Sampling techniques for hidden populations at risk for HIV

TLS among MSM in San Francisco:

A long-term experience

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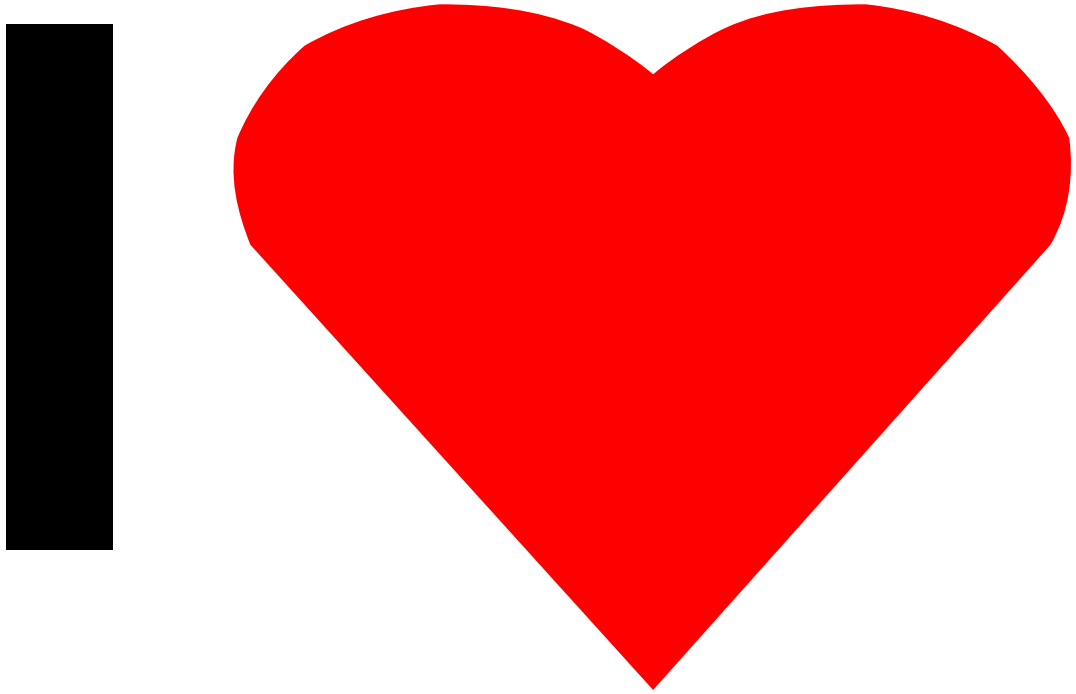
RDS


I
TLS

Also known as…

- Time Location Sampling (TLS)
- Venue Day Time (VDT) sampling
- Temporal Spatial Sampling (TSS)
- Time Venue Sampling (TVS)
- Amostragem Tempo-Espaço (ATE)

Paradox of HIV epidemiology research

- **Behaviors that lead to HIV infection are often stigmatized, illegal, or both**
- **Therefore hard-to-reach populations are the ones for whom we most need representative data**
- **But!**
  - No census of target populations for true probability samples
  - They will be rare in general population-based surveys, and
  - They are likely to deny behavior in household surveys

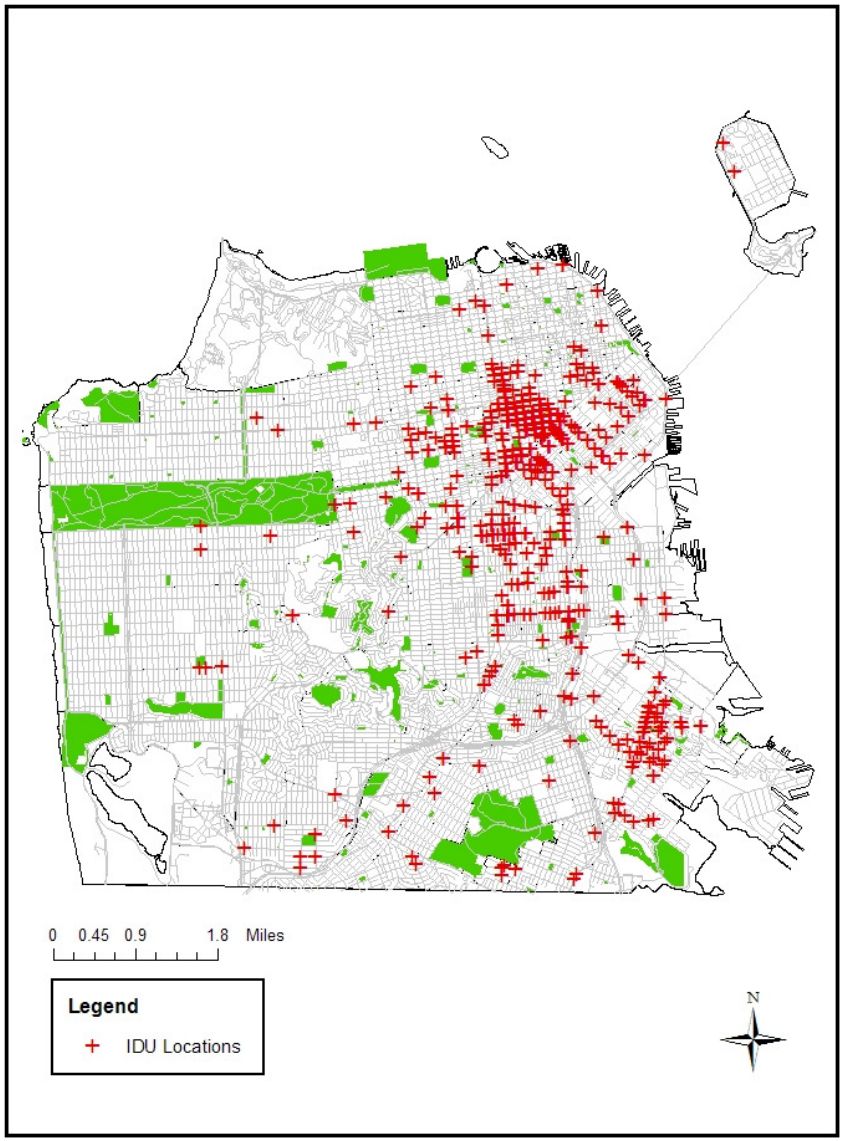
Convenience Sampling

- **“Amostragem Folgado”**
- **Enroll subjects where they are visible, taking whomever you want**
- **Easy to complete sample size**
- **Less likely to deny risk behavior**
- **Examples:**
  - **MSM:** Gay pride parades, gay bars, saunas, cruising areas
  - **Sex workers:** Brothels, “red light” areas
- **But, no basis for probability, statistics, representation**

