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Economic evaluation of a combined microfinance and gender training intervention for the prevention of intimate partner violence in rural South Africa

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Objective Assess the cost-effectiveness of an intervention combining microfinance with gender and HIV training for the prevention of intimate partner violence (IPV) in South Africa.

Methods We performed a cost-effectiveness analysis alongside a cluster-randomized trial. We assessed the cost-effectiveness of the intervention in both the trial and initial scale-up phase.

Results We estimated the cost per DALY gained as US$7688 for the trial phase and US$2307 for the initial scale-up. The findings were sensitive to the statistical uncertainty in effect estimates but otherwise robust to other key assumptions employed in the analysis.

Conclusions The findings suggest that this combined economic and health intervention was cost-effective in its trial phase and highly cost-effective in scale-up. These estimates are probably conservative, as they do not include the health and development benefits of the intervention beyond IPV reduction.

Keywords Violence against women, health economics, health behaviour, empowerment

KEY MESSAGES

- There is increasing interest in the development of interventions that in resource-poor settings combine health with economic and social development initiatives such as microfinance.
- Little evidence currently exists of the economic viability of these types of initiatives.
- This study evaluated a combined microfinance and gender training intervention for the prevention of intimate partner violence in rural South Africa. It was found to be cost-effective in the pilot phase and highly cost-effective in scale-up.
- This study suggests that proven development initiatives such as microfinance represent ideal vehicles for value-adding public health interventions and that some form of public subsidy to support and strengthen their use in such roles is warranted.

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Introduction

As in many other settings globally, physical and sexual violence against women in South Africa is a major challenge, with recent estimates suggesting nearly 25% of ever-partnered women report having been in an abusive relationship (Jewkes *et al*. 2002). In addition to being an abuse of women's rights, intimate partner violence is increasingly recognized as a neglected but important public health problem, with significant impacts on women's physical, reproductive and sexual, and mental health (Campbell 2002; Garcia-Moreno *et al*. 2006). The development of interventions to prevent IPV that are cost-effective, appropriate and relevant to resource-poor settings remains an urgent priority.

The Intervention with Microfinance for AIDS & Gender Equity (IMAGE) administered a package that combined microfinance with a participatory gender and HIV training curriculum to rural women in Limpopo Province, South Africa. Effects of the intervention were assessed using a cluster-randomized trial between 2001 and 2004. Effect estimates suggest that, relative to a matched comparison group, IMAGE participants experienced a 55% (9%; 77%) reduction in the past year experience of physical and/or sexual violence by an intimate partner (IPV) (Pronyk *et al*. 2006).

The microfinance (MF) component of the intervention offered access to group-based credit and savings services, using a Grameen Bank model (Yunus 1999), where five women formed a solidarity group to collectively guarantee one another's loans. Forty women constituted a 'loan centre' which met fortnightly to repay loans and discuss financial matters. The programme was administered by Small Enterprise Foundation (SEF, Tzaneen, South Africa) and was poverty focused, targeting the poorest households in each village identified through participatory wealth-ranking techniques (Hargreaves *et al*. 2007). Loans were used for income generation, with the most common types of businesses being buying and selling fruit and vegetables (54%), making/selling clothing (23%), food stalls (8%), and running small spaza shops[1] (5%). The original study was conducted in an area that had no prior exposure to microfinance. Upon completion of the study, the combined intervention was rolled out to control villages and the wider local area, affording the opportunity for assessing the costs associated with taking the intervention to scale.

The gender and HIV training component of the intervention was called *Sisters for Life* (SfL) and was implemented in each loan centre over a 12–15 month period. The curriculum was developed and piloted by a local and expatriate team over six months preceding its full implementation and evaluation. A key feature of this type of intervention was the upfront investment in capacity building. The SfL training curriculum comprised two phases (RADAR 2002). In phase one, participants engaged in 10 1-hour training and discussion sessions at the beginning of compulsory fortnightly meetings. The training sessions used adult education techniques to address issues such as gender roles, cultural beliefs, relationships, communication, IPV and HIV. In phase two, those women identified by their peers as *natural leaders* were involved in an intensive 1-week leadership training workshop. Upon returning to their communities, they in turn facilitated the development of village-level action plans geared towards individual and collective mobilization around common concerns. These activities were repeated in the scaling up of the intervention following the completion of the trial.

