

図 1:HIV 陽性結核患者での治療前体重毎の Kaplan-Meier 生存曲線

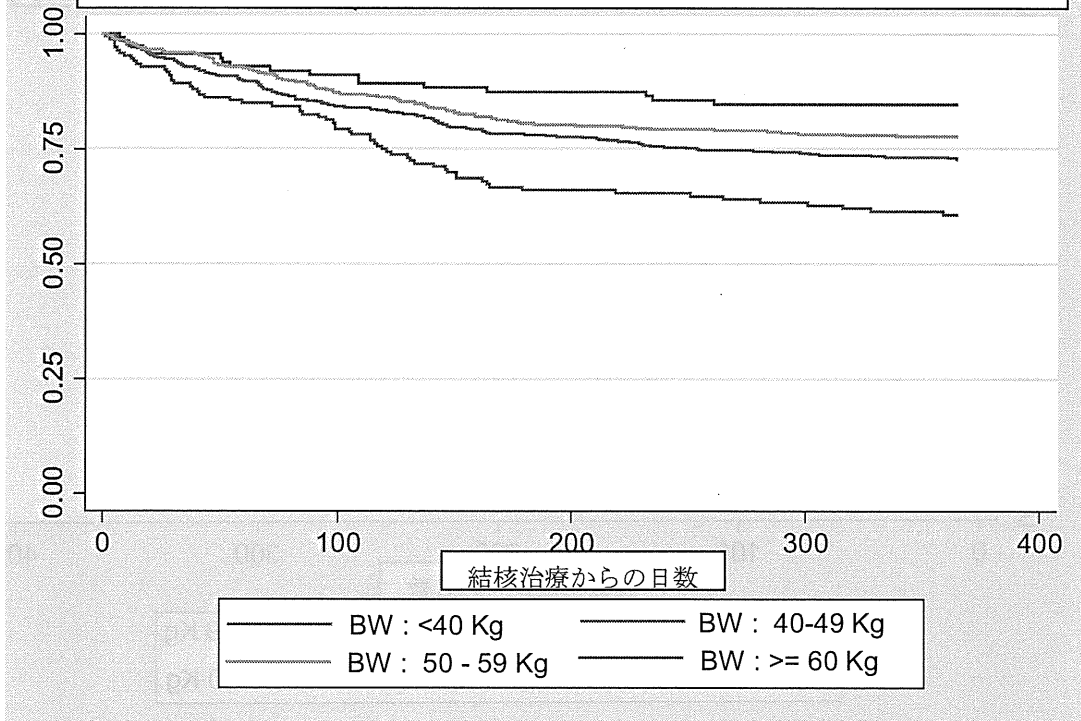
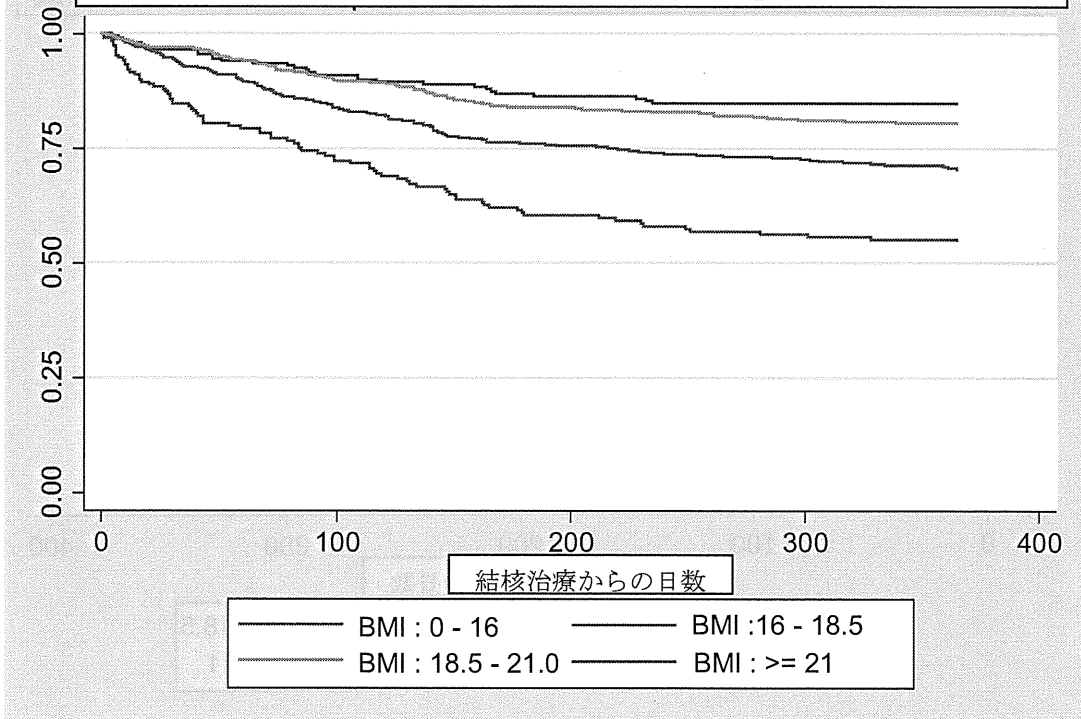
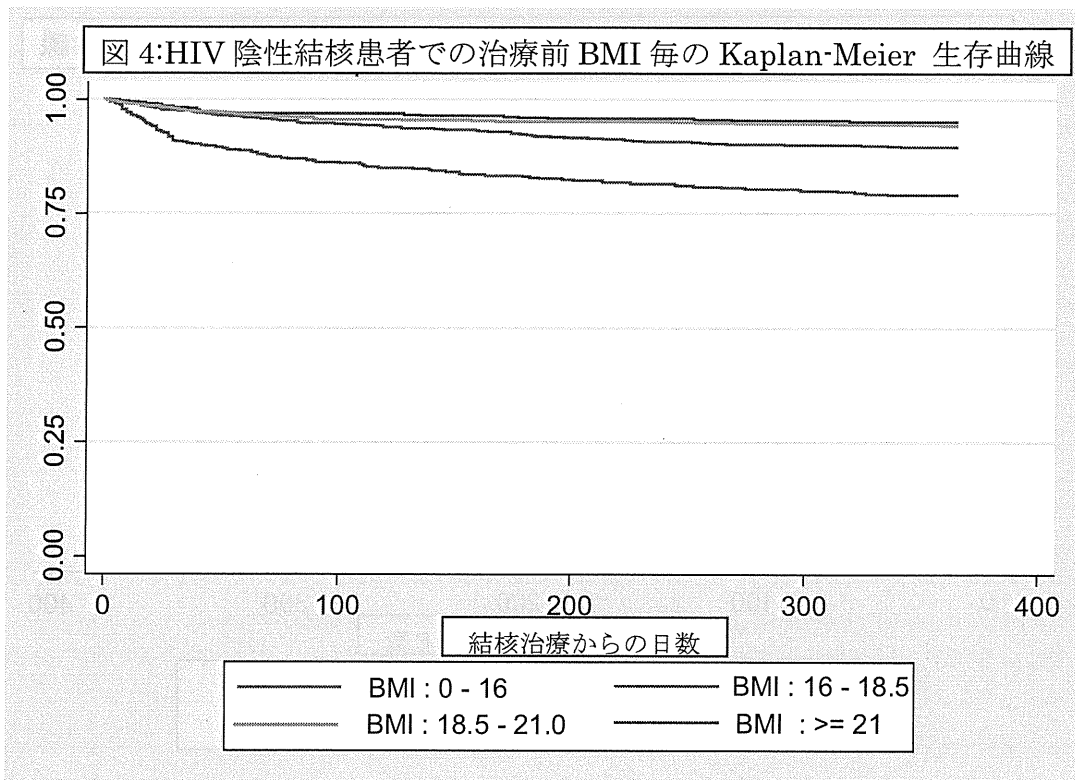
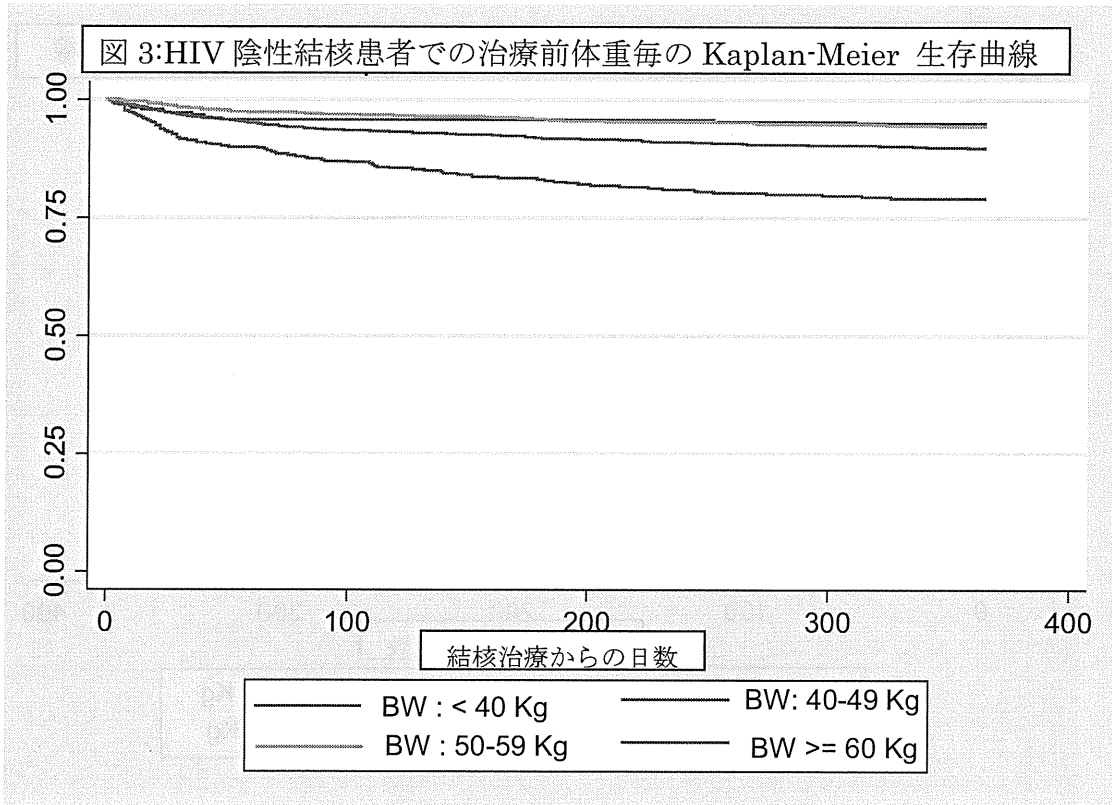