Approximations of probability-based sampling

1. **Targeted Sampling**
   - Convenience sampling guided by formative research
2. **Time-Location Sampling**
   - Strengthens targeted sampling by adding randomization
3. **Respondent-Driven Sampling**
   - Strengthens and statistically adjusts snowball sampling

Locations of IDU activity in San Francisco



Targeted Sampling

- **Physical and ethnographic mapping**
  - Police records
  - Observation
  - Key informants
- **Recruitment purposely targeted to reflect ethnography, using:**
  - Street intercept
  - Quotas
  - Snowball

Basic Design of TLS

- **Construct a "universe" of all places where the target population congregates through formative research**
- **Randomly select the venue, day of the week, and time of day (VDT) from this "universe"**
- **Recruit eligible persons at VDT (variations):**
  - Consecutively,
  - Systematically,
  - Proportionately, or
  - Randomly

Theory and assumptions of TLS

- The mapped “universe” is inclusive of the diversity of the target population
- Members of target population have a chance of being sampled that is approximately known, equal, or can be adjusted for
- Random selection of venue, day, and time minimizes some of the biases of convenience sampling

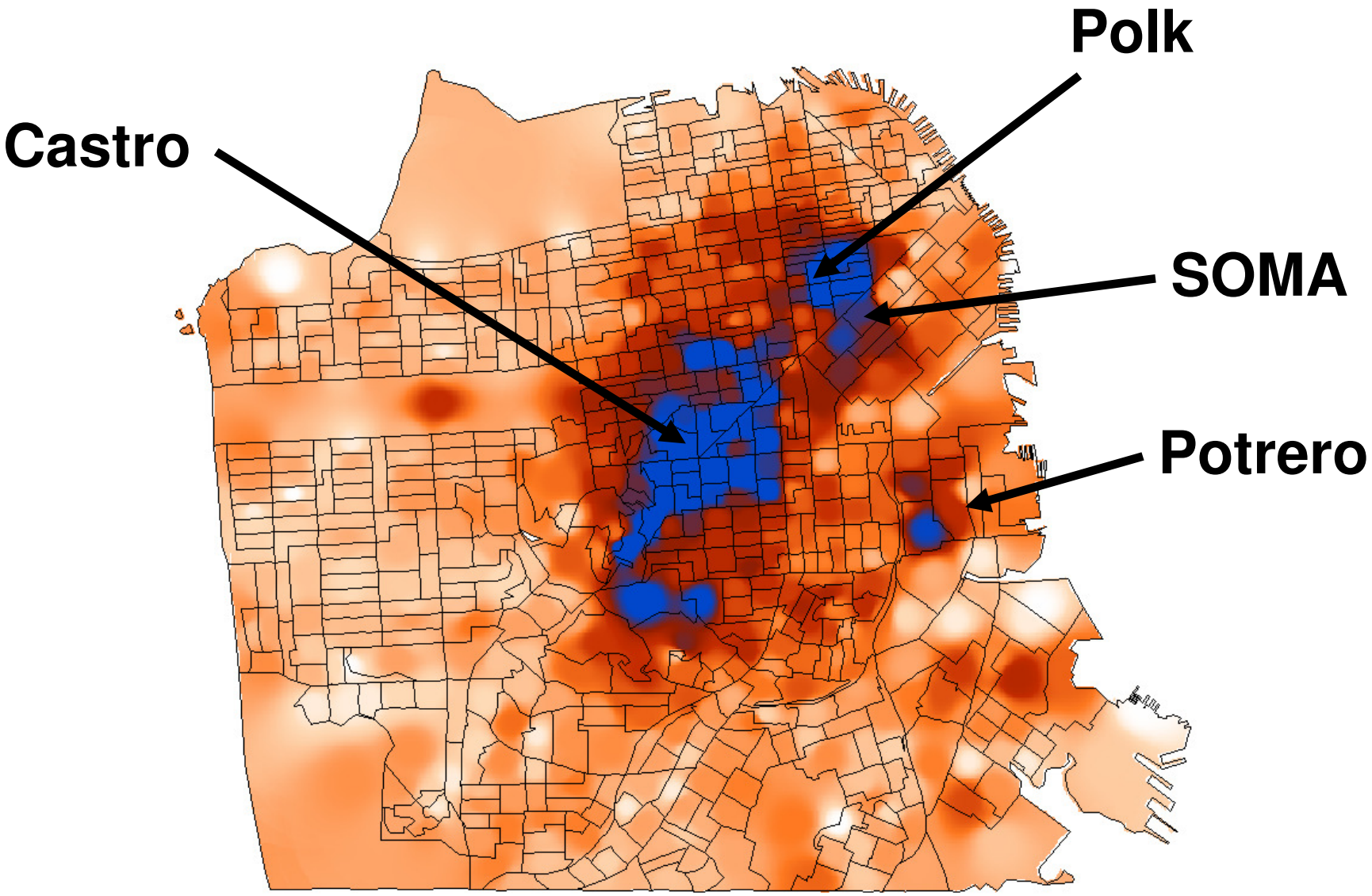
Theory and assumptions of TLS

- **Internal validity strengthened by:**
  - High participation rate (performance goal: >75%)
  - High eligibility assessment rate (>90%)
  - High completion of VDT sampling events (>95%)
  - No interviewer selection allowed
- **Statistical analysis adjusts for venue attendance pattern (relative representation) and homogeneity within the venue (cluster)**
- **External validity depends on good formative research**

Venue identification through formative research

- **Mapping**
- **Observation**
  - Verify presence of risk group, types of sub-groups
  - Attendance patterns, high volume, low volume
- **Key informant interviews**
  - Service providers: Non-government organizations, STI clinics
  - Members of the community, well-connected
  - Police
  - Service industries: travel, hotels, restaurants
  - Taxi drivers