Many health problems, including IPV, are deeply rooted in social and economic vulnerabilities. Proponents for integrating economic and health interventions argue that such packages provide both the means (income) and the knowledge (empowerment) to improve household wellbeing, and may serve as a stimulus for wider mobilization around pervasive public health problems (UNDP 1999; Pronyk *et al*. 2008a). Combined approaches such as IMAGE provide an incentive for individuals to participate in public health programmes, which in the absence of loans, they likely would not. Furthermore, microfinance institutions contain an element of financial sustainability and, with 100 million clients worldwide (Daley-Harris 2006), also work towards economies of scale—both critical for cost-effective interventions aimed at changing complex and deeply-rooted social norms (McDonagh 2001). Operational research into cost-effective models of delivering public health interventions in resource-poor settings that are both sustainable and scaleable remains at an early stage.

In this paper, we assessed the cost-effectiveness of the IMAGE intervention in relation to its effect on IPV. As the microfinance component of the intervention package was financially sustainable and thus cost neutral,[2] we examined the incremental costs of integrating the training curriculum, alongside IPV-related outcomes and disability-adjusted life years (DALYs). This enabled an assessment as to whether the type of activities incorporated in the approach can feasibly be built into the business models of microfinance organizations, and importantly, whether such programmes merit the allocation of scarce public funding through some form of subsidy. Finally, as access to the intervention in the post-trial period was substantially expanded and efforts were made to institutionalize the intervention within communities, we also examined the costs and cost-effectiveness of scale-up. In short, we hypothesize whether this intervention is cost-effective and whether this varies as the intervention is scaled up.

Methods

Trial costs were measured over the duration of the trial period during which the combined intervention package was delivered to 855 clients in four target villages. IPV outcomes were assessed after two years of intervention exposure. Costs associated with the scale-up were based on observed costs over the initial two years following the trial, and involved an additional 2598 clients. On the basis of the primary outcome of the trial, the costs of the intervention per additional woman free of IPV for the previous 12 months were estimated for both the trial and scale-up. These results were then transformed, on the basis of demographic (Statistics South Africa 2006) and burden of disease data from South Africa (Norman *et al*. 2007; Norman *et al*. 2009), into estimates of costs per DALY averted to enable a general assessment of cost-effectiveness. The cost-effectiveness of IMAGE in the trial phase was thus estimated separately from the initial two years of scale-up.

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Costs

The costing adopted an ingredients approach (Creese and Parker 1994) based on the financial statements of the programme and host microfinance organization. All costs were adjusted for local consumer price index increases and reported in 2004 US dollar prices (US$1 = 6.45 ZAR). A provider perspective was adopted, and the costs to participants and families were not included in this analysis (e.g. travel and opportunity costs of attending meetings). A 3% discount rate was used throughout, as recommended by the World Health Organization (Tan-Torres Edejer *et al*. 2003).

All items of capital (office space, equipment, vehicles) were assigned a current market/replacement value based on national South African prices at the base year (e.g. the estimated local prevailing market rent for office space) and costs were allocated to the intervention on the basis of estimated use. The equipment comprised two laptop computers and there were three vehicles used to varying degrees during the course of the intervention.

Personnel costs were valued either at prevailing gross salary in the relevant year or—for volunteer labour—at the market rates for equally qualified personnel occupying equivalent positions, reflecting their economic cost (Drummond *et al*. 1997). The personnel included three SfL trainers, one facilitator and two external consultants in the initial trial phase (a project director and a senior trainer). Other recurrent costs included supplies (mainly stationery), transport (public transport), operations (photocopier lease, furniture and telephone) and maintenance (vehicles and building).

Costs associated with adherence to the research protocol were excluded (Drummond *et al*. 1997; Glick *et al*. 2007). These were incurred because the sites chosen for the intervention were located substantially farther apart than would normally be the case due to random village assignment. Adjustments to transport costs were therefore made by assuming the use of public transport by local staff in line with programme operations in a non-research setting.

A major component of costs was the initial development costs associated with training of staff and production of training materials. As it was expected that the initial investment in these activities would yield benefits beyond the duration of the study, such costs were annuitized (Creese and Parker 1994; Jan *et al*. 2008). Initial staff training was annuitized over five years, while conceptualization of the protocol and production of the SfL training manuals was annuitized over 10 years to reflect their potential for use not only in scale-up but in other settings (Welbourn 1995), in view of previous experience with similar materials in other African contexts. Factored into these costs were the consultancy services that were required for the planning of the initial intervention and in the training of staff and volunteers.

