

Integrating Family Planning Promotion into the Work Of Environmental Volunteers: A Population, Health and Environment Initiative in Kenya

Voluntary use of family planning is instrumental to the health and social well-being of women, families and communities.^{1,2} Although contraceptive use in Sub-Saharan Africa is increasing,³ unmet need for family planning remains high.⁴ Even within countries that have achieved increases in contraceptive prevalence, use remains low among some population subgroups. Contraceptive prevalence is generally lower in rural areas than in cities, and is consistently lower among women in the lowest wealth quintile than among those in the highest.⁵ Achieving progress in health and social indicators, such as those captured by the Millennium Development Goals, depends on expanding family planning services to poor, remote rural areas in Africa.⁶

One promising approach for promoting family planning use within traditionally hard-to-reach populations is to integrate services with those of other development sectors.⁷ Integrating messages and services from different sectors offers several potential advantages over traditional, single-sector development programs. For example, in the field of population, health and environment (PHE),^{8,9} family planning and other health services are linked with environmental conservation initiatives, which gives environmental programs an opportunity to educate communities about the relationship between rapid population growth and environmental degradation. Further, by facilitating access to family planning services and publicizing their role in preventing unplanned pregnancies, environmental programs can offer a practical, immediate action that contributes to future conservation of natural resources. Meanwhile, the PHE approach offers family planning programs arguments beyond those related to health benefits to use when encouraging couples to plan pregnancies and consider contraceptive use. Women and men may be motivated by messages highlighting the associations of family size with household prosperity and the availability of such natural resources as firewood, water, and land for cultivation and grazing.¹⁰ From a program management perspective, integration may improve efficiency, because multiple activities and services can be carried out by the same workers within a single management structure. Finally, integrated programs can target broader audiences. Some people may be drawn into conservation efforts through an interest in family planning education; others may be engaged in environmental initiatives, but then benefit from increased access to family planning education and services.¹¹

Although the potential advantages of linked population and environment programs are increasingly acknowledged,^{12,13} evidence is still limited regarding the feasibility

and acceptability of PHE initiatives.^{7,14} In some of the best known PHE models, such as those implemented in the Philippines¹⁰ and Madagascar,¹⁵ health promotion was added to environmental initiatives through the intervention of community health workers. Less is known about the ability of environmental workers to assume a direct role in health promotion. To help fill this evidence gap, the Program Research for Strengthening Services (PROGRESS) project, which was funded by the U.S. Agency for International Development to improve access to family planning services, teamed with the Green Belt Movement (GBM), a Kenyan nongovernmental organization dedicated to environmental conservation and community development. Leadership at both PROGRESS and GBM recognized that the latter organization's community-based environmental initiative complemented the former's efforts to expand family planning services to remote areas. Unknown was whether GBM's frontline environmental outreach workers, known as Green Volunteers, could lead family planning promotion activities. Of particular interest was whether these volunteers, many of whom are semiliterate and have no health training, would be willing to take on added responsibility and whether they could master PHE concepts sufficiently well to convey related information to the community. Also unknown was how communities would react to Green Volunteers' promoting potentially sensitive messages about contraception.

PROGRESS and GBM conducted a mixed-methods study to examine these issues. We used process monitoring and postintervention data collection to assess the feasibility and acceptability of Green Volunteers' implementing a PHE intervention and to explore the potential of this approach for expanding access to family planning information and services. In addition, we examined the costs of the intervention to evaluate affordability.

Program Partner: The Green Belt Movement

Intervention activities were conducted by GBM, which was founded in Kenya in 1977 by Nobel laureate Wangari Maathai. The organization is best known for its volunteers, who have planted an estimated 51 million trees throughout Kenya. The planting is done by a network of 5,000 community groups, known as tree nursery groups, that each comprise about 25 unpaid members. The groups are led by Green Volunteers, who at the time of this project earned a monthly stipend of roughly US\$120. Paid GBM staff members known as extension officers visit Green Volunteers monthly to provide supportive supervision. Field

By Theresa H. Hoke, Caroline Mackenzie, Gwyneth Vance, Brooke Boyer, Eva Canoutas, John Bratt, Agatha Mbulo and Nancy Waceke