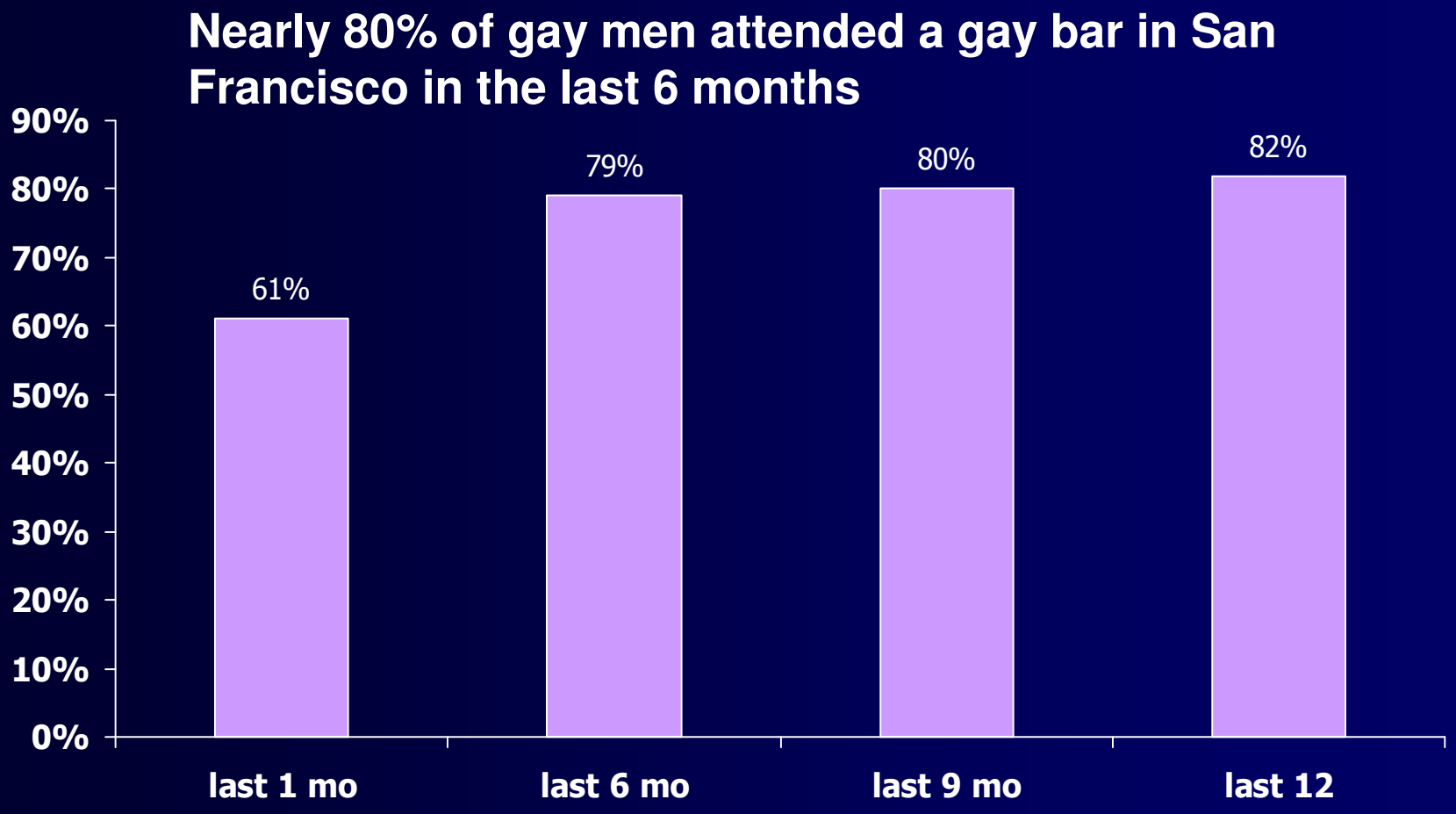
Neighborhoods of MSM with HIV/AIDS in San Francisco



"Universe" of venues: Public spaces where MSM meet

- Gay bars
- Cafes and restaurants
- Dance clubs
- Gyms
- NGOs
- Social organizations
- Parks and beaches
- Saunas, bathhouses
- Retail businesses
- Street locations
- Adult bookstores
- Raves, circuit parties, and other events
- Internet, online?

MSM attending gay bars in a random digit dial telephone survey



What hidden population?

What hidden population?

- **San Francisco has a large, openly gay community**
- **Legal and civil rights relatively protected**
- **Recent legalization of gay marriage in California**
- **Gay capital of North America**
- **One in five adult men are MSM**
- **Strong altruism in MSM to be in research studies**
- **But:**
  - Expensive to do door-to-door (1 in 10 people or houses)
  - Random digit dial becoming less geographically linked
  - No count of gay men in Census
  - No gold standard sampling frame

Approximation Sampling Frame

No roster of all individuals, rather a roster of all places where and when they can be found

- Stonewall Inn, Friday 11PM-3AM
- Vera's Cafe, weekdays 6PM-10PM
- Neighbors, 11PM-3AM, Friday, Saturday
- Fins @ Arcadia University Pool, Sunday 930AM-1030AM
- Rainbow Black Pride Dance, Hyatt Regency, July 4, 8PM-12PM
- House Party, Friday or Saturday 11PM-3AM
- Project Q drop-in, Saturday, 2PM-6PM
- Herring Cove, Saturday or Sunday 2PM-6PM
- Black's Beach, Saturday or Sunday, 2PM-6PM
- The Gap, weekdays, 3PM-7PM
- Outwrite Bookstore, every weekday, 6PM-10PM
- Hilldale and Santa Monica, weekdays, 8PM-12PM, Saturday, 10PM-2AM, Sunday, 2PM-6PM
- Midtown Spa, 5PM-8PM, every day
- Power Exchange 11PM-3PM, Friday or Saturday
- Fort Tryon Park, every night 11PM-3AM
- Alianza Picnic, Saturday 3PM-7PM

