Integrated Epidemic Profile
Arizona Department of Health Services (ADHS)
Office of HIV/AIDS
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EXECUTIVE SUMMARY

Current (5/1/05) Arizona Data:

Cumulative counts:

Since 1981, the year in which initial HIV/AIDS cases first appeared in Arizona, there have been 18,737 reports of HIV infection or perinatal exposure made to ADHS, among which 14,517 were confirmed cases of HIV infection *emergent* in Arizona. Of these:

- 9,329 (64.3%) were *emergent* HIV, and 5,188 (35.7%) were *emergent* AIDS.
- 4,220 HIV cases were re-diagnosed with AIDS in Arizona, representing non-emergent AIDS diagnoses.
- As much as 7% of Arizona's reports of HIV disease may be attributed to current patterns of migration.

Mortality:

Among 17,987 confirmed reports of both emergent and non-emergent HIV infection, 8.0% (n=503) of HIV cases and 56.5% (n=6,622) of AIDS cases are known to be deceased. The annual number of deaths among persons with AIDS in the state declined in the late 1990's, attributable to the introduction of multi-drug treatment. Between 1999 and 2003 the number of deaths among persons with HIV or AIDS has remained level.

Prevalence and Incidence:

Arizona currently has 10,294 (5/1/05) persons known to be living with HIV or AIDS. Among persons now living with HIV infection, 4,762 have a diagnosis of AIDS and 5,532 have a diagnosis of HIV. The state as a whole has a known HIV disease prevalence rate of 184.5 per 100,000 persons. Based on current prevalence estimates, at least 1 of every 542 persons in Arizona has HIV. HIV and AIDS in Arizona are disproportionately distributed. The greatest prevalence and incidence rates are observed among persons who engage in high-risk sexual activity, injection drug use, and in urban regions of the state. Maricopa and Pima Counties, Arizona's most urbanized regions together contain 77% of Arizona's population, but they account for 87% of current HIV prevalence and 96% of *emergent* cases in 2004.

In the past decade, the annual rate for reported *emergent* HIV infection has shown a steady decline from 24.4 per 100,000 in 1990 to 12.4 per 100,000 in 2004. The rate of reported *emergent* HIV infection in 2004 is the lowest observed in the last 5 years.

Gender trends:

Throughout the epidemic in Arizona, the majority of *emergent* HIV infections have been among males, who comprise 88.2% (12,800/14,517) of all confirmed Arizona *emergent* HIV infections and 86.7% of current estimated prevalence. But the proportion of female cases is slowly increasing. For the three-year period from 1985 to 1987, 6.6% of *emergent* cases of HIV infection were female, whereas for the three-year period from 2002 to 2004, 12.3% of *emergent* cases were female.

Race/Ethnicity trends:

Trends of *emergent* HIV infection among all racial ethnic groups in Arizona are reflective of broader population trends with the clear exception of Non-Hispanic Blacks. Non-Hispanic Blacks were just 3.4% of Arizona's population in 2004, but accounted for 12.9% of *emergent* HIV infection. This 3 to 4 fold disproportionate impact is not seen among other race/ethnicity groups.

Risk/Transmission mode trends:

The predominant behavior associated with *emergent* HIV infection in Arizona continues to be men who have sex with men (MSM), which was reported in 72.4% of *emergent* HIV infections in 2003. MSM as a behavior associated with *emergent* HIV infection is rising in Arizona. After declining steadily, the proportion of *emergent* HIV cases reporting MSM behavior reached 59% in 1995, and remained level through 2000. Beginning in 2001, the proportion of *emergent* HIV cases reporting MSM behavior has risen to its current 72.4%. Injection drug use (IDU) as a proportion of *emergent* cases, IDU has remained steady over the last 5 years.

High Risk Heterosexual (HRH) is only considered a likely mode of HIV infection when MSM or IDU is not reported. HRH was associated with *emergent* HIV infection in around 5% of cases in the early 1990's. In 2003, HRH was associated with 12.6% of *emergent* HIV infection reports. Among all risk categories, MSM and HRH are the only categories that appear to be increasing as a proportion of *emergent* HIV infection in Arizona.

Patterns of co-morbidity among persons now reported with HIV/AIDS demonstrate that significantly elevated risk of HIV infection exists among persons with a history of diagnosis with Hepatitis C, Syphilis or Gonorrhea. Patterns of STD diagnosis among persons with HIV establish that ongoing high-risk sexual behaviors continue after HIV diagnosis among a significant proportion of persons living with HIV in Arizona.

Other Issues:

Throughout 2003 and 2004 lengthy delays in completion of case investigations have hindered timely data analysis, and primary prevention efforts. Partner counseling and referral services (PCRS) are a critical component of primary case investigation because all persons who may have been exposed to HIV need to be tested and educated. The mean completion time of case investigations initiated during 2004 was three times the 30-day requirement. By September 30, 2005 there were 25 case investigations from 2004 still pending for Arizona. Partner counseling and referral did not result in new discovery of significant numbers of HIV infection primarily because the number of tests conducted as a result of PCRS were so few in number.

Current HIV/AIDS Programs in Arizona:

Surveillance:

The Epidemiology Program funds seven full-time-equivalent (FTE) positions within ADHS through federal funds. Another 4.5 FTEs in the form of Communicable Disease Investigators are funded via contract at health departments in Maricopa County and Pima County through both federal and state funds.

State statutes, Administrative Rule and a Cooperative Agreement with CDC require that ADHS investigate new cases of HIV and AIDS. This is accomplished through mandated reporting by health care providers and laboratories.

Efforts are being made to enhance HIV surveillance and epidemiologic activity at the state and local level. These include improving the timeliness of reporting; refocusing and emphasizing Partner Counseling and Referral Services (PCRS); incorporating Incidence Surveillance into Core surveillance activities; increasing reporting from rural counties; instituting reporting from correctional facilities; furthering expansion of data analysis capacity; collaborating with other Programs including Sexually Transmitted Diseases, Hepatitis C, Tuberculosis, and the Office of Infectious Disease Surveillance.

Prevention:

The HIV Prevention program is funded by the Centers for Disease Control and Prevention (CDC) and provides resources to decrease further transmission of HIV infection and delay the onset of symptoms in persons already infected with HIV. The prevention program sponsors the HIV prevention community planning process, which involves community representatives of those groups affected by the HIV epidemic, epidemiologists, behavioral and social scientists, HIV/AIDS prevention service providers, health department staff, and others. The community planning group (CPG) assesses the characteristics of the epidemic within their geographic area, points out unmet HIV prevention needs, identifies science-based strategies to prevent HIV transmission and facilitate access to early intervention and treatment, and develops a comprehensive HIV prevention plan to guide ADHS in allocating resources to identified priorities.

Prevention program-funded services include HIV counseling and testing services (CTS), partner counseling and referral services (PCRS), and science-based targeted prevention programs for HIV-infected persons and persons at highest risk of acquiring HIV.

The prevention program's current emphasis is best stated by CDC's *Advancing HIV Prevention* initiative: "Prevent new infections by working with people diagnosed with HIV and their partners." To this end, the program's highest priority activity for 2006 is implementing more successful PCRS which is the most effective method of finding those with as-yet undiagnosed HIV infection and referring them into appropriate services. ADHS will shift prevention funding toward those counties (Maricopa and Pima) with the highest HIV incidence and greatest prior success in case-finding. CTS programs in these counties will also increase their emphasis on testing aimed at those at highest risk and in geographic areas of highest incidence. Other funded science-based prevention programs will emphasize improved performance and consistent fidelity to proven program elements. The prevention program will also provide additional resources to support the newly-formed statewide community planning group and assist it in setting priorities for the 2007-2009 funding cycle.

Care and Services:

There were 31 sites and a combined total of 164 full time equivalent staff (FTEs) in Arizona funded in 2004 to provide services such as care, treatment, and education under the Ryan White CARE Act. Title II of the CARE Act provides grants for HIV care and services including outpatient medical care, medications, dental care, mental health, substance abuse, case management, transportation, and other core and supportive services.

Under Title II of the Care Act, The AIDS Drug Assistance Program had 1535 clients enrolled to receive anti-retroviral therapy in 2004, an increase of 279 cases (22.2% increase) since 2002. Among clients receiving services for Title II statewide, 83.8% were male, 63.7% were between the ages of 25 and 44, 30.2% of the clients were Hispanic, 77.3% were white, and 74.5% had an income less than 300% of the federal poverty level. In addition, approximately 80% of the Title II clients were permanently housed, and had Medicare (10%), Medicaid (17.4%) or no insurance coverage (36%).

Decisions regarding Arizona's Title II programs, including ADAP, are made in concert with the Title II Statewide Advisory Council. The Ryan White Title II Care and Services Program empowers the regional each HIV care consortia and direct service area to develop, implement, and evaluate their own needs assessment. Services identified for funding currently include outpatient medical care, local medical assistance, dental care, mental health and dependency counseling, case management and transportation.

Introduction

The 2005 Arizona Integrated Epidemiologic Profile draws upon many and diverse data sources to present a comprehensive picture of the current HIV/AIDS epidemic in Arizona. The profile describes the general population of Arizona, and of those infected with HIV. It reports recent trends in modes of HIV transmission, and examines comorbidity patterns associated with HIV transmission. It describes those currently receiving care and services, and those with unmet treatment needs.

The Profile is intended to inform, support, and advise state programs and advisory/planning groups within the prevention and care and services realms toward meeting their performance objectives. It seeks to use data-driven methods that suggest strategies for improvement, support better appropriation of resources in existing HIV/AIDS programs, and highlight funding shortfalls. It is hoped that the profile will draw attention to both the reality and the subtleties of the HIV/AIDS epidemic in Arizona. The profile seeks to answer five essential questions:

1. What are the socio-demographic characteristics of the general population, and the HIV/AIDS population of Arizona?
2. What is the scope of the HIV/AIDS epidemic in Arizona?
3. What are the number and characteristics of individuals who know they are HIV positive but who are not in care?
4. What are the indicators of HIV/AIDS infection risk in Arizona?
5. What are the HIV service utilization patterns of individuals in Arizona?

The Profile is arranged in the order of the questions listed above, with each question representing a section of the Profile. The Profile divides these 5 questions into two broader sections as follows:

Section 1: Core Epidemiological Questions

The general population of Arizona is described in detail, including the distribution of HIV disease and a closer look at those known to be HIV infected. This section addresses the following questions:

1. What are the socio-demographic characteristics of the general population, and the HIV/AIDS population of Arizona?
2. What is the scope of the HIV/AIDS epidemic in Arizona?
3. What are the indicators of HIV/AIDS infection risk in Arizona?

Section 2: Ryan White HIV/AIDS CARE Act Impact

Those receiving care and services in Arizona under the federal Ryan White HIV/AIDS CARE Act are described, including utilization patterns and those who do not receive treatment after diagnosis. This section attempts to answer the remaining two questions:

4. What are the number and characteristics of individuals who know they are HIV-positive, but who are not in care?
5. What are the HIV/AIDS service utilization patterns of individuals in Arizona?

The Profile's form and content are largely in response to guidelines and initiatives by the Centers for Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA) toward capacity building, and integration/coordination of services. No such "integrated" Epidemiological Profile concerning HIV/AIDS has been previously conducted in Arizona.

Profile Strengths and Limitations:

The profile is the result of an initiative to build epidemiological capacity in Arizona, and to make that expanded capacity readily available to all HIV/AIDS programs and groups in the state. This profile is not the first result of that initiative. The state's annual reports for 2004 and 2005 have expanded from the prior data format to include county-specific reporting, and standardized rates. Those reports are available at:

http://www.azdhs.gov/phs/hiv/hiv_epi.htm

County-specific reporting and standardized rates have also been employed in this Profile.

Effort has been made to find new ways to present epidemiological data that more closely conform to the classic public health indicators of prevalence and incidence. In addition, new methods of comparison of non-HIV data sources with HIV/AIDS Reporting System (HARS) data has allowed direct measures of risk behavior among the prevalent HIV/AIDS population to be studied, rather than indirect measures using proxy indicators. Several new methods are introduced in this Profile, and discussed fully in topical appendices.

Behavioral Definitions and Data:

Since HIV infection is associated with high-risk behaviors, behavioral analysis can offer valuable insight for prevention. However, analysis of the HIV/AIDS epidemic using behavioral rather than demographic definitions must resolve two fundamental problems. The first problem is that, unlike demographic data, behavioral data have no recognized population data source. Numerous studies have attempted to estimate population size of behavioral risk groups related to HIV/AIDS, but none are universally acknowledged as a reliable standard, and none offer current data estimates. The second problem is, unlike demographic data categories, behavioral data categories are not statistically independent. For example, one person may not be both age 20-29 and age 30-39 simultaneously, but they may be both an injection drug user and a participant in high-risk sexual activity. As a result of the possibility of such statistical confounding, changes in one behavioral category may, and often do influence other behavioral category outcomes. Some of this may be resolved by how behavioral categories are defined, but there is no simple solution to this problem with behavioral data.

It is also important to understand that there is a difference between behavioral definitions, and self-identification definitions. Not every man who participates in sexual contact with other men will identify himself as "gay" or homosexual. For this reason, it is important not to equate the behavioral definitions used in this behavioral analysis with other social, political, or self-identification issues. The CDC has established several main categories of behavioral risk in HIV/AIDS surveillance data. The principal categories are Men having Sex with Men (MSM), Injection Drug User (IDU), Men having Sex with Men who also report Injection Drug Use (MSM/IDU), and High-Risk Heterosexuals (HRH). In scenarios where persons report multiple risk behaviors, the CDC uses a priority system to assign a mode of transmission to each report of HIV infection. For instance, an HIV infected person who reports MSM and Heterosexual behaviors will be assigned to the MSM mode of transmission, but a person reporting MSM and IDU behaviors will be assigned to the MSM/IDU mode of transmission.

Only a person reporting Heterosexual behavior with no other risk behaviors will be assigned to the Heterosexual mode of transmission. Thus, even the existing behavior categories have potential confounding.

Given these limitations, ADHS Office of HIV/AIDS has made some effort within this profile portray behavioral data according to a simpler definition of behaviors. In most instances MSM and IDU behaviors will include all cases reporting that behavior, including those that report both. This is because we do not really know how that person may have actually acquired their HIV infection when they report several different behaviors that place them at risk. We may also wish to report data by specific risk behaviors without consideration of other risk behaviors. This approach does not resolve the problem with Heterosexual behaviors that may exist with other behaviors such as MSM or IDU. We have used a definition of HRH in this profile, which refers to persons who report no other risk behaviors, but who have had heterosexual contact with any of the following:

1) multiple partners
2) persons known or suspected to be infected with HIV
3) persons who are known to have other high-risk behaviors or events (MSM, IDU or medical/surgical/occupational exposure to blood or blood/tissue products).

Emergence and Incidence:

The first significant concept introduced here is that of *emergence* as an epidemiological event. In the past, diagnostic counts for both HIV (non-AIDS) and AIDS were reported as a method of estimating incidence. But many persons will be diagnosed with HIV years before being diagnosed with AIDS, and therefore will be counted twice in incidence estimates based entirely upon diagnostic event. The natural inclination to derive an incidence count is to sum the number of HIV and AIDS diagnostic events within a time period. But doing so will skew the tally toward AIDS because of this double-counting problem. This problem may be resolved by defining an emergent diagnosis for each person which may only occur once in the disease history of persons reported with HIV infection or AIDS. The emergent diagnosis would be the earliest report of HIV infection for each person. Those first diagnosed as HIV (non-AIDS) would be emergent HIV cases, and those first diagnosed as AIDS would be emergent AIDS. Incidence estimates derived from diagnostic reports would only count emergent cases. Non-emergent diagnostic events are not newly reported cases of HIV infection, but a progression in diagnostic status of previously reported cases. Incidence estimates reported in this profile count only emergent cases.

Using emergence as the basis for incidence has the same limitations as using counts of diagnostic events of both HIV and AIDS. Neither really measures incidence. The classic definition of incidence is the number of new *infections*, not the number of reports. For this reason it should be clearly understood that emergence is not considered to be incidence, only a more precise *estimator* of incidence than diagnostic counts alone. But emergence has advantages beyond resolving the double-counting problem. Because emergent AIDS cases are first discovered only when they develop an AIDS-defining illness, there has been no influence by anti-viral therapy to slow the progression of disease in emergent AIDS cases. It is reasonable to conclude that the mean time period from infection to AIDS diagnosis in this group will most closely conform to the mean 10 years latency period from HIV infection to AIDS diagnosis estimated by the Centers for Disease Control. The emergent AIDS group may be used to estimate the distribution of age at infection. The development of emergence is discussed fully in the appendix.

Risk Group Population Estimates:
Ample sources are available to estimate population by geographic region, or demographic characteristic (age, race, sex, or ethnicity). Therefore, generating standardized rates of incidence and prevalence from HIV/AIDS reports is easily possible on a geographic or demographic basis. However producing standardized rates by risk behavior is not possible if no population estimates exist for behavioral groups. Risk behaviors which are most strongly associated with HIV infection, and for which case report counts exist cannot be adequately contrasted to HIV reports by geographic region or demographic characteristic. When developing HIV/AIDS prevention strategies and priorities, this deficiency means that policy must to some extend rely upon speculation. It would be greatly advantageous were standardized rates also available for the most prevalent behavior groups.

Epidemiologists at ADHS Office of HIV/AIDS have produced behavior group population estimates for MSM, IDU, and HRH using Scott Holmberg's 1996 study as a starting point. Risk group population definitions are based upon Holmberg's definitions, and 2003 estimates are updated and adjusted from Holmberg's 1994 Arizona MSA estimates. Rates derived from these estimates and resulting expected positivity rates among first-time testers closely correspond with observed positivity rates among first-time testers at Arizona's Counseling and Testing Service sites during the same time period. Recent studies based upon 2000 U.S. Census projections that estimate the "Gay" male populations in the US precisely match the 2003 Arizona MSM estimates derived from Holmberg's study. The 2003 estimated rates and population sizes for MSM, IDU, and HRH are reported in the Profile. The literature review, selection process, and calculations for these population estimates are discussed in detail in the appendix on Holmberg's study.

Age, gender, race/ethnicity, and county stratified population estimates developed by ADHS Office of HIV/AIDS are state-wide estimates derived from Holmberg's study that have been interpolated upon the current Arizona population age, race/ethnicity, gender, or county population distribution. While fully acknowledging the distortions this method would inevitably introduce to some stratified estimates, no other available method could be consistently applied. Consistent methodology was viewed to be more important than secondary efforts to improve the precision of estimates that are not intended to be more than reasonable, but crude indicators.

Cross-matching Studies:
Epidemiologists in HIV/AIDS, Hepatitis C, and Sexually Transmitted Disease (STD) sections of the ADHS collaborated to develop and test a method to identify persons who have multiple disease co-morbidities. Using this method, cross-match studies were conducted between HARS and the Hepatitis C, and STD report data that permitted co-morbidity patterns to be compiled for persons with a history of HIV infection. Patterns observed both prior to and after HIV diagnosis provide valuable information for prevention and ongoing care. This same method was also used to complete the Unmet Needs Framework for Ryan White CARE Act programs in the state, which evaluated whether persons reported living in Arizona with HIV disease were receiving a minimal standard of care. Inconsistencies in basic data format and completeness among different databases posed significant obstacles to assembling a comprehensive picture of co-morbidity and care among persons with HIV infection. Although the picture that did emerge is incomplete, it still provides illumination into the barriers that effective prevention and care strategies must overcome. Further discussion on this methodology is found in the appendix on cross matching.

Epidemic Impact Factor:
Data contained in this profile was used in support of the priority setting process by regional Community Planning Groups to develop recommendations for statewide prevention objectives, and for priority setting for regional care and services consortia. Because of polarized population concentrations in Arizona among two largely urban, and 13 rural counties, the method for priority setting and data evaluation proved problematic, requiring development of a convenient epidemiological evaluator called the Epidemic Impact Factor (EIF). This tool equally considers both case counts and rates together to provide a single measure of epidemic impact but without some of the distortions inherent to case counts alone, or relative rates alone. The impact of HIV disease in rural communities with low HIV case counts and high burdens of disease, and in large urban communities with high HIV case counts and lower burdens of disease can be measured and contrasted using the same EIF tool. The EIF was developed to be simple enough to be understood and calculated by persons who are not comfortable with statistics. It may be calculated with a hand calculator, using nothing more than the case count and population size. The resulting statistic is a raw number that allows direct comparison of unrelated or overlapping groups, indicating which grouping method is able to portray the greatest scope of the epidemic, and therefore likely to be effective as a platform for prevention targeting. The EIF test is discussed fully in the appendix on Epidemic Impact Factor, and used in geographic presentations in the section on HIV co-morbidities.

Section 1: Core Epidemiologic Questions

1) What are the socio-demographic characteristics of the general population, and the HIV/AIDS population of Arizona?
2) What is the scope of the HIV/AIDS epidemic in Arizona?

In illustration 1, prevalence and emergence are contrasted to Arizona's age stratified population. Prevalence includes all those reported living with HIV/AIDS in Arizona. Emergence includes previously unknown cases reported in Arizona within the designated time period.

Illustration 1: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND STATE POPULATION BY AGE GROUP

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Age	**Cases**	**% State Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**	**Population**	**% State Total**
0-1	1	0.0%	0.56	12	0.3%	1.44	177,224	3.2%
2-12	38	0.4%	4.07	14	0.4%	0.32	932,594	16.7%
13-19	47	0.5%	8.39	52	1.5%	1.95	560,298	10.0%
20-24	171	1.7%	42.57	292	8.3%	15.52	401,734	7.2%
25-29	512	5.0%	128.58	471	13.4%	24.84	398,194	7.1%
30-34	1,021	9.9%	251.92	638	18.1%	33.29	405,283	7.3%
35-39	1,833	17.8%	475.95	722	20.5%	37.17	385,125	6.9%
40-44	2,496	24.2%	624.24	574	16.3%	29.74	399,847	7.2%
45-49	1,881	18.3%	511.51	355	10.1%	20.53	367,734	6.6%
50-54	1,146	11.1%	353.54	201	5.7%	13.07	324,147	5.8%
55-59	629	6.1%	223.51	97	2.8%	7.65	281,421	5.0%
60-64	271	2.6%	116.44	52	1.5%	4.87	232,743	4.2%
65 and Older	225	2.2%	31.49	39	1.1%	1.14	714,467	12.8%
Unknown	23	0.2%	NA	0	0.0%	N/A	N/A	N/A
TOTAL	10,294	100.0%	184.45	3,519	100.0%	13.26	5,580,811	100.0%

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

The largest populations by age groups used in illustration 1 are age 2-12 (16.7%) and 65 and older (12.8%). National data show similar patterns in numbers of youth and seniors. The 2002 American Community Survey Profile reports 26% of the nation's population is age 18 or younger; 12% are age 65 or older (U.S. Census Bureau, 2002). The same survey found 27% of Arizona's population is age 18 or younger; 13% are age 65 or older. This reflects the large retiree community in Arizona. Neither of these age groups experience significant numbers of cases of either prevalent or emergent HIV/AIDS. The peak among emergent cases occurs in between age 30-44, with the highest reporting in 35-39 year-olds (21.0%). The peak among prevalent cases occurs in age groups 35-49, with the highest reporting in 40-44 year-olds (24.2%). The estimated seven-year difference in these peaks is reflective of longer survival times from emergent diagnosis due to Highly Active Anti Retroviral Therapy (HAART).

Illustration 2: ARIZONA HIV AND AIDS 1999-2003: AGE AT EMERGENT DIAGNOSIS

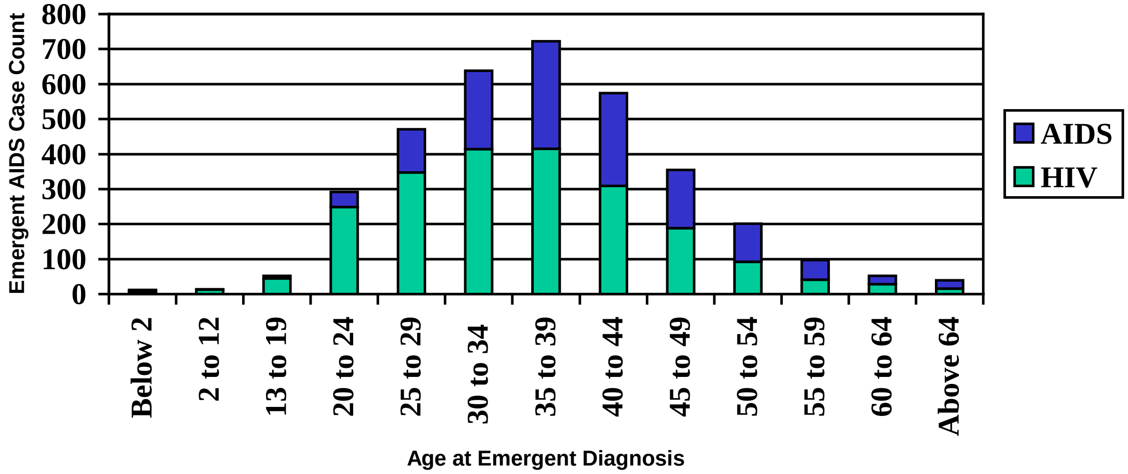


Illustration 2 describes the HIV/AIDS epidemic in Arizona in relation to age at emergent diagnosis and the emergent AIDS case count. It demonstrates there are more Arizonans being diagnosed with HIV than AIDS and that emergent HIV infection diagnoses peak among the 35-39 year age group.

Illustration 3: ARIZONA HIV AND AIDS 1999-2003: AGE AT EMERGENT DIAGNOSIS

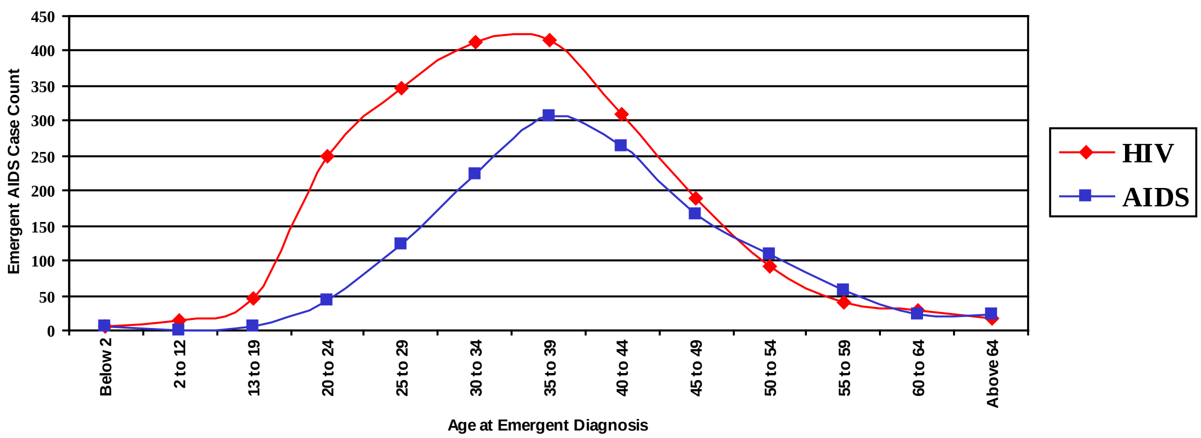


Illustration 3 more clearly describes the age difference between emergent HIV and AIDS cases. While HIV emergent cases peak at age 34, emergent AIDS peaks a few years later at 37. Persons in the emergent HIV group will not progress to an AIDS diagnosis as quickly as those in the emergent AIDS group have done because many of them will receive HAART therapy, which slows the progression of HIV disease. Age at diagnosis among the emergent AIDS group represents a cohort of persons who have not known of their HIV positive status, and who will not have received HAART prior to receiving an AIDS diagnosis. This cohort will have a mean latency period from infection to emergent AIDS diagnosis of 10 years. The CDC recognizes this 10 year period as the length of time it take for 50% of emergent AIDS cases to be reported. By shifting the emergent AIDS curve in Illustration 3 back by 10 years, a distribution for age at infection for this cohort may be estimated. This hypothetical distribution curve is presented in Illustration 4. While this method is crude, it suggests a profile of age at infection for the entire prevalent HIV/AIDS population. The age of the emergent AIDS cohort may vary from the emergent HIV cases. However, emergent AIDS cases constitute nearly 25% of all emergent infections in Arizona, and are less likely to be influenced by systematic bias.

Illustration 4: ARIZONA PROJECTED AGE DISTRIBUTION AT HIV INFECTION: 1999-2003

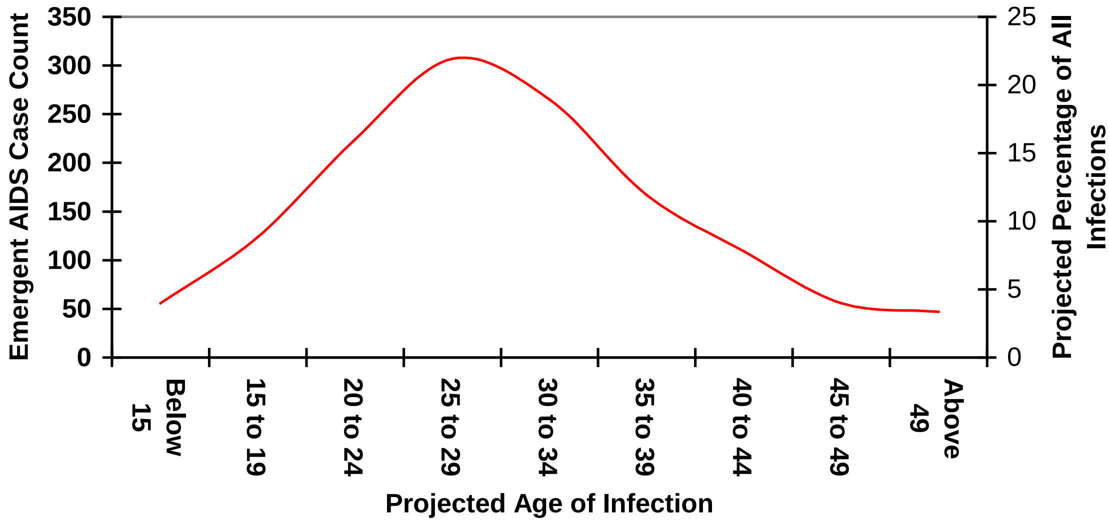


Illustration 4 suggests that the mean age of infection among future emergent AIDS cases may be in the later 20s. The majority of these projected AIDS infections may occur before age 35.

Arizona's population is shown by gender, prevalence and emergence in Illustration 5. While the population is divided equally among male and female residents, HIV/AIDS prevalent and emergent cases are predominantly male – 86.9% and 85.6%, respectively. Data have long shown that men have higher rates of HIV prevalence and incidence. A national survey on HIV/AIDS

Illustration 5: ARIZONA EMERGENT HIV/AIDS, PREVALENT HIV/AIDS, AND STATE POPULATION BY SEX

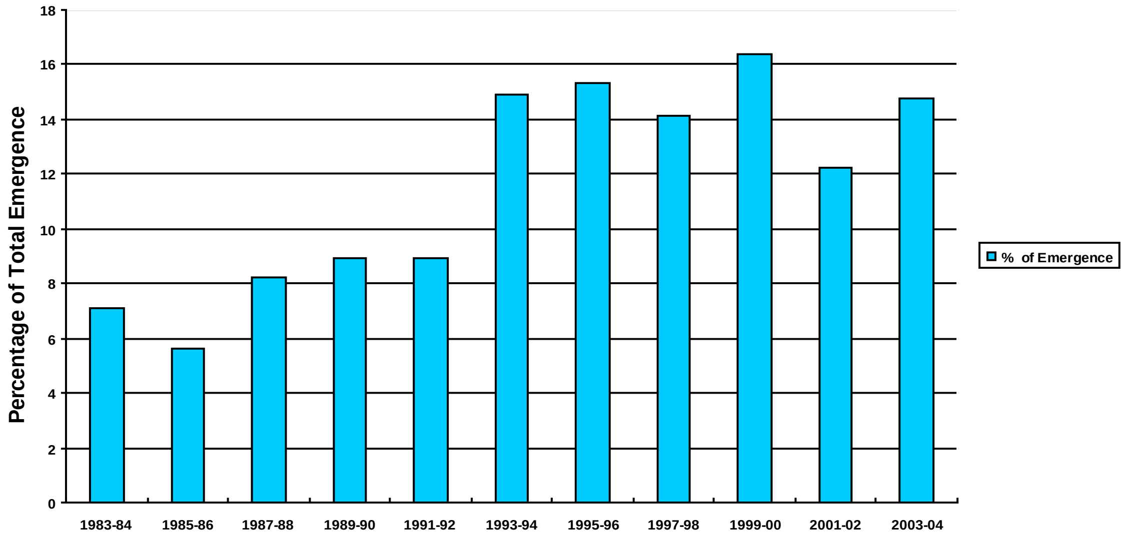
	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Sex	Cases	% State Total	Rate Per 100,000	Cases	% State Total	Rate Per 100,000	Population	% State Total
Male	8,922	86.7%	319.61	3,032	86.2%	22.88	2,791,507	50.0%
Female	1,372	13.3%	49.19	487	13.8%	3.67	2,789,304	50.0%
TOTAL	10,294	100.0%	184.45	3,519	100.0%	13.26	5,580,811	100.0%

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

prevalence conducted by the Centers for Disease Control and Prevention (CDC) and Centers for Health Statistic in 1991 found that nationally, those most likely to be infected with HIV/AIDS were male, age 25-34 and unmarried. Those with the highest prevalence were men who reported having sex with men

(MSM), but not reporting intravenous drug use (IDU) (*MMWR*, 1991). The relative proportion of emergent HIV among women is slowly increasing in Arizona. The first female case of AIDS was reported in 1983 in Arizona, two years after the first male case. Illustration 6 presents the trend in proportion of emergent cases among women since 1983.

Illustration 6: PROPORTION OF ARIZONA EMERGENT HIV/AIDS AMONG WOMEN: 1983-2004



The observed rise in the proportion of emergent HIV/AIDS among women since the beginning of the epidemic raises further questions about other characteristics of the female population which might explain this trend. Illustrations 7 and 8 present current data and recent historic trends in the epidemic among Arizona women.

Illustration 7: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND STATE POPULATION AMONG WOMEN BY RACE/ETHNICITY

	Current Female HIV/AIDS Prevalence			Emergent Female HIV/AIDS 1999-2003			2003 Female Population Estimates	
Race/Ethnicity	**Cases**	**% State Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**	**Population**	**% State Total**
White non-Hispanic	657	47.9%	37.46	168	34.5%	1.96	1,753,661	62.9%
Black non-Hispanic	278	20.3%	326.07	125	25.7%	30.93	85,258	3.1%
Hispanic	341	24.9%	45.68	155	31.8%	4.61	746,433	26.8%
A/PI/H [1] non-Hispanic	15	1.1%	23.05	5	1.0%	1.69	65,079	2.3%
AI/AN [2] non-Hispanic	63	4.6%	45.37	32	6.6%	4.87	138,873	5.0%
MR/ [3]Other non-Hispanic	18	1.3%	N/A	2	0.4%	N/A	N/A	N/A
TOTAL	1,372	100%	49.19	487	100%	3.67	2,789,304	100%

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

1. Asian / Pacific Islander / Native Hawaiian
2. American Indian / Alaska Native
3. Multiple Race / Other

Most noteworthy is the disproportionately severe impact of HIV/AIDS among Black non-Hispanic women among whom HIV/AIDS both prevalence and emergence rates are orders of magnitude greater than any other racial/ethnic group. This disparity is most pronounced in 1999-2003 emergent case rates, where Black non-Hispanic women experience a rate of HIV/AIDS 8.4 times greater than the state average for women, and 15.8 times greater than the rate among White non-Hispanic women. Accounting for 26% of all emergent cases among women, Black non-Hispanic women are 3.1% of the female population of Arizona, an impact disparity of over 800%.

Mode of exposure among women by race/ethnicity among the three largest race/ethnicity groups in Arizona are examined in Illustration 8.

Illustration 8: ARIZONA PREVALENT HIV/AIDS AMONG WOMEN BY RACE / ETHNICITY AND REPORTED MODE OF EXPOSURE

Race/Ethnicity	Prevalent Cases	IDU [1]	HRH [2]	NIR [3] / Other	Blood or Transplant	Vertical Pediatric
White non-Hispanic	657	233 (36%)	331 (50%)	67 (10%)	15 (2%)	11 (2%)
Black non-Hispanic	278	70 (26%)	162 (58%)	26 (8%)	10 (3%)	10 (5%)
Hispanic	341	88 (25%)	215 (65%)	24 (7%)	6 (2%)	8 (2%)

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

1. Injection drug use
2. High Risk Heterosexual
3. 'NIR' is no indicated risk.

The remarkable disparity of impact noted among Black non-Hispanic women is not observed when exposure categories by race/ethnicity are compared. This suggests that while exposure modes have some meaningful variation between ethnic groups, the remarkable disparity between Black non-Hispanics and other racial/ethnic groups may not be explained by differences in modes of exposure alone.

Illustration 9: ARIZONA PREVALENT HIV/AIDS BY URBAN AND RURAL COUNTY, AMONG WOMEN BY RACE/ETHNICITY

	Female HIV/AIDS Prevalence: Maricopa County			Female HIV/AIDS Prevalence: Pima County			Female HIV/AIDS Prevalence: All Other Counties		
Race/Ethnicity	Cases	% Cnty Total	Rate Per 100,000	Cases	% Cnty Total	Rate Per 100,000	Cases	% State Total	Rate Per 100,000
White non-Hispanic	415	46.1%	37.84	121	47.5%	44.26	121	62.9%	31.55
Black non-Hispanic	209	23.2%	321.01	45	17.6%	345.41	24	3.1%	336.98
Hispanic	222	24.6%	49.68	67	26.3%	46.42	52	26.8%	33.50
A/PI/H [1] non-Hispanic	7	0.8%	14.88	5	2.0%	43.04	3	2.3%	46.65
AI/AN [2] non-Hispanic	37	4.1%	119.81	12	4.7%	88.45	14	5.0%	14.83
MR/[3]Other non-Hispanic	11	1.2%	N/A	5	2.0%	N/A	2	N/A	N/A
TOTAL (% State Female Cases)	901 (66%)	100%	53.42	255 (19%)	100%	55.93	216 (16%)	100%	33.40

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

1. Asian / Pacific Islander / Native Hawaiian
2. American Indian / Alaska Native
3. Multiple Race / Other

Illustration 9 examines geographic patterns of prevalence among women by race/ethnicity. These data demonstrate a pattern of intensification in HIV/AIDS among women in Urban counties of Arizona. Similar patterns are also observed among men, and in aggregate prevalence counts. Further illustrations examining patterns of prevalence and emergence by race among both women and men are provided in Illustrations A1–A5 in the supplemental data appendix.

Arizona's population is predominantly White. Illustration 10 describes the reported racial / ethnic makeup of Arizona, including prevalent and emergent HIV/AIDS cases. White, non-Hispanics are 62.0% of the state population, and represent 62.2% of current estimated prevalence; however, they constitute only 53.6% of emergent HIV infection. Trends of emergent HIV infection among all racial ethnic groups in Arizona are reflective of broader population trends with the clear exception of non-Hispanic Blacks. Non-Hispanic Blacks were just 3.2% of Arizona's population, but accounted for 12.9% of emergent HIV infection in 2003. This 3 to 4 fold disproportionate impact, not seen among other minority groups, is in line with national trends among non-Hispanic Blacks. Census Data from 2000 show African Americans make up 12.3% of the population of the United States. However, they have accounted for 39% -- more than 347,000 – of the more than 886,000 estimated AIDS cases diagnosed since the beginning of the epidemic. By the end of December 2002, more than 185,000 African Americans had died of AIDS. For those diagnosed with AIDS since 1994, African Americans had the poorest survival rates of all racial and ethnic groups, with 55% surviving after 9 years compared to 61% of Hispanics, 64% of whites, and 69% of Asian/Pacific Islanders (www.cdc.gov/hiv/pubs/facts/afam.htm).

Illustration 10: ARIZONA EMERGENT HIV/AIDS, PREVALENT HIV/AIDS, AND STATE POPULATION BY RACE/ETHNICITY

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
RACE/ETHNICITY	**Cases**	**% State Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**	**Population**	**% State Total**
White non-Hispanic	6,408	62.2%	185.30	1,885	53.6%	11.17	3,458,217	62.0%
Black non-Hispanic	1,097	10.7%	613.67	430	12.2%	50.64	178,762	3.2%
Hispanic	2,224	21.6%	143.49	991	28.2%	14.21	1,549,889	27.8%
Asian/Pacific Islander /Hawaiian non-Hispanic	81	0.8%	65.03	27	0.8%	4.81	124,560	2.2%
American Indian/Alaska Native non-Hispanic	372	3.6%	138.09	179	5.1%	14.02	269,383	4.8%
Multi-Racial /Other non-Hispanic	112	1.1%	N/A	7	0.2%	N/A	N/A	N/A
TOTAL	10,294	100.0%	184.45	3,519	100.0%	13.26	5,580,811	100.0%

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

Hispanics, who are 27.8% of the Arizona population, make up 21.6% of prevalent cases and 28.2% of emergent cases. The apparent lag in HIV/AIDS prevalence proportions among Hispanics may be due to misclassification under new race/ethnicity definitions. When the HIV/AIDS Reporting System converted from a race to a race/ethnicity classification system in 2002, it is suspected that many White ethnic Hispanics were incorrectly classified as White non-Hispanic.

Other issues of relevance to Arizona Hispanics include the number of undocumented persons living in Arizona who may live in poverty or not have access health services. The U.S. Department of Health and Human Services HIV/AIDS Bureau reports, "In 2000, 21.2% of Hispanics in the United States lived below the poverty line, compared with 7.5% of whites. Although Hispanics represent just 11.9% of the U.S. population, they constitute approximately one-third of uninsured persons. Data on HIV/AIDS among migrant farm-workers, a majority of whom are Hispanic, are scarce, and much of the research that does exist is several years old. Various studies have found rates of HIV seroprevalence of 3 to 13% among this population, and prevalence appears to be increasing. Hispanics are more likely than whites to live in medically under served areas; approximately two-thirds of users of federally funded Community and Migrant Health Centers are racial and ethnic minorities"(http://hab.hrsa.gov/programs/factsheets/hispfact.htm).

Arizona has one of the nation's largest American Indian populations. All American Indian national groups together constitute 4.8% of the state population, 3.8% of HIV/AIDS prevalence, and 5.1% of emergent HIV infection. Statistical variance will have a more significant influence upon rate variations within American Indian populations due to their comparatively small number of cases of HIV infection. Indicators of risk behaviors associated with HIV infection are of particular concern among American Indian groups, and will be discussed more extensively in the section on indicators of HIV/AIDS infection risk.

Illustration 11: ARIZONA EMERGENT HIV/AIDS, PREVALENT HIV/AIDS, AND STATE POPULATION BY COUNTY

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates		
COUNTY	**Cases**	**% State Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**	**Population**	**% State Total**	**Population Density (people per sq. mile)**
Apache	26	0.3%	38.16	18	0.5%	5.25	68,129	1.2%	6.1
Cochise	117	1.1%	95.78	32	0.9%	5.37	122,161	2.2%	19.7
Coconino	120	1.1%	98.93	41	1.2%	6.93	121,301	2.2%	6.5
Gila	25	0.2%	48.59	6	0.2%	2.34	51,448	0.9%	10.7
Graham	29	0.3%	87.74	17	0.5%	10.21	33,051	0.6%	7.1
Greenlee	2	0.0%	26.61	0	0.0%	0.00	7,517	0.1%	4.1
LaPaz	21	0.2%	107.60	7	0.2%	7.17	19,517	0.3%	4.3
Maricopa	7,010	68.1%	206.83	2,509	71.3%	15.68	3,389,260	60.7%	367.5
Mohave	173	1.7%	100.95	42	1.2%	5.23	171,367	3.1%	12.7
Navajo	45	0.4%	43.15	29	0.8%	5.80	104,280	1.9%	10.5
Pima	1,903	18.5%	213.15	576	16.4%	13.35	892,798	16.0%	97.2
Pinal	331	3.2%	162.14	145	4.1%	15.38	204,148	3.7%	38.0
Santa Cruz	29	0.3%	72.02	12	0.3%	6.13	40,267	0.7%	32.6
Yavapai	130	1.3%	70.49	47	1.3%	5.41	184,433	3.3%	22.7
Yuma	128	1.2%	74.80	38	1.1%	4.64	171,134	3.1%	31.0
Unknown	205	2.0%	N/A	0	0.0%	N/A	N/A	N/A	N/A
TOTAL	10,294	100.0%	184.45	3,519	100.0%	13.26	5,580,811	100.0%	49.0

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

Arizona has 15 counties, two of which are home to the bulk of the state's population: Maricopa (Phoenix metropolitan area) and Pima (Tucson metropolitan area). Population density analysis shows there are 367.5 people and 97.2 persons per square mile in Maricopa and Pima counties, respectively. Maricopa County makes up 60.7% of the state's population, 68.1% of prevalent cases and 71.3% of emergent cases. Pima County makes up 16.0% of the state's population, 18.5% of prevalent cases and 16.4% of emergent cases. Logically, counties with small populations report few cases of HIV/AIDS. However the rate of prevalence and emergence reported in Arizona are not evenly distributed. Rates tend to increase with population density across the state.

