



Original article

Effectiveness of an Integrated Community- and Clinic-Based Intervention on HIV Testing, HIV Knowledge, and Sexual Risk Behavior of Young Men Who Have Sex With Men in Myanmar



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A B S T R A C T

Purpose: Young men who have sex with men (YMSM) in Myanmar are disproportionately affected by HIV, with prevalence five times that of the general population. The Link Up project implemented an intervention using peer education and outreach providing education and counseling on health seeking around sexually transmitted infections and reproductive health, combined with focused clinic capacity building to improve the sexual and reproductive health of YMSM. This study aimed to evaluate the effectiveness and acceptability of the intervention.

Methods: Using a mixed-methods approach, and employing a quasi-experimental design, we conducted two quantitative repeat cross-sectional surveys in purposively selected control (no intervention) and intervention townships, before and after implementation of the Link Up intervention. Respondent-driven sampling was used to recruit YMSM aged 15–24 years, and study participants were administered a structured questionnaire assessing intervention exposure, health service access, knowledge of HIV, and sexual risk behavior. Focus group discussions were held to elicit perspectives on the use and acceptability of the health services and peer outreach.

IMPLICATIONS AND CONTRIBUTION

Utilizing a rigorous mixed methods research design, this study found that the Link Up—integrated, community-based, and clinic-based intervention for young men who have sex with men (YMSM) in Myanmar was associated with trends towards improvement in their

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Results: At baseline, 314 YMSM were recruited in the intervention townships and 309 YMSM in the control townships. At end line, 267 (intervention) and 318 (control) YMSM were recruited. Coverage of the program was relatively low, with one-third of participants in the intervention townships having heard of the Link Up program by the end line. Comparing changes between baseline and end line, a greater proportion of HIV-negative or unknown status YMSM accessed HIV testing in the past 3 months in intervention townships (from 45.0% to 57.1%) compared with those in control townships (remained at 29.0%); however, this difference in the effect over time was not statistically significant in multivariate modeling (adjusted odds ratio: 1.45; 95% confidence interval: .66–3.17). Qualitative findings showed that the intervention was acceptable to YMSM.

Conclusions: Overall, the intervention was perceived as acceptable. Although not statistically significant, results showed some trends toward improvements among YMSM in accessing HIV testing services and HIV-related knowledge. The modest coverage and short time frame of the evaluation likely limits the ability for any significant behavioral improvements.

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access to HIV services, as well as in their HIV knowledge.

Currently, there are more than 200,000 people living with HIV in Myanmar [1], of which an estimated 7,770 are young people aged 10–19 years [2]. Despite the relatively low HIV prevalence among this age group, the majority of new infections occur among young key populations. One such group is young men who have sex with men (YMSM), who continue to experience HIV infection rates more than five times that of their counterparts in Myanmar [1]. The latest figures indicate that 68% of YMSM aged 15–24 years had comprehensive knowledge of HIV, 84% used a condom at last sex, and only 45% had an HIV test in the last 12 months and obtained the result [1].

Despite high reported condom use, sociocultural norms and taboos concerning same-sex relationships contribute to poor access to essential health services and information regarding sexual and reproductive health and rights (SRHR). Furthermore, punitive legislation in Myanmar concerning MSM, which, in theory, carries a prison sentence of up to 10 years, may account for the low rates of disclosure and caution taken with government organizations and services. These factors make provision of sustainable SRHR and HIV prevention services challenging.

To address these challenges, peer-led interventions have been implemented successfully to improve behavioral outcomes. Recent global reviews of peer-led approaches to improve young people's SRHR found that peer-led HIV-prevention interventions can be effective in improving knowledge and behaviors, particularly among YMSM [3–12]. There is, however, limited evidence to suggest that behavior change programs alone result in reducing HIV incidence [13,14]. Targeted interventions should involve a more comprehensive approach that includes peer education and outreach integrated with SRHR-focused service delivery models. To the best of our knowledge, community- and peer-based comprehensive HIV prevention programs that focus exclusively on YMSM have yet to be evaluated in Myanmar.

Recognizing this gap, our study aimed to evaluate one component of the Link Up project—a global consortium that consists of service provision, advocacy, and research aimed at improving the SRHR of young vulnerable populations in Africa and Asia. The component of Link Up in Myanmar that we evaluated focused on YMSM and involved a community-based peer education intervention, combined with a clinic-based service improvement component. We assessed the effectiveness and acceptability of the intervention on changes in health-seeking

practices, HIV knowledge, and sexual risk behaviors among YMSM after 6 months of implementation.