Time Location Sampling Frame

VDT = "Venue, Days, and Time periods"

Venue Sampling Frame				VDT Sampling Frame						
Venue ID	**Name**	**Address**	**Phone**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
12F001	Power Fitness	2230 18th Street	239-4287	6p – 10p	6p – 10p	6p – 10p	6p – 10p	6p – 10p	10a – 2p 2p – 6p	12p – 4p
12X002	West End Video	1984 West End Place	234-2390			8p – 12a	8p – 12a	8p – 12a	8p – 12a	
12C019	Café Noir	28 Sheppard	834-4823		6p – 10p	6p – 10p	6p – 10p	6p – 10p 10p – 12a	6p – 10p 10p – 12a	4p – 8p
12P007	North Side Park	North Side Park	NA						2p – 6p	2p – 6p
12D101	End Up @ Salvation	293 Washington	932-1389					11:30p – 3:30a		
12R045	Fresh Concepts	1987 Houston	843-2947	6p – 10p	6p – 10p	6p – 10p	6p – 10p	6p – 10p	6p – 10p	
12S033	Market and Meridian	Market and Meridian	NA	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a	4p – 8 p 8p – 12a 12a – 2a
12D052	Vinyl Factory	8342 Davidson	883-9898			8p – 12a	8p – 12a	8p – 12a	8p – 12a	
12O004	Men's Choir	1438 Oak	NA			8p – 9p				
12Z001	Gay Skate	1539 Jefferson	239-8902	8p – 12a						
12X021	Men's Club	89 Frost	234-1098	6p – 10p 10p – 2a	6p – 10p 10p – 2a	6p – 10p 10p – 2a	6p – 10p 10p – 2a	6p – 10p 10p – 2a	2p – 6p 6p – 10p 10p – 2a	2p – 6p 6p – 10p 10p – 2a
12O008	GLBT Youth	1329 Manor	843-4892		1st and 3rd Tuesday 7p – 9p					
12S001	San Jose and Meridian	San Jose and Meridian	NA	6p – 10p	6p – 10p	6p – 10p	6p – 10p	6p – 10p 10p – 12a	6p – 10p 10p – 12a	4p – 8p 6p – 10p
12C001	Polk Street Tavern	14th and Polk	932-5490	6p – 10p	6p – 10p	6p – 10p	6p – 10p	8p – 12a	8p – 12a	

Recruitment Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
October 2003			1 PR: Men's Choir 8p-9p A1: Vinyl Factory A2: W. End Video	2 Staff Meeting	3 PR: End Up @ Sal. 11:30-3:30a A1: Market & Meridian	4 PR: Twilight 10p – 2a A1: Café Noir A2: San Jose & Meridian
5	6 Rest	7 PR: GLBT Youth 7p-9p A1: Market & Meridian	8	9 PR: Vinyl Factory 8p-12a A1: Men's Club A2: Central Stat.	10 PR: West End Video 8p-12a A1: Vinyl Factory A2: Polk Street Tavern	11 Free Weekend
12 Free Weekend	13 Columbus Day	14 PR: Central Stat. 10p – 2a A1: Men's Club A2: Market & Meridian	15 PR: Polk Street Tavern 6p-10p A1: Power Fitness A2: West End Video	16	17 PR: Fresh Concepts 6p-10p A1: Cypress Cove A2: Twilight	18
26	20 PR: Gay Volleyball 8p – 9p A!: Univ. GLBT A2: Gay Skate	21	22 PR: Power Fitness 6p-10p A1: Café Noir A2: Polk Street Tavern	23 PR: San Jose & Meridian 6p-10p A1: Fresh Concepts A2: Central Station	24	25
26	27 PR: Gay Skate 8p-12a A1: Central Stat. A2:Market & Meridian	28	29 Pr: Market & Mer. 8p–12am A1: Twilight A2: Men's Choir	30	31 Halloween	

