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AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/caic20>

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Version of record first published: 27 May 2010.

To cite this article: U. Laukamm-Josten , B. K. Mwizarubi , A. Outwater , C. L. Mwaijonga , J. J. Valadez , D. Nyamwaya , R. Swai , T. Saidel & K. Nyamuryekung'e (2000): Preventing HIV infection through peer education and condom promotion among truck drivers and their sexual partners in Tanzania, 1990-1993, AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV, 12:1, 27-40

To link to this article: <http://dx.doi.org/10.1080/09540120047440>

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Preventing HIV infection through peer education and condom promotion among truck drivers and their sexual partners in Tanzania, 1990–1993

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Abstract HIV prevention through peer education and condom promotion among truck drivers and their sexual partners is described. Trends during an initial 18-month intensive phase, followed by a 24-month maintenance phase, were monitored with surveys. Trends for self-reported condom use were: increase among men (56 to 74%) during the first phase with a decrease (72%) during the maintenance phase. Respective figures for women were 51%, 91% and 70%. Multivariate analyses revealed that men most likely to report using condoms were unmarried, had children, were more educated, had previously reported a genital ulcer, and perceived themselves at risk for HIV infection (OR = 1.95–3.47). Women tending to use condoms were unmarried, aware of the limitations of condoms, not in denial as to the existence of HIV, harboured inaccurate information about HIV transmission and were afraid (OR = 1.35–2.52). Both sets of results suggest that the most sexually experienced men and women who did not have a permanent stable relationship and who perceived themselves at risk, were most likely to use a condom. Peer education was an effective tool for increasing knowledge and encouraging appropriate behaviour change. It was most effective as an intensive high-input intervention and sustainable with the relatively stable population of truck drivers.

Introduction

Tanzania has been greatly affected by the HIV/AIDS epidemic. Of mainland Tanzania's 10 million adults (ages 15–54, total population = 24 million), an estimated 800,000 were HIV

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infected in 1990; in 1996, 1.35 million people were infected (Anonymous, 1996). Eight years of human development may have been lost in Tanzania due to AIDS (Bloom *et al.*, 1996).

Truck drivers and their assistants, bar/hotel workers and commercial sex workers (CSWs) have been associated with the high risk of acquiring and transmitting HIV infection in East Africa (Carswell *et al.*, 1989; Kreiss *et al.*, 1986; Lamptey, 1991; Ngugi *et al.*, 1988; Nzyuko *et al.*, 1991; Plummer *et al.*, 1991; Van de Perre *et al.*, 1985). In 1986, a sample of East African lorry drivers and their assistants were found to have an HIV-1 infection rate of 35% (Carswell *et al.*, 1989). In Tanzania, in the same year, female bar workers in Dar es Salaam were found to be 29% HIV infected (Mhalu *et al.*, 1991); in 1991–1993, 56% of women working at truckstops, 28% of truck drivers at truckstops and 13% at trucking companies in Dar es Salaam were HIV-1 infected (Laukamm-Josten *et al.*, 1992).

Prevention of further HIV transmission through interventions targeting these groups has been a priority from the beginning of the pandemic (Carswell *et al.*, 1989; Kreiss *et al.*, 1986; Lamptey, 1991; Ngugi *et al.*, 1988; Nzyuko *et al.*, 1991; Plummer *et al.*, 1991; Van de Perre *et al.*, 1985). The assumption is that reduction of risk within core groups has a direct impact on that target population, but also on secondary populations such as the wives of truck drivers. A project designed by Family Health International/AIDSTECH and the African Medical and Research Foundation (AMREF) began implementation in 1990. The project aimed to decrease high-risk sexual behaviour and improve appropriate STD (sexually transmitted diseases) care seeking behaviour among truck drivers, their assistants and sexual partners. Peer educators (PEs) were trained to disseminate information about HIV/AIDS and its prevention, to promote condom use and to distribute Health Learning Materials (HLMs).

Despite the fact that communication for behaviour change through peer health education has become one of the major strategies in HIV/AIDS prevention (Lamptey, 1991) and the World Health Organization has identified peer projects as some of the most successful approaches in promoting and assisting behaviour change (WHO, 1993; 1995), descriptions of how the method has been implemented and discussions of its validity as a public health intervention strategy are not common in the literature. This paper describes the peer education component of the AMREF Truck Driver Project in Tanzania from 1990 to 1993, and the results of its evaluation. The introduction of STD services have been reported elsewhere (Nyamuryekung'e *et al.*, 1997). This paper reports an intervention that has been used as a prototype in many parts of Africa and elsewhere.

