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PROGRAMME PAPER

An assessment of cost, quality and outcomes for five HIV prevention youth peer education programs in Zambia

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Abstract

Youth peer education (YPE) programs are a popular strategy for HIV prevention in sub-Saharan Africa. However, research on the effectiveness of YPE programs is scarce and the wide variation in programs makes it difficult to generalize research findings. Measuring quality and comparing program effectiveness require the use of standardized instruments. In this study, we used standardized evidenced-based instruments to compare program inputs, quality, outputs and outcomes for five YPE programs in Zambia. Clinic surveys were used to measure the following program outcomes: young people's exposure to the YPE programs and referrals of young people to clinics for HIV/sexually transmitted infection (STI) testing and other reproductive health services. The study revealed wide variation in the cost, quality and outcomes of YPE programs. Higher quality programs were associated with greater exposure and more referrals of youth to the clinics. However, one of the two highest quality programs achieved twice as many exposure and referral outcomes at about half the cost per peer educator of the more expensive program. Results indicate that the standardized instruments used in this study are useful for assessing and comparing program attributes among diverse YPE programs.

Introduction

Youth peer education (YPE) programs are central to public health programs in sub-Saharan Africa, including Zambia. They tap the energy and altruism of youth volunteers who are thought to be more effective than adults in communicating information about sensitive topics with other youth [1]. YPE programs strive to change knowledge, attitudes and behaviors of youth, often in the areas of HIV prevention and reproductive health (RH). Donors and programs invest significant time and resources into YPE programs to recruit, train, re-train and supervise volunteers.

YPE programs are used widely in Zambia and for good reasons: 46% of Zambia's population is under the age of 15 [2]; 26% of adolescent girls aged 15–19 years report having been pregnant; and 7% of adolescent females and 2% of males aged 15–19 years are HIV positive [3]. Nationally, approximately 40% of 15- to 24-year-olds have been exposed to YPE in Zambia [4]. However, research on the effectiveness, including cost-effectiveness, of YPE programs is limited [5–7]. Studies from developing countries suggest that YPE programs can have an impact on young people's knowledge, attitudes and some behaviors [8–13]. For example, research has demonstrated that exposure to YPE is associated with behaviors such as decreased equipment sharing among drug users and increased

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condom use [12]. However, systematic reviews have yielded mixed findings regarding the impact of YPE programs on biological outcomes such as sexually transmitted infections (STIs) [12, 13]. Regarding cost-effectiveness, one recent analysis of behavioral interventions designed to prevent STIs among youth found that teacher-led interventions are more cost-effective than peer-led interventions because youth required more training than teachers [14].

There are multiple variations in the way that YPE programs are designed, implemented and monitored. Program implementers report numerous challenges in implementing YPE programs including problems with recruitment and/or retention of high-quality peer educators and staff; stability and sustainability; and limited or low-quality monitoring and evaluation [15–17]. Even when a program is found to be effective, the diversity of YPE programs makes it difficult to generalize the research findings from one program to another. Given the significant resources being put into YPE in many countries, there is a need for donors and program implementers to know what the core elements of successful YPE are and how to operationalize them in their programs to maximize program impact.

In this study, standardized evidenced-based instruments were used to measure program attributes among five YPE programs in Zambia including program inputs, quality, outputs and outcomes. We demonstrate the value of using standardize instruments to compare programs and discuss how these instruments can be used to strengthen active YPE programs.

Methods

Study design

This study was conducted from February 2005 to August 2006 and used various quantitative methods to compare program inputs, quality, outputs and outcomes of five YPE programs in Zambia. Information on the YPE programs was gathered using standardized instruments developed as part of this project. Program inputs were measured through cost analysis, program quality through checklists and program outputs through activity logs. The process to develop these tools has been cited elsewhere [18]. Information on the exposure to and referrals by YPE programs were collected through anonymous questionnaires with young clients accessing clinic services in the YPE program catchment areas.