図 2:HIV 陽性結核患者での治療前 BMI 毎の Kaplan-Meier 生存曲線





**Table 1: Patient characteristics and body weight of TB patients in Chiang Rai, Thailand, 2005-2009**

Characteristic	BW known	BW<40kg		BW=40-49kg		BW=50-59kg		BW>=60kg		BW Unknown	BW Unknown%
			%		%		%		%		
<b>Total (n=7690)</b>	6754	1245	18.4%	2857	42.3%	2024	30.0%	628	9.3%	936	12.2%
<b>HIV</b>											
Negative	4285	811	18.9%	1815	42.4%	1249	29.1%	410	9.6%	491	10.3%
Positive	2062	324	15.7%	893	43.3%	668	32.4%	177	8.6%	338	14.1%
Unknown	407	110	27.0%	149	36.6%	107	26.3%	41	10.1%	107	20.8%
<b>Gender</b>											
Female	2198	707	32.2%	946	43.0%	445	20.2%	100	4.5%	348	13.7%
Male	4556	538	11.8%	1911	41.9%	1579	34.7%	528	11.6%	588	11.4%
<b>Age (years)</b>											
15-34	1866	254	13.6%	803	43.0%	634	34.0%	175	9.4%	204	9.9%
35-59	3320	460	13.9%	1392	41.9%	1110	33.4%	358	10.8%	420	11.2%
60+	1568	531	33.9%	662	42.2%	280	17.9%	95	6.1%	312	16.6%
<b>Fiscal year</b>											
2005	1481	287	19.4%	635	42.9%	427	28.8%	132	8.9%	290	16.4%
2006	1311	251	19.1%	537	41.0%	408	31.1%	115	8.8%	206	13.6%
2007	1389	255	18.4%	586	42.2%	422	30.4%	126	9.1%	138	9.0%
2008	1316	224	17.0%	565	42.9%	392	29.8%	135	10.3%	136	9.4%
2009	1257	228	18.1%	534	42.5%	375	29.8%	120	9.5%	166	11.7%
<b>ARV (only those who are HIV-positive)</b>											
No ARV	688	103	15.0%	300	43.6%	226	32.8%	59	8.6%	121	15.0%
ARV	1135	179	15.8%	478	42.1%	376	33.1%	102	9.0%	142	11.1%
Missing	239	42	17.6%	115	48.1%	66	27.6%	16	6.7%	75	23.9%
<b>Patient type</b>											
New	5576	1028	18.4%	2354	42.2%	1659	29.8%	535	9.6%	753	11.9%
Other	323	60	18.6%	134	41.5%	99	30.7%	30	9.3%	64	16.5%
Transfer in	323	43	13.3%	140	43.3%	111	34.4%	29	9.0%	51	13.6%