Methods

This intervention took place in seven major truckstops along the TanZam Highway which connects Tanzania to eight neighbouring countries. The intervention also included three trucking companies in Dar es Salaam. During 1990–1993, six of the seven truckstops increased numbers of bars, hotels, guest houses and bar workers on average by 178%, while the number of sleeping rooms and trucks per night did not change.

The client group consisted of approximately 1,200 women working in bars and hotels in truckstops, and 450 long-distance truck drivers based in three companies. Also included were as many as 40,000 truck drivers using the highway. Each truck typically had a minimum of one driver and one assistant. The project was divided into two parts: an initial 18-month intensive phase, and a maintenance phase of 24 months. The main strategy was peer education. PEs, who were mostly CSWs, delivered verbal messages to peers (i.e. other CSWs and truck drivers) which were reinforced by HLMs. PEs also promoted condom use and encouraged health-seeking behaviour for STDs.

Selecting and training peers

The PEs were identified, trained and coached by two Master's degree level health behaviour officers (HBOs). Their entrance into the communities and companies took place in steps. First, the Ministry of Health/National AIDS Control Programme wrote letters of introduction to regional political leaders. Second, the HBOs met regional government and party leaders to familiarize them with the project. Third, regional leaders and area health workers introduced the project into the community or company through a motivator's seminar. During the seminar, HBOs requested business owners to support the project and permit employees to attend a meeting at a later date.

Fourth, at truckstops, HBOs, identified all bars, guesthouses, *pombe* (locally brewed alcohol) shops, disco halls, truck stands, brothels, and drew them on a map. Patterns and focal points of interactions were observed. Fifth, HBOs talked to potential PEs, local leaders and owners of bars, hotels, guesthouses, and informed them of the aims of the project.

Sixth, client group members were invited to attend a meeting. Owners and government leaders were usually excluded so that members would speak freely. Members of this meeting selected two or three people from among themselves to be trained as PEs. Criteria for selecting PEs included social skills, acceptability and respect by the group, ability to discuss sensitive issues openly, friendliness and kindness, able to attract peers by being a role model, ability and interest to donate time to community service, and functional literacy. PEs at the truckstops were usually female bar and guesthouse workers and male petrol station workers. At the trucking companies they were usually social welfare and transport officers. PEs were not paid a salary, although in the maintenance phase they received a small transport allowance (\$3/month) for condom distribution.

The PEs received three types of in-service training: an orientation session, zonal workshops and a central workshop. The orientation sessions covered: HIV transmission and prevention, use of monitoring forms, use of a wooden penis model and other methods to teach peers correct condom use. Small group discussions and role plays helped to improve condom negotiation skills. Thereafter, HBOs travelled periodically to give on-site training and support to PEs at their sites. During the intensive phase, HBOs visited each PE at least once a month.

After six months, PEs attended a five-day zonal workshop and discussed issues of HIV/AIDS control relevant to their area. Later, PEs were trained in STD risk identification, promotion of treatment-seeking by their peers at local health units, elementary counselling and condom social marketing skills. HBOs organized focus groups at truckstops with the owners, managers and bar staff at bars to discuss ways to improve programme implementation. Group discussions explored issues such as: condom storage, condom expiration dates, condom use by uncircumcised males, condom breakage, safe sex practices, acceptability and psychological effects of masturbation, and anal sex.

After a year, a central five-day workshop for PEs was held to facilitate exchange of experiences and completed the training. PEs presented zonal implementation reports, compared and discussed problem areas, including women and AIDS, cultural influences on HIV risk, and the social and economic impact of AIDS.

During the 24-month maintenance phase, HBOs reduced the frequency of training and supervision, visiting PEs once a quarter. Although the number of PEs doubled, training decreased by almost two-thirds. In the intensive phase, 13 PEs received 54 training sessions including orientation seminars, on-site training, zonal and central workshops. In the maintenance phase, 23 PEs received 16 training sessions. The project lost five PEs: two developed AIDS and three could not cope with the demands of being a PE.

