

Primary health care nurses implement and evaluate a community outreach approach to health care in the South African agricultural sector

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Background: Early detection and effective case management of tuberculosis (TB) among a high-risk group of materially poor farm workers in an area of the Cape Winelands, South Africa, presents special challenges to the health community, where resource constraints lead to service reduction. In order to address this problem, local nurses established a collaborative partnership between permanent farm workers and their families, their employers, selected non-governmental organizations and the public health sector. In consultation with stakeholders, they developed an intervention primarily focusing on having peer selected trained lay health workers (LHWs) on farms, mentored and managed by nurses.

Purpose: To describe the complex process of implementation and evaluation of the LHW project, and provide a summary of a number of discrete studies evaluating the effectiveness, cost implications, and the perceptions and experiences of key stakeholders of the intervention.

Methods: Quantitative and qualitative research methods conducted within the context of a pragmatic unblinded community cluster randomized control trial were used. Emphasis was placed on an iterative participatory interaction between the researchers and key stakeholders.

Results: The intervention contributed to significantly better successful treatment completion rates among adult new smear-positive TB cases. The process implemented proved cost-effective and was pivotal in initiating a community-based social development programme.

Conclusions: The use of peer-selected LHWs within a wider programme of integrated care designed to merge technical biomedical approaches to disease management with more holistic social development activities, appears essential to meet the complex health needs in conjunction with public health of the rural poor.

Keywords: Agriculture, Community, Integrated Care, Lay Health Worker, Nurse, Poverty, Primary Health Care, South Africa, Tuberculosis

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Table 1 Tuberculosis rates for South Africa, the Western Cape and Boland in 1998

Boland health district	1087/100 000
Western Cape	292/100 000
South Africa	438/100 000

Source: Boland Health Municipality 1998; Department of Health Western Cape 2002.

Introduction

Ensuring equitable, integrated health care to poor people in rural settings of South Africa is a challenge for public healthcare providers (Department of Health 2000). Farm workers throughout South Africa have experienced little change to their living conditions in the 12 years since the democratic elections in April 1994. They continue to lead lives locked in a cycle of poverty, dependent both socially and economically on their employers. Most farms dwellers have no access to public transport, limiting their access to health care (Fast 1997).

Tuberculosis (TB) is a prevalent health problem for farm workers (Clarke et al. 2003a) in 1998 in the Boland Rural Agricultural health district (approximately 65 km from Cape Town in the Western Cape Province). In 1998, the Boland district had an incidence of TB 2.5 times higher than the national rate, and 3.7 times higher than the Western Cape rate (Boland District Municipality, unpublished data) (Table 1).

Dramatic increases in TB caseloads in South Africa have increased the pressure on government healthcare providers to develop programmes to identify patients with TB and to treat them effectively (Department of Health 1996). Sputum smear-positive TB is infectious, targeting individuals susceptible due to a poor immunological response and so it primarily affects the socially disadvantaged and poor. (Enarson et al. 2000; Grange 1999; Reider 1999). In high-burden countries, TB treatment typically occurs in contexts where time and resources are limited and HIV co-infection and multi-drug resistance are commonplace. High caseloads, understaffing, staff rotation and turnover, task-orientated care and limited privacy inhibit health care (Dick et al. 2004).

Successful implementation of the comprehensive World Health Organization (WHO) strategy of directly observed treatment short course (DOTS) (Department of Health 1996), adopted in the study area in 1997, is also complicated here because of issues such as the lack of infrastructure. Implementation of DOTS in high-TB areas is labour-intensive and is thus expensive in sparsely populated rural and farming areas. Continuity of care must therefore be maintained by interventions in the workplace. Pivotal to

the success of the TB-control programme is ensuring that each diagnosed patient adheres to the anti-TB medication for a minimum period of 6 months. Research suggests that patient adherence to long courses of treatment may be enhanced by peer-group support (WHO 2003).

This paper describes a story how a small group of primary health care (PHC) nurses with varying skills in management, education and research combined efforts to design, implement and evaluate an outreach programme on 211 farms in the Western Cape of South Africa. Farm dwellers were selected by their peers to be trained as community lay health workers (LHWs). The initial thrust of the intervention focused on the early detection and treatment of TB patients, but the long-term strategy involved general promotion of the health of farm workers. The strategy was based on the principles of holistic health and integrated care.

