

Post-Project Assessment of Community-supported Emergency Transport Systems for Health Care Services in Tanzania

**Indu B. Ahluwalia¹, Dorcas Robinson², Lisa Vallely³, Juliana Myeya⁴,
Lukumay Ngitoria⁵, Victor Kitambi⁶, Alfreda Kabakama⁷**

Author¹ is affiliated with the Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. Authors ² & ⁴⁻⁶ are affiliated with CARE-Tanzania, Dar es Salaam, Tanzania. Author ³ is affiliated with the Institute of Medical Research, Papua New Guinea. Author ⁷ is affiliated with the Ministry of Health and Social Welfare, The Lake Zone, Reproductive Health Coordinator, Tanzania. **Contact author:** Indu B. Ahluwalia, MPH, PhD Centers for Disease Control and Prevention, 4770 Buford Hwy, NE, Mailstop K-22, Atlanta, GA 30341-3724; Phone: (770) 488-5764; Fax: (770) 488-6291; Email: Iahluwalia@cdc.gov

Submitted September 7, 2010; Revised and Accepted October 6, 2011

Abstract

We examined the continuation of community-organized and financed emergency transport systems implemented by the Community-Based Reproductive Health Project (CBRHP) from 1998 to 2000 in two rural districts in Tanzania. The CBRHP was a multipronged program, one component of which focused on affordable transport to health facilities from the villages. In 2006-2007, we assessed the existence and continuation of community-supported emergency transport systems. A total of 249 persons in 29 villages were surveyed, and qualitative data were collected to identify features of community-supported transport systems that have continued. Twelve villages reported having an emergency transport system for obstetrical/medical emergencies to a dispensary/district hospital. Six systems continue to be community supported and have been functioning since CBRHP activities ended in 2000. In these six villages, the modes of transport include tricycles with platforms, canoes, oxcarts, and stretchers. A total of 272 people have used the emergency transport system since its implementation; 47% were pregnant women experiencing obstetrical difficulties. In 2006, 35% (29/84) of users were women with obstetrical difficulties. The community-supported transport systems provide a critical service to villagers in rural areas who experience health emergencies that necessitate facility level care and while some communities continue to maintain support for these systems, other do not. Future research should focus on examining long-term sustainability of community level efforts aimed at increasing access to health care facilities and explore reasons for community level decisions to continue or discontinue activities over time, to fully understand the process of sustainability.

Key Words: Sustainability, Community, Maternal Health, Transport

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Introduction

Although fostering sustainability is a desired goal of many programs, there is seldom an opportunity to examine whether this goal is actually reached, often because of limited time frames or failure to include sustainability in the project planning phase. The existing literature has described various dimensions of sustainability, including independent functioning of the program beyond the funding cycle, institutionalization of a program that might have been adopted during implementation, and continued relevance.¹⁻⁸ Sustainability is viewed as an outcome of a set of activities after project implementation,⁴ and it is important because of the large investments involved in developing and implementing a program.

The Community-Based Reproductive Health Project (CBRHP) initiated through CARE-Tanzania in collaboration with that country's Ministry of Health and Social Welfare (MOHSW) and used community-based approaches to promote demand for maternal health services.⁹⁻¹¹ The CBRHP activities took place during 1998–2000, with a focus on increasing demand for- and supply of maternal health services, including emergency obstetric care (EMOC).⁸⁻¹⁰ One component of the community mobilization approach focused on building capacity to address EMOC through the development/implementation of affordable community-supported emergency transport systems, which was identified by the communities as a critical need.⁹⁻¹¹

The purpose of our study was to examine the extent to which the community-supported transport systems for medical/EMOC emergencies were integrated into the village operations and to assess their operational status. Using the conceptual basis of the sustainability planning model⁴ and literature on program institutionalization,^{1,12} we assessed the status of transport options in the communities (Figure 1). We followed up villages with different end-of-project status as documented in the 2001 evaluation of the CBRHP¹¹ in order to examine independent movement among villages that participated in CBRHP.

