Modeling HIV Prevalence Estimates in California:

Using the Workbook Method

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Background

- Health departments typically depend on HIV/AIDS Reporting Surveillance to monitor the HIV/AIDS epidemic. New HIV estimation software permits systematic estimation of concentrated epidemics. The goal of this study was to estimate HIV prevalence among men and women aged 15-49 years in California.

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Methods:

- The WHO/UNAIDS Workbook Method was used to estimate and project adult HIV prevalence. U.S. Census data were used to obtain age and gender-specific estimates for California populations. Population and HIV prevalence estimates for MSM, MSM-IDUs, IDUs and low-risk heterosexuals were obtained from published articles, the outcome of a statewide meeting of HIV/AIDS researchers, and the CDPH Office of AIDS. Numbers of HIV-positive men and women were estimated for each at-risk group and then aggregated. Low and high HIV prevalence estimates were calculated.

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HIV/AIDS Estimation Workbook: Overview

- Developed by UNAIDS and WHO
  - MS Excel Spreadsheets
  - Available at: www.unaids.org
- For low-level or concentrated HIV/AIDS epidemics
- Combines estimates for populations at higher risk (PHR) and populations at lower risk (PLR) to produce an overall estimate of adult prevalence

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California HIV/AIDS Estimates

- Calculated for inclusion in a broader US-Mexico Border Epidemiologic Profile
- Workbook inputs obtained from various data sources and included in Workbook spreadsheets (Table 1)
  - U.S. Census data utilized for CA population
  - Population and HIV prevalence estimates for various CA risk groups obtained from literature and consensus report.

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Table 1. Workbook: State of California- Populations at Higher Risk (PHR)*

California	California
Region adult (15-49) population:	17,921,614
% Urban population:	93%
Urban adult population:	16,667,101
Year	2006

Method used to calculate number of low risk infections

Select only one:		
		Method A: Partners of high risk
	X	Method B: ANC data applied to low risk women

1. Populations at higher risk (PHR)

Names of higher risk population groups	Population Size Estimate		HIV prevalence Estimate (%)		Estimates of adults living with HIV/AIDS				Average number of adults living with HIV
	Low estimate	High estimate	Low	High	(Low Population x Low Prevalence)	(Low Population x High Prevalence)	(High Population x Low Prevalence)	(High Population x High Prevalence)	
IDU	180,000	250,000	1.00%	5.00%	1,800	9,000	2,500	12,500	6,450
MSM	450,000	810,000	10.00%	20.00%	45,000	90,000	81,000	162,000	94,500
Female sex workers	0		-0.00%	0.00%	0	0	0	0	0
Male clients of female sex workers	0		-0.00%	0.00%	0	0	0	0	0
MSM-IDU	50,000	90,000	10.00%	25.00%	5,000	12,500	9,000	22,500	12,250
Optional HR2					0	0	0	0	0
Optional HR3					0	0	0	0	0
Optional HR4					0	0	0	0	0
Sub-total PHR	680,000	1,150,000							113,200

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*Risk Population and Prevalence Input (i.e., data) Sources

- MSM: CDHS Office of AIDS Consensus Report (2001)
- IDU: CDHS Office of AIDS Consensus Report (2001) and Friedman et al (J. Urban Health, 2004); cross-checked with CA HIV counseling and testing rates
- MSM-IDU: CDHS Office of AIDS Consensus Report (2001)

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Populations at Lower Risk

- Next, Workbook calculates the population size and HIV prevalence for lower risk populations in California based on data inputs provided (Table 2).

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Table 2. Workbook: State of California- Populations at Lower Risk (PLR)**

2. Populations at lower risk (PLR) that are not already included in PHR

Method A: Partners of high risk populations	Population Size Estimate		HIV prevalence Estimate (%)		Estimates of adults living with HIV/AIDS				Average number of adults living with HIV
	Low estimate	High estimate	Low	High	(Low Population x Low Prevalence)	(Low Population x High Prevalence)	(High Population x Low Prevalence)	(High Population x High Prevalence)	
Partners of IDU					0	0	0	0	0
Female partners of MSM					0	0	0	0	0
Partners of clients of female sex workers					0	0	0	0	0
Optional LR1					0	0	0	0	0
Optional LR2					0	0	0	0	0
Optional LR3					0	0	0	0	0
Sub-total	0	0							0