Methods

Study design

Using a mixed-methods approach, and employing a quasi-experimental design, we conducted two quantitative repeat cross-sectional surveys in purposively selected intervention and control townships (an administrative subdivision of a district) before (baseline: June to July 2014) and after 6 months of intervention implementation (end line). Focus group discussions were conducted with YMSM ($n = 54$) and Link Up peer educators ($n = 18$) in the intervention townships at end line.

Intervention description

The intervention package for YMSM involved linking community- and clinic-based services that were youth friendly and tailored to meet the specific needs of YMSM.

Peer education and outreach. YMSM peer educators were recruited by community-based organizations (CBOs) and trained by Alliance Myanmar to provide individual and group education and counseling on health promotion, HIV and sexually transmitted infections (STIs), gender, sexuality, and gender-based violence. Peer educators provided male condoms and lubricants, conducted HIV/STI prevention counseling and risk assessments, and made referrals to appropriate services during outreach activities. They either accompanied clients to referred services or followed up with clients to check if the referral was completed. Clients received approximately \$4 when they presented the completed referral slip to the CBO.

Clinic-based services. Peer educators referred YMSM to MSM-friendly clinics operated by Marie Stopes International (MSI) for integrated safer sex counseling with HIV/STI testing and treatment, including information on HIV/STI risks, gender, sexuality, and violence. Free condoms and lubricants were available at clinics or drop-in centers. MSI clinics also provided specialized referrals for antiretroviral treatment, postviolence care, cancer care, and psychosocial and harm reduction support. The Link Up project specifically supported the presence of a Link Up Medical Officer

who is responsible for the health education intervention activities, clinical care, and treatment related to YMSM in MSI clinics where Link Up was being implemented. Moreover, specific training related to sexual health and rights of YMSM for the MSI staff under the Link Up funding was also carried out during the project period.

The Link Up project also supported clinics to develop and implement policies on child protection, confidentiality, and informed choice, and sensitized and trained staff on working with key populations. Moreover, clinics were supported in creating a youth- and key population-friendly environment through refurbishments, new rooms, and expansion to include YMSM-friendly spaces (e.g., drop-in centers where YMSM clients could socialize, talk to peer educators).

Study sites

The intervention was implemented in 10 townships, of which seven had already started implementation of an intervention before study start. As such, the remaining three townships were purposively selected for this evaluation: Patheingyi, Mawlamyine, and Bago. In each of these townships, the peer education, outreach, and clinic-based service delivery components of the Link Up intervention commenced after the baseline data collection, except in Patheingyi, where the clinical services component had been initiated a few weeks before the baseline data collection. Three comparable townships (Kalay, Magway, and Thantlaryin), where there was no intervention planned, were purposively selected as control townships based on (1) size of the government hospital (100 beds and above), (2) population size (i.e., above 250,000), (3) presence of an MSI clinic similar to the intervention sites, and (4) presence of a large outreach HIV prevention program for key populations that has been operating in the intervention sites as part of another program. Each study site was the capital city of its respective state or region.

Study participants and procedures

For the baseline and end line surveys, men aged 18–24 years who self-reported having sex with a man in the last 6 months, residing and planning to reside in the study township for the duration of the study were eligible to participate. Potential participants were identified through respondent-driven sampling (RDS). Recruitment commenced with seed participants (initial participants) purposively identified by outreach workers from local organizations working with YMSM. Seed participants were selected to be diverse with regard to sexual identity. Four seeds were initially selected in each township; extra seeds were added when recruitment slowed down, which occurred in two control townships at baseline and in all sites at end line. Eligible participants provided informed consent for survey participation and were compensated approximately \$4 for their time and travel. Participants were asked to recruit three peers and were compensated an additional \$1 for each they successfully recruited.

Questionnaires were administered face-to-face by trained interviewers who were also YMSM. The questionnaire sought information on participant demographics, sexual behavior, health-seeking behavior, HIV knowledge and testing history, and exposure to the Link Up intervention and other programs. Data were recorded with electronic tablets programmed using Mobile Data Studio, version 7, software (CreativityCorp Pty Ltd, Perth, Australia).

Focus group discussions were conducted only in intervention townships (eight sessions with YMSM [$N = 54$] and three sessions with peer educators [$N = 18$]). Six informal group interviews were also conducted with MSI and CBO staff ($N = 20$). YMSM participants were purposively selected from the YMSM networks of peer educators from MSI and CBOs. They may or may not have participated in the quantitative survey. YMSM participants had to be aged 18–24 years, residing in the intervention townships for the 6-month duration of the intervention, and have had at least one contact with the Link Up intervention. Focus group discussions were conducted with all Link Up peer educators. Each focus group discussion had 7–10 participants and lasted 45–60 minutes; participants were compensated approximately \$4 for their time and travel. Focus group discussions and informal group interviews concentrated on the feasibility and acceptability of the Link Up intervention, particularly exploring barriers and enablers to uptake of HIV and sexual health services. All sessions were audio recorded and facilitated by a trained young male interviewer and two notetakers. All sessions were conducted at the drop-in center or CBO office away from project and center staff. Confidentiality and autonomy of participants were ensured, and written informed consent was taken before the interviews.