Context and Description of CBRHP Activities

The estimated maternal mortality ratio (MMR) in sub-Saharan Africa is particularly high— 900 deaths per 100,000 live births,¹³ and it was 578 deaths per 100,000 live births in Tanzania according to the

2004-2005 Demographic and Health Survey (<http://www.measuredhs.com/pubs/pdf/FR173/FR173-TZ04-05.pdf>) Three major types of delays contribute to maternal mortality: delay in (1) patients deciding to seek care, (2) reaching a health facility, and (3) receiving appropriate care once at the health facility.¹³⁻²¹ Although most obstetrical complications cannot be predicted, timely response, such as those offered by affordable transport to a functioning health facility can reduce maternal morbidity and mortality.²²⁻²⁷ The two districts where the CBRHP activities were implemented were in Northwestern Tanzania. Combined, these two rural districts house a population of 500,000 people with a crude birth rate of 39.65 per 1,000, and an estimated $\geq 20,000$ births per year (Personal communication-MOHSW-Reproductive Health Coordinator, 2006). Four district-level hospitals, four health centers, and 58 dispensaries serve the districts.

The CBRHP consisted of strengthening community-level prevention services by mobilizing the community and building capacity to address maternal health, training village health workers, and improving the quality of EMOC services offered at the health facilities. The maternal-and- newborn component of the project was designed to increase demand for (and access to) prenatal care, to improve basic obstetric services at dispensaries/health centers, and to improve both the availability and quality of comprehensive obstetrical services at the district hospitals. At the community level the emphases were on early initiation of prenatal care, increasing recognition of pregnancy-related danger signs, increasing referrals, pregnancy planning, and availability of affordable transport to health facilities.¹⁰⁻¹¹ When the CBRHP was implemented, CARE-Tanzania worked with local bicycle shops to develop a sturdy tricycle with a platform, as this was one of the methods that communities were most interested in adopting.¹⁰ During this time, CARE and the MOHSW were collaborating to strengthen the availability of basic and comprehensive EMOC services at the district hospitals by upgrading staff skills, implementing protocols for treating obstetrical emergencies, and upgrading facilities to ensure that adequate staff and supplies (e.g., for blood transfusion) were available.²⁷

The CBRHP project staff worked with the village leaders, village health workers, and the dispensary in-charge (a person with some training who manages/dispenses care at the dispensary) to develop referral plans for pregnant women in need of emergency obstetrical services. Under the CBRHP

initiative, a number of villages implemented emergency transport systems to assist pregnant women with obstetrical difficulties.^{10,11} These villages were assisted by CARE field officers and community development officers (employed by the Tanzanian district government) trained by CBRHP; they assisted villages in developing their transport plans, developing linkages with health facilities, and for those villages that had moved towards operational plans, implementing and overseeing the respective plans during the project period.¹¹ The villages received multiple visits from a CARE field officer to assess their progress with transportation plans, community mobilization activities focused on maternal health, and other capacity-building issues such as participatory problem solving.⁹⁻¹¹ CARE field officers supervised the work of village health workers every month. An evaluation of the CBRHP that was completed in 2001 showed that 10 villages had developed a community-supported, functional transport system, and about half were from the Missungwi district.¹¹ Since the completion of the CBRHP evaluation, no follow-up has been performed to examine the project's status.

Method

Selection of Villages

In early 2007 we followed up with 29 of the 52 villages that were part of the 2001 evaluation.^{10,11} The selection of these villages was based on their end-of-project status; (10 had a functioning transport system in 2001, 9 had viable plans at that time to develop a system with resources allocated such as money or a down payment, and 10 had plans without a specific action at that time). These last 10 villages that we evaluated were randomly selected from the set of 33 villages that had plans without specific action in 2001.

Data Collection

We used multiple methods to collect data. First, we examined existing documents to learn about activities that had taken place in the two districts since the cessation of CBRHP activities, and we worked with the MOHSW and district-level officials to document projects that may have had implications for conducting a post-CBRHP assessment. Specifically, we examined documents such as project reports, protocols, and descriptions of projects initiated, by CARE Tanzania and the MOHSW Reproductive Health Unit, in the Lake Zone during the time after CBRHP activities had concluded. Second, using a

purposeful sampling strategy to maximize variation across each of the villages, we selected 8–10 (n=249) individuals representing different perspectives of those villages; these persons were interviewed using a face-to-face community assessment survey. This group included male (n=34) and female (n=28) community leaders, sub-village leaders from different parts of the village (n=30), women (n=60) and men (n=63) of target reproductive age groups living in the outskirts of the village as well as near the center, and government extension workers (n=34). No one refused participation in the community survey. Third, in-depth follow-up was conducted with persons from the six communities with functioning community-supported transport systems in 2007. Here we conducted group interviews with village government leaders, the dispensary In-charge, and the village health workers using a semi-structured qualitative interview guide; to assess utilization, we examined the records kept by the village health workers.