Failure	104	20	19.2%	45	43.3%	31	29.8%	8	7.7%	6	5.5%
Relapse	141	31	22.0%	58	41.1%	44	31.2%	8	5.7%	11	7.2%
Default	257	50	19.5%	116	45.1%	73	28.4%	18	7.0%	46	15.2%
Chronic	30	13	43.3%	10	33.3%	7	23.3%	0	0.0%	5	14.3%
<b>Marital status</b>											
Single	1159	149	12.9%	519	44.8%	374	32.3%	117	10.1%	122	9.5%
Married	4026	676	16.8%	1672	41.5%	1270	31.5%	408	10.1%	504	11.1%
Divorce	491	88	17.9%	214	43.6%	147	29.9%	42	8.6%	73	12.9%
Widow	877	288	32.8%	371	42.3%	174	19.8%	44	5.0%	137	13.5%
Missing	201	44	21.9%	81	40.3%	59	29.4%	17	8.5%	100	33.2%
<b>Education</b>											
Illiterate	403	403	26.7%	685	45.3%	339	22.4%	85	5.6%	148	8.9%
Primary school	460	460	16.4%	1163	41.4%	907	32.3%	279	9.9%	238	7.8%
Secondary school	70	70	8.0%	350	40.0%	341	39.0%	114	13.0%	60	6.4%
Higher	14	14	6.3%	87	39.2%	74	33.3%	47	21.2%	21	8.6%
Missing	298	298	22.3%	572	42.8%	363	27.2%	103	7.7%	469	26.0%
<b>Occupation</b>											
Unemployed	1222	306	25.0%	539	44.1%	297	24.3%	80	6.5%	281	18.7%
Agriculture	1784	303	17.0%	788	44.2%	550	30.8%	143	8.0%	150	7.8%
Labor	2272	284	12.5%	970	42.7%	777	34.2%	241	10.6%	210	8.5%
Employee	197	28	14.2%	68	34.5%	60	30.5%	41	20.8%	24	10.9%
Merchant/ business	271	24	8.9%	92	33.9%	99	36.5%	56	20.7%	31	10.3%
Prisoner	116	6	5.2%	43	37.1%	53	45.7%	14	12.1%	10	7.9%
Missing	892	294	33.0%	357	40.0%	188	21.1%	53	5.9%	230	20.5%
<b>TB site</b>											
Pulmonary with sputum AFB positive	3280	645	19.7%	1455	44.4%	931	28.4%	249	7.6%	338	9.3%
Pulmonary with sputum AFB negative	1827	387	21.2%	793	43.4%	487	26.7%	160	8.8%	213	10.4%
Pulmonary with sputum AFB unknown	194	42	21.6%	81	41.8%	54	27.8%	17	8.8%	39	16.7%
Extra-pulmonary	1453	171	11.8%	528	36.3%	552	38.0%	202	13.9%	346	19.2%

**Table 2: Predictor of Mortality and Success in HIV positive TB patients in Chiang Rai, Thailand, 2005-2009**

Characteristic (N=2,062)	n	Died (%)	Univariate HR(95%CI)	AHR(95%CI)	P	Success (%)	COR(95%CI)	AOR (95%CI)	P
<b>Age</b>									
15-34	893	281 (31.5%)	Reference	Reference		573 (64.2%)	Reference	Reference	
35-59	1137	384 (33.8%)	1.09 (0.93-1.28)	1.1 (0.93-1.3)	0.267	728 (64%)	0.99 (0.83-1.19)	0.99 (0.81-1.22)	0.955
≥60	32	14 (43.8%)	1.68 (0.96-2.93)	1.2 (0.68-2.12)	0.523	17 (53.1%)	0.63 (0.31-1.28)	0.92 (0.42-2.04)	0.845
<b>Gender</b>									
Female	790	251 (31.8%)	Reference	Reference		517 (65.4%)	Reference	Reference	
Male	1272	428 (33.6%)	1.07 (0.91-1.26)	1.38 (1.15-1.66)	0.001	801 (63%)	0.9 (0.75-1.08)	0.67 (0.54-0.84)**	0.001
<b>Body Weight (kg)</b>									
<40	324	152 (46.9%)	3.26 (2.19-4.86)	3.99 (2.63-6.04)	<0.001	136 (76.8%)	0.32 (0.21-0.48)*	0.22 (0.14-0.35)**	<0.001
40-49	893	317 (35.5%)	2.16 (1.48-3.17)	2.36 (1.61-3.48)	<0.001	166 (51.2%)	0.48 (0.33-0.7)*	0.41 (0.27-0.61)**	<0.001
50-59	668	177 (26.5%)	1.47 (0.99-2.19)	1.49 (1-2.22)	0.05	550 (61.6%)	0.7 (0.47-1.02)*	0.66 (0.44-1)**	0.049
≥60	177	33 (18.6%)	Reference	Reference		466 (69.8%)	Reference	Reference	
<b>Fiscal Year of start treatment</b>									
2005	518	229 (44.2%)	Reference	Reference		289 (55.8%)	Reference	Reference	
2006	433	148 (34.2%)	0.77 (0.62-0.96)	0.83 (0.66-1.05)	0.124	263 (60.7%)	1.23 (0.95-1.59)	1.21 (0.9-1.63)	0.209
2007	436	137 (31.4%)	0.67 (0.53-0.84)	0.74 (0.58-0.95)	0.016	286 (65.6%)	1.51 (1.16-1.97)*	1.39 (1.03-1.89)**	0.033
2008	361	98 (27.1%)	0.57 (0.44-0.73)	0.71 (0.55-0.93)	0.012	253 (70.1%)	1.86 (1.4-2.47)*	1.58 (1.14-2.18)**	0.006
2009	314	67 (21.3%)	0.45 (0.34-0.6)	0.64 (0.48-0.86)	0.003	227 (72.3%)	2.07 (1.53-2.8)*	1.57 (1.12-2.21)**	0.009
<b>ARV</b>									
No	688	333 (48.4%)	Reference	Reference		297 (43.2%)	Reference	Reference	
Yes	1135	230 (20.3%)	0.35 (0.3-0.41)	0.3 (0.25-0.36)	<0.001	904 (79.6%)	5.15 (4.18-6.35)*	5.31 (4.27-6.59)**	<0.001
Missing	239	116 (48.5%)	1.08 (0.9-1.29)	0.84 (0.66-1.07)	0.166	117 (49%)	1.26 (0.94-1.7)	1.54 (1.11-2.14)**	0.010
<b>Patient Type</b>									
New	1644	545 (33.2%)	Reference			1057 (64.3%)	Reference		
Transfer In	137	32 (23.4%)	0.6 (0.4-0.88)			95 (69.3%)	1.26 (0.86-1.83)		
Other	131	37 (28.2%)	0.81 (0.57-1.15)			92 (70.2%)	1.31 (0.89-1.93)		
Failure	25	10 (40%)	1.35 (0.7-2.61)			12 (48%)	0.51(0.23-1.13)*		