Study measures

Health-seeking behavior. Health-seeking behavior was based on self-report of having accessed information or services at clinics or drop-in centers in the past 12 months, and being counseled and tested for HIV at a health facility or voluntary counseling and testing center in the last 3 and 6 months. This time frame was based on current testing guidelines in Myanmar recommending high-risk persons, including YMSM, undergo HIV testing as frequently as every 3 months. To assess the effectiveness of our intervention on care seeking, the primary outcome variable was constructed as the proportion of YMSM who self-reported not knowing their HIV status and/or knowing that they are HIV negative, and who self-reported accessing an HIV test in the past 3 months at any clinic. In this way, the variable was designed to reflect the HIV testing guidelines for YMSM.

HIV knowledge. HIV knowledge was operationalized as a score on an additive single unit-weighted scale comprising eight commonly used questions to indicate accurate knowledge of HIV prevention, transmission, and service and treatment availability. A dichotomous variable was constructed with participants correctly answering at least five of eight questions, versus those correctly answering less than five.

Sexual risk. Sexual risk behaviors were assessed based on self-reported condom use during anal sex in the 30 days preceding the survey with regular, casual, and commercial male sex partners, and unprotected vaginal or anal sex with female sex partners. Responses were categorized as “always” having used a condom during all sex acts versus other responses (i.e., “never” or “sometimes”).

Sexual identity. Sexual identities were self-reported as Tha-nge, Apone, or Apwint. A Tha-nge (masculine partner), which translates to “young boy” in Myanmar language, is not effeminate, and generally has sexual relationships with the other two main types of YMSM. Tha-nges are typically the insertive partner and may

also have sexual relationships with females. Apone (hidden), which translates to “closed,” are not effeminate, are generally only known by those close to them to be YMSM, and tend to be the receptive partner. Apwint (open) are often male-to-female transsexuals who are born biologically male but openly dress and act like a woman, and are generally the receptive partner.

Data analysis

All statistical analyses were undertaken using the Stata statistical package, version 13.1 (StataCorp LP, College Station, TX). First, descriptive analyses were conducted to describe the study population at the two study time points. Contingency table analyses and chi-square tests of independence were performed to examine differences in sociodemographic and other behavioral factors between study groups (intervention vs. control) at each study time point (baseline and end line). In these exploratory analyses, second-order Pearson's statistics by Rao and Scott [15] were applied to account for the lack of independence in observations due to the RDS sampling methodology (clustering induced by study participants originating from a common seed participant). After descriptive analyses, for analyses pertaining to primary study outcomes to determine the effectiveness of the intervention, we used generalized multilevel modeling (binomial family, logit link function) with a random intercept for cluster seeds to model the between-seed variability in specific outcomes directly. Therefore, these multilevel analyses comprised two levels, individual participants (level 1) nested in seeds defined clusters (level 2). For primary outcomes (health-seeking behavior, HIV knowledge, and unprotected sex), adjusted (for factors that might confound the association between the intervention and each primary outcome) generalized multilevel modeling was undertaken to estimate the group (intervention township participants vs. control township participants) by time odds of each of the primary outcomes. Effect estimates from these interaction terms showed the change in odds for intervention participants over and above average change (i.e., cross-sectional change over time for the control population).

For qualitative analysis, recordings were transcribed in Myanmar language into a Microsoft Word document. Thematic analysis was carried out by three data coders using a deductive approach with preidentified code-based main themes and subthemes. As themes emerged using an inductive approach, additional codes were added to the coding framework. Atlas.ti, version 6.1 (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany), was used for analysis. Analysis was completed in Myanmar language, and key findings from themes and subthemes were written in English. Selected quotations from relevant subthemes were translated into English.

Ethical approval

This research was approved by the Department of Medical Research Ethics Review Committee (Yangon, Myanmar), the Population Council Institutional Review Board (New York), and the Alfred Hospital Human Research Ethics Committee (Melbourne, Australia).

Results

At baseline, a total of 827 men were screened for eligibility (intervention: 396; control: 431). Of these, 314 and 309 men were eligible and consented to participate, respectively. At end

line, 830 men were screened (intervention: 380; control: 450), and 267 and 318 participated, respectively.