Enumeration, Recruitment, Interview, Counseling, Blood Collection

Venue: Gay bar

Intercept line

Counter

Recruitment director

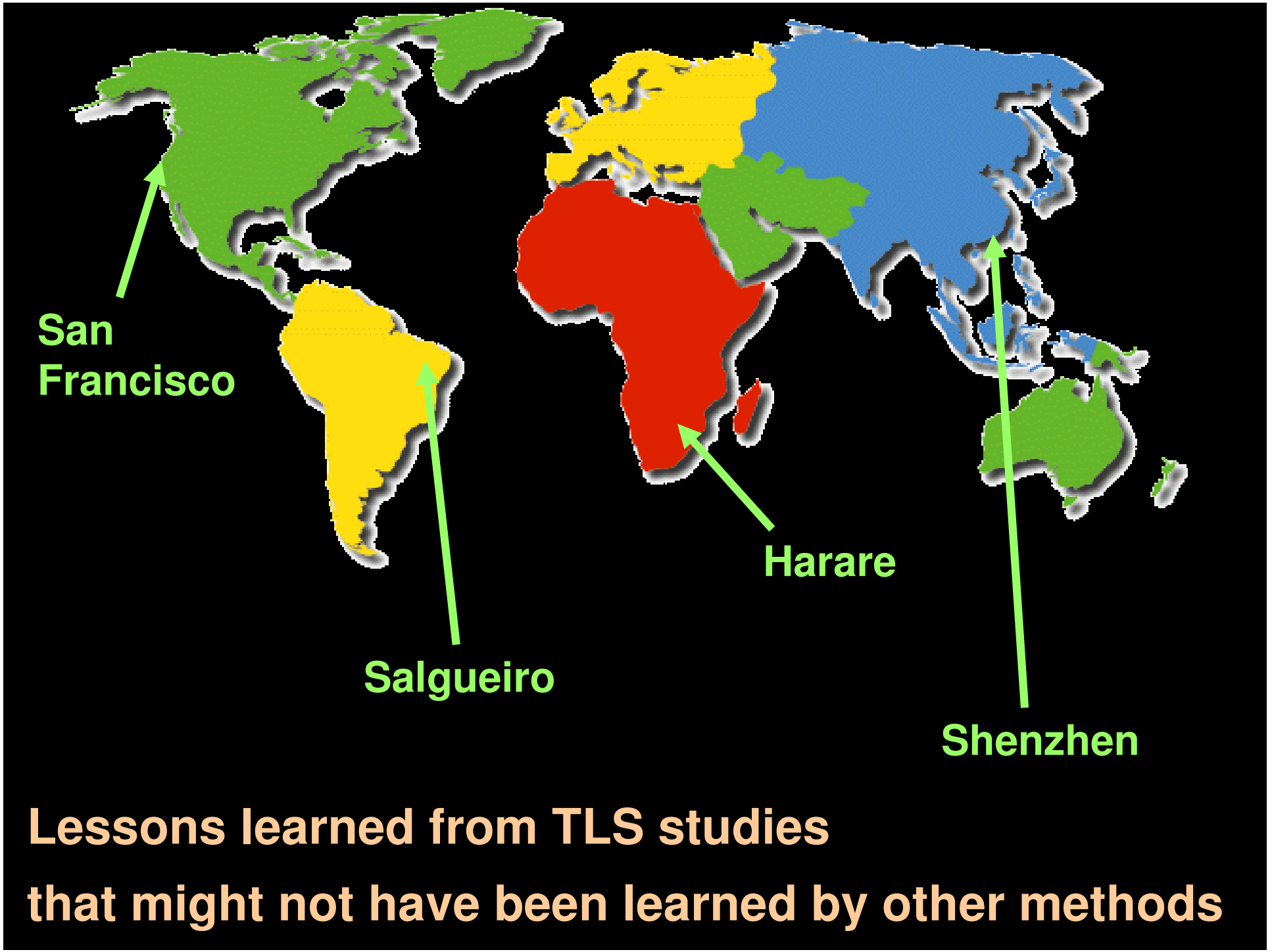
Interviewer

Interview

Pre-test counseling and blood draw

A long-term relationship with TLS in San Francisco

- 1991 very young MSM
- 1994 young MSM
- 1995 – 2008 STOP AIDS Project
- 1999 Asian MSM
- 2003 US National Behavioral Surveillance MSM
- 2005 WHERE
- 2006 PrEP
- 2007 ASSORT!
- 2008 US National Behavioral Surveillance MSM



Lessons learned from TLS studies

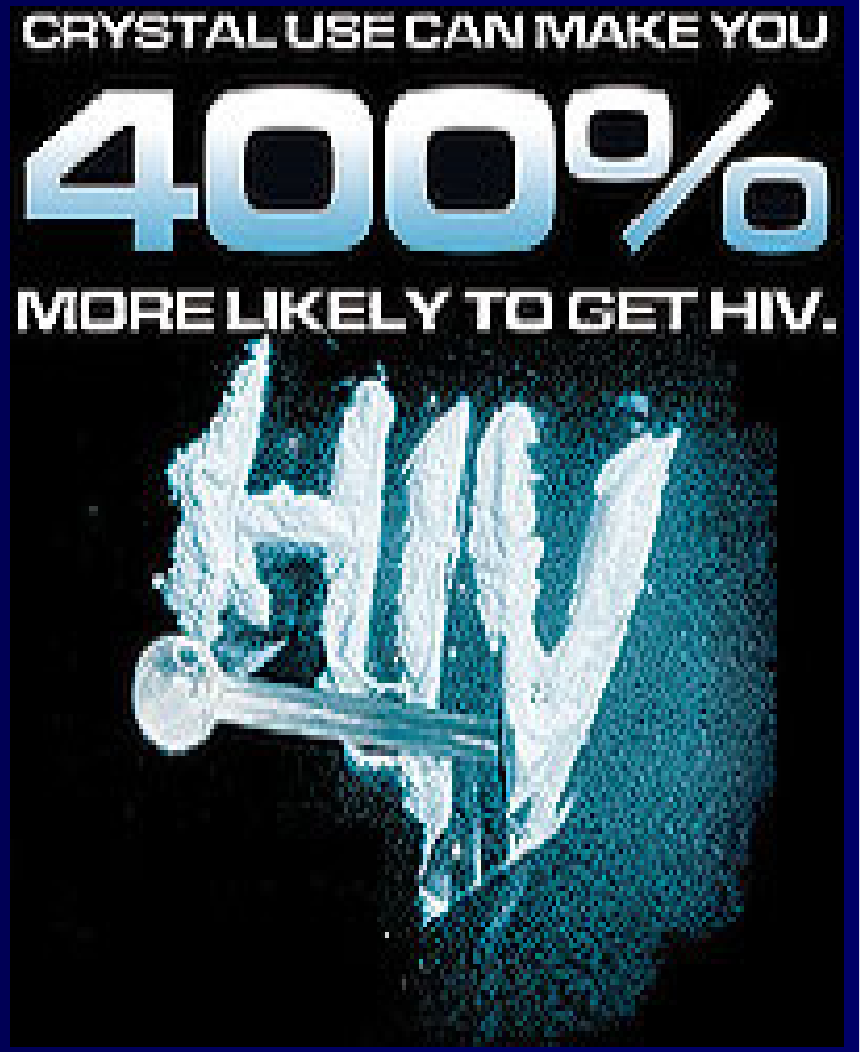
that might not have been learned by other methods

Lessons learned from TLS in San Francisco

- **TLS informs HIV prevention when the venue itself is the point of interest**
  - When and where the population can be reached
  - The risk behaviors of the population when at the venue
  - The physical, social, and legal environment that affects behavior
  - The appropriate and feasible prevention response