Instruments

We developed the community assessment survey and the semi-structured interview guide in collaboration with the MOHSW and CARE-Tanzania field staff. The survey was translated into Kiswahili and reviewed by experts such as the community coordinators working on reproductive health issues in the two districts along with CARE-Tanzania staff (DR) who have extensive field experience in Tanzania and qualitative data analysis. Finally, the instrument was revised, pilot-tested, and re-revised them to ensure linguistic and conceptual consensus. The community survey included both closed-ended and short, open-ended questions (e.g., is there an emergency transport system in your village? If yes, describe the system.) The multiple choice options for this last question included canoe, oxcart, tricycle, stretcher, community funds, multiple systems, other.

Using the community assessment survey, each village was assessed on the status/existence of the emergency transport system, type, responsibility for maintaining the system, its use in the past year, cost of travel to a health facility, decision making in the village whether it was by discussion, vote or leaders making the decisions themselves, the existence of CBRHP-trained village health workers, and five indicators of perceptions about the village. For example, a list was provided to which the respondent could say they agreed or did not agree with each item (e.g., the village leadership is responsive to the community; community members feel engaged in

decision making, open communication between village leaders and residents, village residents feel that their views are counted, and people give each other assistance in time of need). These indicators arose from community work performed earlier by CARE-Tanzania in similar communities that had been part of their community assessment process. Items from the survey were coded as “dichotomous or categorical”, and open-ended questions were translated for analysis.

Group interviews were conducted to learn about the context in which community-supported transport systems existed and the community’s reasons for continuing to invest in this effort. The participants in these interviews were village leaders, village health workers, the dispensary-In-charge, and informal leaders such as the traditional birth attendants. The semi-structured interview guide was used to facilitate group discussion about management and use of the community-supported transport systems, communication about the systems, how the systems were made available to the village residents, and reasons for continuing.

Survey data were collected by trained field officers employed by CARE-Tanzania. Survey staff were trained to collect face-to-face data. The group interviews were conducted by three of the project staff (coauthors DR, IA, and JM) with experience in collecting and analyzing qualitative data and familiarity with the target districts. Survey data were entered into the Epi-Info system for analysis. The quality and the consistency of the interview data were checked with field notes to resolve inconsistencies. Qualitative data were translated from Kiswahili to English by researchers who were fluent in both English and Kiswahili (coauthors DR and JM) and analyzed to assess themes across the villages with community-supported transport systems. Ethical clearances were obtained from the institutional review board of the Centers for Disease Control and Prevention in Atlanta and from the MOHSW in Tanzania.

Results

Twelve of the 29 villages reportedly had an emergency transport system in place in 2007 to get someone with an obstetrical or medical emergency to a dispensary or a hospital. In 2001, of these 12 villages, 7 had had a functional community-supported system and were reported to be functioning in 2007; 4 had plans with resources dedicated towards a transport system and now had privately

owned systems; and 1 had no specific plans but now had a private system. In 2007, 6 of the 12 villages had a transport system available for use by community members for little or no cost, while 5 systems had emerged since 2001 and were privately owned, and 1 community-supported system was no longer functional. Upon closer examination, it was revealed that the village had experienced leadership changes and the new leadership was instituting its own priorities.

Users of the Transport Systems

Collectively, the seven villages with community-supported transport systems (the six current systems plus the one that lasted until 2005) have served 272 people with medical emergencies since the end of CBRHP activities—47% were pregnant women (Table 1). Non-pregnant villagers used the community-funded emergency transport system to go to a health facility for an illness or an injury. No data on users were available from the villages with private systems, and thus the characteristics of those who may have used them could not be ascertained. In 2006, the six villages with functioning community-supported transport systems reported having provided transportation to 29 pregnant women with obstetrical difficulties and 55 additional persons needing emergency medical care. Using the 1998 population estimate of 20,116 for the six villages and the guidelines of the World Health Organization (WHO) on surveillance and monitoring,²⁸ approximately 4.4% (n = 885) would be expected to be pregnant during the year, and of these, about 15% (133) would have been expected to need emergency assistance during pregnancy. Thus, the pregnant women who used the emergency transport systems in these villages during 2006 represented about 22% of the expected need.