Sociodemographic characteristics

The mean age of participants at baseline and end line was approximately 20 years in both the intervention and control groups (Table 1). There were some significant differences in the sociodemographic and sexual behavioral characteristics of YMSM in the intervention versus the control group at baseline (religion, employment status) and at end line (education, religion, employment status; Table 1). In all four samples, Tha-nge (masculine) YMSM accounted for approximately one-half of all participants enrolled at both baseline and end line (varying from 50% to 64%), and the proportion of Apwint (open type) varied from 20% to 39%. Almost 90% of them were of Bamar ethnicity and Buddhist religion. The majority of participants in all four samples had completed middle school and were employed, although more than half were in “nonprofessional” jobs, such as market seller or trishaw driver. Most participants classified themselves as single, with a small proportion having ever been married to a woman, and some having been married to, or currently living with, a man. Very few participants in the four samples had children. The mean age at sexual debut with a male partner ranged from 16.1 to 17.0 years. More than one-third of participants had a current regular sexual partner. Most (90%) had had sexual intercourse in the last 90 days, with more than 70% in all groups having sex only with male partners.

Uptake of the Link Up intervention

Increases were noted in the proportion of participants who had heard of, and interacted with, the Link Up project in both the intervention and control townships, with almost one-third of intervention participants (31%; 84/267) having heard of the project at end line, compared with 13% (42/318) of control participants (Table 2). The control participants who had heard of Link Up often had an encounter (usually only one) with a peer educator during an individual session. In comparison, intervention group participants who were aware of Link Up were exposed to both group sessions (35%) as well as individual sessions (66%) and often had multiple encounters with Link Up peer educators (62% had two or more encounters). About 62% of intervention participants, compared with 48% of control participants who had heard of Link Up, reported contact with a peer educator in the past 12 months at baseline, and similar proportions reported contact with a peer educator at end line (intervention townships 59%; control townships 47%).

At end line, almost half (39/84) of participants who had contact with Link Up peer educators in intervention townships received a referral compared with only 17% (7/42) in control townships. Similarly, in intervention townships, a larger proportion of participants (66%; 55/84) received both condoms and lubricants from peer educators, as compared to the control townships (19%; 8/42).

Acceptability of the Link Up project

During qualitative inquiries, YMSM participants reported positive interactions with peer educators. Participants were happy with the health education that they provided and felt that they were an approachable resource. One 22-year-old YMSM participant who self-identified as Apwint explained:

Table 1

Sociodemographic and sexual behavior–related characteristics of young men who have sex with men (YMSM) by time point and study group: counts (n/N), percent (%), and probability values (*p* values)

