC Program Evaluation Framework

The CDC Program Evaluation Framework lists six steps an evaluation should follow, including:

1. Assess context
   a. Understand the context including readiness for evaluation, interest holders, place, and evaluation capacity".[5]
   b. Decide if the program can conduct an evaluation.
2. Describe the program
   a. "Create narrative description.... and logic model or program roadmap".[5]
   b. Describe the program using a logic model or program roadmap to understand the inputs, outputs, activities, and desired outcomes.
3. Focus the evaluation questions and design
   a. Formulate the "purpose, evaluation type, intended users and use, evaluation questions, and evaluation design".[5]
   b. Develop the questions to be answered and the design of the evaluation.
4. Gather credible evidence
   a. "Establish expectations, methods, indicators, data sources, data quantity and quality, data collection, and context considerations".[5]
   b. Develop data collection methods and collect data.
5. Generate and support conclusions
   a. "Analyze, interpret, and make recommendations".[5]
   b. Analyze the data and evidence collected in Step 4.
6. Act on findings
   a. "Plan, prepare findings for use, and facilitate insights into action".[5]
   b. Share the evaluation findings with relevant interest holders and put them into practice.

Figure 1: 2024 CDC Evaluation Framework[5]

Accessible explanation on page 54.



While the steps are linear, they are also interdependent. For instance, when gathering credible evidence, the evaluator might also think about how to act on findings.

[5] Kidder, Daniel P, Fierro, Leslie A, Luna, Elena, et al. *CDC Program Evaluation Framework, 2024*. MMWR Recomm Rep 2024;73(No. RR-6

Evaluation resources

Name: CDC Program Evaluation Framework, 2024

Link: https://www.cdc.gov/mmwr/volumes/73/rr/rr7306a1.htm

Description: Guides CDC evaluation work.

Name: CDC's Program Evaluation Framework Action Guide

Link: https://www.cdc.gov/evaluation/media/pdfs/2024/12/FINAL-Action-Guide-for-DFE-12182024_1.pdf

Description: Accompanies the 2024 CDC Evaluation Framework as a "how to" guide.

Name: Asthma Evaluation Resources

Link: https://www.cdc.gov/national-asthma-control-program/php/program_eval/guide.html

Description: Offers numerous resources, including a toolkit, textbook, and guide, geared towards program evaluation. From the CDC National Asthma Control Program and applicable to STI program evaluation.

Name: Evaluation Plan Template

Description: Provides evaluation templates from the CDC National Asthma Control Program and applicable to STI program evaluation.

Name: Rapid Community Assessment Guide

Link: https://www.cdc.gov/vaccines/covid-19/vaccinate-with-confidence/rca-guide/index.html

Description: Serves as an excellent guide on how to conduct a rapid community assessment to inform program design; geared towards the evaluation of vaccination and can be applied to STI program evaluation.

Name: Evaluation Design Guidance

Link: https://www.cdc.gov/overdose-resources/media/pdfs/2025/03/Evaluation-Profile-for-Naloxone-Distribution-Programs.pdf

Description: Demonstrates how to conduct evaluations, oftentimes using programmatic data, to produce actionable and timely findings; geared towards the evaluation of naloxone distribution and can be applied to STI program evaluation.

Name: Indigenous Evaluation Toolkit

Link: https://www.indigenousphi.org/tribal-opioid-use-disorders-prevention/indigenous-evaluation-toolkit

Description: Offers "…step-by-step guidance, worksheets and concrete examples to support communities".

Name: Liberating Structures (see LS Menu)

Link: https://www.liberatingstructures.com/

Description: Provides 33 more options to the big five conventional approaches of focus groups, which are often part of an evaluation process.

Name: Western Michigan University Evaluation Center

Link: https://wmich.edu/evaluation/checklists

Description: Includes detailed checklists to guide the evaluation process.

Case study

An astute Disease Intervention (DI) Professional working in the local health department (LHD) in Syphilopolis brought a potential syphilis outbreak to the attention of the DI Supervisor after noticing a lot of field records being generated for women with an address of a women's shelter.

The DI Supervisor met with the Surveillance Lead to do an in-depth review of the recent syphilis data. Results from the data review confirmed what the DI Professional had suspected, and the HIV/STI Director was informed of these findings. A local official was notified, and a syphilis outbreak in Syphilopolis was declared on June 1, 2024. The DI Supervisor, who served as the Response Coordinator, requested that the State Health Department (SHD) deploy three DI Professionals from other health departments to help support the outbreak response in Syphilopolis for one month, with the possibility to extend. The SHD agreed to the request.