Study setting

The study was conducted in three towns in Zambia: Lusaka, Livingstone and Mongu. Five YPE programs (labeled Program A–E) and seven health clinics were included in the study. The criteria for selecting the programs included the following: addresses RH/HIV/AIDS, targets youth primarily in out-of-school settings, community-based, implements multiple YPE activities, utilizes youth peer educators (PEs) between 15 and 24 years of age and has at least 2 years of operating experience. The community-based programs in this study were diverse but all collaborated with the local clinics on youth-friendly services and referred young people to their local clinic for voluntary counseling and testing (VCT) and other RH services. Each YPE program in the study was 'linked' to one clinic in the study with the exception of Program E. Peer educators from Program E operated the youth friendly services within and referred youth to two clinics within their community. One study clinic did not have a formal link with a specific YPE program; youth attending that clinic were referred by more than one program.

Participants

The participants included the members and stakeholders of the five YPE programs and youth who attended one of the seven study clinics during the study period. All youth aged 15–24 years who attended a study clinic from October to December 2005 were invited by trained clinic staff or research assistants to complete an anonymous questionnaire. This study received ethical approval from the University of Zambia Research Ethics Committee and FHI 360's Protection of Human Subjects Committee. All participants underwent a verbal informed consent process prior to participation.

A waiver of parental consent for minors was granted for this minimal risk study.

Data collection

'Program inputs' are resources (material, equipment, localities and personnel time) that go into the preparation and delivery of services. Identifying and assigning value to them permits calculation of the costs of producing program outputs. In mid-2006, cost data from the five YPE programs were collected and verified by a local consultant retrospectively to determine their resource base and the costs per PE. Excel cost data collection worksheets tracked start-up and recurrent resource costs of the YPE programs over a year period. Program managers were trained by the local consultant to identify relevant cost information which included PE and health service provider trainings, the development of 'youth-friendly' corners in local health centers, facilitative supervision, PE incentives (such as t-shirts and refreshments), PE resources such as videos and drama/teaching activities, facilitators for trainings, venue costs, *per diems* and meals for participants, transportation for trainings and for supervisors to field sites and contraceptive supplies (condoms). Annual costs were calculated by multiplying the unit cost by the quantity of the resources used in the 1-year study period. Costs of capital items were annualized assuming a 5- or 10-year useful life (depending on the resource) and a 3% discount rate. The total cost of an activity was calculated by summing the costs of all resources listed for that activity. The cost per PE was calculated by dividing the total cost of all activities by the number of PEs trained. The costs measured in Zambian Kwacha were converted to US dollars using the average exchange rate during 2005–06. The costs, however, do not include adjustment for the higher costs of goods and services in larger cities like Lusaka compared with more rural towns such as Mongu.

Program outputs are all the activities or services conducted by PEs to promote changes in peers' attitudes and behaviors. YPE activities were recorded from September 2005 to June 2006 by four of the five YPE programs studied. Data from Program A are missing because of a data collection problem. An activity log was used to capture PE activities and contacts. Peer educators were trained to use the activity logs in which they recorded contacts with friends and family, acquaintances and new persons that included discussion about HIV/AIDS, STIs, pregnancy, condoms, contraceptive methods and other health issues that affected their peers. Standardized definitions were developed to capture similar activities that varied in name across programs. Individual PE data from the activity logs were averaged (median number per PE per day) for each program.

Program processes are mechanisms by which resources are put together to produce quality services. Eight checklists were used to measure program processes believed to influence 'program quality,' including stakeholder cooperation, parental involvement, youth involvement, youth–adult partnerships, PE cooperation, gender equity and equality, community involvement and technical frameworks [18, 19]. Table I lists the checklists and describes the aspects of program quality each checklist intended to measure.

In December 2005, trained assessment teams completed the checklists for each program through individual or group interviews over 2- to 3-day periods. The assessment teams for the YPE programs in Lusaka and Livingstone were composed of one adult and two youth with expertise in YPE, while the Mongu team included two youth YPE experts. Team members were not affiliated with the programs under study. The assessment team conducted a thorough review of program documents including work plans and reports prior to the assessment. The purpose of this review was to gain an understanding of the program's organizational structure, operations and stakeholders. The team leader conducted a pre-assessment visit to the program to introduce the assessment to program staff, PEs and stakeholders. Prior to data collection, the team members were trained on the use of the checklists and interviewing techniques. During the interviews, one team member conducted the interview, while a second member took notes that were used later for the checklist ratings. Checklist ratings were determined by the team at the end of the assessment.