	Intervention townships		Control townships		p value ^a ; A versus C	p value ^a ; B versus D
	Baseline (N = 314); n/N (%); A	End line (N = 267); n/N (%); B	Baseline (N = 309); n/N (%); C	End line (N = 318); n/N (%); D		
Sociodemographic characteristics						
Number of MSM by townships						
Patheingyi	108/314 (34.4)	93/267 (34.8)				
Mawlamyine	103/314 (32.8)	84/267 (31.5)				
Bago	103/314 (32.8)	90/267 (33.7)				
Kalay			106/309 (34.3)	114/318 (35.8)		
Magwe			100/309 (32.4)	100/318 (31.4)		
Thanlyin			103/309 (33.3)	104/318 (32.7)		
Age, mean years (SD)	20.4 (2.1)	20.9 (2.0)	20.4 (1.7)	20.6 (1.9)	.78	.20
Education, highest level completed					.12	.019
Primary or lower	39/313 (12.5)	35/267 (13.1)	20/309 (6.5)	19/316 (6.0)		
Middle or high school	240/313 (76.7)	198/267 (74.2)	242/309 (78.3)	214/316 (67.7)		
University or graduated	34/313 (10.9)	34/267 (12.7)	47/309 (15.2)	83/316 (26.3)		
Ethnicity					.54	.094
Bamar	282/314 (89.8)	234/259 (90.4)	282/309 (91.3)	292/317 (92.1)		
Others (Mon, Shan, Chin, Kayin)	32/314 (10.2)	25/259 (9.6)	27/309 (8.7)	25/317 (7.9)		
Religion					.004	.001
Muslim	19/313 (6.1)	16/267 (6.0)	3/309 (1.0)	5/318 (1.6)		
Christian	0/313 (.0)	1/267 (.4)	14/309 (4.5)	21/318 (6.6)		
Hindu	5/313 (1.6)	4/267 (1.5)	1/309 (.3)	2/318 (.6)		
Buddhist	289/313 (92.3)	246/267 (92.1)	291/309 (94.2)	290/318 (91.2)		
Marital status					.20	.30
Never married	257/313 (82.1)	213/267 (79.8)	252/309 (81.6)	273/314 (86.9)		
Currently married to a woman	19/313 (6.1)	14/267 (5.2)	4/309 (1.3)	8/314 (2.6)		
Committed to a man as married	22/313 (7.0)	38/267 (14.3)	37/309 (12.0)	32/314 (10.2)		
Formerly married to man or woman	15/313 (4.8)	2/267 (.8)	16/309 (5.2)	1/314 (.3)		
Has one or more children	8/314 (2.6)	6/266 (2.3)	3/309 (1.0)	2/318 (.6)	.25	.10
Currently enrolled as a student	23/313 (7.4)	27/267 (10.1)	45/299 (15.1)	77/306 (25.2)	.087	.009
Currently employed	282/314 (89.8)	223/267 (83.5)	237/309 (76.7)	227/318 (71.4)	.001	.028
Current professional employment	113/282 (40.1)	114/223 (51.1)	97/237 (40.9)	85/226 (37.6)		
Current nonprofessional employment	169/282 (59.9)	109/223 (48.9)	140/237 (59.1)	141/226 (62.4)		
Sexual identity					.28	.073
Apone (hidden, receptive)	35/314 (11.2)	30/267 (11.2)	65/309 (21.0)	49/318 (15.4)		
Apwint (open, receptive)	103/314 (32.8)	104/267 (39.0)	80/309 (25.9)	65/318 (20.4)		
Tha-nge (masculine, insertive)	176/314 (56.1)	133/267 (49.8)	164/309 (53.1)	204/318 (64.2)		
Sexual history characteristics						
Age at sexual debut with male partner, mean years (SD), n = 566	16.7 (2.5)	16.1 (2.9)	16.8 (2.2)	17.0 (2.6)	.84	.009
Forced or coerced into first sexual experience with a male partner	65/312 (20.8)	35/265 (13.2)	28/307 (9.1)	71/317 (22.4)	.007	.047
Current regular sex partner						
Male	118/313 (37.7)	109/267 (40.8)	104/309 (33.7)	112/318 (35.2)	.88	.36
Female	46/313 (14.7)	24/267 (9.0)	31/309 (10.0)	18/318 (5.7)	.16	.005
Had sexual intercourse in the last 90 days	281/313 (89.8)	255/267 (95.5)	294/309 (95.2)	288/318 (90.6)	.073	.20
With male sex partners only	198/281 (70.5)	226/255 (88.6)	220/285 (77.2)	236/287 (82.2)		
With female sex partners only	31/281 (11.0)	3/255 (1.2)	6/285 (2.1)	7/287 (2.4)		
With both male and female partners	52/281 (18.5)	26/255 (10.2)	59/285 (20.7)	44/287 (15.3)	.072	.23

SD = standard deviation.

^a Omnibus *p* values taken from chi-square tests of independence for categorical variables and between-group *t* tests for continuous variables.

“...if we don’t understand something during the discussion or health talk, we can ask them questions, because they are also YMSM, same with us! If we ask them a question, they explained us patiently. How lovely they are!”

Participants also valued the role that peer educators could play in helping them access clinic services and appreciated the support they offered. Another YMSM participant aged 19 years (self-identified Apone) remarked the following:

“...we usually meet each other during night time, at the time of looking for our partners, sometimes we meet with them [peer educators] on the street, or at the group talk. If we are

interested in blood test [HIV tests], peer educators accompanied us to go to the clinic, that’s the point I like most....feeling like we are not alone....”

Drop-in centers were considered to be a valuable service to YMSM participants as was explained by a 21-year-old who self-identified as Apwint:

“...the drop-in center is great space, near to the clinic, friendly, freely and wonderful place. We like it. We can stay, rest, play games, listen music, making fun with friends, etc. We can go to the clinic easily... One thing I like is that there is a small beauty salon and we can do make-up and so on!!”

