

# BMJ Open Cost-effectiveness analysis of an intimate partner violence prevention intervention targeting men, women and couples in rural Ethiopia: evidence from the Unite for a Better Life randomised controlled trial

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## ABSTRACT

**Objectives** Experience of intimate partner violence (IPV) is associated with adverse health and psychosocial outcomes for women. However, rigorous economic evaluations of interventions targeting IPV prevention are rare. This paper analyses the cost-effectiveness of Unite for a Better Life (UBL), a gender-transformative intervention designed to prevent IPV and HIV risk behaviours among men, women and couples.

**Design** We use an economic evaluation nested within a large-scale cluster randomised controlled trial, analysing financial and economic costs tracked contemporaneously.

**Setting** UBL was implemented in rural southern Ethiopia between 2013 and 2015.

**Participants** The randomised controlled trial included 6770 households in 64 villages.

**Interventions** UBL is an intervention delivered within the context of the Ethiopian coffee ceremony, a culturally established forum for community discussion, and designed to assist participants to build skills for healthy, non-violent, equitable relationships.

**Primary and secondary outcome measures** This paper reports on the unit cost and cost-effectiveness of the interventions implemented. Cost-effectiveness is measured as the cost per case of past-year physical and/or sexual IPV averted.

**Results** The estimated annualised cost of developing and implementing UBL was 2015 US\$296 772, or approximately 2015 US\$74 per individual directly participating in the intervention and 2015 US\$5 per person annually for each community-level beneficiary (woman of reproductive age in intervention communities). The estimated cost per case of past-year physical and/or sexual IPV averted was 2015 US\$2726 for the sample of direct beneficiaries, and 2015 US\$194 for the sample of all community-level beneficiaries.

**Conclusions** UBL is an effective and cost-effective intervention for the prevention of IPV in a low and middle-income country setting. Further research should explore strategies to quantify the positive effects of the intervention across other domains.

## Strengths and limitations of this study

- This study contributes to an extremely limited literature around the cost-effectiveness of strategies targeting intimate partner violence (IPV) and community-based norms transformation in low and middle-income countries.
- A key strength of this study is that it draws on high-quality, contemporaneously collected cost and outcome data from a large-scale randomised controlled trial, and generates cost-effectiveness estimates that are relatively robust to different costing assumptions.
- However, one important limitation is that cost-effectiveness can be evaluated only with respect to cases of physical and/or sexual IPV averted.
- No data are available on health outcomes (eg, health-related quality of life) that would enable the estimation of a more broadly comparable cost-effectiveness measure.

**Trial registration number** NCT02311699 (ClinicalTrials.gov); AEARCTR-0000211 (AEA Registry)

## INTRODUCTION

Globally, 30% of women experience physical and/or sexual violence by an intimate partner (IPV) in their lifetime.<sup>1</sup> IPV has both immediate and long-term adverse health and social consequences for women and their families.<sup>2–6</sup> Physical effects of IPV include traumatic injuries, chronic illness and death, and adverse mental health effects include depression and suicide.<sup>1–4</sup> In addition, IPV has substantial economic costs.<sup>7 8</sup> Evidence suggests rates of IPV are particularly high in sub-Saharan Africa; in Ethiopia, the site of this study, over 70% of women reported lifetime physical/and or sexual IPV in the

2005 WHO Multi-country Study on Women's Health and Domestic Violence.<sup>9</sup>

A growing literature has explored the effectiveness of interventions designed to prevent and reduce IPV in low-income contexts, and thus the body of evidence about useful IPV prevention strategies has expanded.<sup>10–17</sup> However, from a policymaking perspective, identifying viable IPV interventions requires additional data on the relative cost-effectiveness of different programmes.<sup>18</sup> To date, only two papers have published estimates of the cost-effectiveness of IPV prevention interventions in low and middle-income countries, implemented in Uganda and South Africa.<sup>19,20</sup> One recent paper published an estimate of unit costs of pilot interventions targeting violence against women and girls in six countries (Ghana, Kenya, Pakistan, Rwanda, South Africa and Zambia).<sup>21</sup>

Unite for a Better Life (UBL) is a gender-transformative, participatory intervention delivered to men, women and couples in Ethiopia in the context of the coffee ceremony, a traditional forum for community-based discussion. The programme aims to reduce physical and sexual IPV and HIV risk behaviours as well as promote healthier, more equitable relationships. UBL was evaluated in a large-scale cluster randomised controlled trial (cRCT) conducted in the rural Gurague Zone in southern Ethiopia between 2013 and 2018.