Table I. *Description of the checklists used to measure program quality*

Checklist	Purpose	Number of items[a]
Stakeholder cooperation	Examines the degree to which program staff and PEs work with stakeholders to facilitate cooperation and trust and keep them informed of the program	12
Parental involvement	Assesses how much programs reach out to and involve parents	7
Youth involvement	Examines the degree of empowerment and decision-making that youth are able to assume through established organizational mechanisms	13
Youth–adult partnerships	Measures the level of direct youth involvement, open communication, trustworthiness, mutual respect, mutual sharing about others' actions and adult support	17
PE cooperation	Examines to what degree PEs share a vision and commitment to the program, the use of group activities to increase PEs skills and self-esteem and conflict resolution among PEs	8
Gender equity and equality	Measures the balance of male and female PEs and how the program promotes gender equity and equality among PEs and program beneficiaries	10
Community involvement	Assesses the degree of program collaboration with and support by local community-based organizations	19
Technical frameworks	Examines basic YPE requirements, organizational structures and responsiveness to the youth community	21

[a]Scoring range for all checklist items is 1–5.

For each YPE with the exception of Program D, 12–14 PEs, 3–5 program staff, 4–7 parents and 4–5 stakeholders were interviewed. In Program D, there were no stakeholders available to be interviewed. Peer educators sampled from the programs included experienced PEs and those recently recruited, males and females, and youth representing different ethnic groups and geographical locations. The stakeholder sample included organizations and individuals who were active in the program, worked directly with PEs in their activities and were community opinion leaders and decision-makers such as faith leaders, traditional leaders and ministerial representatives.

Notes from the interviews with the above groups were cross-referenced with each other as it was not unusual for PEs, program staff and stakeholder groups involved in the same program to have different perspectives on the same issue. The team assessed the degree of cooperation between these groups and their support for the program and its goals. A five-point scale was used for checklist items. These were classified as follows: 1–2 = low, 3 = medium and 4–5 = high. Scores of 1 and 5 were used sparingly. After the assessments were completed, the three teams met for 2 days to discuss the programs and scoring methods to ensure standardized methods for scoring across programs. Information collected during the field assessment was then consolidated to assess the overall program. Mean scores were computed for each checklist for each program.

'Program outcomes' are defined as young people's exposure to the YPE programs and referrals of young people to clinics for HIV/STI testing and other RH services. Outcomes were measured at the individual level in the YPE program catchment areas using clinic surveys. One-page anonymous questionnaires were distributed to clients (15–24 years) attending the study clinics from October to December 2005. Clinic staff and research assistants were trained in the use of the questionnaire and how to ensure respondents' privacy and anonymity. When it was necessary for clinic staff to read the questionnaire to clients with low literacy, the nurse did so in a private location. Respondents were asked their age, gender, area of residency, if they had been exposed to YPE programs, attitudes toward the program and if the YPE program had influenced their decision to visit the clinic.

Information was collected on the types of services the clients received at the clinic and the results of HIV and STI tests performed. Test results were recorded to examine whether PEs were appropriately referring young people at higher risk to HIV

and STI (i.e. a positive diagnosis indicating a higher risk status). Higher disease levels among referred youth were interpreted as PEs effectively reaching and referring these higher risk youth for VCT and RH services. Completed questionnaires were stored in a locked container. To determine the response rate, a blank dated questionnaire was placed in the locked container for clients who declined to participate.

Variable definition

A dichotomous exposure variable was created from the clinic data. If a respondent reported 'yes' to the question, 'Have you ever talked with, seen, or heard a health message from a trained peer educator?', then he/she was considered exposed to peer education. Respondents were also considered exposed if they provided the name of a peer education program when asked the question, 'Which peer education program(s) have you been in contact with?'. Otherwise the respondent was considered not exposed to PE. If a respondent was missing both of these variables, he/she was considered missing for the exposure variable.