Relapse	45	18 (40%)	1.18 (0.73-1.92)	25 (55.6%)	0.69 (0.38-1.26)
Default	75	34 (45.3%)	1.4 (0.96-2.04)	36 (48%)	0.51 (0.32-0.82)*
Chronic	5	3 (60%)	2.22 (0.72-6.92)	1 (20%)	0.14 (0.02-1.25)*
<b>Marital Status</b>					
Single	471	155 (32.9%)	Reference	290 (61.6%)	Reference
Married	1026	317 (30.9%)	0.92 (0.75-1.13)	681 (66.4%)	1.23 (0.98-1.54)*
Divorced	243	83 (34.2%)	1.01 (0.76-1.35)	151 (62.1%)	1.02 (0.74-1.41)
Widow	251	92 (36.7%)	1.11 (0.84-1.46)	155 (61.8%)	1.01 (0.74-1.38)
Missing	71	32 (45.1%)	1.57 (1.06-2.33)	41 (57.7%)	0.85 (0.51-1.42)
<b>Education</b>					
Illiterate	246	69 (28%)	Reference	151 (61.4%)	Reference
Primary School	973	353 (36.3%)	1.32 (1.01-1.73)	613 (63%)	1.07 (0.8-1.43)
Secondary School	378	104 (27.5%)	0.87 (0.63-1.21)	259 (68.5%)	1.37 (0.98-1.92)*
Above high school	48	8 (16.7%)	0.45 (0.2-1.05)	38 (79.2%)	2.39 (1.14-5.02)*
Missing	417	145 (34.8%)	1.26 (0.93-1.7)	257 (61.6%)	1.01 (0.73-1.4)
<b>Occupation</b>					
Unemployed	304	108 (35.5%)	Reference	189 (62.2%)	Reference
Agriculture	435	154 (35.4%)	1.04 (0.8-1.35)	272 (62.5%)	1.02 (0.75-1.37)
Labor	965	307 (31.8%)	0.87 (0.69-1.1)	625 (64.8%)	1.12 (0.86-1.46)
Employee	38	8 (21.1%)	0.4 (0.16-0.97)	30 (78.9%)	2.28 (1.01-5.15)*
Merchant/business	100	22 (22%)	0.61 (0.38-0.98)	72 (72%)	1.56 (0.95-2.56)*
Prisoner	49	16 (32.7%)	0.92 (0.53-1.58)	33 (67.3%)	1.25 (0.66-2.38)
Missing	171	64 (37.4%)	1.16 (0.84-1.61)	97 (56.7%)	0.8 (0.54-1.17)
<b>TB site</b>					
Pulmonary with AFB(+)	696	227 (32.6%)	Reference	442 (63.5%)	Reference
Pulmonary with AFB(-)	519	175 (33.7%)	1.05 (0.85-1.29)	323 (62.2%)	0.95 (0.75-1.2)
Pulmonary with AFB unknown	71	28 (39.4%)	1.24 (0.81-1.89)	43 (60.6%)	0.88 (0.54-1.46)
Extra-pulmonary	776	249 (32.1%)	0.98 (0.81-1.18)	510 (65.7%)	1.1 (0.89-1.36)

CI: Confidence interval, HR: Hazard Ratio calculated by Cox-proportional hazard model, AHR: Adjusted HR COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio

**Table 3: Predictor of Mortality and Success in HIV negative TB patients in Chiang Rai, Thailand, 2005-2009**

Characteristic (N=4,285)	n	Died (%)	Univariate HR(95%CI)	AHR(95%CI)	P	Success(%)	COR(95%CI)	AOR (95%CI)	P
<b>Age</b>									
15-34	904	30 (3.3%)	Reference	Reference		748 (82.7%)	Reference	Reference	
35-59	2048	235 (11.5%)	3.14 (2.19-4.5)	2.92 (1.76-4.85)	<0.001	1630 (79.6%)	0.81 (0.66-1)*	1.02 (0.84-1.24)	0.861
≥60	1333	426 (32%)	10.37 (7.32-14.69)	6.76 (4-11.42)	<0.001	884 (66.3%)	0.41 (0.33-0.5)*	0.83 (0.4-1.75)	0.627
<b>Gender</b>									
Female	1258	163 (13%)	Reference	Reference		1003 (79.7%)	Reference	Reference	
Male	3027	528 (17.4%)	1.22 (1.04-1.44)	1.57 (1.28-1.94)	<0.001	2259 (74.6%)	0.75 (0.64-0.88)*	0.67 (0.54-0.83)**	<0.001
<b>Body Weight (kg)</b>									
<40	811	235 (29%)	3.99 (2.68-5.92)	2.57 (1.7-3.87)	<0.001	335 (81.7%)	0.42 (0.31-0.55)*	0.27 (0.17-0.42)**	<0.001
40-49	1815	292 (16.1%)	1.84 (1.24-2.73)	1.54 (1.04-2.3)	0.032	527 (65%)	0.73 (0.56-0.96)*	0.44 (0.3-0.65)**	<0.001
50-59	1249	127 (10.2%)	1.07 (0.7-1.64)	1.1 (0.72-1.68)	0.672	1390 (76.6%)	0.95 (0.71-1.26)	0.69 (0.47-1.02)	0.063
≥60	410	37 (9%)	Reference	Reference		1010 (80.9%)	Reference	Reference	
<b>Fiscal Year of start treatment</b>									
2005	816	146 (17.9%)	Reference			598 (73.3%)	Reference		
2006	794	134 (16.9%)	0.95 (0.75-1.2)			617 (77.7%)	1.27 (1.01-1.6)*		
2007	884	157 (17.8%)	0.97 (0.77-1.22)			669 (75.7%)	1.13 (0.91-1.41)		
2008	886	129 (14.6%)	0.94 (0.75-1.19)			674 (76.1%)	1.16 (0.93-1.44)		
2009	905	125 (13.8%)	0.91 (0.72-1.14)			704 (77.8%)	1.28 (1.02-1.59)*		
<b>Patient Type</b>									
New	3612	572 (15.8%)	Reference			2796 (77.4%)	Reference		
Transfer In	147	17 (11.6%)	0.58 (0.35-0.95)			110 (74.8%)	0.87 (0.59-1.27)		
Other	167	18 (10.8%)	0.57 (0.35-0.91)			135 (80.8%)	1.23 (0.83-1.82)		
Failure	77	14 (18.2%)	0.72 (0.37-1.39)			49 (63.6%)	0.51 (0.32-0.82)*		
Relapse	90	22 (24.4%)	1.44 (0.92-2.24)			59 (65.6%)	0.56 (0.36-0.86)*		
Default	167	36 (21.6%)	1.38 (1-1.91)			101 (60.5%)	0.45 (0.32-0.61)*		
Chronic	25	12 (48%)	2.29 (1.14-4.61)			12 (48%)	0.27 (0.12-0.59)*		
<b>Marital Status</b>									

Single	642	41 (6.4%)	Reference	Reference		536 (83.5%)	Reference	Reference	
Married	2745	422 (15.4%)	2.62 (1.89-3.64)	1.09 (0.71-1.65)	0.702	2113 (77%)	0.66 (0.53-0.83)*	1.16 (0.91-1.48)	0.222
Divorced	239	47 (19.7%)	3.23 (2.1-4.97)	1.76 (1.05-2.95)	0.031	158 (66.1%)	0.39 (0.27-0.54)*	0.99 (0.71-1.38)	0.964
Widow	548	163 (29.7%)	5.93 (4.19-8.38)	1.41 (0.9-2.22)	0.136	379 (69.2%)	0.44 (0.34-0.58)*	1.03 (0.73-1.44)	0.883
Missing	111	18 (16.2%)	5.08 (3.26-7.92)	1.12 (0.58-2.16)	0.743	76 (68.5%)	0.43 (0.27-0.67)*	0.97 (0.56-1.68)	0.927
<b>Education</b>									
Illiterate	1156	214 (18.5%)	Reference	Reference		865 (74.8%)	Reference	Reference	
Primary School	1710	294 (17.2%)	0.86 (0.72-1.03)			1316 (77%)	1.12 (0.94-1.34)		
Secondary School	464	31 (6.7%)	0.25 (0.16-0.39)	0.61 (0.39-0.94)	0.025	372 (80.2%)	1.36 (1.04-1.77)*	1.3 (1.02-1.67)**	0.037
Above high school	159	7 (4.4%)	0.27 (0.14-0.53)			136 (85.5%)	1.99 (1.25-3.16)*		
Missing	796	145 (18.2%)	1.24 (1.03-1.51)	1.12 (0.9-1.39)	0.323	573 (72%)	0.86 (0.7-1.06)	0.99 (0.77-1.27)	0.941
<b>Occupation</b>									
Unemployed	833	215 (25.8%)	Reference	Reference		591 (70.9%)	Reference	Reference	
Agriculture	1243	152 (12.2%)	0.37 (0.3-0.46)	0.64 (0.51-0.8)	<0.001	997 (80.2%)	1.66 (1.35-2.04)*	1.04 (0.79-1.36)	0.783
Labor	1233	114 (9.2%)	0.29 (0.23-0.37)			977 (79.2%)	1.56 (1.28-1.91)*		
Employee	140	27 (19.3%)	0.6 (0.4-0.91)			109 (77.9%)	1.44 (0.94-2.2)*		
Merchant/business	157	18 (11.5%)	0.29 (0.17-0.51)			121 (77.1%)	1.38 (0.92-2.06)		
Prisoner	66	7 (10.6%)	0.37 (0.17-0.78)			52 (78.8%)	1.52 (0.83-2.8)		
Missing	613	158 (25.8%)	1.13 (0.93-1.36)	0.84 (0.66-1.06)	0.141	415 (67.7%)	0.86 (0.68-1.08)	0.79 (0.52-1.2)	0.266
<b>TB site</b>									
Pulmonary with AFB(+)	2448	372 (15.2%)	Reference			1860 (76%)	Reference		
Pulmonary with AFB(-)	1141	201 (17.6%)	1.12 (0.95-1.33)			870 (76.2%)	1.01 (0.86-1.2)		
Pulmonary with AFB unknown	102	21 (20.6%)	1.16 (0.73-1.84)			75 (73.5%)	0.88 (0.56-1.38)		
Extra-pulmonary	594	97 (16.3%)	1.06 (0.86-1.31)			457 (76.9%)	1.05 (0.85-1.3)		

CI: Confidence interval, HR: Hazard Ratio calculated by Cox-proportional hazard model, AHR: Adjusted HR COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio



## IV章

### 研究成果の刊行に関する一覧表

## 研究成果の刊行に関する一覧表

(2011年4月1日～2012年3月31日迄)