Illustration 12 demonstrates that there is currently an eight-fold difference in the rates of the lowest and highest HIV/AIDS prevalence counties in the state of Arizona. These rates strongly correspond with population density suggesting that HIV/AIDS prevalence is related to urbanization in Arizona. Correlation analysis shows significant correlation between population density and prevalence rate using both linear and non-parametric models (Pearsons = .687, p=.005; Kendall's =.410, p=.033; Spearman's =.550, p=.034). This correlation is strengthened when rates for Graham and Pinal counties are adjusted to exclude incarcerated cases (Pearsons = .735, p=.002; Kendall's =.448, p=.020; Spearman's =.575, p=.025).

Illustration 12: ARIZONA CURRENT ESTIMATED HIV/AIDS PREVALENCE RATE BY COUNTY

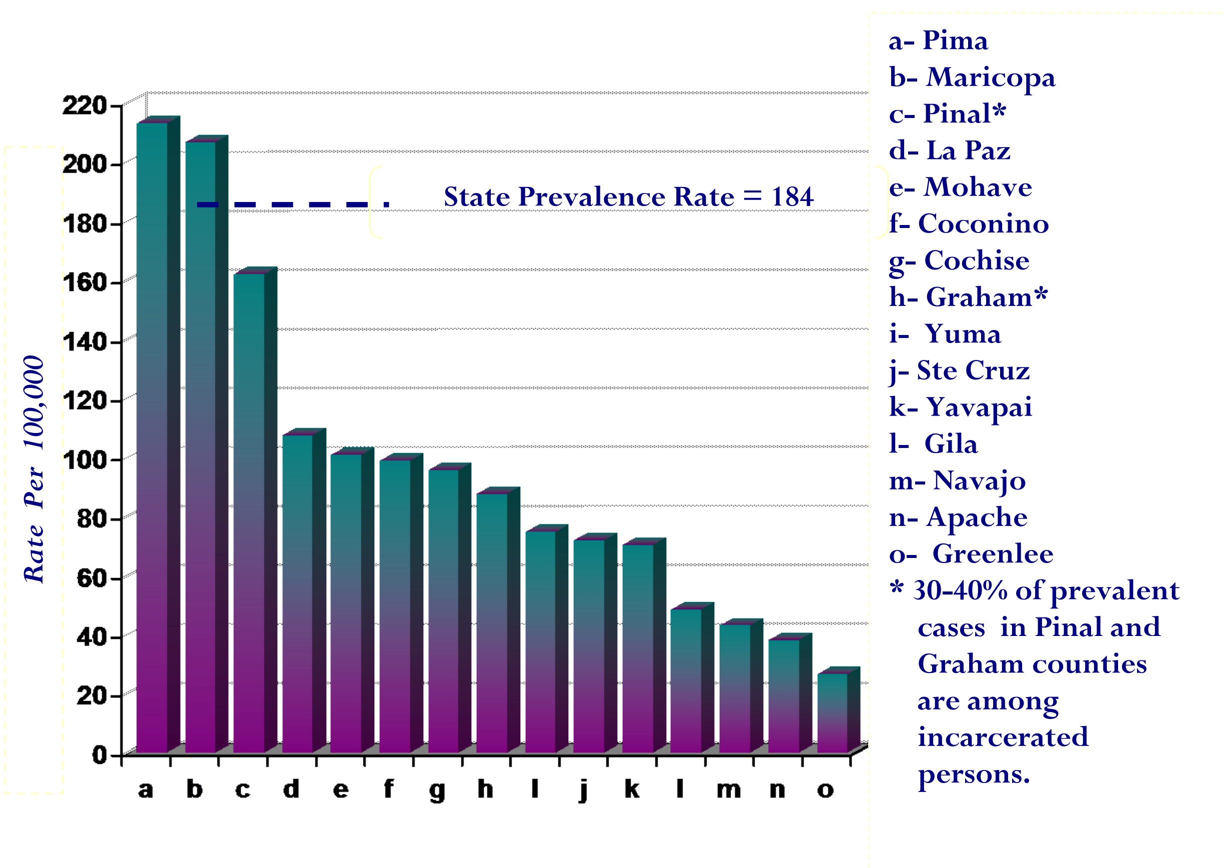
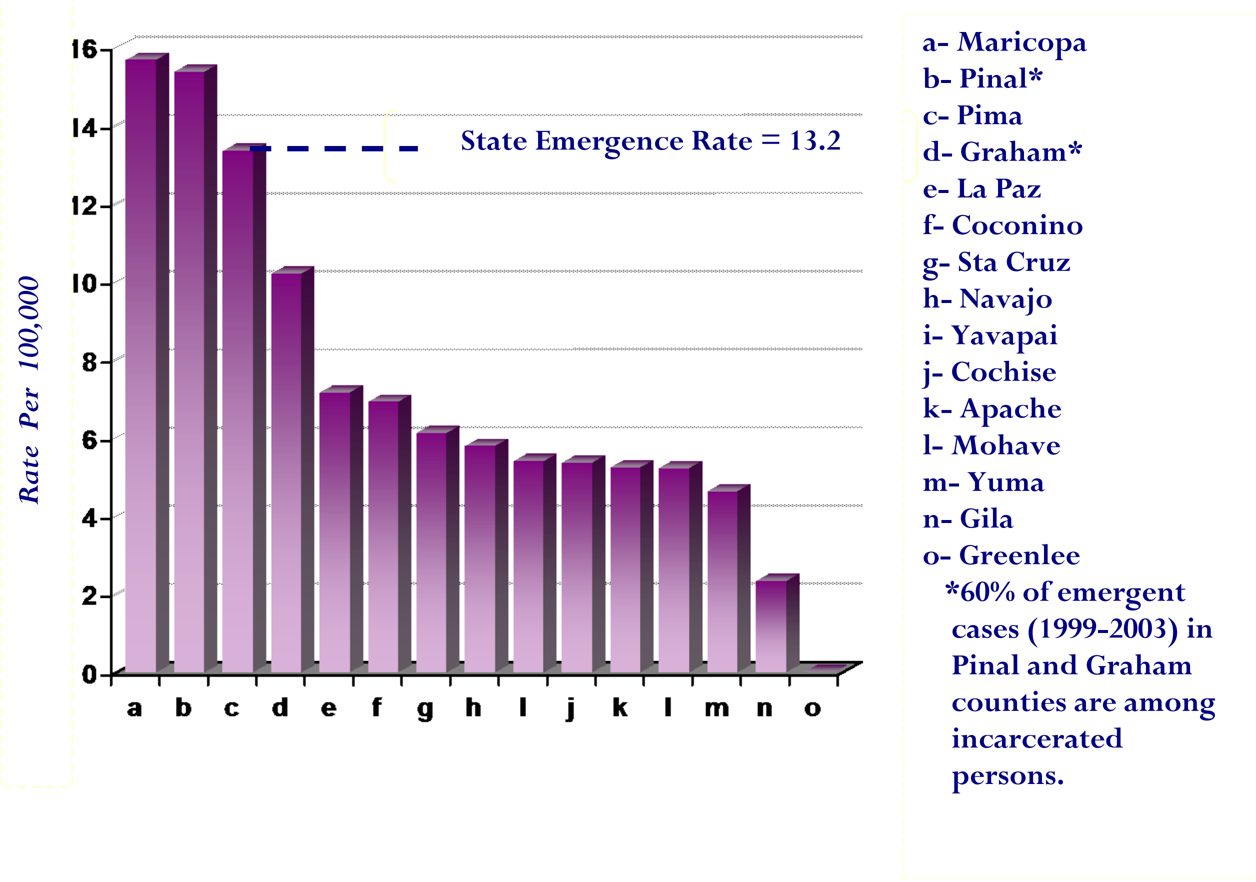


Illustration 13 demonstrates that there is a nearly seven-fold difference in the rates of emergent HIV infection between the lowest and highest counties in the state of Arizona. Counties with the highest percentages of their population in incarceration also experience large relative proportions of emergent HIV among incarcerated persons. These counties also coincidentally deviate from the broader trend of increasing prevalence and emergence with increasing population density, suggesting that HIV among incarcerated populations needs special consideration and study. Correlation analysis shows significant linear correlation between population density and emergence rate. Non-parametric correlations are not statistically significant (Pearsons = .631, p=.012; Kendall's =.333, p=.083; Spearman's =.450, p=.092). The linear correlation is strengthened when rates for Graham and Pinal counties are adjusted to exclude incarcerated cases (Pearsons = .763, p=.001).

The relationship between prevalence and incidence in an epidemic is dynamic and complex. As epidemic conditions change, the influence of prevalence upon incidence can be altered. In the early years of the HIV epidemic, for example, when prevalence was low, persons frequently engaging in frequent high-risk activity would still have had a low probability of exposure to HIV, because the pool of HIV infected persons was extremely small. But after a few years, when prevalence of HIV was high within some sub-populations, persons frequently engaging in frequent high-risk activity within those sub-populations would have had a high probability of exposure to HIV. Increasing prevalence can leverage incidence of new HIV infection if behavior patterns remain static. Many of these elements are difficult to quantify, but one useful general

Illustration 13: ARIZONA CURRENT HIV EMERGENCE RATE BY COUNTY



indicator is estimated doubling time. Even though doubling time estimates will change from year to year, the trends in that estimate – either to increase, decrease, or remain stable – can provide insight into the broader epidemic.

By combining the mean (1998-2003) annual Arizona HIV/AIDS incidence (13.58/100,000) and death (3.94/100,000) rates, the mean annual net change in HIV/AIDS cases may be estimated at 9.64/100,000. Using the 2003 year-end Arizona HIV/AIDS prevalence estimate of 9700, the mean (1999-2003) annual population growth rate for Arizona of 2.71%, and the annual net change in HIV/AIDS cases of 9.64/100,000 the estimated Arizona HIV/AIDS prevalence doubling time is 14 years and 6 months from 1/1/04.

A similar result can be found by using a simple compounding formula based upon the net annual change expressed as a percentage of prevalence (5.12%), and compounded annually. By that method, the estimated doubling time of Arizona HIV/AIDS prevalence is 13 year 11 months from 1/1/04.

An even less precise method called the “rule of 72” (72 divided by the percentage of annual change = doubling time in years) achieves a result of 14.1 years. By contrast, the population of Arizona doubled between 1980 and 2002, a time span of 22 years. This demonstrates that HIV/AIDS continues to expand within Arizona’s population at a greater rate than the pace of population growth. See the doubling time appendix for further details.

In 2004 the Unmet Needs Framework, a cooperative effort between numerous State and private entities was completed. This project measured the proportion of persons living with HIV/AIDS in Arizona who met a minimal standard of care during 2003. Using data from numerous sources and computer based cross-matching methods, patterns of care-related testing and treatment were compiled for calendar 2003 for persons who were reported to ADHS as living with HIV/AIDS in Arizona. Persons meeting one or more threshold criteria of care were classified as “In Care,” while those failing to meet any threshold criteria were classified as having “Unmet Needs”. In this way both the relative proportions of persons “in care” or having an “unmet need”, and their geographic distribution within the state could be studied and reported.

Results of that project are summarized for all 15 counties in Illustration 14, and are based upon 2004 estimated prevalence, not current (5/1/2005) prevalence estimates. The overall proportions of persons in Arizona who were ‘in care’ during 2003 as reported by the Unmet Needs Framework was 49.8%, and of those with an ‘unmet need’ was 50.2%. The relative ratio of those in care to those having an unmet need within each county may be compared to the statewide ratio (0.99) to identify regions of particular concern. Ratios above 1 are more favorable, and those below 1 are less favorable. The 2002 federal poverty data are also reported for the state, and for each county.

Illustration 14: DISTRIBUTION OF 'IN CARE', 'UNMET NEEDS' AND POVERTY BY COUNTY, ARIZONA 2003

COUNTY	IN CARE			UNMET NEEDS			Ratio	2002 POVERTY	
	CASES	%	Rate Per 100,000	CASES	%	Rate Per 100,000	'In Care' /'Unmet Needs'	Number of Persons	% of County Pop.
APACHE	12	0.2	17.65	13	0.3	19.12	0.92	25,798	37.8
COCHISE	48	1.0	39.85	73	1.5	60.61	0.66	19,772	17.7
COCONINO	46	1.0	38.24	66	1.3	54.87	0.70	20,609	18.2
GILA	15	0.3	29.09	9	0.2	17.45	1.67	8,752	17.4
GRAHAM	6	0.1	18.10	23	0.5	69.40	0.26	6,952	23.0
GREENLEE	2	0.0	25.55	1	0.0	12.77	2.00	842	9.9
LA PAZ	5	0.1	25.62	13	0.3	66.61	0.38	3,798	19.6
MARICOPA	3524	72.9	106.66	3242	66.4	98.13	1.09	355,668	11.7
MOHAVE	62	1.3	37.44	109	2.2	65.82	0.57	21,252	13.9
NAVAJO	24	0.5	23.48	15	0.3	14.68	1.60	28,054	29.5
PIMA	864	17.9	98.05	975	20.0	110.64	0.89	120,778	14.7
PINAL	115	2.4	58.59	170	3.5	86.61	0.68	27,816	16.9
SANTA CRUZ	15	0.3	37.47	14	0.3	34.97	1.07	9,356	24.5
YAVAPAI	58	1.2	32.39	66	1.3	36.86	0.88	19,552	11.9
YUMA	41	0.8	24.49	75	1.5	44.80	0.55	29,670	19.0
UNKNOWN	0	0.0	N/A	18	0.4	N/A	N/A	N/A	N/A
TOTAL	**4837**	**100**	**88.65**	**4882**	**100**	**89.47**	**0.99**	**698,669**	**13.9**

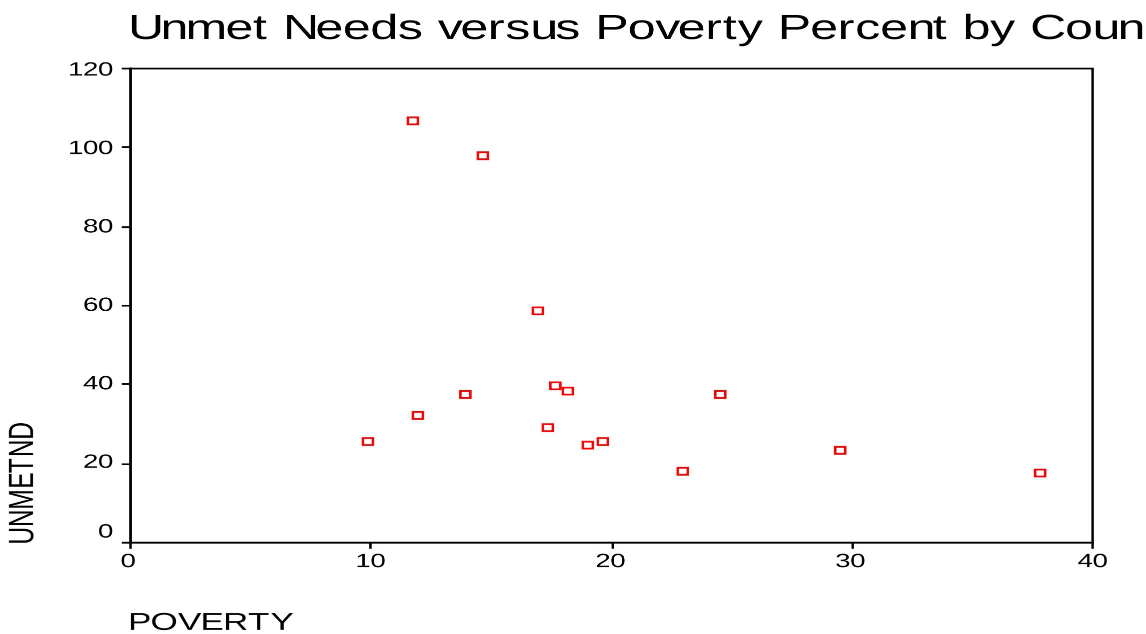
Source: Arizona HARS 8/6/04; Census 2000.

Illustration 14 shows that urbanized (Maricopa and Pima) counties have the majority of cases. Conventional understanding is that rates of 'unmet need' should increase in counties with higher poverty, and more limited health resources.

To verify if this appears to hold true in Arizona, a correlation analysis was performed between the rate of 'unmet need' and the percentage of the population living in poverty. The analysis results failed to demonstrate any statistically significant correlation (Kendall's: p=0.299, Spearman's: p =0.390, Pearson's: p=0.144). A simple scatter plot shown in illustration 15 suggests no linear pattern to the correlation.

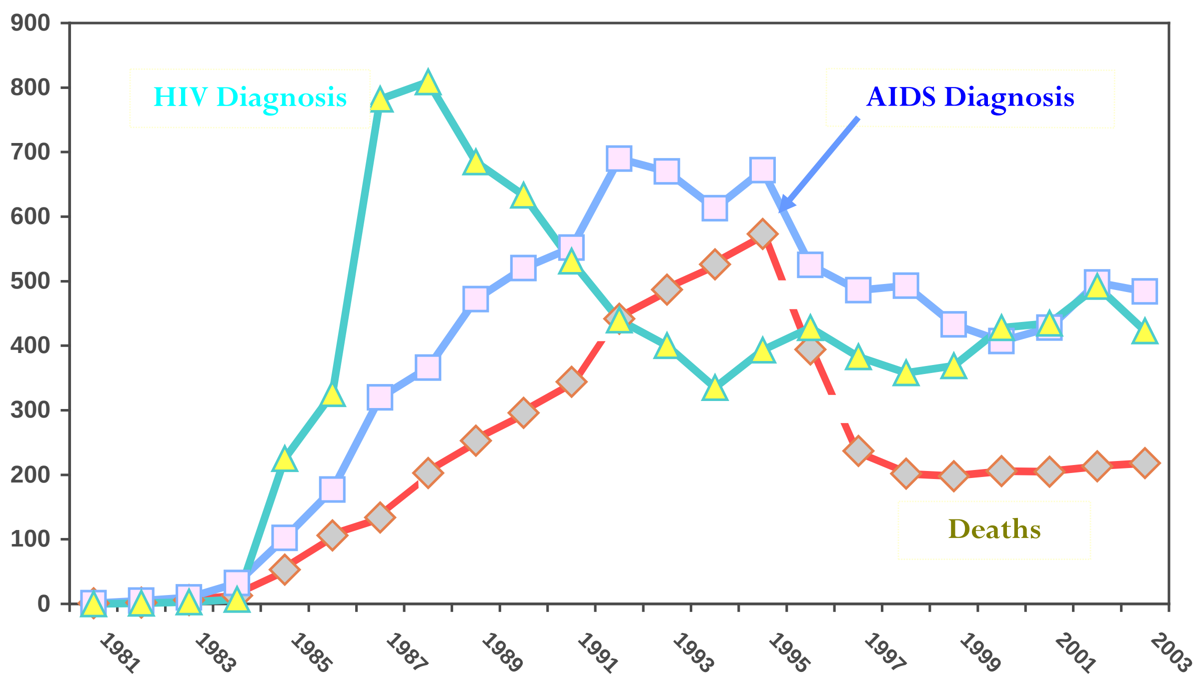
Any relationship that exists between access to minimal HIV care and poverty in Arizona is complex, and is not immediately apparent in this analysis. The 2002 American Community Survey, conducted by the U.S. Census Bureau found 10% of all families nationally, and in Arizona live in poverty. The survey reported 8% of those aged 65 and older, 20% of children age 18 and younger and 28% of female-headed households also live in poverty in Arizona. (U.S. Census, 2002).

Illustration 15: 'UNMET-NEEDS' RATES BY COUNTY AND PERCENTAGE OF COUNTY POPULATION LIVING IN POVERTY, ARIZONA 2002



The historic scope of the HIV/AIDS epidemic in Arizona may be represented in different ways. This has been done in the past by charting the frequency of three significant events: HIV diagnosis, AIDS diagnosis, and death of persons diagnosed with HIV or AIDS. Illustration 16 presents these trends from 1981, the year in which the first case of AIDS was reported in Arizona, through 2003. The AIDS trend line will include all diagnoses of AIDS, both emergent and those progressing from emergent HIV.

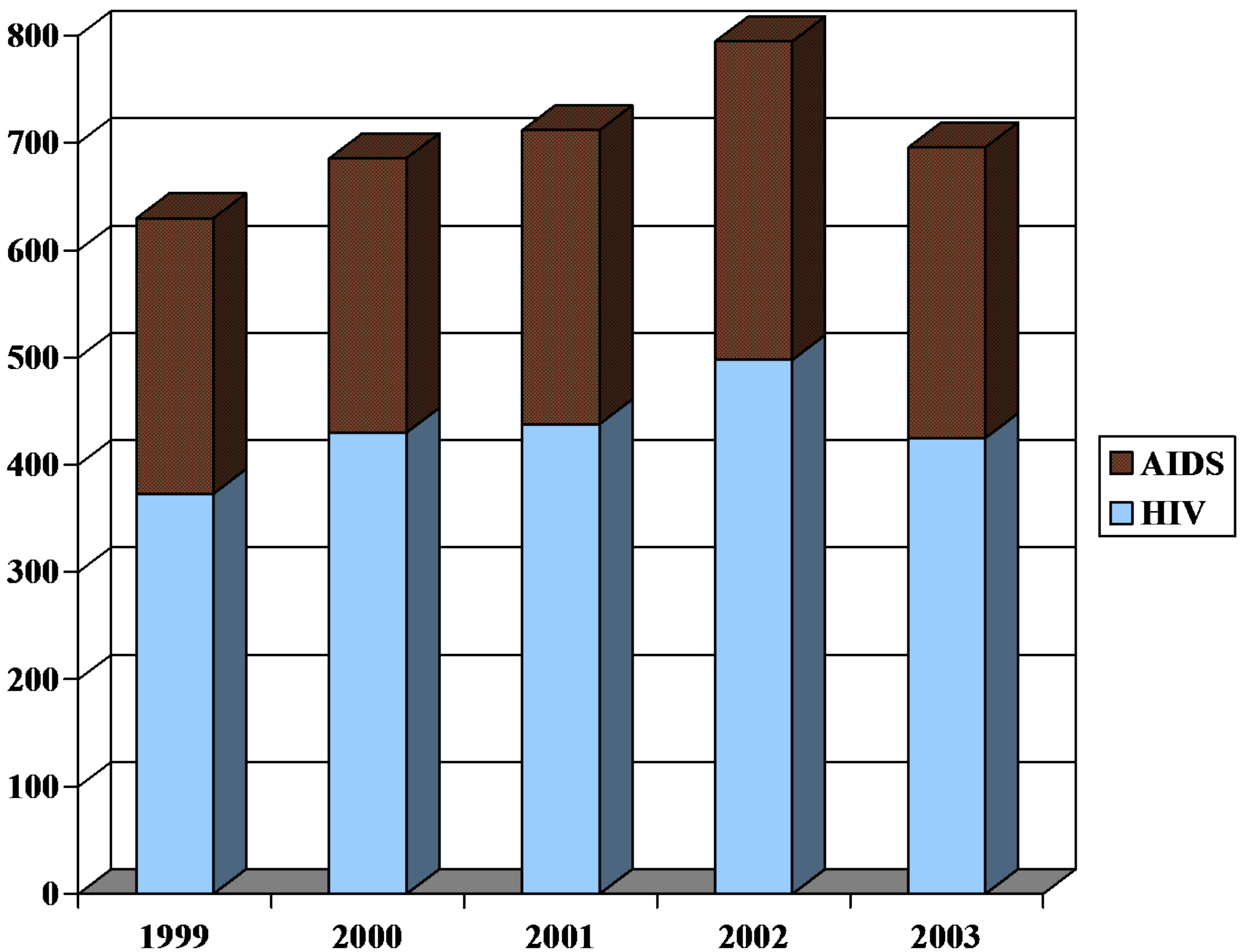
Illustration 16: HISTORY OF HIV/AIDS IN ARIZONA BY EVENT FREQUENCY, 1981 -2003



The history of the epidemic clearly shows a "first wave" among HIV diagnoses that peaked in 1988. A similar peak in the AIDS "first wave" followed in 1992, 4 years later. HAART therapy first became available in 1996, having a significant impact on deaths that same year. Deaths have been steady since 1998 at about one third the 1995 number of deaths. The number of new HIV/AIDS diagnoses annually has shown a slow increase since 1998 until 2003, when there were more than 12% fewer new HIV/AIDS cases reported than in 2002. This trend is clearly presented in Illustration 17 below.

Illustration 17 also shows that while there was a 12% decline in reported emergent cases in 2003, the relative proportion of emergent AIDS cases to all emergent cases has remained at or near 40% in the last 5 years. As was observed in Illustration 16, meaningful changes in the HIV/AIDS epidemic have not been observed simultaneously in HIV events and AIDS events. Rather, trend changes have been observed first in HIV events, and then in AIDS events several years later. The

Illustration 17: FREQUENCY OF EMERGENT HIV AND AIDS IN ARIZONA, 1999 -2003



significant and unexpected decline in reported emergence in 2003 among both emergent HIV and AIDS reports triggered a Quality Assurance review by the Office of HIV/AIDS Surveillance in late

2004. The review intended to discover whether observed declines were a real epidemic event, or the result of reporting issues. Investigation discovered no clear pattern of faulty reporting.

Throughout 2003 and 2004 lengthy delays in completion of case investigations have hindered timely data analysis, and prevention efforts. According to rules for reporting established by ADHS Office of HIV/AIDS, primary case investigation is to be completed and returned to ADHS by County health departments within 30 days. Partner Counseling and Referral Service (PCRS) is a critical component of primary case investigation because all persons who may have been exposed to HIV need to be tested and educated. The mean completion time of case investigations initiated during 2004 was three times the 30-day requirement. By March 15, 2005 there were 156 uncompleted case investigations from 2004 pending for Arizona.

Because of the disproportionately urban impact of HIV/AIDS in Arizona, nearly 9 of 10 prevalent and emergent HIV infections are reported in Arizona's two urban counties – Maricopa and Pima – which contain more than 75% of the state population. The strategic importance of these two counties in HIV prevention and surveillance must be understood. Available data suggest that the majority of HIV surveillance investigations do not include a client interview. As a result PCRS does not discover significant numbers of HIV infection because so few tests resulted from PCRS. In 2004 Maricopa County's Surveillance Summary reports that 233 of 1169 (19.9%) persons potentially exposed to HIV and submitted for HIV/AIDS surveillance were contacted and interviewed. These interviews resulted in the elicitation of 97 partners, of whom 16 were tested for HIV infection. Similar data from Pima County were not available for 2004, but will be reported to ADHS beginning in 2005.

Partner elicitation can be effective in discovery of undiagnosed HIV infection. During 2004 among partners of HIV positive individuals elicited through PCRS, ADHS Office of HIV/AIDS Counseling and Testing Service (CTS) found more than 14% were undiagnosed HIV positive. At the time of this publication data from Maricopa County in August and September of 2005 from a renewed intensive PCRS effort was producing positivity rates of around 25% among elicited partners who were successfully contacted.

Illustration 18: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND STATE POPULATION BY RISK BEHAVIOR CATEGORY

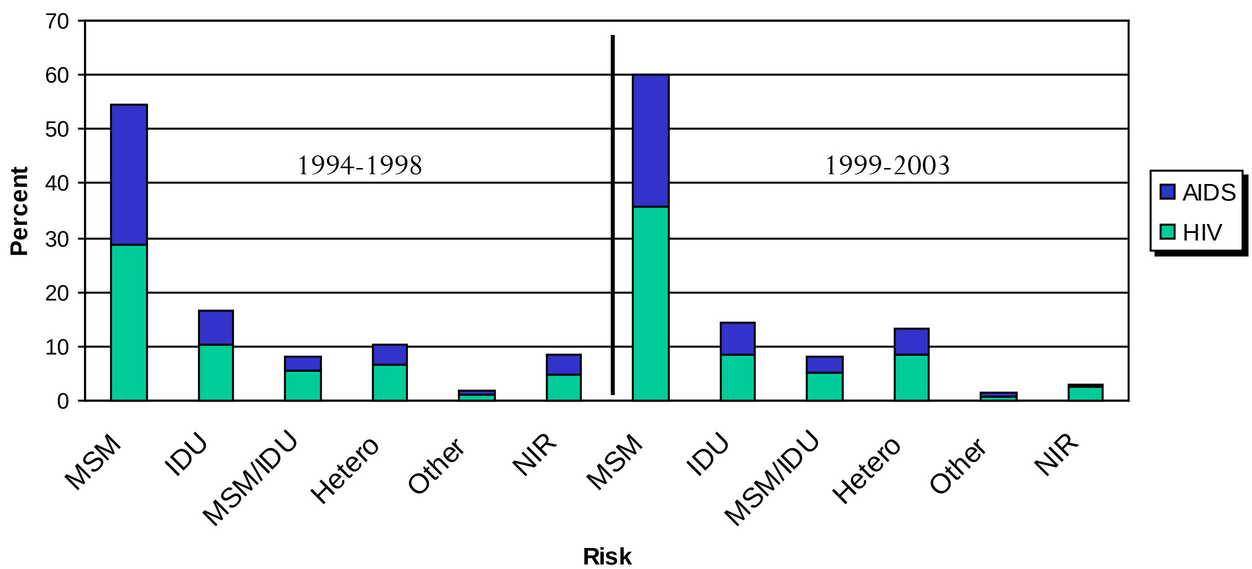
	Current HIV/AIDS Prevalence		Emergent HIV/AIDS 1999-2003	
Risk Category/Mode of Transmission	**Cases**	**% State Total**	**Cases**	**% State Total**
MSM [1]	6,039	58.7%	2,119	60.2%
IDU [2]	1,379	13.4%	505	14.4%
MSM/IDU [3]	937	9.1%	288	8.2%
Heterosexual	1,065	10.3%	460	13.1%
O/H/TF/TPR [4]	186	1.8%	50	1.4%
No Reported Risk	688	6.7%	97	2.8%
TOTAL	10,294	100.0%	3,519	100.0%

1) Men having Sex with Men
2) Injection Drug Use
3) Men having Sex with Men as well as reporting Injection Drug Use
4) Other/Hemophilia/Transfusion and Blood products/Transplant Recipient

Behavior remains the most powerful predictor of HIV infection. Regional differences in predominant HIV risk behaviors and modes of transmission have been observed and well documented. The current profile of reported risk behaviors for prevalent and emergent HIV infection in Arizona are reported in Illustration 18. No U.S. Census figures exist to estimate population size or rates according to these definitions, so rates and population numbers have not been calculated for this illustration.

These data demonstrate that the HIV/AIDS epidemic in Arizona remains predominantly among MSM. Illustration 19 shows recent trends by risk behavior category.

Illustration 19: ARIZONA EMERGENT HIV/AIDS BY RISK BEHAVIOR CATEGORY, 1994-2003



The predominant behavior associated with emergent HIV infection in Arizona continues to be MSM, which was reported in 71.6% of emergent HIV infections in 2003. MSM as a behavior associated with emergent HIV infection is rising in Arizona. MSM were around 70% of emergent cases in the late 1980's. But by 1995 the proportion of Arizona emergent HIV cases reporting any MSM behavior (MSM + MSM/IDU) fell to 59%, and remained level through 2000. Beginning in 2001, the proportion of emergent HIV cases reporting any MSM behavior has risen to 71.6%.

IDU is the second most frequently reported behavior associated with emergent HIV infection. In 2003, IDU behavior was associated with 22.3% of emergent HIV infection. As a proportion of emergent cases, IDU has remained steady over the last 5 years.

High-risk heterosexual (HRH) is only considered a likely mode of HIV infection when MSM or IDU are not reported. HRH was associated with emergent HIV infection in around 5% of cases in the early 1990's. In 2003, HRH was associated with 12.6% of emergent HIV infection reports, down from a peak proportion of 16.5% in 2000. Among all risk categories, MSM and HRH are the only categories that appear to be increasing as a proportion of emergent HIV infection.

3). What are the indicators of HIV/AIDS infection risk in Arizona?

Determining denominators for high-risk populations was done with considerable thought. Recognizing the problems and potential controversy in assigning population denominators, state epidemiologists conducted a lengthy literature review to formulate their plan. Details of the literature review and selection process are fully discussed in the appendix on Holmberg's study.

Men Who Have Sex With Men:

Using the 2002 estimated population of MSM in Arizona developed from the estimates published in the Holmberg (1996) study, estimated rates may be projected from reported cases. Illustration 20 reports these estimates by age category. The estimate projects that 70,013 men, around 2.56% of the 2002 male population, have had sex with other men. This estimate has been updated to 71,609 for change in population from 2002 to 2003.

Illustration 20: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY AGE GROUP OF MSM

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Age	**MSM* Cases**	**% State MSM Total**	**Est. Rate Per 100 MSM***	**MSM* Cases**	**% State MSM Total**	**Est. Rate Per Year Per 100 MSM***	**Estimated MSM* Population**	**% State Total**
13-19	3	0.1%	0.03	25	1.0%	0.06	8,974	12.5%
20-24	101	1.4%	1.57	180	7.5%	0.56	6,439	9.0%
25-29	308	4.4%	4.83	341	14.2%	1.07	6,381	8.9%
30-34	695	10.0%	10.71	476	19.8%	1.47	6,489	9.1%
35-39	1,280	18.3%	20.76	510	21.2%	1.65	6,166	8.6%
40-44	1,786	25.6%	27.89	401	16.7%	1.25	6,403	8.9%
45-49	1,292	18.5%	21.95	228	9.5%	0.77	5,886	8.2%
50-54	761	10.9%	14.66	125	5.1%	0.48	5,192	7.3%
55-59	421	6.0%	9.35	63	2.6%	0.28	4,504	6.3%
60-64	184	2.6%	4.93	36	1.5%	0.19	3,731	5.2%
65 and older	134	1.9%	1.17	22	0.9%	0.04	11,444	16.0%
Unknown	11	0.2%	N/A	0	0.0%	0.00	N/A	N/A
TOTAL	6,976	100%	9.74	2,407	100%	0.67	71,609	100%

*Men who have Sex with Men. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

The number of MSM in each age category is derived by applying it's relative proportion of the population above age 12 to the total number of MSM estimated for the state. It is understood that this method will not precisely estimate the population size or rates in each age category due to variations in population size of MSM. These variations are due to higher rates of death from HIV/AIDS among older age groups, and variable ages of MSM behavior initiation among younger age groups. For this reason, only persons age 12 and older are considered likely to participate in MSM behavior and be HIV infected in substantial numbers. All of these problems notwithstanding, these estimates offer reasonable and valuable insights into likely epidemic impact among MSM in Arizona. These estimates are based upon cases of HIV infected persons reporting any MSM activity, including those with other risk behaviors such as IDU.

By this estimate, currently nearly 1 in 10 MSM statewide are infected with HIV, and nearly 1 in 4 between the ages of 35 and 49. These proportions are similar to HIV infection rates observed in Arizona among persons testing for HIV for the first time between 1998 and 2002 who report any MSM activity.

Recent research (R Doyle, 2005) based on 2000 U.S. Census Bureau information appears to reinforce the Arizona estimates of MSM population size. Doyle reports "The census form asked respondents to classify any unrelated people in their household as a housemate, boarder, foster child, unmarried partner or other non-relative. If the unmarried partner is reported to be of the same sex, that partner and the respondent are very likely gay or lesbian. The census showed that 0.6% of men and 0.5% of women 18 years of age and older live together as same-sex unmarried partners… By extrapolation, the proportion of gay men in the population is 2.5%, and of lesbians 1.2%, consistent with earlier research" (Doyle, R., *Scientific American*, March 2005, pg. 28).

Illustration 21: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY RACE/ETHNICITY OF MSM

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Race/Ethnicity	**MSM* Cases**	**% State MSM Total**	**Est. Rate Per 100 MSM***	**MSM* Cases**	**% State MSM Total**	**Est. Rate Per Year Per 100 MSM***	**Estimated MSM* Population**	**% State Total**
White Non-Hispanic	4,744	68.0%	10.68	1,427	59.4%	0.64	44,399	62.0%
Black Non-Hispanic	508	7.3%	22.17	196	8.1%	1.71	2,291	3.2%
Hispanic	1,414	20.3%	7.1	651	27.0%	0.65	19,907	27.8%
Asian/Pacific Islander /Hawaiian Non-Hispanic	55	0.8%	3.49	20	0.8%	0.25	1,575	2.2%
American Indian/Alaska Native Non-Hispanic	238	3.4%	6.92	110	4.6%	0.64	3,437	4.8%
Multi-Racial /Other Non-Hispanic	17	0.2%	N/A	3	0.1%	N/A	N/A	N/A
TOTAL	6,976	100%	9.74	2,407	100%	0.67	71,609	100%

*Men who have Sex with Men. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D.Holmberg (1996).

Test data from ADHS Office of HIV/AIDS Counseling and Testing Services among all testers during 1999-2003 who reported MSM activity show that 6.0% (905 of 15,093 testers) were infected with HIV. Age specific rates vary, and may be higher. Because of the non-random nature of a person's decision to seek testing for HIV infection, self-selection may have either a positive or negative bias upon the positivity rate of persons seeking testing through CTS. Most persons who are living with

HIV/AIDS are aware of their HIV infection, and CDC estimates are that about 25% of persons actually infected with HIV are unaware of their HIV status. The prevalence of HIV among persons who have never been tested or among persons who have tested negative is likely to be much lower than global HIV prevalence. But these people are far more likely to seek testing to discover their HIV status than persons who already know they are HIV positive. However, persons who have participated in high-risk behaviors may be more likely to be infected with HIV, and may seek testing as a result of their risky behaviors. These considerations suggest that CTS data should not be understood to accurately reflect global prevalence or incidence rates, and they underscore the difficulty of establishing reliable estimates of population size and HIV rates for behavior groups.

Illustration 21 describes the race/ethnicity of MSM with HIV/AIDS in Arizona. Although Black Non-Hispanics are just 3.2% of the state population, they are 8.1% of emergent HIV/AIDS cases. A Black non-Hispanic MSM is nearly three times more likely to be infected with HIV/AIDS in Arizona than any other MSM. Rates of emergent HIV infection among White non-Hispanics, Hispanics, and American Indians are very similar, and the relative proportions of emergent HIV infection among MSM in these groups reflect their presence in the population. This pattern may not be observed with other risk behaviors, and may vary regionally within the United States. The Department of Health and Human Services HIV/AIDS bureau report, "In 2000, the HIV exposure category of MSM accounted for 47% of cases among Hispanic males, substantially less than for white males (73%). Injection drug use (IDU) was the exposure category in 33% of cases; heterosexual contact in 14% and MSM/IDU in 5%" (http://hab.hrsa.gov/programs/factsheets/hispfact.htm).

MSM minority HIV/AIDS infection survey results published in Morbidity and Mortality Weekly Report (January, 2000) show a disproportionate number of Black Non-Hispanic and Hispanic MSM are infected. The survey studied MSM who were diagnosed with HIV from 1996-1998 in 25 states. The authors write "Among racial/ethnic minority MSM in the 25 states that have conducted confidential HIV surveillance and AIDS case surveillance since 1994, … findings indicate that among MSM, non-Hispanic black and Hispanic men accounted for an increasing proportion of AIDS cases and had smaller proportionate declines in AIDS incidence and deaths from 1996 to 1998… The annual number of AIDS cases remains high, although AIDS incidence and deaths have declined among racial/ethnic minority MSM. These declines reflect the beneficial impact of HIV prevention programs, HAART, and opportunistic infection prophylaxis. Young non-Hispanic black and Hispanic MSM remain at high risk for HIV infection as indicated by higher proportion of AIDS and HIV cases among non-Hispanic black and Hispanic MSM age 13-24 years compared with white MSM" (http://www.thebody.com/cdc/minoritymen/minoritymen.html)

Maricopa and Pinal counties together include 77% of the state population, 88% of MSM HIV/AIDS prevalence, and 90% of MSM emergent HIV infection. Urbanization is significantly correlated with higher rates of HIV prevalence and emergence in Arizona. In 2003 a Rapid Assessment Response and Evaluation (RARE) study took place in Pima County due to a surge in HIV/AIDS infections reported there among MSM. The study summarized that "63% of HIV/AIDS cases in Pima County are found among MSM with the highest rate of infection occurring between the ages of 30-40 years. Additionally, MSM of color (especially African Americans) have been disproportionately affected by

Illustration 22: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY COUNTY OF MSM

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
COUNTY	**MSM* Cases**	**% State MSM Total**	**Rate Per 100 MSM***	**MSM* Cases**	**% State MSM Total**	**Rate Per Year Per 100 MSM***	**Estimated MSM* Population**	**% State Total**
Apache	18	0.3%	2.10	12	0.5%	0.28	859	1.2%
Cochise	64	0.9%	4.06	17	0.7%	0.22	1,575	2.2%
Coconino	68	1.0%	4.32	26	1.1%	0.33	1,575	2.2%
Gila	17	0.2%	2.64	4	0.2%	0.12	644	0.9%
Graham	14	0.2%	3.26	10	0.4%	0.47	430	0.6%
Greenlee	2	0.0%	2.78	0	0.0%	0.00	72	0.1%
LaPaz	9	0.1%	4.19	2	0.1%	0.19	215	0.3%
Maricopa	4,840	69.4%	11.13	1,765	73.3%	0.81	43,467	60.7%
Mohave	108	1.5%	4.86	26	1.1%	0.23	2,220	3.1%
Navajo	29	0.4%	2.13	20	0.8%	0.29	1,361	1.9%
Pima	1,304	18.7%	11.38	402	16.7%	0.70	11,457	16.0%
Pinal	171	2.5%	6.45	72	3.0%	0.54	2,650	3.7%
Santa Cruz	23	0.3%	4.59	10	0.4%	0.40	501	0.7%
Yavapai	70	1.0%	2.96	23	1.0%	0.19	2,363	3.3%
Yuma	70	1.0%	3.15	18	0.7%	0.16	2,220	3.1%
Unknown	169	2.4%	N/A	0	0.0%	N/A	N/A	N/A
TOTAL	6,976	100%	9.74	2,407	100%	0.67	71,609	100%

*Men who have Sex with Men. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

HIV." Focusing on MSM age 30 years of age and older with an emphasis on men of color, data was collected during a 3½ month period through written surveys (N = 200), observation, face to face interviews of both short (N = 20) and long (N = 27) duration, and 5 focus groups (N = 39). The purpose of this research was to understand how locations influence the level of risk taking behavior among MSM in Pima County and to support existing efforts to understand and respond to the prevention/intervention needs of MSM.

Specific themes emerged from this data that provided an up-to-date snapshot of MSM culture in Tucson, Ariz. The study found that a large selection of locations exists where MSM go to find sex, but some are perceived to be more popular than others. The three most commonly cited places among self-identified gay men over 21 year of age, regardless of ethnicity or age in order of popularity were bars (81%), Internet (53%), and Parks (48%). Illustration 23 reports the most commonly mentioned venues where MSM meet for sex by race/ethnicity.

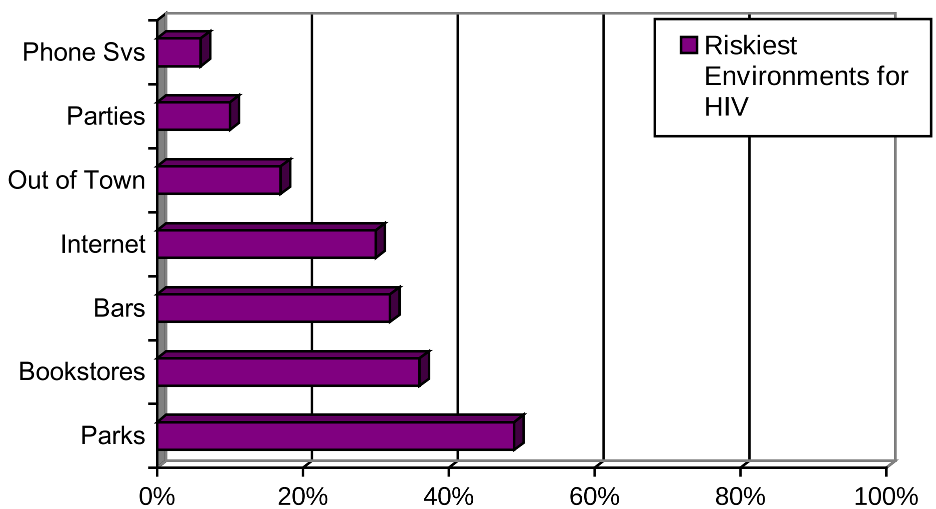
Illustration 23: WHERE MSM "HOOK UP" FOR SEX

	Bars	Bookstore	Internet	Parks	Other*
Anglo (N=102)	22%	13%	24%	15%	26%
Latino (N=74)	20%	15%	20%	22%	23%
African American (N=13)	16%	29%	17%	13%	25%
Native American (N=4)	25%	25%	25%	0%	25%
Other (N=7)	20%	20%	0%	20%	40%

*parties, phone services, bathrooms, along 4th Ave etc.
N=200; Source: 2003 RARE Study Pima County, AZ.