The primary outcome of interest was 'referral'. A dichotomous referral variable was created. If the respondent reported 'yes' to the question, 'Were you asked to come to the clinic/center by a trained peer educator?', then he/she was considered referred to the clinic by a PE. Respondents were also considered to be referred if they provided the name of a PE program when asked the question, 'Which peer education program(s) asked you to come to the clinic?'. Otherwise, the respondent was considered not referred by a PE. If a respondent was missing both of these variables, he/she was considered missing for the referral variable.

Analysis

Crude and adjusted logistic regression models were used to estimate the effect of referrals on the receipt of clinic services. The adjusted models controlled for sex, age, education, marital status and the clinic where the respondent was recruited. Clinic was controlled for in the models to adjust for clustering. The other variables were included in the models because they may influence the outcomes of interest (e.g. married youth may be more likely to receive contraceptives than unmarried youth). Odds ratios and 95% confidence intervals were calculated. The effect of referrals on dichotomous outcomes was judged to be statistically significant if the 95% confidence intervals for the coefficient associated with YPE referral did not include 1.0.

Results

Program inputs

Table II shows the total costs and distribution by resource category for the five YPE programs. Training costs contributed the largest proportion of all costs generated by each program, at more than 50%. Supporting youth-friendly corners (in programs that included this service) totaled 20–30% of all costs, while PE supplies and incentives ranged from 5% to 12% of costs. Supervision of PEs accounted for another 6–15% of costs across the different programs.

Program quality

Item scores on the eight checklists tended to be low (data not shown). No program received a score of 5 (the highest score) on any item. Thirty scores of 4 were awarded to the various programs compared with almost 200 scores of 1 (the lowest score).

Table III shows the mean checklist scores by program and across all programs. Across all programs, Stakeholder Cooperation had the highest average score, while Parental Involvement had the lowest. The Parental Involvement score for Program E, while still low, was more than twice the average scores of the other four programs. In general, most programs tended to score either medium or low on most items in the checklists. However, most programs scored low on the Parental Involvement checklist.

Program outputs

Peer educators from four of the five YPE programs completed activity logs; no PEs from Program A completed activity logs. Sixty-two PEs completed activity logs that collected information on hours

Table II. *Cost distribution of YPE programs by resource categories in $US*

	Training costs	Youth-friendly corners	PE supplies and incentives	Supervision	Total
Lusaka					
Program A	$17 364	$8682	$3537	$2572	$32 156
Program B	$130 621	$39 394	$16 587	$20 734	$207 335
Livingstone					
Program C	$25 603	$11 638	$2328	$6983	$46 551
Program D	$9335	$0	$1455	$1334	$12 123
Mongu					
Program E	$21 678	$7337	$2335	$2001	$33 350

Table III. *Mean YPE checklist scores (range 1–5)*

	Program A	Program B	Program C	Program D	Program E	All programs
Technical frameworks	1.52	2.52	1.86	2.05	2.05	2.00
Youth–adult partnerships	1.35	1.82	1.59	1.64	2.06	1.69
Youth involvement	1.46	1.54	2.0	1.23	2.38	1.72
PE cooperation	1.75	2.5	2.37	1.87	2.62	2.22
Gender equity and equality	1.4	2.5	2.4	1.2	2.8	2.06
Parental involvement	1.14	1.0	1.0	1.29	3.14	1.51
Stakeholder cooperation	1.33	3.25	2.33	—	2.83	2.44
Community involvement	1.58	3.10	1.84	2.05	2.0	2.11

worked, activities conducted, contacts, events and topics covered.

Table IV presents data on PE output per day, based on completed activity logs. Peer educators in the Program B were generally the most productive, with the highest median number of hours spent working, activities, topics covered and contacts. Program D had the highest median number of new attendees, defined as new program activity attendees, per PE per year. Program E had the lowest median number of new attendees.

The most common activity for PEs was condom distribution, followed by discussion groups and referrals (data not shown). Each program had different primary activities. The most common topic covered by all PEs at all four programs was HIV/AIDS/STIs. The other most commonly discussed topics were VCT and condom use.

