

Behavior Change Evaluation of a Culturally Consistent Reproductive Health Program for Young Kenyans

By Annabel S. Erulkar,
Linus I. A. Etyang,
Charles Onoka,
Fredrick K. Nyagah
and Alex Muyonga

Annabel S. Erulkar is program associate, Population Council, Accra, Ghana. Linus I. A. Etyang is program manager, Charles Onoka is program officer for research and evaluation, Fredrick K. Nyagah is program officer for youth and Alex Muyonga is program officer for advocacy, all in the Nairobi or Nyeri offices of the Family Planning Association of Kenya.

CONTEXT: Few rigorous evaluations have been conducted of locally designed, culturally consistent adolescent reproductive health programs.

METHODS: A quasi-experimental research design was used to measure behavioral changes associated with a culturally consistent reproductive health program for young people in Kenya. Baseline and endline surveys were conducted in 1997 and 2001, respectively, in the project and control areas. Multivariate analysis was used to assess whether the project was associated with changes in young people's sexual initiation, safer-sex behavior and discussion of reproductive health issues with adults.

RESULTS: The 36-month project was associated with considerable changes in young people's sexual and reproductive health-related behavior, but behavior change differed by gender. Females in the project site were significantly more likely than those in the control site to adopt secondary abstinence (odds ratio, 3.3) and less likely to have had three or more sex partners (0.1). Males in the project site were more likely to use condoms than those in the control site (3.7). Both males and females in the project site were more likely to discuss sexual and reproductive health issues with a nonparent adult than were young people in the control site (1.9 and 5.5, respectively).

CONCLUSIONS: Interventions that adapt to indigenous traditions can be both acceptable to communities and associated with significant changes in young people's behavior.

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Increasingly, public health policies and programs have focused on the sexual and reproductive health needs of adolescents, particularly in the developing world. This is largely a result of recognition that adolescents constitute large segments of developing countries' populations, that they are disproportionately affected by negative reproductive health outcomes and that services for adults are not responsive to the needs of adolescents.¹ Most recently, alarming rates of HIV infection in young adults, particularly young women, have further focused attention on this vulnerable group, especially in Sub-Saharan Africa.²

Reproductive health interventions targeted at adolescents are a relatively new phenomenon in Sub-Saharan Africa, with the first programs having been established in the late 1970s. Most of these programs are educational and are delivered via youth centers, peers, the media and schools.³ Few of these programs provide sexual and reproductive health services, perhaps because of discomfort with addressing the needs of unmarried, sexually active adolescents.⁴ Despite considerable evidence to the contrary, many policymakers fear that discussing family life or sex education will encourage young people to experiment with sex and may increase risky sexual behavior. Some cite previous research on drug education programs for young people showing that certain programs—especially those that take the “just say no” approach—may, in fact, increase experimentation.⁵

One of the major problems with adolescent reproductive health programs in the developing world has been the lack of rigorous evaluation of their impact on young people's knowledge, attitudes and behavior.⁶ Without such evidence, it has been difficult to convince policymakers that these programs are likely to improve the health outcomes of young people, or, at least, to do no harm. Most of the evaluations of youth programs have been conducted in the developed world, and the majority of these have focused on school-based programs.⁷

More recently, studies in Sub-Saharan Africa have focused on changes in knowledge and attitudes, and to a lesser extent, in behavior, related to youth programs—most of which are peer education interventions. An evaluation of a peer education program in Cameroon revealed that residence in the project site was correlated with increases in young people's knowledge of sexually transmitted infections (STIs). Although the findings suggested that improvements in condom use increased among those who had been in contact with peer educators, it was not clear whether a selection effect influenced this result.⁸

A study in Botswana, Cameroon, Guinea and South Africa examined the impact of mass media, peer education and “youth friendly” contraceptive services.⁹ The varied effects of the four programs were attributed to differences both in the way the projects were implemented and in the duration of the interventions. The programs were related

to a number of changes in knowledge and attitudes, especially concerning the benefits of condoms and abstinence. The evaluation also found that contraceptive use rose, numbers of partners decreased and abstinence increased; however, some negative changes were also detected, such as decreased proportions of young people believing that condoms protect against HIV. This study, and others, have suggested that variations in impact may sometimes arise from the way programs are managed and supervised, rather than from the effectiveness of a model itself.¹⁰

Evaluations in Nigeria and Ghana revealed that peer education had a measurable impact on reproductive health knowledge, especially for young people in secondary schools.¹¹ This study indicated that a program's effect can differ for males and females, and in different settings. However, some evaluations, such as the Cameroon study, did not have a sufficient sample size to conduct a sex-stratified analysis.¹²

All these studies used a quasi-experimental research design to measure the impact of peer education programs. They provide evidence that peer education can have positive effects on adolescents' knowledge and attitudes in the African context. Changes in behavior are less clear, with some research¹³ revealing some negative changes among youth in the experimental sites. Moreover, for most of these studies, intervention periods were probably too short to see changes in young people's behavior.