HLMs were developed and pre-tested with extensive PE involvement (Kohler *et al.*, 1992; Kohler & Romocki, 1992; Romocki *et al.*, 1992). Messages focused on HIV transmission through especially sexual intercourse, and prevention especially through condom use (e.g. 'AIDS has no cure but it is preventable', 'Sexual intercourse is a transmission route for HIV', 'Condoms protect you from AIDS', 'Think of your family. Avoid AIDS', 'Condoms show you care', 'You cannot live on hopes alone, use condoms').

Condoms were not often available through commercial outlets in 1990. The Ministry of Health distributed condoms only at hospitals. The project extended the government system of distribution into hotel bedrooms, bars and company bathrooms. Verbal messages were reinforced with posters, stickers, pamphlets, booklets, flip charts, audio-cassettes, dramas and video shows. Although condoms were accepted in mid-1990, people were shy to ask for condoms in public. By early 1991, truck drivers often put white boxes of condoms on the windscreen, 'to assure barmaids that we constantly use condoms and are therefore safe. It attracts them.' The quantities of condoms distributed directly to drivers and through trucking companies dropped slightly during the maintenance phase, while distribution at bars and directly to women increased. At the same time, condom availability increased all over the country and condom social marketing was started. Condom breakage continued to be an issue throughout the project life. The Tanzania Bureau of Standards tested all incoming lots of condoms. Nevertheless, the possibility remains that condoms, due to deficiencies in transport or storage, may have sometimes been sub-standard. Testing at distribution sites was not done.

Survey and sample selection

KAP (Knowledge, Attitude and Practice) surveys were conducted three times during the intervention: KAP I was baseline data; KAP II was collected 18 months later after an intensive intervention; KAP III was collected after 24 months of maintenance activities. The KAP questionnaire included questions with structured option responses for demographic characteristics, HIV/AIDS knowledge, attitudes about HIV/AIDS, condom use, sexual practices, risk perception and history of STD episodes. A set of questions, without structured option responses, were also included. Spontaneous answers to these questions, such as *What transmission routes do you know?*, were recorded as *Mentioned Yes/No*. Prompted responses to questions like *Do you think mosquitoes transmit HIV?* were also recorded as *Yes/No*. Results for both types of questions from the surveys were aggregated as percentages of affirmative responses. A *regular partner* was defined as one having an ongoing sexual relationship with financial obligations such as paying rent, providing food, or child support, but was not a spouse or co-habiting partner. A *casual partner* was one without any continuing obligation.

Students from the university were interviewers. Six of eight interviewers participated in all KAP surveys. Initially, they were trained for two days on basic HIV/AIDS/STD information and the questionnaire to be used. Refresher training was held before the other surveys.

All respondents understood that participation was voluntary and anonymous. At truck-stops, bar owners and guesthouse managers acted as key informants, who introduced the interviewers to convoy leaders who then facilitated the interviews. At each truck stop all drivers and their assistants, who accepted the invitation, were interviewed, excluding men already interviewed elsewhere. At trucking companies, respondents were selected through systematic random sampling from an alphabetical employee list.

Sample sizes of men were: 1990 (KAP I) 425; 1991 (KAP II) 198; and 1993 (KAP III) 305. Assuming that sampling techniques approximate the variation of a simple random sample, and a 95% confidence level, corresponding precision of proportions calculated with

these samples are: $\pm 5\%$, $\pm 7\%$, $\pm 5\%$, respectively. Sample sizes vary due to budgetary constraints during KAP II.

Female respondents were women working at truckstops, bar/guest houses, and commercial sex workers. A two-stage cluster sample was used to select respondents. At each truck stop all mapped bars, guesthouses and brothels were listed and numbered; 10 per truckstop were randomly selected. From each selected unit, names of all females were written on a piece of paper, providing the sampling frame from which at least half the names were randomly selected. Samples were: 304 women for KAP I; 121 for KAP II; 318 for KAP III. Assuming a 95% confidence level, corresponding precision of proportions calculated with these samples are: $\pm 6\%$, $\pm 9\%$, $\pm 5\%$, respectively.

Analyses were carried out using Epi Info Version 5 and SAS 3.00. Chi-square tests for trend were calculated to assess variations of key variables across time. Separate multivariate analyses were performed to assess the relationship of condom use with other characteristics. Four sets of logistic models corresponding to the independent variables of each table were constructed, the condom use variables of Table 1 was the dependent variable (Schlesselman, 1982). A reduced model was developed by including only independent variables that had relative odds significantly different from 1. Neither HIV testing nor extending collection of survey data from a control group in non-intervention sites were achievable in this study.