In this paper, we present a cost and cost-effectiveness analysis of UBL. Previous evidence suggests the intervention when delivered to men was effective in reducing women's reported past-year experience of physical and/or sexual IPV and men's reported past-year perpetration of physical and/or sexual IPV, in addition to promoting equitable gender norms and reducing HIV risk behaviours when delivered to men and couples.<sup>22,23</sup> This paper reports on the overall cost of the programme, and its cost-effectiveness relative to the number of direct beneficiaries, the number of community-level beneficiaries and the cases of past-year physical and/or sexual IPV averted.

## METHODS

### Intervention

UBL is a gender-transformative intervention delivered within the context of the Ethiopian coffee ceremony, a culturally established forum for community discussion. Additional details about the intervention are also provided in the primary trial paper.<sup>22</sup> Gender-transformative strategies to reduce IPV seek to address the root causes of gender-based inequalities by actively examining and changing inequitable gender norms and imbalances of power.

Curricula designed for women, men and couples were developed by EngenderHealth in collaboration with researchers and programme developers from Addis Ababa University (AAU), the Ethiopian Public Health Association (EPHA) and other partner institutions; AAU and EPHA managed the implementation of the

intervention. Each curriculum includes 14 participatory sessions (total 38 hours) led by one trained, same-sex facilitator for men and women's UBL groups, and one female and one male facilitator for couples' UBL groups. The objective of the intervention is to assist participants to identify and transform power imbalances within their relationships and to build skills for healthy, non-violent, equitable relationships. The duration of the intervention was finalised following extensive piloting to identify a structure of discussions that would allow participants to fully engage in all relevant materials, while simultaneously minimising participant dropout.

UBL was delivered in biweekly sessions including approximately 20 individuals per group. This group size was identified during piloting as appropriate given the competing objectives of facilitating inclusive and well-moderated discussions while simultaneously reaching as many individuals as possible given resource constraints. Each session included a coffee ceremony, discussion and interactive activities focused on gender norms, sexuality, communication and conflict resolution, HIV/AIDS and IPV. While the sessions did include written materials available for those who were literate, all materials were also conveyed orally or visually, and participants were not required to be literate.

Male and female facilitators (48 in total) were recruited from the evaluation districts (Meskan, Mareko, Silte and Sodo districts in the Gurague Zone of the Southern Nations, Nationalities and Peoples' Region). The facilitators were drawn from the local region (though they did not work in their own home communities); all facilitators had at least a secondary education, and the majority had some experience in the educational and/or health services.

Facilitators were trained in two phases. During the pilot phase of intervention development, the facilitators participated in the full set of intervention sessions as led by master trainers in order to observe high-quality facilitation in practice, and reflect on their own perspective on gender, sexuality and IPV. This was followed by a 10-day training in facilitation skills. The intervention was then implemented in two phases between March and October 2015.

### Randomised controlled trial

The UBL intervention was evaluated in a four-arm cRCT conducted between December 2014 and March 2018. The UBL trial was implemented by the Abdul Latif Jameel Poverty Action Lab (J-PAL) at the Massachusetts Institute of Technology, in partnership with the AAU School of Public Health, the EPHA and EngenderHealth. The trial was prospectively registered on ClinicalTrials.gov and at the American Economic Association registry.

As the intervention was designed for groups of individuals, a cluster design was employed. Sixty-four villages (kebeles) in the evaluation districts were randomly selected for inclusion from the sampling frame of all villages within these districts, and were randomly assigned

to one of the four study arms (women's UBL, men's UBL, couples' UBL and control). The control arm received a short educational (1 hour) session focused on IPV.