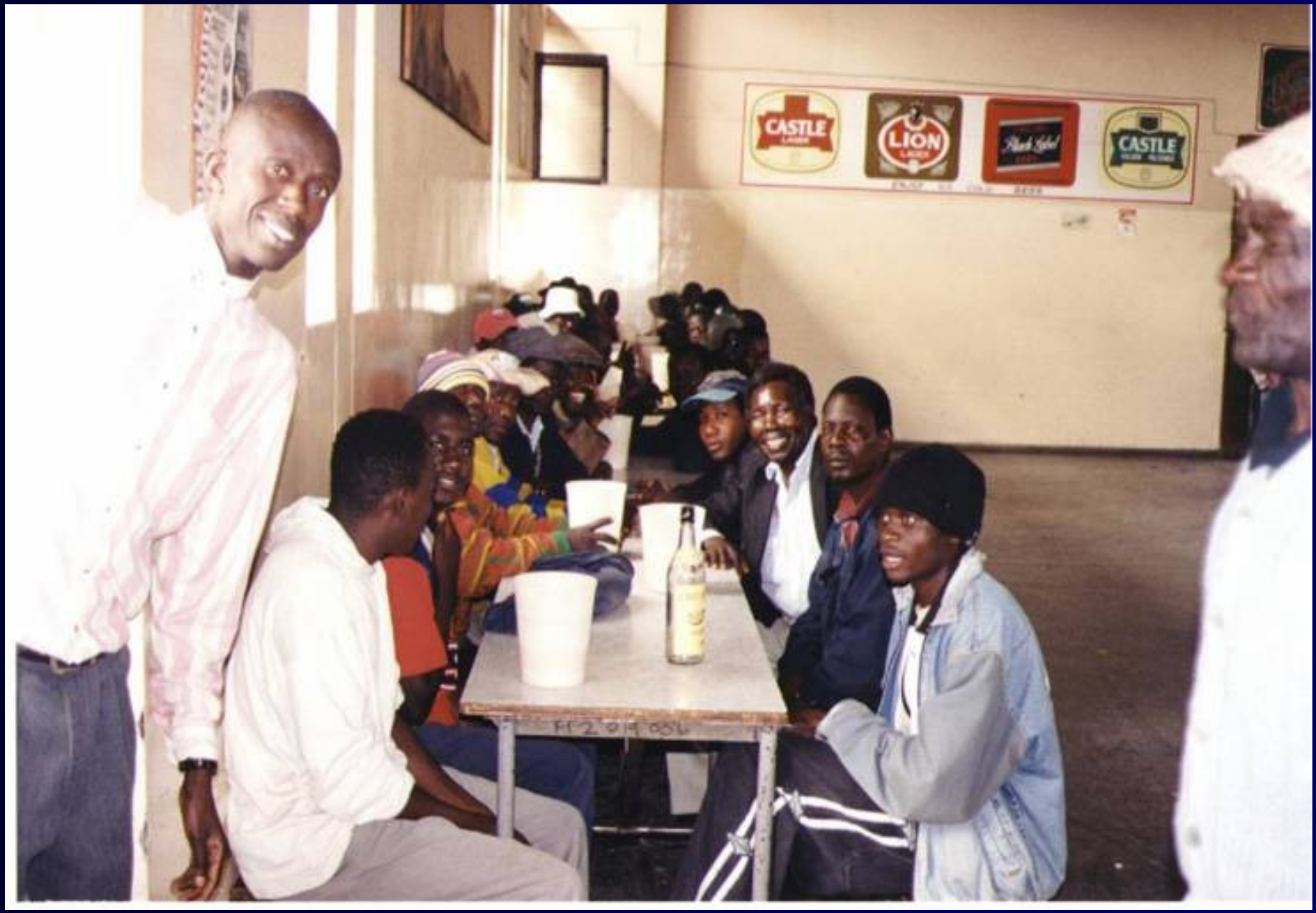
Lessons learned from TLS in San Francisco

- **TLS informed the creation of innovative HIV prevention programs**
  - The “Late Night Breakfast Buffet”: reaching very late night MSM and IDU at risk
  - The “Crystal Clear Project”: targeting venues where methamphetamine use is very high
  - The “WHERE Project”: targeting venues where high risk mixes with lower risk using structural interventions
  - Asian MSM TLS: Where to reach population for HBV vaccination campaign