Results

Demographics

Sociodemographic characteristics of persons interviewed were not significantly different in the surveys except for a few exceptions listed below. The men were older, more often married, more highly educated and had steadier jobs with higher incomes than the women. The majority of both sexes had children.

Median age of men was 32 (range 18–65 years); all were truck drivers or assistants. Seventy per cent were married. The majority had worked in their jobs for more than five years. In the last survey significantly more drivers were beginners or up to two years in the job (26.5%). More had completed eight years of primary education in 1993 as compared with 1990 (72.8% versus 61.8%). In 1990, 16.6% earned more than 30US\$ per month; by 1993 62.6% earned this amount.

Median age of women was 24 years (range 15–50 years). They had a variety of primary jobs ranging from bar and guest house attendants to small businesses to farming. From 1990 to 1993, women shifted significantly into small business, including *pombe* brewing. While the majority was not married, this proportion was significantly higher in the second survey. This can be attributed to the fact that due to the restriction in the number of interviews in 1991 more bar/guest house attendants were interviewed than women with other occupations (e.g. small business owners, brewers, 1991: 78.5%, 1990: 53.5%, 1993: 49.4%). About 20% maintained their job for more than five years; in 1993 the proportion of newcomers (< 1 year) was significantly higher (41.8%). The women had significantly increased their income by 1993: however, not to the level of men (women < \$10 per month = 56.3%; men < \$10 per month = 5.3%).

Knowledge, attitudes and perceptions of HIV/AIDS

Even before the intervention began, more than 95% of the client group knew sexual intercourse was a mode of HIV transmission (Table 1). Misconceptions about transmission, although prevalent, decreased over time. Positive attitudes became more prevalent (Table 2).

Table 1. Chi-square analyses of variation in knowledge about HIV transmission among truck drivers and their sexual partners

Spontaneous responses	Year	Males		Females	
		Knowledgeable (%)	OR	Knowledgeable (%)	OR
Intercourse	1990	97.4	1.00	93.4	1.00
	1991	100.0	N/A	97.5	2.77 (0.80–14.80)
	1993	99.0	2.67 (0.70–15.04)	97.2	2.42 (1.03–5.84)
			χ^2 3.61 $p = 0.058$		χ^2 5.247 $p = 0.022$
Needles/syringes	1990	55.8	1.00	33.6	1.00
	1991	70.7	1.91 (1.31–2.79)	71.1	4.87 (3.00–7.92)
	1993	37.7	0.48 (0.35–0.66)	36.5	1.14 (0.81–1.60)
			χ^2 19.00 $p < 0.001$		χ^2 11.54 $p < 0.001$
Mother to child	1990	27.4	1.00	11.2	1.00
	1991	30.3	1.15 (0.78–1.70)	34.7	4.22 (2.44–7.32)
	1993	3.0	0.08 (0.04–0.17)	6.3	0.05 (0.53–0.99)
			χ^2 59.43 $p < 0.001$		χ^2 3.51 $p < 0.061$
Prompted responses	Year	Misconception (%)	OR	Misconception (%)	OR
Shaking hands	1990	40.7	1.00	42.4	1.00
	1991	15.2	0.26 (0.17–0.41)	10.7	0.16 (0.08–0.31)
	1993	17.4	0.31 (0.21–0.44)	19.2	0.32 (0.22–0.47)
			χ^2 52.77 $p < 0.001$		χ^2 41.73 $p < 0.001$
Mosquitos	1990	55.5	1.00	61.8	1.00
	1991	51.0	0.83 (0.59–1.19)	52.1	0.67 (0.43–1.05)
	1993	43.3	0.61 (0.45–0.83)	45.3	0.51 (0.37–0.71)
			χ^2 10.512 $p < 0.001$		χ^2 17.071 $p < 0.001$
Healthy person can't be infected	1990	12.6	1.00	22.1	1.00
	1991	40.4	4.71 (3.08–7.20)	42.1	2.57 (1.59–4.13)
	1993	42.3	5.09 (3.47–7.47)	48.1	3.27 (2.27–4.70)
			χ^2 81.954 $p < 0.001$		χ^2 44.996 $p < 0.001$

The proportion of truck drivers ≥ 25 years of age who perceived themselves at risk for HIV infection increased from 54.5% to 62.1% (Table 3). Regarding the risk perceptions of the under 25 years age group and among women, the proportion for any age group did not increase significantly.