In addition, a second individual-level randomisation was conducted. In each village within the three treatment arms, 80% of individuals enrolled in the trial were randomly sampled to participate in UBL. The remaining 20% were included in baseline and endline data collection only in order to assess intervention spillover effects. Data were collected from enrolled individuals at baseline and from enrolled individuals and their spouses at endline, approximately 24 months after intervention.

The analysis strategy entails comparing the effectiveness of each of the three intervention arms vis-à-vis the control arm. Study findings suggest that the UBL intervention, when delivered to men, significantly reduced women's experience of past-year physical and/or sexual IPV as well as male perpetration of physical and/or sexual IPV at approximately 24 months of follow-up. When UBL was delivered to couples, there was a reduction in experience of IPV that was not statistically significant at conventional levels; there was no observed reduction in IPV when UBL was delivered to women.<sup>22</sup>

In addition, a separate analysis examined the diffusion of the intervention effects to the 20% of individuals enrolled in the trial who were not invited to participate in the intervention.<sup>24</sup> Evidence suggests that women in the intervention communities who were not sampled for participation in the intervention reported a decline in experience of past-year IPV of comparable magnitude to that reported for intervention participants. In fact, the hypothesis that the direct and indirect effects are identical cannot be rejected. Accordingly, we interpret the experimental effects as consistent in magnitude for all women in intervention communities.

### Patient and public involvement

Implementation of the randomised controlled trial was guided and supported by a community advisory board constituted by local and national stakeholders and policymakers, including representatives of women's groups who work with women experiencing IPV. The community advisory board met regularly for the duration of the study to provide feedback on the design, the intervention and the local context. Findings were also presented first to the board in order to enable their feedback on dissemination.

### Measuring costs

In order to analyse the intervention's cost-effectiveness, we estimated all costs corresponding to the development and implementation of UBL between 2013 and 2015. Development and piloting was conducted in 2013 and 2014; training and programme implementation was conducted in 2015.

For this analysis, we adapted a provider perspective including both financial and economic costs, but excluding the costs associated with participants' attendance. All costs are estimated at the programme level,

and there is no local or community-level variation in cost. In addition, all costs were considered in the year in which they were incurred. The methodology described here draws substantially on existing guidelines for cost analyses of interventions to prevent violence against women in low-income settings.<sup>25</sup>

All costs are reported in 2015 US\$. During the project, some costs (personnel for intervention development and travel) were incurred in dollars; these costs are simply converted to 2015 US\$ using inflation rates reported by the World Bank. Costs associated with field implementation were incurred in Ethiopian birr, but expenditure was tracked quarterly by the lead institution (J-PAL) in dollars using the exchange rate at the conclusion of each quarter. We use the dollar estimates of these costs, calculated at the point at which these expenses were paid by the lead institution, and again convert to 2015 US\$.

The costs of intervention development include personnel costs for curriculum development, travel costs associated with curriculum development and piloting, and field piloting. This development cost was treated as an initial investment with long-term returns beyond the scope of this evaluation, consistent with the strategy employed by previous cost-effectiveness analysis of IPV programmes.<sup>19 20</sup> Accordingly, the total cost of intervention development was treated as a single capital item, annualised over 10 years using a 3% discount rate.

The costs of training facilitators were similarly treated as an investment with medium-term returns; in a context in which UBL was implemented consistently and/or on a large scale, training would be periodic. Accordingly, training cost was again treated as a single capital item, annualised over 5 years using a 3% discount rate. This strategy is again consistent with previous cost-effectiveness analysis in the IPV literature.<sup>19 20</sup>

Implementation costs for the intervention include only recurrent costs: staff salaries, staff transport (to intervention sites) and materials (coffee ceremony materials and in-kind incentives for participants). No capital costs were incurred during intervention implementation. Transportation was rented, and the cost of a rented office site is included in the transportation sub-budget.

The intervention sessions themselves were conducted in public spaces in the intervention communities: this included outdoor public spaces and school classrooms. The cost of this space is denoted to be zero for two reasons. First, these spaces are plausibly considered to be public goods. Second, in no case did the intervention use a space that would be available for rent or purchase, or that is plausibly comparable to another space available for rent or purchase.

