

Making sustainable water and sanitation in the Peruvian Andes: an intervention model

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ABSTRACT

Sustainability of water supplies in remote rural communities is problematic and resource consuming. CARE has a long history of working hand in hand with remote rural communities and devising programs tailored to their needs. We present here an intervention that integrates development of water supplies and sanitation, with operation and maintenance skills development and training of health promoters that can educate from within the community that ensures the sustainability of drinking water supply systems in rural communities. The training used is innovative in that it uses a series of video-workshops which are found to be particularly useful in communities with high illiteracy rates.

Key words | audiovisual training materials, health promoters, public health intervention, remote rural communities, sanitation, water supply systems

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INTRODUCTION

Diarrheal infections are still an important cause of childhood mortality and morbidity worldwide, particularly in developing countries (Murray & Lopez 1997). Improvements in access to safe drinking-water drastically reduce the incidence of childhood diarrheal infections (Fewtrell *et al.* 2005; Clasen 2006). Unlike in urban areas, water and sanitation projects aimed at poor rural communities are difficult to sustain after the implementation phase, because of the lack of skills available locally to operate and maintain the systems and the high costs associated with this (Yusuf & Zakir Hussain 1990; Hoque *et al.* 1996, 1998).

One-third of Peru's population live in rural communities, in small villages in the Andes with around 60 families per village, where only two-thirds have access to safe water and one-third to sanitation facilities (Table 1).

CARE, an international non-for-profit organization¹, has been working in Peru in the rural water and sanitation sector since 1973. More recently, CARE has been using technologies of proven efficiency and developing suitable

approaches to bring drinking-water systems to remote Andean rural communities. Throughout the years CARE initiatives have been externally evaluated to improve them and ensure they are sustainable in resource-poor communities. Education is a key issue in these Andean communities since the majority of women and an important proportion of men are illiterate. Access to these villages is not easy due to very rough roads and the difficult terrain. Basic services, including electricity, continue to be unavailable in the majority of these communities despite the Government's efforts trying to get the necessary funds to develop the infrastructure.

The aim of the drinking-water supply implementation scheme developed by CARE Peru is to engage and empower communities to be able to self-maintain water systems and educate peers on hygiene and sanitation issues.

INTERVENTION MODEL

Drinking-water supply implementation model

The implementation model has three dimensions: infrastructure installation, training in operation and maintenance of

¹CARE is a non-for-profit organization largely funded through private donations and international grants from multiple donors including DFID, OFDA/USAID and the Gates Foundation, among others.

Table 1 | Access to water and sanitation in the Peruvian population, 2005

Area	Peruvian population (in millions)	Access to water, in millions (percentage)	Access to sanitation facilities, in millions (percentage)
Urban	19.6	15.6 (81%)	13.4 (68%)
Rural	7.9	4.9 (62%)	2.4 (30%)
Total	27.5	20.8 (76%)	15.7 (57%)

Source: National Statistical Institute, 2005.

water systems and hygiene training. This is done over a period of 12 months. The implementation scheme used by CARE Peru is divided into four phases: pre-intervention, intervention, monitoring and reinforcement (Figure 1).

During the pre-intervention phase, negotiations with the targeted communities take place; issues discussed with the target community include the timing for the different aspects of the project, the level of community participation and the timings and duration of the training offered (Figure 1).