A multi-pronged approach was used to address the outbreak, including increasing HIV/STI screening at numerous sites in Syphilopolis. As part of the outbreak response, during the month of June, a mobile clinic van was deployed to the women's shelter (the same as discussed above) in Syphilopolis for three evenings to offer free mobile HIV/STI screening and pregnancy testing. A Public Health Nurse would return to the shelter in the mobile clinic van two evenings a week for three weeks to offer treatment to anyone who had positive lab results and hadn't been treated. The Public Health Nurse would also provide referrals as needed to HIV care, obstetrics care, needle exchange, and drug diversion programs.

The four (one local and three deployed) DI Professionals went to the women's shelter prior to the mobile clinic van's arrival to discuss logistics and operations with the shelter staff and to obtain the shelter census. The shelter staff stated that the census was currently at 100 women.

During the three evenings of HIV/STI screening, using rapid syphilis and HIV tests, and urine gonorrhea and chlamydia tests, 49 (49%) women were screened, of which 4 (8%) had positive pregnancy tests. All patients with positive rapid syphilis and/or HIV tests had blood draws taken for confirmatory testing.

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Treatment and linked to care outcomes from six evenings (over three weeks) are in Table B.

Table B: Mobile clinic van treatment/linked to care outcomes for women newly diagnosed by pregnancy status

New diagnoses	Number of non-pregnant women who were treated/linked to care	Number of pregnant women treated/linked to care	Total
Chlamydia (n=7)	5 (71%)	0	5 (71%)
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Syphilis (n=3)	1 (100%)	1 (50%)	2 (67%)
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The screening events at the women's shelter were part of a broader outbreak response effort led by Syphilopolis, which included multiple community-based screening initiatives. Throughout the response, the DI Supervisor and the Surveillance Lead closely monitored many key data points to understand the trajectory of the outbreak. After one month, the three DI Professionals who were deployed to Syphilopolis had to return to their regular positions.

The DI Supervisor continued to monitor the two pregnant women who were newly diagnosed with syphilis. The woman who was unable to be located by the Public Health Nurse for treatment had a stillbirth that met the CSTE case definition for congenital syphilis. The other woman who received timely treatment had a healthy baby with no complications.

The LHD in Syphilopolis declared the outbreak over on December 1, 2024.

During routine partner services interviews and interviews with a few non-patients from the shelter, a few themes were identified:

1. Trust and confidentiality; 95% of respondents liked the local DI Professional and trusted them to be confidential;
2. Transportation and logistical issues; 80% of respondents did not have transportation to go to the health department for STI testing because it wasn't on the bus line and was only open 8:30-4:30 Monday-Friday;
3. Patient experience; 75% of respondents felt the staff at the health department was not very welcoming, especially because of the long wait times. One patient said, "last time I went there to get tested, I waited over an hour to be taken back, and then everything else took another hour and a half." Another patient said, "they always call me a frequent flyer just because I come in for testing every six months. That's what the DI professional said to do!!"

The LHD in Syphilopolis closed two hours early on consecutive Mondays so that the HIV/STI program staff could attend a patient-centered training.

Six months later, the mobile clinic van has continued to offer HIV/STI screening and treatment one evening a month at the women's shelter and screens approximately 40 people. The HIV/STI Director is speaking with the Housing Services Department to offer HIV/STI screening and treatment at other shelters.

Given the positive feedback from the clinic staff in the LHD in Syphilopolis regarding the patient-centered training, the SHD has continued to offer patient-centered training to HIV/STI program staff working at other LHDs across the state.

Step 1: Assess context

Syphilopolis is a CDC grant-funded local health department and well-versed in submitting performance measures to the CDC. They do not often conduct other evaluations of their programs, though they do rate the performance of their DI Professionals on their partner services outcomes. The LHD in Syphilopolis has the bandwidth for more formal evaluation and has decided that this outbreak is a good start for conducting formal program evaluations. Going through the CDC Program Evaluation Framework Action Guide, they have decided that the key interest holders are:

1. LHD in Syphilopolis Informatics, Analysis, and Evaluation (IAE) Teams;
2. LHD in Syphilopolis DI Professionals;
3. LHD in Syphilopolis Division of Infectious Disease;
4. Local Community, specifically housing services, medical providers, and shelter residents.
5. The State Health Department (SHD)

The LHD in Syphilopolis IAE Teams and DI Professionals will collaborate on the evaluation and be empowered to be the decision-makers. The LHD Division of Infectious Disease and the local community will be kept informed of the progress and evaluation findings. The SHD will be consulted and involved, and their concerns will be reflected in the evaluation.