In addition, all research costs associated with the randomised controlled trial were excluded from this analysis. However, the principal investigators and research support staff did provide additional monitoring and support for the programme's implementation; accordingly, part of the cost of this investigator and staff time is included in the estimate of the programme's cost.

Implementation was spearheaded by a separate intervention team whose salaries are fully included in the estimated cost of programme implementation. The inclusion of the costs of supervisory staff is standard, given that future programme roll-out would need to include equivalent staff resources in order to maintain the intervention's quality and therefore effects.

Given that the evaluation included three treatment arms, it may also be informative to examine cost-effectiveness by trial arm. In particular, the estimated cost-effectiveness for the men's arm is of interest, given that the primary results suggest that the reduction in IPV was largest in this arm. In order to estimate the costs by arm, operational costs such as staff, transportation and materials can be directly attributed to a trial arm. However, indivisible costs (intervention development and training costs) were not assigned or billed to specific intervention arms, and the literature in this case does not provide any clear guidance as to what share of aggregate intervention expenses should be assigned to a specific arm. In order to generate an estimate of costs comparable to the cost of launching one arm of UBL as an independent programme, we estimate that the indivisible costs corresponding to each arm (eg, men's UBL) are 66% of total costs in these categories (calculating that half of the total costs correspond to joint investment in the intervention as a whole, and half of the total costs are divided across the three intervention arms equally).

### Outcomes

For the randomised trial, the prespecified primary outcomes include women's past-year experience of physical IPV and women's past-year experience of secondary IPV. For this analysis, we pool these measures and focus on women's past-year experience of physical and/or sexual IPV as a summary measure of intervention effectiveness.

Unit cost estimates include the cost per individual invited to the intervention; the cost per individual in intervention communities; and the cost per case of physical and/or sexual IPV averted.

In order to conceptualise the target sample for the intervention, it is important to note that the intervention was delivered to both men and women. However, the target beneficiaries of the intervention were women. We calculate the sample of beneficiaries using two different methodologies. First, we analyse the sample of direct and household-level beneficiaries: women in households directly targeted by the intervention. This is a sample of 1344 women in each intervention arm. Second, given the evidence previously cited that the intervention effects are of comparable magnitude for indirect beneficiaries resident in the intervention communities, we also examine the effects on the sample of community-level beneficiaries, defined to encompass all women of reproductive age in the intervention communities. This is a measure that has also been employed in recent literature.<sup>19</sup> To calculate the number of community-level beneficiaries, we use existing population and demographic estimates to

estimate a population of 1180 women of reproductive age per kebele, or 18880 women per study arm (constituted by 16 kebeles).<sup>26 27</sup>

In order to estimate the number of averted cases of past-year physical and/or sexual IPV, we use data collected at endline reporting past-year experience of physical and/or sexual IPV. The adjusted risk difference in prevalence of past-year physical and/or sexual IPV between communities in each intervention arm (couples, women's and men's) and control communities is used to estimate the additional number of cases of IPV that would have been observed in the absence of the intervention in the specified arm. The estimated number of averted cases can then be extrapolated to broader populations of interest. We use the estimated risk differences calculated in the full sample (including households who were included in the evaluation, but not invited to participate in the intervention), and adjusted for baseline demographic covariates.

More specifically, we employ the following formula, in which the adjusted difference in risk between treatment and control communities is multiplied by the population.<sup>19</sup> Given that the observed intervention effects are estimated separately for each treatment arm, we estimate the number of cases averted separately in each arm and calculate the sum; here, the subscript m denotes the men's arm, and the subscript cp denotes the couples' arm. The subscript c denotes the control arm. No reduction in IPV was observed in the women's experimental arm, and accordingly this arm is excluded from the calculation of cases averted. Cases averted are also reported separately for the men's and couples' arms.

$$\text{Cases averted} = (\text{IPV}_m - \text{IPV}_c) \times \text{Pop} + (\text{IPV}_{cp} - \text{IPV}_c) \times \text{Pop}$$

The estimated number of cases averted is similarly calculated for both the target sample of direct beneficiaries and the larger sample of community-level beneficiaries.

