

## A multilevel analysis of gatekeeper characteristics and consistent condom use among establishment-based female sex workers in Guangxi Province, China

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## Previous Studies

*Li Q, Wilsnack RW, Wilsnack SC, & Kristjanson AF. Cohabitation, Gender, and Alcohol Consumption in 19 Countries: A Multilevel Analysis ([Substance Use and Misuse, Accepted](#))*

*Li Q, Kirby RS, Sigler RT, Hwang SS, LaGory M, & Goldenberg RL. A multilevel analysis of individual, household, and neighborhood correlates of intimate partner violence among low-income pregnant women in Jefferson county, Alabama ([American Journal of Public Health. 2009. doi:10.2105/AJPH.2008.151159](#))*

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## Research Question

Whether perceived gatekeeper support will be associated with increased condom use among female sex workers (FSWs) in China, after controlling the clustering in the data and other individual characteristics and cognitive constructs.

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## Ecological Framework

(Bronfenbrenner, 1979, 1998)



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## Multilevel Analysis

- Observations are correlated/clustered over space/time;
- Causal processes are thought to operate at more than one level;
- Researchers have intrinsic interest in modeling the variability and heterogeneity in the population simultaneously.

Subramanian S. V., Jones K., & Duncan C. Multilevel methods for public health research. In Kawachi I, Berkman LF, eds. *Neighborhoods and Health*. New York: Oxford University Press, 2003: 65-111.

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## Condom Use Research

Increasing use of multilevel analyses to investigate the environmental influences and clustered data

Society (Lazarus et al., 2009)

Neighborhood (Crosby et al., 2004; Ukwuani et al., 2003; Van Horne et al., 2009)

Family (Van Horne et al., 2009)

Dyad (Sherman & Latkin, 2001; Van Horne et al., 2009)

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## Environmental influences in Global Commercial Sex

*Street-based* (Shannon et al., 2009)

*Legal brothels* (Hanenberg et al., 1994; Rojanapithayakorn & Hanenberg, 1996; Visrutaratna et al., 1995) (Evans et al., 2009; Jana et al., 1998; Jana et al., 2004)

*Entertainment establishments* (Kerrigan et al., 2003; Kerrigan et al., 2006) (Chiao et al., 2008; Morisky et al., 2002; Morisky et al., 2006)

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## Commercial Sex in China

Thriving in the form of entertainment establishments

No mandatory condom use policy or HIV/STI testing programs by the government

Constant interactions (behavior, person, and environment)

FSWs clustering within establishments were not accounted (Hong et al., 2008; Yang et al., 2005; Wang et al., 2009)

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## Methodology

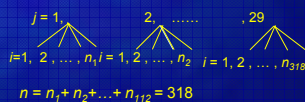
**Study Design:** A cross-sectional study

**Sources of Data:** 454 (78%) of 582 FSWs in Guangxi Province participated in 2004. 136 FSWs were excluded due to a maximum of 4 workers per site (Furstenberg et al., 1999).

**Data Analysis:** Hierarchical Linear Models (HLM) program with Laplace estimation (Raudenbush et al., 2004)  
Intra-class correlation coefficient (ICC)=16.0% [5.24/(5.24+27.45)]

Level-2 (29 workplaces)

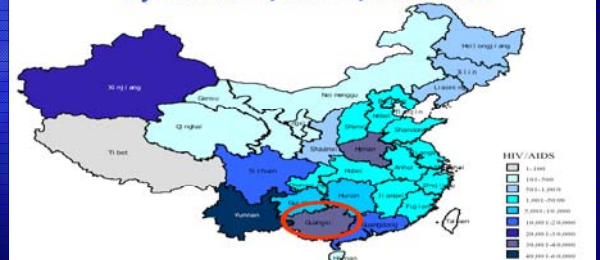
Level-1 (318 Women)



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## Study Site

### Cumulative HIV/AIDS Reported Cases by Province, China, 1985-2008

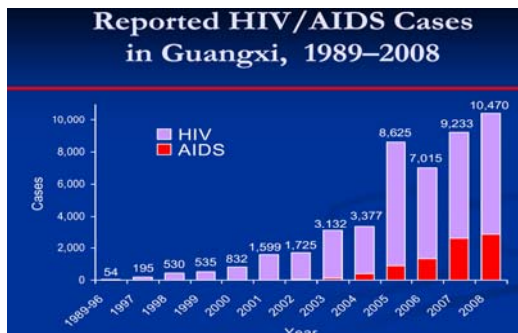


Chen, L., Yao, Y., Wei, X., et al. (2009). Integrating PMICT into the rural health care system in Guangxi Province, China. Accessed August 2, 2009 [http://www.hivimplementers.com/pdfs/Session%2025%25\\_445\\_Wei.pdf](http://www.hivimplementers.com/pdfs/Session%2025%25_445_Wei.pdf)

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## Study Site

### Reported HIV/AIDS Cases in Guangxi, 1989-2008



Chen, L., Yao, Y., Wei, X., et al. (2009). Integrating PMICT into the rural health care system in Guangxi Province, China. Accessed August 2, 2009 [http://www.hivimplementers.com/pdfs/Session%2025%25\\_445\\_Wei.pdf](http://www.hivimplementers.com/pdfs/Session%2025%25_445_Wei.pdf)

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## Measures

**Consistent Condom Use with Clients.** Whether a participant always use a condom with clients during their sexual life and during the 3 most recent sexual encounters.

**Gatekeeper Support for Condom Use.** Requiring FSWs to use condoms, allowing FSWs' refusal of sex if a client does not use a condom, discussing condom use with FSWs, providing FSWs with free condoms, and being supportive to FSWs in dealing with unreasonable clients. The Cronbach  $\alpha$  for this scale was 0.56.