Method B: ANC data applied to low risk women	Population Size Estimate		HIV prevalence Estimate (%)		Estimates of adults living with HIV/AIDS				Average number of adults living with HIV
	Low	High	Low	High	(Low Population x Low Prevalence)	(Low Population x High Prevalence)	(High Population x Low Prevalence)	(High Population x High Prevalence)	
Urban female low risk pop	8,275,426	8,291,701	0.04%	0.10%	2,896	8,275	2,902	8,292	5,591
Rural female low risk pop	622,881	624,106	0.03%	0.10%	187	623	187	624	405
Sub-total	8,898,307	8,915,807							5,997
No Risk Population	7,855,807	8,343,307							
Sub-total PLR	8,898,307	8,915,807							

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**Data Input Sources for Low Risk Populations

- Population inputs: U.S. Census Bureau
- HIV Prevalence inputs: CDHS Office of AIDS Consensus Report (2001)

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Workbook calculates overall HIV Prevalence

- Given the inputs highlighted above for high and low risk population sizes and high and low HIV prevalence estimates for each group, Workbook calculates the overall HIV prevalence estimates for the State of California (Table 3).

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Table 3. Workbook: Total No. of Estimated Adults living with HIV in California

3. Total number of adults living with HIV

	Average number of adults living with HIV	Female statistics		
		Percent (%) female in risk group	Number of women Infected	Percent (%) of infected who are women
	119,197		7,609	6.4%
REGIONAL TOTAL				

Number of adults (15-49) LWHA:	119,197
Proportion of LWHA that are IDU (%):	5.4112%
Adult (15-49) prevalence (%):	0.6651%
Percent of LWHA who are female (%):	6.4%

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Results:

- Nearly 18 million adults aged 15-49 lived in California in 2006.
- The estimated number of persons living with HIV in the state was between 54,883 and 205,916 (mean=119,197).
- HIV prevalence was 0.67%.
- More than 93.6% of infections were among men.
- 5.4% of persons living with HIV are IDU
- The largest number of persons with HIV across California were MSM (range=45,000 to 162,000), MSM-IDUs (5,000 to 22,500) and IDUs (1,800 to 12,500).

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Workbook Consistency Checks

- Workbook compares population estimates calculated in the California model to those in similar populations internationally. If calculated population estimates vary considerably from what has been observed elsewhere, Workbook issues an alert that encourages surveillance staff to look closely at data inputs provided.
  - E.g., MSM population commentary from Workbook: "Unusually HIGH Value! Research has found that in most countries between 2% and 5% of men aged 15-49 have sex with other men."
  - California decision: higher population estimates for MSM (7.03%) are not unusual; maintain population estimates for MSM.

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Table 4. Workbook Consistency Checks

Consistency Check

Higher risk population size estimates	% behavior	Check
IDU among adult population	1.20%	Unusually HIGH value!
MSM among men	7.03%	Unusually HIGH value!
Female sex workers among women	0	Missing Sex Worker data!
Clients of sex workers among men	0	Missing client of sex worker data!

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Additional Workbook Utility

- Develop epidemic curves with projection through 2010
- Data from the Workbook can be uploaded into Spectrum software
- Spectrum is useful to derive estimates of the number of adults and children living with HIV, HIV incidence and mortality

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Issues to Consider

- Modeling is an on-going process of revising estimates to get the best numbers possible. Be prepared to revise estimates as better data inputs become available.
- Estimates for low risk populations may be hard to find in some regions as local data inputs may be limited.

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Issues to Consider

- Men who have Sex with Men (MSM)
  - Gay-identified vs. non-gay identified men
  - On the local level (e.g., county) creating mutually exclusive groups for MSM, IDU and MSM-IDU can be challenging
- Injecting Drug Users (IDU)
  - In less researched areas, populations size estimates and HIV prevalence estimates may be difficult to obtain
  - Number of IDU in drug treatment could be helpful
  - Friedman et al. (2004): estimates for population size and HIV prevalence in nearly 100 U.S. cities
- Are data inputs available for sex workers and other higher risk sub-populations?

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Potential Sources for Data Inputs

- Census data
- Peer reviewed literature
- Gray literature (e.g., gov. reports)
- Consensus meetings and reports
- Unmet needs estimation
- Special studies data
- Surveillance data
- HIV counseling and testing data
- Population-based studies
- Statewide telephone surveys

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Conclusions:

- HIV prevalence estimates for California, using the WHO/UNAIDS Workbook Method, provide an enhanced understanding of the HIV/AIDS epidemic.
- Estimation techniques may be particularly useful for public health departments and regions that do not yet have well established HIV reporting surveillance systems.
- A unique advantage of the estimation software is that it allows for systematic forecasting of future HIV/AIDS trends. Further exploration of the forecasting tools is needed.

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Questions?

- Website for UN/WHO (free software downloads and user manuals)
  - www.unaids.org/en/HIV_data/Epidemiology/episoftware.asp
- California Department of Public Health / Office of AIDS (www.CAofficeofAIDS.org)
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