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Ota E, Wariki WMV, Mori R, Hori N, Shibuya K.	Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries.	Cochrane Database of Systematic Reviews	Issue 12. Art. No.: CD006045.	DOI: 10.1002/14651858.CD006045.pub3.	2011
Wariki WMV, Ota E, Mori R, Koyanagi A, Hori N, Shibuya K.	Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in low- and middle-income countries.	Cochrane Database of Systematic Reviews	Issue 2. Art. No.: CD005272.	DOI: 10.1002/14651858.CD005272.pub3.	2012
Nababan H, Ota E, Wariki WMV, Koyanagi A, Ezr oe S, Shibuya K, Tobe-Gai R.	Structural and community-level interventions for increasing condom use to prevent HIV and other sexually transmitted infections. (Protocol).	Cochrane Database of Systematic Reviews	Issue 11. Art. No.: CD003363.	DOI: 10.1002/14651858.CD003363.pub2.	2011
Shibuya K, Hashimoto H, Ikegami N, Nishi A, Tani moto T, Miyata H, Takemi K, Reich MR.	Future of Japan's system of good health at low cost with equity: beyond universal coverage.	Lancet.	378(9798)	1265-73	2011
Llano R, Kanamoto S, Kunii O, Mori R, Takei T, Sasasaki H, Nakamura Y, Kurokawa K, Hai Y, Chen L, Takemi K, Shibuya K.	Re-invigorating Japan's commitment to global health: challenges and opportunities.	Lancet.	378(9798)	1255-64	2011
Kario K, Nishizawa M, Hoshida S, Shimpo M, Ishibashi Y, Kunii O, Shibuya K.	Development of a disaster cardiovascular prevention network.	Lancet.	378(9797)	125-7	2011

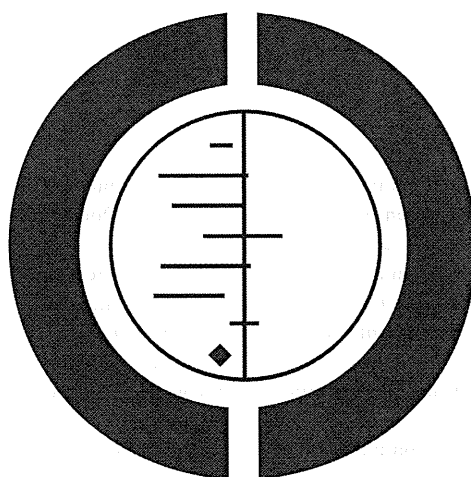
Ikegami N, Yoo BK, Hashimoto H, Matsumoto M, Ogata H, Babazono A, Watanabe R, Shibuya K, Yang BM, Reich MR, Kobayashi Y.	Japanese universal health coverage: evolution, achievements, and challenges.	Lancet.	378(9796)	1106-15	2011
Ikeda N, Saito E, Kondo N, Inoue M, Ikeda S, Satoh T, Wada K, Stickley A, Katano K, Mizoue T, Noda M, Iso H, Fujino Y, Sobue T, Tsugane S, Naghavi M, Ezzati M, Shibuya K.	What has made the population of Japan healthy?	Lancet	378(9796)	1094-105	2011
Kantipong P, Yamada N, Nampaisan O, Moolphatse S, Yanai H, Hailandarnsuthivatchakul C.	Predictors of antiretroviral therapy regimen changes in Northern Thailand	Bulletin of Department of Medical Services			2011 (in press)
Pitabut N, Mahasirimongkol S, Yanai H, Ridruechai C, Sakurada S, Dhepakson P, Kantipong P, Piyaworawong S, Moolphate S, Hansudechakul C, Yamada N, Keichon N, Okada M, Khusmith S.	Decreased granulysin and increased interferon-gamma levels in plasma of patients with newly diagnosed and relapse tuberculosis. Microbiol Immunol.	Microbiology and Immunology	55(8)	565-73	2011
Ridruechai C, Sakurada S, Yanai H, Yamada N, Kantipong P, Piyaworawong S, Dhepakson P, Khusmith S, Keichon N.	Association between circulating full-length osteopontin and IFN-γ with disease status of tuberculosis and response to successful treatment.	The Southeast Asian Journal of Tropical Medicine and Public Health	42(4)	876-889	2011

## V 章.

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# **Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries (Review)**

Ota E, Wariki WMV, Mori R, Hori N, Shibuya K



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Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries (Review)

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[Intervention Review]

## Behavioral interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries

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### ABSTRACT

#### Background

Interventions to change behaviour among sex workers and their clients have been identified as a strategy to reduce HIV transmission. However, there has been no systematic review that has examined and summarized their effects.

#### Objectives

To identify and evaluate the effects of the studies performed on behavioural interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries.

#### Search methods

Electronic searches were undertaken using MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and other databases between January 1980 and July 2010. Experts in the field were contacted to locate any other studies.

#### Selection criteria

Randomised controlled trials or specified quasi-experimental designs with comparison groups that examined the effects of behavioural interventions aimed at reducing the risk of HIV or sexually transmitted infections (STIs) transmission among sex workers in high-income countries. We reviewed studies for outcome relevance and methodological rigor.

#### Data collection and analysis

Two reviewers independently applied the inclusion criteria to potential studies, and any disagreements were resolved by discussion. Studies were assessed for completeness of reporting and extracted data.

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### **Main results**

A total of four studies were included, comprising two randomised controlled trials and two quasi-experimental pretest-posttest trials with control groups involving 1795 participants. No trials reported HIV prevalence/incidence as outcomes.

Overall, the effects of behavioural interventions for sex workers in high-income countries on STI incidence did not differ significantly among two studies using a random effects model (risk ratio (RR) 0.46, 95% confidence interval (CI) 0.11 to 1.98). Only one study found that the self-reported STI prevalence in clients of female sex workers was statistically significant (RR 0.09, 95%CI 0.01 to 0.72,  $P=0.02$ ). There was no significant difference after behavioural intervention for condom use. Two studies demonstrated the effectiveness of intervention for knowledge of HIV transmission among sex workers (RR 1.82, 95%CI 1.55 to 2.14) and clients of sex workers (RR 1.93, 95%CI 1.46 to 2.55).

### **Authors' conclusions**

There is limited evidence from randomised controlled trials for the effectiveness of behavioural interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries. Further randomised controlled trials are very likely to have important impacts on our confidence in the estimates of the effects, and are likely to change the estimates for effective interventions with outcomes of HIV incidence or prevalence and a variety of different settings among sex workers and their clients in high-income countries. Randomised controlled trials that test for the identification of effective interventions for HIV prevention with outcomes of biological endpoints, such as HIV incidence or prevalence, are needed for these neglected populations. More research is also needed for male or transgender sex workers and their clients in high-income countries.