This intervention contributes to the urgent need to improve PHC activities regionally and nationally, and to find new and innovative ways of integrating community resources with the public health facilities. It focuses on agricultural farm communities that are disadvantaged and have relatively poor access to health care. Understanding the impact of the intervention, both on selected health indicators and on the perceptions of key stakeholders, presents a challenge to health-systems researchers.

Background

The research setting

This intervention took place on 211 rural farming communities situated in the Boland Health District (Western Cape Province) of South Africa. The study area was about 1661 km² and had an estimated population of 73 511 in 2002 (Boland District Municipality, unpublished data). The commercial agricultural economy of the area is based on deciduous fruit growing and wine making. A farm owner or manager runs the farms employing labour who live permanently on the farm with their families. Migrant casual workers provide additional labour.

Life for farm dwellers

Life for farm dwellers throughout South Africa is hard. Farm dweller communities living in the study area have, over generations, become locked into a context of dependence, isolation, poor literacy, alcoholism and violence (Fast 1997). A lack of public transport means that farm dwellers are dependent on the farmers and the public health service to meet all their health requirements.

Female farm workers' conditions of service are inequitable, with low wages, poor job security, and little or no provision of annual or maternity leave. Male farm workers are given preference for housing tenure, so women may have to maintain relations

with men in order to obtain a place to stay. Women experience low literacy and high levels of domestic violence (Fast 1997; Sunde & Kleinbooi 1999).

Organization of health care

The local public health authority manages the PHC services around professional nurses operating from mobile and fixed clinics. Since 1997, this service has been reduced incrementally and centralized. Preventative care has become over-shadowed by the curative needs of patients. The service operates on limited resources, and due to continual cutbacks in the health budget, mobile clinics no longer visit each farm individually, or as regularly as in the past. Currently mobile stops are made every 2–4 weeks at centralized farm venues, with the farm dwellers having to walk up to 5 km to attend these facilities. TB is a problem in this area, but strategies such as ‘directly observed therapy’ (DOT) are difficult to implement because of the inability of the nurses to reach each TB patient daily.

The lay health worker intervention

The intervention assisted farm dwellers to select suitable peers to be trained and function as LHWs on farms. This initiative was underpinned by a number of principles: a high level of community awareness; a holistic approach to health care with an emphasis on health promotion and social development; a system of communication between all stakeholders, especially the public health sector and the LHWs; advocacy among employer groups; and systematic monitoring and evaluation of the process. The intervention team emphasized a non-partisan political approach attempting to engage all stakeholders in the process.

In response to a request by the farmers themselves, the public health authority conducted a pilot project on 21 farms during 1993–95. The evaluation of the pilot study indicated that introduction of trained LHWs significantly improved TB control on farms, while their health-promotion activities enhanced a positive cycle of social development in the community (Dick et al. 1997). The health authority, based on the recommendations of the pilot study, decided to upgrade the LHW intervention and expand it to include a further 211 farms (Clarke et al. 2005).

Phases of the intervention

The intervention was organized into three phases (Box 1).

Intervention team

From the inception of the intervention during 1998, the Director of Health in the district and key members of her staff formed a working group with researchers from the Health Systems Unit of the Medical Research Council and the Cape Peninsula University of Technology. This relationship has been maintained to date.

Box 1 Phases of the Intervention

Phase 1: preparation

The preparatory phase involved informing each farming community of: (i) the aim of the study, (ii) basic information regarding tuberculosis (TB), and (iii) the selection process to be followed when identifying the person to be trained and function as the lay health worker (LHW) on the farm. This phase was undertaken ahead of the randomization process by the project leader, a registered nurse seconded to the intervention by the local health authority.

Phase 2: training the LHWs

The training programme included five different 1-week modules offered during the 5-month off-peak season period. The training was offered on a decentralized basis, on a farm centrally situated within the study district. Module topics included: becoming a community LHW, TB, family health (including HIV/AIDS), home-based care and first aid. The LHW trainer had been trained and supported by the project leader.