Theresa H. Hoke is director, and John Bratt is scientist, Health Services Research, FHI 360, Durham, NC, USA. At the time this study was conducted, Caroline Mackenzie, Gwyneth Vance, Brooke Boyer and Eva Canoutas were affiliated with FHI 360 in Nairobi, Kenya (MacKenzie) or in Durham (Vance, Boyer and Canoutas); and Agatha Mbulo and Nancy Waceke were affiliated with Green Belt Movement, Nairobi.

operations are managed by GBM's Nairobi-based team of technical officers. GBM programs have expanded beyond tree planting to include such initiatives as the organic cultivation of indigenous crops and advocacy and community education to promote gender equity. GBM-supported projects aim to advance women's status through multiple means, including increasing women's ability to earn money, building their self-sufficiency and leadership capacity, and disseminating information about healthier life choices. GBM's orientation toward integrated development initiatives and its focus on women's well-being made the organization an appropriate partner to test an intervention integrating family planning into environmental activities.

Intervention

GBM referred to the intervention as Environment, Health and Population (EHP) to accent the dominant role of environmental activities. In February 2012, we launched the intervention in Nyeri, Tetu and Othaya Districts in Central Province and in Nithi District in Eastern Province. Contraceptive prevalence among married women is higher in Central Province (63%) and Eastern Province (44%) than in Kenya as a whole (39%), and the method mix is dominated by the injectable.¹⁶ However, in the remote rural areas where GBM typically operates, consistent use of contraceptives was expected to be much lower because of the long distances between targeted communities and public-sector health facilities (the primary source of services). All 45 Green Volunteers working in the aforementioned districts were invited to participate in the intervention. These volunteers, chosen by their communities, had previously been trained and deployed by GBM to lead conservation and development activities, such as tree planting, gardening of indigenous foods, and the collection and reuse of rainwater. To link these efforts to the health sector, FHI 360 and GBM project officers visited district- and facility-level health sector managers to inform them about the project and request their collaboration.

FHI 360 technical staff created a training curriculum designed to increase Green Volunteers' understanding of the interrelations between family size and the health of individuals, households, communities and the environment. The training emphasized the importance of the timing and spacing of pregnancies for family well-being, and explained how family planning helps couples to have well-timed pregnancies and the number of children they desire. Next, we conducted a two-day orientation session to prepare four GBM staff trainers to teach the EHP curriculum. These trainers then joined an FHI 360 trainer in teaching a two-week course attended by the 45 Green Volunteers working in the target districts. The course consisted of one week of classroom training and a one-week practicum that provided Green Volunteers with the knowledge and skills to lead structured EHP education sessions and communicate EHP messages in informal situations. Through lectures, discussions, hypothetical case studies and interactive learning exercises, participants were exposed to EHP

concepts. In addition, a doctor from FHI 360 provided basic information on reproductive physiology, the contraceptive methods available in Kenya, and the safety and effectiveness of those methods. Finally, training included instruction on collaborating with health personnel and completing study-related monitoring forms.

An important aim of the training was to teach Green Volunteers to use a flipbook developed by the project to guide group education. The book's content was developed by an FHI 360 curriculum development specialist who worked in close collaboration with GBM technical staff. Entitled "Care for Your Family, Care for Your Environment for a Prosperous Life," the flipbook consists of images for the audience to see along with messages on the back of pages to guide the presenter in leading presentations and discussions. To illustrate the advantages of seeking contraceptive services and planning family size, the book presents a story line about two men who made different life choices. One section describes the concept of healthy timing and spacing of pregnancies and the contraceptive methods available in Kenya. Another section covers the relationships among family size, population size, use of natural resources, environmental conservation and the prosperity of families and communities. A key message is that couples should be free to have the number of children they desire, but that this choice should be guided by consideration of their ability to provide for the children's upbringing. Finally, the flipbook briefly describes GBM's core community development activities. The flipbook content was intended to be covered over a series of approximately five sessions.

Once trained, each Green Volunteer was equipped with a flipbook, a booklet on family planning methods to distribute to community members, and posters illustrating EHP themes to display in community spaces. They were also issued a book with referral slips to be used when directing community members to family planning services at public-sector health facilities. Finally, they received tee shirts, caps, bags (to carry materials and further publicize the initiative), and raincoats and gumboots.