Table 2

Knowledge of and exposure to the Link Up program among young men who have sex with men by time point and study group: counts (n/N) and percent (%)

	Intervention townships		Control townships	
	Baseline (N = 314); n/N (%)	End line (N = 267); n/N (%)	Baseline (N = 309); n/N (%)	End line (N = 318); n/N (%)
Contact with any peer educator in past 12 months (Link Up or not)	191/314 (60.8)	160/267 (59.3)	148/309 (47.9)	149/317 (47.0)
Heard of and interacted with Link Up peer educator	32/314 (10.2)	84/267 (31.5)	4/309 (1.3)	42/318 (13.2)
Number of times interacted with Link Up peer educators (among those who interacted with a Link Up peer educator)				
One time	10/30 (33.3)	32/84 (38.1)	4/4 (100.0)	31/42 (73.8)
Two to four times	18/30 (60.0)	42/84 (50.0)	0 (.0)	11/42 (26.2)
Five or more times	2/30 (6.7)	10/84 (11.9)	0 (.0)	0 (.0)
Type of education received from Link Up peer educator				
Group community education	17/31 (54.8)	29/84 (34.5)	2/4 (50.0)	6/42 (14.3)
Individual	14/31 (45.2)	55/84 (65.5)	2/4 (50.0)	36/42 (85.7)
Commodities received from peer educators				
Condoms	5/32 (15.6)	16/84 (19.1)	2/4 (50.0)	20/42 (47.6)
Both condoms and lubricants	20/32 (62.5)	55/84 (65.5)	1/4 (25.0)	8/42 (19.1)
None	7/32 (21.9)	13/84 (15.5)	1/4 (25.0)	14/42 (33.3)
Referral received from Link Up peer educators	21/32 (65.6)	39/84 (46.4)	2/4 (50.0)	7/42 (16.7)

While the majority of YMSM participants indicated positive interactions and experiences with peer educators and receiving services at the drop-in centers and many of these positive attributes were echoed by peer educators, some peer educators and CBO and MSI staff pointed to some difficulties in implementation of the intervention that may have impeded greater coverage of services. For example, one CBO staff noted that the upper age limitation of the Link Up project (up to 24 years) likely resulted in lower uptake of services of YMSM who were partners of older MSM. Another CBO staff mentioned that some YMSM preferred to have a “one-stop shop” where they can get testing and treatment done in the same place as opposed to needing a referral for HIV treatment. A few peer educators and some YMSM focus group discussion participants also mentioned that some YMSM actually preferred receiving HIV testing at the government services as opposed to NBO-based services (even though they are MSM friendly) because the government testing procedures were shorter in duration due to the lack of or minimal pre- and post-test counseling. This is despite them having to wait until the next day for the test result. A peer educator indicated:

“... the clients prefer quick process...they don't want to stay at the clinic longer duration...because they afraid of being seen by others....it doesn't matter for them to come to NAP clinic [referring to the government clinic] on the next day to get the result...therefore they prefer going to NAP clinic”

Health-seeking behaviors, HIV knowledge, and sexual risk behavior

In descriptive analysis, the proportion of participants who had ever visited a clinic or drop-in center increased from baseline to end line by 7 percentage points in intervention townships, compared with a 3 percentage point increase in the control townships, although this increase was not statistically significant ($p = .41$; Table 3). The proportion of HIV negative or unknown status YMSM who accessed an HIV test in the past 3 months also consistently showed larger increases in intervention townships compared with control townships from baseline to end line (12.1 vs. 0 percentage point increase; $p = .14$), similarly, for HIV testing in the past 6 months (13.6 vs. 4.2 percentage point increase; $p = .28$). However, in the generalized multilevel model, controlling for predefined potential confounding covariates,

there was no statistically significant increase in odds over time among the intervention participants (compared with control participants) with regards to accessing an HIV test in the past 3 months (adjusted odds ratio [AOR]: 1.45; 95% confidence interval [CI]: .66–3.17, $p = .35$).

The proportion of participants deemed to have “adequate” HIV knowledge increased in both intervention and control townships between baseline and end line, from 23.8% to 39.1% in intervention townships and from 26.3% to 36.9% in control townships. A larger increase, however, was observed in intervention areas (Table 3). This change, although indicating some positive effect of the intervention, did not reach statistical significance ($p = .45$). Furthermore, in the generalized multilevel model controlling for potential confounding factors, there was no statistically significant increase in the odds over time among the intervention participants (compared with control participants) with regard to having adequate knowledge (AOR: 1.25, 95% CI: .70–2.25, $p = .45$; Table 4).

In terms of sexual risk behavior, the proportion of YMSM who reported one or more unprotected sex acts (anal or vaginal) with any partner (male or female) in the 30 days preceding the survey increased between baseline and end line in intervention townships (from 32.3% to 36.7%) but declined in control townships (from 26.6% to 24.2%). Adjusted generalized multilevel modeling showed that this difference in the effect of time across intervention and control townships was not statistically significant (AOR: 1.22, 95% CI: .71–2.12; $p = .47$).