Program exposure

The response rate for the clinic questionnaire was 93.1%. Basic demographic information for the 10 343 youth who completed the questionnaire was compared with the 10 300 (99.6%) youth who provided information on exposure to YPE. Examination of sex, age, education, literacy, marital status, STI history and study clinic revealed no proportional differences between youth who provided and did not provide exposure information on the questionnaire. The proportional differences between the two groups varied at most by 0.1% (data not shown). Demographic information for youth attending the clinics by exposure to YPE and referral by a YPE program are shown in Table V. Exposed youth were similar in age to unexposed youth. While only 30% of clinic clients were male, 34% of exposed youth were male. Exposed youth were more educated, more likely to be literate, less likely to be married and more likely to have a history of STIs compared with those not exposed to YPE.

A similar pattern was observed when comparing the demographic characteristics of referred and not referred youth. For example, while only 30% of the

clinic clients were male, 37% of referred youth were males. Also, a larger percentage of referred youth had a history of STI diagnosis (30%) compared with those who were not referred (13%) and the total sample (22%).

Three-quarters (74%) of the sample reported that they had been exposed to YPE (data not shown). Even at the only clinic in this study not directly linked to a YPE program, almost half of the youth (49%) reported being exposed to any YPE program. At four of the six clinics linked to a YPE program, the most common source of exposure was the YPE program being evaluated. Program E had the highest exposure rates at its two clinics (38% and 35%). The lowest exposure was found for Program A—only 3% of youth attending the clinic linked to Program A reported exposure to Program A.

Program referrals

Among those youth who provided information about whether they were referred to the clinic by a PE (n = 10 288), over half (53%) reported that

Table IV. *Program outputs (median number per PE per day)*

	Range	Program A	Program B	Program C	Program D	Program E
Hours working	0.2–3.4	—	2.0	0.4	1.4	0.9
Activities	1.0–9.8	—	6.7	1.0	2.4	1.1
Topics	1.0–9.8	—	6.1	1.1	3.0	1.1
Contacts	3.0–110.5	—	67.1	9.0	21.8	8.4
New attendees	0.0–21.2	—	8.4	7.7	10.0	2.8

Table V. *Demographics for youth attending the clinics, by exposure and referral*

Background variables	Total n = 10 343		Exposed to YPE (n = 10 300)				Referred by YPE (n = 10 288)			
			Exposed		Unexposed		Referred		Not referred	
	n	%	n	%	n	%	n	%	n	%
Sex										
Male	3122	30.2	2554	33.7	555	20.3	2013	37.2	1090	22.4
Female	7221	69.8	5015	66.3	2176	79.7	3399	62.8	3786	77.7
Age (years)										
15–19	4238	41.0	3133	41.4	1079	39.5	2310	42.7	1904	39.1
20–24	6105	59.0	4436	58.6	1652	60.5	3102	57.3	2972	61.0
Education										
0–8 years	2561	24.8	1501	19.8	1048	38.4	949	17.5	1596	32.7
9–11 years	4563	44.1	3518	46.5	1029	37.7	2606	48.2	1937	39.7
⩾12 years	3219	31.1	2550	33.7	654	24.0	1857	34.3	1343	27.5
Literate										
No	1377	13.3	687	9.1	687	25.2	425	7.9	942	19.3
Yes	8966	86.7	6882	90.9	2044	74.8	4987	92.2	3934	80.7
Married										
No	6170	64.0	4727	66.9	1415	55.9	3532	69.9	2601	57.4
Yes	3464	36.0	2338	33.1	1117	44.1	1522	30.1	1930	42.6
STI history										
No	8061	77.9	5632	74.4	2393	87.6	3771	69.7	4243	87.0
Yes	2282	22.1	1937	25.6	338	12.4	1641	30.3	633	13.0

they were referred to the clinic by a PE (data not shown). The clinic not linked to a YPE program in the study had the lowest percentage of referrals by a PE (22% of youth). At four of the six clinics, youth attending the clinics were more likely to be referred by the YPE program linked to the clinic as compared with other programs operating in the community. Program E had the highest percentage of referrals to its two clinics—43% of youth at one clinic and 41% at the other. Program A had the lowest percentage of referrals to its clinics (1%).

Table VI shows that referred youth were equally likely to be tested for one or more STIs during their visit as youth not referred. Tested youth who were referred to the clinic by a PE, however, were three times more likely to test positive for STIs than those who were not referred.