Reported STDs and condom use

Increasing proportions of both men and women reported having had an STD episode. Reported STDs increased among men (40.2% to 56.7%) and women (15.5% to 36.8%) from 1990 to 1993, respectively.

Table 2. Attitudes towards people with HIV/AIDS and willingness to take anonymous HIV test among truck drivers and their sexual partners

	Year	Males		Females	
		Responding yes (%)	OR	Responding yes (%)	OR
Knows someone with AIDS	1990	69.9	1.00	26.6	1.00
	1991	53.0	0.49 (0.34–0.70)	46.3	2.38 (1.50–3.78)
	1993	62.6	0.72 (0.52–1.00)	53.1	3.14 (2.21–4.45)
			χ^2 5.21 $p < 0.022$		χ^2 45.243 $p < 0.001$
Willing to live in same house	1990	66.7	1.00	43.3	1.00
	1991	79.3	1.91 (1.26–2.90)	85.1	7.50 (4.20–13.53)
	1993	90.8	4.93 (3.11–7.84)	79.9	5.20 (3.58–7.56)
			$\chi^2 = 58.736$ $p < 0.001$		χ^2 90.235 $p < 0.001$
Willing to eat together	1990	57.6	1.00	33.5	1.00
	1991	65.2	1.38 (0.95–2.00)	66.9	4.02 (2.45–6.63)
	1993	69.5	1.68 (1.21–2.33)	52.5	2.20 (1.52–3.19)
			χ^2 10.54 $p < 0.001$		χ^2 15.888 $p < 0.001$
Willing to share toilet	1990	53.1	1.00	28.1	1.00
	1991	66.7	1.76 (1.21–2.56)	67.8	5.39 (3.24–8.99)
	1993	56.1	1.13 (0.82–1.54)	41.5	1.82 (1.24–2.68)
			χ^2 0.867 $p = 0.35176$		χ^2 6.777 $p = 0.00924$
Agreed to HIV test	1990	86.6	1.00	81.9	1.00
	1991	66.7	0.31 (0.20–0.47)	83.5	1.12 (0.62–2.03)
	1993	68.5	0.31 (0.21–0.46)	97.2	7.58 (3.53–16.80)
			χ^2 41.275 $p = 0.00000$		χ^2 36.268 $p = 0.00000$

During 1990 to 1991, the proportion of respondents who had *ever used condoms* increased significantly among men and women. In 1993, the proportions of men and women decreased, but not to pre-intervention levels. Between the intensive phase and maintenance phase, the proportion of men and women reporting consistent condom use (*used always last five times*) with casual sexual partners increased. With regular sexual partners the proportion also increased. After the maintenance phase, respective figures were lower but still significantly higher than at baseline. The above patterns were also evident among men and women for *used a condom at least once in the last five contacts* (Table 4).

The likelihood of both partners proposing condom use increased significantly. An increasing proportion of both men and women reported that the partner refused to use condoms (men: 22.2%, 23.3%, 39.9%; women 21.5%, 35.5%, 42.6%).

Analyses revealed strong colinearity of the five condom use variables. Therefore, one single dependent variable was used, '*ever used a condom*'. Table 5 lists odds ratios (OR) for 12 variables included in the bivariate logistic regression analyses of condom use. Out of 12 variables, eight for both men and women were significantly associated with condom use. In multivariate analyses, five variables remained for men, the adjusted odds ratio was 2.09 (CI = 1.95–3.47). For women, four variables remained: the adjusted odds ratio was 1.85 (CI = 1.35–2.52).