Respondents were also asked in which venues they would feel they were most at risk of acquiring HIV infection. The venues perceived as the riskiest for acquiring HIV infection were also the most popular locations in which men actually meet for sex. Illustration 24 reports venues respondents felt posed the greatest risk of acquiring HIV infection.

Illustration 24: VENUES WHERE RESPONDENT MSM FEEL MOST AT RISK OF ACQUIRING HIV INFECTION



N=200; Source: Street Intercept Survey, Tucson RARE Study, 2003.

The RARE project in Tucson was unique in that detailed research of specific risk-groups in Arizona had not been conducted at length. The project provides insight into why MSM in Southern Arizona are becoming infected. Many reported drug use, anonymous sex partners and a fatalistic culture of not wanting to outlive their peer group.

Illustration 25: DISTRIBUTION OF MET, UNMET NEEDS AMONG MEN HAVING SEX WITH MEN BY COUNTY, ARIZONA 2003

	2003 IN CARE			2003 UNMET NEED			Ratio	EST. 2003 MSM* POPULATION	
COUNTY	MSM* CASES	%	Rate Per 100 MSM*	MSM* CASES	%	Rate Per 100 MSM*	In Care/ Unmet Needs	MSM* POPULATION	MSM* POP. DENSITY
APACHE	10	0.3	1.16	6	0.2	0.70	1.67	859	0.08
COCHISE	31	0.9	1.97	35	1.2	2.22	0.89	1,575	0.25
COCONINO	30	0.8	1.90	32	1.1	2.03	0.94	1,575	0.08
GILA	11	0.3	1.71	6	0.2	0.93	1.83	644	0.13
GRAHAM	6	0.2	1.40	7	0.2	1.63	0.86	430	0.09
GREENLEE	2	0.1	2.78	1	0.1	1.39	2.00	72	0.04
LA PAZ	4	0.1	1.86	3	0.1	1.40	1.33	215	0.05
MARICOPA	2629	73.6	6.05	2054	69.5	4.73	1.28	43,467	4.71
MOHAVE	46	1.3	2.07	64	2.2	2.88	1.40	2,220	0.16
NAVAJO	14	0.4	1.03	10	0.3	0.73	1.40	1,361	0.14
PIMA	651	18.2	5.68	579	19.6	5.05	1.12	11,457	1.25
PINAL	69	1.9	2.60	72	2.4	2.72	0.96	2,650	0.49
SANTA CRUZ	11	0.3	2.20	10	0.3	2.00	1.10	501	0.41
YAVAPAI	34	1.0	1.44	29	1.0	1.23	1.17	2,363	0.29
YUMA	23	0.6	1.04	35	1.2	1.58	0.66	2,220	0.40
UNKNOWN	0	0.0	N/A	12	0.4	N/A	N/A	N/A	N/A
TOTAL	**3571**	**100.0**	**4.98**	**2955**	**100.0**	**4.13**	**1.21**	**71,609**	**0.63**

*Men who have Sex with Men.
Source: Arizona HARS 4/6/04; NCHS 2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Illustration 25 describes the HIV/AIDS epidemic in Arizona in terms of MSM cases per county, including a ratio of those in care, and those with an unmet need. Persons included in the "in care" portion of this ratio met the criteria established by the Ryan White CARE Act for the Unmet Needs Framework during 2003. Those who did not meet any of these criteria were defined as having an "unmet need."

Ratios of persons in care to those with an unmet need in Arizona's most populous counties with nearly 9 of 10 MSM cases op HIV infection establish statewide mean rates. In Maricopa County there are 1.28 persons "in care" per person with an unmet need. In Pima County the ratio is 1.12 persons "in care" per person with an unmet need. Patterns observed among MSM reflect those previously observed - urbanized areas of Arizona have disproportionately greater rates of HIV/AIDS.

Injection Drug Use:

IDU has long been recognized as one of the leading risks to becoming infected with HIV/AIDS. Illustration 26 examines prevalent and emergent HIV/AIDS cases by age in Arizona.

The majority of prevalent cases are reported among people age 35 to 49. The greatest number of cases are reported among those aged 40-44 with 597 prevalent cases. Among emergent HIV/AIDS cases reported, the greatest number are reported among those aged 35-39 with 184 cases from 1999 through 2003.

Illustration 26: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY AGE GROUP OF IDU

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Age	IDU* Cases	% State IDU Total	Est. Rate Per 100 IDU*	IDU* Cases	% State IDU Total	Est. Rate Per Year Per 100 IDU*	Estimated IDU* Population	% State Total
13-19	2	0.1%	0.03	12	1.5%	0.03	7,482	12.5%
20-24	26	1.2%	0.48	61	7.7%	0.23	5,387	9.0%
25-29	101	4.7%	1.90	80	10.1%	0.30	5,327	8.9%
30-34	185	8.5%	3.40	123	15.5%	0.45	5,447	9.1%
35-39	384	17.7%	7.46	184	23.2%	0.71	5,148	8.6%
40-44	597	27.5%	11.21	138	17.4%	0.52	5,327	8.9%
45-49	469	21.6%	9.56	109	13.7%	0.44	4,908	8.2%
50-54	246	11.3%	5.63	52	6.6%	0.24	4,369	7.3%
55-59	101	4.7%	2.68	19	2.4%	0.10	3,771	6.3%
60-64	27	1.2%	0.87	8	1.0%	0.05	3,112	5.2%
65 and Older	27	1.2%	0.28	7	0.9%	0.01	9,577	16.0%
Unknown	6	0.3%	N/A	0	0.0%	0.00	N/A	N/A
TOTAL	2,316	100%	3.87	793	100%	0.26	59,855	100%

* Injection Drug Users. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Nationally, new HIV infections reporting IDU have recently declined as a proportion of total new infections. *Morbidity and Mortality Weekly Report* stated in 2003 that “During 1994-2000, IDU-related HIV diagnoses declined among persons age 13-19 years and 30-39 years by 17% and 68%, respectively. Among persons aged 20-29 years and 40-49 years, diagnoses decreased 53% and 26%, respectively during 1994-1999, and leveled off during 1999-2000. IDU-related HIV diagnoses among persons age ≥ 50 years were level during 1994-1999 and increased slightly during 1999-2000” (MMWR, 2003). In Arizona, emergent HIV infection reporting IDU behavior declined from 24.8% of all emergent infections during 1994-1998 to 22.6% during 1999-2003.

Illustration 27: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY SEX OF IDU

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Sex	IDU* Cases	% State IDU Total	Est. Rate Per 100 IDU*	IDU* Cases	% State IDU Total	Rate Per Year Per 100 IDU*	Estimated IDU* Population	% State Total
Male	1,899	82.0%	6.34	650	82.0%	0.43	29,939	50.0%
Female	417	18.0%	1.39	143	18.0%	0.10	29,916	50.0%
TOTAL	2,316	100%	3.87	793	100%	0.26	59,855	100%

* Injection Drug Users. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Evidence in Arizona supports the view that IDU are disproportionately male. For this reason, the gender stratified population estimates above should be regarded with caution in the case of IDU. The CDC reports, "During 1994-2000, a total of 21,687 HIV diagnoses reported in the 25 states were among IDU; males accounted for 14,252 or 66% of cases" (2003). Illustration 27 reports that 82% of prevalent and emergent IDU cases in Arizona are male. Illustration 28 presents prevalence and emergent HIV infection among IDU by race/ethnicity.

Illustration 28: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY RACE/ETHNICITY OF IDU

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Race/Ethnicity	**IDU* Cases**	**% State IDU Total**	**Est. Rate Per 100 IDU***	**IDU* Cases**	**% State IDU Total**	**Est. Rate Per Year Per 100 IDU***	**Est. IDU* Population**	**% State Total**
White Non-Hispanic	1,349	58.%	3.64	385	48.5%	0.21	37,110	62.0%
Black Non-Hispanic	349	15.%	18.22	129	16.3%	1.35	1,915	3.2%
Hispanic	500	21.%	3.00	228	28.8%	0.27	16,640	27.8%
Asian/Pacific Islander /Hawaiian Non-Hispanic	10	0.4%	0.76	3	0.4%	0.05	1,317	2.2%
American Indian/Alaska Native Non-Hispanic	95	4.1%	3.31	45	5.6%	0.31	2,873	4.8%
Multi-Racial Non-Hispanic/Other	13	0.6%	N/A	3	0.4%	N/A	N/A	N/A
TOTAL	2,316	100%	3.87	793	100%	0.26	59,855	100%

* Injection Drug Users. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Similar to previous illustrations, Black non-Hispanics IDU are disproportionately impacted by HIV/AIDS infection. Black non-Hispanic IDU prevalence is nearly 5 times the statewide rate, and Black non-Hispanic emergence was more than 5 times the statewide emergent rate. Similar national trends are being reported. According to a CDC study of 25 states, Black, non-Hispanics are 65% of reported IDU-related HIV cases – nearly 5.5 times the presence of Blacks in the national population. White, non-Hispanics are 23% and Hispanics are 10% of IDU related HIV infection (2003).

Illustration 29: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY COUNTY OF IDU

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
COUNTY	**IDU* Cases**	**% State IDU Total**	**Rate Per 100 IDU***	**IDU* Cases**	**% State IDU Total**	**Est. Rate Per Year Per 100 IDU***	**Estimated IDU* Population**	**% State Total**
Apache	5	0.2%	0.70	2	0.2%	0.06	718	1.2%
Cochise	26	1.1%	1.97	4	0.5%	0.06	1,317	2.2%
Coconino	24	1.0%	1.82	6	0.8%	0.09	1,317	2.2%
Gila	7	0.3%	1.30	2	0.2%	0.07	539	0.9%
Graham	14	0.6%	3.90	10	1.3%	0.56	359	0.6%
Greenlee	0	0.0%	0.00	0	0.0%	0.00	60	0.1%
LaPaz	9	0.4%	5.00	6	0.8%	0.67	180	0.3%
Maricopa	1,445	62.4%	3.98	513	64.7%	0.28	36,331	60.7%
Mohave	61	2.6%	3.29	13	1.6%	0.14	1,856	3.1%
Navajo	9	0.4%	0.79	7	0.9%	0.12	1,137	1.9%
Pima	466	20.1%	4.87	133	16.8%	0.28	9,576	16.0%
Pinal	146	6.3%	6.59	70	8.8%	0.63	2,215	3.7%
SantaCruz	2	0.1%	0.48	2	0.2%	0.10	419	0.7%
Yavapai	34	1.5%	1.72	15	1.9%	0.15	1,975	3.3%
Yuma	25	1.1%	1.35	10	1.3%	0.11	1,856	3.1%
Unknown	46	2.0%	N/A	0	0.0%	N/A	N/A	N/A
TOTAL	2,316	100%	3.87	793	100%	0.26	59,855	100%

* Injection Drug Users. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

The majority of IDU-related HIV infections are found in urban counties – Maricopa and Pima (77% of population, 83% of prevalence; 82% of emergence). The distribution of IDU prevalence and emergence within the state does not appear to be as influenced by urbanization as MSM cases. Among rural counties, Pinal County has twice the proportion of prevalent IDU cases, and more than twice the proportion of emergent IDU cases as its proportion of the state population. Pinal County is home to several of the state's largest prisons, and an estimated 5% of the county population is inmates. There is insufficient health data concerning prisons to demonstrate that elevated rates of IDU related HIV in Pinal County are the result of high proportion of incarcerated IDU offenders. Pinal County is also experiencing much more rapid urbanization, particularly in northern areas adjacent to metropolitan Phoenix along the I-10 corridor. The effect of urbanization may also contribute to observed elevated rates of HIV prevalence and emergence in Pinal County. Illustration 29 reports estimated IDU population density (urbanization) by county, and examines proportions of prevalent IDU related HIV infection which met a minimal standard of care during 2003 or who have an unmet need.

Illustration 30: DISTRIBUTION OF MET, UNMET NEEDS AMONG IDU BY COUNTY, ARIZONA 2003

	2003 IN CARE			2003 UNMET NEED			Ratio	EST. 2003 IDU* POPULATION	
COUNTY	IDU* CASES	%	Rate Per 100 IDU*	IDU* CASES	%	Rate Per 100 IDU*	InCare/Unmet Needs	EST. IDU* POPULATION	IDU* POP. DENSITY
APACHE	3	0.3	0.42	2	0.2	0.28	1.50	718	0.06
COCHISE	10	1.0	0.76	17	1.5	1.29	0.59	1,317	0.21
COCONINO	11	1.0	0.84	11	1.0	0.84	1.00	1,317	0.07
GILA	3	0.3	0.56	3	0.3	0.56	1.00	539	0.11
GRAHAM	3	0.3	0.84	13	1.1	3.62	0.23	359	0.08
GREENLEE	0	0.0	0.00	0	0.0	0.00	N/A	60	0.03
LA PAZ	0	0.0	0.00	8	0.7	4.44	0.00	180	0.04
MARICOPA	720	68.7	1.98	698	60.4	1.92	1.03	36,331	3.94
MOHAVE	19	1.8	1.02	41	3.5	2.21	0.46	1,856	0.14
NAVAJO	6	0.6	0.53	1	0.1	0.09	6.00	1,137	0.11
PIMA	194	18.5	2.03	258	22.3	2.69	0.75	9,576	1.04
PINAL	53	5.1	2.39	65	5.6	2.93	0.82	2,215	0.41
SANTA CRUZ	1	0.1	0.24	2	0.2	0.48	0.50	419	0.34
YAVAPAI	13	1.2	0.66	19	1.6	0.96	0.68	1,975	0.24
YUMA	12	1.1	0.65	13	1.1	0.70	0.92	1,856	0.34
UNKNOWN	0	0.0	N/A	5	0.4	N/A	N/A	N/A	N/A
TOTAL	**1048**	**100.0**	**1.75**	**1156**	**100.0**	**1.93**	**0.91**	**59,855**	**0.53**

* Injection Drug Users. Source: Arizona HARS 8/6/04; Holmberg.

Those who have tested positive for HIV/AIDS and have reported IDU are less likely to be in care and services than MSM who test positive for HIV/AIDS (see Illustration 25). However, in Maricopa County, where 60% of all IDU HIV/AIDS cases are reported, there are 1.03 clients in care for every one who is not in care. In Pima County, there are 0.75 clients in care for every one not in care. Reporting and access to care in the case of IDU related HIV infection may be hindered by the illegality of IDU behavior and fear of prosecution among HIV infected IDU.

High-risk Heterosexual Behavior:

No consensus exists regarding a precise definition of High-risk heterosexual behavior (HRH). Holmberg's study acknowledges the lack of consensus regarding specific behaviors that place a person at high risk of HIV infection through Heterosexual intercourse. While Holmberg does not set a clear and specific definition for his study, a reasonable definition would include persons who themselves have no history of MSM or IDU behavior but who have had unprotected heterosexual sex with multiple sex partners, with any partner who reports MSM or IDU behavior, or with someone who is known to be HIV infected. Persons who have had heterosexual sex with a prostitute should be considered to be HRH. Because of the lack of study data specific to this risk group, estimates of High-risk heterosexual population in Holmberg's study were extended from estimates of the number of IDU and MSM after weighting for HIV sero-prevalence.

It is important to mention that many persons reporting MSM or IDU behaviors also report HRH behavior. If such persons become infected with HIV, they will not be classified as HRH under the current CDC defined system by which mode of transmission is assigned. When multiple risk behaviors are reported together assignment of a mode of transmission should not be understood to mean that the risk behavior through which HIV infection actually occurred is an established fact. Holmberg mentions that women at risk of HIV infection through HRH behavior alone are thought to outnumber men by a ratio of 4:1. It seems likely, however, that persons participating in any HRH behavior would be predominantly male. However many of these may have other risk behaviors as well. Within this risk behavior category the relative risk of HIV infection does not appear to be equitably distributed by sex. For this reason, rates of HIV infection among women may reflect broader trends in heterosexual HIV transmission.

Illustration 31: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY AGE GROUP OF HRH

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Age	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per 100 HRH***	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per Year Per 100 HRH***	**Estimated HRH* Population**	**% State Total**
13-19	5	0.5%	0.05	13	2.8%	0.02	10,924	12.5%
20-24	45	4.2%	0.57	61	13.3%	0.16	7,866	9.0%
25-29	99	9.3%	1.27	72	15.7%	0.19	7,778	8.9%
30-34	148	13.9%	1.86	72	15.7%	0.18	7,953	9.1%
35-39	205	19.2%	2.73	71	15.4%	0.19	7,516	8.6%
40-44	185	17.4%	2.38	75	16.3%	0.19	7,778	8.9%
45-49	152	14.3%	2.12	42	9.1%	0.12	7,166	8.2%
50-54	96	9.0%	1.50	30	6.5%	0.09	6,380	7.3%
55-59	60	5.6%	1.09	12	2.6%	0.04	5,506	6.3%
60-64	26	2.4%	0.57	5	1.1%	0.02	4,545	5.2%
65 and Older	36	3.4%	0.26	7	1.5%	0.01	13,983	16.0%
Unknown	8	0.8%	N/A	0	0.0%	0.00	N/A	N/A
TOTAL	1065	100%	1.22	460	100%	0.11	87,395	100%

* High-risk heterosexuals. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

In Arizona, HRH make up 10.3% of prevalent HIV/AIDS, and 13.1% of emergent HIV infection. Illustration 31 describes the prevalence and emergence of HIV/AIDS cases by age. Prevalence peaks between ages 35 and 44, while emergence peaks between ages 24 and 44. 11.3% of all HIV/AIDS diagnoses among persons aged 30-39 in Arizona were HRH during 1999-2003, up from 9.3% of all HIV/AIDS diagnoses among those ages during 1994-1998.

Illustration 32: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY SEX OF HRH

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Sex	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per 100 HRH***	**HRH* Cases**	**% State HRH Total**	**Rate Per Year Per 100 HRH***	**Estimated HRH* Population**	**% State Total**
Male	311	29.2%	0.71	160	34.8%	0.07	43,715	50.0%
Female	754	70.8%	1.73	300	65.2%	0.14	43,680	50.0%
TOTAL	1065	100%	1.22	460	100%	0.11	87,395	100%

* High-risk heterosexuals. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Prevalent and five-year emergent HIV/AIDS cases among HRH are estimated by gender in Illustration 32. Rates are expressed per 100 so that they are comparable to preceding data among MSM and IDU. Among HRH cases, Females outnumber male cases by a ratio of nearly 2.5:1 among prevalent cases, and by 2:1 among emergent cases.

Illustration 33: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY RACE/ETHNICITY OF HRH

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
Race/Ethnicity	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per 100 HRH***	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per Year Per 100 HRH***	**Est. HRH* Population**	**% State Total**
White Non-Hispanic	486	45.%	0.90	156	33.9%	0.06	54,184	62.0%
Black Non-Hispanic	205	19.%	7.33	107	23.3%	0.77	2,797	3.2%
Hispanic	308	28.%	1.27	158	34.3%	0.13	24,296	27.8%
Asian/Pacific Islander /Hawaiian Non-Hispanic	10	0.9%	0.52	3	0.7%	0.03	1,923	2.2%
American Indian/Alaska Native Non-Hispanic	56	5.3%	1.33	36	7.8%	0.17	4,195	4.8%
Multi-Racial Non-Hispanic/Other	0	0.0%	N/A	0	0.0%	N/A	N/A	N/A
TOTAL	1065	100%	1.22	460	100%	0.11	87,395	100%

*High-risk heterosexuals. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Illustration 33 shows prevalence and emergence among HRH HIV/AIDS cases in Arizona by race/ethnicity. Patterns observed among MSM and IDU by race/ethnicity are observed among HRH, with racial minorities disproportionately impacted. Again, Black non-Hispanics are more severely affected than any other minority group, with six times the statewide prevalence rate, and seven times the statewide emergence rate. American Indians also show higher than average rates of prevalent and emergent HRH HIV infection. Low case counts suggest that case rates among American Indians are more subject to the influence of statistical variance. White non-Hispanics are the majority of the state population (62.0%) and the majority of the estimated HRH population. But they do not constitute a majority of prevalent HRH cases (45.7%) or emergent cases (33.9%).

Illustration 34: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND ESTIMATED STATE POPULATION BY COUNTY OF HRH

	Current HIV/AIDS Prevalence			Emergent HIV/AIDS 1999-2003			2003 Population Estimates	
COUNTY	**HRH* Cases**	**% State HRH Total**	**Rate Per 100 HRH***	**HRH* Cases**	**% State HRH Total**	**Est. Rate Per Year Per 100 HRH***	**Estimated HRH* Population**	**% State Total**
Apache	6	0.6%	0.57	5	1.1%	0.10	1,049	1.2%
Cochise	20	1.9%	1.04	10	2.2%	0.10	1,923	2.2%
Coconino	26	2.4%	1.35	11	2.4%	0.11	1,923	2.2%
Gila	6	0.6%	0.76	1	0.2%	0.03	787	0.9%
Graham	1	0.1%	0.19	1	0.2%	0.04	524	0.6%
Greenlee	0	0.0%	0.00	0	0.0%	0.00	87	0.1%
LaPaz	3	0.3%	1.15	0	0.0%	0.00	262	0.3%
Maricopa	722	67.8%	1.36	330	71.7%	0.12	53,048	60.7%
Mohave	22	2.1%	0.81	4	0.9%	0.03	2,709	3.1%
Navajo	10	0.9%	0.60	4	0.9%	0.05	1,661	1.9%
Pima	149	14.0%	1.07	56	12.2%	0.08	13,983	16.0%
Pinal	36	3.4%	1.11	16	3.5%	0.10	3,234	3.7%
SantaCruz	4	0.4%	0.65	1	0.2%	0.03	612	0.7%
Yavapai	27	2.5%	0.94	10	2.2%	0.07	2,884	3.3%
Yuma	24	2.3%	0.89	11	2.4%	0.08	2,709	3.1%
Unknown	9	0.8%	N/A	0	0.0%	N/A	N/A	N/A
TOTAL	1065	100%	1.22	460	100%	0.11	87,395	100%

* High-risk heterosexuals. Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates; Scott D. Holmberg (1996).

Illustration 34 shows HRH prevalence and emergence by county. The majority of HRH HIV/AIDS cases are reported in Maricopa County and Pima County (77% of population; 82% of prevalence; 84% of emergence). The distribution of HRH prevalence and emergence within the state does not appear to be as influenced by urbanization as MSM cases.

Illustration 35 shows HRH "In Care" and "Unmet Need" prevalence case counts and rates expressed per 100 HRH, the ratio of "In Care" cases to those with an "Unmet Need", and the estimated HRH population and population density by county.

Illustration 35: DISTRIBUTION OF MET, UNMET NEEDS AMONG HRH BY COUNTY, ARIZONA 2003

	2003 IN CARE			2003 UNMET NEED			Ratio	EST. 2003 HRH* POPULATION	
COUNTY	HRH* CASES	%	Rate Per 100 HRH*	HRH* CASES	%	Rate Per 100 HRH*	InCare/Unmet Needs	EST. HRH* POPULATION	HRH* POP. DENSITY
APACHE	1	0.2	0.10	5	1.1	0.48	0.20	1,049	0.09
COCHISE	12	2.3	0.62	10	2.2	0.52	1.20	1,923	0.31
COCONINO	10	1.9	0.52	15	3.3	0.78	0.67	1,923	0.10
GILA	3	0.6	0.38	1	0.2	0.13	3.00	787	0.16
GRAHAM	0	0.0	0.00	1	0.2	0.19	0.00	524	0.11
GREENLEE	0	0.0	0.00	0	0.0	0.00	N/A	87	0.05
LA PAZ	1	0.2	0.38	1	0.2	0.38	1.00	262	0.06
MARICOPA	369	71.4	0.70	279	60.7	0.53	1.32	53,048	5.75
MOHAVE	7	1.3	0.26	15	3.3	0.55	0.47	2,709	0.20
NAVAJO	4	0.8	0.24	4	0.9	0.24	1.00	1,661	0.17
PIMA	65	12.6	0.46	83	18.0	0.59	0.78	13,983	1.52
PINAL	17	3.3	0.53	19	4.1	0.59	0.89	3,234	0.60
SANTA CRUZ	2	0.4	0.33	2	0.4	0.33	1.00	612	0.50
YAVAPAI	16	3.1	0.55	10	2.2	0.35	1.60	2,884	0.35
YUMA	10	1.9	0.37	13	2.8	0.48	0.77	2,709	0.49
UNKNOWN	0	0.0	N/A	2	0.4	N/A	N/A	N/A	N/A
TOTAL	**517**	**100.0**	**0.59**	**460**	**100.0**	**0.53**	**1.12**	**87,395**	**0.77**

* High-risk heterosexuals. Source: Arizona HARS 8/6/04; Scott D. Holmberg (1996).

Prison:

According to the Center for Prison Studies at Kings College, London, The United States has the highest prison population both in numbers of persons imprisoned, and rates of imprisonment per capita in the world (2.1 million persons, 726 per 100,000 at mid-2004; 4/2005, U.S. Bureau of Justice Statistics). By mid 2004, one in every 138 U.S. residents was in prison or jail. Nearly 60% of the nation's prisoners are minorities. An estimated 12.6% of all black males in their late 20's were in prison, compared with 3.6% of Hispanic males, and 1.7% of White males. Nearly 5% of all non-Hispanic Black males in the United States are in prison. While women are currently the most rapidly growing segment of the U.S. prison population (2.9% increase in 2003), the prison population remains mostly male (91%). Prisoners sentenced for drug offenses constituted the largest group of federal inmates (55%) in 2001, the date of the latest available data in the Federal Justice Statistics Program, down from 60% in 1995. During the same time period, drug offenders constituted 20.4% (246,100 persons) of all State prison inmates. Overall, nearly one in four state or federal prisoners is in prison for a drug related offence.

These data suggest that the prison population is an intersection of demographic and behavioral characteristics that are also associated with elevated risk of HIV infection. Prisoners are predominantly male, mostly ethnic minorities, with Black non-Hispanics being the minority group most likely to be imprisoned, and one in four persons is imprisoned for drug related behaviors. Reports estimate that as many as 70%-80% of those entering jails and penitentiaries in most parts of the United States have histories of substance abuse (Wilson 2000; BJS/Mumola 1999). For these reasons, incarcerated persons have a greater likelihood of being infected with HIV before they enter prison than the general population.

Adequate studies of HIV/AIDS among American prison populations have not been published. Prison populations experience problems with many communicable diseases such as Tuberculosis, HIV/AIDS, Hepatitis C, Syphilis, Gonorrhea, and Chlamydia at much higher rates than the general U.S. population (Hammett, 1998). Prison environments create conditions, such as overcrowding that are conducive to the transmission of infectious disease, with large number of persons in close and consistent proximity within an enclosed space. Maricopa County (Phoenix) is the fourth largest local jail jurisdiction in the United States, after Los Angeles, New York City, and Chicago (Cook County), and maintained an average of 176% occupancy during 2004. Maricopa County held a total of 9,148 inmates in 2004, had a daily average capacity of 8,657 persons in custody, and a rated capacity of 5,201 persons.

Outbreaks of tuberculosis among prisoners in New York in 1991, and California in 1995-96 have been reported, demonstrating that Tuberculosis may spread easily within the prison environment, including to staff and visitors. Immune compromised persons are much more likely to become ill (Valway, et. al, 1994; Prendergast, et. al, 1999). Other surveys found the prevalence of tuberculosis to be from 3 to 11 times greater among prison populations in the United States than in the general population (Hutton et. al, 1993). Recent reports document outbreaks of other diseases in prisons, including meningitis in Los Angeles County jails that proliferated to the community (Tappero, et. Al; 1996), and MRSA among San Francisco city jail inmates in 2002. Studies also report victimization rates of rape and sexual assault among prisoners ranging from 10-22% (Struckman-Johnson, 1996; Struckman-Johnson, 2000; Nacci, 1984). One study reported 28% of inmates surveyed in Tennessee reported injecting drugs while in prison (Decker, 1984).

There are no published data that measure the risk of prisoners becoming HIV infected while incarcerated. HIV infection through exposures while in prison - such as sexual contact, injection drug use or tattooing - merit further scientific study. Despite limitations in the HIV/AIDS Reporting System data, ADHS Office of HIV/AIDS was able to identify 223 cases of HIV infection reported among Arizona inmates by counting all HIV reports showing a known prison address as the current address. It is likely that some of these have been released from prison, yet still show a current prison address in surveillance data. Illustration 36 reports on these cases as a proportion of estimated current county prevalence, and estimates a rate of HIV infection reported while incarcerated:

Illustration 36: REPORTS OF HIV INFECTION WHILE INCARCERATED AMONG PREVALENT HIV AND ESTIMATED PRISON POPULATIONS BY COUNTY

	Current County Est. HIV/AIDS Prevalence	Prevalent HIV Reported In Prison (% of Total Prevalence)	Current Estimated State/ Federal Prison Population	Reported Prison HIV/AIDS Prevalence Rate per 100,000	1999-2003 Emergent County HIV/AIDS	Emergent HIV/AIDS Reported In Prison (% of Total Emergence)
Cochise Co.	117	5 (4.3%)	2,178	230	32	1 (3.1%)
Graham Co.	29	13 (44.8%)	2,596	501	17	10 (58.8%)
Maricopa Co.	7010	83 (1.2%)	9,824	845	2509	84 (3.3%)
Navajo Co.	45	3 (6.7%)	1,865	161	29	2 (6.9%)
Pima Co.	1903	18 (0.9%	5,502	327	576	18 (3.1%)
Pinal Co.	331	99 (29.9%)	10,613	933	145	86 (59.3%)
Total	9435	223 (2.4%)[1]	32,578	678	3308	201 (6.1%)

. 1) Includes 2 cases from other counties. *Source: Arizona HARS 5/1/05; ADOC

Illustration 37 reports on these cases by race and ethnicity. Black non-Hispanics are present in disproportionate numbers – more than 6 times their presence in the general population.

Illustration 37: RACE/ETHNICITY OF CURRENT INMATES REPORTED WITH HIV INFECTION WHILE INCARCERATED

	Reported Cases	Percentage of Reported Cases
White non-Hispanic	84	37.7%
Black non-Hispanic	45	20.2%
Hispanic	86	38.6%
Asian/Pacific Island Non-Hispanic	3	1.3%
American Indian/Alaska Native non-Hispanic	5	2.2%
Total	223	100%

*Source: Arizona HARS 5/1/05

Illustration 38 reports on these cases by reported risk behavior. Among this group the total proportion of persons reporting any IDU behavior is 62%, and the total number reporting any MSM behavior is 45%. This differs from the risk behavior profile of the prevalent HIV/AIDS population in the substantial increase in IDU related HIV reported.

Illustration 38: REPORTED RISK BEHAVIOR ASSOCIATED WITH HIV TRANSMISSION AMONG CURRENT INMATES REPORTED WITH HIV INFECTION WHILE INCARCERATED

	Reported Cases	Percentage of Reported Cases
MSM Only	54	24.2%
IDU Only	91	40.8%
MSM And IDU	47	21.1%
Heterosexual	14	6.3%
Other Risk	3	1.3%
No Reported Risk	14	6.3%
Total	223	100.0%

Prisoners in some Arizona counties are a large proportion of the county resident population, especially rural counties with large prisons. HIV prevalence and emergence rates in these counties will be most sensitive to any influence that prison populations have upon HIV rates. Proportions of estimated prevalence that can be attributed to prisoners are most elevated in Graham and Pinal Counties, both of which are rural, and have large prisons. In Graham County, prisoners are an estimated 7.9% of the county population, and in Pinal County they are 5.2%. Rates of both prevalence and emergence for Graham and Pinal Counties in Illustrations 11 through 13 would decline significantly from current estimates if inmates were excluded. Most inmates in State, Federal, and private prisons in Graham and Pinal counties previously resided elsewhere, and are resident in those counties purely by virtue of their incarceration.

Policies on testing and treatment of HIV/AIDS among prisoners vary from state to state. The situation is complicated by the growth of private prisons, several of which exist in Arizona. Policies on infectious disease testing and treating in private prisons are not made public. In public facilities in Arizona, inmates are not screened for HIV on intake or at discharge. They may only be tested for

HIV/AIDS upon request. If such a request is made testing and post-test counseling are administered. If a prisoner tests HIV positive, they meet with the HIV treatment team at the facility. The team, which includes a doctor, nurse, pharmacist and a mental health service provider, meets and treats the prisoner. HIV-positive prisoners in Arizona are kept at “corridor facilities” that are closer to highways and hospitals/specialists. The medical staff at these facilities also receives additional training on treating HIV-positive prisoners.

Considering this testing policy and the background risk of HIV infection inherent to the populations of persons entering prison, the number of reported HIV infections that occur while in prison does not represent the totality of HIV prevalence among prison populations. Exactly what proportion of total HIV infection in prisons is being reported is unknown. Despite the fact that HIV prevalence among prison populations is underreported, the prevalence of HIV infection reported among Arizona prisoners is 0.7%, 3.7 times the estimated rate of HIV infection in the general population of Arizona. National estimates of HIV prevalence in prisons range from 1.9% (BJS, 2004) to 2.3% (NCCHC/NIJ/CDC, 2002). Regional estimates vary, but can be much higher. This suggests that HIV infection reported while incarcerated in Arizona is a fraction of total HIV prevalence among Arizona inmates.

This would appear to be confirmed by the 2002 report to Congress on the Health Status of Soon-to-be-Released Inmates conducted by the National Institute of Justice, the National Commission on Correctional Health Care and the Centers for Disease Control and Prevention (NCCHC, 2002). This national, 3-year-long study was the largest and most comprehensive of its kind ever undertaken. The report states:

> “During 1996, about 3% of the U.S. population spent time in prison or jail; however between 12 and 35 % of the total number of people in the Nation with selected communicable diseases passed through a correctional facility during that year. Specifically:
>
> - 17% of the estimated 229,000 persons living with AIDS in the United States in 1996 passed through a correctional facility that year. The prevalence of AIDS among inmates is five times higher than among the total U.S. population.
> - The estimated 98,000 to more than 145,000 prison and jail releases with HIV Infection in 1996 represent 13-19% of all HIV-positive individuals in the United States.

Reports of HIV and AIDS in Arizona in 1996 do not differ substantially from those reported in 2003. In 1996, there were 428 total reports of HIV infection in Arizona, and 525 total reports of AIDS, compared to 423, and 484 respectively in 2003. If national trends found in the NCCHC study were mirrored in Arizona in 1996, they may be similar today.

However, recent HIV testing data from Arizona prisons appear to contradict these national findings. The most recent testing data from Arizona jails and prisons found that in 2004, from among 4230 tests for HIV infection, 56 were confirmed positive - about 1.3%. At that rate HIV prevalence among the Arizona prison population would be 7 times higher than the general population. Problems with duplicate testing, and selection bias exist in HIV testing data from prisons and jails in Arizona, making it difficult to draw any firm conclusions on current HIV prevalence in Arizona jails and prisons.

Sexually Transmitted Disease and Hepatitis C:

An epidemiological synergy between HIV/AIDS and other sexually transmitted diseases (STDs) has been observed and studied for two decades. Researchers have shown that persons with STDs are more likely to become infected with HIV/AIDS. Also, those with HIV/AIDS may be more likely to become infected with other STDs.

> "Several studies have explored potential biological mechanisms by which other STDs can facilitate sexual transmission of HIV infection by increasing infectiousness or susceptibility. HIV is detected routinely in the exudates of genital ulcers from HIV-infected men and women. Ulcers bleed easily and can come in contact with vaginal, cervical, oral urethral and rectal mucosa during sex. In men and women, inflammatory STDs (gonococcal and chlamydial infections) appear to increase both the prevalence of HIV shedding and the HIV RNA viral load in genital secretions. Thus, these STDs are likely indicators of HIV infectiousness (CDC, 1998).

ADHS Office of HIV/AIDS examined patterns of all co-morbidity reports of STDs and Hepatitis C among persons reported with HIV/AIDS. The primary modes of transmission of these reportable diseases closely correspond to those of HIV. Unlike many data measures derived from the general population that are used as proxy measures of risk behavior, HIV/STD/Hepatitis C co-morbidity data are direct measures of risk behavior patterns among the HIV/AIDS population, both before and after HIV diagnosis. Patterns in co-morbidity histories may inform improved prevention and targeted testing strategies. New opportunities also emerge to develop integrated prevention strategies for all such reportable diseases that improve efficiencies, and are oriented to the needs of the individual client.

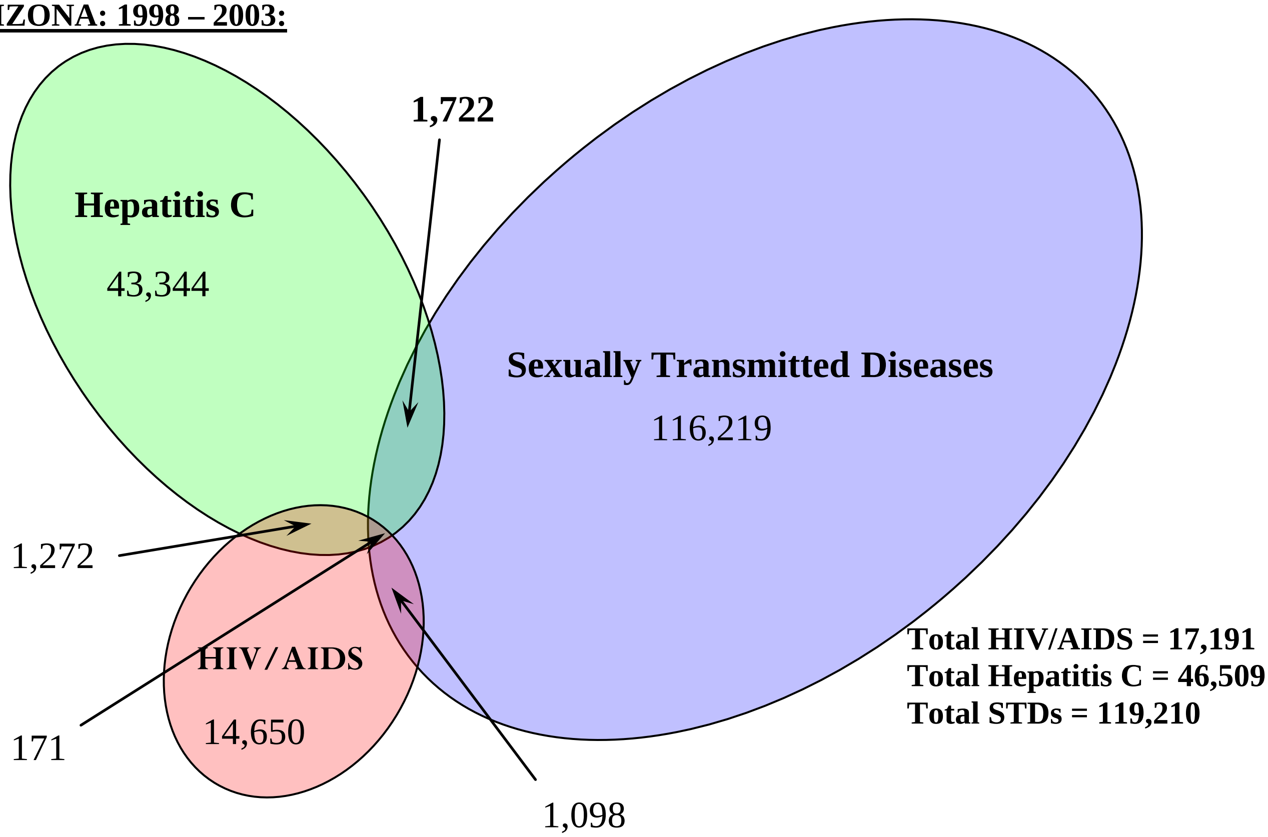
By comparing data from Hepatitis C and four primary sexually transmitted diseases with data from HIV/AIDS, ADHS Office of HIV/AIDS program was able to find 1,904 persons believed to be now living in Arizona, who have a history of HIV infection and also have any lifetime history of diagnosis with Hepatitis C, Chlamydia, Gonorrhea, Herpes, or Syphilis. At the time that this cross-match study was completed, the prevalence of reported HIV infection in Arizona was 9,962 persons. Results of this analysis are presented in Illustrations 39 and 40:

Illustration 39: SUMMARY COUNTS, RATES, AND ODDS OF CURRENT HIV AMONG PREVALENT PERSONS WITH ANY LIFETIME HISTORY OF HEPATITIS C INFECTION, OR INFECTION WITH ANY SEXUALLY TRANSMITTED DISEASE

Total Population:	5,580,811
Now HIV Infected with no STD or HepC Diagnosis History:	8,058
Any STD or HepC Diagnosis History but not HIV Infected:	181,466
Now HIV Infected with any STD or HepC Diagnosis History:	1,904
Estimated HIV Prevalence Rate:	179 per 100,000
Estimated Prevalence Rate of Persons with any STD or HepC Diagnosis History:	3,286 per 100,000
Estimated Prevalence Rate of HIV among Persons with any STD or HepC Diagnosis History:	1,038 per 100,000
Estimated Prevalence Rate of STD or HepC Diagnosis History among HIV Positive Persons:	19,113 per 100,000
Estimated Odds of Current HIV Infection with any History of STD or HepC Diagnosis:	5.8 times greater

In this analysis, nearly 3.3% of the current Arizona population have a history of diagnosis with an STD or Hepatitis C, and 0.2% are living with HIV/AIDS. These data suggest that at least 19% of persons now living with HIV/AIDS in Arizona also have a history of Hepatitis C or STD infection. The odds of current HIV infection among persons with a history of STDs or Hepatitis C are nearly 6 times greater than the general population.

Illustration 40: LIFETIME CO-MORBIDITY PATTERNS AMONG PERSONS DIAGNOSED WITH HIV/AIDS, HEPATITIS C, OR SEXUALLY TRANSMITTED DISEASES IN ARIZONA: 1998 – 2003:



Only persons reported in Arizona with any diagnosis of HIV/AIDS, Hepatitis C, or a sexually transmitted disease (STD) during the 1998-2003 time frame were included in this analysis, a total of 178,476 persons. 1998 - 2003 were the only years for which data from all disease groups was available. A lifetime diagnostic history of HIV, AIDS, Hepatitis C or STD's was constructed for persons in this analysis using all available data. Illustration 40 shows the lifetime co-morbidity configuration among those persons. The proportions of reported co-morbidity are 6.8% of those with Hepatitis C (3,165/46,509), 2.5% of those with Sexually Transmitted Diseases (2,991/119,210), and 14.8% of those with HIV/AIDS (2,541/17,191).

Reporting data in Hepatitis C and the STD do not track current address and living status for persons ever reported with those diseases, information needed to estimate prevalence. Therefore, in this analysis persons reported with Hepatitis C or an STD are used as an estimate of prevalence of persons with any lifetime history of Hepatitis C or STD. This was considered to be reasonable because this analysis examines total reported lifetime history against current HIV status. Because of the significant growth in Arizona's population due to migration, persons in this analysis who have since died, or moved out of state will likely have been replaced by others moving in state with a lifetime history of Hepatitis C or STDs, or by persons in Arizona who have acquired new infections of Hepatitis C or STDs but not yet been reported.

Sensitivity estimates suggest that 75-85% of reported co-morbidities are detected using the cross-matching method employed for this analysis, and that 15-25% will not be detected. Proportions and rates reported above are expected to be conservative, but present a reasonable picture of the correlation between HIV and these other diseases.