Paradoxically, a different trend was observed for HIV testing and diagnosis. Youth who were referred by a PE were less likely to be tested for HIV than youth who were not referred. Tested youth who were referred to the clinic by a PE were less likely to test positive for HIV than those not referred.

Table VI shows the association between being referred by a PE and services received during the clinic visit. Youth referred by a PE were more likely to receive the following during their visit: condoms, other contraceptives and RH counseling. Referred youth were less likely to receive antenatal care.

Table VII displays inputs, quality, exposure and referrals for each YPE program. Program B incurred the highest cost per PE, while Program D incurred the lowest. The mean scores of all eight checklists are provided in the third column of Table VII. Program B had the highest mean score and Program E was a close second. Program A had the lowest mean score. The two highest quality programs (B and E) had the highest exposure and referrals, whereas the lowest quality program (A) had the lowest exposure and referrals. The highest quality program, Program B, was the most expensive overall. Program E costs about half the per-PE cost of Program B, yet had double the outcomes of exposure and referrals compared with Program B.

Discussion

Using standardized evidence-based instruments, we found wide variation in the cost, quality and outcomes of YPE programs. The five programs varied in cost from approximately $200 per PE to over $1200 per PE; mean scores across all the checklists intended to measure eight aspects of program quality varied from 1.46 to 2.37 (possible range from 1 to 5), program exposure ranged from 3% to 38% of youth attending the clinics and the proportion of youth at the clinics who were referred by their 'linked' YPE program ranged from 1% to 43%. Programs tend to score high or low on all eight checklists measuring quality. Although not directly comparable, the variation among programs found in our study corroborates with systematic reviews showing variation in the impact of YPE programs [12, 13].

In general, higher quality programs like Programs B and E cost more and were associated with better program outcomes. However, Program E, at 16% the cost of Program B, had quality scores almost equal to Program B and double the exposure and referral outcomes compared with Program B. Interestingly, there was not a clear link between program quality and PE outputs (hours spent working, number of contacts made, etc.). Program B had the highest output of all the programs and the highest quality score, but Program E had relatively low output despite being high quality. It may be that Program E, located in a rural setting compared with the other programs, used different intervention strategies such as conducting more intensive activities with a smaller number of program beneficiaries instead of conducting more diffuse activities with large groups of young people. We are also missing output data from the lowest quality program that limits our assessment of the link between quality and PE outputs. Nevertheless, the following trend is clear—program quality (measured by the checklists) was positively associated with outcomes (exposure and referrals), thus demonstrating that the standardized evidenced-based instruments used in this study are useful when assessing and comparing program attributes among diverse YPE programs.

Table VI. *Odds ratios and 95% confidence intervals (CIs) for the association between referral by a PE and RH services received in clinics (n = 10 288)*[a]

	% Receiving service or positive diagnosis	Crude odds ratios (95% CI)	Adjusted[b] odds ratios (95% CI)
Tests performed			
STI			
Not referred	38.2	1.0	1.0
Referred	41.6	1.2 (1.1–1.2)	1.1 (1.0–1.2)
HIV			
Not referred	34.8	1.0	1.0
Referred	27.8	0.7 (0.7–0.8)	0.7 (0.6–0.8)
Positive diagnosis			
STI[c]			
Not referred	21.7	1.0	1.0
Referred	58.0	4.9 (4.3–5.6)	3.2 (2.8–3.8)
HIV[d]			
Not referred	26.7	1.0	1.0
Referred	21.6	0.8 (0.6–0.9)	0.6 (0.5–0.7)
Service received			
Pregnancy test			
Not referred	3.5	1.0	1.0
Referred	4.9	1.4 (1.2–1.7)	1.2 (1.0–1.5)
Condoms			
Not referred	14.0	1.0	1.0
Referred	34.6	3.3 (3.0–3.6)	2.8 (2.5–3.1)
Other contraceptives			
Not referred	14.3	1.0	1.0
Referred	13.7	1.0 (0.8–1.1)	1.5 (1.3–1.7)
Antenatal care			
Not referred	28.2	1.0	1.0
Referred	13.8	0.4 (0.4–0.5)	0.5 (0.4–0.6)
RH counseling			
Not referred	52.7	1.0	1.0
Referred	56.7	1.2 (1.1–1.3)	1.2 (1.1–1.3)
HIV counseling			
Not referred	57.7	1.0	1.0
Referred	57.8	1.0 (0.9–1.1)	1.0 (0.9–1.1)
STI counseling			
Not referred	58.2	1.0	1.0
Referred	63.6	1.3 (1.2–1.4)	1.0 (1.0–1.2)