Table 3. Risk perception among truck drivers and their sexual partners

	Year	Males		Females	
		Responding yes (%)	OR	Responding yes (%)	OR
Perceive truck drivers at risk	1990	93.9	1.00	89.8	1.00
	1991	93.9	1.01 (0.48–2.17)	98.3	6.76 (1.67–59.02)
	1993	92.8	0.84 (0.45–1.57)	90.3	1.05 (0.60–1.83)
			χ^2 0.33 $p < 0.567$		χ^2 0.03 $p < 0.863$
Perceive bar/guest house attendants at risk	1990	95.5	1.00	91.1	1.00
	1991	99.0	4.59 (1.09–40.93)	98.3	5.80 (1.41–50.98)
	1993	97.4	1.74 (0.25–1.76)	95.0	1.84 (0.93–3.66)
			χ^2 2.427 $p < 0.119$		χ^2 3.963 $p < 0.046$
Perceive self at risk (< 25 yrs of age)	1990	58.2	1.00	65.1	1.00
	1991	48.3	0.67 (0.25–1.76)	77.0	1.80 (0.92–3.53)
	1993	64.5	1.31 (0.60–2.83)	68.6	1.17 (0.73–1.89)
			χ^2 0.495 $p < 0.481$		χ^2 0.499 $p < 0.480$
Perceive self at risk (≥ 25 yrs of age)	1990	54.5	1.00	70.9	1.00
	1991	67.5	1.73 (1.16–2.59)	72.3	1.09 (0.49–2.43)
	1993	62.1	1.37 (0.97–1.31)	73.8	1.17 (0.67–2.04)
			χ^2 4.34 $p < 0.037$		χ^2 0.347 $p < 0.556$
Perceive self at risk (all ages)	1990	55.1	1.00	67.8	1.00
	1991	64.6	1.49 (1.04–2.15)	75.2	1.44 (0.87–2.39)
	1993	62.6	1.37 (1.00–1.87)	71.1	1.17 (0.82–1.67)
			χ^2 4.719 $p < 0.030$		χ^2 0.793 $p < 0.373$

Discussion

Peer education has been used with many different client groups in HIV/AIDS prevention in Africa (Bocoum *et al.*, 1994, Hayman *et al.*, 1996, Nichols *et al.*, 1989, Ramakhula *et al.*, 1990). The concept behind peer education is that people with common experiences, interests and lifestyles are more effective teachers within that group than are outsiders. Since PEs share concerns, values and norms of the client group, they are credible, trusted and have access to the group. Since PEs are selected from within the group, they can continuously reinforce messages in culturally appropriate ways, times and places. Successful peer education ensures that the distance of the intervention to actual risk taking is minimized (Laukamm-Josten, 1996).

The project included two client groups at truckstops: truck drivers and their sexual partners. Men often visited the same women as they passed along their routes (O'Connor *et al.*, 1991). Women did not see themselves as CSWs, however, many juggled several regular partners and occasionally casual partners. This life style was an economic survival strategy not uncommon in Tanzania (Mmari, 1993).

Although truckstops expanded, women at the truckstops complained of fewer partners. This may have been because of increasing numbers of CSWs, but may have been also early evidence of the trend seen at that time—a male-instigated reduction of partners due to fear of HIV/AIDS (Jackson *et al.*, 1997; Pool *et al.*, 1996). The percentage of truck drivers working more than five years as truck drivers decreased over time and coincided with the

Table 4. *Reported condom use and frequency of condom use among truck drivers and their sexual partners*

	Year	Males		Females	
		Responding yes (%)	OR	Responding yes (%)	OR
Ever used condoms	1990	56.1	1.00	50.7	1.00
	1991	73.7	2.20 (1.49–3.25)	90.9	9.72 (4.84–20.00)
	1993	71.5	1.96 (1.41–2.73)	70.0	2.27 (1.60–3.22)
			χ^2 19.51		χ^2 23.46
			$p < 0.001$		$p < 0.001$
At least once in last five times with casual partner	1990	37.3	1.00	38.6	1.00
	1991	66.7	3.36 (2.26–5.00)	87.6	11.27 (5.79–22.33)
	1993	63.8	2.96 (2.10–4.17)	58.0	2.20 (1.52–3.18)
			χ^2 48.148		χ^2 20.506
			$p < 0.001$		$p < 0.001$
At least once in last five times with regular* partner	1990	27.3	1.00	30.2	1.00
	1991	53.6	3.08 (2.09–4.55)	74.8	6.85 (2.05–5.64)
	1993	48.3	2.50 (1.75–3.56)	46.6	2.02 (1.41–2.89)
			χ^2 31.83		χ^2 14.874
			$p < 0.001$		$p < 0.001$
Always used last five times with casual partner	1990	19.8	1.00	18.4	1.00
	1991	48.5	3.82 (2.54–5.76)	56.2	5.68 (3.36–9.61)
	1993	43.6	3.13 (2.17–4.52)	32.2	2.11 (1.37–3.24)
			χ^2 44.432		χ^2 12.245
			$p < 0.001$		$p < 0.001$
Always used last five times with regular* partner	1990	12.6	1.00	11.5	1.00
	1991	34.6	3.68 (2.33–5.81)	42.6	5.71 (3.28–9.95)
	1993	30.2	3.00 (1.95–4.62)	29.4	3.2 (2.01–5.12)
			χ^2 29.905		χ^2 24.188
			$p < 0.001$		$p < 0.001$
Carry condoms	1990	46.1	1.00	32.7	1.00
	1991	73.2	3.19 (2.17–4.71)	87.6	14.51 (7.75–27.57)
	1993	63.3	2.01 (1.47–2.76)	63.7	3.61 (2.54–5.13)
			χ^2 23.77		χ^2 55.461
			$p < 0.001$		$p < 0.001$