Although trained Green Volunteers were not responsible for providing contraceptives, they promoted family planning use in a number of ways. They delivered EHP messages during regular meetings—typically 2–4 times a month—with their assigned tree nursery groups. They were also expected to organize community meetings to educate the public about EHP topics, and they were encouraged to invite government-supported nurses serving as community health extension workers in the nearest public-sector health facility to attend these meetings to discuss family planning methods in greater depth. Finally, Green Volunteers were expected to refer community members seeking family planning services to public-sector health centers. These facilities routinely offered counseling and short-acting methods (condom, pills and injectables); long-acting reversible and permanent methods (IUDs, implants and female sterilization) were available intermittent-

ly at these sites through periodic mobile outreach visits by the nongovernmental organization Marie Stopes International. GBM's extension officers, already in place to support Green Volunteers' usual activities, were responsible for providing support for and supervision of the new EHP activities. They were asked to incorporate EHP oversight into their normal supervisory visits, and to make an initial supervisory visit in the first two months to observe Green Volunteers conducting community meetings.

Data Collection and Analysis

In October and November 2012, we collected data from multiple sources to assess the intervention's feasibility and acceptability. First, we surveyed the Green Volunteers to assess their job knowledge and to explore their experiences conducting EHP activities. The survey, conducted in the participant's choice of English or Kiswahili, consisted primarily of fixed-response questions. On average, participants had been Green Volunteers for five years (Table 1). We analyzed quantitative data descriptively using Stata 10.0, and used Microsoft Excel 2010 to code responses to open-ended questions and to tally results.

In addition, we conducted in-depth interviews in English with 20 key informants who worked in the study regions in professional positions that should have afforded them direct knowledge of Green Volunteers' EHP work. They represented the health and community development sectors, local government and GBM; 14 were women aged 30–60 and six were men aged 31–57. The interviews were intended to capture perspectives on the process and outcomes of the Green Volunteers' EHP activities. Interviews were audio-recorded with the participants' consent and transcribed. We performed thematic analysis using Excel to display qualitative data and to capture the convergence and divergence of perspectives.

We also conducted focus group discussions with seven tree nursery groups and nine groups of community members who were not associated with GBM. The latter groups, which were convened with the aid of the Green Volunteers, can be regarded as convenience samples. The discussions, conducted separately for men and women, each had 9–14 participants, yielding a total of 174 participants. We restricted eligibility to individuals aged 25–35, under the assumption that participants would speak more freely if they were with people of about the same age. The discussions explored participants' exposure to the EHP intervention, their retention of key messages and their perspectives on the appropriateness and benefits of having Green Volunteers perform EHP activities. The discussions were conducted in Kiswahili and were audio-recorded with participants' consent. The principal investigator and an analyst read the translated transcripts, decided on major themes to be explored through data coding and developed a coding scheme. Using QSR NVivo 9, the analyst coded transcript text files and then sorted and searched the data to identify themes and patterns of ideas that addressed the study objectives.

TABLE 1. Characteristics of surveyed Green Volunteers, Kenya, 2012

Characteristic	% , mean or median (N=42)
% female	55
Median age (range)	49.5 (29–70)
% married	86
% completed primary school	93
% farming or raising livestock	76
Mean no. of years as Green Volunteer	5.1
Mean no. of tree nursery groups overseen	5.8

We assessed the implementation process by reviewing data from the following tools used by the project to monitor Green Volunteers' EHP activities: a one-page form added to GBM's standard monthly activity reports to capture EHP activities completed; a logbook in which Green Volunteers were to record referrals of clients to public-sector health facilities; and a form to guide supervisors' monitoring visits. Data were compiled and analyzed using Excel spreadsheets.

Finally, we collected data on the incremental costs of the intervention. We estimated costs for three phases: the planning and designing of the intervention; preparation for program implementation; and the delivery of EHP services. Each phase comprised a set of activities with associated resource needs, such as supplies, the labor time of trainers and supervisors, and transportation of volunteers to training. To identify intervention-related activities and their costs, we relied on discussions with program staff and reviews of administrative records, trip reports and progress reports. The resulting information was recorded and analyzed using Excel spreadsheets. We first computed the costs of the pilot intervention. To estimate the hypothetical cost of replicating the program, we subtracted the planning and design costs, since these expenditures would not be repeated in a scale-up scenario. We identified intervention components whose value or usefulness would likely extend beyond the pilot period (e.g., flip books and other materials), and then amortized related costs over the period during which those components presumably would be effective.

FHI 360's Protection of Human Subjects Committee deemed the study exempt from ethics committee review. The study protocol was reviewed and approved by the Kenya Medical Research Institute.