Lessons learned from TLS in Harare, Zimbabwe

- **TLS evaluated the impact of an innovative, community-level HIV prevention intervention**
  - To address risk associated with alcohol use and unprotected sex
- **The "Sahwira AIDS Prevention Project"**
  - Peer / mentor program at beer halls
- **Design rationale for TLS:**
  - Target population was clientele of beer halls
  - Unit of randomization was the beer hall
  - Unit of intervention was the beer hall
  - Unit of analysis was the beer hall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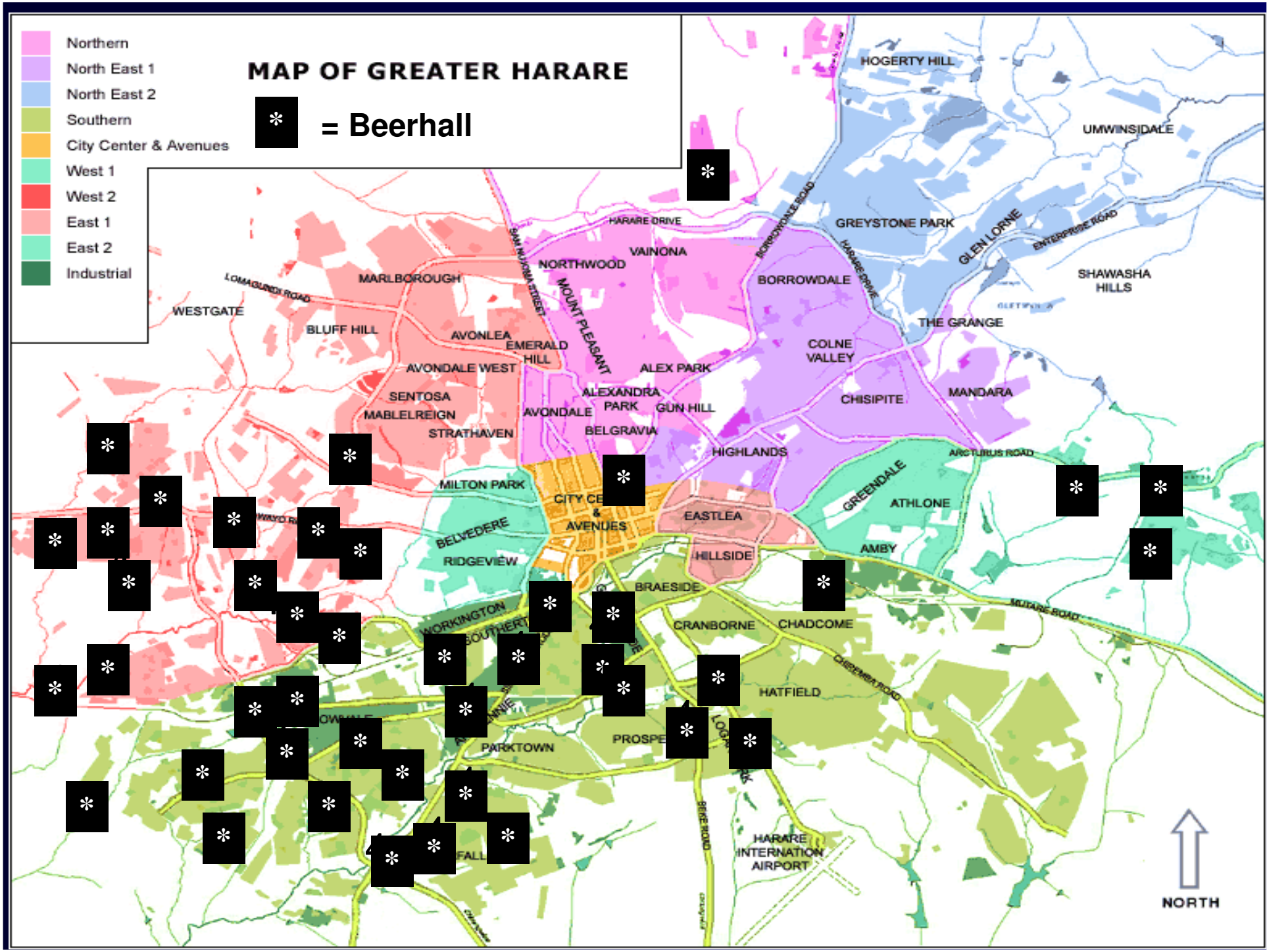
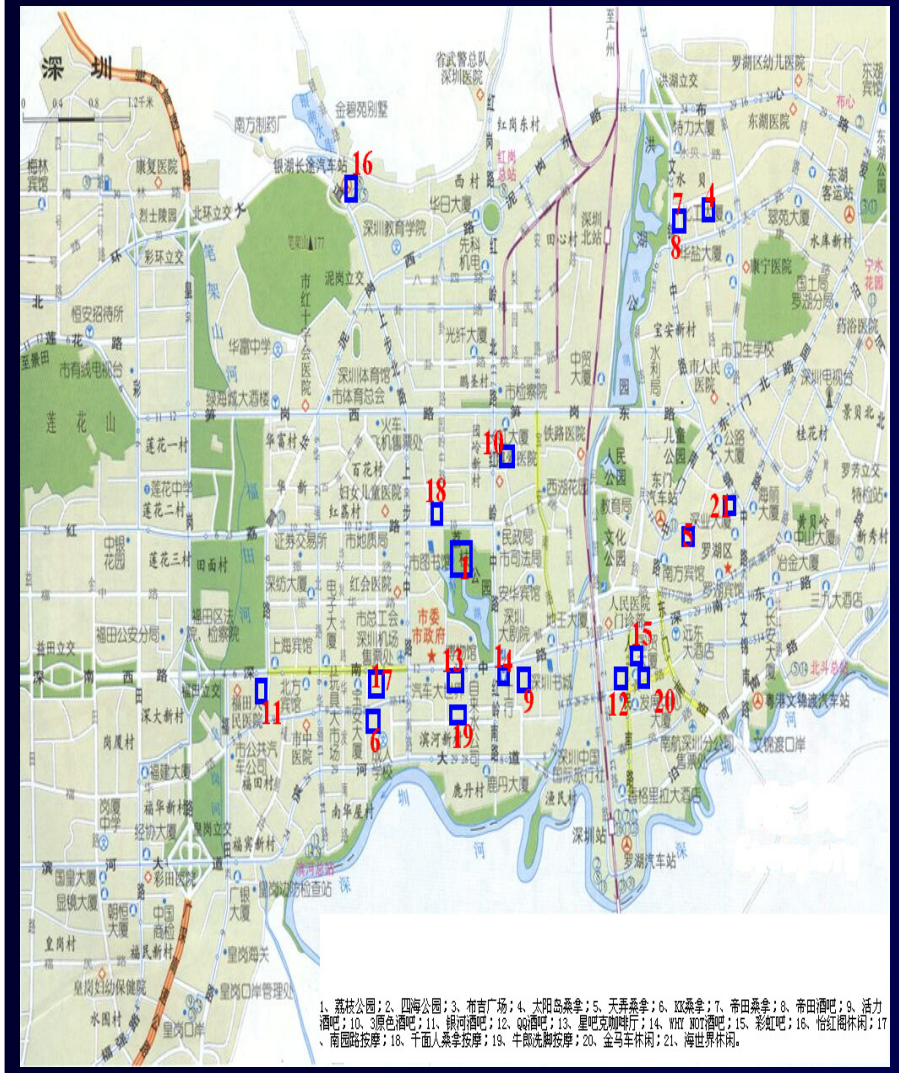

MAP OF GREATER HARARE
* = Beerhall
Northern
North East 1
North East 2
Southern
City Center & Avenues
West 1
West 2
East 1
East 2
Industrial
HOGERTY HILL
UMWINSIDALE
GREYSTONE PARK
GLEN LORNE
SHAWASHA HILLS
BORROWDALE
THE GRANGE
COLNE VALLEY
CHISIPITE
MANDARA
VAINONA
NORTHWOOD
MARLBOROUGH
WESTGATE
BLUFF HILL
AVONLEA
EMERALD HILL
AVONDALE WEST
SENTOSA
MABLELREIGN
STRATHAVEN
MOUNT PLEASANT
ALEX PARK
ALEXANDRA PARK
GUN HILL
AVONDALE
BELGRAVIA
HIGHLANDS
MILTON PARK
BELVEDERE
RIDGEVIEW
CITY CE & AVENUES
EASTLEA
GREENDALE
ATHLONE
AMBY
HILLSIDE
BRAESIDE
CRANBORNE
CHADCOME
HATFIELD
PARKTOWN
HARARE INTERNATION AIRPORT
NORTH

Sahwira AIDS Prevention Project: Did it work?