The adolescent program models generally used in Sub-Saharan Africa originated outside of the African context and may not be effective for young people on the continent. For example, in many African countries school enrollment is low, especially at the secondary level.¹⁴ In such countries, large investments in school-based programs are likely to reach only a fraction of young people. Mixed-gender programs, such as youth centers, might not be acceptable in more traditional settings. And youth center programs may assume a high degree of mobility and free time among those who visit them, which might not be true for many young people, especially females.¹⁵

Few programs intended for adolescents have used research in the local communities to guide their design and development. Despite the enormous diversity of cultures, settings and norms on the African continent, surprisingly few interventions for young people have taken cultural context into account.¹⁶

THE NYERI YOUTH HEALTH PROJECT

The Nyeri Youth Health Project, a community-based project for young people, was implemented by the Family Planning Association of Kenya at a time when the environment in Kenya was not conducive to providing young people with reproductive health information and services. Many opinion leaders and policymakers in Kenya opposed provision of such information to young people, although the critical nature of adolescent reproductive health issues was becoming apparent. In the early 1990s, family life education programs in schools were banned,

the curricula and condoms were publicly burned, and schoolgirls who became pregnant were expelled.¹⁷

Because staff and provider attitudes can represent a significant barrier to adolescent services,¹⁸ research was undertaken as part of yearlong planning phase to understand staff attitudes toward providing information and services to young people. The association subsequently held a workshop to discuss whether and how to address the issue of adolescent sexual and reproductive health. Next, qualitative research was conducted among young people, their parents and community leaders to explore preferences regarding an information and services project for youth. This study revealed that both young people and parents preferred that adults, rather than peers, deliver such information.¹⁹

The primary target group for the project was unmarried young people aged 10–24, as well as the adults who influenced their environment. The objectives of the program were to delay the onset of sexual activity among youth who were not yet sexually active; to prevent sexually experienced youth from suffering negative consequences of sexual activity; and to create a reproductive health information and service environment that was responsive to the information and service needs of young people. The design of the project drew heavily on the following six principles for youth programming: recognize the diversity of adolescents; begin with what young people want and what they are already doing to obtain sexual and reproductive health information and services; include skills building; engage adults to create a safe and supportive environment; use a variety of settings and providers; and make the most of existing infrastructure.²⁰

Among the Kikuyu, the largest ethnic group in Kenya, young people were traditionally initiated into adulthood after undergoing a rite of passage that included circumcision. At initiation time, parents of initiates asked other parents they knew and trusted to give their young people information and guidance on sexuality and related issues.²¹ The design of the Nyeri Youth Health Project was derived from research in the Nyeri community and was consistent with Kikuyu traditions. Respected and well-known young parents were nominated by young people and parents to give adolescents sexual and reproductive health information and referrals for services. These adult counselors, referred to as Friends of Youth, worked in their own communities to educate both adolescents and parents on reproductive health and to encourage dialogue between them. The counselors were trained for one month and used a life skills curriculum entitled "Life Planning Skills for Adolescents in Kenya," which includes sessions on community, family and individual values, adolescent development, sexuality, gender roles, relationships, pregnancy, STIs, HIV/AIDS, harmful traditional practices, substance abuse, planning for the future, children's rights and advocacy.²²

Each of the 25 counselors (18 women and seven men) was assigned a specific geographic area that included

TABLE 1. Percentage distribution of adolescents, by gender and site, according to selected characteristics, 1997 and 2001

Characteristic	Baseline (1997)				Endline (2001)			
	Males		Females		Males		Females	
	Project (N=573)	Control (N=219)	Project (N=523)	Control (N=229)	Project (N=711)	Control (N=214)	Project (N=697)	Control (N=243)
Age								
10–14	40.8	42.8	39.6	45.9	38.0	37.4	39.6	43.6
15–19	39.3	36.7	41.9	38.7	32.2	35.0	32.7	32.9
20–24	19.9	20.5	18.5	15.4	29.8	27.6	27.7	23.5
Religion								
Catholic	48.5***	29.8	44.8***	34.2	43.5**	32.2	36.7	32.1
Other Christian	47.2	68.4	47.7	63.1	53.1	65.0	59.6	66.3
Non-Christian	4.3	1.8	7.5	2.7	3.4	2.8	3.7	1.6
Ethnic group								
Kikuyu	93.2	87.9	91.7	89.6	93.5	83.6	89.1	90.1
Non-Kikuyu	6.8	12.1	8.3	10.4	6.5	16.4	10.9	9.9
Ever attended school								
Yes	99.6	100	99.4	100	98.9	98.1	99.1	98.4
No	0.4	0	0.6	0	1.1	1.9	0.9	1.6
School status								
In school	66.0	58.6	66.4	60.8	54.5	50.5	51.1	47.3
Out of school	34.0	41.4	33.6	39.2	45.5	49.5	48.9	52.7
Yrs. of schooling								
< 9	75.2	72.2	71.1	72.2	71.4	79.6**	69.7	75.2
≥ 9	24.8	27.8	28.9	27.8	28.6	20.4	30.3	24.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*p<.05. **p<.01. ***p<.001.

approximately 300 adolescents. Areas were created on the basis of government maps and population estimates from the Kenya Central Bureau of Statistics. Before they conducted educational activities, counselors went house-to-house introducing themselves and the project, while ascertaining where eligible adolescents lived. After this informal community assessment, counselors took advantage of existing structures where youth were found, such as schools, church youth groups, youth clubs and sports clubs. To reach young people who were not engaged in groups, counselors either formed their own groups or sought out young people individually.

TABLE 2. Percentage of adolescents reporting selected reproductive health behaviors, by gender and site, 1997 and 2001

Behavior	Males				Females			
	Project		Control		Project		Control	
	1997	2001	1997	2001	1997	2001	1997	2001
Initiated sex	34	24	30	33	24	21	25	21
Abstained from sex for last 6 mos.	34	38	26	30	40	53	39	26
Used condom at last sex	39	45	41	16	22	32	28	25
Had ≥3 sex partners in the last 3 yrs.	29	24	38	30	14	5	13	30
Discussed reproductive health with parent	10	17	33	32	26	37	39	19
Discussed reproductive health with other adult	39	47	39	31	49	57	54	26

Using the curriculum as a guide, counselors conducted a range of activities with young people, including group discussions, role playing, drama and lectures. They tailored the curriculum to the age, preferences and needs of the group. For example, they devoted comparatively more time to the topics of values and puberty with younger adolescents, but spent more time on STIs and HIV/AIDS with older adolescents. Counselors typically met with groups weekly for 4–8 weeks, in 90–120 minute sessions. The counselors also worked with adults in the community to improve attitudes and the general atmosphere affecting how adolescent issues are addressed at the community level. They worked closely with schools, conducting activities with students or coaching teachers to try to improve their communication with young people.

