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Determinants of the low uptake of HIV-related intervention services by female sex workers in Shenzhen, China: an observational study (2009–2012)

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Supplementary materials

1. Sample size calculation:

$$N = Z^{2*}(P^{*}(1-P))/E^{2}$$

Here, we took a confidence level of 95%, and estimated that 50% of FSWs consistently used condoms with their clients in the last month.

Z = 1.96, E = 5%, P = 0.5, thus N = 384.

We took 400 as a minimum of our sample size.

2. Translation of questions about uptake of HIV-related intervention services:

In the last year, did you use any of the following services?

- condom promotion and distribution / voluntary HIV consultancy and testing
- peer education
- specifically, did you test for HIV?

3. Translation of questions about HIV-related knowledge:

- Is it possible to identify HIV positives from appearance?
- Can HIV transmit through mosquito biting?
- Can HIV transmit through sharing meals?
- Can HIV transmit through blood transfusion and using blood products?
- Can HIV transmit through sharing needles?
- Can HIV transmit to children through breast feeding?
- Can condom use reduce the HIV transmission?
- Can the HIV transmission probability be reduced by being constant in a certain sexual partner?

	2009		20	010	20	11	2012		Total	
Factors	n=426	(%)	n=430	(%)	n=400	(%)	n=400	(%)	N=1656	(%)
Socio-demographics										
Venues										
Low risk venues	61	14.3	169	39.3	100	25.0	88	22.0	418	25.2
Medium risk venues	248	58.2	108	25.1	110	27.5	188	47.0	654	39.5
High risk venues	117	27.5	153	35.6	190	47.5	124	31.0	584	35.3
Age (categories, years)										
<20	121	28.4	105	24.4	74	18.5	63	15.8	363	21.9
21-24	175	41.1	125	29.1	131	32.8	122	30.5	553	33.4
25-29	86	20.2	78	18.1	89	22.3	119	29.8	372	22.5
>30	44	10.3	122	28.4	106	26.5	96	24.0	368	22.2
Marital status										
Never married	274	64.3	268	62.3	229	57.3	230	57.5	1001	60.4
Married	76	17.8	83	19.3	120	30.0	142	35.5	421	25.4
Cohabiting	60	14.1	40	9.3	28	7.0	18	4.5	146	8.8
Seperated/widowed	14	3.3	37	8.6	23	5.8	10	2.5	84	5.1
Missing	2	0.5	2	0.5	0	0.0	0	0.0	4	0.2
Residency										
Guangdong province*	63	14.8	42	9.8	53	13.3	68	17.0	226	13.6
Other provinces	363	85.2	388	90.2	347	86.8	332	83.0	1429	86.3
Education (years)										
<=9	284	66.7	269	62.6	257	64.3	264	66.0	1074	64.9
>9	142	33.3	161	37.4	143	35.8	136	34.0	582	35.1

Table S1. Socio-demographics, substance use and STD history among female sex workers in Shenzhen, China, from 2009-2012

*Guangdong province: Shenzhen is a city in Guangdong province.

	20	09	20	10	201	2011		2012		
Factors	n=426	(%)	n=430	(%)	n=400	(%)	n=400	(%)	N=1656	(%)
Duration of current work (months)										
>12	123	28.9	203	47.2	202	50.5	156	39.0	684	41.3
6-12	70	16.4	48	11.2	82	20.5	64	16.0	264	15.9
1-6	165	38.7	129	30.0	72	18.0	136	34.0	502	30.3
<1	62	14.6	47	10.9	44	11.0	44	11.0	197	11.9
Missing	6	1.4	3	0.7	0	0.0	0	0.0	9	0.5
Location of previous work										
Guangdong province	317	74.4	354	82.3	178	44.5	242	60.5	1191	71.9
Other provinces	96	22.5	76	17.7	92	23.0	135	33.8	399	24.1
No previous work	5	1.2	0	0.0	30	7.5	23	5.8	58	3.5
Missing	8	1.9	0	0.0	0	0.0	0	0.0	8	0.5
Substance use										
No	404	94.8	385	89.5	381	95.3	397	99.3	1567	94.6
Yes	11	2.6	39	9.1	14	3.5	3	0.8	67	4.0
Refused to answer	10	2.3	6	1.4	5	1.3	0	0.0	21	1.3
Missing	1	0.2	0	0.0	0	0.0	0	0.0	1	0.1
Self-reported STD history in the last year										
No	402	94.4	374	87.0	372	93.0	387	96.8	1535	92.7
Yes	20	4.7	48	11.2	23	5.8	13	3.3	104	6.3
Refused to answer	3	0.7	7	1.6	5	1.3	0	0.0	15	0.9
Missing	1	0.2	1	0.2	0	0.0	0	0.0	2	0.1

Table S1. Socio-demographics, substance use and STD history among female sex workers in Shenzhen, China, from 2009-2012 (continued)

 Table S2. Determinants of no uptake of HIV testing service by 1654 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio.