*Excluded spouses and cohabiting partners.

complaints of transport company managers who claimed they were losing their most experienced drivers due to AIDS (personal communication).

Reported STD episodes and symptoms increased significantly from one KAP survey to the next. We attribute this increase primarily to increased knowledge, awareness and care seeking. The same has been found in other programmes (Mens, 1996) and may be counted as an early sign of behaviour change.

By 1991, condom use had increased from 56% to 74% in men and continued at the same level in 1993 (72%). Among women, the increase was even higher, from 51% to 91%, but dropped to 70% in 1993. This drop may reflect the influx of new recruits into the female target population during the intervention's maintenance phase. The reduction in study participants in KAP II might have affected the positive outcome in women in 1991, because a higher proportion of core group of CSWs was recruited. This group had a lower proportion of married women and received most of the attention in the intensive phase.

Achieved levels of condom use were far higher than levels reported in the general

Table 5. Odds ratios (OR) in logistic regression model for factors related to condom use among truck drivers and their sexual partners

	Males				Females			
	Univariate		Multivariate		Univariate		Multivariate	
	OR	(95 % CI)	OR	(95 % CI)	OR	(95 % CI)	OR	(95 % CI)
Older age	0.46*	(0.23–0.93)	0.95	(0.88–1.02)	0.37*	(0.24–0.59)	0.97	(0.90–1.04)
Job length	0.60	(0.36–1.00)	1.00	(0.95–1.05)	0.89	(0.56–1.42)	1.04	(1.00–1.08)
Self risk perception	1.87*	(1.27–2.76)	1.10*	(1.02–1.19)	2.44*	(1.56–3.82)	1.02	(0.93–1.11)
Not married	2.03*	(1.45–2.85)	1.22*	(1.09–1.35)	3.32*	(2.31–4.76)	1.25*	(1.14–1.38)
Having children	0.84	(0.60–1.19)	0.81*	(0.73–0.91)	0.71	(0.49–1.02)	1.04	(0.95–1.15)
Positive attitude for PWA	1.10	(0.76–1.59)	0.98	(0.95–1.02)	2.66*	(1.74–4.09)	1.05*	(1.01–1.09)
More education	2.07*	(1.46–2.93)	1.07*	(1.01–1.14)	1.56*	(1.10–2.21)	1.05	(1.00–1.11)
Reporting syphilis	3.68*	(1.46–9.87)	1.06	(0.92–1.21)	1.95	(0.69–5.97)	1.00	(0.85–1.16)
Reporting urethritis/discharge	2.02*	(1.46–2.80)	1.07	(0.98–1.16)	2.82*	(1.52–5.29)	1.05	(0.94–1.18)
Reporting ulcer	3.23*	(1.59–6.69)	1.19*	(1.03–1.37)	4.00*	(1.32–13.57)	1.02	(0.86–1.21)
Experienced burst condom	NA		1.00	(0.92–1.08)	NA		1.19*	(1.10–1.29)
Heard condom HIV contaminated	1.72*	(1.16–2.57)	1.07	(0.98–1.17)	4.16*	(2.08–8.52)	1.18*	(1.07–1.31)

*Statistically significant; NA = not available (2×2 table with cell containing zero).

population in 1991 and 1992 (7% in women (age 20–24 years) and 6% in men (age 30–34 years) (Ngallaba *et al.*, 1993). In 1994, 18% of women and 29% of men nationally reported condom use (Weinstein *et al.*, 1995).

Condom use was most frequent with casual partners and least frequent with regular partners. Many of the project's messages promoted condom use, especially with 'casual', unknown sex partners, and so may have undermined the idea of using condoms with regular partners. This pattern has been shown elsewhere (Borgdorff *et al.*, 1994).