The counselors were paid a monthly honorarium for their work in the project. Initially, the family planning association had recruited 10 counselors and made a considerable investment in training them for one month, but considered them volunteers. Within the first six months of the program, half the counselors dropped out. Given the considerable investment in training and development, subsequent counselors were hired as part-time contract workers and were paid the equivalent of US \$25 per month.* As part-time workers, counselors were expected to work a minimum of 3.5 days per week. None of the counselors recruited under these terms dropped out.

Formative research indicated that young people tend to visit private service providers when they have a sensitive reproductive health problem such as an STI. The family planning association trained a network of local doctors, clinical officers, chemists and laboratory personnel—mostly from the private sector—to provide youth-friendly services. Counselors referred youth to service providers and gave them a coupon that entitled them to subsidized services. Young people paid the equivalent of US \$0.50–1.50 for services; the remainder of the cost was underwritten jointly by the association and the collaborating service providers.

Counselors made more than 40,000 contacts with young people during the three years of the intervention. In addition, they made 5,800 contacts with parents. The number of contacts with males roughly equaled the number of contacts with females. The 12 participating service providers had 2,772 clinical sessions with young people. Most of the clinical visits were for reproductive tract infections (55%), followed by family planning (15%) and male circumcision (15%). By the end of the project, a significant proportion of the Nyeri community knew of the project and had had contact with its staff. Forty-seven percent of Nyeri parents were aware of the program, and 19% had attended a session with a counselor; two-thirds of all young people aged 10–24 were aware of the program and one-third had had contact with a counselor.

*The cost of training 25 adult counselors for one month is approximately US \$8,000; the cost of paying 25 counselors for one year is US \$7,500.

METHODS

Data Collection

The project's quasi-experimental design permitted the measurement of the project's effect on young people in the project area. The project area was Nyeri Municipality, where pilot activities were undertaken for three years, from 1998 through 2000. The project site, which is located about 200 kilometers north of Nairobi, comprised four sublocations, including an estimated 14,000 young people aged 10–24. Nyahururu Municipality, the control site, lies 300 kilometers north of Nairobi. The two sites are similar in ethnic and religious composition, socioeconomic status, and health and education infrastructure.* Nyahururu is located more than 100 kilometers from the project area, making contamination unlikely.†

Cross-sectional surveys were carried out in the project and control sites at baseline (1997) and at endline (2001). At baseline, unmarried young people aged 10–24 were sampled. At endline, data were collected from young adults aged 10–26, as those who were aged 25 or 26 at endline may have benefited from the project during its first two years of implementation, but aged out of the project. For the present study, we included only respondents aged 10–24 in the analysis. Comparison of baseline and endline survey results in the control site permits an assessment of changes between surveys that are not due to the intervention. Changes in the project site that are significantly different from those in the control site are probably due to project activities.

To select adolescents for interview, we first listed all households in the project site, using maps from the Central Bureau of Statistics. The “select random sample of cases” function in SPSS was used to select households. Seventy-five households with eligible adolescents were selected per counselor area at baseline, and 100 households per area were selected at endline. As in the project area, households in the control area were listed and selected at random. In the control area, where there were no counselors and therefore no counselor areas, the distribution of respondents was selected to reflect the same urban-rural population distribution in the project area. To control for potential intrahousehold correlation, we interviewed only one adolescent per household. If there were two or more eligible adolescents in a household, we used a Kish grid to randomly select one for interview. For each adolescent selected, interviewers made up to three visits to the household to locate the selected respondent.

Increasing evidence suggests that there may be considerable misreporting by adolescents on such sensitive issues as premarital sexual behavior.²³ Because adolescents are thought to be more forthcoming in self-administered questionnaires, a longer interviewer-administered questionnaire was used to collect data on less sensitive issues, and a short, self-administered questionnaire collected information on sensitive issues.‡ Such issues included whether or not the participant had had sexual intercourse, an STI or an abortion.

TABLE 3. Odds ratios (and 95% confidence intervals) from hazard models examining associations between selected characteristics and time to sexual debut among adolescents who had not had sex three years prior to interview, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=553)	2001 (N=715)	1997 (N=618)	2001 (N=853)
Age	0.79 (0.71–0.83)***	0.69 (0.63–0.76)***	0.72 (0.63–0.82)***	0.70 (0.64–0.78)***
Socioeconomic status	0.99 (0.90–1.07)	0.97 (0.90–1.05)	1.00 (0.91–1.11)	0.95 (0.89–1.02)
School status				
In school	0.50 (0.32–0.77)**	0.47 (0.30–0.73)**	0.37 (0.24–0.59)***	0.52 (0.31–0.86)*
Out of school (ref)	1.00	1.00	1.00	1.00
Yrs. of schooling	1.03 (0.95–1.12)	1.06 (0.99–1.14)	0.92 (0.84–1.01)	0.93 (0.87–0.99)*
Religion				
Catholic	1.21 (0.88–1.66)	1.01 (0.75–1.36)	1.35 (0.96–1.91)	1.28 (0.94–1.74)
Other (ref)	1.00	1.00	1.00	1.00
Resident parents				
Neither (ref)	1.00	1.00	1.00	1.00
At least one	0.61 (0.41–0.92)*	0.86 (0.62–1.21)	1.60 (0.97–2.64)	1.01 (0.73–1.39)
Site				
Project	0.99 (0.69–1.44)	0.75 (0.54–1.05)†	0.82 (0.57–1.19)	0.83 (0.59–1.17)
Control (ref)	1.00	1.00	1.00	1.00

*p<.05. **p<.01. ***p<.001. †p<.10.