Table C: Interest holder planning matrix+

	Level of involvement				
Interest holder	**Inform**	**Consult**	**Involve**	**Collaborate**	**Empower**
Syphilopolis Informatics, Analysis, and Evaluation Teams				X	X
Syphilopolis DI Professionals				X	X
Syphilopolis Division of Infectious Disease	X				
Local community	X				
The State Health Department		X	X		

+ adapted from CDC Program Evaluation Framework Action Guide

Step 2: Describe the program

The IAE Teams had a quick meeting with the local DI Professional and the DI Supervisor to understand the workflow of their jobs. Because the LHD Division of Infectious Disease does not have a logic model, the IAE Teams worked with DI Professionals to devise one specifically for this outbreak response, following the standard logic model form.

The IAE Teams and DI Professionals believe the inputs and activities will facilitate the short term, intermediate, and long-term outcomes outlined in Table D.

Table D: Outbreak logic model

Inputs	Activities	Short-term outcomes	Intermediate outcomes	Long-term outcomes
■ DI professionals ■ Mobile clinic ■ Housing Services department ■ Staff in the LHD in Syphilopolis ■ HIV linkage coordinator ■ Patient-centered curriculum	■ Chart review ■ Mobile testing ■ Mobile treatment ■ Partner services ■ Patient-centered training ■ Qualitative interviews	■ 90% of new syphilis cases from screening brought to treatment ■ 100% of pregnant syphilis cases brought to treatment ■ 2.0 partner index ■ 90% of new HIV patients linked to care ■ 95% of staff in the LHD in Syphilopolis completed patient-centered training ■ Themes identified from interviews	■ Established monthly mobile clinic ■ Improved partnerships with other local agencies Improved clinic wait times	■ Reduced STI/HIV infection among unhoused women in local area ■ Increased acceptance of the LHD in Syphilopolis within the community ■ Enhanced detection of syphilis cases through the mobile clinic

Step 3: Focusing the evaluation questions and design

With help from the DI Professionals, the IAE Teams determine the purpose of the evaluation:

1. Assessing the effectiveness of the outbreak response in controlling the syphilis outbreak among unhoused women.
2. Evaluating the efficiency and efficacy of the mobile clinic strategy.
3. Understanding the impact of patient-centered training on staff interactions with patients.
4. Identifying lessons learned for future outbreak responses in similar populations.

The evaluation would combine components of both process and outcome evaluations, as the IAE Teams want to understand what worked during the response and what the outcomes of the response were. They came up with several questions:

1. What percentage of patients screened during the outbreak response were diagnosed as new cases of syphilis?
2. What percentage of patients received timely treatment following their new diagnosis?
3. How many pregnant women received adequate and timely treatment, and what were the pregnancy outcomes?
4. What barriers did patients report regarding access to health services before and after the outbreak response?
5. How did the patient-centered training impact staff interactions with patients?

Step 4: Gather credible evidence

The IAE Teams plan to use a mixed-methods approach to conduct the evaluation. DI professionals already interview patients when receiving testing or treatment using the standard partner services interview form and will add a few additional questions developed by the IAE Teams to ascertain barriers that relate to the LHD in Syphilopolis. DI professionals will also interview a few non-patients in the shelter, asking only the barrier questions. The IAE Teams will analyze the data in NVivo to identify themes. Then the IAE Teams will use surveillance data and chart review to answer other outcome-based questions. The patient-centered training has a built-in post-training survey they will use to gauge staff satisfaction and changed views.