RESULTS

Intervention Feasibility

This assessment examined whether Green Volunteers had performed their assigned responsibilities and demonstrated competence. GBM extension officers' reports showed that 42 of the 45 trained Green Volunteers had conducted EHP activities in their communities. Of the three who had not conducted such activities, one had been promoted to a new position, and another had left the program; it was unclear what had happened with the third. The exten-

sion officers observed a total of 47 Green Volunteer-led community meetings: one meeting each for 37 Green Volunteers and two meetings each for five. The completed performance monitoring forms indicated that the Green Volunteers usually prepared well for meetings (98% of observed meetings), used the flipbooks (87%), had effective presentation skills (94%) and provided clear and simple answers to questions (96%).

Survey responses at the eight-month follow-up indicated that the 42 remaining Green Volunteers had adequately mastered the concepts taught during the project-supported training. More than 80% correctly answered at least seven of 10 questions concerning essential EHP and family planning knowledge (Table 2). Nearly all Green Volunteers reported that they felt well prepared or sufficiently knowledgeable to conduct EHP activities; the three who reported not feeling well prepared attributed this to the training being too short.

Key informants confirmed that EHP activities had been implemented as intended. Most had observed Green Volunteers providing community education to groups of 20–150 participants. The majority commented that the Green Volunteers appeared to have been well trained by GBM; 17 of 20 informants had confidence in Green Volunteers' ability to conduct community education on EHP topics. Those expressing reservations noted that because Green Volunteers' technical knowledge about family planning methods is limited, they should be supported by a community health extension worker to ensure that the community receives complete information. Several informants mentioned that the intervention was effective in part because Green Volunteers routinely worked in pairs and GBM's extension officers teamed less skillful individuals with others who were strong in conducting community education.

Participants in all 16 focus groups reported that Green Volunteers had conducted community education sessions on the connections among family planning, healthy timing and spacing of pregnancies, and the environment. Their accounts indicated that Green Volunteers had capitalized

on diverse opportunities to communicate EHP messages, such as community-wide meetings called by village chiefs; special events, like "Cancer Day"; and meetings of parents, church members and women's savings clubs. Some focus group participants mentioned having heard Green Volunteers communicating EHP messages when speaking casually with tea pickers in the fields or at commercial centers, with miners at quarry sites and with small groups of women. In the focus group discussions conducted with tree planting groups, participants confirmed that Green Volunteers had led discussions on EHP topics during their regular meetings; some groups reported that this had occurred every time they met.

Intervention Acceptability

Green Volunteers indicated that they supported the addition of EHP activities to their conventional responsibilities. Two-thirds reported that it was completely acceptable to discuss family planning at public meetings, and the remaining third said that it was sometimes acceptable, depending on the message. When asked what family planning has in common with tree planting and GBM's other core activities, all Green Volunteers were able to articulate at least one way in which their new responsibilities were consistent with the GBM mission; the most common response was that slower population growth reduces consumption of natural resources and environmental degradation. All 42 Green Volunteers indicated their interest in continuing their EHP activities; 35 spontaneously mentioned a desire to continue educating on family planning in particular.

Key informants appreciated GBM's work in strengthening ties between the community and family planning services. Some of those interviewed commented that Green Volunteers played an essential role by stimulating community interest in the topic of family planning and assembling an audience. Nearly all said that the community had responded positively to Green Volunteers' EHP activities. Several reported high turnout for public meetings organized to discuss family planning topics, and said that audiences had been enthusiastic and posed many questions, particularly when a community health extension worker was present to provide information about specific contraceptive methods. One key informant recounted:

"I mean, [there was] question after question....Because people were trying to understand family planning, some saying 'my wife heard this, I heard this in the market.' And men wanted to know about the coil. Another thing we noted is that men were visual. When you talk[ed] about the female condom, men wanted see [what] it looked like, as well as the demonstration. When you talk[ed] about the coil, they wanted to touch it."