## **PLAIN LANGUAGE SUMMARY**

### **Behavioral interventions to reduce HIV transmission among sex workers and their clients in high-income countries**

Behavioural interventions, such as individual counselling, voluntary counselling and testing, peer education, negotiation skills for using a condom with their clients, assertiveness and relationship support, discussing attitudes and beliefs, videos and role-playing, may reduce the prevalence of sexually transmitted infections (STI) and improve the knowledge of HIV transmission among sex workers and their clients.

Further randomised controlled trials that test for the identification of effective interventions for HIV prevention with outcomes of biological endpoints, such as HIV incidence or prevalence, are needed for these neglected populations. More research is also needed for male or transgender sex workers and their clients in high-income countries.



**SUMMARY OF FINDINGS FOR THE MAIN COMPARISON** [Explanation]

<b>Behavioural intervention versus control for reducing HIV transmission among sex workers and their clients in high-income countries.</b>						
<b>Patient or population:</b> Sex workers and their clients						
<b>Settings:</b> High-income countries						
<b>Intervention:</b> Behavioural intervention versus control						
Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	Comparison intervention versus control				
STI incidence for sex workers	Study population		RR 0.46 (0.11 to 1.98)	627 (2 studies)	⊕○○○ very low <sup>1,2,3,4</sup>	
	302 per 1000	139 per 1000 (33 to 598)				
	Moderate					
	268 per 1000	123 per 1000 (29 to 531)				
STI prevalence for clients of sex workers	Study population		RR 0.09 (0.01 to 0.72)	288 (1 study)	⊕⊕⊕⊕ high <sup>3,5</sup>	
	75 per 1000	7 per 1000 (1 to 54)				
	Moderate					
	75 per 1000	7 per 1000 (1 to 54)				
Condom use for sex workers	Study population		RR 1.04 (0.99 to 1.09)	1133 (3 studies)	⊕○○○ very low <sup>3,6</sup>	

	825 per 1000	858 per 1000 (817 to 900)			
	Moderate				
	729 per 1000	758 per 1000 (722 to 795)			
Condom use for clients of sex workers	Study population		RR 1.1 (0.69 to 1.75)	26 (1 study)	⊕⊕⊕○ moderate <sup>3</sup>
	706 per 1000	776 per 1000 (487 to 1000)			
	Moderate				
	706 per 1000	777 per 1000 (487 to 1000)			

\*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).  
**CI:** Confidence interval; **RR:** Risk ratio;

GRADE Working Group grades of evidence  
**High quality:** Further research is very unlikely to change our confidence in the estimate of effect.  
**Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.  
**Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.  
**Very low quality:** We are very uncertain about the estimate.

<sup>1</sup> Not randomised studies.  
<sup>2</sup> Heterogeneity is significantly different.  
<sup>3</sup> Small sample size.  
<sup>4</sup> RR is 0.46.  
<sup>5</sup> RR is 0.09.  
<sup>6</sup> Including non randomised studies.

## BACKGROUND

### Description of the condition

The HIV/AIDS epidemic continues to expand worldwide. Globally, there were an estimated 33.3 million people (range 31.4 million to 35.3 million) living with HIV in 2009, and the annual number of new HIV infections declined from 3.0 million (range 2.6 million to 3.5 million) in 2001 to 2.6 million (2.3 million to 2.8 million) in 2009 (UNAIDS 2010). Overall, 1.8 million people (range 1.6 million to 2.1 million) died from AIDS in 2009 (UNAIDS 2010).

Some of the most worrisome increases in new infections are now occurring in various high-income countries, such as those in Western Europe (UNAIDS 2010, UNAIDS 2009). The rate of newly reported HIV infections in Europe nearly doubled between 2000 and 2007 (van de Laar 2008). In the United States, the Centers for Disease Control and Prevention estimated that the annual HIV incidence has remained relatively stable since the early 1990s, although the annual number of new HIV infections in 2006 (56,300) was approximately 40% greater than previously estimated (Hall 2008). In Canada, official epidemiological estimates suggest that the annual HIV incidence may have increased between 2002 and 2005 (Public Health Agency of Canada 2007).

Sex workers are defined as female, male and transgender, whether adults or young people including adolescents, who receive money, goods or protection directly or indirectly in exchange for indoor or outdoor sexual services, such as in a brothel, street or home, either regularly or occasionally, and who may or may not consciously define those activities as income-generating. The World Health Organization (WHO) regards sex workers as one of the four key populations globally for HIV/AIDS health initiatives (WHO 2006). Sex workers are at high risk for infection with HIV, and their clients may serve as a "bridging population" by spreading HIV to the general population (Ghys 2001A). Talbott argued that the number of HIV-infected sex workers in an individual country is highly significant for explaining the HIV prevalence levels across countries in globally (Talbott 2007). National estimates of the median HIV prevalence among sex workers averaged 0.4% (range 0.1% to 1.4%) in Western Europe in 2000 (Vandepitte 2006). It has been estimated that there are around 80,000 female sex workers (FSWs) in Britain (Scambler 2007) and that less than 2% of London's FSWs are HIV-positive (Day 2006a; Day 2006b), notwithstanding reports that almost half (43%) of new diagnoses of HIV in the United Kingdom in 2005 occurred in London (UNAIDS/WHO 2006).

In general, the living and working conditions of sex workers could result in a variety of interrelated risk factors for HIV infection as follows: a large number of different sexual partners, and hence exposure to many other sexually transmitted infections (STIs) that could increase the probability of acquiring or transmitting HIV; unprotected sexual activity, often because clients or private partners refuse to use condoms; and drug injection by either the sex

workers or her sexual partners (Estebanez 1993). Violence against sex workers mediated by partners, family or the community was reported to have a relationship with an increased risk of STIs in San Francisco (Cohan 2006).

Migrant sex workers have become a bridging population in the global spread of HIV/AIDS in various high-income countries (Parrado 2004A, O'Connor 1996), and their mobility causes problems for the establishment of support networks and ongoing medical care (Mardh 1999, Church 2001, Wolffers 2002). An Australian study showed a higher risk of STIs and lower rates of condom use for international sex workers than for local sex workers (O'Connor 1996). Higher HIV rates were also found in foreign transsexual sex workers in Rome (Spizzichino 2001). Migrant sex workers face cultural, social, legal and linguistic obstacles to accessing services and information (WHO 2005).