Table E: Evaluation question matrix

Question	Indicator	Data source	Data analysis
What percentage of patients screened during the outbreak response were new cases of syphilis?	■ % new cases	■ Surveillance data	Simple statistics
What percentage of patients received timely treatment following their positive test results?	■ % treated	■ Surveillance data	Simple statistics
How many pregnant women received adequate treatment, and what were the pregnancy outcomes?	■ % pregnant women treated ■ % pregnancy outcomes meeting the CS case definition	■ Surveillance data ■ Chart review	Simple statistics
What barriers did patients report regarding access to health services before and after the outbreak response?	■ Barriers mentioned ■ # resolved	■ Patient interviews before and after outbreak response	Thematic analysis
How did the patient-centered training impact staff interactions with patients?	■ Patient satisfaction/ themes identified ■ Staff satisfaction/ themes identified	■ Patient interviews before and after outbreak response ■ Post-training survey	Thematic analysis

Step 5. Generate and support conclusions

The IAE Teams get to work. They have access to the surveillance data from the Surveillance Lead and access to the interview records from the DI professionals. They soon find out that the mobile clinic worked well. Forty-nine out of 100 women were screened and two of the three women with untreated syphilis were treated during the outbreak response.

Figure A: Syphilis treatment cascade. *Accessible explanation on page 54.*

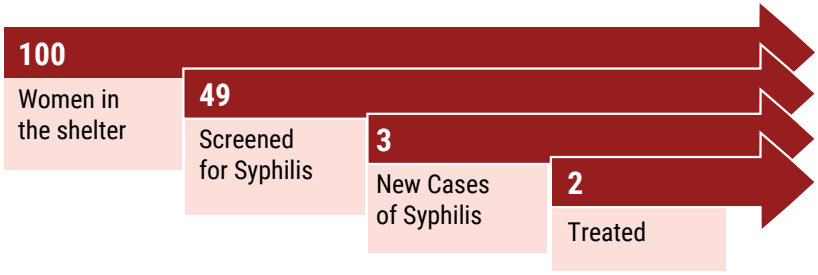

Figure B: Syphilis cases among pregnant women during the mobile clinic van outbreak response[6]

Accessible explanation on page 54.

[6] Timely treatment has been excluded due to the low number of cases.

Regarding the four pregnant women: all four were screened, and two were positive for syphilis. One of the two positive cases was treated, and one was unable to be located by the Public Health Nurse; this means 50% of CS cases were averted, an important performance measure.

The patient-centered training was well-received by the staff. Results from the assessment discovered themes such as:

- Empathy and understanding, with one staff member mentioning: "I hadn't ever thought about how or why people might live over there. I didn't realize I might end up there if I lost my job if it wasn't for having people who would take me and the kids in."
- Awareness of patient experience was also mentioned frequently. One staff member said they had never realized how long patients had to wait at each step of their visit, stating they "thought it wasn't any longer than I have to wait at my doctor's office."
- Continued collaboration: the LHD in Syphilopolis started partnering with the housing services agency at local fairs and events to build on that connection.

Step 6: Act on findings

The mobile clinic has proven to be an excellent method to reach unhoused people, particularly pregnant women. Syphilopolis plans to implement this approach in other areas in the city with a large, unhoused population. The patient-centered training has been effective, so it was implemented in other LHDs across the state. Some communities, however, have pushed back against it. Syphilopolis has decided to research community advisory boards to further incorporate community members into decision-making.

The astute local DI Professional learned a few lessons through this evaluation that they presented at the last All-DI Professional meeting at the SHD. Lessons included:

1. Build and maintain connections with other local agencies as the populations they serve are also the populations you serve;
2. Tailor awareness and education efforts to your specific area;
3. Involve your colleagues in outreach and community events so they understand the population you serve;
4. Staff outreach testing events, like the mobile clinic, with at least two DI professionals and two providers;
5. Monitor your investigations for emerging trends (e.g. geography, population);
6. Speak up when you see a trend in your investigations.

The IAE Teams put together a final report and presented it to the local community for their feedback, as well as the SHD.

Appendix: Explanation of Figures and Tables for Accessibility

Chapter 1: Surveillance

Figure 1: Early syphilis case rates (per 100,000 women) and location of STI testing and treatment centers in the hypothetical city of Syphilopolis, 2024 (Page 6)

Overview- Map shows early syphilis case rates (low to critical) by neighborhood and STI testing and treatment center locations.

Description-Map showing five areas within the hypothetical city of Syphilopolis and their case rates from low (0-19) to critical (50+). Four of the areas have STI testing and treatment centers.