The public discussions served as good opportunities to correct misconceptions about methods. For example, one key informant reported that community health extension workers refuted myths about the IUD's safety, while another said that they confirmed a client's right to have an IUD removed at any time. Some key informants commented

TABLE 2. Levels of family planning knowledge among Green Volunteers

Measure	% or mean (N=42)
Knows women should wait until age 18 before becoming pregnant	69
Knows women should wait ≥2 years after a birth before becoming pregnant	81
Knows women should wait six months after a miscarriage before becoming pregnant again	40
Can name ≥2 health risks to children from poorly spaced births	48
Can name ≥2 health risks to mothers from poorly spaced births	81
Can name ≥2 health risks to women who become pregnant before age 18	55
Can name ≥2 nonhealth benefits of HTSP	98
Knows family planning methods can help women and couples achieve HTSP	100
Can name ≥2 natural resources impacted by population growth	100
Can name ≥4 family planning methods	98
Mean no. of correct responses	7.7
Correctly answered ≥7 questions	81

Note: HTSP=Healthy timing and spacing of pregnancies.

that the initiative was acceptable particularly because communities select Green Volunteers from among their own people and hence trust them. As one informant stated, “You will tend to listen better to someone who comes from the same community....[People] believe this person will not lie to them.” All key informants expressed clear support for Green Volunteers’ continuing to conduct EHP activities.

Similarly, participants in all 16 focus groups spoke positively about Green Volunteers’ conducting EHP activities and noted similar positive reactions from the community. All groups mentioned that community members were happy to receive family planning information from a credible source. As a man in one group stated:

“They are appreciated in the community. They are well known and heard in the community. The Green Volunteer is like a brother or sister in the community and so [is] willing to give information fully until everybody becomes knowledgeable.”

In 15 focus groups, participants had a very positive impression of Green Volunteers’ knowledge of the subject matter and general credibility. The one exception was a group of male community members who complained that the local Green Volunteer was too old to be discussing family planning. That group also noted that the Green Volunteer knew much more about the pill and condoms than about other contraceptive methods. Participants in about half of the focus groups mentioned that some community members, especially older ones, had reacted negatively to Green Volunteers’ discussing sensitive family planning themes. A man in a tree nursery group said:

“When these topics are discussed in a public *baraza* [village meeting convened by a chief], which includes a diverse group of people, you’ll hear the elderly women complaining because [the information] has no relevance for them, and [because] it is embarrassing to be taught about a topic that touches on reproductive health in the presence of their children. Any family planning topic always causes conflict among the elderly women, but the younger generation understands.”

Nonetheless, the participants in all 16 focus groups unanimously affirmed that Green Volunteers should continue discussing family planning and the healthy timing and spacing of pregnancies. Groups readily proposed many locations in Kenya where GBM should expand its EHP efforts.

Perceptions of Intervention Effects

When Green Volunteers were asked to share their perceptions of the benefits of the intervention to GBM, the most common spontaneous response was improved knowledge of and attitudes toward family planning among Green Volunteers and tree nursery group members (69%). Another frequent response was the greater number of community members informed about environmental issues and interested in getting involved in GBM’s activities (64%). The most commonly cited benefit to the community at large was, again, improved family planning knowledge (74%).

Key informants provided further insight regarding factors that made the EHP intervention worthwhile. Several mentioned that community education raised awareness of an expanded range of contraceptive methods, including the IUD, implants, and male and female sterilization. As one key informant stated:

“The good thing about our training was that we were bringing on board a professional—that is, the community health extension worker—and [our] hearing from a practitioner who really knows about [contraceptives] was greatly assisting in terms of changing the myths that were there. I must say that in the meetings I attended, the women and men at the end of those sessions came out better, like they had a revers[al] of what they used to think about the [family planning] methods.”

Community-level dialogue helped to dispel myths about dangers posed by contraceptives (including long-acting and permanent methods). Examples include the concern that an IUD can stick to the penis during sex or be stuck to the forehead of a newly delivered infant, and that the use of contraceptives prevents sexual satisfaction. Participants in some focus groups noted that one of the benefits of the Green Volunteer-led education was that the provision of information regarding side effects motivated women to return to the family planning clinic in search of an alternative method. Community members especially appreciated being able to see samples of contraceptives, often for the first time; this experience helped to demystify contraception and reduce misconceptions.

Three-quarters of key informants spontaneously mentioned that EHP activities served to deliver family planning messages to men who otherwise would have had no exposure to this information. Similarly, participants in all 16 focus groups reported that an important benefit of the intervention was to expose men to family planning messages. Asked to characterize the audience composition when Green Volunteers organized community education events, individuals in several groups reported that male participation was high. Some further commented that men and women’s hearing messages together created an environment supporting continued dialogue between partners about contraception. According to a male community group member, “after the meetings, men could feel free talking to their partners, and it made it easier to make the right choices, especially on matters concerning family planning.”