Functioning Systems

The six communities with functioning systems in 2007 have continued to transport those with medical emergencies from the village to the dispensary and often to the district hospital. The options for transportation range from tricycles with platforms, to canoes, to oxcarts, and stretchers. The characteristics of the community supported transport systems, type of system, user fees, and structures are described in Table 1. Once a need for transportation is identified, these options are mobilized with assistance from the village health workers or the sub-village leaders. Each village has a protocol with specific procedures in place to transport someone from her/his home to a

health facility, and the village transport committee looks after the system and facilitates its use/maintenance. The person in need of emergency transport or a family member can request it from the designated person in the village (e.g., a tricycle driver), and then the affected person is picked up from her (or his) home and taken to the dispensary for consultation with the dispensary In-charge and if necessary to the district hospital. The villages have a system to help those who cannot pay the nominal fee for using the transport system.

Maintenance of the Systems

After the initial expenditures to purchase the selected mode of transportation,¹¹ the systems are maintained either by gathering small user fees or by using community funds allocated for this purpose. The cost of transport varies by village, mode, and destination (e.g., the local dispensary or the district hospital). Usually, the ride from the village to a dispensary is either free or involves a small charge (1000 Tanzania shillings or about \$1.25 U.S.), and for the villages such as Mwadubi that are closer to the nearest district hospital, the cost remains low if the patient must be taken to that facility. For those farther away from a district hospital, the cost of going there from the dispensary increases because it takes longer to reach the hospital. Some modes, such as using a canoe to get to the district hospital, require higher outlays of money, mostly due to the distance and the number of people required to operate the canoe (Table 1). The cost estimates for hiring private systems were significantly higher (mean=25,000 Tanzania shillings) than the estimates for the community-supported systems (mean=7,347 Tanzania shillings).

Factors Involved in Continuation of Emergency Transport Systems: Linkages and Institutionalization

Linkages between the various sectors of the community were identified by the village members and leaders as important for continuation of the community-supported systems. Specifically, linkages between the dispensary In-charge, village health workers, village chief executive officers, and sub-village leaders were identified as critically important. These six villages appear to have institutionalized the issue of emergency transport by having a village-level transport committee that provides updates on the system's use, repairs/condition, and funds during the regularly scheduled village assemblies. Further inquiry into the villages' reasons for continuing the transport

systems revealed that there was accountability and transparency in how the transport-related funds and user fees were managed. During group interviews the leaders and villagers indicated that everyone in the village knew how the funds were used and that full account was given at village assemblies by the transport committees. Concepts consistent with good governance, in this case trustworthiness and the ability of the village leadership to make decisions with input from all sectors of the community, and open communication between the leaders and the villagers, including sub-village leaders, were mentioned repeatedly.

Examination of the community survey data on village level indicators showed that there were some differences between the villages with community supported transport systems and those without in terms of their engagement in maternal health and collective decision making. Survey data from 249 persons showed that among the six villages with community-supported transport systems in 2007, villages with community-supported transport were more likely to have a process/system for following pregnancies and deliveries than were those that did not have a community-supported system (89.2% versus 78.7%; $p=0.06$). Villages with community-supported systems were more likely to report that people in the village gave each other assistance in times of need and that village residents felt that their views were counted than were villages without a community-supported system (Table 2). These also reported that decisions were more likely to be made by discussion than among those without community-supported systems (Table 2).

Discussion

There is seldom an opportunity to examine the long-term effects of multi-year projects that may have required substantive resources to implement. This assessment shows that post-project assessments are important to examine the legacy of activities that required community mobilization and resources. In the present context, a few of the original, villages continued to support emergency transport systems in their communities many years beyond the cessation of CBRHP. These systems appear to have been integrated/institutionalized into the village governance in that there is a body, namely the village transport committee, who maintain the use, repairs, and are accountable to the village. The result is that constituents in these villages appear to have access to affordable transport in an emergency. Although we were not able to assess the actual use or the

availability of transport to those with limited economic means, it would be an important undertaking to learn the end-user's perspective. Lessons learned from this post-project assessment include building sustainability assessment at project onset and fully exploring those communities that adopt an innovation and continue to as well as those who adopt it and either discontinue it at some time and their reasons for doing so.

Literature on safer motherhood and reducing maternal morbidity and mortality has focused on several key recommendations, including timely referral to functioning health care facilities that have EMOC services and the availability of technologies related to transport and communications that are designed to get women to appropriate level of care, as these emergencies cannot be anticipated.²²⁻²⁵ Our findings show that collective community action in developing referral plans, along with realistic transport options, is sometimes sustainable with continued support from village leadership. Continuation of a program beyond its initial funding cycle is needed, and to become completely independent, specifics such as formal linkages with the dispensaries, incorporation of the transport systems into the functions and routine of village government (in this case through the village transport committee), and the willingness of the community to invest resources are necessary.