Presentation- Color map (Return to Page 6)

Figure 2: Sexual network of primary and secondary syphilis cases and contacts by status, sex, age, and pregnancy status in the hypothetical city of Syphilopolis, 2024 (Page 6)

Overview- Network diagram shows connections among men and women with primary and secondary syphilis and their contacts in the hypothetical city of Syphilopolis in 2024. The network includes confirmed cases, contacts, and contacts with unknown syphilis status. Pregnant women are identified within the network.

Description- A sexual network of primary and secondary syphilis cases and their contacts. The network displays men and women and their infection, pregnancy and contact status.

- There are five women depicted, aged 19-33 years.
  - Two women are cases, one is pregnant
  - Two are contacts, one is pregnant
  - One is a contact with an unknown syphilis status.
- There are five men depicted, aged 22-41 years.
  - Two men are cases
  - Two are contacts
  - One is a contact with an unknown syphilis status.

Overall, the diagram highlights interconnected sexual relationships between men and women with varying infection statuses, illustrating how syphilis can spread across overlapping social and sexual networks, including among pregnant women.

Presentation- Color network (Return to Page 6)

Figure 3: Chlamydia – rates (per 100,000) of reported cases by sex, United States, 2000-2019 (Page 9)

Overview- Line graph shows chlamydia rates per 100,000 people in the United States from 2000 to 2019, by sex. Rates increased over time for both men and women, with women consistently higher.

Description- Graph displays chlamydia rates per 100,000 population in the United States from 2000 through 2019, separated by sex and including an overall total rate.

- Women consistently have the highest rates during this period, rising from approximately 450 per 100,000 in 2000 to about 700 per 100,000 in 2019.
- Men have the lowest rates, increasing steadily from approximately 100 per 100,000 in 2000 to about 350 per 100,000 in 2019.
- The total population rate shows a similar upward trend, from around 250 per 100,000 in 2000 to about 525 per 100,000 in 2019.

The overall trends show a steady increase in reported chlamydia cases for both sexes, with rates among women remaining approximately two times higher than those among men throughout the 20-year period.

Presentation- Color line graph (Return to Page 9)

Table A: Primary and secondary, and early non-primary non-secondary syphilis ("early syphilis") cases by morbidity week, sex, and current and previous year, in the hypothetical city of Syphilopolis, 2023–2024 (Page 15)

Overview- Table depicts weekly and yearly cases of primary and secondary syphilis, and early non-primary non-secondary syphilis by sex during 2023 and 2024. This table has 54 rows, one for each morbidity week and a total. There are two main columns, one for primary and secondary syphilis, the other for early non-primary non-secondary syphilis. Under each of these columns, there are columns for women for the years 2023 and 2024, and for the year to date for the years 2023 and 2024, and the same columns for men.

Description- Weeks 16 to 22 show increases in both primary and secondary syphilis, and early non-primary non-secondary syphilis cases among women for 2024 compared to 2023. An outbreak was declared on week 23, and response activities began. On week 36 cases among women slowed, and the outbreak response ended. On week 49 the outbreak was declared over as weekly cases among women were no longer elevated.

Presentation- Table (Return to Page 15)

Figure A: Percent of women with early syphilis with selected characteristics, in the hypothetical city of Syphilopolis, Jan–May 2023 and Jan–May 2024 (Page 16)

Overview- Bar chart compares selected characteristics of women with early syphilis.

Description- This bar chart shows that there was an increase in the proportion of women with early syphilis who were of reproductive age, were pregnant at the time of diagnosis, reported drug use, and reported being unstably housed in 2024 compared to 2023.

Presentation- Bar chart (Return to Page 16)

Figure B: Early syphilis cases among women by week, in the hypothetical city of Syphilopolis, 2024 (Page 17)

Overview- Epi curve of primary and secondary syphilis and early non-primary non-secondary cases, "early syphilis", among women by week.

Description- This stacked bar chart shows an epi curve with the number of early syphilis cases among women in the hypothetical city of Syphilopolis by week for 2024. The bars for the first two months of the year show between eight and 14 cases per week (baseline). In March, weekly cases start to increase, reaching a high of 31 cases in May, and remain elevated for several weeks. An outbreak was declared on June 1, 2024. Cases begin to decrease in the subsequent weeks but are still elevated compared to the beginning of the year. On September 1, 2024 outbreak activities ended as cases returned to baseline. The outbreak was declared over on December 1, 2024.