[a]Five thousand four hundred and twelve youth (52.6%) were referred by a PE and 4876 were not referred.
[b]Adjusted for sex, age, education, marital status and clinic.
[c]Four thousand and sixty received a positive diagnosis of an STI of which 54.5% were referred.
[d]Three thousand two hundred received a positive diagnosis for HIV of which 46.9% were referred.

Overall, the data support the notion that YPE programs are appropriately referring vulnerable youth to health services. Greater STI diagnoses among those referred indicate that PEs are effectively reaching and referring youth with greater need for VCT and RH services. Referred youth were also more likely to receive contraceptives and RH counseling. Referred youth were less likely to receive antenatal care, but this may be due to them experiencing fewer pregnancies since referred youth were more likely to be male, younger and unmarried compared with youth not referred.

Table VII. *Program costs, quality and outcomes*

	Total cost ($US)	Mean cost per PE ($US)	Program checklist Mean scores	% of youth attending linked clinics EXPOSED to each YPE program (n = 10 300)	% of youth REFERRED to linked clinic by each YPE program (n = 10 288)
Lusaka					
Program A	$32 156	$402	1.46	3.3	1.2
Program B	$207 335	$1219	2.37	18.9	18.0
Livingstone					
Program C	$46 551	$665	1.95	4.4	5.0
Program D	$12 123	$209	1.76	16.0	15.9
Mongu					
Program E[a]	$33 350	$667	2.35	38.3	40.6
				35.1	42.9

[a]Program E was linked to two clinics.

Additionally, pregnancy may be a powerful motivator to young women to visit the clinics, independent of whether or not they received referrals, thus increasing the proportion of non-referred young people who received antenatal care. Demographic differences, especially age, may also explain the finding that referred youth were less likely to be diagnosed with HIV. Unlike STIs that can reoccur, HIV infection is a one-time event and its prevalence accumulates over time.

This study is not without its limitations. Missing data on some of the items for two of the programs are certainly a limitation. Additionally, this study may not be generalizable to all YPE programs, especially those outside of sub-Saharan Africa, since it included only programs in Zambia. A third limitation is that the same two outcomes—program exposure and referral of youth to health services—were measured for all programs in this study. It is unknown if the instruments would be useful in comparing programs that had different outcomes or variable outcomes. Lastly, time and financial constraints did not allow us to investigate program impact on behavior change (e.g. increased condom use) or on disease levels (e.g. HIV or STI incidence rates) among young people.

Despite these limitations, this study fills a gap in the literature by presenting cost data for five YPE programs and linking these data to program quality and outcomes. Although this study did not compare peer-led versus teacher-led educational approaches, it does demonstrate that training costs represent a significant cost to YPE programs, a point made by Shepherd *et al*. [14]. This study also introduces standardized evidence-based instruments to the health education community and demonstrates the value of using these instruments to assess and compare YPE program attributes. The checklists are available to other programs in the publication *Assessing the Quality of Youth Peer Education Programs* [19].

We anticipate that these instruments will be useful for donors and program implementers alike. For example, given limited resources available and for reasons of stewardship, donors can use the instruments to compare diverse programs when making funding decisions among programs or decisions about whether to expand or replicate a particular program in other settings. Program implementers can use the instruments to assess their programs and identify the areas where they excel and those that need improvement. Specifically, planners can use their program's checklists scores to make decisions about adding or strengthening certain program features. For example, based on the checklist scores, the programs in this study should add or enhance activities that reach out and involve parents in the program. Furthermore, the seven items within the Parental Involvement checklist suggest specific ways programs can implement this change. Future research is needed to determine if these instruments prove useful when designing and implementing

YPE programs. Lastly, this study suggests an urgent need to use evidence-informed YPE guidelines [20] and minimal criteria for YPE programs so that more youth are reached by high-quality YPE programs.

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Conflict of interest statement

None declared.

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