The village transport committee members included the village health workers, operator or tricycle driver, dispensary In-charge, village or hamlet chairperson and they were charged with oversight (i.e., repairs, facilitating use, keeping accounts) and reporting about it to the village community during monthly meetings. Accountability and transparency were identified as important to continued community support for emergency transport systems, and these characteristics have been identified as being indicators of sustainable programs.¹⁻⁶ In the villages with community-supported emergency transport systems described in the present study the cost of transportation is much lower than it was in the past, bringing it within reach of most people in the village.^{10, 11} The community-supported transport systems provide free or low-cost transport to the local facility and these costs increase for travelling to district hospitals.

Lack of affordable transportation has been identified as a significant barrier to accessing EMOC services by pregnant women in developing countries.^{10-11, 22, 24-26} The CBRHP supported interventions in 52 communities within Tanzania to develop affordable

transportation and, of the 52, 10 had a functioning community-supported system in place at the end of the CBRHP.¹⁰⁻¹¹ Of the six community-supported systems in existence in 2007, all but one was in the Missungwi district. This district is the more remote of the two districts considered here, and the topographical challenges of unpaved paths that run through rough/hilly terrain make conventional transport by bus or vehicle difficult. For those who live in the Missungwi district, the nearest hospital is located on the lake, and thus travel on the lake is essential and often difficult.¹⁰ The community-supported transport systems reported here have made a critical service more broadly available to those villagers who may need to reach health facilities—one of the first delays in accessing timely health care in an emergency. Continued support and maintenance of these systems may be indicating the relevance and need for this service in these communities and the community decision to support it.

The six villages with community-supported systems in 2007 appeared to be organized around this issue and had emergency transport committees, had community champions that kept the issue of maternal health on the community's agenda, and had successfully integrated the transport systems into the routine business of the village government. Accountability for transport systems was communicated to all members of the community during the monthly village assembly. The fact that few of the original 52 villages had supported the transport systems during CBRHP implementation and of those who adopted the systems even fewer have continued for ≥ 5 years may indicate that community-level investments that involve resources may be beyond the reach of poor rural communities even though the systems are felt to be relevant by those who live there. Thus, without continued outside support it might be a difficult endeavor to initiate and continue in these locales. Efforts at organizing private transport systems in five additional villages may have resulted from natural growth, a recognized and continued need for emergency transport to health facilities, and/or individual entrepreneurs who identified an income-generating opportunity. Although these villages were part of the CBRHP, the community-level efforts were abandoned over time. The privately owned and operated systems cost more than the community-supported systems, but they might be fulfilling the needs of those who can afford the service.

There is discussion regarding the length of the initial time frame during which medical action must be initiated during an obstetric emergency and a need

for motorized transport.²⁵ While having access to a motorized vehicle/boat would be preferable to canoes or tricycles as a way of getting to a district hospital, vehicles are not affordable to villages because of the prohibitive cost of purchasing and maintaining them. Thus, the possibility of developing strong links with district-level health facilities that have ambulance services should be explored.²²

This study, in conjunction with previous work,^{9,10} indicates that with a significant investment of effort and time by the community and outside organizations such as CARE-Tanzania, programs or aspects of programs such as CBRHP may take hold in some communities, and these may be continued if the communities see the relevance of the services provided. In this case, the CBRHP helped communities with developing and implementing transport systems by providing technical assistance from 1998 to 2000 and maintaining limited contact with field staff working on unrelated activities in the districts until 2003. Our review of documents and interviews with district- and village-level officials indicates that there had not been any interventions in the districts with focus on emergency transport since the CBRHP.

It is possible that the six villages with community-supported transport systems in 2007 differed on various levels from those where these systems did not continue or from villages with private transport systems—possible differences might include the stability of leadership, priorities for development, the experience of village residents at the district hospital, general infrastructure development in the region such as tarmac roads, public transport, and ability to communicate with health facilities to mobilize ambulance services. We were not able to investigate the nature of any such differences, however. The majority of the systems were in the Missungwi district, where in 2007 they were continuing to flourish despite the district's rugged terrain, limited access to paved roads, and necessity of lake travel. Perhaps, these systems have continued to address an identified need in these communities and have champions who assure that affordable transport is available for obstetric emergencies or other health emergencies.