The interviewers were residents of the region who had no prior relationship with the project and spoke the local language, Kikuyu. In addition, interviewers had to be young enough so that adolescent respondents felt comfortable with them, and open-minded enough to be non-judgmental during interviewing, especially when dealing with sensitive topics. Only females interviewed female respondents and only males interviewed male respondents.

Training of interviewers and supervisors took place over a two-week period. During the training, special sessions were held to familiarize interviewers with aspects of adolescent sexuality and reproductive health and to clarify their values in order to ensure a nonjudgmental approach during the interview. At the end of the training, participants took part in two field practice sessions outside the project area. Before interviews were conducted with adolescents, informed consent was obtained from the parents and the young people themselves.

*Both sites are located in Central Province, the homeland of the Kikuyu. The province, which has a large Catholic population, has a contraceptive prevalence of 61%, compared with 39% in Kenya as a whole. (Source: National Council for Population and Development, Central Bureau of Statistics and Macro International, *Kenya Demographic and Health Survey, 1998*, Calverton, MD, USA: Macro International, 1999.)

†At endline, only six adolescents in Nyahururu were aware of the adult counselors in Nyeri, which suggests negligible contamination of project activities.

‡Previous research undertaken in Nyeri found that the vast majority of adolescents had some exposure to schooling and could read and write (Source: Ajayi A et al., *Schooling and the Experience of Adolescents in Kenya*, Nairobi, Kenya: Ministry of Education and Population Council, 1997). Therefore, use of a self-administered questionnaire that required respondents to read and write did not greatly compromise data quality. Only 1% of the present sample had never been to school.

TABLE 4. Odds ratios (and 95% confidence intervals) from logistic regression models examining associations between selected characteristics and secondary abstinence during the six months before interview, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=328)	2001 (N=449)	1997 (N=206)	2001 (N=244)
Age	0.94 (0.83–1.08)	0.94 (0.85–1.05)	0.98 (0.83–1.18)	0.98 (0.85–1.12)
Socioeconomic status	1.11 (0.95–1.29)	1.02 (0.90–1.15)	0.93 (0.77–1.12)	1.10 (0.97–1.26)
School status				
In school	1.85 (0.89–3.84)	1.92 (0.93–3.97)	1.43 (0.60–3.40)	1.13 (0.34–3.73)
Out of school (ref.)	1.00	1.00	1.00	1.00
Yrs. of schooling	1.10 (0.97–1.25)	1.11 (0.99–1.23)	1.06 (0.88–1.27)	1.05 (0.92–1.20)
Religion				
Catholic	1.01 (0.60–1.70)	1.21 (0.78–1.89)	0.81 (0.42–1.54)	0.57 (0.33–1.01)
Other (ref.)	1.00	1.00	1.00	1.00
Resident parents				
Neither (ref.)	1.00	1.00	1.00	1.00
At least one	1.59 (0.82–3.08)	2.05 (1.27–3.32)**	3.94 (1.53–10.14)**	1.64 (0.92–2.91)
Site				
Project	1.27 (0.70–2.23)	1.33 (0.78–2.28)	0.95 (0.47–1.93)	3.25 (1.76–6.01)***
Control (ref.)	1.00	1.00	1.00	1.00
<i>R</i> ²	0.09	0.13	0.11	0.14

p*<.05. *p*<.01. ****p*<.001.

Measures

The most ambitious objective of the project was to delay sexual initiation among sexually inexperienced young people. It was considered ambitious because some were skeptical that an intervention of only three years' duration could delay sexual initiation. To measure program impact, we selected adolescents who had not had sex at the start of the project, three years prior to the endline survey. We then determined, among young people in each district who had not had sex when the project started, what proportion went on to initiate sex during the intervention. To make a comparison, we conducted the same examination among young people who had not had sex three years prior to the baseline survey.

The second objective of the project was to prevent sexually experienced youth from suffering negative consequences of sex, such as unwanted pregnancy and STIs, including HIV. To ascertain whether the project had achieved this objective, we examined indicators of behaviors that would lead to a reduction in negative sexual and reproductive health outcomes. Three indicators were studied: "secondary abstinence" (prolonged abstinence after sexual debut), condom use and reduction in the number of sex partners.

Young people may experiment with sex at an early age, but they may ultimately decide to abstain for a prolonged

*At baseline, condom use at last sex was the only question used to measure consistent condom use. At endline, additional questions on consistent condom use were added, including: "How often do you use condoms when having sex?" and "Thinking about the last FIVE times you had sex, how many times did you use a condom?"

period of time. To measure secondary abstinence, we included all sexually experienced adolescents and created a variable to reflect whether or not they had abstained for the previous six months.

Although condom use at last intercourse is not a perfect measure of consistent condom use, it was selected to reflect the extent to which young people were currently having protected sex.* Because condom use can be subject to recall bias if last sex took place a long time before interview, this analysis included only young people who had had sex during the last six months.

Similarly, we focused only on the number of sex partners in the three years prior to the survey, to reduce recall bias and to isolate the time during which the project was in operation. Therefore, because of how the questions were asked, we could include only those who had initiated sex in the last three years. A variable reflecting the number of years since sexual initiation was included in this model to control for exposure time since sexual initiation.