HIV and Hepatitis C

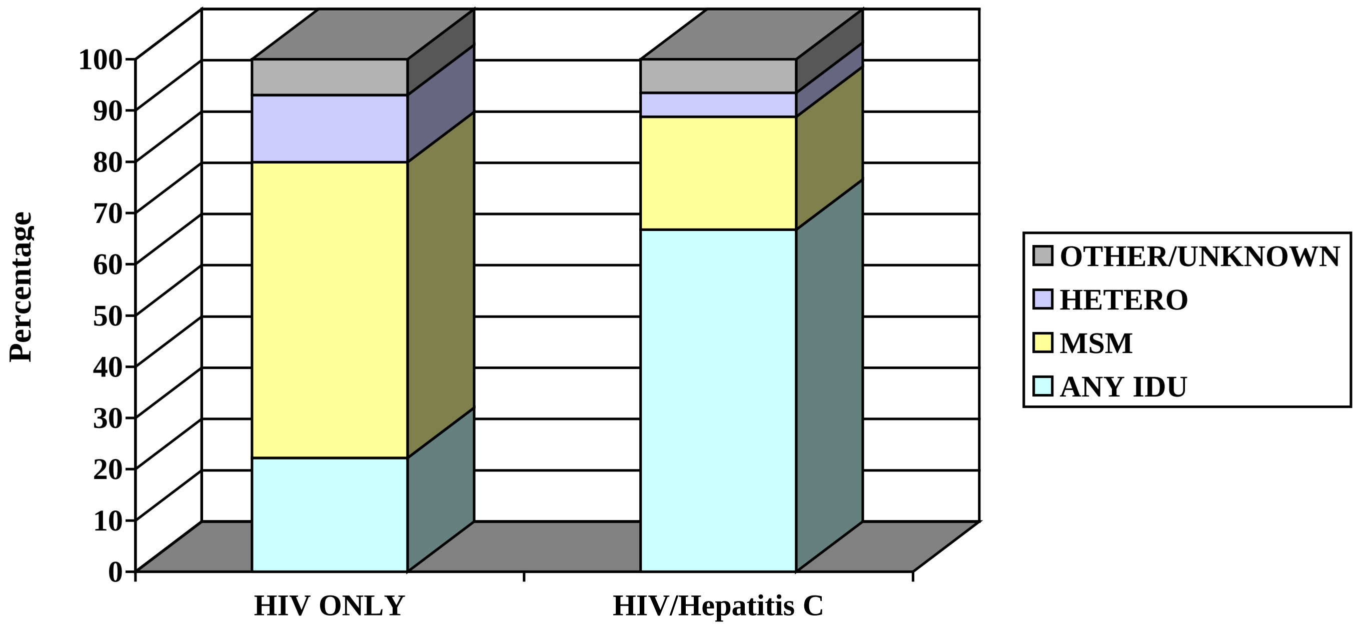
The most significant single disease co-morbidity associated with HIV is Hepatitis C. According to the CDC, about one quarter of those with HIV infection in the United States are also infected with HCV (CDC, 2002). Illustration 41 presents co-morbidity case counts, estimated prevalence rates, and odds ratios of HIV among persons with a history of Hepatitis C infection:

Illustration 41: SUMMARY COUNTS, RATES, AND ODDS OF CURRENT HIV AMONG PREVALENT PERSONS WITH ANY LIFETIME HISTORY OF REPORTED HEPATITIS C INFECTION

Total Population:	5,580,811
HIV Infected with no HepC Diagnosis History:	8,793
HepC Diagnosis History but not HIV Infected:	54,165
HIV Infected with any HepC Diagnosis History:	1,169
Estimated HIV Prevalence Rate:	179 per 100,000
Estimated Prevalence Rate of Persons with any HepC Diagnosis History:	992 per 100,000
Estimated Prevalence Rate of HIV among Persons with any HepC Diagnosis History:	2,113 per 100,000
Estimated Prevalence Rate of HepC Diagnosis History among HIV Positive Persons:	11,735 per 100,000
Estimated Odds of Current HIV Infection with any History of HepC Diagnosis:	11.8 times greater

Of 1,904 persons found with HIV and any Hepatitis C or STD co-morbidity history, 1,169 (61.4%) are living with HIV and Hepatitis C. Hepatitis C infection has been reported among nearly 12% of persons living with HIV/AIDS in Arizona, and at least 2% of more than 55,000 persons known to be living with Hepatitis C are also infected with HIV. In this analysis, the odds of current HIV infection among persons with any history of Hepatitis C infection are nearly 12 times as great as those in the general population. In an earlier study of Hepatitis C, ADHS Office of HIV/AIDS compared the reported risk behaviors among persons with HIV/AIDS and those with HIV/AIDS and Hepatitis C co-morbidity. The results are presented in Illustration 42:

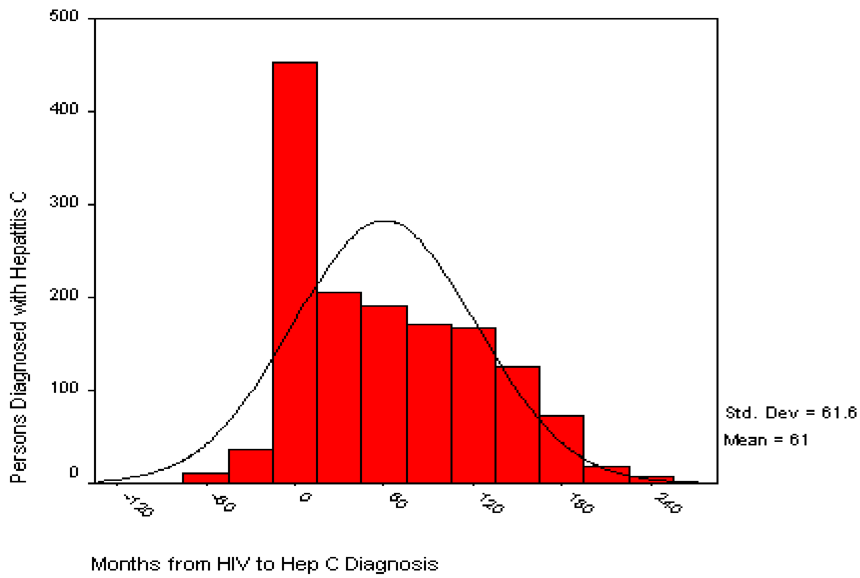
Illustration 42: REPORTED HIV RISK AMONG HIV/HEPATITIS C COINFECTED PERSONS IN ARIZONA: 1999 - 2003



Consistent with documented modes of Hepatitis C transmission, a majority (67%, n= 554) of 830 identified in this earlier study of co-infected persons report injection drug use behavior. This conforms to CDC estimates that 60% of persons infected with Hepatitis C acquired infection through injection drug use. Of the remaining 33% (n=276) of cases reporting no injection drug use behavior, more than 92% (n=255) reported no other risk factor for Hepatitis C, such as dialysis, hemophilia, intranasal drug use, tattooing, piercing, or other blood exposures. The majority of these cases (66%, n= 169) were men reporting sexual contact with other men. Risk behavior data relating to Hepatitis C surveillance are often not reported.

Because of the lengthy latency period of Hepatitis C (estimated 20 – 30 years), the Hepatitis C diagnosis date should not be equated with occurrence of Hepatitis C infection. Comparison of first HIV diagnosis date with first Hepatitis C diagnosis date indicates that many cases of Hepatitis C infection may escape detection at the initial HIV diagnosis. Illustration 43 represents the distribution of time transpired between earliest HIV diagnosis and earliest Hepatitis C diagnosis among all persons, both prevalent and not prevalent, identified as co-infected (n=1466). The time is measured in number of months:

Illustration 43: DISTRIBUTION OF TIME LAPSE IN MONTHS BETWEEN EARLIEST HIV DIAGNOSIS AND HEPATITIS C DIAGNOSIS AMONG REPORTED HIV CO-INFECTED PERSONS



The majority of persons with Hepatitis C and HIV co-infection in Arizona are diagnosed for Hepatitis C after their HIV diagnosis is already known (mean equals 61 months after HIV diagnosis). There are significant considerations for treatment and care with HIV and Hepatitis C co-infection. Higher HCV viral load and faster progression to chronic liver disease have been noted among the co-infected. In some studies more rapid progression of HIV disease has also been reported.

HIV and Syphilis

In a cross-match analysis persons now prevalent with HIV/AIDS with any lifetime history of reported Syphilis infection were identified. Illustration 44 presents co-morbidity case counts, estimated prevalence rates, and odds ratios of HIV among persons with any history of Syphilis infection.

Illustration 44: SUMMARY COUNTS, RATES, AND ODDS OF CURRENT HIV AMONG PREVALENT PERSONS WITH ANY LIFETIME HISTORY OF REPORTED SYPHILIS INFECTION

Total Population:	5,580,811
HIV Infected with no Syphilis Diagnosis History:	9,601
Syphilis Diagnosis History but not HIV Infected:	15,817
HIV Infected with any Syphilis Diagnosis History:	361
Estimated HIV Prevalence Rate:	179 per 100,000
Estimated Prevalence Rate of Persons with any Syphilis Diagnosis History:	290 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Syphilis Diagnosis History:	2,231 per 100,000
Estimated Prevalence Rate of Syphilis Diagnosis History among HIV Positive Persons:	3,624 per 100,000
Estimated Odds of Current HIV Infection with any History of Syphilis Diagnosis:	12.5 times greater

In this analysis, 3.6% of those living with HIV/AIDS in Arizona have a history of ever being reported with Syphilis, and 2.2% of those reported with Syphilis have also been reported with HIV. The odds of a person now being HIV infected who has any lifetime history of syphilis based on this study is 12.5 times greater than the general population of Arizona. Studies have also noted that those infected with HIV may falsely test negative (the prozone phenomenon) when tested for syphilis (Southern Medical Journal, 1997).

Illustration 45: DISTRIBUTION OF TIME LAPSE IN MONTHS BETWEEN EARLIEST HIV DIAGNOSIS AND MOST RECENT SYPHILIS DIAGNOSIS AMONG REPORTED HIV CO-INFECTED PERSONS

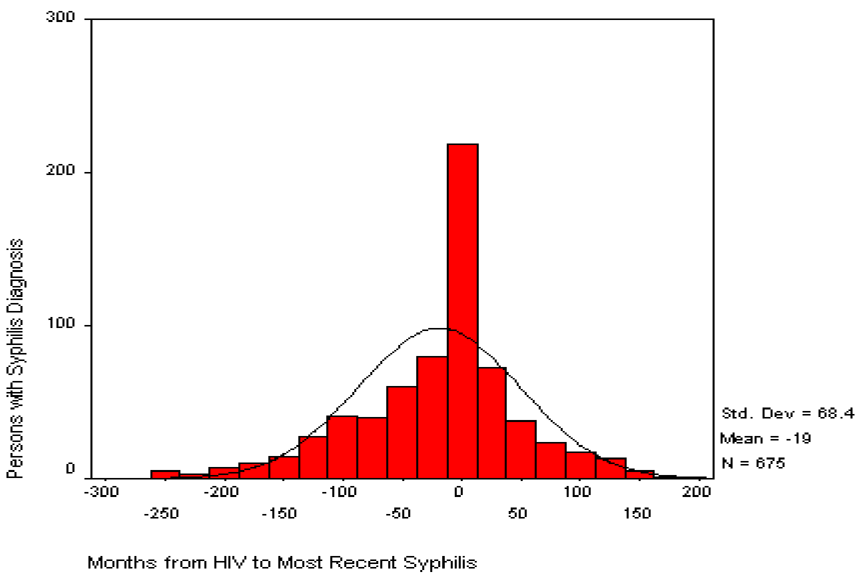


Illustration 45 represents the distribution of time transpired between earliest HIV diagnosis and most recent Syphilis diagnosis among all persons, both prevalent and not prevalent, identified as co-infected (n=676). The time is measured in number of months:

Considering the most recent syphilis diagnosis only, many syphilis diagnoses occur prior to the initial HIV diagnosis (mean equals 18.9 months prior to HIV diagnosis). The greatest frequency of syphilis diagnosis among co-infected persons occurs at diagnosis of HIV infection. Lengthy latency periods associated with HIV infection suggest that syphilis may be used as a sentinel event for elevated risk of HIV infection.

HIV and Gonorrhea

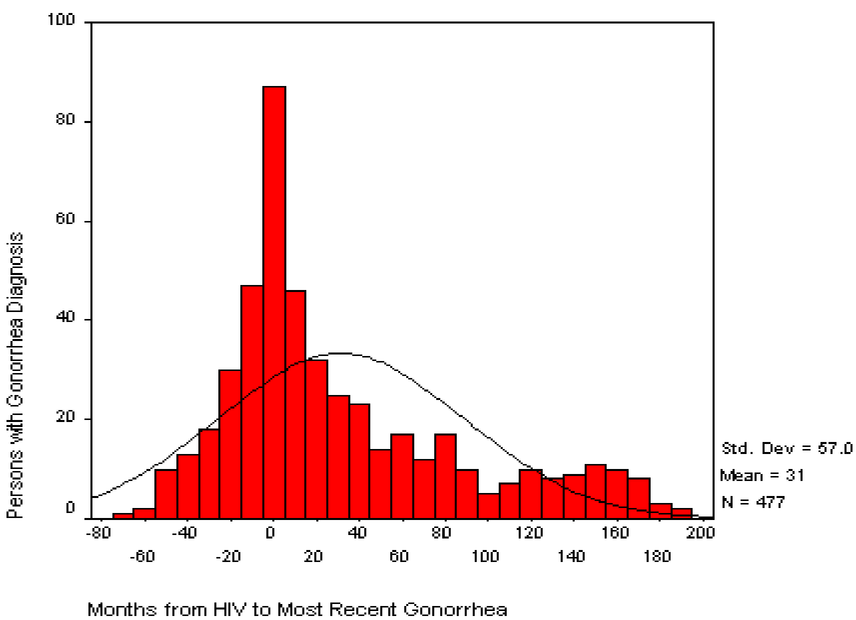
In a cross-match analysis persons now prevalent with HIV/AIDS with any lifetime history of reported gonorrhea infection were identified. Illustration 46 presents co-morbidity case counts, estimated prevalence rates, and odds ratios of HIV among persons with any history of gonorrhea infection.
In this analysis, 4.4% of those living with HIV/AIDS in Arizona have a history of ever being reported with gonorrhea, and 1.6% of those reported with gonorrhea have also been reported with HIV. The odds of a person now being HIV infected who has any lifetime history of gonorrhea based on this study is 9.1 times greater than the general population of Arizona.

Illustration 46: SUMMARY COUNTS, RATES, AND ODDS OF CURRENT HIV AMONG PREVALENT PERSONS WITH ANY LIFETIME HISTORY OF REPORTED GONORRHEA INFECTION

Total Population:	5,580,811
HIV Infected with no Gonorrhea Diagnosis History:	9,526
Gonorrhea Diagnosis History but not HIV Infected:	26,292
HIV Infected with any Gonorrhea Diagnosis History:	436
Estimated HIV Prevalence Rate:	179 per 100,000
Estimated Prevalence Rate of Persons with any Gonorrhea Diagnosis History:	479 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Gonorrhea Diagnosis History:	1,631 per 100,000
Estimated Prevalence Rate of Gonorrhea Diagnosis History among HIV Positive Persons:	4,377 per 100,000
Estimated Odds of Current HIV Infection with any History of Gonorrhea Diagnosis:	9.1 times greater

Illustration 47 represents the distribution of time transpired between earliest HIV diagnosis and most recent gonorrhea diagnosis among all persons, both prevalent and not prevalent, identified as co-infected (n=477). The time is measured in number of months:

Illustration 47: DISTRIBUTION OF TIME LAPSE IN MONTHS BETWEEN EARLIEST HIV DIAGNOSIS AND MOST RECENT GONORRHEA DIAGNOSIS AMONG REPORTED HIV CO-INFECTED PERSONS



The majority of diagnoses of gonorrhea among persons now infected with HIV occur after HIV diagnosis (mean equals 31 months after HIV diagnosis). Of 436 persons now prevalent with HIV and reported with gonorrhea in this analysis, 91% (n=398) are men, and 9% (n=38) are women. Gonorrhea in men is usually reported within two weeks of infection due to the painful nature of disease manifestation. Illustration 47 may be used as an index of ongoing high-risk sexual activity among those with HIV and gonorrhea. Because not every person engaging in such activity will contract a sexually transmitted disease, it is expected that the numbers of persons with gonorrhea infection after HIV diagnosis is a fraction of those participating in high-risk sexual behaviors among the HIV infected population.

HIV, Chlamydia and Herpes

Of the reportable sexually transmitted diseases, Chlamydia and herpes showed the least significant measure of correlation with an HIV positive outcome. The odds of being HIV positive among persons with any diagnostic history of Chlamydia were the same as those of the general population, suggesting that Chlamydia diagnostic history does not augment the likelihood of HIV infection. Herpes diagnosis was the most infrequently reported among STDs (1,094 mean annual case reports 1997-2003 for Arizona). Yet when diagnosed, the odds of HIV co-morbidity were elevated, particularly among males, those with herpes were nearly 5 times as likely to have HIV infection as the general population. Yet the total number of co-morbidity cases identified was so small (71 cases) that no reliable inference may be drawn from calculated rates and odds.

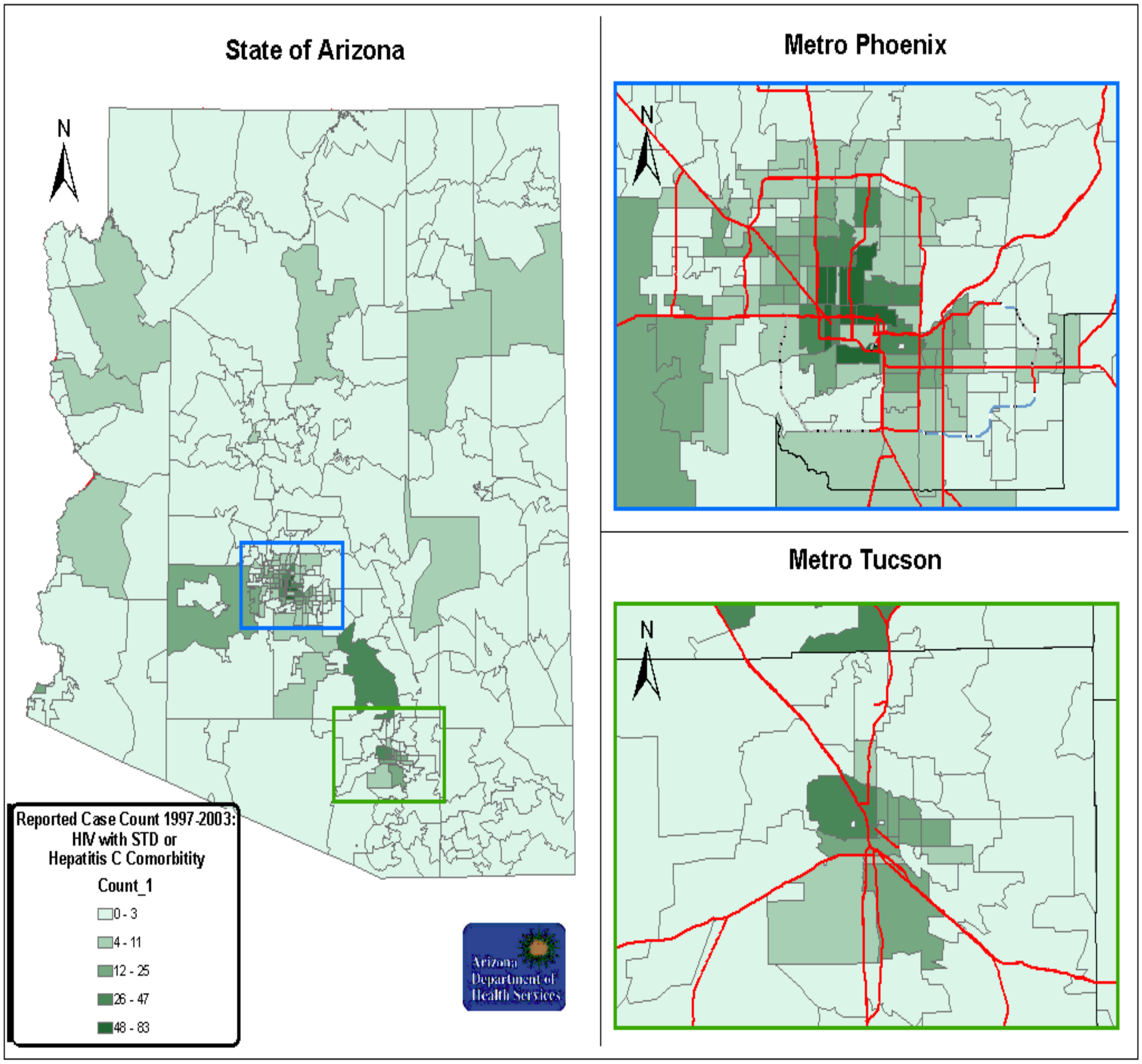
Overall, the combination of Hepatitis C, syphilis, and herpes together accounted for 94 % of all identified co-morbidity with HIV among Hepatitis C or any STD (1,790 of 1,904 persons).

Geographic Analysis of HIV and STD Co-morbidities:

By assigning a geographic coordinate to each diagnostic event of an STD or Hepatitis C, located at the center-point of the zip code tabulation area of residence at diagnosis, a historical pattern map of STD diagnosis can be presented. Zip Code Tabulation Areas (ZTAs) are used, rather than postal zip code areas because these may be associated with U.S. Census population counts. Illustration 48 shows the geographic distribution of all reported STD and Hepatitis C diagnoses among persons with an HIV outcome.

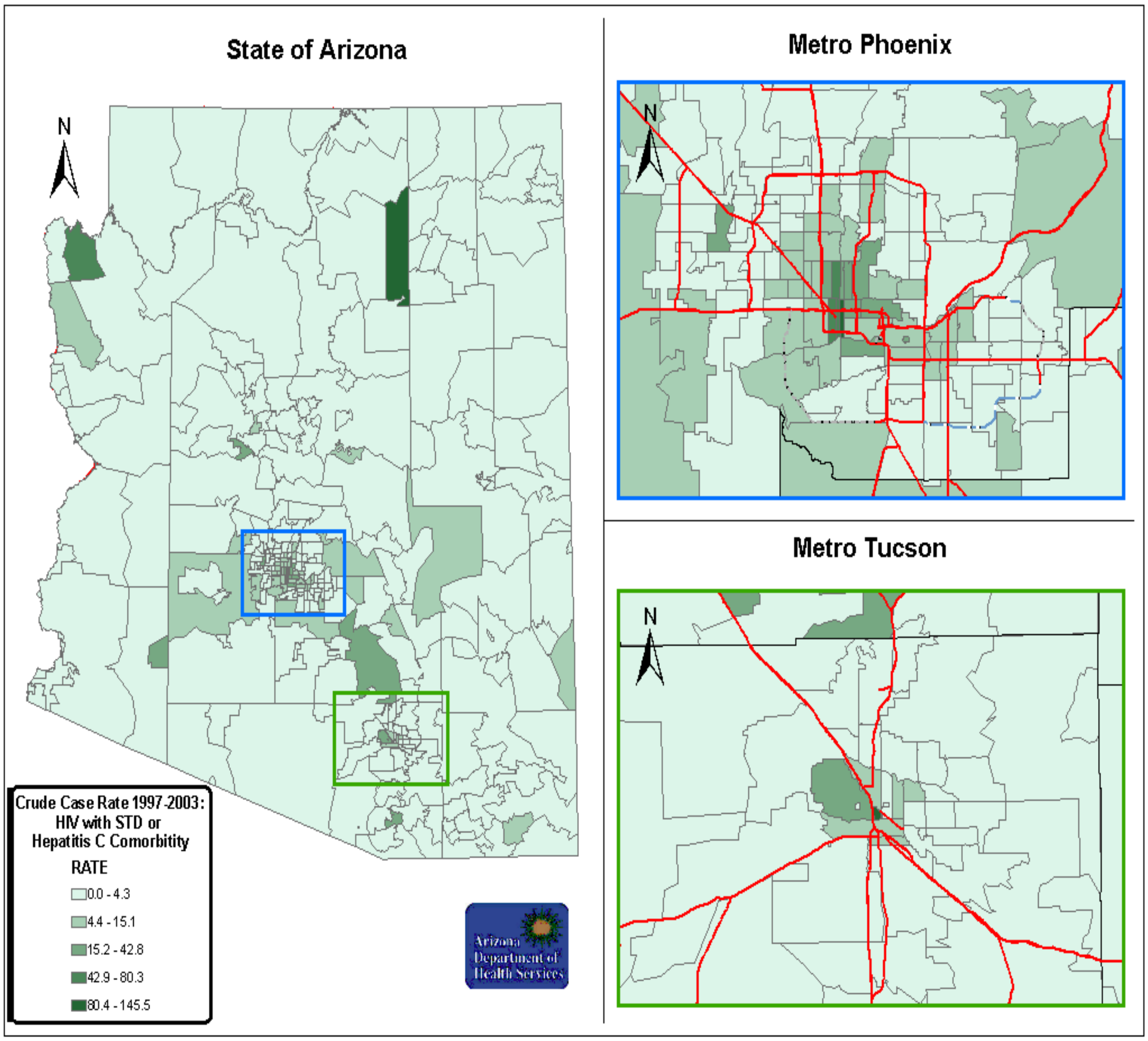
The highest geographic frequency of HIV/STD/Hepatitis C co-morbidity events are found in urban ZTAs, or ZTAs with large prison populations. Presentation of diagnostic event data may be standardized to correct for differences in regional population distribution by presenting a geographic distribution of co-morbidity rates. Illustration 49 presents the same data expressed as a co-morbidity case rate per 100,000 persons of the ZTA population.

Illustration 48: GEOGRAPHIC DISTRIBUTION OF SEXUALLY TRANSMITTED DISEASE AND HEPATITIS C DIAGNOSIS EVENTS AMONG REPORTED HIV COINFECTED PERSONS: 1997-2003:



In illustration 49 on the next page, rates for each ZTA are geographically presented. Two ZTA regions in the northern part of the state with rural populations and case counts below 4 experience rates of HIV/STD/Hepatitis C co-morbidity that equal or exceed those of the most urbanized portions of the state where the greatest numbers of case events are found. These regions may experience HIV co-morbidity incidence at the same intensity as equivalent urban regions, but the scope of cases involved in these differing regions means that the bulk of the epidemic still occurs in urban regions.

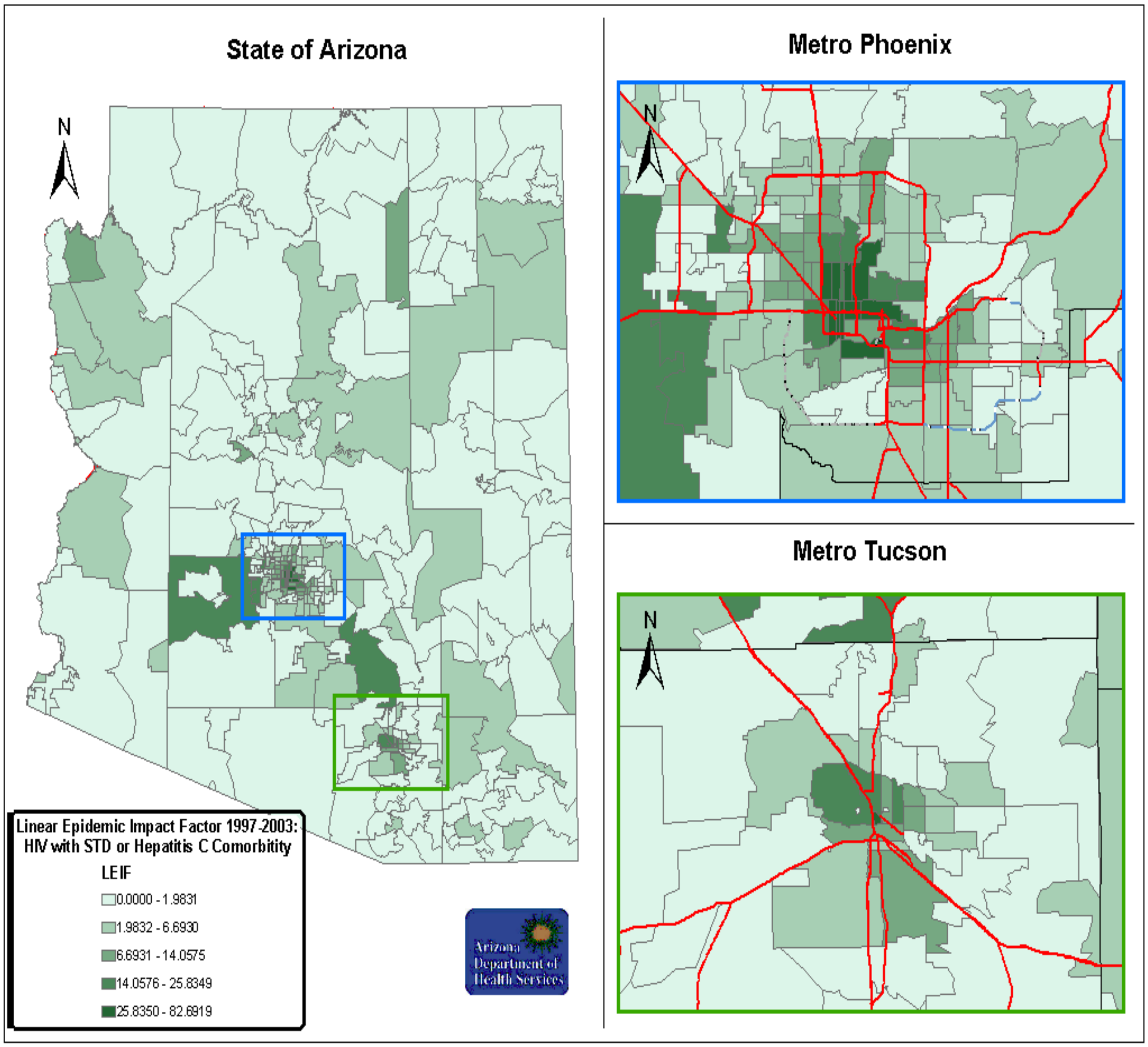
Illustration 49: GEOGRAPHIC DISTRIBUTION OF SEXUALLY TRANSMITTED DISEASE AND HEPATITIS C DIAGNOSIS RATES AMONG REPORTED HIV COINFECTED PERSONS: 1997-2003:



Whether presenting these data by case counts or by relative rates, each presentation may distort the full impact of HIV co-morbidity. In the case of counts of diagnostic events presented in Illustration 48, sufficient information on population is not presented to portray a complete picture of relative disease burden on the local community. A complete picture of epidemic impact must include information on both case counts, and standardized rates in one presentation.

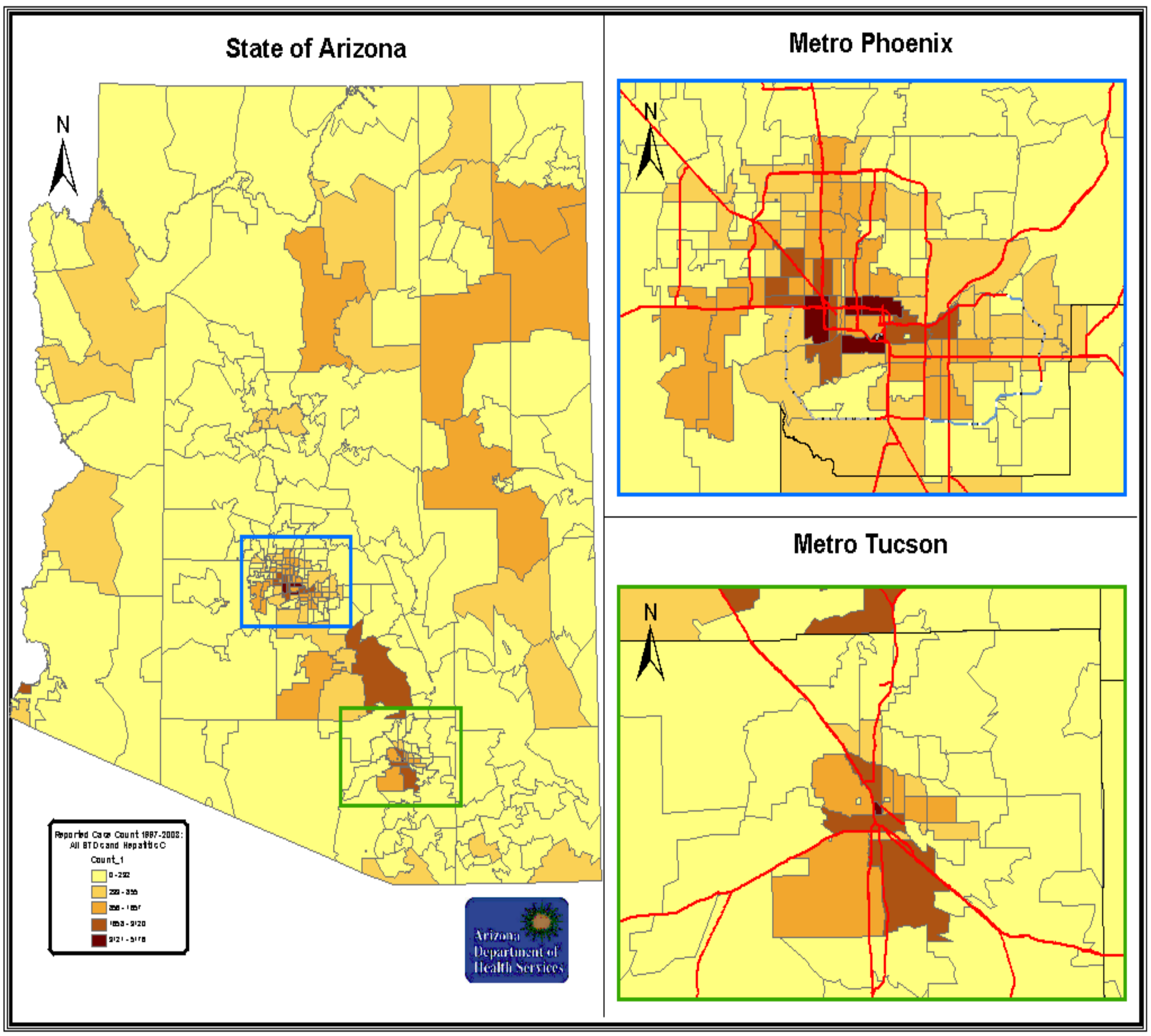
To resolve this difficulty, and to facilitate the priority setting process mandated for regional and statewide planning groups, ADHS Office of HIV/AIDS used a convenience method for evaluating the epidemic impact of HIV. This method needed to consider both standardized rates, and the number of case events, but had to be simple enough to be used and understood by persons in the Planning Groups who were uncomfortable with statistical calculations. This convenience method, called the Epidemic Impact Factor (EIF), was derived by multiplying the relative rate and the number of cases (Rate x Count). This method will evaluate both case counts and rates with equal weight, producing a raw number that may be used for purposes of comparison to contrast epidemic impact between regions of the state, or between defined groups. Illustration 50 presents Linear Epidemic Impact Factor (EIF as a linear expression – see the Priority Setting appendix for a complete discussion on EIF and LEIF) of HIV/STD/Hepatitis C co-morbidity by geographic region.

<u>Illustration 50: LINEAR EPIDEMIC IMPACT FACTOR OF SEXUALLY TRANSMITTED DISEASE AND HEPATITIS C DIAGNOSIS AMONG REPORTED HIV COINFECTED PERSONS: 1997-2003:</u>



This presentation shows that urbanized regions (metropolitan Phoenix and Tucson) experience the greatest epidemic impact of HIV co-morbidities in the state. By contrast, most rural regions experience the lowest epidemic impact of HIV co-morbidities, but there are several apparent exceptions. A region in the northern half of the state roughly corresponding with the I-40 corridor from Flagstaff, Ariz., on the west to Winslow, Ariz., on the East reports moderate HIV co-morbidity epidemic impact. Another region experiencing moderate impact of HIV co-morbidities appears to be a region contained within the south and central area of the Navajo Nation and Hopi Indian Reservation, roughly following route 264 to the New Mexico border. Additionally, the regions of Mohave County nearest Las Vegas, NV, see some elevated impact, as do regions of La Paz county south of Parker Dam in a region containing the Colorado River Indian Reservation. Illustration 51 shows that STD and Hepatitis C diagnostic events in these same regions display similar regional patterns, suggesting that elevated patterns of risk activity conducive to HIV infection are also being observed in the same regions.

<u>Illustration 51: DIAGNOSTIC REPORTS OF SEXUALLY TRANSMITTED DISEASE AND HEPATITIS C DIAGNOSIS AMONG REPORTED HIV COINFECTED PERSONS: 1997-2003:</u>



Unmet Needs:

In order to determine the proportion of reported prevalent persons with HIV/AIDS meeting a minimal standard of care, the Phoenix Eligible Metropolitan Area (EMA) (Title I) and ADHS (Title II) created an Unmet Need Working Group, which consisted of representatives from the ADHS (Title II, HIV Epidemiology/ Surveillance, Prevention and Care Services), Maricopa County Department of Public Health Services (MCDPHS) (HIV Surveillance, Epidemiology, Prevention, HIV Community Planning Group, and Ryan White CARE Act Title I programs) and Maricopa Integrated Health System (MIHS) (Titles III and IV). A key feature of the framework was the single, coordinated process for estimating unmet need in the EMA and the State, reducing duplication while increasing efficiency, and ensuring the consistency of data.

The group agreed to use a 12-month time frame, calendar year 2003, as recommended by UCSF researchers. For Step 2 of the framework, Review and Select Options for Estimating Unmet Need, the Working Group reviewed the data sources available in the EMA/State and chose the following as potential data sources to develop the estimate: VA Hospital and specialty HIV clinic; major medical providers identified through the Arizona branch of the American Academy of HIV Medicine (AAHIVM); McDowell Health Care Center (Title III clinic); HARS data; Indian Health Service (IHS); Phoenix Children's Hospital (PCH); and AHCCCS.

These sources were selected based on the availability of the data source, its representativeness, database content, and the sustainability of a partnership over time. Primary contacts were identified for each data source. The working group conducted a feasibility study in March 2004, which including meeting with key stakeholders from the community, as well as the data managers of the data sources mentioned above, to discuss the unmet need framework and the level of involvement required of stakeholders. As a result of this meeting, the working group received complete buy-in and support for the framework from all of the stakeholders.

Based on the data sources available, the Unmet Need Working Group utilized HIV/AIDS Reporting System (HARS) data for population size input. For care patterns, the group utilized linked data from HIV providers (those identified from the AAHIVM, AHCCCS, McDowell Health Care Center, PCH, IHS and VA) and the ADAP database.

It was later determined at a meeting in April 2004 with Lab Corp and Sonora Quest Laboratories that laboratory data would be the primary data set to cross match with the HARS database. Since El Rio Special Immunology Associates, the largest HIV specialty provider in Tucson, sends most of their labs to either SQ or LC, it was not necessary to collect any client data from El Rio, or other providers that find themselves in the same situation. However, McDowell Healthcare Center, the largest HIV clinic in Arizona located in Phoenix, sends their labs to Maricopa Medical Center, therefore this information was received by the working group and included in the lab database. All labs provided data regarding who HAS received CD4 or VL testing in 2003. The members present stated that most of the smaller labs in the state actually send their labs to LC or SQ for processing, therefore the data would be captured in the primary lab database.

In order to link the utilization data and accurately enumerate the number of individuals with unmet need in the EMA/State, HIV providers were asked to provide basic demographic information, including: county of residence, date of birth, gender, insurance provider, provider name, and whether or not the client has had a viral load, CD4 measurement or anti-retroviral therapy during the past 12 months. One benefit in obtaining this basic demographic information is that it provides the potential for finding unreported people living with HIV/AIDS in the EMA who can then be incorporated into the ADHS Epidemiology (HARS) data and link the client into care and services that they may not have otherwise received.

The most effective use of the HARS database along with the major Unmet Need database that will be created from the labs, providers, and clinics was discussed. The question was raised about how the databases would be synchronized. After much discussion, it was determined that the best and easiest way to link all of the data to reduce duplication and to reduce workload for everyone involved would be to create a unique identifier (or Unique Record Number -- URN) modeled after the URN that is generated out of CAREWare.

The Unmet Needs Working Group ran into some time constraints while waiting for the lab data to be processed and sent to the coordinator of this project; however, in the end, the unmet need framework was completed in a timely fashion and the results were able to be generated.

The total number of prevalent cases in the HARS database is 9,719. The total number of clients in care in Arizona is 4,837, or 49.8% of the total prevalent cases. The total number of clients who are identified as having an unmet need is 4,882, or 50.2% of the total prevalent cases.

Of those people in care, 2044 are HIV cases, while 2793 are AIDS cases. There is one person who is in care but whose HIV status is unknown.

Of those people with an unmet need, 3257 are HIV cases, while 1625 are AIDS cases. There are three people not in care whose HIV status is unknown.

Of the 1708 records in the McDowell lab data source, 503 (29.4%) are not matched among the HARS prevalent cases based upon the URN provided. That is not out of the ordinary range given the incomplete percentages from LabCorps (3,196/14,614, or 21.9%) and Sonora Quest (1899/6362, or 29.8%). If we were able to correct whatever problems are causing these mismatches, the percentages of those "IN CARE" would increase 5-10%. This may be the result of three scenarios:

1) There is a discrepancy between the name, DOB and gender information in HARS and in the lab data set, although the person is actually the same person. However because of the discrepancy, they have different URN's in the multiple databases, and no match is found.

2) The person has in fact been reported, however it is still "in the works" so to speak, and has not yet been verified and entered into HARS. When it is eventually entered, the problem will be resolved.

3) The person has not yet been reported, and therefore does not appear in HARS.

At the request of the epidemiologist at ADHS, an R squared bivariate correlation analysis of "percentage in poverty at 2000 census" and "ratio of met needs to unmet needs" was performed across the 15 counties of Arizona. There was no significance found in p-values between these two indicators on any test (.216 on Kendall's Tau, .362 on Spearman's Rho, and .138 on Pierson's). There does not appear to be any real correlation between levels of poverty, and higher levels of persons defined as "unmet needs.” The correlation between population density (urbanization) and rates of both prevalence and incidence is by far the most powerful association we have observed, with p values on all three correlation tests well above 0.95.

The process used will undercount the true level of “in care” or met needs group; it does so by design (why are we evaluating on the basis of CD4, Viral Load, and HAART alone rather than using other indicators?), and does not reflect in any way on the methods we are using to measure it. There are many records in the lab database that are not matched in HARS - not because the people whom they represent are not truly in HARS, but because of problems with the linkage between their HARS identity, and the other data sources which often have much missing data.

Given the sensitivities of the labs to the Health Insurance Portability and Accountability Act (HIPAA), perhaps the best approach to resolving this is to finalize the Unmet Needs framework, and publish it with some fairly detailed discussion as to why these cases were not matched. We plan to then follow up with the labs requesting named information on non-matching cases for 2003, do a comprehensive cross match that would eliminate as many cases in category 1 and 2 above as possible. After that, we will request verification of reporting on the remaining cases in category 3.

Section II. Ryan White CARE Act

6. What are the number and characteristics of individuals who know they are HIV-positive, but who are not in care?
7. What are the HIV/AIDS service utilization patterns of individuals in Arizona?

We found several significant concerns when preparing the Ryan White CARE Act implementation information for this profile:

- There were 31 sites in Arizona funded in 2004 to provide care and services under the Ryan White CARE Act such as care, treatment, and education. Among the 31 funded sites, a combined total of 164 full time equivalent staff (FTEs), including volunteer staff, were involved in the delivery of grant related services.

- The AIDS Drug Assistance Program had 1535 clients enrolled in the program to receive anti-retroviral therapy in 2004, an increase of 279 cases (22.2% increase) since 2002.

- The demographics of the clients receiving services for Title II statewide showed that 83.8% were male, 63.7% were between the ages of 25 and 44, 30.2% of the clients were Hispanic, 77.3% were white, and 74.5% had an income less than 300% of the federal poverty level. In addition, approximately 80% of the Title II clients were permanently housed, and had Medicare (10%), Medicaid (17.4%) or no insurance coverage (36%).

- The number of clients on Ryan White Title II across the state has increased overall 20.7% since 2002, while funding has not increased. This is causing the entire state to provide HIV care and services to more people enrolled in Ryan White services, with essentially less funding.

The Department of Health and Human Services (DHHS) HIV/AIDS Bureau (HAB) Administers the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act programs. These programs benefit low-income, uninsured and underinsured individuals & families affected by HIV/AIDS. The Four Critical Principles of the HAB are:

- Focusing services on the underserved in response to the HIV/AIDS epidemic's growing impact among underserved minority and hard to reach populations.

- Ensuring access to existing and emerging HIV/AIDS treatments that can make a difference.

- Adapting to changes in the financing of the health care delivery system and the role of CARE Act services in filling gaps in care.

- Documenting the impact of CARE Act funded services on improving access to quality care and treatment, and areas of continued need.

Title I of the CARE Act provides emergency funding for Eligible Metropolitan Areas (EMAs) that are severely and disproportionately affected by the HIV epidemic. These are cities or regions that have over 2,000 AIDS cases. Title I funding is based on a three-tiered award: Title I base formula, Supplemental, and Minority AIDS Initiative funding. In Arizona, the sole Title I EMA is Maricopa and Pinal Counties, and is administratively managed by the Maricopa County Board of Supervisors and the Department of Public Health. Title I provides funding for HIV care and services including outpatient medical care, medications, dental care, mental health, substance abuse, case management, transportation, and other core and supportive services.

Title II of the CARE Act provides grants to all 50 States, territories and jurisdictions for HIV care and services including outpatient medical care, medications, dental care, mental health, substance abuse, case management, transportation, and other core and supportive services. Funding is provided to the States or Territories (grantees) in four ways: The Title II Base Award for HIV Care and Services, AIDS Drug Assistance Program (ADAP) funding, grants to Emerging Communities (EC) (those communities that have fewer than 2000 cases of AIDS, but greater than 500 cases), and Minority AIDS Initiative (MAI) Funding. In Arizona, Tucson was an Emerging Community for FY2003, but not for FY2004. The EC status was reinstated due to an increase in AIDS cases reported for FY2005.