Our estimates show that in the six villages with functioning systems in 2007, about one-fifth of the expected number of women with EMOC emergencies in 2006 used a community transport system to reach a hospital or dispensary. This information indicates that the remaining emergencies may have not been recognized, but some may have been acted upon

early (e.g., pregnant woman went or was taken to the dispensary before delivery). Lack of use of the transport system may also indicate a continued need to educate women and their families about recognition of pregnancy-related danger signs, the need for immediate action should an emergency arise, and the desirability of making plans to facilitate the process of seeking timely care. Indeed, having a transport system is only one part of the chain of events that may need to be mobilized for timely treatment of obstetrical emergencies at functioning and well-equipped facilities.

Strengths and limitations

This project and the CBRHP, were active participants in building local staff capacity in the areas of research and program assessment skills, and thus it assisted both the MOHSW and CARE in their commitment to rural Tanzania. It is possible, however, that there could be bias associated with having some former project staff working on the current assessment. Still, we had a protocol that was to be followed by all staff, a community survey that each member of the staff was trained to administer in person, and qualitative interviews that were conducted by those not directly involved with CBRHP field activities.

Several limitations should be kept in mind while interpreting the results of this study. First, we did not have enough resources to follow up the villages with privately owned systems so that we could learn details of how these functioned. Second, the purposeful sampling strategy does not allow our findings to be generalized to other settings; however, we tried to triangulate our findings with data from several sources. Related to this limitation is that we were not able to validate the items on the community survey; however, these were adopted from existing data collection forms used by CARE-Tanzania in similar communities. Another potential source of bias could be that there were people of different social status present during group interviews, which may have implications for interpretation, as those critical of leaders may have been reluctant to voice their opinions. Therefore, future studies may want to obtain feedback from multiple sources to triangulate data on the use of community supported services and its accessibility to all members including those with limited economic means. Fourth, we did not examine the specific infrastructure capacities of the villages without a community-supported transport option; conceivably they were quite different from the ones who continued.

Because the focus of the CBRHP was on increasing affordable transport, we focused on documenting aspects of community systems. Regardless, it is possible that private systems may achieve the same outcomes.

In addition to transporting women with obstetrical emergencies, or others with medical emergencies, to a district hospital there must be trained staff and equipment at the hospital to address the emergency. Although the hospitals in these two districts are capable of providing EMOC services,²⁷ we were not able to follow the entire chain of the referral cycle. Another issue that needs to be addressed is the continued education of community members on the danger signs of pregnancy and preparedness for EMOC. The CBRHP project did this systematically and routinely with trained village health workers.⁹⁻¹¹ More generally, the skills of village health workers, dispensary staff, and even hospital staff need to be updated periodically to assure quality of care.

Summary and recommendations for future research

Given that there is seldom an opportunity to assess sustainability, it is important to learn from post-project assessment to examine the legacy of community mobilization around emergency transport promoted by CBRHP. It is important to realize that once a program initiates its capacity building/mobilization around a topic such as community-supported emergency transport, those initiatives may continue beyond funding cycles and the timelines of the original projects. Therefore, it might be useful for future projects to build in resources and time for conducting project assessment beyond the funding cycle to fully examine the legacy of projects. It is possible that demonstrated use of an innovation, such as community-supported emergency transport, has to take place for it to flourish in the long term without assistance from the outside organization.

For example, 52 villages were mobilized during the CBRHP, and of these, 10 had functional community-supported transport systems at the end of the CBRHP¹¹; of the 10, 6 have continued to function without assistance and 4 did not continue. Although we did not have resources to fully assess the reasons for discontinuation, it would be worthwhile for future programs to examine; it could provide information for future program implementation and processes communities may undergo to determine the relevance of adopting an innovation. As our post-project

assessment showed that the activities in place at the end of CBRHP did not mean that the community's commitment to an activity or an expansion of that activity had ended.

External organizations should partner with local governments in contexts such as Tanzania to promote an understanding of program uptake and the long-term viability or discontinuation of programs/or specific program components to ensure that the lessons learned are incorporated into planning and budgets. Continuation of community-supported systems depends on their integration into the village systems, especially formal structures such as the transport committees, and it also depends on committed leaders who promote maternal health and serve as program advocates.

Future efforts may want to incorporate ongoing feedback from community members as it pertains to use of services at the community level and examine it from all sectors of the community (i.e., economically disadvantaged to those living farther away from the center of the village), and specifically examine the role of community champions and systematically assess their work with different organizational and government systems to garner support for transport systems in the village. The availability of community-supported transport systems has not only helped women experiencing obstetrical difficulties, but others with medical emergencies, thereby reinforcing the value of the community's commitment to help its members. For health programs to function and be sustainable, it is imperative to involve the communities and to build on their existing sociopolitical strengths and to determine contributors to program continuation beyond the funding cycle.