 Determinants
 Sample No uptake of Proportion size
 Proportion (%)
 OR
 P-value

 All
 1654
 1298
 78.5
 Study year

 2000
 425
 247
 81.6

All		1654	1298	/8.5		
Stuc	ly year					
	2009	425	347	81.6		
	2010	429	300	69.9		
	2011	400	328	82.0		
	2012	400	323	80.8		
Ven	ues*					0.450
	Low risk venues	418	335	80.1	1.00	
	Medium risk venues	652	514	78.8	0.92	0.610
	High risk venues	584	449	76.9	0.82	0.218
Age	c (categories, years)					
	<20	363	307	84.6		
	21-24	552	451	81.7		
	25-29	371	290	78.2		
	>30	368	250	67.9		
Age	e (continuous)				0.95	<0.001
Mar	ital status					0.004
	Never married	1001	807	80.6	1.00	
	Married	421	307	72.9	0.65	0.001
	Cohabiting	145	120	82.8	1.15	0.54
	Separated/widowed	83	60	72.3	0.63	0.070
	Missing	4	4	100.0		
Res	idency					
	Guangdong province	226	188	83.2	1.00	
	Other provinces	1428	1110	77.7	0.70	0.064
Edu	cation (years)					
	<=9	1072	841	78.5	1.00	
	>9	582	457	78.5	1.00	0.97
Dur	ation of current work (months)					<0.001
	>12	683	480	70.3	1.00	
	6-12	264	220	83.3	2.11	< 0.001
	1-6	501	426	85.0	2.40	< 0.001
	<1	197	166	84.3	2.26	< 0.001
	Missing	9	6	66.7		

* Low risk venues include nightclubs, and guesthouse/hotels; medium risk venues include karaoke/dance halls and saunas; high risk venues include hair salons/foot bathing shops, temporary sublets/roadside restaurants and streets.

	Sample	No uptake of	Proportion		
Determinants	size	HIV testing	(%)	OR	P-value
Location of previous work					0.28
Guangdong province	1190	935	78.6	1.00	
Other provinces	398	308	77.4	0.93	0.62
No previous work	58	50	86.2	1.71	0.13
Missing	8	5	62.5		
Substance use					0.008
No	1565	1237	79.0	1.00	
Yes	67	42	62.7	0.45	0.002
Refused to answer	21	18	85.7	1.59	0.46
Missing	1	1	100.0		
Self-reported STD history in the last					
year					
No	1533	1205	78.6	1.00	
Yes	104	76	73.1	0.74	0.19
Refused to answer	15	15	100.0		
Missing	2	2	100.0		

Table S2. Determinants of no uptake of HIV testing service by 1654 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio. (*continued*)

		No uptake of			
	Sample	condom	Proportion		
Determinants	size	promotion	(%)	OR	P-value
All	1653	863	52.2		
Study year					
2009	423	295	69.7		
2010	430	160	37.2		
2011	400	148	37.0		
2012	400	260	65.0		
Venues *					<0.001
Low risk venues	418	241	57.7	1.00	
Medium risk venues	651	375	57.6	1.00	0.99
High risk venues	584	247	42.3	0.54	< 0.001
Age (categories, years)					
<20	362	220	60.8		
21-24	552	319	57.8		
25-29	371	194	52.3		
>30	368	130	35.3		
Age (continuous)				0.94	<0.001
Marital status					<0.001
Never married	999	560	56.1	1.00	
Married	420	192	45.7	0.66	< 0.001
Cohabiting	146	83	56.8	1.03	0.86
Separated/widowed	84	26	31.0	0.35	< 0.001
Missing	4	2	50.0		
Residency					
Guangdong province	225	142	63.1	1.00	
Other provinces	1428	721	50.5	0.60	<0.001
Education (years)					
<=9	1072	558	52.1	1.00	
>9	581	305	52.5	1.02	0.86
Duration of current work (months)					<0.001
>12	683	252	36.9	1.00	< 0.001
6-12	264	154	58.3	2.39	< 0.001
1-6	501	314	62.7	2.87	< 0.001
<1	196	137	69.9	3.97	< 0.001
Missing	9	6	66.7		

Table S3. Determinants of no uptake of condom promotion service by 1653 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio.

* Low risk venues include nightclubs, and guesthouse/hotels; medium risk venues include karaoke/dance halls and saunas; high risk venues include hair salons/foot bathing shops, temporary sublets/roadside restaurants and streets.