Presentation- Stacked bar chart (Return to Page 17)

Chapter 2: Disease Intervention

Figure 1: The state of STIs in the United States in 2024 (Page 22)

Overview- This infographic highlights national statistics for chlamydia, gonorrhea, syphilis, and congenital syphilis.

Description- This infographic states that there were 1.5 million cases of chlamydia, a 4% decrease since 2020; 543,409 cases of gonorrhea, a 20% decrease since 2020; 190,242 cases of syphilis, a 42% increase since 2020; and 3,941 cases of syphilis among newborns, a 82% increase since 2020.

Presentation- Infographic (Return to Page 22)

Chapter 3: Cost Analysis

Figure 1: Example costs by domain (Page 30)

Overview- Shows an example of a lollipop graph depicting total costs by cost domain from July through December.

Description- The graph shows the total costs and percentage share for each domain from July through December. Personnel accounts for the largest portion ($85,486.84, or 38%), followed by Laboratory ($53,328.58, 24%), Buildings ($50,974.11, 23%), Supplies ($15,741.57, 7%), Utilities ($11,885.26, 5%), and Contracted Services ($9,077.28, 4%). Overall, the graph indicates that Personnel, Laboratory, and Buildings make up the majority of total costs, while other domains contribute relatively smaller shares.

Presentation- Lollipop graph (Return to Page 30)

Figure 2: Example costs by domain and programmatic activity (Page 31)

Overview- Shows an example of a horizontal stacked bar graph depicting the total cost for each cost domain and how each total is broken out into different programmatic activities.

Description- The graph shows the total costs, including the breakdown by programmatic activity, for six domains from July through December. Personnel has the highest total cost, about $85,000, making up the largest share of expenses. Most personnel costs are for in-person counseling and referrals, with smaller portions for general administration, supervisory, training, and other activities. Laboratory costs total roughly $53,000, primarily for clinical and medical operations. Buildings costs are about $51,000, mostly for general administration and clinical and medical operations. Supplies total around $16,000, mainly for clinical and medical operations. Utilities account for about $12,000, primarily under general administration. Contracted services are the smallest category, approximately $9,000, mostly related to clinical and medical operations. Overall, the graph shows that personnel, laboratory, and building expenses make up the majority of total costs, with most spending tied to clinical and in-person programmatic activities.

Presentation- Stacked bar graph (Return to Page 31)

Figure A: Mobile clinic response cost by source of support (Page 38)

Overview- Shows a stacked bar graph depicts the total cost for each cost domain and how that total is divided by source of support.

Description- This graph shows the costs for personnel, supplies, and equipment, broken down by source of support. Personnel has the highest total cost: $8,518 to the local health department (LHD) and $13,709 to the state health department (SHD). Supplies cost $4,011 to LHD, and equipment costs $95 to SHD. Overall, personnel represents the majority of expenses, with most costs covered by the SHD.

Presentation- Stacked bar graph (Return to Page 38)

Chapter 4: Evaluation

Figure 1: 2024 CDC Evaluation Framework (Page 41)

Overview- Shows the 2024 CDC Evaluation Framework, with cross-cutting actions, evaluation steps, and standards.

Description- The infographic illustrates the 2024 CDC Evaluation Framework. It highlights three overarching areas of evaluation: advance equity, engage collaboratively, and learn from and use insights. Within these areas are six steps for evaluation planning and implementation: Assess context, describe the program, focus the evaluation questions and design, gather credible evidence, generate and support conclusions, and act on findings. At the center are five evaluation standards: relevance and utility, rigor, independence and objectivity, transparency, and ethics.

Presentation- Color infographic. (Return to Page 41)

Figure A: Syphilis treatment cascade (Page 49)

Overview- Shows the syphilis treatment cascade for this outbreak.

Description- Out of 100 women, 49 were screened for syphilis, three new cases were identified, and two of those cases were treated.

Presentation- Color cascading infographic. (Return to Page 49)

Figure B: Syphilis cases among pregnant women during the mobile clinic van outbreak response (Page 49)

Overview- Flow chart shows treatment outcomes for the two pregnant women who were diagnosed with syphilis.

Description- The mobile clinic van outbreak response included two total cases. One case had no adequate treatment and met the congenital syphilis (CS) case definition. The other case had adequate treatment and did not meet the CS case definition.

Presentation- Color flow chart. (Return to Page 49)