Phase 3: support of LHWs

Each trained LHW was visited on a monthly basis by the particular trainer on the farm where they worked. Each visit aimed to establish any difficulties the LHW may have experienced in implementing the activities they were expected to perform, and support was given accordingly.

The aim of the working group was to collaborate on all stages of the design, implementation and evaluation of the intervention, the researchers working with and for the district health management, rather than undertaking research on them. The ethical code of practice was negotiated with participants during these meetings. The researchers fed back study findings to participants for validation, resulting in collaborative spirals of planning, acting, observing, reflecting and replanning. Feedback of the project was facilitated by the development of a series of colourful posters displayed in the district health facilities, and the development of a glossy brochure utilized in feedback meetings to policymakers and community members.

The implementation team consisted of three members: one professional nurse as project leader and two contracted LHW trainers, one of whom was also a professional nurse. The team met weekly to debrief, discuss progress and review forthcoming training sessions. The LHW training was comprehensive, adhering to PHC and community development principles. The training manual has subsequently been published for wider use in similar programmes (ABE Development Services Trust et al. 2003).

Farm lay health workers

Each farm was regarded as an agricultural business unit, and being private property, gaining access was negotiated with the farmer. If farmers volunteered to participate in the intervention, the project team then visited the farm and enrolled it into the study. Fifty-two per cent of the farms visited were enrolled (Clarke et al. 2005).

All adult farm dwellers were invited to an information session which delineated the various aspects of the intervention. Farm dwellers were given up to 2 months to select an LHW and submit their signed consent form to the project team, enabling them to participate in the intervention. Ninety-eight per cent of the LHWs selected were women.

Training

Many of the LHWs had not had much formal education; therefore, an experiential learning approach was used in training (Friere 1973). Each training session was linked to the next by reinforcement of earlier learning points and by requesting participants to undertake small tasks for 'home work' and to review these in the next session. The training had flexibility within the overall framework in order to respond to the specific needs of each learner in accordance with Adult Basic Education and Training principles (Favish & Plasket 1997). Training venues ranged from church halls to work sheds on a centrally situated farm. Farmers were responsible for transporting their LHWs to and from these venues. The size of each training group varied from 6 to 10 participants.

Role and function of LHWs in the management of TB control

Among many other activities, LHWs were encouraged to create awareness about the signs and symptoms of TB. Each month they weighed willing farm dwellers to detect weight loss. These observations were routinely documented, and anyone who presented with two or more TB-specific clinical features was referred to the nearby PHC clinic for further diagnostic tests. Farm dwellers diagnosed with TB returned to the farm and requested support from the LHW during treatment.

The anti-TB medication was kept either with the LHW or with the patient, according to the patient's wishes. Only patients who requested DOT were so supervised, although there was emphasis on ensuring patient adherence to treatment. TB patients who did not take their prescribed therapy were promptly referred to the clinic nurse, should the LHW's counselling not be sufficient.

On farms where there were two or more TB cases identified in a short period of time, the project leader and trainer would assist with TB screening as active case finding in an attempt to find contacts who may have had undetected active TB.

Supervision and support of LHWs

The trainers visited the LHWs on a monthly basis on farms to provide supervision and support for their activities. The LHWs were encouraged to keep detailed records of their client contacts, and these documents provided valuable process information regarding their caseload and type of activities. The LHW turnover was low, as only 7 of the 84 (8.3%) LHWs withdrew during the intervention. (One LHW died, and another LHW was relocated to a different farm.)

Health-promotion activities

The LHW intervention stimulated the formation of 'health committees' within the study area. The committees consisted of representatives of farm dwellers, farmers, the public health sector, schools and non-governmental organizations. The health committees were instrumental in organizing a series of health-promotional events, which took the form of community festivals and competitions to produce food gardens.

The evaluation

Researchers were asked to answer a number of questions associated with the intervention. First, health authorities were interested in the effectiveness of the intervention to enhance TB case finding and case holding. Second, they needed to understand the cost implications to the health system of implementing further expansion of the intervention. Third, key stakeholders wanted to understand the impact of the intervention on the LHWs, the farmers as the employers, and the public health sector personnel. Each of these research questions was addressed in a series of discrete studies, many of which have been published separately. Here, the methods of addressing the three questions and the results are summarized. The discussion then considers the implications of the project for the further development of LHWs, and more generally, how the approach to rural health as described might be extended.