		No uptake of			
	Sample	condom	Proportion		
Determinants	size	promotion	(%)	OR	P-value
Location of previous work					0.84
Guangdong province	1188	620	52.2	1.00	
Other provinces	399	208	52.1	1.00	0.98
No previous work	58	28	48.3	0.86	0.58
Missing	8	7	87.5		
Substance use					0.001
No	1564	833	53.3	1.00	
Yes	67	20	29.9	0.37	< 0.001
Refused to answer	21	9	42.9	0.66	0.35
Missing	1	1	100.0		
Self-reported STD history in the last					
year					0.10
No	1532	810	52.9	1.00	
Yes	104	44	42.3	0.65	0.038
Refused to answer	15	7	46.7	0.78	0.63
Missing	2	2	100.0		

Table S3. Determinants of no uptake of condom promotion service by 1653 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio. (*continued*)

	Sample	No uptake of	Proportion		
Determinants	size	peer education	(%)	OR	P-value
All	1652	1190	72.0		
Study year					
2009	422	322	76.3		
2010	430	250	58.1		
2011	400	303	75.8		
2012	400	315	78.8		
Venues *					<0.001
Low risk venues	418	300	71.8	1.00	
Medium risk venues	651	499	76.7	1.29	0.073
High risk venues	583	391	67.1	0.80	0.11
Age (categories, years)					
<20	361	291	80.6		
21-24	551	422	76.6		
25-29	372	271	72.8		
>30	368	206	56.0		
Age (continuous)				0.94	<0.001
Marital status					<0.001
Never married	998	744	74.5	1.00	
Married	421	292	69.4	0.77	0.045
Cohabiting	146	109	74.7	1.01	0.98
Separated/widowed	84	44	52.4	0.38	< 0.001
Missing	3	1	33.3		
Residency					
Guangdong province	227	178	78.4	1.00	
Other provinces	1425	1012	71.0	0.66	0.016
Education (years)					
<=9	1072	778	72.6	1.00	
>9	580	412	71.0	0.93	0.51
Duration of current work (months)					<0.001
>12	684	416	60.8	1.00	
6-12	263	212	80.6	2.68	< 0.001
1-6	500	399	79.8	2.55	< 0.001
<1	196	158	80.6	2.68	< 0.001
Missing	9	5	77.8		

Table S4. Determinants of no uptake of peer education service by 1652 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio.

* Low risk venues include nightclubs, and guesthouse/hotels; medium risk venues include karaoke/dance halls and saunas; high risk venues include hair salons/foot bathing shops, temporary sublets/roadside restaurants and streets.

	Sample	No uptake of	Proportion		
Determinants	size	peer education	(%)	OR	P-value
Location of previous work					0.037
Guangdong province	1188	835	70.3	1.00	
Other provinces	398	304	76.4	1.37	0.020
No previous work	58	45	77.6	1.47	0.84
Missing	8	6	75.0		
Substance use					0.003
No	1563	1132	72.4	1.00	
Yes	67	38	56.7	0.50	0.006
Refused to answer	21	19	90.5	3.62	0.085
Missing	1	1	100.0		
Self-reported STD history in the last					
year					
No	1531	1106	72.2	1.00	
Yes	104	67	64.4	0.70	0.088
Refused to answer	15	15	100.0		
Missing	2	2	100.0		

Table S4. Determinants of no uptake of peer education service by 1652 female sex workers in Shenzhen, China: derived from univariate logistic regression. OR=odds ratio. *(continued)*

Supplementary figure



Figure S1. Biplot of socio-demographic and behavioral determinants of uptake of three HIV-related intervention services (HIV testing, condom promotion, and peer education) by female sex workers in Shenzhen, Guangdong Province, China. The black arrows represent the predictors (socio-demographic and behavioral determinants), and the red arrows represent the outcomes (uptake of each of the three services). Each arrow represents a category for predictors with more than two categories. Binary predictors and outcomes are represented by one arrow, because the other arrow would just be in the opposite direction with the same length. The horizontal direction of arrows indicates the tendency of uptake of the three services. The vertical direction of arrows discriminates between tendencies of uptake of each of the services. The length of arrows indicates how well predictors or outcomes are represented by the two-dimensional plane, i.e. a long arrow implies a predictor or outcome variable that is represented well. The angle between arrows indicates the correlation between the corresponding variables, i.e. a small angle implies a high correlation. Thus, a relatively long black arrow which has a relatively small angle with the red arrows implies an important determinant of uptake of HIV-related services. For an explanation of the predictors, see next page.

Predictors (socio-demographic and behavioral determinants) are as follows:

Venue: venues where females sex workers were recruited

Venue (0): low risk venues, i.e. nightclubs and guesthouse/hotels

Venue (1): medium risk venues, i.e. karaoke/dance halls and saunas

Venue (2): high risk venues, i.e. hair salons/foot bathing shops, temporary sublets/roadside restaurants and streets

Mar: marital status

Mar (0): never married

- Mar (1): married
- Mar (2): cohabiting
- Mar (3): separated/widowed

Regis: hukou registration, provinces where people were registered as permanent residents

Regis: hukou registered in provinces other than Guangdong province

Edu: education level

Edu: more than 9 years of education

Duration: duration of current commercial sex work (months)

Duration (0): >12

Duration (1): 6-12

Duration (2): 1-6

Duration (3): < 1

Loc: location of previous commercial sex work

Loc (0): provinces other than Guangdong

Loc (1): Guangdong province

Loc (2): no previous commercial sex work

Drug: substance use history

Drug (0): no use

Drug (1): ever used

Drug (2): refused to answer

STD: STD history

STD (0): no history

STD (1): reported ever had STD

STD (2): refused to answer