At the commencement of scale-up, further training was undertaken to enable expansion of the programme. Major new inputs were the training and deployment of additional facilitators. Each trainer was responsible for nine loan centres, in line with standard practice for the microfinance partner. The cost of this training was annuitized in line with the approach used at the outset of the trial. Overall, the analysis of scale-up costs employed similar assumptions and methods as for the trial.

Effectiveness

The effectiveness of the intervention in terms of reduction in the risk of past year IPV as observed in the trial was assumed to apply to both the trial and the scale-up. Scale-up entailed the expansion of the intervention to populations in surrounding districts where we assumed the integrity and quality of the intervention was well-maintained. We would expect no difference in baseline characteristics between such similarly treatment-naïve trial and scale-up populations to thus suggest any difference in absolute effect.

The transformation of the primary trial outcome into DALYs is outlined in Table 1. It was based on recent burden of disease estimates in South Africa in which the DALYs due to IPV were estimated at 319 135. These were derived through identifying a set of sequelae associated with IPV (depression, anxiety, alcohol consumption, drug abuse, self harm, smoking, cervical cancer, HIV/AIDS, sexually transmitted disease, femicides and injury), the DALYs associated with each condition and then weighting these by their population attributable fraction to IPV (Norman *et al*. 2007; Norman *et al*. 2009). By utilizing population data (Statistics South Africa 2006) and IPV prevalence estimates, we were then able to determine that for each case of a woman reporting an experience of IPV in the previous 12 months, on average, there was a resulting burden of 0.0923 DALYs. Given the potential error in the estimate of this parameter, it was tested in sensitivity analysis.

Sensitivity analysis was conducted in relation to the following parameters:

- the upper and lower bound confidence limits of the effect estimates from the trial (Pronyk *et al*. 2006);
- varying the DALY value of an incident case of IPV by +20% and − 20%;
- increasing the expected life of investment in staff training to 10 years;
- decreasing the expected life of investment in protocol development and training manuals to five years; and
- varying the discount rate to 0% and 6% (Tan-Torres Edejer *et al*. 2003).

Table 1 Transforming IPV-free year gained to DALYs averted

	n / %
1. Absolute number of DALYs due to IPV in South Africa (Norman *et al*. 2009)	319 135
2. Female population >15 years (Statistics South Africa 2006)	18 784 600
3. Prevalence of women >15 years reporting IPV in past 12 months (Norman *et al*. 2009)	18.4%
4. Number of women >15 years reporting IPV in past 12 months in South Africa (2 × 3)	3 456 366
5. DALYs / woman experiencing IPV past 12 months (1/4)	**0.0923**

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Results

Development costs

Table 2 sets out the development costs. These included the costs of training and training material development incurred initially, at the outset of the trial, and the further training costs at the commencement of the scale-up.

The initial training costs were $61 115, the costs of training material development were $13 877, and further training costs at scale-up were $57 663. A significant component of the development costs at the initiation of the trial were consultant fees paid to overseas experts; these were not incurred in the scale-up since the training in the latter phase was carried out by local programme staff.

Cost-effectiveness

Table 3 reports a breakdown of cost figures for the duration of the trial and initial scale-up and cost-effectiveness estimates.

Table 2 Development costs

	US$
Training costs at commencement of trial	
Buildings	918
Equipment	861
Consultancies (non-recurrent)	21 031
Vehicles	6181
Personnel	26 311
Supplies	419
Transport	3528
Vehicle operating and maintenance	1568
Building operating and maintenance	338
Total costs	61 155
Annuitized training costs—trial	**26 707**
Training materials development	
Buildings	62
Equipment	65
Consultancies (non-recurrent)	11 657
Vehicles	215
Personnel	1581
Supplies	28
Transport	201
Vehicle operating and maintenance	54
Building operating and maintenance	14
Total costs	13 877
Annuitized training materials development costs	**3254**
Training costs at commencement of scale-up	
Personnel	51 507
Supplies	252
Transport	4913
Vehicle operating and maintenance	825
Building operating and maintenance	167
Total costs	57 663
Annuitized training costs—scale-up	**13 520**

Over the 2-year trial period, the cost of SfL training was $36 706. In total, 855 clients participated in the intervention, with total per client costs equal to $42.93. During the initial scale-up, the total cost to reach an additional 2598 clients was $33 467, with a cost per client of $12.88.