Another major objective of the Nyeri Youth Health Project was to improve the responsiveness of the community to young people's need for information. During the planning phase of the project, young people said they would prefer to get sexual and reproductive health information from adults, as they distrusted the accuracy of information they received from peers and had concerns over confidentiality. Parents in Nyeri approved of young people receiving family life education, but were often too embarrassed or not knowledgeable enough to give them that information.²⁴ The counselors spent a considerable amount of time working with adults in the community, including parents and teachers, to strengthen their ability to discuss sexual and reproductive health issues with young people.

Communication on sexual and reproductive health topics was used as a measure of community responsiveness to young people's need for information. This reflects both young people's willingness to discuss sexual and reproductive health topics with adults, and adults' readiness and comfort in discussing such topics with young people. Young people were read a list of 13 reproductive health topics, including body changes during puberty, sexual urges, abortion and HIV/AIDS. They were asked whether they had discussed the topic with anyone in the last three months, and if so, with whom. In analyzing adolescents' discussion with parents, we included only adolescents who were living with at least one parent.

Analysis

Two data sets were used, one with baseline data from the experimental site and the control site, and the other with endline data from the two sites. Each data set had a dummy variable identifying whether the respondents were from the experimental or the control site. Because the program may affect males and females differently, all analyses were stratified by sex. We conducted both bivariate analyses and multivariate analyses using logistic regression or Cox proportional hazard models at each round of the survey. The

Multivariate analyses controlled for age of the respondent, socioeconomic status, school status (whether in or out of school), educational attainment, religion and whether or not the respondent lived with at least one parent.

In particular, we were interested in the extent to which residence in the experimental area was associated with positive outcomes in the dependent variable. If residence in the experimental area was not a significant predictor at baseline, but was a significant predictor at endline after we controlled for other background variables, we considered the positive changes to be associated with the intervention.

This study used a quasi-experimental, pretest-posttest research design, with a nonequivalent comparison group. This research design allows us to establish associations, but not causal relationships, between the intervention and the measured outcomes. Because young people were not randomly assigned to the intervention, differences in the outcomes of interest may result from some unknown set of characteristics related to the project sites, but unrelated to the dependent variables. To the extent possible, we addressed this by controlling for a number of measurable background factors in the multivariate models, but the results should be interpreted with these limitations in mind.

RESULTS

Sample Characteristics

During the baseline survey in 1997, 1,544 unmarried young people aged 10–24 were interviewed in the project and control areas. At endline, in 2001, 1,865 young people were interviewed. Although these were separate cross-sectional surveys, there was some overlap, with 4% of endline respondents also interviewed at baseline. The response rates for the two surveys were 87% and 90%, respectively, which were comparable to or higher than those in other adolescent surveys.²⁵

The samples at baseline and endline were comparable in age, ethnic group and school enrollment (Table 1, page 60). In general, they were also similar in socioeconomic status and had scores that ranged from 3.0 to 3.8 on a mean assets index of 0–10 (not shown). However, respondents from the project area were more likely to be Catholic than respondents from the control area. This was true for both males and females at baseline and for males at endline. At endline, males in the project area had attained higher levels of education than males in the control area. They also had higher scores on the socioeconomic index (3.8 vs. 3.0).

Bivariate Analysis

Between 1997 and 2001, young people in the project area improved their sexual and reproductive health behavior on all the indicators examined (Table 2, page 60). The situation was different in the control area, where the proportion of youth reporting healthy behavior declined in many respects.

Between 1997 and 2001, there was a decline in the percentage of young males in the project area who said that

TABLE 5. Odds ratios (and 95% confidence intervals) from logistic regression models examining association of selected characteristics with condom use at last sex, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=223)	2001 (N=233)	1997 (N=123)	2001 (N=57)
Age	1.09 (0.94–1.26)	1.03 (0.89–1.18)	1.04 (0.83–1.31)	0.85 (0.69–1.05)
Socioeconomic status	1.06 (0.87–1.29)	1.07 (0.90–1.26)	0.93 (0.72–1.21)	0.89 (0.72–1.10)
School status				
In school	1.83 (0.74–4.53)	0.75 (0.24–2.29)	0.78 (0.90–3.19)	0.50 (0.07–3.84)
Out of school (ref)	1.00	1.00	1.00	1.00
Yrs. of schooling	1.13 (0.98–1.30)	1.13 (0.99–1.28)	1.00 (0.80–1.26)	1.33 (1.07–1.65)*
Religion				
Catholic	0.86 (0.47–1.59)	1.38 (0.77–2.47)	0.83 (0.33–2.06)	1.20 (0.54–2.69)
Other (ref)	1.00	1.00	1.00	1.00
Resident parents				
Neither (ref)	1.00	1.00	1.00	1.00
At least one	0.82 (0.42–1.64)	1.28 (0.67–2.46)	1.02 (0.38–2.79)	0.90 (0.36–2.25)
Site				
Project	1.05 (0.55–2.02)	3.74 (1.71–8.17)**	0.71 (0.28–1.81)	1.35 (0.59–3.11)
Control (ref)	1.00	1.00	1.00	1.00
<i>R</i> ²	0.08	0.16	0.25	0.09

*p<.05. **p<.01. ***p<.001. Note: Analysis limited to adolescents who had had sex in the six months before interview.

they had initiated sex in the previous three years (34% vs. 24%) or that they had had three or more sexual partners (29% vs. 24%). Over the same period, there was an increase in the proportion of males who reported using con-

