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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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Summary

We did a cost-effectiveness analysis alongside a cluster-randomised trial of an intervention combining microfinance with gender and HIV training for the prevention of intimate-partner violence in South Africa. The average cost per client was \$43 in the trial phase and \$13 in the initial scale-up phase. On the basis of effect estimates from the trial, this translates to \$711 and \$213 per woman per IPV-free year gained. Using recent burden of disease estimates for intimate partner violence from South Africa, we estimated the cost per DALY gained as \$7,700 for the trial and \$2,307 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. These estimates are probably conservative, as they do not include the health and development benefits of the intervention beyond IPV reduction. The findings suggest that this combined economic and health intervention was cost-effective in its trial phase and highly cost-effective in scale-up.

Introduction

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 ¹. In addition to being an affront to women's rights, intimate partner violence is increasingly recognised as a neglected but important public health problem, with significant impacts on women's physical, reproductive and sexual, and mental health ^{2,3}. The development of cost-effective interventions with the potential to prevent IPV and that are appropriate and relevant to resource poor settings, particularly in rural areas, 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 by means of a cluster-randomised trial between 2001 and 2004. Effect estimates suggest that, relative to a matched comparison group, IMAGE participants experienced a 55% reduction in the past year experience of physical and/or sexual violence by an intimate partner (IPV) ⁵.

The microfinance (MF) component of the intervention offered access to group-based credit and savings services, using a Grameen Bank model, ⁶ 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 ⁷. 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^a (5%).

^a 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.

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 phases⁸. In phase 1, participants engaged in 10 one-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 2, those women identified by their peers as *natural leaders* were involved in an intensive one-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 mobilisation 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 well-being, and may serve as a stimulus for wider mobilisation around pervasive public health problems^{4,9,10}. Combined approaches such as IMAGE provide an incentive for individuals to participate in public health programs, which in the absence of loans, they likely would not. Furthermore, microfinance institutions contain an element of financial sustainability and, with 100 million clients worldwide¹¹, also work towards economies of scale – both critical for cost-effective interventions aimed at changing complex and deeply-rooted social norms¹². 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^b, we examined the incremental costs of integrating the training curriculum, alongside IPV-related outcomes and Disability

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

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 organisations and importantly, whether such programs 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 institutionalise the intervention within communities, we also examined the costs and cost-effectiveness of scale-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 2 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 ¹³ and burden of disease data from South Africa ^{14,15}, into estimates of costs per DALY gained to enable a general assessment of cost-effectiveness. The cost-effectiveness of IMAGE in the trial phase was thus estimated separately from the initial 2 years of scale-up.

Costs

The costing adopted an ingredients approach ¹⁶ based on the financial statements of the program and host microfinance organisation. All costs are 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 ¹⁷.

Insert table 1

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 cost allocated to the intervention on the basis of estimated use.

Personnel costs, 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 cost¹⁸. Other recurrent costs included supplies, transport and maintenance.

Costs associated with adherence to the research protocol were excluded^{18,19}. 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 program operations in a non-research setting.

A major component of costs were 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 annuitised^{16,20}. Initial staff training was annuitised over 5 years, while conceptualisation of the protocol and production of the SfL training manuals was annuitised over 10 years to reflect their potential for use not only in scale-up but in other settings. Factored into these costs were 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 program. 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 annuitised 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 of DALYs lost to IPV in South Africa ^{14,15} and population data ¹³. It indicates that each case of a woman reporting an experience of IPV in the previous 12 months, on average, resulted in a loss of 0.0923 DALYs.

Insert table 1

Table 2 indicates the DALY loss from the specific conditions which were included as the relevant sequelae of IPV in the original burden of disease estimates. ¹⁵

Insert table 2

Sensitivity analysis was conducted in relation to the following parameters:

- the upper and lower bound confidence limits of the effect estimates from the trial⁵
- 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 5 years; and
- varying the discount rate to 0% and 6% ¹⁷.

Results

Development costs

Table 3 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.

Insert table 3

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 program staff.

Cost-effectiveness

Table 4 reports a breakdown of cost figures for the duration of the trial and initial scale-up and cost-effectiveness estimates.

Insert table 4

Over the two-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 \$43. During the initial scale-up, the total cost to reach an additional 2,598 clients was \$33,467, with a cost per client of \$13.

When set against effect estimates from the trial, cost-effectiveness ratios for the trial and the scale-up phase were \$711 and \$213 per woman per IPV-free year gained respectively. On the basis of the transformation outlined in table 1, these equate to \$7,700 and \$2,307 per DALY gained.

Sensitivity analysis

The sensitivity analysis in table 5 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 ranged from \$5,500 to \$47,058; whilst for initial scale-up, it ranged from \$1,648 to \$14,099.

- the results were fairly robust in relation to the other parameters. Varying these results in cost-effectiveness between \$5,015 to \$8,193 for the trial phase and \$1,454 and \$2,503 for the initial scale-up.

Insert table 5

Discussion

The IMAGE intervention combined group-based microfinance with a gender and HIV training program. 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 \$43 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 2,598 clients, there was a reduction in average costs to \$13 per client. This indicates that substantial improvements in cost-effectiveness could be achieved with scaling-up.