### Description of the interventions

Many clients of sex workers refuse to use condoms during sexual relations (Estebanez 1993). Condoms comprise one of the most efficacious methods for reducing the risk of transmission of agents of STIs, including HIV infection (Sarkar 2008). Female condoms are accepted by sex workers (Denlaud 1997, Michael 2005), but are associated with major difficulties including cost and poor availability. Continued use of female condoms has not been easy, because some populations have not been receptive to these condoms owing to concerns about the unfamiliar appearance, reported discomfort from the inner ring, high cost and prejudice against their use by providers (Mantell 2005). In Amsterdam, a survey of men recruited from an STI clinic who had had relations with sex workers in the preceding 4 months found that less than half of these men always used condoms during vaginal intercourse with sex workers, and only 7% used condoms with their private sexual partners (Hooykaas 1989).

Injecting drug use is the major risk factor associated with HIV infection among sex workers in Western countries (Estebanez 1993). In most cases, infection among injecting drug users probably results from sharing contaminated syringes or needles, although some women may have acquired HIV through sexual contact with a drug-using partner. Furthermore, non-injected recreational drugs may also cause people to fail to practice safer sex, thereby contributing to HIV transmission. A number of investigators have reported that the disinhibiting effects of alcohol and other drugs decrease the likelihood of using condoms, and may increase the tendency to engage in higher-risk forms of sexual activity (Robertson 1988, Harcourt 1990, Plant 1990). Among 118 sex workers studied in New York from 1985 to 1987, 31% of those who injected drugs versus only 7% of those who did not were HIV-positive (Wallace 1987). A European survey of 866 sex workers from nine European centres (Amsterdam, Antwerp, Athens, Copenhagen, Lisbon, London, Paris, Vienna and eight cities in Spain) carried out from 1990 to 1991 found that the HIV

seroprevalence was 32% among women who were injecting drug users and <2% among women who did not inject drugs (European Working Group 1992). Similarly, a survey of 208 street-based sex workers in Glasgow found that 59% injected drugs (McKeganey 1990).

In regions where HIV infection is rare among FSWs, surveillance of risk behaviour and STIs will indicate the potential for spread of HIV infection (UNAIDS/WHO 2006). Surveillance of behaviour, STIs and HIV among sex workers is important, because the results may indicate the success or failure of the national response to the epidemic, including targeted programs to encourage safe sex between sex workers and clients (Ghys 2001). Interventions to change behaviour among sex workers and their clients have been identified as a strategy to reduce HIV transmission. Fisher et al (Fisher 2006a, Fisher 2006b) concluded that critical components of interventions included not only information but also motivation and skills. Vaginal use of topical microbicides by women helps to reduce the transmission of HIV (Poynten 2009) and other STIs (Behets 2008). Interventions for management of STIs were based on clinical diagnosis and serologic tests for herpes simplex virus type 2 (HSV-2) with a monoclonal blocking enzyme immunoassay (Kamali 2003).

Many sex workers experience violence and fear of arrest under illegal conditions, and may give lower priority to their health needs and behaviour changes, compared with more immediate concerns for their safety and survival (WHO 2005, Alexander 1998).

#### **How the interventions might work**

A previously conducted meta-analysis in developing countries showed that behaviour change interventions effectively reduce HIV transmission for sex workers (Merson 2000). Voluntary counselling and testing (VCT) for HIV has been associated with increased condom use, reduced number of partners, and decreased HIV in sex workers and clients (Merson 2000). These effects result from behaviour changes following education, support and knowledge of one's HIV status. Care programmes and participation in research can have similar effects (Michael 2005).

Male condoms reduce HIV and STI transmission in sex workers (Hananberg 1994, Holmes 1994, Donovan 2004) and prevent STI complications, such as pelvic inflammatory disease (Ness 2004). A reliable and accessible supply of good quality condoms is essential (UNAIDS 2002, Merson 2000, Michael 2005). Condom promotion, distribution and social marketing result in increased condom use and reduced STI and HIV infection rates, especially in FSWs (Merson 2000). Local culture, language and traditions should also be considered (Gerofi 1995). Female condoms have successfully prevented pregnancy and reduced STI transmission in analytical studies (Denlaud 1997, Fontanet 1998, French 2003), and there is *in vitro* evidence and biological plausibility for HIV prevention (Denlaud 1997).

Education for sex workers may improve healthy behaviour by delivering the basic facts about disease, dispelling myths, and offering healthy lifestyle and work options (Michael 2005). Education may effectively reduce drug use, disease, violence, debt and exploitation (O'Connor 1996, Merson 2000, Vanwesenbeeck 2001, UNAIDS 2002). Peer education has resulted in substantial increases in STI and HIV knowledge, condom use and safer sex practices, and reduced the incidence of HIV and STIs (Vanwesenbeeck 2001, UNAIDS 2002, Michael 2005).

Community development has been successful in the promotion of safe sex, identification of injustice, support for HIV-infected workers, enhancement of self-esteem, cooperation with police and controllers, provision of legal and financial training, initiation of alternative income-generation schemes, and support for migrants and human rights (UNAIDS 1999, UNAIDS 2002, Michael 2005). Successful initiatives have resulted in enhanced self-esteem, improved negotiating skills, ability to refuse clients, access and use of condoms, training to recognize, avoid and escape violence, STI and HIV preventive services, safe houses, drop-in centres and STI treatment through pharmacies (UNAIDS 1999, Vanwesenbeeck 2001, Williamson 2001, UNAIDS 2002).

#### **Why it is important to do this overview**

The settings in which sex workers work, as well as the behavioural characteristics of these sex workers and their clients, may differ between the high-income developed world and low- and middle-income developing world. Hence, the intervention strategies may also be different.

Behavioural interventions are being undertaken in various regions of high-income countries (Dorfman 1992). However, there has been no systematic review that has examined and summarized their effects. Therefore, this systematic review was undertaken to assess the available evidence regarding behavioural interventions to prevent HIV transmission among sex workers in high-income countries.

## **OBJECTIVES**

- To identify the studies performed on behavioural interventions to reduce the transmission of HIV infection among sex workers and their clients in high-income countries.
- To evaluate the effects of behavioural interventions on reducing the transmission of HIV infection among sex workers and their clients in high-income countries.

## **METHODS**