TABLE 6. Odds ratio (and 95% confidence intervals) from logistic regression models examining association of selected characteristics with whether adolescents had had three or more partners in the previous three years, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=120)	2001 (N=170)	1997 (N=100)	2001 (N=144)
Age	1.15 (0.90–1.46)	1.17 (0.97–1.42)	1.03 (0.67–1.60)	0.63 (0.41–0.95)*
Socioeconomic status	0.89 (0.68–1.16)	1.06 (0.86–1.29)	0.73 (0.50–1.07)	1.08 (0.82–1.42)
School status				
In school	1.42 (0.45–4.44)	3.16 (1.02–9.82)*	1.02 (0.14–7.72)	0.05 (0.03–0.78)*
Out of school (ref)	1.00	1.00	1.00	1.00
Yrs. of schooling	0.95 (0.74–1.22)	0.78 (0.64–0.94)*	1.29 (0.81–2.07)	1.28 (0.91–1.80)
Religion				
Catholic	0.68 (0.28–1.63)	0.63 (0.29–1.36)	1.71 (0.45–6.42)	0.77 (0.20–3.00)
Other (ref)	1.00	1.00	1.00	1.00
Resident parents				
Neither (ref)	1.00	1.00	1.00	1.00
At least one	0.63 (0.21–1.86)	0.95 (0.39–2.27)	0.58 (0.09–3.83)	0.48 (0.13–1.75)
Yrs. since first sex	1.83 (1.18–2.84)**	1.56 (1.06–2.29)*	3.94 (1.60–9.72)**	1.32 (0.69–2.52)
Site				
Project	0.85 (0.29–2.06)	0.72 (0.33–1.57)	1.41 (0.33–6.00)	0.10 (0.03–0.36)***
Control (ref)	1.00	1.00	1.00	1.00
<i>R</i> ²	0.15	0.11	0.27	0.32

*p<.05. **p<.01. ***p<.001.

TABLE 7. Odds ratios (and 95% confidence intervals) from logistic regression models examining association of selected characteristics with adolescents' communication with a parent on sexual and reproductive health, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=588)	2001 (N=641)	1997 (N=550)	2001 (N=589)
Age	0.94 (0.81–1.08)	0.88 (0.78–0.99)*	0.92 (0.81–1.04)	0.95 (0.85–1.06)
Socioeconomic status	1.03 (0.91–1.17)	1.13 (1.01–1.27)*	1.16 (1.05–1.29)**	1.12 (1.01–1.24)*
School status				
In school	1.20 (0.55–2.64)	0.77 (0.40–1.47)	0.72 (0.43–1.30)	0.99 (0.54–1.81)
Out of school (ref)	1.00	1.00	1.00	1.00
Yrs. of schooling	1.14 (0.99–1.32)	1.13 (0.99–1.29)	1.15 (1.01–1.31)*	1.10 (0.97–1.24)
Religion				
Catholic	1.03 (0.64–1.65)	1.20 (0.80–1.79)	0.94 (0.64–1.37)	0.95 (0.66–1.37)
Other (ref)	1.00	1.00	1.00	1.00
Site				
Project	0.23 (0.14–0.37)***	0.40 (0.23–0.58)***	0.53 (0.36–0.80)**	2.23 (1.40–3.54)**
Control (ref)	1.00	1.00	1.00	1.00
<i>R</i> ²	0.13	0.07	0.08	0.07

*p<.05. **p<.01. ***p<.001.

doms at last sex (39% vs. 45%), abstaining from sex for the last six months (34% vs. 38%) and discussing a sexual and reproductive health topic with a parent (10% vs. 17%) or other adult (39% vs. 47%). In contrast, males in the control area fared worse in 2001 than in 1997 on four of the six indicators measured. For example, condom use by males in the control area declined from 41% to 16%. However, the proportions reporting abstinence for the past six months increased (from 26% to 30%), and the

proportion reporting three or more partners in the previous three years declined (from 38% to 30%).

Behavior among females in the project area also improved between 1997 and 2001—smaller proportions initiated sex (24% vs. 21%) and reported having had three or more partners in the previous three years (14% vs. 5%), and higher proportions had abstained (40% vs. 53%), used condoms (22% vs. 32%) and communicated with a parent (26% vs. 37%) or other adult (49% vs. 57%) about reproductive health. Among females in the control area, five of the six indicators of sexual and reproductive health behavior and communication changed for the worse. While the proportion who had initiated sex in the previous three years decreased (from 25% to 21%), there was also a decline in the percentage of females who had abstained from sex (39% vs. 26%), had used condoms at last sex (28% vs. 25%), and had talked to either a parent (39% vs. 19%) or another adult (54% vs. 26%) about reproductive health. Moreover, the proportion who had had three or more sex partners was higher at endline than at baseline (30% vs. 13%).

On average, females in the project area reported 1.5 lifetime partners at endline, compared with 1.9 among those in the control area (not shown).

Multivariate Analyses

• *Sexual initiation.* At both baseline and endline, age and school enrollment status were significantly associated with sexual initiation in the three years prior to interview, for both males and females (Table 3, page 61). Youth in school were less likely than out-of-school youth to have become sexually active (odds ratios, 0.4–0.5). At baseline, males

TABLE 8. Odds ratios (and 95% confidence intervals) from logistic regression models examining association of selected characteristics with adolescents' communication with an adult other than a parent on sexual and reproductive health, by gender, 1997 and 2001