Qualitative findings on YMSM's risky sexual behaviors supported results from the survey, particularly on unprotected sex. Participants commented on constraints in possessing condoms, and fearing family or friends might discover them. Unprotected sex was also related to factors such as partner trust, condom availability, fear of partner rejection if they suggested condoms, and partners' or clients' refusal or disapproval of using condoms. A 23-year-old who self-identified as Tha-nge explained:

“...I think Apone (hidden) are more concealed and shamed. They are afraid of taking condoms despite they know where to get condoms. Different from Apwint (open), they don't [feel] shame and can get condoms everywhere. But for Apone, they also afraid of being known as a young MSM and their sexual behavior by the family or friends in the community...” (23-year old Tha-nge YMSM)

Table 3

Health-seeking behavior, HIV knowledge, and sexual risk behavior of men who have sex with men (MSM) by time point and study group: counts (n/N), percent (%), and probability values (*p* values)

	Intervention townships		Control townships		<i>p</i> value ^a
	Baseline (N = 314); n/N (%)	End line (N = 267); n/N (%)	Baseline (N = 309); n/N (%)	End line (N = 318); n/N (%)	
Health-seeking behaviors					
Ever visited a clinic or drop-in center in or around township for MSM health information or services in past 12 months	219/314 (69.8)	203/266 (76.3)	158/309 (51.1)	173/318 (54.4)	.41
Ever counseled AND tested for HIV at health facility or voluntary counseling and testing center	223/313 (71.3)	217/267 (81.3)	176/306 (57.5)	192/317 (60.6)	.15
Proportion of negative or unknown status MSM who accessed an HIV test in the past 3 months	135/300 (45.0)	149/261 (57.1)	88/304 (29.0)	91/314 (29.0)	.14
Proportion of negative or unknown status MSM who accessed an HIV test in the past 6 months	169/302 (56.0)	183/263 (69.6)	132/306 (43.1)	149/315 (47.3)	.28
HIV knowledge					
Proportion of participants correctly answering at least five of eight questions on HIV transmission and prevention	73/307 (23.8)	103/263 (39.1)	79/301 (26.3)	114/309 (36.9)	.45
Sexual risk behavior					
Proportion of MSM with one or more unprotected vaginal or anal sex acts (insertive or receptive) with ANY partner in the past 30 days	100/310 (32.3)	98/267 (36.7)	81/305 (26.6)	77/316 (24.2)	.26
Proportion of MSM with one or more unprotected anal sex acts in the past 30 days					
Regular male partner ^a	45/109 (41.3)	39/106 (36.8)	31/91 (34.1)	34/111 (30.6)	.95
Casual male partner ^a	36/157 (22.9)	51/152 (33.6)	37/187 (19.8)	41/212 (19.3)	.25
Commercial male clients	19/76 (25.0)	4/29 (13.8)	8/49 (16.3)	10/44 (22.7)	.15
Proportion of MSM with one or more unprotected vaginal/anal sex acts with a female partner in the past 30 days	30/64 (45.3)	18/31 (58.1)	21/56 (37.5)	16/35 (45.7)	.78

^a Probability value for the study group by time interaction from multilevel regression modeling, accounting for seed clustering but otherwise not adjusted for potential covariates.

Another participant who self-identified as Apwint and aged 24 years reported:

“...if a Tha-nge (masculine) type young MSM is handsome, we like them much, and don't think of using condoms or forgot that they might have sexually transmitted disease....I had the personal experience on such an example... ” (24 year-old Apwint YMSM)

Discussion

This study represents the first to rigorously evaluate an integrated community- and clinic-based intervention targeting YMSM. The data offer important insights into the attitudes and behaviors of YMSM in Myanmar, in the context of this

intervention. Overall, although not statistically significant, the results showed some trends toward increases in accessing HIV-testing services and HIV-related knowledge among YMSM in intervention townships compared with control townships.

YMSM reported enjoying their interaction with the peer educators and appreciated the fact that they would accompany them to clinics. Exposure to the program remained relatively low, with less than one-third of participants in the intervention townships having heard of the program by the end line. The limited coverage of the program may have been affected by the relatively short time frame between the baseline and the end line (6 months), leaving limited time for the intervention to take effect, as well as some reasons mentioned by intervention staff (e.g., age limitation of Link Up, preference for “one-stop shop” and shorter testing times at government clinics due to minimal

Table 4

Multilevel modeling showing unadjusted odds ratio (OR) and adjusted odds ratios (AOR) of intervention by time effects for outcomes among men who have sex with men (MSM): accessing HIV testing in the past 3 months, HIV knowledge, and unprotected sex in the last 30 days with any partners

Outcome	Odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)	<i>p</i> value
Proportion of (sexually active) negative or unknown status MSM who accessed an HIV test in the past 3 months	1.85 (.82–4.17)	1.45 (.66–3.17) ^a	.35
Proportion of participants correctly answering at least five of eight questions on HIV transmission and prevention	1.25 (.71–2.20)	1.25 (.70–2.25) ^b	.45
Proportion of MSM with one or more unprotected vaginal or anal sex acts (insertive or receptive) with ANY partner in the past 30 days	1.37 (.79–2.35)	1.22 (.71–2.12) ^c	.47

^a Study group by time effect from adjusting for ethnicity, marital status, main occupation, sexual identity, level of MSM status disclosure, and having multiple or casual partners.