An increasing proportion of men and women carried condoms as the intervention progressed. This may be an indication of adapting safer sexual behaviour. The likelihood of both males and females requesting condom use also increased. Fear that condoms might be impregnated with HIV was a widespread belief among condom users (Nicoll *et al.*, 1993; Pool *et al.*, 1996) and contributed to the unpopularity of condoms. Also, as condoms were associated with unfaithfulness (Pool *et al.*, 1996), this perception explains why condom use with regular partners was always significantly lower than with casual partners.

The logistic regression analyses refined our understanding of variables with greatest predictive power of condom use. Among men, those most likely to report using condoms were unmarried, had children, were more educated, had previously reported a genital ulcer, and perceived themselves at risk. In short, these men recognized their own high-risk behaviour, had dependants and were concerned they were HIV infected. Women tending to use condoms were unmarried, were aware of limitations of condoms (e.g. experiencing a burst condom), were not in denial as to the existence of HIV (i.e. they had developed positive attitudes for people with AIDS), and yet still harboured incomplete and inaccurate information about transmission. Both these sets of results suggest that the most sexually experienced men and women, who did not have a permanent stable relationship, and who potentially perceived themselves at risk, were most likely to use condoms (Table 5). However, these people also have the greatest likelihood of already being HIV infected.

Our findings are similar to those predicting condom use of factory workers in Mwanza, despite the contrasting low overall use of condoms in that group (Borgdorff *et al.*, 1994). Contrary to factory workers, truck drivers and their sexual partners changed behaviour towards more condom use, a finding also seen by others (Caldwell, 1995).

Our target population included women who lived at truckstops simply because opportunities for commercial sex existed. In this context, *regular partners* in our group of women were more like casual partners described by Pool—regular partners *who could be trusted to have no other partners* (Pool *et al.*, 1996). As a result, truck drivers tended to treat regular partners like a wife with whom using a condom was unacceptable because it tended to signal lack of trust. For the intervention this was a barrier to promoting behaviour change of regular condom use.

Key factors for success of the intervention included having staff who were able to understand real issues of the client group, were unprejudiced and showed respect to PEs and clients. PEs had to be active members of the client group in order to be effective. Key factors for stimulating PE motivation were frequent support visits and respect. Allowances and the amount of materials received were of secondary importance like elsewhere (Gillmore *et al.*, 1997; Slap *et al.*, 1991).

The project overcame barriers of discussing issues like sex, death, STDs and condoms, because the chosen PEs were already recognized leaders among their peers and understood the determinants and intricacies of sexual behaviour, and were willing to reflect upon local beliefs surrounding HIV/AIDS/STD that could be potential barriers to behaviour change (Nicoll *et al.*, 1993).

Availability of condoms was recognized from the beginning as crucial for success. The project effectively distributed condoms initially; later other distribution systems, including a

social marketing system, complemented the distribution channels. Well-packed and marketed condoms were believed to be of better quality than free distributed condoms and were soon preferred by customers. The importance of user-friendly STD services we have reported elsewhere (Nyamuryekung'e *et al.*, 1997).

Peer education needs to be maintained over a long time. As reported in other programmes, without continuing motivation of PEs momentum is lost (Hayman *et al.*, 1996). When support of the HBOs decreased, knowledge and reported condom use also declined but remained still above pre-intervention levels. HIV prevention programmes can be cost-effective, even if effects on behaviour are partial and short term (Tao & Remafedi, 1998).

Experience suggests that intensive peer education has tended to be effective (WHO, 1993; 1995). While the project evolved further, more emphasis was put on STDs (Nyamuryekung'e *et al.*, 1997) and interventions were expanded to meet the demands of the communities surrounding the truckstops (Mwizarubi *et al.*, 1997). Later, different parts of the highways were taken by different implementing organizations (Laukamm-Josten *et al.*, 1995) so that all highways and other high transmission areas in Tanzania were covered until 1998.

Acknowledgements

This work was supported in part by the United States Agency for International Development (USAID) as part of Family Health International's AIDSTECH and AIDSCAP Project (623-0238-A-00-4031-00) and does not necessarily reflect the views or policies of USAID. Laukamm-Josten was supported by Centre for International Migration and Development (CIM) of the Federal Republic of Germany and AMREF Germany. We also wish to thank the Principal Secretary, Ministry of Health of Tanzania, and the Director of the National AIDS Control Programme, Tanzania for permission to publish this report.

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