Titles I and II are administered by the Division of Service Systems (DSS).

Title III of the CARE Act provides Capacity Building, Planning, Early Intervention Services in outpatient specialty clinics for HIV infected people. In Arizona, there are three (3) Title III funded clinics: McDowell Healthcare Center in Phoenix, El Rio Special Immunology Associates and the University of Arizona Special Immunology Clinic, both in Tucson.

Title IV of the CARE Act provides services aimed at improving access to care for Women, Infants, Children & Youth through a collaborative of care network which includes Phoenix Children's Hospital Bill Holt Infectious Disease Clinic, HIV Care Directions, Maricopa County Department of Public Health Testing and Counseling, Ebony House, and the McDowell Healthcare Center.

Part F of the CARE Act provides funding for Special Projects of National Significance (SPNS), HIV/AIDS Education and Training Centers (AETCs), Dental Reimbursement Programs & Community Based Dental Partnerships. In Arizona, SPNS projects have been funded regarding HIV Care and Services outreach along the U.S.-Mexico border, services to the Navajo population in Northern Arizona, and most recently, to facilitate an opioid addiction program at El Rio SIA using buprenorphine in an outpatient medical setting.

The Arizona AETC provides training and consultation to medical providers and practitioners who are seeing HIV infected patients. Informational sessions can be scheduled through the AETC for small groups as well as large, to educate people on the latest treatment guidelines for HIV/AIDS and where to locate additional resources. (http://www.aids-ed.org/).

There were 31 sites in Arizona funded in 2004 to provide care and services under the Ryan White CARE Act. Among those 31 sites, the following populations were especially targeted for outreach or services during the 2004 reporting period. Populations are listed in order of frequency with those most frequently targeted appearing first, and those least frequently targeted last. The number of sites targeting each population group is given in parentheses. Current reported prevalence for each group is listed in the column at right:

1.	Racial/ethnic minorities/communities of color (18)	37.7%
2.	Women (14)	13.4%
3.	Gay, lesbian and bisexual adults (11)	68.2%
4.	IDU (11)	22.4%
5.	Homeless (10)	Unknown
6.	Gay, lesbian, and bisexual youth (9)	<1%
7.	Non-IDU (9)	Unknown
8.	Rural populations other than migrant or seasonal farm workers (8)	13.2%
9.	Incarcerated persons (6)	2.2%
10.	Children (6)	0.4%
11.	All adolescents (5)	0.5%
12.	Migrant or seasonal farm workers (4)	Unknown
13.	Parolees (3)	Unknown
14.	Other:	
	o Parents of HIV+ children (1)	Unknown
	o Native Americans (1)	3.6%
	o People with HIV over 50 (1)	22.3%
15.	Runaway or street youth (0)	Unknown

Targeting of groups is based upon a range of considerations, including a comprehensive needs assessment to define service gaps and funding shortfalls, and regional prevalence patterns.

During the 2004 grant year, Arizona Ryan White CARE Act grantees received nearly $20 million statewide for provision of care, education, and services to clients and practitioners. Among the 31 funded sites, a combined total of 164 full time equivalent staff (FTE's), including volunteer staff, were involved in the delivery of grant related services. Because numerous sites employ the same staff to deliver services under multiple titles, it is not possible to present FTE's by title, only aggregate totals across all titles. Approved funding for 2005 includes a net 13% increase in funding over 2004, but these increases are only felt in Title I, II, and III programs. Title IV and Section F programs both saw declines in overall 2005 funding from 2004.

Illustration 52: ARIZONA RYAN WHITE CARE ACT TITLE PROGRAM FUNDING AND STAFFING

	2004 Grant Year Funding	Paid Staff 2004 FTE's	Volunteer Staff 2004 FTE's	2005 Grant Year Approved Funding
Title I	$5,837,894			$6,467,107
Title II	$11,363,413			$12,732,077
Title III	$1,771,536			$2,407,205
Title IV	$628,619			$ 627,980
AETC (Section F)	$221,373			$156,488
Total	**$19,822,835**	**136.6**	**27.4**	**$22,390,857**

In late 2003, a cooperative effort between the ADHS HIV/AIDS program, the Arizona Drug Assistance Program, and several of the primary testing laboratories was undertaken to measure and describe the group of persons reported with HIV/AIDS in Arizona who did not meet a minimal standard of care. This “Unmet Needs Framework” required extensive comparison of data from multiple sources to identify individuals who had received Highly Active Anti-Retroviral Therapy (HAART), or any CD4 or Viral Load lab testing during the 2003 calendar year. Persons who failed to meet any of these minimal criteria were considered to have an “unmet need” for primary HIV care. Using cross-matching methods (described in detail in the appendix on cross-matching), of 9,723 prevalent persons with HIV infection at the time the analysis was initiated, 4885 (50.2%) were classified as having an unmet need. These numbers were further analyzed geographically, and by demographic descriptors for age, race, and gender, and by reported risk behaviors. Some of these results are presented in Illustrations 14 and 15 (page 27), 25 (page 37), 30 (page 41), and 35 (page 45). Illustrations 53 –56 below present the ‘unmet need’ framework by Age, Sex, Race/Ethnicity, and by reported risk/mode of transmission.

Illustration 53: ARIZONA HIV/AIDS UNMET NEED PREVALENCE BY AGE GROUP

Age	Total Cases	Unmet Needs Cases	% Unmet Needs in Age Category Total
0-1	1	1	100.0%
2-12	33	17	51.5%
13-19	44	24	54.5%
20-24	154	71	46.1%
25-29	483	216	44.7%
30-34	1,020	467	45.8%
35-39	1,843	885	48.0%
40-44	2,418	1,240	51.3%
45-49	1,702	846	49.7%
50-54	996	554	55.6%
55-59	549	289	52.6%
60-64	250	130	52.0%
65 and Older	204	119	58.3%
Unknown	26	26	100.0%
TOTAL	9,723	4,885	50.2%

Source: Based upon Arizona HARS 9/1/03 cross-matched with data provided by several primary reporting laboratories, and Arizona ADAP;

In Illustration 53, there are some noteworthy variations among age categories, with those in the mid-twenties to mid-thirties slightly less likely to be found with an unmet need, and those in the 50’s and older age categories being slightly more likely to be found with an unmet need.

Illustration 54: ARIZONA HIV/AIDS UNMET NEED PREVALENCE BY SEX

Sex	Total Cases	Unmet Needs Cases	% Unmet Needs in Age Category Total
Male	8,446	4,217	49.9%
Female	1,277	668	52.3%
TOTAL	9,723	4,885	50.2%

Source: Based upon Arizona HARS 9/1/03 cross-matched with data provided by several primary reporting laboratories, and Arizona ADAP;

Illustration 54 shows a slight, but not substantial variance between males and females in likelihood to be found with an unmet need.

Illustration 55: ARIZONA HIV/AIDS UNMET NEED PREVALENCE BY RACE/ETHNICITY

Race/Ethnicity	Total Cases	Unmet Needs Cases	% Unmet Needs in Age Category Total
White non-Hispanic	6,118	3,062	50.0%
Black non-Hispanic	1,011	568	56.2%
Hispanic	2,040	24	47.2%
Asian/Pacific Islander non-Hispanic	74	71	43.2%
American Indian/Alaska Native non-Hispanic	353	216	43.1%
Multi-Race/Other/non-Hispanic/Unknown	127	467	85.8%
TOTAL	9,723	4,885	50.2%

Source: Based upon Arizona HARS 9/1/03 cross-matched with data provided by several primary reporting laboratories, and Arizona ADAP;

Illustration 55 demonstrates that there are meaningful variations between race/ethnicity groups, with Black non-Hispanics being more likely to be found with an unmet need than other groups. The high proportion of persons classified as multi-race/other race non-Hispanic/ unknown race in the unmet need group is due to the fact that significant numbers in this group are persons who have incomplete data, including incomplete race/ethnicity, and incomplete medical care information which would make them much more likely to be classified as having an unmet need.

Illustration 56: ARIZONA HIV/AIDS UNMET NEED PREVALENCE BY MODE OF EXPOSURE/RISK BEHAVIOR

Risk Category/Mode of Transmission	Total Cases	Unmet Needs Cases	% Unmet Needs in Age Category Total
MSM Only [1]	5,633	2,542	45.1%
IDU Only [2]	1,324	746	56.3%
MSM and IDU [3]	933	433	46.4%
Heterosexual	965	462	47.9%
O/H/TF/TPR [4]	193	102	52.8%
No Reported Risk	675	600	88.9%
TOTAL	9,723	4,885	50.2%

Source: Based upon Arizona HARS 9/1/03 cross-matched with data provided by several primary reporting laboratories, and Arizona ADAP;

1) Men having Sex with Men
2) Injection Drug Use
3) Men having Sex with Men as well as reporting Injection Drug Use
4) Other/Hemophilia/Transfusion and Blood products/Transplant Recipient

Illustration 56 demonstrates that persons who report only injection drug use risk behavior are more likely to be found with an unmet need than other risk groups. The high proportion of persons having no reported risk in the unmet need group is due to the fact that significant numbers in this group are persons who have incomplete data, including incomplete race/ethnicity, and less than complete medical care information. This would make them much more likely to be classified as having an unmet need.

Prior discussion in Illustrations 14 and 15 shows that urbanized (Maricopa and Pima) counties have the majority of both unmet need cases, as well as the majority of all prevalent cases. Conventional understanding is that rates of ‘unmet need’ should increase in counties with higher poverty, and more limited health resources, but correlation analysis does not demonstrate any such pattern. In fact the intensification of HIV/AIDS epidemic activity with increasing urbanization appears to be a more significant factor in the geographic distribution of persons with an unmet need than does poverty.

Ryan White Title I:

The Phoenix EMA Title I grant provides services to approximately 2000 people living with HIV/AIDS residing in Maricopa or Pinal County. The Phoenix EMA land area is approximately 15,000 square miles with a population of 3.4 million. The grant is administered through the Maricopa County Department of Public Health by the Office of Ryan White CARE Services. The administrative agent's office provides financial, operational, contractual monitoring and quality management services to network of community based organizations. The grantees office coordinates services with Maricopa County Board of Supervisors (BOS) the Phoenix EMA Title I HIV Health Services Planning Council, the Maricopa County Board of Health (BOH) and Arizona Department of Health Services (ADHS). The Title I RFP process is conducted on a three-year cycle based on Maricopa County procurement policies. A pre-selected committee utilizes strict criteria to award all three-year contracts.

Ryan White Title I clients enjoy a very comprehensive continuum of care. Services include the following: primary medical care, case management, legal services, transportation, alternative/complementary, behavioral health, home health, food services, support groups, outreach, dental insurance, nutrition counseling, and pharmaceutical services. On-site monitoring is conducted by the grantees' office to assess operationally efficiency and financial viability of all contracted services. Additionally, all Title I providers are required to participate in the Quality Management program.

The current annual Title I grant amount is for approximately 6.5 million dollars. These funds are allocated by the Title I planning council. The planning council membership is reflective of the Phoenix EMA HIV/AIDS community and coordinates with the grantee's office to oversee the Title I grant. The planning council conducts an annual needs assessment to identify the changing and unmet needs within the Phoenix EMA. Utilizing data from the grantee's office and the needs assessment each service category is allocated funding for each contract year.

Challenges for Title I services continue to be the following:

1. Changing Phoenix EMA demographics
2. Influx of clients relocating to the Phoenix EMA from other states
3. Illegal immigration from Mexico
4. Relocation of African Africans
5. General population growth
6. No HIV Service in Pinal County
7. A geographic area with large expanses of open area

Illustration 57: ARIZONA RYAN WHITE CARE ACT TITLE I UTILIZATION SUMMARY

Enrollment/Sero Status	**HIV +** (Row %)	**HIV -** (Row %)	**Unknown** (Row %)	**Total** (Column %)
Number of Unduplicated Clients	**8,276** (60.0%)	**5,428** (39.4%)	**81** (0.6%)	**13,785** (100.0%)
Number of New Clients	2,397 (32.2%)	4,977 (66.7%)	81 (1.1%)	7,455 (54.1%)
HIV Pos. (not AIDS)	2,440 (100.0%)	N/A		2,440 (17.7%)
HIV Pos. (AIDS status Unknown)	4,556 (100.0%)	N/A		4,556 (33.1%)
AIDS	1,280 (100.0%)	N/A		1,280 (9.3%)
HIV Negative	N/A	5,428 (100.0%)		5,428 (39.4%)
Unknown	N/A	81 (100.0%)		81 (0.6%)
Total	**8,276** (60.0%)	**5,509** (40.0%)		**13,785** (100.0%)
Active and New	1,697 (25.4%)	4,973 (74.6%)		6,670 (48.4%)
Active and Continuing	3,708 (99.1%)	32 (0.9%)		3,740 (27.1%)
Deceased	60 (100.0%)	0 (0.0%)		60 (0.4%)
Inactive	804 (99.5%)	4 (0.5%)		808 (5.9%)
Unknown	2,007 (80.1%)	500 (19.9%)		2,507 (18.2%)
Total	**8,276** (60.0%)	**5,509** (40.0%)		**13,785** (100.0%)

Illustration 58: ARIZONA RYAN WHITE CARE ACT TITLE I DEMOGRAPHIC SUMMARY

Demographic Descriptors	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
Male	6,888 (65.3%)	3,666 (34.7%)	10,554 (76.6%)
Female	1,234 (43.7%)	1,591 (56.3%)	2,825 (20.5%)
Transgender	35 (89.7%)	4 (10.3%)	39 (0.3%)
Unknown	119 (32.4%)	248 (67.6%)	367 (2.7%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)
Less than 2	6 (10.0%)	54 (90.0%)	60 (0.4%)
2 - 12	94 (31.1%)	208 (68.9%)	302 (2.2%)
13 - 24	235 (13.4%)	1,516 (86.6%)	1,751 (12.7%)
25 - 44	5,092 (65.6%)	2,668 (34.4%)	7,760 (56.3%)
45 - 64	2,605 (77.6%)	750 (22.4%)	3,355 (24.3%)
65 and Older	132 (66.7%)	66 (33.3%)	198 (1.4%)
Unknown	112 (31.2%)	247 (68.8%)	359 (2.6%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)
Hispanic	2,057 (52.4%)	1,872 (47.6%)	3,929 (28.5%)
Non-Hispanic	6,026 (64.2%)	3,365 (35.8%)	9,391 (68.1%)
Unknown	193 (41.5%)	272 (58.5%)	465 (3.4%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)
White	5,761 (61.7%)	3,575 (38.3%)	9,336 (67.7%)
Black	991 (67.0%)	488 (33.0%)	1,479 (10.7%)
Asian/Pacific Islander/Native Hawaiian	44 (28.0%)	113 (72.0%)	157 (1.1%)
American Indian/Alaska Native	177 (61.7%)	110 (38.3%)	287 (2.1%)
Multiple Race/Other Race	82 (66.1%)	42 (33.9%)	124 (0.9%)
Unknown	1,221 (50.8%)	1,181 (49.2%)	2,402 (17.4%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)

Illustration 59: ARIZONA RYAN WHITE CARE ACT TITLE I INCOME/HOUSING / INSURANCE SUMMARY

Income/ Housing/Insurance	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
<= Federal Poverty Level	3,814 (42.8%)	5,094 (57.2%)	8,908 (64.6%)
101-200% Federal Poverty Level	1,914 (98.5%)	29 (1.5%)	1,943 (14.1%)
201-300% Federal Poverty Level	324 (96.4%)	12 (3.6%)	336 (2.4%)
> 300% Federal Poverty Level	23 (95.8%)	1 (4.2%)	24 (0.2%)
Unknown	2,201 (85.5%)	373 (14.5%)	2,574 (18.7%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)
Permanently Housed	4,934 (60.8%)	3,186 (39.2%)	8,120 (58.9%)
Non-Permanently Housed	543 (77.6%)	157 (22.4%)	700 (5.1%)
Institution	27 (81.8%)	6 (18.2%)	33 (0.2%)
Other	67 (56.3%)	52 (43.7%)	119 (0.9%)
Unknown	2,705 (56.2%)	2,108 (43.8%)	4,813 (34.9%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)
Private	559 (33.4%)	1,113 (66.6%)	1,672 (12.1%)
Medicare	427 (96.2%)	17 (3.8%)	444 (3.2%)
Medicaid	791 (80.6%)	190 (19.4%)	981 (7.1%)
Other Public	435 (74.7%)	147 (25.3%)	582 (4.2%)
No Insurance	2,710 (60.8%)	1,744 (39.2%)	4,454 (32.3%)
Other	153 (33.9%)	298 (66.1%)	451 (3.3%)
Unknown	3,201 (61.5%)	2,000 (38.5%)	5,201 (37.7%)
Total	**8,276** (60.0%)	**5,509** (40.0%)	**13,785** (100.0%)

Ryan White Title II:

The Ryan White Title II HIV Care and Services program is housed in the same office as the State HIV/AIDS Prevention Program. Program staff and program managers regularly collaborate on joint projects and programs. HIV Prevention Program staff members attend the Title II Statewide Advisory Council meetings. During FY2001, the HIV Prevention Program funded a new statewide intervention called "Prevention for Positives", focusing HIV prevention resources on those who know that they are HIV-positive. In the rural areas of Arizona, where manpower is limited, very often the same agency and staff who are responsible for HIV prevention services also provide HIV care and services under Ryan White Title II. County health department staff located in rural areas of the state are contractually responsible to provide the entire range of HIV services within their geographic areas, including HIV counseling and testing, health education, and risk reduction services.

The Prevention Planning Group of Arizona (PPGA) (formerly the Statewide HIV Prevention Advisory Group) also fosters increased coordination with other planning activities, especially Ryan White CARE Act Title I and Title II programs. For example, the ADHS program manager for HIV Care and Services often attends quarterly PPGA meetings to update the group on the status of the Arizona AIDS Drug Assistance Program (ADAP) as well as care and services issues throughout the state. ADHS prevention staff members attend the merged planning group and care and services meetings conducted by the Northern Arizona HIV/AIDS Forum. Many members in frontier areas are involved in both HIV care and services and prevention programs.

Arizona created a statewide Prevention for Positives program in 2001 named HIP/AZ. It includes three regional programs -- Central, Southern, and Verde (Northern) -- to serve the communities and target populations in the three planning regions. The HIP/AZ program has the following goals: prevention programs for people living with HIV/AIDS will be integrated into HIV/AIDS care and services as well as other HIV prevention programs; programs delivering prevention services for people living with HIV/AIDS will have well established systems and performance in the areas of program development, implementation and evaluation; and prevention services for people living with HIV/AIDS will be present in rural Arizona. During the period of January through December 2005, HIP/AZ plans to continue to provide education on program services to community agencies involved in care, services and treatment in order to further increase the overall referral base.

Geographic planning is of the utmost importance in Arizona due to the large rural areas of the state and its limited resources, as well as the 50% estimate of unmet need. Persons living with HIV in rural areas of the state are more likely to experience problems with access to HIV care and services, some of which are less likely to occur in an urban setting. These include such factors as transportation availability, cost, and distance, as well as concerns about confidentiality inherent to small communities. Because of these barriers, ADHS makes rural populations a top service priority. There is an unmet primary care and dental care need in each rural county, demonstrated by the numbers of rural people living with HIV/AIDS who seek care in metropolitan areas. In each of these rural counties, there are primary care physicians available and willing to treat people living with HIV/AIDS. However, many of these physicians lack fundamental knowledge of HIV disease, or lack the experience necessary to treat specific conditions related to HIV disease. An assessment of the existing services available indicates that the most pressing needs are education of primary care physicians, necessity of client confidentiality, and early intervention services. Clients will access as many services as are provided.

Local consortia can continue to be empowered to assess needs and gaps in service, to identify early entry points into the care system, to provide quality referrals, appropriate professional medical education through the Arizona AIDS Education and Training Center (AzAETC), and explore additional resources for people living with HIV/AIDS in their areas, thereby decreasing their barriers to care, and strengthening the public health infrastructure. This is consistent with Healthy People 2010 goal 13-13, “Increase the proportion of HIV-infected adolescents and adults who receive testing, treatment, and prophylaxis consistent with current Public Health Service treatment guidelines.”

Contractors have established appropriate relationships to facilitate early intervention for newly diagnosed individuals and for those that know their status but are not in care. Title II contractors are providing services in smaller urban areas (Tucson, for example), small towns, and rural areas of the state. This, in itself, facilitates relationships for newly diagnosed clients and clients not in care due to the limited number of HIV providers, health care providers, social service agencies, treatment centers, and community based organizations. Very often in rural areas, HIV services are either not available, or available on a limited basis. Many times, clients need to be transported to more urban areas in order to receive specific services in order to decrease their barriers to care and improve their quality of care. Providers develop communication networks and referral systems in order to provide many HIV health and medical services.

Decisions regarding Arizona's Title II programs, including ADAP, are made in concert with the Title II Statewide Advisory Council. The Advisory Council is composed of approximately 50 members from throughout the state, which meets quarterly, or based upon emerging needs.

The Statewide Coordinated Statement of Need (SCSN) Development Committee updated the SCSN during FY2001 and will reconvene in 2005 as a subcommittee of the Advisory Council for another update. Other ad hoc committees will be formed as needed. The Title II Statewide Advisory Council makes decisions based upon the consensus model.

The three HIV care consortia in the state serve as planning bodies for Title II HIV care and services. The Ryan White Title II Care and Services Program empowers each regional HIV care consortium and direct service area to develop, implement, and evaluate it's own needs assessment either as a group or via a contractor. This needs assessment activity is a requirement in each regional contract. Historically, Arizona has empowered the care consortia to plan and prioritize care services that are specific for each region of the state. Each region varies as to the priority services provided based on each local planning process. However, Arizona continues to place ADAP as the number one priority service provided by Title II funding. Arizona will continue to fund ADAP with Title II funds and a $1 million contribution from the Arizona State general fund when appropriated.

The Services that have been identified for funding in FY 2005 are as follows:

- <u>Pima County HIV/AIDS Care Consortium</u> (PCHACC) has prioritized outpatient medical care, local medication assistance (non-ADAP), dental care, mental health counseling, substance abuse treatment, case management (including peer counseling), in-home health care, and alternative/complementary services. All service providers are contractually obligated to provide HIV education and risk reduction activities and outreach services.

- The Southeastern Arizona HIV/AIDS Care Consortium (SEAHACC) has prioritized funding for outpatient medical care, local medication assistance program, dental care, mental health, substance abuse services, case management services, and transportation as top priorities.

- The Northern Arizona HIV/AIDS Forum (NAHAF) has prioritized funding for outpatient medical care, local medication assistance program, dental care, mental health counseling, food/home meals/supplements, transportation, and other services (translation).

- Yuma and La Paz Counties have prioritized case management and support services, while contracting out directly for outpatient medical care (including health insurance co-pays and referrals to specialty care), dental care, laboratory services, mental health services, local medication assistance (non-ADAP), and transportation services.

In addition, El Rio Special Immunology Associates in Pima County is the recipient of Minority AIDS Initiative funding for the Arizona Border HIV/AIDS Care Program to subcontract to border regions to conduct outreach and increase minority participation in ADAP.

Transportation services are critical funding priorities for all three aforementioned rural regions due to the vast geographical distance between the client's homes and the medical and specialty clinics, and case management offices. Without funding for transportation, there would be a significant barrier to access to care, and significantly decreased health outcomes. Many clients choose to access their services in metropolitan areas such as Phoenix, Tucson and Flagstaff, and without transportation assistance, they would not be able to be seen by the medical provider of their choice or of their required treatment plan. In all regions, all travel reimbursement requires a medical letter, invoice, and voucher to identify the client and verify the medical need to travel for service. Transportation expenses will include out-of town and local travel, rental car vouchers, gas reimbursement, taxi reimbursement; with the regions implementing mileage limits on travel. Meals and lodging will be determined on a case-by case situation and will require a prior travel plan and the approval of the Program Coordinator or Case Managers. In all regions of the state, outpatient medical care and case management are listed as two of the top needed service categories in the needs assessments, to ensure access to care, referrals to HIV specialty providers, and to coordinate Title II services with other health-care delivery systems.

Illustration 60: ARIZONA RYAN WHITE CARE ACT TITLE II UTILIZATION SUMMARY

Enrollment/Sero Status	**HIV+** (Row %)	**HIV-** (Row %)	**Unknown** (Row %)	**Total** (Column %)
Number of Unduplicated Clients	**4,669** (98.2%)	**77** (1.6%)	**10** (0.2%)	**4,756** (100.0%)
Number of New Clients	1,072 (94.5%)	62 (5.5%)	0 (0.0%)	1,134 (23.8%)
HIV Pos. (not AIDS)	1,514 (100.0%)	N/A		1,514 (31.8%)
HIV Pos. (AIDS status Unknown)	1,736 (100.0%)	N/A		1,736 (36.5%)
AIDS	1,419 (100.0%)	N/A		1,419 (29.8%)
HIV Negative	N/A	77 (100.0%)		77 (1.6%)
Unknown	N/A	10 (100.0%)		10 (0.2%)
Total	**4,669** (98.2%)	**87** (1.8%)		**4,756** (100.0%)
Active and New	756 (93.0%)	57 (7.0%)		813 (17.1%)
Active and Continuing	3,182 (99.1%)	28 (0.9%)		3,210 (67.5%)
Deceased	77 (100.0%)	0 (0.0%)		77 (1.6%)
Inactive	649 (99.7%)	2 (0.3%)		651 (13.7%)
Unknown	5 (100.0%)	0 (0.0%)		5 (0.1%)
Total	**4,669** (98.2%)	**87** (1.8%)		**4,756** (100.0%)

Illustration 61: ARIZONA RYAN WHITE CARE ACT TITLE II DEMOGRAPHIC SUMMARY

Demographic Descriptors	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
Male	3,934 (98.6%)	54 (1.4%)	3,988 (83.8%)
Female	731 (95.7%)	33 (4.3%)	764 (16.1%)
Transgender	4 (100.0%)	0 (0.0%)	4 (0.1%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)
Less than 2	1 (50.0%)	1 (50.0%)	2 (0.0%)
2 - 12	14 (77.8%)	4 (22.2%)	18 (0.4%)
13 - 24	236 (94.0%)	15 (6.0%)	251 (5.3%)
25 - 44	2,989 (98.7%)	39 (1.3%)	3,028 (63.7%)
45 - 64	1,321 (98.2%)	24 (1.8%)	1,345 (28.3%)
65 and Older	108 (99.1%)	1 (0.9%)	109 (2.3%)
Unknown	0 (0.0%)	3 (100.0%)	3 (0.1%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)
Hispanic	1,418 (98.7%)	19 (1.3%)	1,437 (30.2%)
Non-Hispanic	2,716 (97.6%)	68 (2.4%)	2,784 (58.5%)
Unknown	535 (100.0%)	0 (0.0%)	535 (11.2%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)
White	3,601 (97.9%)	76 (2.1%)	3,677 (77.3%)
Black	340 (97.1%)	10 (2.9%)	350 (7.4%)
Asian/Pacific Islander/Native Hawaiian	42 (100.0%)	0 (0.0%)	42 (0.9%)
American Indian/Alaska Native	113 (100.0%)	0 (0.0%)	113 (2.4%)
Multiple Race/Other Race	38 (97.4%)	1 (2.6%)	39 (0.8%)
Unknown	535 (100.0%)	0 (0.0%)	535 (11.2%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)

Illustration 62: ARIZONA RYAN WHITE CARE ACT TITLE II INCOME/HOUSING/ INSURANCE SUMMARY

Income/Housing/Insurance	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
<= Federal Poverty Level	1,456 (97.5%)	37 (2.5%)	1,493 (31.4%)
101-200% Federal Poverty Level	1,402 (98.9%)	16 (1.1%)	1,418 (29.8%)
201-300% Federal Poverty Level	626 (98.9%)	7 (1.1%)	633 (13.3%)
> 300% Federal Poverty Level	630 (97.1%)	19 (2.9%)	649 (13.6%)
Unknown	555 (98.6%)	8 (1.4%)	563 (11.8%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)
Permanently Housed	3,725 (98.0%)	76 (2.0%)	3,801 (79.9%)
Non-Permanently Housed	226 (96.6%)	8 (3.4%)	234 (4.9%)
Institution	41 (100.0%)	0 (0.0%)	41 (0.9%)
Other	94 (98.9%)	1 (1.1%)	95 (2.0%)
Unknown	583 (99.7%)	2 (0.3%)	585 (12.3%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)
Private	480 (99.0%)	5 (1.0%)	485 (10.2%)
Medicare	468 (98.7%)	6 (1.3%)	474 (10.0%)
Medicaid	824 (99.4%)	5 (0.6%)	829 (17.4%)
Other Public	222 (99.6%)	1 (0.4%)	223 (4.7%)
No Insurance	1,701 (99.2%)	13 (0.8%)	1,714 (36.0%)
Other	377 (100.0%)	0 (0.0%)	377 (7.9%)
Unknown	597 (91.3%)	57 (8.7%)	654 (13.8%)
Total	**4,669** (98.2%)	**87** (1.8%)	**4,756** (100.0%)

Due to anecdotal reports that migration into Arizona was having a substantial influence upon client numbers among Title II providers, the ADHS Care and Services Program compiled summary data on recent trends in client numbers among Title II providers for Arizona. Because each clients' testing history is collected when they are new clients, migration patterns from other states can be summarized. However, sites do not maintain data on client who have become inactive. As a result, migration patterns out of state cannot be provided at this time. It should be noted, however, that clients who become inactive at one Title II site have not necessarily moved out of state. They often subsequently become active at another Title II site within Arizona, consistent with a change of residency within the state. As mentioned above, Title II sites each maintain independent client lists, so duplication of some proportion of clients between sites is expected because of such factors as moving within state. Illustration 63 on the next page reports client counts and status from 2002 through 2004 for Title II sites:

Illustration 63: ARIZONA RYAN WHITE CARE ACT TITLE II CLIENT COUNTS: 2002-2004

	2002			2003			2004		
	Active	**Deceased**	**Inactive**	**Active**	**Deceased**	**Inactive**	**Active**	**Deceased**	**Inactive**
ADHS AIDS Drug Assistance Program	1256	0	0	1362	0	0	1535	0	0
Cochise County Health Department	50	0	0	77	1	0	80	3	0
Coconino County Health Department	42	1	18	137	0	0	61	0	12
COPE	76	3	51	75	6	41	74	3	31
El Rio Special Immunology Associates	1392	31	0	1530	22	0	1704	21	217
Gila County Health Department	8	0	0	9	0	0	37	2	1
Kino Hospital	40	0	0	0	0	0	0	0	0
Navajo AIDS Network	35	2	2	24	0	0	26	1	2
Northland Cares	0	0	0	0	0	0	30	0	0
Southern Arizona AIDS Foundation	823	32	176	899	34	130	948	42	146
Yavapai County Health Department	76	6	7	81	2	2	100	2	13
Yuma County Health Department	62	2	0	70	4	0	64	1	3
TOTAL	**3860**	**77**	**254**	**4264**	**69**	**173**	**4659**	**75**	**425**

Trends of change from Illustration 63 are reported in Illustration 64 on the next page:

Illustration 64: ARIZONA RYAN WHITE CARE ACT TITLE II CLIENT COUNT TRENDS: 2002-2004

	2002-03 Change		2003-04 Change		Total 2002-04 Change		Net In-Migration Proportion: 2002-2004
	Cases	%	Cases	%	Cases	%	
ADHS AIDS Drug Assistance Program	106	8.4%	173	12.7%	279	22.2%	N/A
Cochise County Health Department	27	54.0%	3	3.9%	30	60.0%	13.1%
Coconino County Health Department	95	226.2%	-76	-55.5%	19	45.2%	15.6%
COPE	-1	-1.3%	-1	-1.3%	-2	-2.6%	N/A
El Rio Special Immunology Associates	138	9.9%	174	11.4%	312	22.4%	28.4%
Gila County Health Department	1	12.5%	28	311.1%	29	362.5%	40.6%
Kino Hospital	-40	-100.0%	0	N/A	-40	-100.0%	N/A
Navajo AIDS Network	-11	-31.4%	2	8.3%	-9	-25.7%	Unknown
Northland Cares	0	0.0%	30	100.0%	30	100.0%	Included below
Southern Arizona AIDS Foundation	76	9.2%	49	5.5%	125	15.2%	52.6%
Yavapai County Health Department	5	6.6%	19	23.5%	24	31.6%	26.9%
Yuma County Health Department	8	12.9%	-6	-8.6%	2	3.2%	50.0%
TOTAL	**404**	**10.5%**	**395**	**9.3%**	**799**	**20.7%**	**33.6%**

These data demonstrate an average annual 10.3% growth in client counts across all Title II sites during 2002-2004. During that same time period, an average of 1/3 of new clients were persons diagnosed with HIV outside of Arizona who moved to Arizona. During that same time period, the state population grew 5.6% (2004 U.S. Census Est.) between 2002 and 2004. This demonstrates that Ryan White Title II client enrollment is increasing at a pace between 3 and 4 times greater than what would be expected due to increasing state population alone. Patterns of migration have long been suspected to play a role in growth in Ryan White Title II client enrollment, however no evidence has previously suggested that migration was having a greater influence on Ryan White client loads than upon the state population. Arizona’s population growth rate is the second highest for a state in the U.S., doubling from 2.7 million in 1980 to 5.4 million in 2002, just 22 years. The estimated doubling time of HIV prevalence in Arizona from its current levels is 14 years. Ryan White Title II client enrollment would be expected to double in 9 years if trends observed between 2002 and 2004 are sustained.

Ryan White Title III:

Three medical clinics are funded by Ryan White Title III to provide early intervention services (EIS) to people living with HIV/AIDS in Arizona; the El Rio Special Immunology Associates Clinic in Tucson, McDowell Healthcare Center in Phoenix, and the University of Arizona Ryan White Program.

El Rio Special Immunology Associates (SIA):

Since 1991 El Rio SIA has provided primary medical services to over 2000 individuals living with HIV/ AIDS in Pima County and Southern Arizona. Special Immunology Associates (SIA) is licensed to provide medical and behavioral health outpatient services.

El Rio's Special Immunology Associates provides primary care (inpatient and outpatient) as well as consultative care to approximately 1500 persons living with HIV infection throughout Southern Arizona. SIA is the largest provider of care to HIV-infected patients in the area. The goal of SIA is to provide accessible, affordable, quality ambulatory primary health care to HIV/AIDS infected patients; provide community education and information regarding new treatments and therapies to improve the quality of life of those living with HIV/AIDS; and provide for the behavioral health/counseling needs of people living with HIV and AIDS. The Special Immunology Associates (SIA) is a clinic of El Rio Community Health Center and funded by the US Department of Health Resources & Services Administration Ryan White Care Act Titles II ($836,750)& III ($966,247).

Research by J. Kevin Carmichael, MD, unit chief of SIA, suggests that the major risk factor of death among persons in the SIA clinic is the presence of substance abuse and mental health issues that prevent these persons from fully benefiting from antiretroviral and other therapies. For this reason, quality HIV treatment requires a comprehensive range of services that will best enable patients with these risk factors to start and stay on treatment. SIA has a truly integrated system of care, wherein medical care, mental health, substance abuse, case management, and advocacy are provided in a one-stop multidisciplinary approach. All disciplines document in the same chart, staff and patients together, coordinate efforts to optimize the success of treatment. Through advocacy activities that access drug assistance programs, compassionate use programs, and grant funds, El Rio/SIA distributes millions of dollars of HIV/AIDS medications at no charge to patients.

The project also makes extensive use of continuity of care counselors (3Cs) who do whatever needs to be done to ensure no one falls through the cracks of the system. This may entail eligibility assistance, coordinating with AIDS service organizations or with other care systems, such as disability and mental health; delivering medication boxes; and assisting with food, housing, and transportation. They also provide health education, including supplemental medication adherence and secondary HIV prevention counseling. Their final role is to provide an extra ear to hear patient concerns and problems that patients may not bring to the attention of the physician. The role of the continuity of care counselor is critical to the clinic's success because we have found that keeping people with HIV infection in care and adherent to medications is the key to keeping them alive and living meaningful lives.

McDowell Healthcare Center:

The Ryan White Title III EIS program in Phoenix, Arizona, provides funding ($695,000) to the Maricopa Integrated Health System (MIHS) to support its McDowell Healthcare Center (HCC). McDowell HCC is the largest provider of HIV primary care in Maricopa County and provides primary medical care, oral health services, behavioral health services, treatment adherence education and monitoring, and nutritional services on-site. Through an Intergovernmental agreement with Maricopa County Department of Public Health, MIHS supports HIV counseling and testing and outreach services that target hard-to-reach populations and use mobile capability to bring those services to clients, rather than having the clients travel to various sites.

The grant monies received through Title III funding sources provide salaries and ERE for 11.24 FTE's of the McDowell HCC clinical and support staff. Additionally, a total of 0.89 clinician FTE's are supported by this grant. Through the agreement with Maricopa County Department of Public Health, a 0.750 FTE is paid for out of the Title III monies. For the 2005 grant year (1/1/05-12/31/05) Ryan White Title III funding provided $26,655 in medical care to the eligible clients.

As a result of this Ryan White funding, McDowell HCC's providers were able to provide care to a total of ***1,535*** unduplicated clients between 08/01/04 through 07/31/05. Of the total population served, 80% were males, 20% were females and 6% were youth. The youngest patient seen at McDowell HCC is 13; the oldest is 84 (both females). In addition, 49% were Caucasian, 14% were Black/African American, 32% were Hispanic, and 5% were Asian or other ethnicities.

University of Arizona Ryan White Program:

The University of Arizona Ryan White program includes clinics at two hospitals in Tucson, AZ. One is the University Medical Center (UMC), a quaternary care, multi-discipline hospital located in the center of the city and Kino Community Hospital (KCH) located in the south part of Tucson. Both hospitals are staffed by faculty, residents, medical students, pharmacy and nursing students from the University of Arizona Health Sciences Center.

The clinic serves people from all over the state of Arizona including Native American patients living on reservations. UMC clinics are predominately Caucasian, 35% Hispanic and 20% women-most are working; KCH serves predominately Hispanic (90%) patients with 15% women and most patients are not working. Few patients have insurance and about 10% entered the clinic homeless. There has been an estimated 5-10% increase in the number or persons with HIV living in the catchment area of the two hospitals over the past year.

The University of Arizona Ryan White Program serves ~300 patients who had over 900 primary care physician encounters over the past year and an equal number of HIV pharmacist counseling encounters as well. The program counsels and tests on-site for HIV; Internists and Infectious Diseases specialists provide primary care with a dedicated pharmacist, nurse coordinator, nurse practitioner and outreach specialist. The program Pharmacist has a major clinic role in reducing unnecessary medications, choosing HAART regimens and adherence counseling for the expensive antiretroviral drugs. There is oral health available at KCH and proactive patient education is available through a number of venues. There are emergency rooms staffed 24 hours a day at UMC and KCH. There are state of the art radiology, laboratory and ancillary services at both hospitals. Referrals go to internationally renowned specialists in the University of Arizona Health Sciences Center and Arizona Cancer Center. All of the referral services are available on-site at UMC and after a five-mile trip for those at KCH.

Illustration 65: RYAN WHITE CARE ACT TITLE III UTILIZATION SUMMARY

Enrollment/Sero Status	**HIV+** (Row %)	**HIV-** (Row %)	**Unknown** (Row %)	**Total** (Column %)
Number of Unduplicated Clients	**1,663** (25.4%)	**4,844** (74.1%)	**29** (0.4%)	**6,536** (100.0%)
Number of New Clients	560 (10.3%)	4,832 (89.2%)	24 (0.4%)	5,416 (82.9%)
HIV Pos. (not AIDS)	1,071 (100.0%)	N/A		1,071 (16.4%)
HIV Pos. (AIDS status Unknown)	200 (100.0%)	N/A		200 (3.1%)
AIDS	392 (100.0%)	N/A		392 (6.0%)
HIV Negative	N/A	4,844 (100.0%)		4,844 (74.1%)
Unknown	N/A	29 (100.0%)		29 (0.4%)
Total	**1,663** (25.4%)	**4,873** (74.6%)		**6,536** (100.0%)
Active and New	501 (9.4%)	4,849 (90.6%)		5.350 (81.9%)
Active and Continuing	859 (98.3%)	15 (1.7%)		874 (13.4%)
Deceased	0 (0.0%)	0 (0.0%)		0 (0.0%)
Inactive	0 (0.0%)	0 (0.0%)		0 (0.0%)
Unknown	303 (97.1%)	9 (2.9%)		312 (4.8%)
Total	**1,663** (25.4%)	**4,873** (74.6%)		**6,536** (100.0%)

Illustration 66: RYAN WHITE CARE ACT TITLE III DEMOGRAPHIC SUMMARY

Demographic Descriptors	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
Male	1,376 (28.5%)	3,449 (71.5%)	4,825 (73.8%)
Female	279 (16.4%)	1,419 (83.6%)	1,698 (26.0%)
Transgender	3 (42.9%)	4 (57.1%)	7 (0.1%)
Unknown	5 (83.3%)	1 (16.7%)	6 (0.1%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)
Less than 2	1 (100.0%)	0 (0.0%)	1 (0.0%)
2 - 12	1 (100.0%)	0 (0.0%)	1 (0.0%)
13 - 24	65 (4.3%)	1,443 (95.7%)	1,508 (23.1%)
25 - 44	1,055 (28.6%)	2,632 (71.4%)	3,687 (56.4%)
45 - 64	514 (41.3%)	732 (58.7%)	1,246 (19.1%)
65 and Older	27 (29.0%)	66 (71.0%)	93 (1.4%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)
Hispanic	541 (24.7%)	1,648 (75.3%)	2,189 (33.5%)
Non-Hispanic	1,101 (25.6%)	3,200 (74.4%)	4,301 (65.8%)
Unknown	21 (45.7%)	25 (54.3%)	46 (0.7%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)
White	1,073 (24.7%)	3,269 (75.3%)	4,342 (66.4%)
Black	205 (33.2%)	413 (66.8%)	618 (9.5%)
Asian/Pacific Islander/Native Hawaiian	17 (13.2%)	112 (86.8%)	129 (2.0%)
American Indian/Alaska Native	18 (14.2%)	109 (85.8%)	127 (1.9%)
Multiple Race/Other Race	11 (22.4%)	38 (77.6%)	49 (0.7%)
Unknown	339 (26.7%)	932 (73.3%)	1,271 (19.4%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)

Illustration 67: RYAN WHITE CARE ACT TITLE III INCOME/ HOUSING/ INSURANCE SUMMARY

Income/ Housing/Insurance	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
<= Federal Poverty Level	1,166 (19.4%)	4,837 (80.6%)	6,003 (91.8%)
101-200% Federal Poverty Level	371 (98.9%)	4 (1.1%)	375 (5.7%)
201-300% Federal Poverty Level	105 (99.1%)	1 (0.9%)	106 (1.6%)
> 300% Federal Poverty Level	7 (100.0%)	0 (0.0%)	7 (0.1%)
Unknown	14 (31.1%)	31 (68.9%)	45 (0.7%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)
Permanently Housed	1,463 (33.5%)	2,902 (66.5%)	4,365 (66.8%)
Non-Permanently Housed	21 (12.4%)	148 (87.6%)	169 (2.6%)
Institution	1 (16.7%)	5 (83.3%)	6 (0.1%)
Other	3 (5.6%)	51 (94.4%)	54 (0.8%)
Unknown	175 (9.0%)	1,767 (91.0%)	1,942 (29.7%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)
Private	18 (1.6%)	1,081 (98.4%)	1,099 (16.8%)
Medicare	103 (87.3%)	15 (12.7%)	118 (1.8%)
Medicaid	191 (86.0%)	31 (14.0%)	222 (3.4%)
Other Public	9 (6.0%)	141 (94.0%)	150 (2.3%)
No Insurance	890 (34.3%)	1,701 (65.7%)	2,591 (39.6%)
Other	18 (5.7%)	298 (94.3%)	316 (4.8%)
Unknown	434 (21.3%)	1,606 (78.7%)	2,040 (31.2%)
Total	**1,663** (25.4%)	**4,873** (74.6%)	**6,536** (100.0%)

<u>Ryan White Title IV:</u> Maricopa Integrated Health System

Maricopa Integrated Health System (MIHS) and the Title IV network of support service providers have been providing comprehensive, coordinated Title IV funded services to HIV infected women, infants, children, youth and their families in Maricopa County since 1998. MIHS has served as the healthcare safety net for county residents for over 125 years. MIHS is a comprehensive healthcare delivery system incorporating the Maricopa Medical Center (MMC), a 555-bed public teaching hospital with a Level I Trauma Center; Arizona Burn Center; Phoenix Cancer Center; a 92-bed psychiatric facility for inpatient, outpatient, and urgent psychiatric treatment; and 11 outpatient family health centers, including the comprehensive McDowell Healthcare Center (MHCC) with behavioral health and dental care on-site, serving persons living with HIV/AIDS (PLWHA) since 1989. MIHS is the grantee for Title III (since 1991) and the adult medical provider for Title I (since 1994).