When set against effect estimates from the trial, cost-effectiveness ratios for the trial and the scale-up phase were $710 and $213 per woman per IPV-free year gained, respectively. On the basis of the transformation outlined in Table 1, these equate to $7688 and $2307 per DALY averted.

Sensitivity analysis

The sensitivity analysis in Table 4 indicates:

- Some uncertainty in relation to the effect estimates—a consequence of the limited number of clusters enrolled in the trial, resulting in wide confidence intervals for most indicators. For the trial, the cost per DALY averted ranged from $5491 to $46 982; whilst for initial scale-up, it ranged from $1648 to $14 099.
- The results were fairly robust in relation to the other parameters. Varying these results in cost-effectiveness between $5015 to $9610 for the trial phase and $1454 and $2884 for the initial scale-up.

Table 3 Cost-effectiveness estimates of trial and scale-up operations

	Trial	Scale-up
Fixed costs (US$)		
Buildings	110	110
Equipment	115	115
Vehicles	150	3281
Development costs[a]		
Training—trial	26 707	26 707
Manuals	3254	3254
Training—scale-up[b]		13 520
Variable costs (US$)		
Operational staff[c]	5429	
Supplies[b]	52	
Transport[b]	425	
Vehicle operating and maintenance[b]	37	
Building operating and maintenance[b]	32	
Total costs (US$)	**36 706**	**33 467**
Per capita cost (US$)	**42.93**	**12.88**
Baseline risk of IPV in previous 12 months (%)	11	11
Relative risk reduction (effect estimate from trial) (%)	55	55
Absolute risk reduction (%)	6.05	6.05
Cost per woman with an IPV-free year gained (US$)	**710**	**213**
DALY / woman experiencing IPV past 12 months[d]	0.0923	0.0923
Cost per DALY averted (US$)	**7688**	**2307**

Notes:
[a]See Table 2.
[b]The costs are fixed within the scale-up phase.
[c]These were costs involved in establishing the operations (as opposed to the development and training) and incurred only the trial phase.
[d]See Table 1.

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Table 4 Sensitivity analysis—cost per DALY averted

Parameter	Trial (US$)	Scale-up (US$)
Upper bound 77% relative risk reduction	5491	1648
Low bound 9% relative risk reduction	46 982	14 099
Upper bound DALY value of an incident IPV (+20%)	6407	1923
Lower bound DALY value of an incident IPV (−20%)	9610	2884
Expected life (5 years; 5 years)	8193	2501
Expected life (10 years; 10 years)	5015	1454
Discount rate 0%	7053	2119
Discount rate 6%	8184	2437

Discussion

The IMAGE intervention combined group-based microfinance with a gender and HIV training programme. During the trial period, the intervention reached 855 women in 12 loan centres from four study villages. The incremental cost of delivering the intervention during this phase was $36 706, or $42.93 per client. An assessment of the costs of taking this to scale within the local area showed that at two years, with coverage extended to a further 2598 clients, there was a reduction in average costs to $12.88 per client. This indicates that substantial improvements in cost-effectiveness could be achieved with scaling-up due to a larger number of clients, and the move from an expatriate supported training programme to the provision of training by local staff.

Within study villages, effect estimates suggest that levels of IPV would be reduced by 55%, at an estimated cost-effectiveness of $7688 per DALY averted in the trial phase and $2307 per DALY averted in the initial two years of scale-up. There is little basis for direct comparison of these impact results as this was the first randomized controlled trial in a developing country study to demonstrate significant reductions in levels of IPV. There were, however, a number of pragmatic features in the original trial, most notably in the design of the intervention, which provide confidence that its findings could be sustained, particularly in the scale-up phase. For example:

- The SfL curriculum was developed through an extensive phase of consultation based on participatory learning and principles, and thus was tailored to the specific concerns of the community. Aside from initial input into the training and development of materials, the intervention was staffed largely through use of local health workers whose skill profile increased over time.
- The intervention built onto locally established formal and informal institutions (such as the SEF, the existing social groupings on which the loan groups were configured and the leadership provided by key women in these groups) and utilized existing facilities made available by the local health service.