^b Study group by time effect adjusting for ethnicity and education.

^c Study group by time effect adjusting for marital status and education.

counseling). Moreover, discussions with community organizations managing Link Up peer educators indicated that they wore minimal Link Up branding (t-shirts, hats), which could have resulted in under-reporting of intervention exposure. This, however, seems unlikely considering that the proportion of participants reporting contact with any peer educator did not change in either the intervention or control townships.

Despite relatively low coverage, there was a trend toward increased knowledge and health-seeking measures in both intervention and control areas, though more pronounced in intervention townships. From the quantitative findings, the tendency toward improved health-seeking behaviors among intervention participants was also reflected in sentiments collected in the qualitative research, from both YMSM and peer educators. This improved health-seeking behavior is consistent with routine clinic statistics collected in the program indicating an increasing proportion of YMSM-seeking services (data not shown). These findings suggest that successful integration of the outreach and clinic-based components is feasible and acceptable, and successful capacity building to ensure that the clinics are more sensitive to and capable of providing appropriate YMSM-friendly services.

While we saw some positive (though nonstatistically significant) trends toward increases in both health-seeking behaviors and HIV knowledge, there was no change in sexual behaviors. Changing sexual behaviors may be more difficult compared with improving knowledge and health-seeking behaviors and may indicate the need for more intensive and longer term intervention. This is consistent with findings from a systematic review and recent studies indicating limited effects of peer education on sexual behavior change; but, there is some evidence of changes in attitudes, knowledge, and intentions [16–19]. Michielsen et al. [16] suggest that “peer education might be more effective if it is integrated in holistic interventions and if the role of peer educators is redefined in a way that makes them more of a source of sensitization and referral to experts and services.”

Establishment of high-quality, respectful, and accessible services is of utmost importance in improving the SRHR of key and marginalized populations, but unfortunately, the existence of a service does not guarantee its use [20,21]. Linkages to services are arguably as important as the services themselves, and a multitude of evidence supports peer-based linkages strategies improving retention in health care, whether for HIV management, prevention of mother-to-child transmission, or HIV diagnosis [11,12,22–24]. Linking the most vulnerable communities to HIV services can lead to early diagnosis and earlier ART initiation, both of which could reduce HIV transmission [21,25–27]. Although we were unable to see statistically significant improvements in HIV-testing rates and sexual risk behavior, the qualitative findings (and clinic statistics) indicate that these important linkages between the community and clinic services are being formed under the Link Up project. Under the treatment as prevention strategy, these linkages are critical in ensuring that the most vulnerable persons are tested, treated, and virally suppressed to reduce transmission and ultimately halt the spread of HIV in key populations. More importantly, these linkages will ensure that HIV-positive YMSM are linked to proper care and treatment and HIV-negative YMSM are able to protect themselves from contracting HIV.

This study has several limitations. First, we were unable to randomly select the intervention sites, and as such were not able to randomize study sites to intervention and control groups,

which might have resulted in selection bias. The hidden nature and stigma toward YMSM meant that an RDS sampling methodology was most feasible and appropriate but could have resulted in some selection bias and lack of homogeneity between the two groups. It is also possible that some participants were enrolled during both surveys before and after the intervention, but we did not record these instances. Second, the 6-month time frame allocated for the intervention may be too short for any significant changes in behavior or knowledge to occur. The last limitation is the major confounding factor of other YMSM-focused interventions already existing in the townships. We attempted to minimize this by selecting control sites that had similar (non-Link Up) interventions running, but the high levels of HIV knowledge among both control and intervention participants are testament to the impact of existing programs, further complicating our ability to see additional benefits.

Although not statistically significant, results showed some trends toward improvements among YMSM in accessing HIV testing services and HIV-related knowledge. These findings nonetheless provide important insights into the sexual behavior and health-seeking practices of YMSM in Myanmar. The findings also point toward potential for the successful implementation of the Link Up intervention given perhaps a more intensive intervention implementation and provide information that could be used for designing an effective integrated community- and peer-based intervention. The use of peer educators, connected to clinical services, was found to be an acceptable approach to these populations.

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