In Maricopa County, during the past 10 years, the percentage of women as a part of the total HIV/AIDS cases has more than doubled from 5.5 to 12.3%. Although the vast majority of HIV/AIDS cases occur in males, the percentage and cases among women have increased steadily. A rapidly growing segment of this epidemic is within women and youth of color, greatly disproportionate to their representation in the general population, which is predominantly White (66%). In 2003, minorities comprised 36% of the HIV/AIDS prevalence. In 2004 at MHCC, 72% and 89% of the new female and youth clients, respectively, were ethnic/racial minorities, compared to 55% and 35% in 2003. The Title IV program through its network of support service providers addresses the access to healthcare needs of these HIV-infected women, infants, children, youth and their affected families in Maricopa County. Services include primary care in a women's clinic, pediatric care, case management, medication adherence, childcare, access to clinical drug trials, consumer advocacy, Consumer Advisory Board (CAB), support groups, HIV counseling and testing, and case finding, particularly of pregnant women to reduce the risk of perinatal transmission. In 2004 the program served 988 clients.

<u>Challenges</u>

The primary challenge is maintaining the current standards of care for a growing population of PLWHA with no increase from any funding source. However, a particular challenge in the next year is the education of doctors and hospitals to the import of testing pregnant women prior to delivery, and then, instituting the practice of rapid testing in labor and delivery (L&D) units county-wide

<u>Network Coordination</u>

This program builds on services provided through its four network agencies: Phoenix Children's Hospital Bill Holt Infectious Diseases Clinic (PCH), HIV Care Directions (CD), Phoenix Body Positive (BP), Maricopa County Department of Public Health (MCDPH) and other partners funded through Title I, II, III, and HOPWA. Challenges in coordinating services are related to the tremendous population growth in Maricopa County due to in-migration and the corresponding growth in the number of PLWHA. All Title IV agencies struggle to maintain high levels of service for even more clients while the overall level of funding remains flat.

Illustration 68: RYAN WHITE CARE ACT TITLE III UTILIZATION SUMMARY

Enrollment/Sero Status	**HIV+** (Row %)	**HIV-** (Row %)	**Unknown** (Row %)	**Total** (Column %)
Number of Unduplicated Clients	**4,943** (44.3%)	**5,179** (46.4%)	**1,030** (9.2%)	**11,152** (100.0%)
Number of New Clients	1,551 (20.6%)	4,977 (66.0%)	1,011 (13.4%)	7,539 (67.6%)

HIV Pos. (not AIDS)	2,240 (100.0%)	N/A		2,240 (20.1%)
HIV Pos. (AIDS status Unknown)	1,477 (100.0%)	N/A		1,477 (13.2%)
AIDS	1,226 (100.0%)	N/A		1,226 (11.0%)
HIV Negative	N/A	5,179 (100.0%)		5,179 (46.4%)
Unknown	N/A	1,030 (100.0%)		1,030 (9.2%)
Total	**4,943** (44.3%)	**6,209** (55.7%)		**11,152** (100.0%)

Active and New	1,045 (17.4%)	4,972 (82.6%)		6,017 (54.0%)
Active and Continuing	2,029 (98.4%)	32 (1.6%)		2,061 (18.5%)
Deceased	23 (100.0%)	0 (0.0%)		23 (0.2%)
Inactive	29 (93.5%)	2 (6.5%)		31 (0.3%)
Unknown	1,817 (60.2%)	1,203 (39.8%)		3,020 (27.1%)
Total	**4,943** (44.3%)	**6,209** (55.7%)		**11,152** (100.0%)

Illustration 69: RYAN WHITE CARE ACT TITLE III DEMOGRAPHIC SUMMARY

Demographic Descriptors	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
Male	4,111 (49.7%)	4,156 (50.3%)	8,267 (74.1%)
Female	795 (28.9%)	1,959 (71.1%)	2,754 (24.7%)
Transgender	32 (88.9%)	4 (11.1%)	36 (0.3%)
Unknown	5 (5.3%)	90 (94.7%)	95 (0.9%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)

Less than 2	5 (8.5%)	54 (91.5%)	59 (0.5%)
2 - 12	85 (29.0%)	208 (71.0%)	293 (2.6%)
13 - 24	172 (6.8%)	2,361 (93.2%)	2,533 (22.7%)
25 - 44	3,078 (53.5%)	2,677 (46.5%)	5,755 (51.6%)
45 - 64	1,528 (67.0%)	754 (33.0%)	2,282 (20.5%)
65 and Older	75 (53.2%)	66 (46.8%)	141 (1.3%)
Unknown	0 (0.0%)	89 (100.0%)	89 (0.8%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)

Hispanic	1,261 (36.6%)	2,188 (63.4%)	3,449 (30.9%)
Non-Hispanic	3,605 (48.0%)	3,902 (52.0%)	7,507 (67.3%)
Unknown	77 (39.3%)	119 (60.7%)	196 (1.8%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)

White	3,659 (46.9%)	4,142 (53.1%)	7,801 (70.0%)
Black	667 (52.9%)	593 (47.1%)	1,260 (11.3%)
Asian/Pacific Islander/Native Hawaiian	32 (20.8%)	122 (79.2%)	154 (1.4%)
American Indian/Alaska Native	119 (44.2%)	150 (55.8%)	269 (2.4%)
Multiple Race/Other Race	64 (61.0%)	41 (39.0%)	105 (0.9%)
Unknown	402 (25.7%)	1,161 (74.3%)	1,563 (14.0%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)

Illustration 70: RYAN WHITE CARE ACT TITLE III INCOME/ HOUSING/ INSURANCE SUMMARY

Income/ Housing/Insurance	**HIV+** (Row %)	**HIV-** (Row %)	**Total** (Column %)
<= Federal Poverty Level	2,254 (30.7%)	5,091 (69.3%)	7,345 (65.9%)
101-200% Federal Poverty Level	681 (96.1%)	28 (3.9%)	709 (6.4%)
201-300% Federal Poverty Level	139 (92.1%)	12 (7.9%)	151 (1.4%)
> 300% Federal Poverty Level	18 (94.7%)	1 (5.3%)	19 (0.2%)
Unknown	1,851 (63.2%)	1,077 (36.8%)	2,928 (26.3%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)
Permanently Housed	3,847 (54.7%)	3,184 (45.3%)	7,031 (63.0%)
Non-Permanently Housed	472 (75.0%)	157 (25.0%)	629 (5.6%)
Institution	26 (81.3%)	6 (18.8%)	32 (0.3%)
Other	64 (55.2%)	52 (44.8%)	116 (1.0%)
Unknown	534 (16.0%)	2,810 (84.0%)	3,344 (30.0%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)
Private	548 (33.0%)	1,113 (67.0%)	1,661 (14.9%)
Medicare	423 (96.1%)	17 (3.9%)	440 (3.9%)
Medicaid	772 (80.2%)	190 (19.8%)	962 (8.6%)
Other Public	405 (73.4%)	147 (26.6%)	552 (4.9%)
No Insurance	1,420 (44.9%)	1,742 (55.1%)	3,162 (28.4%)
Other	149 (33.3%)	298 (66.7%)	447 (4.0%)
Unknown	1,226 (31.2%)	2,702 (68.8%)	3,928 (35.2%)
Total	**4,943** (44.3%)	**6,209** (55.7%)	**11,152** (100.0%)

Ryan White Part F:

The Arizona AIDS Education and Training Center is Ryan White Grant funded part F. The University of Arizona College of Medicine has been the recipient of AETC funding since 1987, and are currently subcontracted through the University of California San Francisco (UCSF). AZ AETC are part of the Pacific AIDS Education and Training Center (CA, NV, HI and AZ) which receives an education and training grant that focuses on training low to mid-volume HIV providers throughout the state of Arizona. The Arizona AETC training plan includes targeted education and training efforts for:

- Emergency Department personnel at hospitals in the Phoenix EMA and in Tucson. Topics for training include risk assessment and early identification of HIV, HIV testing including rapid testing, Arizona laws related to HIV testing and information on local resources for care. Training will also address issues related to cultural competence.

- Prenatal providers in Tucson and the Phoenix EMA. Topics for training include risk assessment, rapid testing, care of pregnant women, and referral sources for medical and social services in the region. Training will include issues related to cultural competence.

- Primary care providers in rural, geographically isolated and remote sites across Arizona. The "Roadshow" will cover testing, risk assessment, clinical care, therapeutics, and early identification of HIV. Training will also address issues of cultural competence. Clinical preceptorships will be offered, as will information on how to reach and consult with AETC faculty on patient issues.

- HIV providers in the Phoenix EMA and the Tucson area, to facilitate increased inter-provider cooperation and provide faculty development. Training topics include risk assessment, co-morbidities, rapid HIV testing, substance abuse, care of pregnant women, mental health and referrals to service. Dentists will also be invited to these training programs.

- Department of Corrections clinicians to improve patient care for incarcerated people. Training topics include HIV testing, risk assessment, and current clinical care.

In addition, Arizona's AETC works cooperatively on border area training with the UMBAST-UCLA AETC, UCSD AETC the CA STD/HIV Prevention Training Center, and the Francis J. Curry TB Center. AZ AETC anticipates working with the USC AETC for dental training, a group of Arizona health professionals very difficult to reach. The Pacific Southwest ATTC located in Tucson, is another anticipated partner. The border work provides an opportunity for rural border area practitioners to attend a "one-stop shopping" event. At all training events, materials about the AETC are provided. The teaching faculty members make their contact information available to the participants, and in fact these faculty members do receive calls for clinical consultation.

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Arizona Department of Health Services Hepatitis C Program – Surveillance Data

Arizona Department of Health Services HIV/AIDS Prevention Program – Counseling and Testing Data

Arizona Department of Health Services HIV/AIDS Surveillance Program – HIV/AIDS

Arizona Department of Health Services Sexually Transmitted Diseases Program – Chlamydia, Gonorrhea, Herpes, and Syphilis Surveillance Data

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Appendix of Supplemental Data:

Illustration A1: ARIZONA PREVALENT HIV/AIDS, EMERGENT HIV/AIDS, AND STATE POPULATION AMONG MEN BY RACE/ETHNICITY

	Current Male HIV/AIDS Prevalence			Emergent Male HIV/AIDS 1999-2003			2003 Male Population Estimates	
Race/Ethnicity	**Cases**	**% State Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**	**Population**	**% State Total**
White Non-Hispanic	5,751	64.5%	337.39	1,717	56.6%	20.65	1,704,556	61.06%
Black Non-Hispanic	819	9.2%	875.90	305	10.1%	68.54	93,504	3.35%
Hispanic	1,883	21.1%	234.36	836	27.6%	23.17	803,456	28.78%
A/PI/H Non-Hispanic	66	0.7%	110.96	22	0.7%	8.27	59,481	2.13%
AI/AN Non-Hispanic	309	3.5%	236.76	147	4.9%	23.73	130,510	4.68%
MR/Non-Hispanic Other	94	1.1%	N/A	5	0.2%	N/A	N/A	0.00%
TOTAL	8,922	100%	319.61	3,032	86.2%	22.88	2,791,507	100.00%

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

Illustration A2: ARIZONA PREVALENT HIV/AIDS AMONG MEN BY RACE/ETHNICITY AND REPORTED MODE OF EXPOSURE

Race/Ethnicity	Prevalent Cases	ANY IDU [1]	ANY MSM [2]	HRH [3]	NIR [4] / Other	Blood or Transplant	Vertical Pediatric
White Non-Hispanic	5,751	1,116 (19%)	4,744 (83%)	155 (3%)	279 (5%)	44 (<1%)	24 (<1%)
Black Non-Hispanic	819	279 (34%)	508 (62%)	43 (5%)	74 (9%)	5 (<1%)	10 (1%)
Hispanic	1,883	412 (22%)	1,414 (75%)	93 (5%)	115 (6%)	17 (<1%)	7 (<1%)

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

1) Injection drug use
2) Men who have sex with men
3) High Risk Heterosexual
4) NIR is no indicated risk.

Illustration A3: ARIZONA PREVALENT HIV/AIDS AMONG MEN BY RACE/ETHNICITY AND REPORTED "MERGED MODE" OF EXPOSURE

Race/Ethnicity	Prevalent Cases	ANY IDU [1]	Non-IDU Sexual [2]	NIR / Other [3]	Blood or Transplant	Vertical Pediatric
White Non-Hispanic	5,751	1,116 (19%)	4,288 (75%)	279 (5%)	44 (<1%)	24 (<1%)
Black Non-Hispanic	819	279 (34%)	451 (55%)	74 (9%)	5 (<1%)	10 (1%)
Hispanic	1,883	412 (22%)	1,332 (71%)	115 (6%)	17 (<1%)	7 (<1%)

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

*Injection drug use

**High Risk Heterosexual

***NIR is no indicated risk.

Illustration A4: ARIZONA 1999-2003 EMERGENT HIV/AIDS BY URBAN AND RURAL COUNTY, AMONG WOMEN BY RACE/ETHNICITY

	Female HIV/AIDS Emergence: Maricopa County			Female HIV/AIDS Emergence: Pima County			Female HIV/AIDS Emergence: All Other Counties		
Race/Ethnicity	**Cases**	**% Cnty Total**	**Rate Per 100,000**	**Cases**	**% Cnty Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**
White Non-Hispanic	107	31.9%	2.00	32	40.5%	2.36	29	39.7%	1.56
Black Non-Hispanic	98	29.3%	32.29	18	22.8%	28.15	9	12.3%	24.51
Hispanic	107	31.9%	5.41	26	32.9%	3.90	22	30.1%	3.05
A/PI/H Non-Hispanic	2	0.6%	0.94	1	1.3%	1.87	2	2.7%	6.81
AI/AN Non-Hispanic	19	5.7%	13.24	2	2.5%	3.12	11	15.1%	2.45
MR/Non-Hispanic Other	2	0.6%	N/A	0	0.0%	N/A	0	0.0%	N/A
TOTAL (% State Female Cases)	335 (69%)	100%	4.20	79 (16%)	100%	3.58	73 (15%)	100%	2.36

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

Illustration A5: ARIZONA PREVALENT HIV/AIDS BY URBAN AND RURAL COUNTY, AMONG MEN BY RACE/ETHNICITY

	Male HIV/AIDS Prevalence: Maricopa County			Male HIV/AIDS Prevalence: Pima County			Male HIV/AIDS Prevalence: All Other Counties		
Race/Ethnicity	**Cases**	**% Cnty Total**	**Rate Per 100,000**	**Cases**	**% Cnty Total**	**Rate Per 100,000**	**Cases**	**% State Total**	**Rate Per 100,000**
White Non-Hispanic	4,025	65.9%	379.18	1,047	63.5%	403.85	679	58.3%	176.92
Black Non-Hispanic	621	10.2%	912.71	133	8.1%	923.48	65	5.6%	587.54
Hispanic	1,178	19.3%	235.25	396	24.0%	282.37	309	26.5%	190.18
A/PI/H Non-Hispanic	46	0.8%	104.59	11	0.7%	105.05	9	0.8%	178.93
AI/AN Non-Hispanic	174	2.8%	614.62	41	2.5%	327.87	94	8.1%	104.80
MR/Non-Hispanic Other	65	1.1%	N/A	20	1.2%	N/A	9	0.8%	N/A
TOTAL (% State Male Cases)	6,109 (68%)	100%	358.81	1,648 (18%)	100%	377.22	1,165 (13%)	100%	178.67

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

Illustration A6: ARIZONA 1999-2003 EMERGENT HIV/AIDS BY URBAN AND RURAL COUNTY, AMONG MEN BY RACE/ETHNICITY

	Male HIV/AIDS Emergence: Maricopa County			Male HIV/AIDS Emergence: Pima County			Male HIV/AIDS Emergence: All Other Counties		
Race/Ethnicity	Cases	% Cnty Total	Rate Per 100,000	Cases	% Cnty Total	Rate Per 100,000	Cases	% State Total	Rate Per 100,000
White Non-Hispanic	1,306	60.1%	25.28	274	55.1%	21.30	137	38.0%	7.36
Black Non-Hispanic	225	10.3%	70.81	56	11.3%	79.05	24	6.6%	42.55
Hispanic	557	25.6%	25.31	149	30.0%	23.03	130	36.0%	17.09
A/PI/H Non-Hispanic	14	0.6%	7.14	4	0.8%	8.53	4	1.1%	17.21
AI/AN Non-Hispanic	69	3.2%	52.43	14	2.8%	23.89	64	17.7%	14.91
MR/Non-Hispanic Other	3	0.1%	N/A	0	0.0%	N/A	2	0.6%	N/A
TOTAL (% State Male Cases)	2,174 (72%)	100%	27.13	497 (16%)	100%	23.56	361 (12%)	100%	11.53

Source: Arizona HARS 5/1/05; NCHS 1999-2003 Bridged-Race Intercensal Estimates.

STDs and HIV

Illustration A7: Odds of HIV Outcome With Any Lifetime STD Diagnosis History

Total Population:	5,580,811
HIV Infected with no STD Diagnosis History:	9,084
STD Diagnosis History but not HIV Infected:	129,081
HIV Infected with any STD Diagnosis History:	878
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any STD Diagnosis History:	2,328.68 per 100,000
Estimated Prevalence Rate of HIV among Persons with any STD Diagnosis History:	675.60 per 100,000
Estimated Prevalence Rate of STD Diagnosis History among HIV Positive Persons:	8,813.49 per 100,000
Estimated Odds of Current HIV Infection with any History of STD Diagnosis:	3.78 times greater

Those in Arizona who have been diagnosed with an STD are 3.78 more likely to be diagnosed with HIV than someone without an STD diagnosis.

Illustration A8: Odds of HIV Outcome With Any Lifetime STD Diagnosis History by Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no STD Diagnosis History:	7,881	1,203
Diagnosis History but not HIV Infected:	44,432	84,649
HIV Infected with any STD Diagnosis History:	767	111
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any STD Diagnosis History:	1,619.16*	3,038.75*
Estimated Prevalence Rate of HIV among Persons with any STD Diagnosis History:	1,696.94*	130.96*
Estimated Prevalence Rate of STD Diagnosis History among HIV Positive Persons:	8,869.10*	8,447.49*
Estimated Odds of Current HIV Infection with any History of STD Diagnosis:	5.48 times greater	2.78 times greater

Men are at a much greater risk than women of being diagnosed with HIV after an STD diagnosis. Men are 5.48 times more likely to be diagnosed with HIV after an STD diagnosis. Women are 2.78 times more likely.

Illustration A9: Odds of HIV Outcome With Any Lifetime STD Diagnosis History By Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no STD Diagnosis History:	12,397	1,564	2,092	106	545
STD Diagnosis History but not HIV Infected:	42,328	15,482	53,183	1,108	16,978
HIV Infected with any STD Diagnosis History:	516	144	150	6	56
Estimated HIV Prevalence Rate:	373.40*	955.46*	144.66*	89.92*	223.10*
Estimated Prevalence Rate of Persons with any STD Diagnosis History:	1,238.90*	8,741.23*	3,441.09*	894.35*	6,323.34*
Estimated Prevalence Rate of HIV among Persons with any STD Diagnosis History:	1,204.37*	921.54*	281.25*	538.60*	328.75*
Estimated Prevalence Rate of STD Diagnosis History among HIV Positive Persons:	3,995.97*	8,430.91*	6,690.45*	5,357.14*	9,317.8*
Estimated Odds of Current HIV Infection with any History of STD Diagnosis:	3.23 times greater	0.96 times greater	1.94 times greater	5.99 times greater	1.47 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Among racial/ethnic groups, the increased odds of being HIV positive with any history of STD diagnosis are lowest among Black non-Hispanics. Considering the rates of STDs reported among Black non-Hispanics (8.7 per 100 among the general Black non-Hispanic population versus 8.4 per 100 among Black non-Hispanics who are reported with HIV), the comparatively low odds of HIV outcomes for Black non-Hispanics are the result of much higher background rates of STDs in that group. A similar pattern of low odds of HIV outcome exists for Native American groups, among whom STD rates are also comparatively high (6.3 per 100).

Chlamydia and HIV

Research has shown that non-ulcerative STDs, such as gonorrhea and Chlamydia, attract CD4-positive lymphocytes at the endocervix or ulcer surface. This disrupts the normal epithelial and mucosal barriers that would fight infection and promotes a person's susceptibility to HIV infection (CDC, 1998).

Chlamydia is a difficult disease to accurately discuss in relation to co-infection with HIV/AIDS. This difficulty is two fold: most men who are infected with Chlamydia are asymptomatic and most cases of HIV/AIDS reported in Arizona are male.

Symptoms of Chlamydia infection for women include abnormal vaginal bleeding or discharge, burning during urination, abdomen pain and anal discomfort. Symptoms of male infection include watery or light discharge from penis, burning during urination and anal discomfort. Chlamydia, similar to HIV/AIDS, is transmitted via vaginal, oral and anal sex.

Illustration A10: Odds of HIV Outcome With Any Lifetime Chlamydia Diagnosis History

Total Population:	5,580,811
HIV Infected with no Chlamydia Diagnosis History:	9,810
Chlamydia Diagnosis History but not HIV Infected:	85,601
HIV Infected with any Chlamydia Diagnosis History:	152
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any Chlamydia Diagnosis History:	1,536.57 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Chlamydia Diagnosis History:	177.25 per 100,000
Estimated Prevalence Rate of Chlamydia Diagnosis History among HIV Positive Persons:	1,525.80 per 100,000
Estimated Odds of Current HIV Infection with any History of Chlamydia Diagnosis:	0.99 times greater

Chlamydia/HIV By Gender:

Chlamydia cases reported from 1997-2003 were predominantly female, which is no surprise considering the STD is often asymptomatic in men. Of those women reported with emergent Chlamydia infections, 53 were also infected with HIV. Even though there were fewer men infected with Chlamydia, they make up the majority of HIV cases and coinfection cases.

Illustration A11: Odds of HIV Outcome With Any Lifetime Chlamydia Diagnosis History by Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no Chlamydia Diagnosis History:	8,549	1,261
Chlamydia Diagnosis History but not HIV Infected:	19,980	65,621
HIV Infected with any Chlamydia Diagnosis History:	99	53
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any Chlamydia Diagnosis History:	719.29*	2,354.49*
Estimated Prevalence Rate of HIV among Persons with any Chlamydia Diagnosis History:	493.05*	80.70*
Estimated Prevalence Rate of Chlamydia Diagnosis History among HIV Positive Persons:	1,144.77*	4,033.49*
Estimated Odds of Current HIV Infection with any History of Chlamydia Diagnosis:	1.59 times greater	1.71 times greater

* Rates are per 100,000 persons

Illustration A12: Reported Emergence of Chlamydia and Reported Lifetime HIV/Chlamydia Co-Morbidity Prevalence By Gender

	1997-2003 Mean Annual Chlamydia Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			
Gender:	**N[5]**	**%**	**Rate[2]**	**N**	**%**	**Rate[3]**	**Estimated Current HIV+ Population**
Male	2,719	21.5	105.4	99	65.1	1,144.7	8,648
Female	9,951	78.5	384.6	53	34.9	4,033.5	1,314
TOTAL	12,674	100.0	245.3	152	100.0	1,525.8	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Chlamydia.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Event count includes a mean of 4 emergent reports per year with unknown gender.

Chlamydia/HIV By Race/Ethnicity:

Illustration A13: Odds of HIV Outcome With Any Lifetime Chlamydia Diagnosis History by Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no Chlamydia Diagnosis History:	12,830	1,687	2,210	111	587
Chlamydia Diagnosis History but not HIV Infected:	26,926	7,898	36,726	763	13,289
HIV Infected with any Chlamydia Diagnosis History:	65	21	50	1	14
Estimated HIV Prevalence Rate:	373.40*	955.46*	144.66*	89.92*	223.10*
Estimated Prevalence Rate of Persons with any Chlamydia Diagnosis History:	781.01*	4,429.91*	2,371.65*	613.36*	4,938.32*
Estimated Prevalence Rate of HIV among Persons with any Chlamydia Diagnosis History:	240.66*	265.18*	136.02*	130.89*	105.24*
Estimated Prevalence Rate of Chlamydia Diagnosis History among HIV Positive Persons:	503.37*	1,229.51*	2,230.15*	892.86*	2,329.45*
Estimated Odds of Current HIV Infection with any History of Chlamydia Diagnosis:	0.64 times greater	0.28 times greater	0.94 times greater	1.46 times greater	0.47 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Illustration A14: Reported Emergence of Chlamydia and Reported Lifetime HIV/Chlamydia Co-Morbidity Prevalence By Race/Ethnicity

Race/Ethnicity:	1997-2003 Mean Annual Chlamydia Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[7]
	N[8]	%	Rate[2]	N[9]	%	Rate[3]	
White N-H.	3,763	29.7	113.0	65	42.7	907.9	7,159
Black N-H.	1,252	9.9	754.4	21	13.8	1,981.1	1,060
Hispanic	5,425	42.8	411.9	50	32.9	4,212.3	1,187
A/PI N-H.[5]	103	0.8	97.3	1	0.7	1,265.8	79
AI/AN N-H.[6]	2,131	16.8	864.0	14	9.2	3,835.6	365
TOTAL	12,674	100.0	245.3	152	100.0	1,525.8	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Chlamydia.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Asian/Pacific Islander Non-Hispanic.
[6]American Indian/Alaska Native Non-Hispanic.
[7]Total includes 112 multi-racial or other racial non-Hispanic persons.
[8]Counts are estimates based upon proportions of cases where race/ethnicity is reported. 1,450 (11.4%) mean annual cases report no race/ethnicity.
[9]Total includes 1 person of multi-racial/other-racial non-Hispanic race/ethnicity.

Chlamydia/HIV By Age Category:

From 1997 to 2003, there were 152 people who with emergent Chlamydia and HIV infections. Of the age categories listed, those 25-34 had the highest case count of co-infection with 71 cases.

Illustration A15: Reported Emergence of Chlamydia and Reported Lifetime HIV/Chlamydia Co-Morbidity Prevalence By Age

Age Group:	1997-2003 Mean Annual Chlamydia Emergent Events[4] N	%	Rate[2]	Current Est. HIV Co-Morbidity Prevalence[1] N	%	Rate[3]	Estimated Current HIV+ Population[5]
Under 20	4,652	36.7	297.0	1	0.7	1,176.5	85
20-24	4,457	35.2	1,230.8	8	5.3	5,031.4	159
25-34	2,811	22.2	381.5	71	46.7	4,683.4	1,516
35-44	610	4.8	80.1	51	33.6	1,192.4	4,277
45-54	117	0.9	18.1	18	11.8	634.0	2,839
55-64	21	0.2	4.8	3	1.9	351.7	853
65 +	6	0.0	0.9	0	0.0	0.0	208
TOTAL	12,674	100.0	245.3	152	100.0	1,525.8	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Chlamydia.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Total includes 25 persons of unknown age.

Illustration A16: Age Distribution among Arizona HIV/Chlamydia Co-morbidity Group at Any Chlamydia Diagnosis

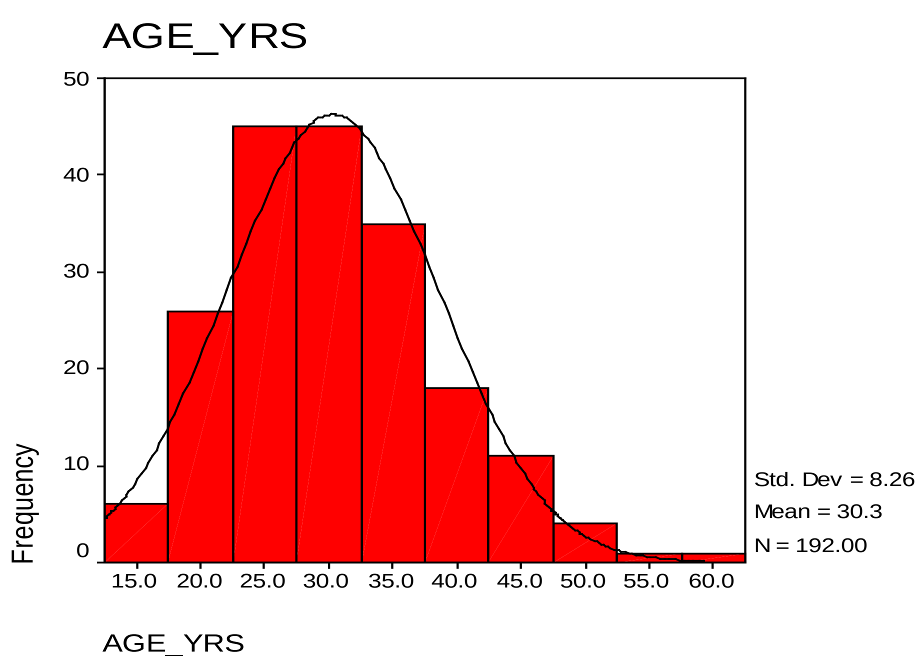
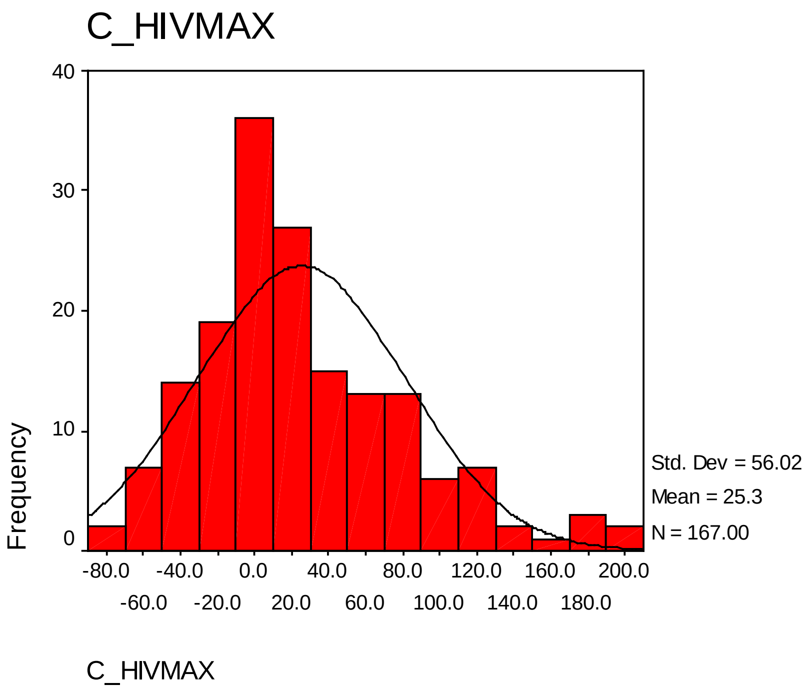


Illustration A17: Time Transpired in Months From Earliest HIV Diagnosis to Most Recent Chlamydia Diagnosis Among Arizona HIV/Chlamydia Co-Morbidity Group



Gonorrhea and HIV

Gonorrhea, *Neisseria gonorrhoeae*, is a bacterial disease spread through sexual contact. In both men and women, it can infected the genital tract, mouth and rectum. In female cases, the first infection is typically diagnosed from the cervix. Without prompt diagnosis, this can cause pelvic inflammatory disease, tubal pregnancy and infertility. In 2002, there were more than 350,000 cases of gonorrhea reported to the CDC. The agency reports 75% of these cases are reported in people age 15-29. The highest rates for women are found in those aged 15-19 and for men ages 20-24 (NIAID, 2004).

Those diagnosed with gonorrhea are more than 9 times more likely to become HIV-positive. There are 436 cases of gonorrhea/HIV co-infection in Arizona.

Illustration A18: Odds of HIV Outcome With Any Lifetime Gonorrhea Diagnosis History

Total Population:	5,580,811
HIV Infected with no Gonorrhea Diagnosis History:	9,526
Gonorrhea Diagnosis History but not HIV Infected:	26,292
HIV Infected with any Gonorrhea Diagnosis History:	436
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any Gonorrhea Diagnosis History:	478.93 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Gonorrhea Diagnosis History:	1,631.25 per 100,000
Estimated Prevalence Rate of Gonorrhea Diagnosis History among HIV Positive Persons:	4,376.63 per 100,000
Estimated Odds of Current HIV Infection with any History of Gonorrhea Diagnosis:	9.14 times greater

HIV and Gonorrhea By Gender:

Unlike Chlamydia, men often have more symptoms of gonorrhea infection than women. These include a yellow or green painful discharge from the penis, burning sensation during urination and swollen testicles. Rectal infection symptoms include discharge, itching and painful bowel movements. Symptoms usually occur within 2 to 5 days after intercourse.

Officials at the CDC write, "Some less common STDs in the United States have been associated with a higher than-average prevalence of HIV co-infection and transmission risk. Examples include rectal gonorrhea among MSM and the bacterial genital ulcer diseases (syphilis and chancroid). Rectal gonorrhea in men should be monitored carefully, and its persistence should be considered a community-level sentinel event reflecting a mixture of higher-risk behavior, STD cofactor effects, and other HIV transmission risk factors. It should prompt an urgent HIV prevention response, including but not restricted to enhanced STD detection and treatment among MSM" (The Body, 1998).

Those co-infected with gonorrhea and HIV were predominantly male. Of 436 co-infection cases, just 38 were reported among females.

Illustration A19: Odds of HIV Outcome With Any Lifetime Gonorrhea Diagnosis History by Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no Gonorrhea Diagnosis History:	8,250	1,276
Gonorrhea Diagnosis History but not HIV Infected:	14,810	11,482
HIV Infected with any Gonorrhea Diagnosis History:	398	38
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any Gonorrhea Diagnosis History:	544.80*	413.01*
Estimated Prevalence Rate of HIV among Persons with any Gonorrhea Diagnosis History:	2,617.04*	329.86*
Estimated Prevalence Rate of Gonorrhea Diagnosis History among HIV Positive Persons:	4,602.22*	2,891.93*
Estimated Odds of Current HIV Infection with any History of Gonorrhea Diagnosis:	8.45 times greater	7.00 times greater

* Rates are per 100,000 persons

Illustration A20: Reported Emergence of Gonorrhea and Reported Lifetime HIV/Gonorrhea Co-Morbidity Prevalence By Gender

	1997-2003 Mean Annual Gonorrhea Emergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			
Gender:	**N[5]**	**%**	**Rate[2]**	**N**	**%**	**Rate[3]**	**Estimated Current HIV+ Population**
Male	2,253	57.3	87.3	398	91.3	4,602.2	8,648
Female	1,675	42.6	64.7	38	8.7	2,891.9	1,314
TOTAL	3,930	100.0	76.1	436	100.0	4,376.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Gonorrhea.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Event count includes a mean of 2 emergent reports per year with unknown gender.

Gonorrhea and HIV By Race/Ethnicity:

White non-Hispanics (252) and Hispanics (95) account for the majority of co-infection cases of those with gonorrhea and HIV. Black non-Hispanics make up 15.4% of co-infection cases; the percentage is not representative of their population in Arizona (3.2%).

Illustration A21: Odds of HIV Outcome With Any Lifetime Gonorrhea Diagnosis History by Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no Gonorrhea Diagnosis History:	12,630	1,640	2,179	108	586
Gonorrhea Diagnosis History but not HIV Infected:	7,956	5,955	10,190	123	2.068
HIV Infected with any Gonorrhea Diagnosis History:	252	67	95	4	15
Estimated HIV Prevalence Rate:	373.40*	955.46*	144.66*	89.92*	223.10*
Estimated Prevalence Rate of Persons with any Gonorrhea Diagnosis History:	238.24*	3,369.28*	661.53*	101.96*	773.25*
Estimated Prevalence Rate of HIV among Persons with any Gonorrhea Diagnosis History:	3,641.22*	1,295.04*	702.23*	3,149.61*	720.12*
Estimated Prevalence Rate of Gonorrhea Diagnosis History among HIV Positive Persons:	2,323.24*	4,566.74*	3,211.42*	3,571.43*	2,495.84*
Estimated Odds of Current HIV Infection with any History of Gonorrhea Diagnosis:	9.75 times greater	1.36 times greater	4.85 times greater	35.03 times greater	4.09 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Illustration A22: Reported Emergence of Gonorrhea and Reported Lifetime HIV/Gonorrhea Co-Morbidity Prevalence By Race/Ethnicity

	1997-2003 Mean Annual Gonorrhea Emergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			
Race/Ethnicity:	N[9]	%	Rate[2]	N[8]	%	Rate[3]	Estimated Current HIV+ Population[7]
White N-H.	1,156	29.4	34.7	252	57.8	3,520.0	7,159
Black N-H.	980	24.9	590.4	67	15.4	6,320.8	1,060
Hispanic	1,487	37.9	112.9	95	21.8	8,003.4	1,187
A/PI N-H.[5]	18	0.4	16.6	4	0.9	5,063.3	79
AI/AN N-H.[6]	289	7.3	117.0	15	3.4	4,109.6	365
TOTAL	3,930	100.0	76.1	436	100.0	4,376.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Gonorrhea.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Asian/Pacific Islander Non-Hispanic.
[6]American Indian/Alaska Native Non-Hispanic.
[7]Total includes 112 multi-racial or other racial non-Hispanic persons
[8]Total includes 3 person of multi-racial/other-racial non-Hispanic race/ethnicity.
[9]Totals are based upon proportions among persons with reported race/ethnicity, and adjusted for an mean of 348 (8.9%) persons per year with no reported race/ethnicity.

Gonorrhea and HIV By Age Category:

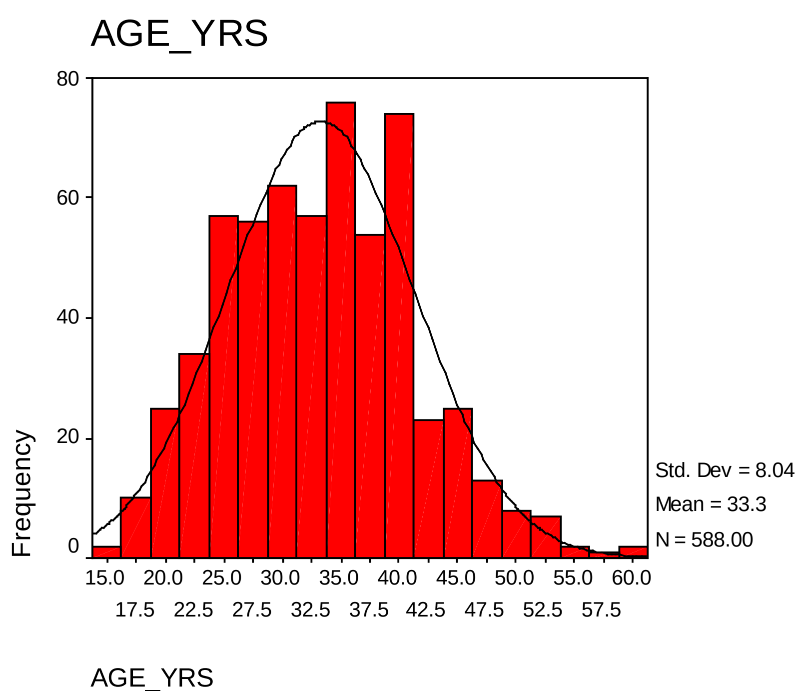
There were 3,930 emergent cases of gonorrhea from 1997-2003 in Arizona. Of those, 436 people were co-infected with HIV. The majority of these infections occurred in those age 25-44.

Illustration A23: Reported Emergence of Gonorrhea and Reported Lifetime HIV/Gonorrhea Co-Morbidity Prevalence By Age

Age Group:	1997-2003 Mean Annual Gonorrhea Emergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[5]
	N	%	Rate[2]	N	%	Rate[3]	
Under 20	892	22.7	57.0	0	0.0	0.0	85
20-24	1,094	27.8	302.1	20	4.6	12,578.6	159
25-34	1,156	29.4	156.9	146	33.5	9,630.6	1,516
35-44	572	14.6	75.1	185	42.4	4,325.5	4,277
45-54	162	4.1	25.0	72	16.5	2,536.1	2,839
55-64	42	1.1	9.5	13	3.0	1,524.0	853
65 +	12	0.3	1.8	0	0.0	0.0	208
TOTAL	3,930	100.0	76.1	436	100.0	4,376.6	9,962

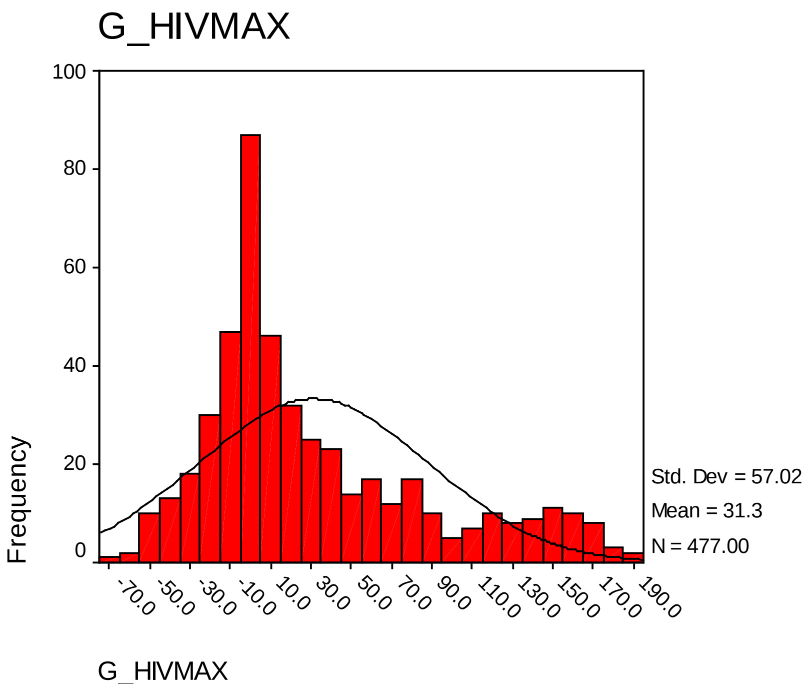
[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Gonorrhea.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Total includes 25 persons of unknown age.

Illustration A24: HIV/Gonorrhea Co-mobidity group: age at Gonorrhea diagnosis distribution



Number of diagnostic events of Gonorrhea = 588

Illustration A25: HIV/Gonorrhea Co-morbidity Group: Months from Initial HIV Diagnosis to Most Recent Gonorrhea Diagnosis



Number of persons = 477

Syphilis and HIV

Syphilis is another sexually transmitted disease caused by bacterium – *Treponema pallidum.* Officials at the CDC reported in 2002 that there was the first increase in syphilis cases nationally in a decade. This is of concern because "syphilis increases by 3-5-fold the risk of transmitting and acquiring HIV" (NIAID, 2004).

Syphilis is spread by contact with an infected ulcer. These ulcers may be present in the genitals, mouth or anus of an infected partner. The bacterium can also spread from broken skin to other areas of the body when contacted. The disease can also easily be spread from a pregnant mother to her unborn child. Children born with in utero infections may have significant mental and physical problems.

There are four stages of syphilis: primary, secondary, latent and tertiary – or late. The first two stages usually last one to two years. This is the time when the infected person is most infectious and may infect another partner. The later stages of syphilis when untreated can cause heart problems, mental disorders, blindness and death.

The chancre, or immediate sign of stage 1 syphilis, usually appears within 10 days to 3 months of exposure. This sore is usually painless and will be found on the area of the body on which the person was exposed. The chancre will disappear within weeks without treatment; this may be the cause for more than 1/3 of all syphilis infections advancing to the chronic phases before seeking treatment.

In the second stage, an infected person will usually present with a skin rash – brown penny-like sores. This will typically occur 3 to 6 weeks after the chancre's development. This rash is usually found on the soles of the feet and on the palms. The rash may be infectious to the touch and is usually healed within several weeks. In this stage, those infected may also have a fever, fatigue, headache, etc.

Latent syphilis is no longer contagious and typically is asymptomatic. Tertiary syphilis causes chronic illness; the bacterium causes heart, eye, brain, bone, nervous system and joint damage. This can last for years or decades. Patients can be treated with penicillin in the earlier stages (NIAID, 2004).

Research shows those infected with HIV may have a false negative when tested for syphilis. The *Southern Medical Journal* reports a prozone phenomenon in a several case reports of HIV-positive patients tested for syphilis. Researchers assume the high level of antibody titers, perhaps from antiretrovirals or the HIV virus, cause a false negative reaction to the serum rapid plasma reagin test.

They write, "Although no large students have been undertaken to determine the incidence of this prozone phenomenon in HIV-infected patients, particular care in this regard should be exercised in those patients in whom the clinical suspicion for syphilis is high when the RPR test returns negative. Our case exhibited many of the prominent clinical findings associated with secondary syphilis. The astute physician who maintains a high index of suspicion and a continued familiarity with the protean manifestations of secondary syphilis will look for the prozone phenomenon in suspected cases. The RPR cards in these situations should be then performed in the quantitative manner with serial dilutions to exclude the prozone phenomenon" (South Med J, 1997).