Characteristic	Males		Females	
	1997 (N=792)	2001 (N=925)	1997 (N=751)	2001 (N=940)
Age	0.95 (0.86–1.06)	0.95 (0.87–1.03)	0.90 (0.81–1.01)	1.03 (0.94–1.12)
Socioeconomic status	1.03 (0.94–1.13)	1.02 (0.94–1.11)	1.08 (0.98–1.19)	1.01 (0.93–1.10)
School status				
In school	8.48 (4.54–15.86)***	9.90 (5.78–16.96)***	6.96 (3.87–12.51)***	15.65 (8.95–27.38)***
Out of school (ref)	1.00	1.00	1.00	1.00
Yrs. of schooling	1.18 (1.06–1.32)**	1.17 (1.07–1.28)**	1.36 (1.21–1.53)***	1.05 (0.95–1.15)
Religion				
Catholic	0.82 (0.62–1.24)	1.14 (0.83–1.56)	0.76 (0.53–1.09)	1.12 (0.80–1.58)
Other (ref)	1.00	1.00	1.00	1.00
Resident parents				
Neither (ref)	1.00	1.00	1.00	1.00
At least one	0.82 (0.47–1.44)	1.08 (0.71–1.66)	1.12 (0.66–1.90)	1.59 (1.09–2.34)*
Site				
Project	0.91 (0.62–1.34)	1.94 (1.33–2.84)**	0.76 (0.52–1.11)	5.48 (3.67–8.19)***
Control (ref)	1.00	1.00	1.00	1.00
<i>R</i> ²	0.24	0.35	0.28	0.45

*p<.05. **p<.01. ***p<.001.

who lived with at least one parent were less likely to have initiated sex than those who lived in another situation (0.6). At baseline, residency in the project area was not associated with a delay in sexual debut for either males or females; at endline, it was marginally significant for males (0.8; $p < .10$).

• **Secondary abstinence.** At baseline, none of the variables included in the model were significant predictors of secondary abstinence for males (Table 4, page 62). At endline, males who lived with at least one parent were more likely to report secondary abstinence than were those who had another living arrangement (odds ratio, 2.1). Residence in the project area, however, was not associated with secondary abstinence in males. At baseline, females who lived with a parent were more likely to report secondary abstinence than were those who did not live with either parent (3.9). At endline, the odds of secondary abstinence were greater for females who resided in the project site than for those who resided in the control site (3.3), suggesting that the intervention was associated with long-term abstinence after sexual debut for females.

• **Condom use.** At baseline, none of the variables in the model were significant predictors of condom use (Table 5, page 63), a finding that is consistent with other adolescent studies.²⁶ At endline, however, males in the project area were more likely than those in the control area to say they had used condoms at last sex (odds ratio, 3.7). For females, only increased educational attainment was associated with condom use (1.3).

• **Number of sex partners.** As Table 6 (page 63) shows, the number of years since sexual initiation was the only variable associated at baseline with having had three or more sex partners in the previous three years for either males (odds ratio, 1.8) or females (3.9). At endline, predictors for males were school status (3.2 for those currently enrolled), years of schooling (0.8) and number of years since sexual initiation (1.6). For females, having had three or more partners in the three years preceding the endline survey was associated with age (0.6) and school status (0.1 for those currently enrolled). Finally, females in the project site were less likely than those in the control site to have had three or more partners in the previous three years (0.1).

• **Communication with parents and other adults.** As Table 7 (page 64) shows, young males in the project area were less likely than those in the control site to have discussed sexual and reproductive health issues with a parent at both baseline and endline (odds ratios, 0.2 and 0.4, respectively). Females, in contrast, made dramatic changes in their communication patterns. At baseline, those in the project area were less likely than those in the control site to have discussed sexual and reproductive health issues with a parent (0.5). At endline, however, females in the project area were more likely than females in the control site to have talked about such issues with a parent (2.2).

Table 8 shows factors associated with the odds that young people had discussed a sexual and reproductive health issue with an adult other than a parent. Males who

were in school were significantly more likely than those who were not to have had such a discussion (8.5 at baseline, 9.9 at endline). The same was true for females (7.0 at baseline, 15.7 at endline). For males, the odds of discussion rose with years of education at baseline and at endline (1.2 for both). This was true for females only at baseline (1.4). At baseline, living in the project site was not a significant predictor of whether or not either males or females had discussed sexual and reproductive health with a nonparent adult. However, at endline, both males and females living in the project area were more likely than those in the control area to have had such a discussion (1.9 for males, 5.5 for females).

DISCUSSION

The Nyeri Youth Health Project was unique in several ways. It closely mirrored indigenous Kikuyu tradition and therefore was acceptable to the community. In addition, a diverse group of service providers (including those from the private sector), pharmacies and laboratories made up the network of outlets providing youth-friendly, subsidized services. The intervention period was 36 months, presumably allowing sufficient time for the project to affect young people's behavior. Given that other evaluations have shown that sexual and reproductive health programs for young adults can have positive effects on knowledge and attitudes, this evaluation focused on behavior change.

The project did not promote experimentation with sex or promiscuity, a fear of many policymakers regarding such programs for young people. Measures of adolescents' reproductive health behavior in the control area, Nyahuru, did worsen in many respects over the study period, which may in part reflect an increase in campaigns by religious sects in Kenya against family planning clinics. If the youth project had not been active in promoting dialogue and counteracting negative messages, the sexual and reproductive health status of young people in Nyeri might have worsened as well. Indeed, condom use by males in the control site declined from 41% to 16%. While one may suspect that the severe decline in condom use among Nyahuru males was attributable to a decline in condom availability, there was no such change in supply during the intervention period. Moreover, if supply were a barrier to use, one would have expected a similar decline in usage among Nyahuru females. However, condom use by females in the control site declined by only three percentage points.

The most ambitious objective of the project was to delay the age of sexual initiation among youth in the project area. At endline, the project site variable was only marginally predictive of delayed sexual initiation and only among males. A project of three years' duration is perhaps too short a time period to make a significant impact on this variable.