**Condom Use Self-Efficacy.** "I know where to get condoms;" "I can persuade my client to use a condom if he is unwilling to use it;" "I will refuse to have sex if my client does not want to use a condom;" and "I know how to use condoms properly." The Cronbach  $\alpha$  for this scale was 0.56.

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TABLE 1- Metrics and Descriptive Statistics of Characteristics of 318 Female Sex Workers and 136 Non-selected Workers, H County, Guangxi, China, 2004

Variables	Metrics	Range	Mean (Std. Dev) / %	
			n=318	n=136
<b>Dependent Variable</b>				
Consistent condom use	0=no, 1=yes	0-1	11.6%	19.9%*
<b>Explanatory variables</b>				
Age	Years	15-38	23.4 (5.0)	23.7 (5.4)
Education	Years	0-16	5.6 (3.2)	5.9 (3.5)
	0=no, 1=yes	0-16	6.9%	7.6%
>9	0=no, 1=yes	7-9	33.2%	39.4%
≤6	0=no, 1=yes	0-6	59.9%	53.0%
Han ethnicity	0=no, 1=yes	0-1	54.4%	57.4%
Unmarried or divorce	0=no, 1=yes	0-1	63.5%	68.4%
Having a child*	0=no, 1=yes	0-1	41.7%	32.1%
Hometown				
Rural	0=no, 1=yes	0-1	80.5%	77.4%
County seat	0=no, 1=yes	0-1	14.0%	12.0%
Medium/large city	0=no, 1=yes	0-1	5.5%	10.5%
Monthly income <sup>b</sup>	Yuan	50-4000	518 (418.6)	709.5 (694.5)*
Length of being a sex worker	Months	0.25-66	13.2 (13.1)	9.7 (9.3)*
Average clients per week <sup>c</sup>	Persons	0.25-10	1.8 (1.3)	2.4 (2.4)*
Perceived gatekeeper support	Score	0-5	1.59 (0.93)	1.96 (1.08)
HIV/STI knowledge	Score	0-21	10.2 (5.1)	10.3 (5.5)
Condom use self-efficacy	Score	0-5	3.2 (1.4)	2.5 (1.2)
Alcohol intoxication	0=no, 1=yes	0-1	34.6%	28.7%
Drinking before selling sex	0=no, 1=yes	0-1	32.1%	22.8%*
Susceptibility and severity	Score	0-5	2.1 (1.3)	2.1 (1.2)
Perceived barriers	Score	0-5	1.9 (1.7)	1.8 (1.7)
Correct condom use skill <sup>c</sup>	0=no, 1=yes	0-1	61.0%	58.5%

Note: <sup>a</sup>Cases involving missing data were excluded from percentage calculations.

\*  $P < 0.05$

TABLE 2- Odds Ratio and 95% Confidence Interval of Multilevel Logistic Regression (Model 1 and 2) and Logistic Regression (Model 3) of Consistent Condom Use with Clients among 318 Female Sex Workers from 29 Establishments, Guangxi, China, 2004

	Model 1	Model 2	Model 3
Gatekeeper support		1.80 (1.08-3.03)*	1.59 (1.09-2.31)*
Condom use self-efficacy	1.66 (1.03-2.69)*	1.64 (0.87-3.10)	1.63 (1.12-2.36)*
Knowledge	0.94 (0.86-1.02)	0.90 (0.81-1.00)	0.92 (0.85-1.01)
Education	1.19 (1.02-1.39)*	1.18 (1.01-1.39)*	1.18 (1.03-1.34)*
Drinking Before Selling Sex	0.33 (0.08-1.28)	0.30 (0.07-1.35)	0.42 (0.17-1.02)
Susceptibility and severity	1.13 (0.68-1.86)	1.12 (0.59-2.13)	1.10 (0.82-1.47)

Note: \*  $p < 0.05$  OR= Odds Ratio. CI = 95% Confidence Interval. Coef (SE) = Coefficient (Standard Error). In the model selection process, several variables were insignificant and dropped (e.g., age, marital status, Han ethnicity, perceived barriers, and perceived benefits).

## Findings

Participants were predominantly Han ethnicity, unmarried or divorce, young, and low educated, and 11.6% reported consistent condom use with clients, worse off than non-selected ones (Table 1).

After controlling for the clustering (Table 2), women's perceived gatekeeper support and education remained positively associated with condom use.

The initial protective effect of condom use self-efficacy was diminished, after considering perceived gatekeeper support.

Compared to logistic regression, multilevel analyses might correct the shrinkage in coefficient of perceived gatekeeper support and the overestimation of significance of condom use self-efficacy.

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## Strengths & Limitations

- ❖ An ecological paradigm and multilevel analysis
- ❖ Limited generalizability to other workplaces
- ❖ Causal relationships were not proven
- ❖ Self-reported indicators of gatekeeper support
  - Other potential correlates (e.g., client-perpetrated violence)
- ❖ Potential reporting bias of consistent condom use measure

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## Implications & Future Directions

- ❖ The interest in an ecological perspective was triggered by the ability of new statistical techniques and because of attentions on environmental influences.

Recognizing contexts helps to balance an individual focus by redirecting attention to interventions at the environmental level.

Interventions to enhance gatekeepers' support might become much important to design programs overcoming structural barriers.

- ❖ Future data collection & analysis

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## Conclusions

After adjusting for data clustering, both perceived gatekeeper support and other individual variables remain associated with condom use with clients among FSWs in Guangxi, China.

The results imply that *combined* interventions to intervene both gatekeepers and individual FSW may effectively promote consistent condom use.

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Qing Li

(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

## Thank you!

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