Acknowledgments

We thank the communities that participated in the project activities. We also thank, Dr. Thomas Schmid for reviewing an early draft of the manuscript.

References

1. Shediak-Rizkallah MC, Bone LR. Planning for the sustainability of community-based health programs: conceptual frameworks and future directions for research, practice, and policy. *Health Educ Res* 1998; **13**: 87-108.
2. Sarriot EG., Winch PJ, Ryan LJ *et al.* A methodological approach and framework for

- sustainability assessment in NGO-implemented primary health care programs. *Int J Health Plann Manage* 2004; **19**: 23–41.
3. Sarriot EG, Winch P J, Ryan LJ *et al.* Qualitative research to make practical sense of sustainability in primary health care projects implemented by non-governmental organizations. *Int J Health Plann Manage* 2004; **19**, 3–22.
 4. Johnson K, Hays C, Center H *et al.* Building capacity and sustainable prevention innovations: a sustainability planning model. *Eval Program Plann* 2004; **27**: 135-49.
 5. Scheirer MA. Is sustainability possible? A review and commentary on empirical studies of program sustainability. *Am J Eval* 2008; **26**: 320-47.
 6. Scheirer MA, Hartling G, Hagerman D. Defining sustainability outcomes of health programs: illustrations from an on-line survey. *Eval Program Plann* 2005; **31**: 335-46.
 7. Swerissen H, Crisp BR. The sustainability of health promotion interventions for different levels of social organization. *Health Promot Int* 2004; **19**:123–30.
 8. Urassa E, Massawe S, Linkmark G *et al.* Operational factors affecting maternal mortality in Tanzania. *Health Policy Plann* 1997; **12**:50–7.
 9. Ahluwalia I, Kouletio M, Curtis K, Schmid T. Community empowerment: CDC collaboration with the CARE Community Based Reproductive Health Project in two districts in Tanzania. *J Womens Health Gend Based Med* 1999; **8**(9): 1015-19.
 10. Schmid T, Kanenda O, Ahluwalia I *et al.* Transportation for maternal emergencies in Tanzania: empowering communities through participatory problem solving. *Am J Public Health* 2001; **91**: 1589–90.
 11. Ahluwalia, IB, Schmid T, Kouletio M, Kanenda O. An evaluation of a community-based approach to safe motherhood in northwestern Tanzania. *Int J Gynecol Obstet* 2003; **82**
 12. Goodman RM, Steckler A. A framework for assessing program institutionalization. *Knowledge Society Int J Knowledge Transfer* 1989; **2**: 57-71.
 13. World Health Organization, UNICEF. *Maternal Mortality in 2005: Estimates Developed by WHO, UNICEF, UNFPA, and the World Bank.* Geneva, Switzerland: WHO, UNICEF.
 14. Campbell OM, Graham WJ; Lancet Maternal Survival Series steering group. Strategies for reducing maternal mortality: getting on with what works. *Lancet* 2006; **368**: 1284–99.
 15. Starrs A. Safe motherhood initiative: 20 years and counting. *Lancet* 2006; **368**: 1130–2.
 16. Goodburn E, Campbell O. Reducing maternal mortality in the developing world: sector-wide approaches may be the key. *BMJ* 2001; **322**: 917–20.
 17. Maine D, Rosenfield A. The Safe Motherhood Initiative: why has it stalled? *Am J Public Health* 1999; **89**: 480–2.
 18. Tita AT. The role of emergency obstetric care in the Safe Motherhood Initiative. *Am J Public Health* 2000; **90**: 810.
 19. Sundari TK. The untold story: how the health care systems in developing countries contribute to maternal mortality. *Int J Health Services* 1992; **22**: 513–28.
 20. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med* 1994; **38**: 1091–110.
 21. Fawacus S, Mbizvo M, Lindmark G *et al.* A community-based investigation of avoidable factors for maternal mortality in Zimbabwe. *Stud Fam Plann* 1996; **27**: 319–27.
 22. Hofman JJ, Dzimadzi C, Lungu K *et al.* Motorcycle ambulances for referral of obstetric emergencies in rural Malawi: do they reduce delay and what do they cost? *Int J Gynaecol Obstet* 2008; **102**: 191-97.
 23. Gage JA. Barriers to the utilization of maternal health care in rural Mali. *Soc Sci Med* 2007; **65**: 1666–82.
 24. Murray SF, Pearson SC. Maternity referral systems in developing countries: current