Officials from the Division of STD Prevention at the CDC published an article in 2003 which found HIV infections are associated with costs attributed to syphilis coinfection in African Americans. They write, "We estimated the number and cost of syphilis-attributable HIV cases among African Americans (with a mathematical model). In 2000, an estimated 545 new cases of HIV infection among African Americans could be attributed to the facilitative effects of infectious syphilis, at a cost of about $113 million. Syphilis prevention could reduce HIV incidence rates and the disproportionate burden of HIV/AIDS on the African American community, resulting in substantial reductions in future HIV/AIDS medical costs" (Am J Public Health, 2003).

Estimated prevalence between syphilis and HIV infection show a strong correlation. Those diagnosed with syphilis are 12.5 times more likely to become infected with HIV.

Illustration A26: Odds of HIV Outcome With Any Lifetime Syphilis Diagnosis History

Total Population:	5,580,811
HIV Infected with no Syphilis Diagnosis History:	9,601
Syphilis Diagnosis History but not HIV Infected:	15,817
HIV Infected with any Syphilis Diagnosis History:	361
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any Syphilis Diagnosis History:	289.89 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Syphilis Diagnosis History:	2,231.43 per 100,000
Estimated Prevalence Rate of Syphilis Diagnosis History among HIV Positive Persons:	3,623.77 per 100,000
Estimated Odds of Current HIV Infection with any History of Syphilis Diagnosis:	12.50 times greater

Syphilis and HIV By Gender:

Similar to Chlamydia and gonorrhea infections, the majority of emergent syphilis infections were male (60%). Among those co-infected, 87.1% were male.

Illustration A27: Odds of HIV Outcome With Any Lifetime Syphilis Diagnosis History by Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no Syphilis Diagnosis History:	8,334	1,267
Syphilis Diagnosis History but not HIV Infected:	3,510	6,307
HIV Infected with any Syphilis Diagnosis History:	314	47
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any Syphilis Diagnosis History:	351.92*	227.80*
Estimated Prevalence Rate of HIV among Persons with any Syphilis Diagnosis History:	3,196.25*	739.69*
Estimated Prevalence Rate of Syphilis Diagnosis History among HIV Positive Persons:	3,630.90*	3,576.86*
Estimated Odds of Current HIV Infection with any History of Syphilis Diagnosis:	10.32 times greater	15.70 times greater

* Rates are per 100,000 persons

Illustration A28: Reported Emergence of Syphilis and Reported Lifetime HIV/Syphilis Co-Morbidity Prevalence By Gender

	1997-2003 Mean Annual Syphilis Emergent Events[4]			**Current Est. HIV Co- Morbidity Prevalence[1]**			
Gender:	**N**	**%**	**Rate[2]**	**N**	**%**	**Rate[3]**	**Estimated Current HIV+ Population**
Male	526	60.0	20.4	314	87.0	3,630.9	8,648
Female	350	40.0	13.5	47	13.0	3,500.8	1,314
TOTAL	876	100.0	17.0	361	100.0	3,576.9	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Syphilis.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.

Syphilis and HIV By Race/Ethnicity:

Illustration A29: Odds of HIV Outcome With Any Lifetime Syphilis Diagnosis History by Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no Syphilis Diagnosis History:	12,719	1,638	2,176	110	574
Syphilis Diagnosis History but not HIV Infected:	3,529	2,857	7,311	162	1,957
HIV Infected with any Syphilis Diagnosis History:	148	68	111	2	25
Estimated HIV Prevalence Rate:	373.40*	955.46*	144.66*	89.92*	223.10*
Estimated Prevalence Rate of Persons with any Syphilis Diagnosis History:	107.66*	1,637.37*	475.97*	131.66*	736.50*
Estimated Prevalence Rate of HIV among Persons with any Syphilis Diagnosis History:	3,975.29*	2,323.20*	1,504.68*	1,219.51*	1,260.08*
Estimated Prevalence Rate of Syphilis Diagnosis History among HIV Positive Persons:	1,146.13*	3,981.26*	4,950.94*	1,785.71*	4,159.73*
Estimated Odds of Current HIV Infection with any History of Syphilis Diagnosis:	10.65 times greater	2.43 times greater	10.40 times greater	13.56 times greater	5.65 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Illustration A30: Reported Emergence of Syphilis and Reported Lifetime HIV/Syphilis Co-Morbidity Prevalence By Race/Ethnicity

Race/Ethnicity:	1997-2003 Mean Annual Syphilis Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[7]
	N[9]	%	Rate[2]	N[8]	%	Rate[3]	
White N-H.	192	21.9	5.8	148	41.6	2,067.3	7,159
Black N-H.	156	17.8	94.0	68	19.1	6,415.1	1,060
Hispanic	460	52.5	34.9	111	31.2	9,351.3	1,187
A/PI N-H.[5]	7	0.8	6.6	2	0.6	2,531.6	79
AI/AN N-H.[6]	61	7.0	24.7	25	7.0	6,849.3	365
TOTAL	876	100.0	17.0	356	100.0	3,573.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Syphilis.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Asian/Pacific Islander Non-Hispanic.
[6]American Indian/Alaska Native Non-Hispanic.
[7]Total includes 112 multi-racial or other racial non-Hispanic persons
[8]Total includes 2 persons of multi-racial/other-racial non-Hispanic race/ethnicity.
[9]Totals are based upon proportions among persons with reported race/ethnicity, and adjusted for an mean of 45 (5.1%) persons per year with no reported race/ethnicity.

Syphilis and HIV By Age Category:

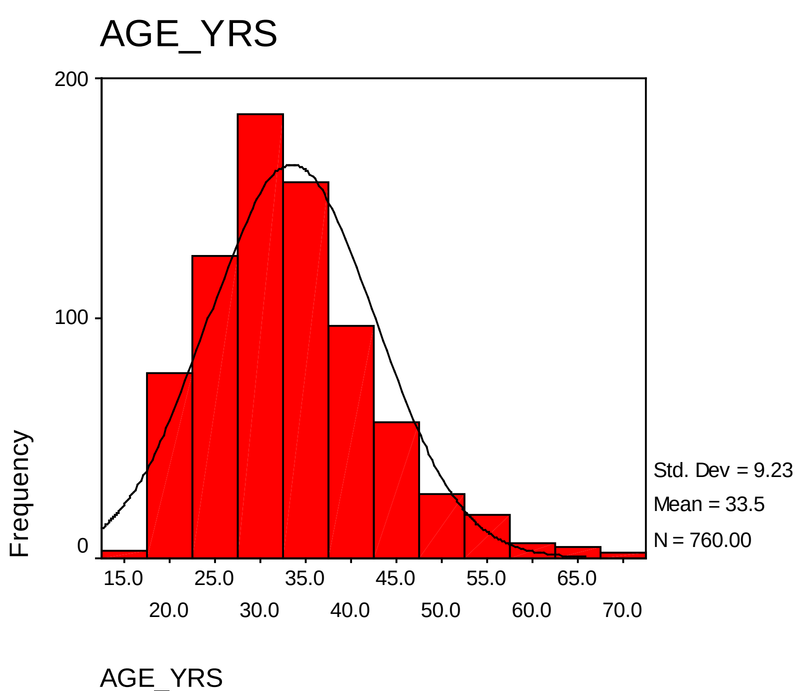
Of the 876 people diagnosed with syphilis from 1997-2003, 356 were also infected with HIV. Those age 35-44 had the highest rate of co-infection, with 158 cases, or 44%.

Illustration A31: Reported Emergence of Syphilis and Reported Lifetime HIV/Syphilis Co-Morbidity Prevalence By Age

Age Group:	1997-2003 Mean Annual Syphilis Emergent Events[4]			Current Est. HIV Co- Morbidity Prevalence[1]			Estimated Current HIV+ Population[5]
	N	%	Rate[2]	N	%	Rate[3]	
Under 20	59	6.7	3.8	0	0.0	0.0	85
20-24	131	14.9	36.2	6	1.7	3,773.6	159
25-34	281	32.1	38.1	64	18.0	4,221.6	1,516
35-44	233	26.6	30.6	158	44.4	3,694.2	4,277
45-54	110	12.6	17.0	88	24.7	3,099.7	2,839
55-64	37	4.2	8.4	36	10.1	4,220.4	853
65 +	25	2.9	3.7	4	1.1	1,923.1	208
TOTAL	876	100.0	17.0	356	100.0	3,573.6	9,962

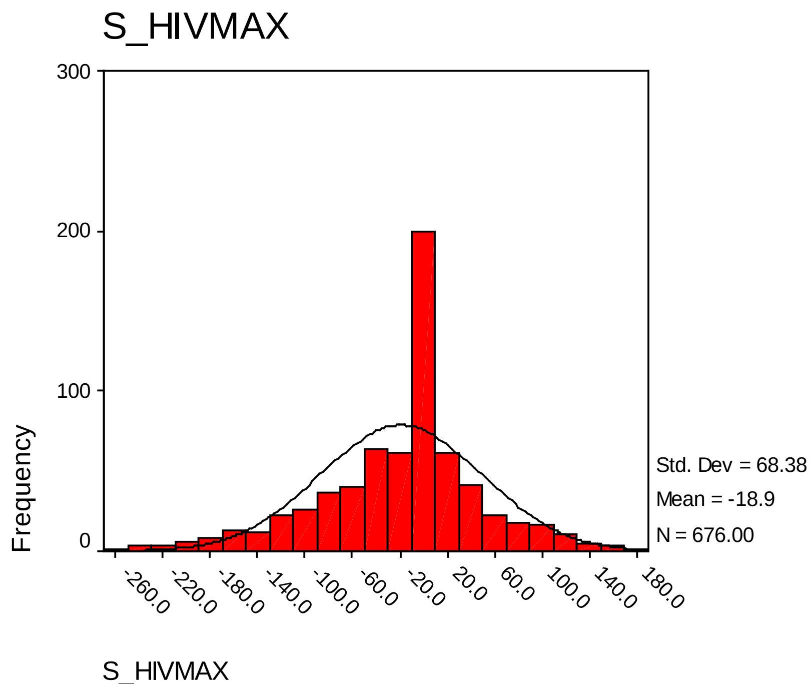
[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Syphilis.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Total includes 25 persons of unknown age.

Illustration 32: HIV/Syphilis Co-mobidity group: age at Syphilis diagnosis distribution



:
Number of Syphilis Diagnostic Events = 760

Illustration 33: HIV/Syphilis Comorbidity Group: Months from Initial HIV Diagnosis to Most Recent Syphilis Diagnosis



Number of persons = 676

GENITAL HERPES AND HIV

Herpes Simplex Virus 2 (HSV 2) is commonly transmitted sexually and is increasing in prevalence globally (http://hivinsite.ucsf.edu/insite?page=kb-05&doc=kb-05-03-02). For those symptomatic in the primary stages of infection, small papules and lesions will appear in the infected areas. Eventually, these become more tender to touch and will heal within two to three weeks. Other symptoms include fever, headache, myalgia and malaise. Those who became infected with HIV through sexual routes may be more prone to HSV 2 infection. "True primary or initial genital HSV infection in an HIV-infected person indicates unsafe sexual activity. When primary or initial HSV infection does occur in a patient with advanced HIV disease, the clinical course tens to parallel that in other immunocompromised persons, with more severe local infection, prolonged time to healing, more severe systemic symptoms, and more prolonged virus shedding than seen in normal subjects." (http://hivinsite.ucsf.edu/insite?page=kb-05&doc=kb-05-03-02).

With 71 reported co-infection cases of herpes and HIV, the correlation is not as significant. Nonetheless, those infected with herpes are more than 3 times more likely to be infected with HIV.

Illustration A34: Odds of HIV Outcome With Any Lifetime Herpes Diagnosis History

Total Population:	5,580,811
HIV Infected with no Herpes Diagnosis History:	9,891
Herpes Diagnosis History but not HIV Infected:	12,374
HIV Infected with any Herpes Diagnosis History:	71
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any Herpes Diagnosis History:	223.00 per 100,000
Estimated Prevalence Rate of HIV among Persons with any Herpes Diagnosis History:	570.51 per 100,000
Estimated Prevalence Rate of Herpes Diagnosis History among HIV Positive Persons:	712.71 per 100,000
Estimated Odds of Current HIV Infection with any History of Herpes Diagnosis:	3.20 times greater

Herpes and HIV By Gender:

Even though twice as many women were diagnosed with Herpes than men from 1997-2003, 80.3% of all co-infection cases were male. This is representative of state-wide gender discrepancies in HIV/AIDS infection.

Illustration A35: Odds of HIV Outcome With Any Lifetime Herpes Diagnosis History by Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no Herpes Diagnosis History:	8,591	1,300
Herpes Diagnosis History but not HIV Infected:	3,822	8,552
HIV Infected with any Herpes Diagnosis History:	57	14
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any Herpes Diagnosis History:	138.96*	307.10*
Estimated Prevalence Rate of HIV among Persons with any Herpes Diagnosis History:	1,469.45*	163.44*
Estimated Prevalence Rate of Herpes Diagnosis History among HIV Positive Persons:	659.11*	1,065.45*
Estimated Odds of Current HIV Infection with any History of Herpes Diagnosis:	4.74 times greater	3.47 times greater

* Rates are per 100,000 persons

Illustration A36: Reported Emergence of Herpes and Reported Lifetime HIV/Herpes Co-Morbidity Prevalence By Gender

	1997-2003 Mean Annual HerpesEmergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			
Gender:	**N[5]**	**%**	**Rate[2]**	**N**	**%**	**Rate[3]**	**Estimated Current HIV+ Population**
Male	353	32.3	13.7	57	80.3	659.1	8,648
Female	741	67.7	28.6	14	19.7	1065.4	1,314
TOTAL	1094	100.0	21.2	71	100.0	712.7	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Herpes.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Event count includes a mean of 4 emergent reports per year with unknown gender.

Herpes and HIV By Race/Ethnicity:
Similar to Chlamydia, gonorrhea and syphilis co-infection rates, Black non-Hispanics (16.9%) and Hispanics (30.9%) constitute disproportionately high percentage of Herpes/HIV co-infections cases. White non-Hispanics make up 42.3% of co-infection cases.

Illustration A37: Odds of HIV Outcome With Any Lifetime Herpes Diagnosis History by Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no Herpes Diagnosis History:	7,023	1,048	1,171	79	358
Herpes Diagnosis History but not HIV Infected:	7,199	1,022	3,037	114	1,002
HIV Infected with any Herpes Diagnosis History:	30	12	22	0	7
Estimated HIV Prevalence Rate:	373.40*	955.46*	144.66	89.92*	223.10*
Estimated Prevalence Rate of Persons with any Herpes Diagnosis History:	209.21*	578.42*	196.98	91.52*	374.56*
Estimated Prevalence Rate of HIV among Persons with any Herpes Diagnosis History:	414.65*	1,160.54*	720.60	0.00*	693.76*
Estimated Prevalence Rate of Herpes Diagnosis History among HIV Positive Persons:	232.32*	702.58*	981.27	0.00*	1,164.73*
Estimated Odds of Current HIV Infection with any History of Herpes Diagnosis:	1.11 times greater	1.21 times greater	4.98 times greater	N/A	3.11 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Illustration A38: Reported Emergence of Herpes and Reported Lifetime HIV/Herpes Co-Morbidity Prevalence By Race/Ethnicity

Race/Ethnicity:	1997-2003 Mean Annual Herpes Emergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[7]
	N[8]	%	Rate[2]	N	%	Rate[3]	
White N-H.	621	56.9	18.6	30	42.3	419.1	7,159
Black N-H.	86	7.8	51.8	12	16.9	1,132.1	1,060
Hispanic	279	25.5	21.2	22	30.9	1,853.4	1,187
A/PI N-H.[5]	10	0.9	9.4	0	0.0	0.0	79
AI/AN N-H.[6]	98	8.9	39.7	7	9.9	1,917.8	365
TOTAL	1094	100.0	21.2	71	100.0	712.7	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Herpes.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Asian/Pacific Islander Non-Hispanic.
[6]American Indian/Alaska Native Non-Hispanic.
[7]Total includes 112 multi-racial or other racial non-Hispanic persons
[8]Totals are based upon proportions among persons with reported race/ethnicity, and adjusted for a mean of 187 (17.1%) persons per year with no reported race/ethnicity.

Herpes and HIV By Age Category:

There were 1094 people in Arizona diagnosed with emergent Herpes from 1997-2003. Of these, 71 were co-infected with HIV. The predominant age group for those co-infected is 35-44, with 53.5% of all co-infection cases.

Illustration A39: Reported Emergence of Herpes and Reported Lifetime HIV/Herpes Co-Morbidity Prevalence By Age

Age Group:	1997-2003 Mean Annual Herpes Emergence[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[5]
	N	%	Rate[2]	N	%	Rate[3]	
Under 20	155	14.3	9.9	0	0.0	0.0	85
20-24	286	26.1	79.0	2	2.8	1,257.9	159
25-34	358	32.7	48.6	19	26.8	1,253.3	1,516
35-44	173	15.8	22.7	38	53.5	888.5	4,277
45-54	77	7.0	11.9	9	12.7	317.0	2,839
55-64	25	2.3	5.7	3	4.2	351.7	853
65 +	20	1.8	3.0	0	0.0	0.0	208
TOTAL	1094	100.0	21.2	71	100.0	712.7	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Herpes.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Total includes 25 persons of unknown age.

Illustration A40: AGE DISTRIBUTION IN YEARS AT ANY DX EVENT FOR HERPES AMONG HIV POSITIVE PERSONS:

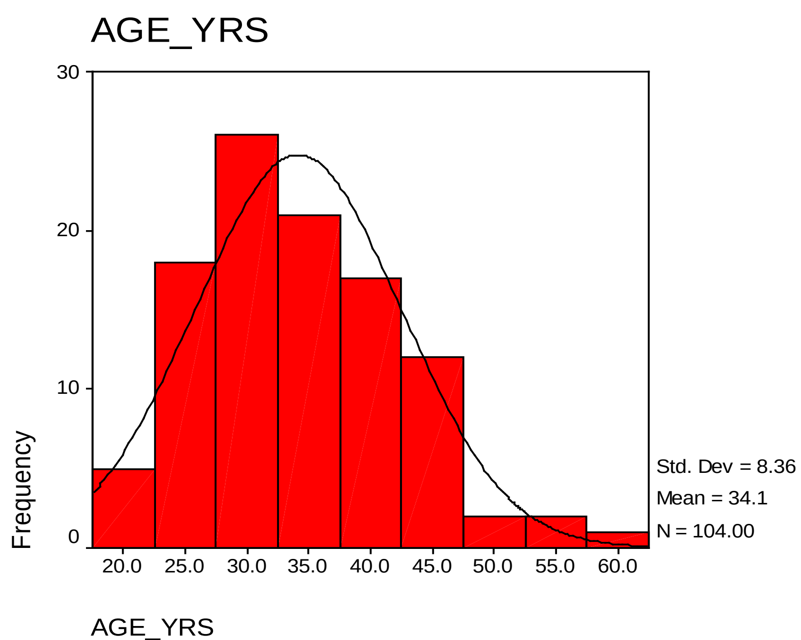
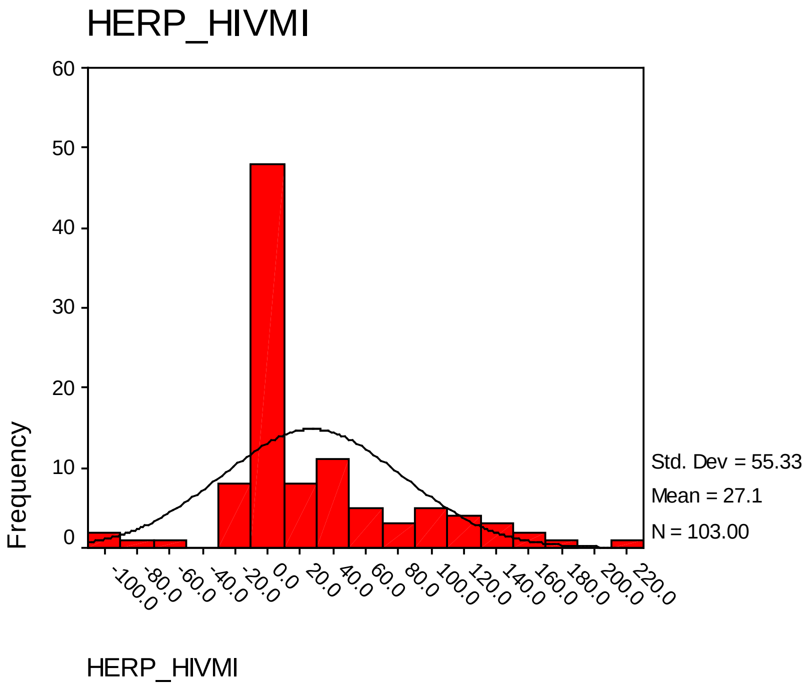


Illustration A41: TIME IN MONTHS FROM FIRST HIV DIAGNOSIS TO FIRST HERPES DIAGNOSIS AMONG ARIZONA HIV/HERPES COMORBIDITY GROUP



Hepatitis C and HIV

Hepatitis C is a disease of the liver caused by the hepatitis C virus (HCV).
"HCV is transmitted primarily by large or repeated direct percutaneous (i.e., passage through the skin by puncture) exposures to contaminated blood. Therefore, co-infection with HIV and HCV is common (50-90%) among HIV-infected injection drug users (IDUs)". Reviewed April 5, 2005 from: www.cdc.gov/hiv/publs/facts/HIV-HCV_Coinfection.htm).

Co-infection of the two diseases is a public health concern because it can progress the chronic liver disease associated with HCV. Higher tiers of HCV and faster disease progression have been noted in the co-infected. Nonetheless, HCV is not considered an AIDS-defining illness. Manufacturers of two drugs designed for those with HCV/HIV co-infection report more than 300,000 Americans are co-infected. "HCV and HIV are the two most prevalent blood-borne infections in the United States. Research has show that HCV is more resistant to treatment in people with HIV". Reviewed April 5, 2005 from:
www.hivandhepatitis.com/hiv_hcv_inf/2005/022805_feature.html.

Illustration A42: Reported Emergence of Hepatitis C and Reported Lifetime HIV/Hepatitis C Co-Morbidity Prevalence by Age

Age Group:	1997-2003 Mean Annual Hep C Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population[5]
	N	%	Rate[2]	N	%	Rate[3]	
Under 20	116	1.8	7.4	3	0.3	3,529.4	85
20-24	255	4.0	70.4	11	0.9	6,918.2	159
25-34	1,058	16.4	143.6	133	11.4	8,773.1	1,516
35-44	2,138	33.2	280.7	523	44.7	12,228.2	4,277
45-54	2,012	31.2	310.6	400	34.2	14,089.5	2,839
55-64	506	7.9	114.8	84	7.2	9,847.6	853
65 +	357	5.5	53.1	15	1.3	7,211.5	208
TOTAL	6,442	100.0	124.7	1,169	100.0	11,734.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Hepatitis C.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Total includes 25 persons of unknown age.

Illustration A43: Reported Emergence of Hepatitis C and Reported Lifetime HIV/Hepatitis C Co-Morbidity Prevalence by Gender

Gender:	1997-2003 Mean Annual Hep C Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			Estimated Current HIV+ Population
	N[5]	%	Rate[2]	N	%	Rate[3]	
Male	4,370	67.8	169.4	1,024	87.6	11,840.9	8,648
Female	2,072	32.2	80.1	145	12.4	11,035.0	1,314
TOTAL	6,442	100.0	124.7	1,169	100.0	11,734.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Hepatitis C.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Event count includes a mean of 13 emergent reports per year with unknown gender.

A significant problem arose during analysis of the data was the lack of racial data from the Hepatitis C database (60% missing) and the STD database (15% missing). It was proposed that racial data for the STD group as a whole be interpolated into the 15% missing. and for the Hepatitis C group. Concerns on validity of using this method arose, especially for the Hepatitis C group, where 60% of the group's race would be estimated from 40% of the data. Those infected with HIV and Hepatitis C might be very different from those solely infected with Hepatitis C resulting in significant sample bias. In the end, this method was used because the probability of significant bias was judged to be small given the proportion of cases where race was defined to the number of global cases reported. The smallest sample was 40% of the universe of reported cases, and would be sufficient under minimum sample size standards to provide a statistically significant estimate of the actual racial breakdown.

Illustration A44: Reported Emergence of Hepatitis C and Reported Lifetime HIV/Hepatitis C Co-Morbidity Prevalence by Race/Ethnicity

Race/Ethnicity:	1997-2003 Mean Annual Hep C Emergent Events[4]			Current Est. HIV Co-Morbidity Prevalence[1]			
	N[8]	%	Rate[2]	N[9]	%	Rate[3]	Estimated Current HIV+ Population[7]
White N-H.	3,896	60.5	116.9	740	63.3	10,336.6	7,159
Black N-H.	499	7.8	300.8	147	12.6	13,867.9	1,060
Hispanic	1,533	23.8	116.4	208	17.8	17,523.2	1,187
A/PI N-H.[5]	145	2.2	136.9	9	0.8	11,392.4	79
AI/AN N-H.[6]	369	5.7	149.8	60	5.1	16,438.4	365
TOTAL	6,442	100.0	124.7	1169	100.0	11,734.6	9,962

[1]Prevalence of persons now HIV positive with any lifetime diagnostic history of Hepatitis C.
[2]1997-2003 Emergence rates are based upon 2000 US Census, and expressed per 100,000 persons per year.
[3]Current Prevalence rates use 2003 US Census Estimates and are expressed per 100,000 HIV infected persons.
[4]Emergence occurs at initial diagnosis, and does not equate to incidence of infection.
[5]Asian/Pacific Islander Non-Hispanic.
[6]American Indian/Alaska Native Non-Hispanic.
[7]Total includes 112 multi-racial or other racial non-Hispanic persons
[8]Counts are estimates based upon proportions of cases where race/ethnicity is reported. 3513 (54.5%) mean annual cases report no race/ethnicity.
[9]Total includes 5 person of multi-racial/other-racial non-Hispanic race/ethnicity.

The most powerful combination of co-morbidity diseases among those that were studied was Syphilis, Gonorrhea or Hepatitis C together. Overall, persons diagnosed with one or more of these diseases was more than 10 times as likely to have been reported with HIV infection than persons in the general population.

Illustration A45: Odds of HIV Outcome With Any Lifetime Syphilis, Gonorrhea or Hepatitis C Diagnosis History

Total Population:	5,580,811
HIV Infected with no SGHC Diagnosis History:	8,172
SGHC Diagnosis History but not HIV Infected:	94,185
HIV Infected with any SGHC Diagnosis History:	1,790
Estimated HIV Prevalence Rate:	178.50 per 100,000
Estimated Prevalence Rate of Persons with any SGHC Diagnosis History:	1,719.73 per 100,000
Estimated Prevalence Rate of HIV among Persons with any SGHC Diagnosis History:	1,865.07 per 100,000
Estimated Prevalence Rate of SGHC Diagnosis History among HIV Positive Persons:	17,968.28 per 100,000
Estimated Odds of Current HIV Infection with any History of SGHC Diagnosis:	10.45 times greater

Illustration A46: Odds of HIV Outcome With Any Lifetime Syphilis, Gonorrhea or Hepatitis C Diagnosis History By Gender

	Males	Females
Total Population:	2,791,507	2,789,304
HIV Infected with no SGHC Diagnosis History:	7,055	1,117
SGHC Diagnosis History but not HIV Infected:	59,656	34,523
HIV Infected with any SGHC Diagnosis History:	1,593	197
Estimated HIV Prevalence Rate:	309.80*	47.11*
Estimated Prevalence Rate of Persons with any SGHC Diagnosis History:	2,194.12*	1,244.75*
Estimated Prevalence Rate of HIV among Persons with any SGHC Diagnosis History:	2,600.86*	567.40*
Estimated Prevalence Rate of SGHC Diagnosis History among HIV Positive Persons:	18,420.44*	14,992.39*
Estimated Odds of Current HIV Infection with any History of SGHC Diagnosis:	8.40 times greater	12.04 times greater

* Rates are per 100,000 persons

Illustration A47: Odds of HIV Outcome With Any Lifetime Syphilis, Gonorrhea or Hepatitis C Diagnosis History By Race/Ethnicity

	White**	Black**	Hispanic	Asian/Pacific Islander**	Native American**
Total Population:	3,458,217	178,762	1,549,889	124,560	269,383
HIV Infected with no STD or HepC Diagnosis History:	5,916	792	915	65	268
STD or HepC Diagnosis History but not HIV Infected:	67,877	20,298	69,612	1,925	21,514
HIV Infected with any STD or HepC Diagnosis History:	1,243	268	272	14	97
Estimated HIV Prevalence Rate:	207.01*	592.97*	76.59*	63.42*	135.49*
Estimated Prevalence Rate of Persons with any STD or HepC Diagnosis History:	1,998.72*	11,504.68 *	4,508.97*	1,556.68*	8,022.41*
Estimated Prevalence Rate of HIV among Persons with any STD or HepC Diagnosis History:	1,798.32*	1,303.12*	389.22*	722.02*	448.85*
Estimated Prevalence Rate of STD or HepC Diagnosis History among HIV Positive Persons:	17,362.76 *	25,283.02 *	22,914.91 *	17,721.52*	26,575.34*
Estimated Odds of Current HIV Infection with any History of STD or HepC Diagnosis:	8.69 times greater	2.20 times greater	5.08 times greater	11.38 times greater	3.31 times greater

* Rates are per 100,000 persons
** Group does not include ethnic Hispanics

Illustration 48: TIME IN MONTHS FROM FIRST HIV DIAGNOSIS TO FIRST STD DIAGNOSIS AMONG ARIZONA HIV/STD COMORBIDITY GROUP

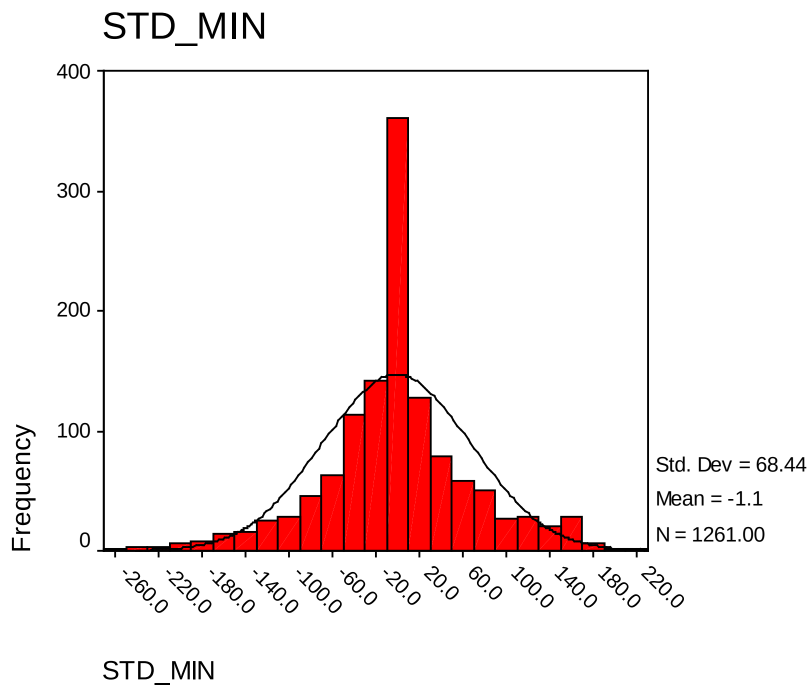
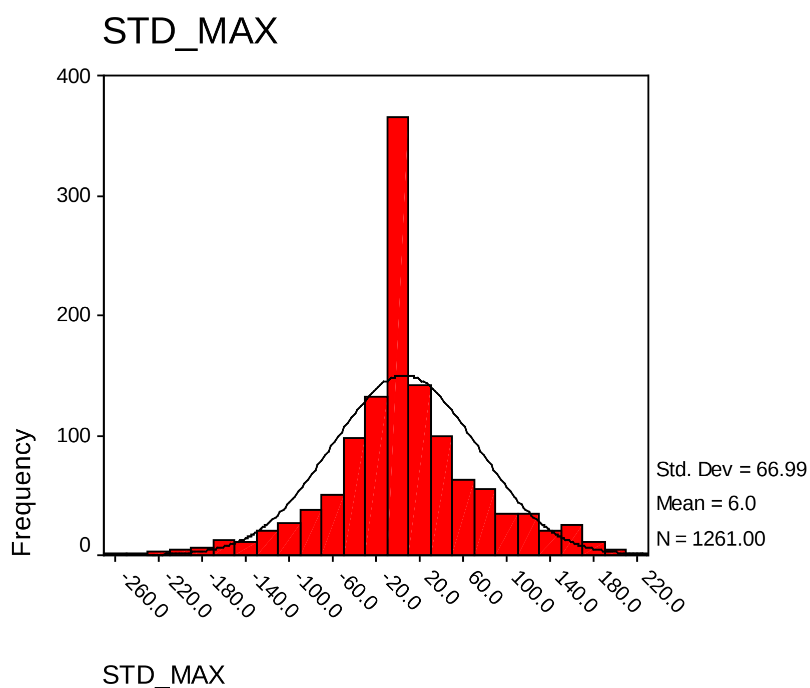


Illustration 49: TIME IN MONTHS FROM FIRST HIV DIAGNOSIS TO MOST RECENT STD DIAGNOSIS AMONG ARIZONA HIV/STD COMORBIDITY GROUP



Appendix on Emergence:

In the earliest days of the AIDS epidemic, diagnosis of AIDS was made without benefit of any antibody, viral load, or Nucleic Acid Amplification test since none of these yet existed. In fact, AIDS was the first significant example of retro-viral disease, which are associated with prolonged and often asymptomatic latency periods prior to the manifestation of clinical disease. Consequently, all of the earliest diagnoses in the HIV/AIDS epidemic were diagnoses of AIDS. Soon reports began to emerge of an AIDS related complex (ARC), characterized by lymphadenopathy, night sweats, chronic fatigue, unexplained fever, and weight loss preceding AIDS diagnosis by months or years, and indicated immune system involvement leading to AIDS.

In 1985 an HIV antibody test was first patented, and diagnosis of HIV infection prior to clinical AIDS became possible. This introduced a division in how different states handled diagnoses. Some states mandated reporting only of AIDS diagnosis, while others mandated reporting of HIV infection, or of AIDS. Reconciling and comparing reported data from states with different reporting requirements became more complex. In order to accommodate data of different types relating to HIV/AIDS, separate tracks for reporting HIV and AIDS diagnosis came to be the norm, and these are maintained by the CDC today.

The introduction of Highly Active Anti-Retroviral Therapy (HAART) in 1996 resulted in a rapid decline in deaths from AIDS, and has substantially improved survival times among persons living with HIV. But it has further blurred the distinction between clinical illness and diagnostic status relating to HIV disease. In many cases, persons who have been diagnosed with AIDS and are receiving HAART will have better clinical indicators (viral load, CD4 counts) than persons with HIV infection who have never been diagnosed with AIDS and are not receiving HAART. A diagnosis of AIDS is less related to any measure of illness or burden of disease today than it was in years prior to the introduction of HAART.

But reporting by diagnostic event has been maintained despite significant changes in available treatment that have changed the face of the HIV/AIDS epidemic. And the question of how to measure standard public health indicators such as incidence or prevalence from diagnostic events in a disease that can have more than one diagnosis, and latency periods of 10 years or more has not been adequately addressed. As a result, different states approach this problem differently. Arizona has recently changed the manner in which it counts HIV disease related diagnostic events in an effort to better estimate true incidence and prevalence for the state.

In the past, diagnostic counts for both HIV and AIDS were reported as a method of estimating incidence in Arizona. But many persons will be diagnosed with HIV years before being diagnosed with AIDS, and therefore will be counted twice in incidence estimates based entirely upon diagnostic event. The natural inclination to derive an incidence count is to sum the number of HIV and AIDS diagnostic events within a time period. But doing so would skew the tally toward AIDS because of this double-counting problem.

Prior to 2004, the method of counting used by ADHS Office of HIV/AIDS did not adequately consider the complexities of multiple diagnoses over the course of a patient history of HIV disease. Counting programs employed for producing epidemiologic summary data considered only the current diagnosis variable (DIAGSTAT) in the HIV/AIDS Reporting System database (HARS), then considered secondary characteristics such as race/ethnicity, age, gender, mode of exposure, or geographic location at diagnosis. As a result, any person, living or dead, whose most recent diagnostic status was HIV would be counted among HIV cases. When that person was re-diagnosed with AIDS, they would no longer be included among HIV diagnosis in the year of their initial HIV diagnosis, but would instead be counted among AIDS diagnoses in the year of their initial AIDS diagnosis.

This approach resolved the double counting problem, but had several other disadvantages. Like case counting on diagnosis alone, it skewed case counts toward AIDS with the passage of time by failing to consider any prior history of HIV diagnosis once an AIDS diagnosis had taken place. With this method of counting, diagnosis counts for each year would change with every passing year until all persons diagnosed with HIV in that year had subsequently been re-diagnosed with AIDS. At that point, 100% of the diagnoses for that year would be AIDS diagnoses, but they would not equal the total number of cases of HIV or AIDS originally reported in that year – only the total number of cases of first AIDS diagnoses made in that year.

A further problem with this method was that a person progressing from HIV to AIDS in a given year would not be re-classified as AIDS in that year (a method that would have equaled current diagnostic status of all cases of HIV infection first reported in that year). Instead they would be counted as an AIDS diagnosis in the year in which their AIDS diagnosis was first made. This method inaccurately depressed case counts from earlier years and inflated them in more recent years. Examples of SAS query statements used under the prior method are given below:

1) <u>Subset observations to exclude all that do not have a current AIDS diagnostic status, and were not diagnosed AIDS in Arizona:</u>

```
select for st='AZ' and STATUS~='B' and STATUS~='S' and STATUS~='Z' and (diagstat='2' or diagstat='5');
```

2) <u>Creates a new variable called year, that is the year of initial AIDS diagnosis:</u>

```
year=substr(dxmoyr,4,2);
```

3) <u>Establishes the year of initial AIDS diagnosis as the diagnosis year:</u>

```
if (year='81') then yrdiag='1981';
```

Results from the aforementioned step 3 would be counted by year, and presented as the number of AIDS diagnoses for that year. This same procedure would be used for a count of HIV cases. In the end, counts of HIV are presented alongside counts of AIDS for each year.

But, as an example, if someone diagnosed with HIV in 2000 was re-diagnosed with AIDS in 2004, their diagnostic status would change to AIDS in 2004. This method would count them as a diagnosis of HIV in 2000 until their status changed to AIDS in 2004. After that they would no longer be counted at all in 2000, regardless of their HIV diagnosis date in that year because their diagnostic status had now changed to AIDS. Instead they would be counted as a 2004 AIDS diagnosis.

In effect, this case has been reclassified from HIV to AIDS even though it was first discovered as HIV, and would have shifted from 2000, when it was first discovered, to 2004. This over-reports AIDS and under reports HIV, and shifts the timeframe of diagnosis forward from the point at which the infection is being first reported.

These problems may be resolved by defining an *emergent* diagnosis for each person which may only occur once in the disease history of persons reported with HIV infection or AIDS. The emergent diagnosis would be the earliest report of HIV infection for each person. Those first diagnosed as HIV would be emergent HIV cases, and those first diagnosed as AIDS would be emergent AIDS. Incidence estimates derived from diagnostic reports would only count emergent cases. Non-emergent diagnostic events are not newly reported cases of HIV infection, but a progression in diagnostic status of previously reported cases.

Defining an emergent event for each case is a completely new approach to surveillance events, but one which does not skew diagnostic counts toward AIDS events, or shift diagnostic timeframes toward more recent years as the previous method had done. It also does not double count cases as a method of counting diagnostic events would do, because it counts an event which may only occur once in the disease history of each person.

With the new method, current diagnostic status is not considered at all, except to exclude unconfirmed cases. Rather, counting is done on the basis of diagnosis date of HIV and of AIDS. The earliest date of diagnosis of HIV infection, whether as HIV or as AIDS, becomes the emergent event date. Persons who had been previously emergent (whether in another state or in Arizona as HIV or AIDS) would not be re-counted as emergent cases on any subsequent report or re-diagnosis date. If initial HIV and AIDS diagnosis are made in the same year, the case will be counted only as emergent AIDS in that year. The steps below outline the process of defining an emergent date for each case, and provide examples of SAS code that are used for each step:

1) Define diagnosis year for any HIV or AIDS diagnosis made in Arizona:

```
Length HINCID $2.;
Length AINCID $2.;
Length HIV2AIDS $1.;
Length EMERGH $2.;
Length EMERGA $2.;

if hst='AZ' and substr(hivpmoyr,4,2)='81' and substr(dxmoyr,4,2)>'81' and diagstat~='3' and
diagstat~='6' then HINCID='81';

else if hst='AZ' and substr(hivpmoyr,4,2)='81' and substr(dxmoyr,4,2)<'80' and diagstat~='3'
and diagstat~='6' then HINCID='81';

else if hst='AZ' and substr(hivpmoyr,4,2)='81' and substr(dxmoyr,4,2)=' ' and diagstat~='3' and
diagstat~='6' then HINCID='81';

if st='AZ' and substr(dxmoyr,4,2)='81' and diagstat~='3' and diagstat~='6' then AINCID='81';
```

2) Mark HIV to AIDS progressing cases with a separate variable. Note that cases emergent outside of Arizona but diagnosed AIDS in Arizona will still be marked as a non-emergent diagnosis because they were emergent elsewhere:

```
if aincid~=' ' and hivpmoyr~=' ' and substr(hivpmoyr,4,2)>'80' and
substr(hivpmoyr,4,2)<substr(dxmoyr,4,2) and diagstat~='3' and diagstat~='6' then
```

```
HIV2AIDS='T';

else if aincid~=' ' and hivpmoyr~=' ' and substr(dxmoyr,4,2)<'80' and
substr(hivpmoyr,4,2)<substr(dxmoyr,4,2) and diagstat~='3' and diagstat~='6' then
HIV2AIDS='T';

else if aincid~=' ' and hivpmoyr~=' ' and substr(dxmoyr,4,2)<'80' and substr(hivpmoyr,4,2)>'80'
and diagstat~='3' and diagstat~='6' then HIV2AIDS='T';

else HIV2AIDS=' ';
```

3) Count emergent HIV cases as those with hincid values and no aincid values, or hincid values with later aincid values and HIV2AIDS marked “T”. Count emergent AIDS cases as those where aincid=hincid and aincid is not blank, or aincid values with no hincid values where HIV2AIDS is not marked “T”.

```
if hincid~=’’ and aincid=’’ then emergH=hincid;

else if hincid~=’’ and hiv2aids=’T’ then emergH=hincid;

else if hincid=’’ and aincid~=’’ and hiv2aids~=’T’ then emergA=aincid;

else if hincid~=’’ and aincid~=’’ and hincid=aincid and hiv2aids~=’T’ then emergA=aincid;
```

4) Count three categories for each year: emergent HIV, emergent AIDS, and HIV progressing to AIDS. Secondary sums of ‘total emergent diagnoses’ and ‘total AIDS diagnoses’ can be made for each year by appropriately summing emergent HIV, emergent AIDS, or HIV progressing to AIDS.

As the coding shows, evaluation of records under this method is considerably more complex than under the previous method. However the results are considerably more precise, and count each reported case at the earliest point of its discovery – theoretically the closest point to infection.

Using emergence as the basis for incidence does have some of the same limitations as using counts of diagnostic events of both HIV and AIDS. Neither really measures incidence. The classic definition of incidence is the number of new *infections*, not the number of reports. Measuring numbers of new infections is beyond the scope of available technology, although some recently reported testing protocols using the NAAT (Nucleic Acid Amplification Test) show promise. For this reason it should be clearly understood that emergence is not considered to equal incidence, but is a more precise *estimator* of incidence than diagnostic counts alone, or than methods based upon current diagnostic status, such as the one previously used by ADHS Office of HIV/AIDS.

Emergence has additional advantages beyond resolving the problems inherent to previous methods. Because emergent AIDS cases are first discovered only when they develop an AIDS-defining illness, there has been no influence by HAART to slow progression of disease in emergent AIDS cases. It is reasonable to conclude that the mean time period from infection to AIDS diagnosis in this group will most closely conform to the estimated mean 10 years latency period from HIV infection to AIDS diagnosis reported by the Centers for Disease Control. The emergent AIDS group may be used to estimate the distribution of age at infection. This theoretical reverse projection has been done with Arizona emergent AIDS cases and may be found in Illustration 4.

Another advantage of emergence-based counts is that the annual counts change very little after the first several years. Occasionally, due to new testing information reported from labs or other states, or changes in the data records due to IDEP (Interstate Duplication Elimination Project), changes in counts of emergent cases may occur beyond the first few years. However this sort of data update is much less likely to occur after 4 or 5 years have passed. By that time, the emergent date usually remains unchanged on most records, resulting in stable counts for past years. Under counting methods using diagnostic status, the annual diagnosis counts for each year were constantly changing.

Appendix on Holmberg's Study:

Published in 1996 in the *American Journal of Public Health,* "The Estimated Prevalence and Incidence of HIV in 96 Large U.S. Metropolitan Areas," written by S. Holmberg, has become one of the most referenced articles in high risk denominator determination.