The effectiveness of the intervention to enhance TB case holding and case finding

The aim of this study was to evaluate the effect of LHW recruitment, training and deployment on successful treatment completion by new smear-positive TB patients among permanent farm dwellers. Subsidiary aims included assessment of the impact on TB case finding and retreatment cases. A pragmatic, unblinded cluster randomized trial was designed to achieve this aim. We estimated that at least 180 farms (90 intervention and 90 control) would be required to detect a 15% difference in power of 80% at a significance level of 0.5%. A sample size of 211 farms was achieved (Clarke et al. 2005).

All permanent farm workers aged 15 years or older who lived on any of the 211 study farms (106 farms in the intervention group and 105 farms in the control group) and commenced with TB treatment during the period 1 November 2000 to 31 October 2001 were included in the study. (The multi-drug resistant TB patients were excluded.) A total of 164 TB cases were recruited into the study, 89 of who were new smear-positive cases.

Treatment outcomes of TB patients on farms with the LHW intervention were compared with those on farms with no LHW intervention. Farms were the unit of randomization, and analysis was by intention to treat for clusters in a completely randomized design using individual-level data on rate differences between intervention and control groups, and a chi-squared test adjusted for clustering within farms. This aspect of the study has been described fully elsewhere (Clarke et al. 2005).

The cost-effectiveness of LHWs in conjunction with current TB-control programme, amidst health service contraction

The aim of this study was to study the cost-effectiveness of LHWs in conjunction with the current local TB-control programme, amid health service contraction, to provide empirical data for decisions regarding health policy. The data included assessing the direct nursing time cost from when a new patient was suspected of having sputum smear-positive TB until the completion of the 6-month treatment under clinic-based DOT. The data were compared with the direct time cost to farmers of having a LHW involved in TB screening, clinic referral, TB case finding and supervising 6 months of treatment, and applied the time costs to the measures of effectiveness based on the findings of the randomized control trial (RCT) (Clarke et al. 2005). This study has also been described elsewhere (Clarke et al. 2006).

The perceptions and experiences of the intervention on the LHWs, the farmers as the employers, and the public health sector personnel

Qualitative research methods, which included in-depth interviewing, focus groups, field notes and participant observation, were used to describe the perceptions and experiences of key stakeholders to the intervention (Clarke et al. 2003b, 2004; Daniels et al. 2004). Interview and focus group discussions were audio-taped and transcribed. A content analysis qualitative research approach was used to analyse and interpret the data using the verbatim transcripts. To enhance reliability, these transcripts were analysed by three different researchers. These studies have also been described elsewhere (Clarke et al. 2003b, 2004; Daniels et al. 2004).

Main results

The measure of impact

The results from the cluster RCT indicated that, within the first year of the LHW intervention, the successful treatment completion rate in new smear-positive TB patients was 18.7% higher (83%) ($P = 0.042$) on farms with a LHW compared with those without. Furthermore, case finding for new smear-positive cases was 8% higher on farms with LHWs, although the improved case detection was not statistically significant (Clarke et al. 2005). As smear-positive TB cases constitute the greatest threat of spreading the disease in the community (Enarson et al. 2000), the study showed that it was feasible to initiate a new programme to recruit, train and support effective LHWs on a large number of farms, even under conditions of decreasing healthcare resources and increasing centralization (Clarke et al. 2005).

The cost-effectiveness study compared the direct time costs of the current TB management strategy with the intervention using LHWs, involved in TB-control activities, on farms (Clarke et al. 2006).

The observed cost reduction to the District Health Authorities was 74% per case detected and cured on the intervention farms compared with the control farms. The direct LHW costs were borne by the farmers, who were motivated to bear these costs due to their perception of reduced job absenteeism and positive morale on the farms. Even without outcome improvements, costs per case cured were 59% lower on the intervention farms (Clarke et al. 2006).

Participants speak of their experiences

The LHWs reported their experience of the training as overwhelmingly positive. There was a sense of gratitude for all that they felt they had gained by attending. What the LHWs gained through the intervention was of relevance to them personally in terms of self-development and growth. 'I learned a lot that is also applicable in my personal life'. LHWs reported gaining skills that enabled them to assist their communities in managing their health, and this was perceived as important to them (Daniels et al. 2004).