This exposure reportedly allowed couples to talk more freely about family planning choices, and it motivated some to seek family planning services as a couple. One key informant commented that reaching men with information was an effective approach for reducing community resistance to family planning: “Males sometimes...embrace issues of family planning [at] a very slow pace, but eventually, with knowledge, we seem to be getting over that problem.”

The focus groups provided the clearest insight into how EHP activities could improve family planning-related

TABLE 3. Incremental costs of pilot intervention and estimated incremental costs of scale-up

Intervention Activity	Pilot	Scale-up
Planning/design		
Intervention development and curriculum design	55,762	na
Development of intervention materials and job aids	43,999	na
<i>Subtotal</i>	<i>99,761</i>	<i>na</i>
Preparing for program implementation		
Printing curriculum, flip book, booklets, posters	12,426	6,023*
Green Volunteer supplies and equipment	6,597	1,466**
Ministry of Health outreach	4,512	1,003**
Training of trainers	19,337	4,297**
Training of Green Volunteers	16,571	3,682**
<i>Subtotal</i>	<i>59,442</i>	<i>16,471</i>
Initial service delivery		
Supervision/monitoring	22,164	22,164
Stipends for Green Volunteers	11,060	11,060
Community meetings led by Green Volunteers	1,510	1,510
<i>Subtotal</i>	<i>34,734</i>	<i>34,734</i>
Total	193,937	51,205

*The costs of printing the curriculum and flip books were amortized over three years; the costs of printing posters and booklets were not, since they require ongoing replenishment. **Amortized over three years. Notes: All costs are in U.S. dollars. Sum of component costs may not equal subtotal because of rounding. na=not applicable.

knowledge, attitudes and behaviors. Participants spoke knowledgeably about the relationship between family planning use and family size, and about the resultant effects on household economics, food security, children's education, land management, conservation of natural resources, women's health, marital harmony and women's ability to work (including on environmental conservation initiatives). In all 16 groups, participants reported sharing with others the family planning information they had received from Green Volunteers. In all but one group, participants personally knew someone who had sought family planning services as a result of Green Volunteers' discussion of EHP matters. For example:

"I talked to a lady in my neighborhood that now has seven children with different men, and is living at her parents' home and has no husband. At first she felt uncomfortable [talking about family planning], but since I went to talk to her along with my wife who had also undergone the training with the [Green Volunteers], she felt comfortable, and my wife even offered to take her to a health facility, where she got assistance."—*Tree nursery group, male*

Moreover, participants in nine focus groups said that they had personally sought family planning services as a result of EHP activities. As a female participant in a community group explained:

"I became interested [in tubal ligation] after being taught by the Green Volunteer. I was given a form, and I went to the health provider, who asked me whether I had discussed [the matter] with my husband, and she requested that he accompany me to the health facility the next time he would be available. So, I went with my husband, and I convinced the provider that I wanted to use tubal ligation.

She wanted to know why I chose that method at my age [when] there are many other methods. So I told her, based on what we were taught, [that] I knew there were many methods and I had tried all the other methods but they were not suitable for me. So she let me choose, and I decided to go for tubal ligation. And I do not see any problem with it."

Challenges with Intervention Implementation

Although our data suggest that the intervention was feasible, acceptable and well-received, they also indicate that the health sector support offered to Green Volunteers needed reinforcement. Some Green Volunteers reported that no community health extension workers were available at the local health facility to invite to community gatherings or tree nursery group meetings. Others faced resistance from community health extension workers, some of whom were reluctant to travel to the village because of the lack of a transportation allowance. Eight Green Volunteers reported receiving no help at all from community health extension workers. Seven of 20 key informants said that adequate logistic support should be offered to community health extension workers to allow them to conduct community outreach activities; seven also mentioned that Green Volunteers should receive a greater transportation allowance to permit them to move more effectively among communities.

Activity reporting also needed improvement. During the eight-month project period, only 30 of the 42 Green Volunteers submitted a report documenting their EHP activities, a finding that diverged from extension officers' statements that all trained Green Volunteers conducted the work as intended. Moreover, the form introduced by the study to track Green Volunteers' referrals of community members to family planning services was used inconsistently. Green Volunteers reported that even when they issued referral forms, some clients forgot to take them to the health facility, some health workers failed to fill them in and some clients failed to return them to the Green Volunteer once their visit had been completed.