- **No.**
- **No effect of intervention on risk behavior**
- **Why not?**
  - Too much control effect
  - Did not address both sides of the equation: men and women
  - Did not address alcohol use
  - Intervention not taken up as intended intensely enough
- **TLS worked as method of evaluation**

TLS promotes government involvement in the affected communities in China

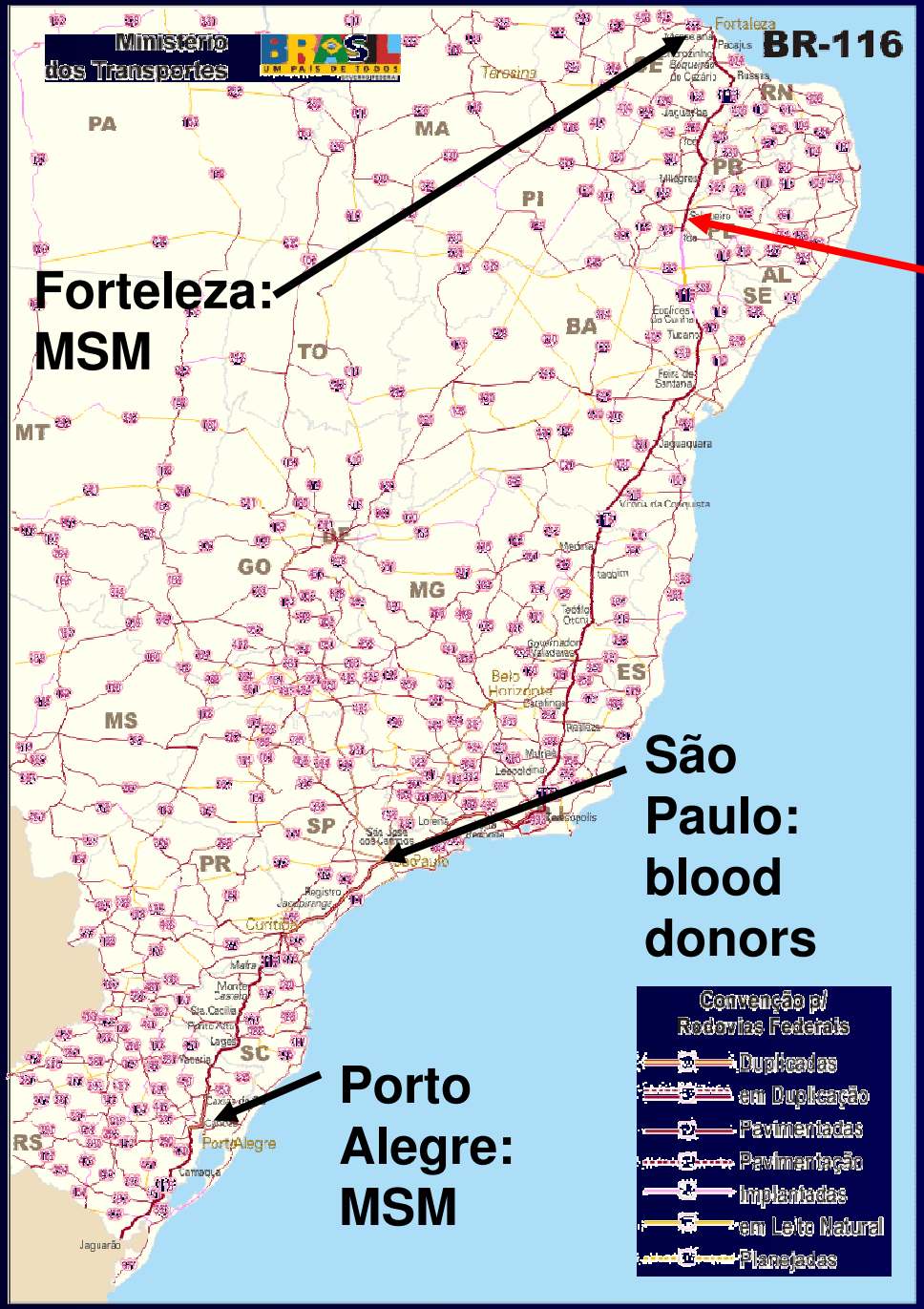


- **Emerging HIV epidemic among MSM in China, need for response, need for data**
- **RDS or TLS?**
- **NGOs and gay activists rebelled against RDS: seen as circumventing their efforts**
- **Local governments rebelled against RDS**
  - Wanted to do something, outreach
  - Wanted staff to be comfortable and visible in MSM environments
- **Shenzhen map of MSM universe**

TLS in Brazil

Salgueiro: Truck drivers

Eniel Sabino de Oliveira and Luiz Oscar Cardoso Ferreira



TLS matches the conceptual target population of truckers who may stop in Salgueiro

Predictors of having unprotected sex with women met on the road (caronas)

- **Use of "rebite":**
  - Adjusted Odds Ratio 4.7 (1.2 – 18.0)
- **No religion:**
  - Adjusted Odds Ratio 6.1 (1.9 – 19.8)
- **Divorced or separated:**
  - Adjusted Odds Ratio 5.1 (1.3 – 20.4)

Lessons Learned

- **San Francisco:** TLS is integral to the community-based response to HIV – where, when and how to conduct HIV prevention
- **Zimbabwe:** TLS evaluates community-level interventions - especially when the intervention is linked to the venue
- **China:** TLS fosters health department - community cooperation
- **Salgueiro:** TLS samples highly mobile populations

Limitations

- Difficult to fully account for different probabilities of inclusion
- Hard to validate in absense of “Gold Standard”
- Similar problems with TS and RDS
- No study is perfect…
- Need to select the sampling design that matches the target population and aims of the study

TLS or RDS?

TLS

- Target population is visible
- Highly mobile
- Robust to what you know from formative research
- Ensures diversity

RDS

- Target population is truly hidden
- Geographically defined
- Formative research less critical
- Robust to what you don't know

TLS or RDS?

TLS

- "What you see is what you get"
- When you want to interact with the community in their environment
- When the venue itself is of interest for prevention programs
- When you need to go to them

RDS

- When you have faith

Obrigado!