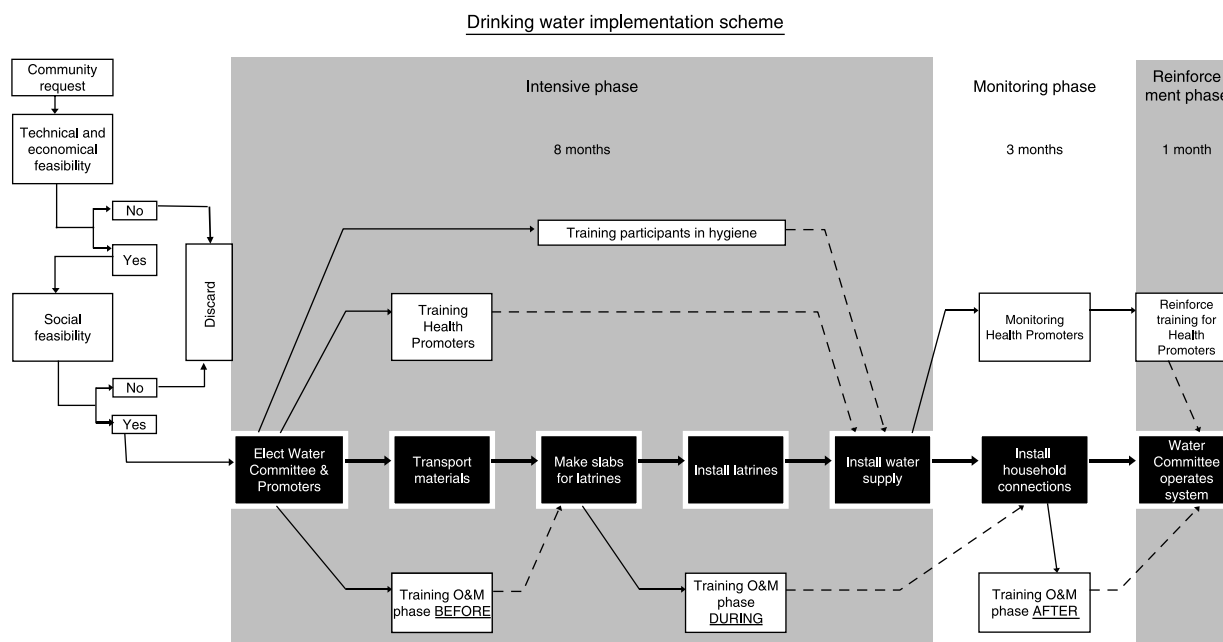
After this period, the implementation phase starts. Normally CARE assigns a trainer to each community who will start training communities on hygiene and sanitation issues. At the same time the community self selects a number of volunteer health promoters. Health promoters get on-the-job-training and receive the necessary theoretical

training in a series of three workshops. These initial workshops are attended by volunteers from more than one community and cover topics such as safe water, use of latrines and hand-washing. In parallel to this training process, materials are brought in and, over a period of eight months, work is carried out to build latrines and install a drinking-water system.

After the theoretical training is completed, the monitoring phase starts. During this, health promoters start training other people in their own community, while still being supervised by a CARE trainer. Also during this time households start getting connected to the water supply system. This phase typically lasts three months.

The last month of the scheme sees the water committee taking over the operation of the system, while health promoters attend a reinforcement workshop, completing their training.

Throughout the 12-month process, operation and maintenance training (O&M) is provided to 25 people elected by villagers in three phases: before, during and after the installation of the water supply system. Audiovisual workshops are run, using a purpose-developed series of video modules that are shown to participants. The content of the video-workshops is appropriate to each phase

**Figure 1** | Drinking water supply system intervention model, CARE Peru.

(e.g. organization at the *before-phase*; correct pipes assembly at the *during-phase*). Practical training follows every video session. Further detailed O&M training is given once water systems are installed (*after-phase*). This again uses video-workshops and takes place over one week. By the end of the course, the water system is installed and the first maintenance of the system has been carried out by trained villagers.

Five of the 25 people trained for each community remain as the 'water committee' in charge of ensuring long-term maintenance. The 'water committee' membership is renewed every two years; so, as 25 people are trained at a time, this ensures that the community will have enough manpower to support the system for at least 10 years.

Model development process

Evaluation of existing CARE projects conducted in 1983 showed that water systems installed in the Andean communities were not sustainable and the main cause was the lack of knowledge among the local people on how to maintain or to repair their water systems.

After one year of fruitless attempts to develop appropriate training programs for people in Andean communities and while also gathering experiences from other CARE missions working in the developing countries, it was decided to pilot the use of audiovisual training materials. At the time, the audiovisual methodology was in use by the Peruvian National Government for training Andean people in agricultural practices.