The behavior changes associated with the project differed by gender. At endline, females in the project site were significantly more likely to have abstained from sex for the previous six months and to have had fewer sex partners than females in the control site. Males in the project site

were significantly more likely than those in the control site to have used a condom at last sex.

The intervention did not appear to affect condom use among females, probably reflecting the fact that females traditionally have little control over use of this method, and that their partners are often older than the males targeted in this intervention. Curriculum messages regarding condom use should be examined regarding the extent to which they are relevant and useful for females.

Residence in the project area was positively associated with females' communication with parents and other adults and with males' discussion of sexual and reproductive health issues with nonparent adults. When asked about other adults they had talked to, youth in the project site mentioned teachers (38%) and the project counselors (16%) as their most common discussion partners. In comparison, 22% of youth in the control site reported they had discussed sexual and reproductive health with a teacher. This difference in discussion with teachers may reflect an improvement in teachers' ability to discuss sexual and reproductive health topics with young people, an area in which the adult counselors had been active.

The Nyeri Youth Health Project was a package of activities, including community-based education for youth and parents, advocacy and subsidized clinical services. Although the program was associated with a number of significant behavior changes in adolescents and young adults, the research does not allow us to tease out which discrete components were involved in these changes. Further operations research implementing specific components of the model in different areas would be needed to determine the effectiveness of those components.

Despite Africa's cultural richness and diversity, a small set of intervention models have been used for adolescents, including school-based family life education, peer education and youth centers. These models involve establishing new structures or mechanisms, rather than building on what already exists at the community level. This strategy is not only costly, but can conflict with community values. For example, evaluations of the youth center approach have shown that centers can be perceived negatively by the local community, especially when they are closely associated with the provision of family planning to unmarried youth.²⁷ Few programs have experimented with adapting indigenous traditions and making use of existing structures. The Nyeri Youth Health Project is unique in that it was designed and managed by the local community, and was consistent with its culture and traditions. The project adapted the traditional Kikuyu system of *atiri*—or respected adult counselor—to give young people information and support. It capitalized on existing groups of youth, used service providers they already frequented and engaged adults in improving the environment for young people. The project demonstrated that indigenous systems in Africa can be adapted for programs and can help improve the reproductive health status of young people in Sub-Saharan Africa.

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RESUMEN

Contexto: Se han realizado muy pocas evaluaciones de los programas de salud reproductiva para adolescentes que hayan sido preparados tomando en cuenta los aspectos locales y culturales.

Métodos: Se utilizó un método de investigación cuasi-experimental para medir los cambios de conducta relacionados con un programa de salud reproductiva que fuera culturalmente congruente para los jóvenes de Kenya. En 1997 y 2001 se realizaron encuestas de línea base y finales, respectivamente, en el área del proyecto y el área de control. Se utilizaron análisis multivariados para evaluar si el proyecto estaba relacionado con cambios en la iniciación sexual de los jóvenes, la conducta sexual más segura y el intercambio de opinión con adultos acerca de cuestiones de salud reproductiva.

Resultados: Este proyecto de 36 meses de duración estuvo relacionado con considerables cambios de la conducta sexual y la salud reproductiva de los jóvenes, aunque se observaron diferencias entre un género y otro. Las mujeres que participaron en el proyecto fueron significativamente más proclives que aquellas del grupo de control a adoptar la práctica de la abstinencia secundaria (razón de probabilidad, 3,3) y menos proclives a tener tres o más parejas sexuales (0,1). Los hombres del proyecto eran más proclives a usar condones que sus pares en el grupo de control (3,7). Tanto los hombres como las mujeres del proyecto se mostraron más proclives a hablar sobre cuestiones de salud reproductiva con adultos que no fueran sus padres que

los jóvenes del grupo de control (1,9 y 5,5, respectivamente).

Conclusiones: Los programas que se adaptan a las tradiciones del lugar pueden ser al mismo tiempo aceptables a las comunidades y estar relacionados con cambios significativos de la conducta de los jóvenes.

RÉSUMÉ

Contexte: Rares sont les évaluations rigoureuses de programmes de santé reproductive des adolescents de conception locale adaptée à la culture.

Méthodes: Un plan de recherche quasi-expérimental a servi à mesurer les changements comportementaux associés à un programme de santé reproductive culturellement adapté aux jeunes du Kenya. Des enquêtes de référence et de fin d'étude ont été menées en 1997 et 2001, respectivement, dans les zones du projet et de contrôle. L'analyse multivariée a servi à évaluer l'association entre le projet et les changements éventuels en termes d'initiation sexuelle des jeunes, de comportements sexuels à moindre risque et de discussion des questions de santé reproductive avec des adultes.

Résultats: Le projet, mené sur 36 mois, s'est révélé associé à une évolution considérable des comportements liés à la santé sexuelle et reproductive des jeunes, de manière différente toutefois suivant le sexe: les jeunes filles du site soumis au projet se sont avérées significativement plus susceptibles que celles du site de contrôle d'adopter l'abstinence secondaire (rapport de probabilités, 3,3) et moins susceptibles d'avoir trois partenaires sexuels ou plus (0,1). Côté masculin, les jeunes évalués au site du projet se sont montrés plus susceptibles d'utiliser le préservatif que ceux du site de contrôle (3,7). Les jeunes, hommes et femmes, du site à l'étude se sont révélés plus susceptibles que ceux du site de contrôle de parler de questions de santé sexuelle et reproductive avec un adulte autre que leur père ou mère (1,9 et 5,5, respectivement).

Conclusions: Les interventions adaptées aux traditions indigènes peuvent tout à la fois être acceptables aux communautés et donner lieu à un changement significatif du comportement des jeunes.

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Author contact: aerulkar@pcaccra.org