Some LHWs suggested that there had been some transfer of their skills to other people living on the farm. Through this interaction, health promotion occurs, with LHWs teaching their communities about being healthy. 'Look, mainly it is about health and how to live healthily, in your home, at the workplace and so on. This is how I explained it to them' (Daniels et al. 2004).

In terms of TB treatment, respondents related stories of how they stuck by patients who they thought had TB, convincing them to be tested and then staying with them through the process, insisting on more tests if initial ones proved negative.

What the data suggest is that, through having an LHW available, people living on intervention farms gained an easily accessible person skilled in basic PHC who could provide assistance. The LHW also decreased their dependence on external sources, including the farm management and health services, in so doing saving the community members the cost of medical expenses (Daniels et al. 2004).

The data showed that respondents wanted to do their best as LHWs but, in so doing, had to pay a price in terms of their community. One LHW said: 'It's hard to be a LHW'. In one instance, a respondent developed a better relationship with the farmer through the intervention, but was then criticized by the community because they thought that she 'thought she was better than them'. Similarly, there was mistrust over the relationship between the nurses and the LHWs. Other respondents spoke of how their families criticized them and did not understand what they were doing and why it took so long. There was acknowledgement that being an LHW is difficult, with discussion around how they were torn between doing the job well, working full time, and fulfilling their domestic responsibilities (Daniels et al. 2004).

The farmers perceived that their role in health and related issues on the farms changed, with the LHW acting as a 'broker' between farmers and farm dwellers. The farmers appreciated and trusted the LHWs, relying on the LHWs' judgement to address health and related issues beyond TB on the farm. One farmer said: 'One of the benefits is that the farm has a contact person with whom you can discuss health issues and deal with them, as well as someone that gives you feedback on different health issues of the farm workers' (Clarke et al. 2004).

The farmers felt that having an LHW on site saved them both time and money: 'I see a change in the productivity since having a lay health worker. Attention is given to each individual on the farm and they are not being seen just as a group'. Farm work is associated with a variety of occupational health and safety hazards. Physical injuries and exposure to chemical poisons are risks associated with the work, and the LHWs are trained to deal with these issues. One farmer commented: 'She is much better equipped to deal with health issues on the farm than my wife or I' (Clarke et al. 2004).

However, the farmers felt that they had to be wary of being perceived as showing the LHW any favouritism, as this could lead to jealousy from the other workers. This jealousy serves as a threat to her health functions because it could result in the farming communities' unwillingness to cooperate. This jealousy is founded on perceptions of the LHW benefiting from increased opportunities and an elevated relationship with the employer. It was thought that this might lead to social isolation in a small, remote and inter-dependent community (Clarke et al. 2004).

The farmers observed a number of changes in the individuals selected to act as LHWs. They commented on the LHWs' increased personal self-confidence as they gained expertise in the health field. The training programme had exposed the LHWs to a variety of alternative environments, for instance the trauma unit of the local public hospital where they gained experience in first aid. The farmers perceived that the LHWs had developed the ability to communicate accurate and appropriate health information to the farmers. The farmers also commented on a '*noticeable improvement*' in the quality of life of LHW's family, in that her home and its environs appeared cleaner and LHWs frequently established food gardens following their health training. They commented on her position of a '*role model in the community*'. Communication with the LHW increased the farmer's insight into the health dynamics on their farm, and the LHWs were able to use their increased insight of health issues to refer problem cases appropriately to the local public health services (Clarke et al. 2004).

The nurses involved reported how the intervention made a dramatic change to TB treatment, making DOT possible in this context. It increased the personal contact with the patient in PHC, and re-emphasized preventative care. Patients could be supervised daily about issues like drug compliance without having to travel to the nearest clinic. The nurses regard the intervention as relieving their workload, in terms of the LHWs' capacity both to impact upon the TB epidemic and to carry out basic PHC tasks.

Public health management saw that the intervention resulted in improving TB statistics. Involvement in such a developmental intervention was also seen as a way of building their capacity (Clarke et al. 2003b).