Acting in cooperation with the governmental Center for Audiovisual Training (CESPAC), in charge of producing and using the methodology, and other relevant partners such as the Pan-American Sanitary Engineering and Environmental Sciences Center (CEPIS), the Ministry of Health and the Association of Engineers, CARE Peru produced its training course on 'Operation and Maintenance of Rural Drinking Water Systems', which was piloted and validated in December 1984.

Since 1985 the O&M training course has been imparted to communities after the completion of every drinking-water system. In 1987, an external evaluation was conducted by CESPAC and DelAgua, a British non-governmental organization, following up communities trained by CARE but that had not had contact with CARE personnel for over one year.

The findings of this evaluation showed that these communities were providing timely and adequate maintenance of water systems, with around 80% of systems tested showing nil Coliforms per 100 ml and, most importantly, that those trained by CARE had extended the pull of people trained by using the participants' guide left behind with them as the working manual.

In 1988, a subsequent external evaluation by TEAM, a Canadian organization commissioned by CARE Canada to assess water supply programs in four countries (Nicaragua, Ecuador, Peru and Bolivia), showed that the sustainable water systems were not producing a significant impact in Andean people's lives. Audiovisual training was good for training in operation and maintenance but not good enough to let people adopt hygiene practices. As a result, in order to deliver sustainable hygiene education at the same time as safe drinking-water, the intervention model adopted the health promoters' approach developed and used decades before by WHO.

Evaluations conducted after 1991 on rural drinking-water and sanitation systems showed not only their sustainability but also an important reduction in diarrhea amongst children under 5 years old. By 1991, a cholera epidemic spread through Peru, but none of the communities where CARE applied its intervention model was affected, because all of them had adequate access to safe drinking-water and sanitation, and people adhered to strict hand-washing practices.

By 1999, the Swiss Development Aid Agency (COSUDE) selected CARE Peru's Drinking Water Project model to be implemented as the pilot project for the governmental National Drinking Water Project (PRONASAR). To date, PRONASAR continues implementing its program following the same model used by CARE (infrastructure installation, training in operation and maintenance, and hygiene training), with only the addition of training aimed at municipal government officials.

DISCUSSION

The intervention model presented here has been developed aiming at making water supply systems and sanitation sustainable in resource-poor rural communities. It builds on

the experience of CARE Peru over a 20 year period. The key to this model is the active participation of the community that is empowered to educate its own members, and self-operate and maintain the water systems long after NGOs and government agencies have moved on.

Other projects have tried similar approaches to engage and empower the community to take charge of health education and maintenance of infrastructure (Yusuf & Zakir Hussain 1990; Hoque *et al.* 1994; Manikutty 1997; Noosorn 2005). But where CARE's model is innovative is in integrating aspects of health promotion with skills training involving the community from the start of the project, building up the skills necessary to operate, service and maintain the water supply system as well as educate the community on aspects of sanitation and hygiene at the different stages of the development. Also, because of the number of people trained, the community has a large enough pool of expertise to maintain the system over long periods.

Various forms of audiovisual tools have been used in health education and promotion, in a variety of settings and for a number of diseases and conditions, from family planning songs (Pekerti & Musa 1989) and sexual health education (Joseph *et al.* 2006), drug compliance (Ngoh & Shepherd 1997) and prevention of animal diseases and zoonotic infections (Rimm 2003), generally in situations where a change in peoples' behaviour is required. Evaluations of video as educational tools has highlighted that, although it has great potential, tools need to be tailored to the audience and constantly evaluated and improved to get the message right (Mathews *et al.* 2002). In the intervention model described here, video-workshops are used to teach the skills necessary to service and maintain a water supply system, and it is an adjunct to practical training and supervision.

CONCLUSION

The benefits of interventions aimed at improving water quality are closely linked with the provision of sanitation and hygiene education (Eisenberg *et al.* 2007). The model presented here integrates the development of water supplies, sanitation and hygiene promotion, which makes

it a successful model. In addition, as it has been developed and improved over a long period of time it addressed the needs of the population it is aimed at. Using audiovisual training materials it is possible to overcome illiteracy barriers and teach new skills to people in a short period of time. We argue that this training serves in two ways, by empowering communities to look after water systems, aiding the sustainability, and at the same time the promotion of hygiene practices are actively being promoted, improving the health of the community.

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