Cost Analysis

Analysis of the intervention costs provide evidence of the value for money obtained through the EHP initiative and of the costs of scaling up the intervention. The planning and design phase accounted for US\$99,800 (51%) of the total incremental cost (Table 3), reflecting the costs of design workshops and of activities supporting the development, testing and refinement of intervention materials. International experts participated substantially in this phase. The second phase, preparing for program implementation, accounted for US\$59,400 (31%) of the total incremental cost, and included the costs of producing intervention materials, of introducing Ministry of Health officials to the intervention to seek their support and of training Green Volunteers. Finally, in the initial service delivery phase, Green Volunteers performed intervention

activities with tree nursery groups and in the community. The costs captured in this phase included the portion of the Green Volunteers' existing stipend that was associated with EHP duties (30% of the normal stipend, amounting to US\$36 each per month), along with the cost of labor and transportation for GBM extension workers to supervise EHP activities.

To estimate the cost of implementing the intervention at scale, we subtracted the planning and design costs, since they were one-time expenditures. The costs of conducting outreach with the Ministry of Health to prepare for the intervention and of training and equipping the Green Volunteers were amortized over three years, the period of time during which these components are assumed to remain effective. Overall, the estimated implementation costs for the eight-month observation period totaled US\$51,200; dividing this cost by the 42 Green Volunteers who had been trained and were still conducting EHP activities yielded a cost-output measure of US\$1,219 per volunteer. Using data from activity reports, we conservatively estimated that the Green Volunteers had had 9,867 contacts with tree nursery group and community members, leading to a cost of US\$5.19 per contact.

DISCUSSION

The GBM experience showed that introducing an EHP intervention was both feasible and acceptable to a range of stakeholders. The environmental agents mastered the knowledge and skills required to conduct effective community education on EHP themes. Furthermore, the trained GBM agents, their supervisors, the organization members and the targeted communities all expressed support for the innovation. This demonstration project generated appreciation for the mutual benefits potentially realized by both the environmental and family planning sectors from an EHP intervention. Specifically, GBM volunteers and members of the communities they served grasped the concept that contraceptive use for healthy timing and spacing of pregnancies could help to improve family well-being, increase women's economic productivity and conserve natural resources. Health sector representatives acknowledged the value of having trusted community agents communicating messages about the benefits of family planning and the availability of services. Finally, our analysis of the project costs and estimation of scale-up costs showed that the intervention was not prohibitively expensive.

The study results illustrate the potential value of a PHE intervention in which environmental agents do not serve as community health workers delivering family planning services, but rather work in close collaboration with the health sector. Repeated community education with ample opportunity for dialogue helped to address misconceptions and fears about modern contraceptive methods; prior research conducted in multiple settings has shown that fear of side effects is an important reason for women's non-use of contraceptives.^{17,18} Communities expressed clear appreciation for the information delivered by nurses, and key

informants acknowledged that Green Volunteers played an essential role in facilitating the nurses' visits. The study results further reveal, not surprisingly, that participation by health sector personnel in future initiatives will depend on availability of resources to cover transportation costs. One unanticipated but important result of the intervention was that it constructively engaged men in family planning promotion, which is instrumental to successful family planning initiatives.^{19,20} Although more than 80% of GBM members are women, a disproportionately high number of Green Volunteers are men, as our sample shows. Male participation in community education events also was high. Key informants noted that men and women's hearing messages together helped instigate dialogue between partners about contraception. The GBM intervention thus may help satisfy the need for interventions that involve men in family planning.²¹

While this study's systematic examination of intervention implementation makes important contributions, the PHE field would be well served by more rigorous evaluations of interventions' community-level effects on family planning knowledge, family planning service use and contraceptive prevalence. Such studies should also assess the effects of integrated services on environmental program outcomes, including level of participation in activities, community-level knowledge and attitudes, and indicators of natural resource conservation. Evaluations of this nature would provide needed evidence that family planning programs can indeed heighten efficiency by integrating with other programs through PHE initiatives aimed at mutual objectives. Nonetheless, on the basis of this study's findings on the intervention's feasibility, acceptability and potential benefits, we would advocate for sustained implementation of the intervention and its expansion into more of GBM's 4,000 tree nursery groups throughout Kenya. We further advocate for replication of this model of integrated service delivery in comparable environmental initiatives.

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Author contact: thoke@fhi360.org