The fact that the LHW intervention made delivery of DOT possible was a step forward in terms of the management of TB. In addition, patients ceasing to adhere to anti-TB medication were identified faster (within 24 h) because patients had daily, as opposed to monthly, support. There was also continuous support for patients and their family. The nurses also believed the screening of patients worked effectively and, as a consequence, they felt that patients referred by an LHW were more than likely to have TB, because those who have not would have been eliminated through the screening process (Clarke et al. 2003b).

The LHWs were seen as having training in a range of PHC skills beyond TB assessment, potentially screening all patients using these skills before they arrive at the clinic. The LHWs address minor ailments and emergencies so well that only severe cases are actually referred to the clinic, potentially decreasing the number of patients seen by the nurses. The nurses recognized that the LHWs extended the reach of the health department on the farms

and 'filled the gap in terms of basic health promotion', which the nurses no longer were able to do (Clarke et al. 2003b).

The nurses perceived the intervention as empowering the female LHWs, and contributing to leadership development. However, in terms of the stresses on the LHWs mentioned above, the respondents felt strongly that there was a need for continuous support of the LHWs (Clarke et al. 2003b).

Discussion

Integrated care, which merges a technical biomedical approach to disease management with the more holistic social development activities such as prevention and health promotion, is essential to meet the complex health needs of the rural poor. Implementing these principles into practice in under-resourced areas is often difficult. Research provides a way of systematically collecting information in order to understand how these programmes may be established and sustained.

LHW programmes are a way of bridging the gap between the public health sector and the community, amidst service contraction (Clarke 2005). They are complex interventions involving a myriad of components, the whole being a synthesis of all its sub-parts. Evaluating such interventions presents with a number of challenges (Greenhalgh et al. 2004).

In this paper, we have described how we used both process- and effect studies to evaluate and interpret such an intervention. The evaluation process focused on using the research findings to improve the effectiveness of the intervention, and gearing the research questions to the aims of key decision makers.

There is much in the literature regarding the dichotomous distinctions between quantitative and qualitative research (Greenhalgh et al. 2004; Malterud 2001a,b). We avoided the debate on the relative value of the 'scientific' vs. 'naturalist' paradigms, adopting a pragmatic approach by marrying the research method to the research question.

The main research effort was an RCT framed in terms of the causal inference between the intervention and its effect on the clinical indicators of TB 'treatment success' and TB case finding (Clarke et al. 2005). However, TB control was merely one of the numerous components of the intervention, and the indicators were selected not only because of their importance, but because reliable data were easily accessible to researchers.

The qualitative research attempted to illuminate the process as to why the intervention would have the effects it did. However, the research did not elicit situations in which LHWs, with their limited experience, may cause more harm than good. Could such an intervention be expanded beyond the commercial agricultural setting or even onto farms in more remote areas? Little is known about how such interventions could be sustained over a period of years; what incentives and rewards would be needed to motivate

LHWs in their activities over a period of time? This research would involve a longitudinal narrative as to the reciprocal interaction between the intervention and the wider political, economic and social environment.

Cost savings were calculated with reference to the savings made by the public health sector, but we need to know more about the direct and indirect costs of these LHW interventions to the employers, the LHWs and clients. What makes one LHW intervention more effective than another? Was it the dedicated leadership, the extra resources, or factors associated with the intervention, such as the immediacy of the intervention, the clarity of the stakeholders in understanding its purpose, or its ease of use? The participatory research process was itself a co-intervention, unlikely to be replicated when the intervention went through further cycles of expansion.

Despite these issues, we deduce from this set of sub-studies that mobilizing a network of LHWs in the community to bridge the educational, social, linguistic and cultural gap between the providers and recipients of health care has potential to improve selected clinical outcomes in TB management, and start a process of social development within the context of this research setting.

Community-based projects cannot be left to run on their own, as they require high levels of professional support and control. Innovations should not occur faster than the public health sector can provide the necessary trained personnel and support structures. Our experiences taught us that LHW interventions should not be seen to replace the role of the public health sector, but rather that this type of intervention has the potential to free up some of the time of health professionals so that they may use their expertise to reach people with quality care. PHC nurses, working within the public sector, are often in an ideal position to initiate and support these programmes, thereby expanding access to quality care for the rural poor who may have apparently insuperable problems in accessing health care.

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