These design elements were important in embedding the intervention through engaging directly with community members and opportunistically capitalizing on existing community resources. A number of secondary outcomes reported in the trial give some confidence that this process had been successful; such as the initiation of various activities in the intervention sites including 40 village workshops, 16 meetings with leaderships structures, five marches, two partnerships with local institutions and the formation of two new village committees (Pronyk 2006).

Violence clearly has a number of potential 'down-stream' consequences, from loss of life, physical disability and hospitalization, to HIV infection (Dunkle *et al*. 2005), and emotional and psychological conditions including depression and anxiety. Data on savings to the health sector or to other agencies such as the police associated with these reductions in IPV were not collected. While inclusion of such data would further support the case for cost-effectiveness, access to health or social support for survivors of IPV remains a serious obstacle in this population (McIntyre and Gilson 2002). Nevertheless, generating estimates of DALYs attributable to IPV enabled the broader implications of violence for the health sector to be factored into the assessment of outcomes in the economic evaluation, and facilitates comparisons of cost-effectiveness with other potential areas of health investment.

The World Health Organization generalized benchmark for cost-effectiveness is that a cost per DALY averted of less than three times the gross domestic product per capita (GDP) is deemed 'cost-effective'; and that a cost per DALY averted of less than the GDP per capita is deemed 'highly cost-effective' (WHO 2010). In 2004, the GDP per capita in South Africa was $4666 (World Bank 2005). Thus, subject to some uncertainty around the effect estimates, the IMAGE intervention achieves cost-effectiveness in its trial phase and is highly cost-effective when scaled-up.

Additionally, it needs to be recognized that complex structural interventions such as IMAGE have the potential to influence multiple health and social outcomes. In such cases, cost-effectiveness might be more appropriately assessed through a cost-consequences analysis in which the full range of benefits of the intervention are acknowledged (Drummond *et al*. 1997; Coast 2004; Jan *et al*. 2008). In the trial, it was established that the intervention reduced poverty, led to positive shifts in social capital and multiple indicators of empowerment, and resulted in lower levels of HIV risk behaviour among young women who received the intervention (Pronyk *et al*. 2006; Kim *et al*. 2007; Pronyk *et al*. 2008a; Pronyk *et al*. 2008b). As such, the cost per DALY averted estimates presented here, which are based solely on reductions in IPV, are likely to underestimate the true value of the intervention.

There are also potential limitations to our estimates that are important to underscore. First, the distinction between research-driven costs and operational costs were at times complex to disentangle. Close collaboration with the teams involved was crucial for the identification of the resources devoted to each activity, and of the rationale to discriminate operational and research-driven features of the trial period. Second, recall bias on the part of project staff had the potential to interfere with the accuracy of our assessment. However, we feel the adoption of a micro-costing approach yielded a very accurate assessment of resources used for the trial and initial phase of the scale-up. In addition, triangulation of data sources was used to check consistency, including multiple members of

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staff asked to relate the process of the intervention, the same pieces of information being collected from different individuals, and the information that individuals reported being checked against financial records where relevant.

Cost-effective interventions for the prevention of IPV in resource-poor settings are critically important, yet the evidence base to facilitate policy and programme development remains at an early stage. This study indicates that coupling financial services to skills building and education may provide an important opportunity for addressing IPV. Additional research attempting to disentangle the effects of the microfinance and training from microfinance alone suggests that only the combined approach led to consistent improvement in health and social outcomes (Kim *et al*. 2009), highlighting the potential synergies that are important to underscore. Emerging evidence from the microfinance sector suggests such integrated approaches may lead to additional health benefits, including improvements in breast-feeding, diarrhoea management, immunization rates and the nutritional status of children (Marcus *et al*. 1999; Dunford 2001; Morduch and Haley 2001; Pronyk *et al*. 2007). This study suggests that proven development initiatives such as microfinance represent ideal opportunities for such value-adding public health interventions and that some form of public subsidy to support and strengthen these is warranted.

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Ethical clearance

The study design was approved by ethical review committees at the University of the Witwatersrand (South Africa) and the London School of Hygiene and Tropical Medicine (UK).

Endnotes

[1] These are small shops in the local village that sell a wide variety of products, ranging from bread and soft-drinks to small household wares.

[2] Repayment rates by the end of the trial phase in the IMAGE sites were 99.7% and the host microfinance organization, the Small Enterprise Foundation, was financially and operationally sustainable (expenses met by interest on loans).

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