The author, working for the Division of HIV/AIDS Prevention at the National Center for HIV, STD and TB Prevention with the Centers for Disease Control and Prevention, tried to create a reasonable outline for future prevalence of HIV/AIDS in the United States. Eliminating sample surveys and mathematical modeling as methods, he selected a geographic-based epidemiologic "component model."

He writes, "All available information from specific studies, HIV testing sites, and unpublished information and opinions of local health officials was collected, reviewed and analyzed. The focus of the evaluation was adults and adolescents in the 96 largest U.S. metropolitan statistical areas and was restricted to members of three main transmission categories: IDU, MSM, and persons at risk from heterosexual activity."

The results from the survey estimate 1.5 million IDU, 1.7 million gay and bisexual men, and 2.1 million at-risk heterosexuals nationally. Among those found to be "at-risk," Holmberg estimates 565,000 prevalent and 38,000 incident HIV infections, meaning 700,000 prevalent and 41,000 new HIV infections annually in the United States. His research estimates half of all new cases are from injection drug use. Those with the highest rate of prevalent HIV are gay and bisexual men.

After reviewing global studies and examples of denominator determination for prevalence estimates, staff at the Office of HIV/AIDS at ADHS met to decide which methodology would be used. It was decided that Holmberg's approach was the most appropriate. It is statistically questionable to use national estimates for calculation of local populations. But Holmberg's study provided MSA specific data from Arizona in his supplemental material. It would be possible to use Holmberg's Arizona estimates to produce current population estimates that were as reasonably accurate as his original 1995 estimates.

Estimates produced in this way are not authoritative or precise. At best, they are reasonable working estimates of risk population size that could be used to evaluate priority groups, and add new depth to the epidemiologic perspective on HIV/AIDS transmission in Arizona.

Estimates of risk populations are complicated by the lack of statistical independence between risk groups. Many persons may exhibit several risk behaviors simultaneously, and would be counted in each risk group estimate. There are no solutions to some of these problems that are entirely satisfactory. Nevertheless, the potential benefits of reasonable population estimates of risk groups are substantial enough that the effort to calculate them has been made. The calculations for 2003 estimates of the MSM, IDU and HRH population size were derived from Holmberg as follows:

Holmberg's supplemental materials provide the following data:
Combined Estimated Phoenix/Tucson MSA 1992 Population (U.S. Census Bureau): 3,022,596

Estimated MSM population in Combined Phoenix/Tucson MSA in 1995: 40,300
Estimated Phoenix/Tucson MSA Number of New MSM Infections per Year: 177 (71-265 95%CI)

Some problems were observed with Holmberg's Arizona specific data. Most notably, his 1992 MSA population denominators are larger than those derived from the Bridged Census Data Set used by ADHS Office of HIV/AIDS. The Bridged Census Data set helped to resolve problems in methods of counting by race/ethnicity for years prior to and after the 2000 census, when a new method of counting was introduced. The Bridged Census Data may be found at:

http://www.cdc.gov/nchs/about/major/dvs/popbridge/popbridge.htm.

Because of the larger population denominators, the population proportions calculated for risk groups using Holmberg's 2002 denominators will be lower than those calculated with the smaller denominators from the Bridged Census Data Set. These differences result in variances of less than $1/10^{th}$ of 1% of the general population, but even those may result in variations of several thousand persons in the estimated size of the risk group population. It was felt that estimating a confidence interval on such an adjusted estimate would suggest a degree of statistical precision that does not exist in calculating a crude estimate.

Another problem is that Holmberg's projected number of MSM infections within the Phoenix and Tucson MSAs differ substantially from actual emergent counts for the three years following 1995. In each of those three years, actual emergent infections were 15%-20% above the provided 95% confidence interval for the projected number of new infections. However, actual numbers of IDU and Heterosexual emergent infections were within the 95% confidence intervals projected for those risk groups. Is this because Holmberg underestimated the MSM population? Are Holmberg's projected number of new infections incorrect despite a reasonable MSM population estimate? Or are emergent infections used by ADHS Office of HIV/AIDS to estimate incidence a poor estimator of actual new infections?

Just as there are several possible explanations for these problems, there are several methods by which they might be resolved. And since the actual source of the problem is uncertain, no method may be shown to be clearly better than others. Because of these problems, and despite the existence of Arizona specific estimates from Holmberg's study, the ADHS Office of HIV/AIDS had to exercise some degree of judgment in selecting a method for estimating 2003 population sizes.

In Holmberg's study both MSM and IDU populations were used to estimate the high-risk heterosexual population. Because of this, Holmberg's method of estimating each population group will influence estimates for others. The general consensus was that the 2003 MSM figure for Arizona that was derived through the methods outlined below was a reasonable, if cautious figure. Subsequently, other national studies estimated the male homosexual population at 2.5% of the national male population – a figure remarkably close to the 2.57% derived for Arizona MSM using Holmberg. It was also felt that observed positivity rates in Arizona's HIV testing data during the same time period closely corroborated prevalence rates derived from Holmberg's MSM population estimates.

Several factors led to the impression that Holmberg's Arizona specific proportions of IDU/MSM and HRH/MSM were not as reliable as the national proportions. First, the MSM population in Holmberg's

1995 Arizona MSA estimates was larger than the IDU and HRH populations (MSM= 40,300, IDU= 24,400, HRH= 32,000). Nationally, the HRH group estimate was the largest, followed in size by MSM and then IDU groups. The size of the three risk groups relative to each other in Arizona differed significantly from the relative size of the groups nationally (IDU/MSM = 0.6055 in Arizona, 0.8359 nationally; HRH/MSM = 0.7940 in Arizona, 1.1902 nationally). In each case, the proportionate size of the IDU and HRH groups relative to MSM in Arizona was smaller than the corresponding national proportion.

Second, the predicted number of new Arizona MSM infections fell short of the actual number of emergent cases for the years immediately following Holmberg's study. The simplest solution would be to enlarge the size of the MSM estimated population. However, this would further exaggerate the divergence of Arizona group size proportions away from the national patterns. And there was an additional concern that the small size of the IDU and HRH groups would render them more subject to the influence of statistical variance. The impression prevailed that the proportions of IDU/MSM and HRH/MSM in Holmberg's Arizona estimates were not as reasonable as the national proportions.

Calculation of the IDU and HRH populations for Arizona would equal the proportions of these groups to the MSM group in 1995, applied to the 2003 MSM estimate. However, the national proportions would be used for those estimates, rather than the Arizona specific proportions provided in Holmberg's supplemental material.

Calculations based upon Holmberg's supplemental data:
Estimated Proportion of General Population that are MSM (using 1992 denominator):
[(40,300/3,022,596)x100]=1.333%

Estimated 1992/1995 Population Adjustment(U.S. Census Bureau):
0.962406

Adjusted Proportion of MSA General Population that are MSM (using 1995 denominator):
[(1.33% x 0.962406)]=1.283%

The 1.283% Arizona general population proportion is the same as 2.57% of the Arizona male population.

Estimated Statewide General Population that are MSM (using 1995 denominator):
(1.283% x 4,432,499)= 56,880
Projected Estimated MSM statewide population in 2003, based upon 1.283% proportion of General Population:
[(5,580,811 x 1.283%)=71,609

2003 IDU population estimate:
National proportion of IDU to MSM = 0.8359
2003 Arizona MSM population estimate = 71,609
2003 Arizona IDU population estimate = (0.8359 x 71,609) = 59,855

2003 HRH population estimate:
National proportion of HRH to MSM = 1.1902
2003 Arizona MSM population estimate = 71,609
2003 Arizona IDU population estimate = (1.1902 x 71,609) = 85,230

These estimates of statewide MSM, IDU, and HRH risk populations for 2003 were then distributed proportionately by geographic region, gender, race/ethnicity, based upon proportion of the statewide population in each category. In the case of age, based upon the lack of any MSM, IDU, or HRH case findings among persons below age 13, the entire risk population was proportionately distributed within age blocks beginning at age 13, depending upon the proportion of the statewide population within each age block.

This method is not conventional, and has numerous problems. For instance, it is known that MSM are disproportionately present in urban regions, so distributing MSM proportionately with the state population for all counties will over-represent MSM populations in rural regions, and under represent them in urban regions. However, given the predominantly urban nature of the state population, the effect of this was not expected to significantly impact the result of a crude estimate such as this.

There are similar problems with age, race/ethnicity, and gender distribution for some of the risk groups. However, the method used was the only method that could be consistently applied. Due to the complete lack of any data on Arizona risk group populations, any effort to correct for such problems with population distributions would have been just as flawed as the method used, in addition to being entirely arbitrary. In the end, it was felt that these population estimates should not be allowed to approximate a level of precision beyond the scope of their original intent, which was purely to be crude estimates that offer only the possibility of basic comparative analysis.

Appendix on Crossmatching:

The desire had long existed at ADHS Office of HIV/AIDS to study patterns of STD, Hepatitis, and Tuberculosis co-morbidity with HIV infection. However the capacity to conduct any such analysis did not exist within the department due to a lack of experience with records-search and matching methods used in database management. The specialized software for such search and match functions are a significant expense, well beyond the budget of the Surveillance and Epidemiology Program within the office of HIV/AIDS. And the software available was archaic (Dbase 5.7) or no personnel were available with sufficient programming experience (SAS V 8).

In 2003, due to CDC funding for capacity building, ADHS was able to acquire additional staff with prior experience in database management and programming. Without any further expenditure on specialty software, and using only available programs, the Office of HIV/AIDS was able to begin a development process for searching and matching reported persons in different disease databases that would enable a comprehensive cross-match analysis to be conducted.

The two software programs used are widely available at low cost, or at no cost to CDC grantees. They are SAS and Visual Dbase 5.7, which is virtually the same language as Visual FoxPro. SAS is primarily used to import data from multiple sources and often in different formats, and to standardize data formats for the matching process. SAS has a fairly complete library of database conversion engines that allow SAS to import (or export) data from many standardized formats. It will even work with Prodas, an obscure data format apparently used only by the CDC for the HIV/AIDS Reporting System (HARS). SAS is somewhat cryptic, but easy to learn, and is widely used. There is a vast support network available through the CDC help desk, or through the SAS Institute for assistance with programming problems. SAS has a vertical orientation, intended to execute single-step commands on all records at once, but all relating to the same field/variable/column in the table. This is much the same approach as the earliest batch-card based programs. SAS has the tremendous advantage of being able to be executed from a command line, and run within a DOS window. This means that, once perfected, any SAS program may be run as a scheduled ‘script’, essentially automating functions that may have previously been done manually.

Visual Dbase 5, an archaic 16 bit object oriented programming language, was not selected for any of its particular virtues (whatever those might be), but because it was available for the task, and because staff with prior programming experience in that language were also available. Visual Dbase, like most windows-based database programs, and unlike SAS, has a horizontal orientation. It can execute complex functions involving multiple fields/variables/columns within each row. It works one row at a time beginning at the top row, and working down to the last row of the data set. Dbase programs may be scripted and run from a command line as well, and Dbase has one great advantage over SAS – it has a simple, single-step command for counting records or events (“count for event = .t.”) that will return a discreet value. That value may also be captured and stored for output results. SAS, by contrast, requires a multi-step process of sub-setting the data, then counting the number of observations in the new table to do the same thing.

By combining the strengths of each of these programs, and defining a method for searching and matching records, a workable program was developed that could be used, and modified, to cross-match any two data sets. The result is as a text file listing for each record within the primary table, all likely, or possible matches in the other table. For each match the results also provide an array of identifying information about each match. The program does not decide which of the matches is really a match, but it does provide the human being (a real brain, not a printed circuit board) with any available information from which to decide.

It is hoped that all of the steps in this process currently done using Dbase might eventually be re-programmed in SAS, however considerable use of complex macro functions in SAS would need to be programmed and tested, and up to this point the opportunity to perfect the programming code has not been available.

The first opportunity to use this method was in the context of completing the unmet needs framework, a HRSA requirement for Ryan White Title II recipients, the results of which are presented throughout the Integrated Epidemiologic Profile. For this project, ADHS Office of HIV/AIDS, Care and Services was required to evaluate the proportion of prevalent persons with HIV infection or AIDS who met a minimal threshold of primary HIV Care within a calendar year. Several of the primary providers, and the major testing labs were invited to a meeting at which ADHS Office of HIV/AIDS laid out the requirement, and the method by which the requirement could be measured. It required that each lab and provider produce and submit a universal record number (URN) to ADHS Office of HIV/AIDS. This URN is an 11 character code that is already a component of the Care-Ware software package used by several of the providers, and can be generated using an algorithm derived from name, date of birth, and gender. The same algorithm was generated using SAS for all record in HARS.

Each testing lab or HIV care provider at the meeting agreed to generate the URN for all patients in their database that met the threshold of care defined by HRSA for the Unmet Needs Protocol during 2003. The list of URNs from these separate sources would be sent to ADHS Office of HIV/AIDS for matching against the HARS database, which should contain every person reported with HIV infection or AIDS in Arizona since 1981.

Using the URN as the index field, these separate data sources were each matched to records in HARS. Matches were marked as having met the minimal care criteria during 2003. After all data sets had been matched to HARS in this manner, the proportion of records in HARS marked as having met the criteria in 2003, and considered to be prevalent by current address and living status could be measured. Because no secondary or identifying information was provided to ADHS Office of HIV/AIDS by any outside data source for this exercise, these matches could only be made if all 11 characters of the provided URN matched a URN in HARS. Preliminary testing of this method with large data sets containing identifying information showed that the 11-character complete-URN match was more than 99.9% specific for detected matches. Sensitivity of the test was above 70% because many variations in spelling or date of birth resulted in actual matches not being detected by the 11-character complete-URN match. However the proportion of undetected matches was not above 30% of the total in any instance, and is estimated to be nearer 15-20%.

The date of birth field (BIRTH) used for URN generation were standardized to MM/DD/YY format in this case. The name field was divided into a first name (FIRSTN), and last name (LASTN) field. Sex was a single digit character field with male = 1, female = 2. The code for generating the URN in SAS is provided below:

```
UID1=SUBSTR(FIRSTN,1,1);
UID2=SUBSTR(FIRSTN,3,1);
UID3=SUBSTR(LASTN,1,1);
UID4=SUBSTR(LASTN,3,1);
UID5=SUBSTR(BIRTH,1,1);
UID6=SUBSTR(BIRTH,2,1);
UID7=SUBSTR(BIRTH,4,1);
UID8=SUBSTR(BIRTH,5,1);
UID9=SUBSTR(BIRTH,7,1);
UID10=SUBSTR(BIRTH,8,1);
UID11=SUBSTR(SEX,1,1);
IF UID1=' ' THEN UID1='9';
IF UID2=' ' THEN UID2='9';
IF UID3=' ' THEN UID3='9';
IF UID4=' ' THEN UID4='9';
IF UID5=' ' THEN UID5='9';
IF UID6=' ' THEN UID6='9';
IF UID7=' ' THEN UID7='9';
IF UID8=' ' THEN UID8='9';
IF UID9=' ' THEN UID9='9';
IF UID10=' ' THEN UID10='9';
IF UID11=' ' THEN UID11='9';

UID=substr(UID1,1,1)||substr(UID2,1,1)||substr(UID3,1,1)||substr(UID4,1,1)||substr(UID5,1,1)||substr(
UID6,1,1)||substr(UID7,1,1)||substr(UID8,1,1)||substr(UID9,1,1)||substr(UID10,1,1)||substr(UID11,1,1)
;
```

After completion of this exercise, and examination of the patterns of variation in name, birth, and gender fields that resulted in undetected cases, a more comprehensive approach to searching and cross-matching was employed for the HIV/STD/HEPC co-morbidity analysis.

Not only could matching be done using the entire 11 character URN string, it could also be done using only certain sections of the URN string. This would be particularly useful if certain patterns of variation were observed over and over that had resulted in a single point of divergence between the URN generated for reports of the same person in two separate data sets. A single point of divergence would result in no match being found if all 11 characters had to match in order for a record to be listed as a likely match. But if only 10 characters matched, and one did not, could that also be a match? How likely was it to be a match? How many other such possible matching records could be found, that differed on only one character, and on the same character?

Consider the theoretical case of “Joe McShmoe” in HARS and “Joe Mc Schmoe” in the Syphilis database having the same date of birth and gender. Are they the same person? The URN for Joe McSchmoe in HARS will begin with JEMS, but it will begin with JEM9 in Syphilis because there is a space in the last name in Syphilis. If this database were in Scotland, and most surnames had a Mc or a Mac, with or without spaces, then this type of problem would be very common indeed. But a special matching loop can be created in the program that will list out, for each record in the primary database, a list of all records in the secondary database that match on all characters in the URN except for the 4th character. By providing the name, date of birth and sex information for the primary row, and for each possible matching row, one might quickly decide that these two people are, almost certainly, the same person. But if the possible match was for a "Joe Makemecrazy" with the same birth date and gender as Joe McSchmoe, one might consider that this is probably not the same person.

Several patterns of divergence on a single point in the 11-character URN were found, and a series of 6 sub-routines were programmed into the cross-match after the full 11-character URN matching routine. Only matches on all 11 characters of the URN were marked as "likely". Matches on any sub-routine of the 11-character string were marked as "possible" matches. Often, several likely or possible matching records were found for the same person in the secondary data set – as one might expect with diseases for which effective treatment and cure are available. The possibility of repeated re-infection must be provided for in the analysis and in the cross-match.

In the current version, the cross-matching program matches first on the full 11-character URN string, then on 6 sub-routines. Those are as follows:

1) Without regard to position of first or last name, allowing for these to be transposed.
2) Without regard to first name, allowing for nicknames or other names not used in both data sets.
3) Without regard to day or month of birth, allowing for transposed day and month data, or single variations in date or month.
4) Without regard to year of birth, allowing for date errors with the same day and month.
5) Without regard to third initial of last name, allowing for some Galic name forms and spaces
6) Without regard to gender, allowing for transgender or gender errors.

Coding for this program in Dbase is available upon request. Contact the ADHS Office of HIV/AIDS at 602-364-3610. This version of the program was used to cross-match reports from Syphilis, Gonorrhea, Herpes, Chlamydia, and Hepatitis C with records in the HARS database. It is estimated that the 6 secondary loops improve the sensitivity of the ability of the matching program to detect actual matches (either as likely or possible matches) by 15-20% over the estimated 70% sensitivity of the 11-character URN match alone. The process can be time-consuming, especially using a 16-bit program like Dbase to do the record-search and matching component. For example, the full 7 sub-routine program matching the Hepatitis C (55,000 records) and HIV (18,000 records) databases required more than 14 days of processing time to complete on a moderately fast Pentium 5 PC. However it produces an output file of nearly 1,300 likely matches, and nearly 3000 possible matches, resulting in a total of 1,468 confirmed matches. It is estimated at least 1,169 cases were prevalent in Arizona at the end of 2003. The addition of the 6 sub-routines, in the case of the Hepatitis C cross-match, added 13% more matches to the final cross-match than the 11-character URN alone.

Analysis:

After all likely and possible matches had been verified, diagnosis date data for each separate diagnosis of each separate co-morbidity disease finding were imported to a single cross-match table.
This table contains a single record for each person identified in the cross-match as having any co-morbidity history. The structure of this table had to be carefully constructed so that multiple re-

diagnosis findings for any individual would not be truncated by field limitations. In each case the maximum number of repeat diagnoses had to be counted, and an equivalent number of diagnosis date fields for that specific disease had to be created in the cross-match table so that all diagnosis dates would be captured. These diagnosis dates were then imported from their source files to the record for each person in the cross-match table. The result provided as complete a co-morbidity history for each person with any co-morbidity finding as could be verified from these multiple data sets. This table also contained HIV diagnosis date, and AIDS diagnosis date from HARS. Other fields were also generated for further analysis, such as age in months at every diagnosis, and earliest and most recent diagnosis of each co-morbidity disease.

Many types of analysis present themselves once a comprehensive disease history has been constructed for each individual. For the first time, rather than examining information from the perspective of disease or disease group, data could be viewed from the perspective of individual histories across multiple diseases. These diseases are all primarily related to behaviors of either sexual activity, or drug use – patterns defined by the individual, and reflected in the disease history, not the other way around. Constructing data around the individual is more difficult, takes more time, and provides a more complex picture of transmission patterns. But it provides new perspective on these epidemics, and exciting possibilities for more efficient prevention strategies.

Conventional indicators in public health are prevalence and incidence. According to the classic definition, prevalence is the number of persons at any given time who are infected with the disease of interest. This becomes extremely difficult to estimate with treatable illness, unless specific treatment data are also available. It is also necessary to know the incubation period prior to diagnosis in order to estimate the full time frame of infection. Data limitations within the STD and Hepatitis C data sources did not provide information that would allow an estimation of prevalence. However, period prevalence estimates were possible. Since the scope of this analysis intended to examine the correlations of STD and Hepatitis C infection with an HIV outcome in an individuals comprehensive disease history, the most practical period seemed to be the lifetime of each person. For this reason, rather than using period prevalence estimates by year, this analysis based prevalence upon any reported lifetime history of STD or Hepatitis C disease diagnosis among persons with a history of HIV infection. This would allow for analysis based upon disease history before, as well as after HIV diagnosis, both of which would have informative value.

Data on age at diagnosis, and time lapse from emergent diagnosis of HIV infection were used to produce age distributions at diagnosis among all individuals in the HIV co-morbidity group for each disease. Distribution of the time lapse in months from the earliest or latest disease diagnosis to the emergent HIV diagnosis of each individual could also be presented by disease. Distributions of these time periods for each disease are presented in Illustrations 39, 41, and 43 in the Integrated Epidemiologic Profile. They show that different diseases have quite different patterns relative to HIV diagnosis, and they also offer some powerful measures of ongoing high-risk sexual behavior patterns as demonstrated by STD diagnosis among persons already aware of their HIV positive status. Odds ratios of current HIV positive status can be measured from these cross-match results and these suggest which disease diagnoses most powerfully augment the odds of current HIV infection. By developing HIV screening and testing strategies around some of these findings, limited testing resources could be more effectively directed toward successful case discovery.

The most controversial aspect of this type of analysis is that it provides the ability to identify and select individuals within the co-morbidity group who match certain selection criteria that suggest a continuing pattern of high-risk behavior. Not every person participating in high-risk behavior will acquire an STD, Hepatitis C, or HIV. Exactly what proportion will do so is unknown, and could be the subject of much speculation. The cross-match found that 19% of the estimated prevalent HIV infected population also has a history of STD or Hepatitis C diagnosis, and that about one third (depending on the search criterion, selected cases range from 450-750 persons) of those had a diagnosis history months or years after emergent HIV event. These data strongly suggest that significant numbers of persons with HIV continue to engage in high-risk activity after discovering their HIV status. In a state like Arizona, which reports between 600 and 800 emergent cases of HIV infection annually, what proportion of annual emergent infections could be associated with contact with persons in this group of 450-750 persons? If effective prevention measures, and intensive partner counseling and referral could be undertaken with identified persons in this group, could the number of new infections be more substantially cut than with the broad-based approaches currently in use?

Appendix on Epidemic Impact Factor:

In Arizona, state HIV prevention programs are administered within three regions. The Northern region consists of Apache, Coconino, Gila, Mohave, Navajo, and Yavapai counties. The central region, containing the Phoenix/Mesa metropolitan statistical area (MSA), included Maricopa and Pinal counties. The Southern region, containing the Tucson MSA, includes Cochise, Graham, Greenlee, La Paz, Pima, Santa Cruz, and Yuma counties. Each of these areas housed an HIV Prevention Community Planning Group (CPG) consisting of community members, providers, academic, epidemiologic, and state personnel to bring the most inclusive range of views and knowledge to the process of prevention planning.

In mid-2005, Arizona's community planning process moved to a statewide model, with a centralized CPG and three regional advisory groups. The following description follows the interim priority-setting process used by the three CPGs before the statewide model went into effect.

The three regional groups each has the duty of advising the ADHS Office of HIV/AIDS regarding prevention policy and planning, establishment of priority populations and appropriate prevention interventions, and the completion of a Community Services Assessment study within their respective geographic areas. In carrying out these tasks, they may draw on a wide range of data resources, and ADHS Office of HIV/AIDS is frequently asked to provide needed support in the summary and analysis of these data. Many group members may not feel comfortable with the analytic and statistical aspects of these tasks, and appreciate the support and technical assistance provided by a qualified epidemiologist to summarize the data for them in condensed, easily understood form, free of complex statistical calculations. They may also wish to question and verify the findings of the summary data themselves.

In presentation of these data for planning purposes, the ADHS Office of HIV/AIDS included the full range of information needed for defining priority groups. This included both case counts of prevalence and incidence estimates, as well as rates. Originally this information was presented by age category, by race/ethnicity, by gender, and by county for each region. However, the volume of information seemed to complicate rather than simplify the decision making process. It also pointed out the importance of developing similar data for risk groups, including rates, which required estimation of the populations of various risk groups. Even after providing case counts and rates by risk group using estimated populations of MSM, IDU, and HRH groups utilizing Holmberg's 1995 estimates (see the Holmberg appendix), the decision making process seemed to become more difficult.

ADHS Office of HIV/AIDS had only begun to calculate and report prevalence and incidence rates in 2004, and many planning group members were unaccustomed to having rates available for use in their analyses. Because multiple indicators had not been provided in the past, planning group members had never had to contend with questions about the comparative advantages or limitations of indicators such as case counts or rates. Each regional planning group handled this process differently.

In the Central Region, the planning group delegated the task of defining priority groups to a Data Committee. Members of this committee felt that no priority-setting process would be entirely satisfactory to all planning group members, but establishing a data-driven, quantifiable method for evaluating different groups could accomplish the objective in the most satisfactory manner. A standard set of data-evaluators for each priority grouping would be fed into a “black box” (the evaluation method), and the results would establish the priority grouping. This “black box” approach would set the method for determining the priority groups before conducting any evaluation. The advantages of this approach were that no potential group could be excluded from consideration as a priority population, no matter how unlikely. And the standards of evaluation would be the same for all groups. Where data for groups were not available, persons advocating for those groups were asked to provide credible data for use in the evaluation process. This minimal data set included the number of HIV/AIDS prevalent cases, and the estimated population of the group within the region. These minimal data points could be used to provide both case counts and rates for the group.

But this still left unresolved the question of how the data would be used to determine priority groups. What indicators would be used, and how would each be weighted? There are advantages and disadvantages to both rates and case counts. Case counts can provide a picture of where the greatest proportions of the epidemic are being found. But they can distort the level of impact that those cases are having within the communities in which they are found because case counts alone do not consider the relative size of the population in which they occur. Rates, on the other hand, are designed to standardize the presentation of case data by expressing them in the context of the population in which they occur. But rates alone do not specifically provide the scope of the number of cases, or the size of the population. Each indicator presents a critical aspect of the information, but an incomplete picture of the whole epidemic.

This dilemma became increasingly problematic as planning group members began to discuss exactly how to use these data to set priorities between different groupings. Proposed groupings included categories by age, gender, race/ethnicity, geographic region, risk behavior, or economic status. Even if rates and case counts for each of these groupings could be provided, it was unclear exactly how these data would be used to decide, for example, that priority groupings by race/ethnicity were more effective predictors of the epidemic impact of HIV/AIDS than priority groupings by geographic region. In efforts to provide support to the planning group process, the ADHS Office of HIV/AIDS examined different statistical conventions that would meet the following needs:

1) Combine the strengths of rates and case counts in a single measure;
2) Allow valid, data-driven comparisons of both similar and dissimilar groupings;
3) Provide an index for measuring the impact of the HIV/AIDS epidemic; and
4) Simplify both calculation and explanation of the concept for the statistically challenged.

One of the early methods investigated was credibility theory, used in the actuarial field to calculate probability rates for the insurance industry. With this method, the credibility of an observed rate for a particular grouping depends upon the number of cases observed in the grouping. As the number of cases declines from a set threshold at which it is considered to be 100% credible, the credibility of the observed rate will also decline. The observed categorical rates are adjusted toward the global (mean) rate depending upon the proportion of the credibility of each category. A 90% credible rate in one category would be adjusted toward the mean rate by 10%. A 10% credible rate in another category would be adjusted toward the mean rate by 90%. This is a way of adjusting rates based upon case counts, and was considered to have possible application because it provided a way to combine both rates and case counts into a single measure for each category. However, when actual calculations were made, the resulting rates for categories with very low case counts were highly unbelievable.

In the table below, rates of groups with 500 cases or more are considered 100% credible, and are given a credibility weight of 100%. This is approximately the total number of emergent cases for the state in 2003. Lower case counts would be considered less credible, and would have lower credibility weights. The weight in each case is half the square of the weighting percentage times 1000. For example, a 90% credibility weight would require, in this case, ((.90 x .90)/2) x 1000 cases, or (.810/2) x 1000 = .405 x 1000 = 405. The resulting scale for Arizona 2003 emergent HIV/AIDS cases would be:

100% = 500 or above
90% = 405 to 499
80% = 320 to 404
70% = 245 to 319
60% = 180 to 244
50% = 125 to 179
40% = 80 to 124
30% = 45 to 79
20% = 20 to 44
10% = 5 to 19

The following table provides number of cases, resulting credibility weight according to the scale defined above, the observed rate without weighting, the mean statewide rate, and the rate resulting from credibility weighting.

<u>Illustration E1: Values by Race/Ethnicity for Credibility Weighting</u>

Race/Ethnicity	Number Of Cases	Credibility	Observed Rate	Mean Rate	Credibility Weighted Rate
White Non-Hispanic	278	70%	12.9	14.9	13.5
Black Non-Hispanic	65	30%	48.8	14.9	25.1
Hispanic (All Races)	145	50%	15.3	14.9	15.1
Asian Pacific Islander Non-Hispanic	3	0%	3.3	14.9	14.9
American Indian/Alaska Native Non-Hispanic	14	10%	23.7	14.9	15.8
Multi-Race/Other Non-Hispanic	1	0%	N/A	14.9	14.9
Total	506	100%	14.9	14.9	14.9

Most noteworthy is the tendency to significantly inflate rates when low case counts occur, as in the case of Asian Pacific Islanders, among whom the observed rate was 3.3 per 100,000, and the credibility adjusted rate was 14.9 per 100,000. This is higher than both the observed rate and the credibility-adjusted rate among White non-Hispanics. The credibility-adjusted rate in this case is not believable. This method did not provide a satisfactory solution, in part because of the distorted results for categories with very low case counts. Similar patterns were observed when credibility-weighted rates were calculated by age group, and by county.

Another reason why credibility theory did not provide a satisfactory solution was the fact that many planning group members would have difficulty accepting the fact that observed rates, for whatever reason, were changed to something remarkably different. Rate adjustment by any method would fail to meet the need for simplicity of calculation and concept that were necessary for this statistical measure. Even the standard practice of adjusting observed rates by applying a normalized population distribution would fail for the same reason. The method was too complex for many planning group and Data Committee members to understand. Professional statististicians tend to respond to this kind of situation by suggesting that a full understanding is not as important as applying the appropriate statistical method, however complicated it may be. But in this situation the method would need to be understood, supported, and approved by the Data Committee and planning group members because they were the people charged with deciding how the process would work. They would then have to explain and defend it before the planning group. Rates alone, even adjusted rates, were still subject to the inherent limitation of rates – they do not provide specific detail on the scope, or numbers of cases.

The situation is analogous to knowing the velocity of an object and being required to evaluate the force of its impact. That cannot be done unless the mass of the object is also known because an object of little mass traveling at the same velocity as an object of large mass will not have the same impact. In this analogy, the rate of cases represents the velocity of epidemic activity and the case count represents the mass of epidemic cases. Both pieces of information are needed to evaluate the full epidemic impact. The analogy is best expressed by the physical formula for momentum:

Momentum = Mass x Velocity

Similarly:

Epidemic Impact (Momentum) = Number of cases (Mass) x Rate of cases (Velocity)

This does not mean to suggest that there is some relationship between the physics of momentum and the dynamics of an epidemic disease, merely that the relationship of mass and velocity to momentum is a reasonable metaphor for the association between case numbers, case rate, and the broader impact of an epidemic upon a community. This approach allows for the epidemic to be quantified in a single indicator, considers with equal weight the strengths of both case counts and population-based rates, and is easy to understand and to calculate from the minimum data set. It also provides a way to validly compare measured epidemic impact between completely dissimilar groupings in a way which will set priority on groupings which experience the greatest impact. These groups, not coincidentally, will also be the most effective for observing epidemic activity.

It should be understood that the Epidemic Impact Factor (EIF), as it came to be known, is not in and of itself a meaningful number. It is not a case count or case rate. It is a raw number that can be used for the purpose of comparison with EIF results for other groupings. But its intent is to quantify the overall epidemic impact within the group it represents. That group may be geographic, demographic, behavioral, or of any other imaginable type, yet because the EIF results represent Epidemic Impact within that group it allows EIF for that group to be directly comparable to other group EIF results, including groups that are qualitatively different. It allows comparison of EIF for regional groups to demographic groups, behavioral groups, etc. The EIF works using either incidence or prevalence data. In the illustration below, EIF is calculated using prevalence data for the central region of Arizona. Results are given and may be compared by gender, age, race/ethnicity, and behavioral risk category:

Illustration E2: Epidemic Impact Factors for the Central Region of Arizona

GENDER	Prevalent Cases	PrevalenceRate/100K	Epidemic Impact Factor
MALE	6290	347.36	2,184,866
FEMALE	916	51.39	47,070
TOTAL	7206	200.53	1,445,047

Illustration E2: Epidemic Impact Factors for the Central Region of Arizona Continued

AGE	Prevalent Cases	PrevalenceRate/100K	Epidemic Impact Factor
Younger than 2	0	0.00	0
2-12	29	4.68	136
13-19	28	8.06	226
20-24	127	48.77	6,194
25-29	391	141.29	55,243
30-34	813	283.61	230,578
35-39	1378	522.78	720,388
40-44	1767	669.49	1,182,994
45-49	1206	518.29	625,056
50-54	732	364.95	267,144
55-59	399	231.19	92,246
60-64	178	129.64	23,075
65 and Older	139	33.79	4,697
Unknown	19	N/A	N/A
TOTAL	7206	200.53	1,445,047

RACE/ETHNICITY	Prevalent Cases	PrevalenceRate/100K	Epidemic Impact Factor
White Non-Hispanic	5203	228.42	1,188,452
Black Non-Hispanic	847	608.35	515,269
Hispanic	795	78.73	62,589
A/PI/H Non-Hispanic	56	60.40	3,383
AI/AN Non-Hispanic	223	302.15	67,380
MR/Non-Hispanic Other	82	N/A	N/A
TOTAL	7206	200.53	1,445,047
RISK/MODE OF TRANSMISSION	**Prevalent Cases**	**PrevalenceRate/100K**	**Epidemic Impact Factor**
MSM (including MSM/IDU)	4919	10,952.77	53,876,692
IDU (including MSM/IDU)	1558	4,150.35	6,466,246
HIGH-RISK HETEROSEXUAL	726	1,358.15	986,018
OTHER RISK FACTORS	**Prevalent Cases**	**PrevalenceRate/100K**	**Epidemic Impact Factor**
Persons who are HIV Positive	7206	200.53	1,445,047
Persons with any lifetime history of STD diagnosis	1,277	982.62	1,254,803
Persons with any history of Hepatitis C	1468	2,652.98	3,894,575

In the above table EIF results for MSM and IDU risk groups are substantially larger than EIF results for any other groupings. This demonstrates that behavioral definitions such as MSM and IDU that are strongly related to HIV transmission are more specific measures of epidemic impact than demographic groupings such as age, gender, or race/ethnicity. Setting priority groups based upon groupings with the highest EIF values will be much more effective at capturing the greatest proportion of the HIV/AIDS epidemic.

But the EIF is log-linear in nature because, for instance, a doubling of the case count within a given group will produce a 4-fold increase in the EIF value. This is because a doubling of the case count within a group will also double the rate at the same time. So an EIF value of 2000 does not imply twice the epidemic impact of an EIF of 1000, as one might expect. Rather, an EIF value of 4000 represents twice the epidemic impact of an EIF of 1000. The EIF is useful, but this log-linear aspect was likely to make it more confusing. It may be easily remedied by taking the square root of the EIF value as the measure of epidemic impact, rather than the raw EIF value. The square root of the EIF value will behave in a linear manner, and a doubling of the value will represent a doubling of the impact. The square root of the EIF was called the Linear Epidemic Impact Factor (LEIF), and was used in all final presentations to the planning groups and in the profile. LEIF results similar to those from the previous table are given below:

Illustration E3: Linear Epidemic Impact Factors for the Central Region of Arizona

GENDER	Prevalent Cases	Prevalence Rate/100K	Linear Epidemic Impact Factor
MALE	6290	347.36	1,478
FEMALE	916	51.39	217
TOTAL	7206	200.53	1,202
AGE	**Prevalent Cases**	**Prevalence Rate/100K**	**Linear Epidemic Impact Factor**
Younger than 2	0	0.00	0
2-12	29	4.68	12
13-19	28	8.06	15
20-24	127	48.77	79
25-29	391	141.29	235
30-34	813	283.61	480
35-39	1378	522.78	849
40-44	1767	669.49	1,088
45-49	1206	518.29	791
50-54	732	364.95	517
55-59	399	231.19	304
60-64	178	129.64	152
65 and Older	139	33.79	69
Unknown	19	N/A	N/A
TOTAL	7206	200.53	1,202
RACE/ETHNICITY	**Prevalent Cases**	**Prevalence Rate/100K**	**Linear Epidemic Impact Factor**
White Non-Hispanic	5203	228.42	1,090
Black Non-Hispanic	847	608.35	718
Hispanic	795	78.73	250
A/PI/H Non-Hispanic	56	60.40	58
AI/AN Non-Hispanic	223	302.15	260
MR/Non-Hispanic Other	82	N/A	N/A
TOTAL	7206	200.53	1,202

Illustration E3: Linear Epidemic Impact Factors for the Central Region of Arizona Continued

RISK/MODE OF TRANSMISSION	Prevalent Cases	Prevalence Rate/100K	Linear Epidemic Impact Factor
MSM (including MSM/IDU)	4919	10,952.77	7,340
IDU (including MSM/IDU)	1558	4,150.35	2,543
HIGH-RISK HETEROSEXUAL	726	1,358.15	993
OTHER RISK FACTORS	**Prevalent Cases**	**PrevalenceRate/100K**	**Linear Epidemic Impact Factor**
Persons who are HIV Positive	7206	200.53	1,202
Persons with any lifetime history of STD diagnosis	1,277	982.62	1,120
Persons with any history of Hepatitis C	1468	2,652.98	1,973

Neither the EIF or LEIF results are additive across categories. Within racial groups, for instance, the LEIF for all groups combined is not equal to the sum of the LEIF for each group. Nor does LEIF equal the mean of the groups because, as in the race/ethnicity categories, the LEIF score for every individual groups is less than the LEIF score for all groups combined. LEIF and EIF are best understood as a measure of how well that method of grouping is able to detect the epidemic impact, with high scores demonstrating more effective groupings, and low scores demonstrating less effective groupings. Using the mean statewide LEIF score (1,202) as a minimum threshold, the best groupings above are MSM behavior, IDU behavior, Hepatitis C infection, or male gender in that order. The table below reports LEIF by county for the state of Arizona based upon current (5/05) prevalence. Counties are arranged in descending order of population density:

Illustration E4: Linear Epidemic Impact Factor by County for the State of Arizona

County Name	Population Density**	Prevalent Cases	Prevalence Rate/100K	Linear Epidemic Impact Factor
Maricopa	367.5	7,010	206.8	1,204
Pima	97.2	1,903	213.2	637
Pinal	38.0	331	162.1	232
Santa Cruz	32.6	29	72.0	46
Yuma	31.0	128	74.8	98
Yavapai	22.7	130	70.5	96
Cochise	19.7	117	95.8	106
Mohave	12.7	173	101.0	132
Gila	10.7	25	48.6	35
Navajo	10.5	45	43.2	44
Graham	7.1	29	87.7	50
Coconino	6.5	120	98.9	109
Apache	6.1	26	38.2	32
La Paz	4.3	21	107.6	48
Greenlee	4.1	2	26.6	7
Total State	49.0	10,294*	184.5	1,378

* Includes 205 cases with no known county of residence.

** Using 2003 population estimates.

None of the counties has a LEIF score that exceeds that of the state, suggesting that grouping by county is not a very specific measure of epidemic activity. Without question, however, the behavioral categories of MSM and IDU are the most specific groupings for epidemic impact from among those measured here. Some categories of disease morbidity groupings, such as Hepatitis C infection, also appear to be specific for epidemic impact, and could be incorporated into current testing and prevention strategies.

When the EIF was introduced to the CPG Data Committee for the Central Region of Arizona, the members took some weeks in considering how it might be used for selecting priority groups. The initial discussion focused entirely upon the theoretical framework of the EIF, and whether it truly worked. Alternative suggestions were to attempt to quantify the relative "riskiness" of particular behaviors, frequency of behaviors, background prevalence within behavior groups, and to then combine these to calculate a likelihood of exposure to HIV. This would have been an extremely complicated, time-consuming, and expensive task well beyond the scope of the CPG's Data Committee. However, members came to understand that the need to quantify and calculate these complex factors was not necessary. Incidence of HIV infection is the natural consequence of the combination of those factors as they exist in the population, and so data regarding those groups and behaviors representatively display the sequelae of those factors. All that need be done is to examine the data considering those factors. How risky is MSM behavior for HIV infection? Examine the proportion of MSM behaviors reported among persons with HIV, and the answer can be measured. But no method other than the EIF presented a way for comparison of dissimilar factors, such as behavior and geography, that would provide a way to prioritize between the two.

Once the EIF was used to calculate the values shown in Illustrations A2 and A3 above, the group members found that the data results supported what had already been intuitively understood, and confidence in the EIF and LEIF for setting priority groups began to grow. ADHS epidemiologic support also provided a way forward for the group to set specific priority groups without leaving others feeling left out. Here the standard was data driven, and the same method would be applied to every group put forward for consideration.

The Data Committee was able to propose a "black box" approach, using LEIF as 60% of the determination, along with some quantified measures of qualitative considerations. They were able to clearly explain the method and demonstrate how it would work, and effectively defended their decisions before the full planning group, which asked some serious questions.

<u>Appendix on Doubling Time:</u>

Method 1)
2003 year end HIV/AIDS prevalence estimate: 9700
1999-2003 Arizona mean annual population growth: 2.71%
1998-2002 Arizona mean annual HIV/AIDS incidence rate: 13.58/100K
1998-2002 Arizona mean annual HIV/AIDS death rate: 3.94/100K
1998-2002 Arizona mean annual HIV/AIDS net case increase: 9.64/100K

Using those numbers, here are the annual projections for new cases, and end of year prevalence for Arizona:

2003:	9700 year end prevalence
2004: 553 net increase	10,253 year end prevalence
2005: 568 net increase	10,821 year end prevalence
2006: 583 net increase	11,404 year end prevalence
2007: 599 net increase	12,003 year end prevalence
2008: 615 net increase	12,618 year end prevalence
2009: 632 net increase	13,250 year end prevalence
2010: 649 net increase	13,899 year end prevalence
2011: 666 net increase	14,565 year end prevalence
2012: 684 net increase	15,249 year end prevalence
2013: 703 net increase	15,952 year end prevalence
2014: 722 net increase	16,674 year end prevalence
2015: 742 net increase	17,416 year end prevalence
2016: 762 net increase	18,178 year end prevalence
2017: 782 net increase	18,960 year end prevalence
2018: 803 net increase	19,763 year end prevalence

Net estimated doubling time by this model = **14 years 6 months** from 1/1/04.

Method 2) using an interest calculator compounding once annually at 5.12% (5-year new cases - 5 year deaths, divided by 5, expressed as a percentage of 2003 year end prevalence of 9700) would be **13 years 11 months** from 1/1/04.

Method 3) "The Rule of 72."

Doubling time = 72 --divided by-- %change.

72/5.12 = **14.1 years**.

A problem with these models is that they are based on 5-year averaging to estimate population growth rates, new case rates, death rates etc., and the specific rates per year are bound to vary. Another question that comes into play is that the estimation method here is based upon population growth for the state, not a projection of new cases based upon prevalence. As you know, there is a compounding effect of prevalence upon incidence (as the prevalence rate rises in the population, the numbers of new cases also tends to rise). Clearly, because the prevalence rate of HIV/AIDS infection is increasing at a greater rate than the general population, the HIV/AIDS incidence rate may also increase over this same time period, shortening the doubling time. Just to give you an idea, if we increase the net change rate by just 3 per 100,000 per year, the doubling time is reduced to under 12 years. So relatively small fluctuations in the net change rate resulting from the influence of prevalence or death rates can substantially shorten or lengthen the doubling time.

However, such projections can be useful as well, however flawed. They give programs a picture of the change in targeted populations over time, if all current trends remain the same. This is helpful in understanding how budgets for such things as care and services, or prevention planning may be influenced, and how soon.