Within study villages, effect estimates suggest that levels of IPV would be reduced by 55%, at an estimated cost-effectiveness of \$7,700 per DALY gained in the trial phase and \$2,307 per DALY gained in the initial 2 years of scale-up. There is little basis for direct comparison of these results as few previous intervention studies have demonstrated reductions in levels of IPV. Violence clearly has a number of potential 'down-stream' consequences – from loss of life, physical disability and hospitalisation, to HIV infection ²¹, and emotional and psychological conditions including depression and anxiety (see table 3). Data on savings to the health sector associated with improvements in outcomes were not collected. While inclusion of such data would further support the case for cost-effectiveness, access to care for victims of IPV remains a serious obstacle in this population. ²². Nevertheless, generating estimates of disability-adjusted-life year (DALYs) attributable to IPV enabled the broader implications of violence to be factored into the assessment of outcomes in the economic evaluation.

The World Health Organization generalised benchmark for cost-effectiveness is that a cost per DALY of less than 3 times the gross domestic product per capita (GDP) is

deemed 'cost-effective'; and that a cost per DALY of less than the GDP per capita is deemed 'highly cost-effective'²³. In 2004, the GDP per capita in South Africa was \$4,666²⁴, indicating that the IMAGE intervention achieves cost-effectiveness in its trial phase and is highly cost-effective when scaled-up.

Additionally, it needs to be recognised 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^{18,20,25}. 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^{4,5,26,27}. As such, the cost per DALY estimates presented here 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 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 program 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. Emerging evidence from the microfinance sector suggests such integrated approaches may lead to additional health benefits – including improvements in breast-feeding,

diarrhoea management, immunisation rates, and the nutritional status of children^{28-30 31-}
³⁴. 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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Table 1: Transforming IPV-free year gained to DALYs

1. Absolute number of DALYs lost to IPV in South Africa ¹⁵	319,135
2. Population females >15 years ¹³	18,784,600
3. Prevalence of women >15 years reporting IPV in past 12 months ¹⁵	18.4%
4. Number of women >15 years reporting IPV in past 12 months in South Africa (2x3)	3,456,366
5. DALY loss / woman experiencing IPV past 12 months (1/4)	0.0923

Table 2: Estimates burden attributable to IPV, South Africa 2000 (source: Norman et al ¹⁵)

Sequelae	DALYS lost
Unipolar depressive disorders	42,097
Anxiety disorders	12,140
Alcohol abuse	17,704
Drug use disorders	3,096
Self-inflicted injuries	11,112
Tobacco smoking	34,458
Cervical cancer	8,460
HIV/AIDs	97,591
Sexually transmitted infections	6,194
Intimate femicides	51,833
Physical injuries	25,799
Falls	3,090
Other unintentional injuries	5,560
Total	319,135

Table 3: Development costs

Training costs at commencement of trial	\$
Buildings	918
Equipment	861
Consultancies (non-recurrent)	21,031
Vehicles	6,181
Personnel	26,311
Supplies	419
Transport	3,528
Vehicle operating and maintenance	1,568
Building operating and maintenance	338
<i>Total Costs</i>	61,155
Annuitised training costs - trial	26,707
Training materials development	
Buildings	62
Equipment	65
Consultancies (non-recurrent)	11,657
Vehicles	215
Personnel	1,581
Supplies	28
Transport	201
Vehicle operating and maintenance	54
Building operating and maintenance	14
<i>Total Costs</i>	13,877
Annuitised training materials development costs	3,254
Training costs at commencement of scale-up	
Personnel	51,507
Supplies	252
Transport	4,913
Vehicle operating and maintenance	825
Building operating and maintenance	167
<i>Total Costs</i>	57,663
Annuitised training costs – scale-up	13,520

Table 4: Cost-effectiveness estimates of trial and scale-up operations

Costs	Trial	Scale-up
Buildings	\$110	\$110
Equipment	\$115	\$115
Vehicles	\$150	\$3,281
<i>Development costs</i> ^c		
Training - trial	\$26,707	\$26,707
Manuals	\$3,254	\$3,254
Training – scale-up		\$13,520
Operational staff ^d	\$5,429	
Supplies ^d	\$52	
Transport ^d	\$425	
Vehicle operating and maintenance ^d	\$37	
Building operating and maintenance ^d	\$32	
TOTAL COSTS	\$36,706	\$33,467
Per Capita Cost	\$43	\$13
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	\$711	\$213
DALY loss / woman experiencing IPV past 12 months ^e	0.0923	0.0923
Cost per DALY gained	\$7,700	\$2,307

^c See table 3

^d These were costs involved in establishing the operations (as opposed to the development and training) and incurred only the trial phase

^e See table 1

Table 5: Sensitivity analysis – cost per DALY gained

Parameter	Trial \$	Scale-up \$
Upper bound 77% relative risk reduction	5,500	1,648
Low bound 9% relative risk reduction	47,058	14,099
Expected life (5 yrs; 5 yrs)	8,193	2,501
Expected life (10yrs; 10 yrs)	5,015	1,454
Discount rate 0%	7,053	2,119
Discount rate 6%	8,184	2,437