- knowledge and future research needs. *Soc Sci Med* 2006; **62**: 2205–15.
25. Krasovec K. Auxiliary technologies related to transport and communication for obstetric emergencies. *Int J Gynaecol Obst* 2004; **85** (Suppl 1): S14–23.
 26. Tsu VD. Highlighting the role of technologies in the battle against maternal mortality: introduction to a Billagio workshop. *Int J Gynaecol Obstet* 2004; **85**(Suppl 1): S1–S2.
 27. Kayongo M, Rubardt M, Butera J *et al.* Making EmOC a reality—CARE’s experience in areas of high maternal mortality in Africa. *Int J Gynecol Obstet* 2006; **92**: 308-19.
 28. World Health Organization. *Manual on PH in Refugee Situations*. Chapter 9: surveillance and monitoring (1999). [Online]: Available at: http://www.who.int/reproductive-health/publications/interagency_manual_on_RH_in_refugee_situations. Accessed October, 2009.

Table 1 Six villages with active community-supported emergency transport systems in the two Northwestern districts, Tanzania 2007

Village	Users of transport system in 2006		Average cost in Tanzania shillings (range)	System type and user fees	Length of operation	Structures
	Pregnant	Others				
Gambajiga	7	8	1500	Tricycle	7 years	-Village transport committee
			(1000-2000)	-People in the village pay 1500 and those outside village pay 1500 plus some extra for the driver		-Monthly updates at the village assemblies on transport system -Each sub-village has a tricycle driver
Lutalutale	5	11	1500	Canoes/oxcart/stretchers	7 years	- Village transport committee
			(1000-2000)	-Small fee to get from home to dispensary -Canoe costs vary		-Sub-village canoe maintenance committee -Monthly updates during village assemblies on the use and status of the transport system.
Matale	1	5	°2250	Tricycle/oxcart/canoe	7 years	-Village transport committee
			(1000-6000)	-Tricycle use is free from home to dispensary, oxcart has a nominal charge--canoe costs vary		-Monthly updates at the village assembly on the transport system

Mbarika	8	16	°12,600 (5000-20000)	Canoes/oxcart/bicycle/ stretcher - No fees to get from home to dispensary -Canoe costs vary	7 years	-Emergency transport committee -Monthly updates to the village assembly on the status and use of transport systems
Mwadubi	4	13	1333 (1000-2000)	- Two Tricycles/one oxcart -2000 for the driver and 1000 for tricycle/oxcart maintenance	7 years	-Emergency transport committee -Regular reports to the village leadership and sub-villages -Monthly updates at the village assemblies
Ngaya ^a	4	2	°13,333 (10,000-20,000)	Tricycle/oxcart Canoe (not functional) -Free tricycle ride from home to dispensary	7 years without interruption until January of 2007	-Village transport committee -The community-owned canoe is broken and the village is trying to raise funds to fix it.

-Oxcart charges \leq 2000 in good weather/roads and up to 5000 in bad weather/roads

Total	29	55 ^b
-------	----	-----------------

^a Although the canoe was broken at the time of survey, it was functional until January of 2007; there is still free transport from the village to the health dispensary using the tricycle and the oxcart. The canoe was used to go to the hospital located on Lake Victoria, but people now have to make their own arrangements to get to the hospital from the dispensary, which is still accessible using community transport.

^b These include people who may be living outside the official boundary of the village but still used the transport system.

^c The cost does not include local transport from home to dispensary, which is free in these communities.

Table 2 Community Survey data on community involvement indicators, Tanzania, 2007

Characteristic	Transport systems in place ^a	No Transport System	P -value
	%	%	
<u>Community involvement indicators</u>			
Leadership is responsive to the community membership	96.3	91.7	0.17
People in the community feel they are engaged in decision making	92.5	86.2	0.16
Open communication between village leaders and village residents	88.0	91.2	0.44
Village residents feel that their views are counted	98.8	90.5	0.02
People in the community assist each other in time of need	64.9	42.4	<0.01
<u>Decision making indicators</u>			
Decisions are made by vote	10.2	2.5	<0.01
Decisions are made by discussions	94.6	75.4	0.01
Leaders make decisions	1.1	6.3	0.06

^aThis refers to the community-supported transport systems

Figure 1. Stages of CBRHP and Sustainability Assessment of Emergency Transport Systems, Tanzania.