### Cost-effectiveness

We assess the cost-effectiveness of the UBL intervention by comparing it to the status quo, represented in this case by the costs and outcomes observed in the control communities. The cost-effectiveness ratio is then calculated as the ratio of total cost to cases of IPV averted.

### Sensitivity analysis

Sensitivity analysis was conducted with respect to the following parameters. First, we use alternate discount factors of 0% and 6%. Second, we adjust the useful life of the investment in materials development and training, assuming that the useful life of both investments is 10 years, and alternately that the useful life of both investments is 5 years. Third, we calculate the estimated number of cases averted using the parameters estimated for the reduction in male perpetration of IPV, rather than the reduction in female experience of IPV. Fourth, we estimate cost-effectiveness of the male arm only employing alternate assumptions for the cost of implementing one arm alone, relative to the cost of implementing the full project. In the low cost scenario, we assume that the cost

**Table 1** Total cost of Unite for a Better Life

Cost category	All intervention arms				
	Amount	Percentage	Couples	Women	Men
<b>Total cost of UBL development (2015 US\$)</b>					
Staff	148 697	0.66	99 131	99 131	99 131
Travel	27 485	0.12	18 323	18 323	18 323
Pilot	21 712	0.10	14 474	14 474	14 474
Administrative	28 141	0.12	18 761	18 761	18 761
Total	226 035		150 690	150 690	150 690
<b>One year of implementation</b>					
26 499			17 666	17 666	17 666
<b>Total cost of UBL implementation (2015 US\$)</b>					
Training	34 758	0.12	23 172	23 172	23 172
<b>Training cost (1 year)</b>					
7 589			5 059	5 059	5 059
Staff	137 705	0.46	68 852	34 426	34 426
Transport	69 467	0.23	34 734	17 367	17 367
Materials	28 632	0.10	14 316	7 158	7 158
Travel	3 000	0.01	1 500	750	750
Administrative	23 880	0.08	11 940	5 970	5 970
Total implementation/training cost	297 442		154 514	88 843	88 843
Total implementation/training cost (1 year)	270 273		136 401	70 730	70 730
Total intervention cost (1 year)	296 772		154 067	88 396	88 396

UBL, Unite for a Better Life.

of intervention development is only 50% of total development costs, and maintain implementation costs consistent with the original estimate; in the high cost scenario, we maintain development costs consistent with the original estimate, and assume implementation costs for the men's arm alone constitute 35% of total implementation costs.

## RESULTS

### UBL intervention cost: development and implementation

The total estimated cost of the development of the UBL intervention (including drafting and refining the curriculum as well as piloting) is 2015 US\$226 035 (see [table 1](#)). For concision, all costs reported will be rounded to the nearest dollar. This cost category can be subdivided as follows: 66% staff, 12% travel, 10% field pilot and 12% administrative costs. The total estimated cost of intervention implementation is 2015 US\$297 442. This cost category can be subdivided as follows: 12% training, 46% salaries, 23% transport, 10% materials, 1% travel and 8% administrative costs.

The intervention was fully implemented in a single year (2015). In order to generate an estimate of the costs of 1 year's implementation, the costs of intervention development and training are amortised over 10 and 5 years, respectively, following the previous literature. This allows us to generate the estimates of 1 year of intervention implementation. The total cost of 1 year of implementation of

UBL is 2015 US\$296 772; this is the cost estimate that we employ in analysing cost-effectiveness.

We also report each cost category by arm, corresponding to the estimated cost of implementing this arm as an independent intervention. As previously noted, development and training costs for each arm are estimated to be 66% of total costs, and thus the total cost of the three arms exceeds the estimated programme cost reported in the first column. In terms of field implementation costs (facilitator staff time and travel, and materials for participants), the men and women's arms are parallel in cost, while the couples' intervention incurred twice the cost, given that it had twice the number of participants. The estimated cost of 1 year of implementation for the men's arm (and the women's arm) is 2015 US\$88 396, while the estimated cost of 1 year of implementation for the couples' arm is 2015 US\$154 067.

### Effectiveness

The trial results analysed for the sample of indirect beneficiaries suggest that UBL led to a reduction of past-year experience of physical and/or sexual IPV in the men's arm (estimated risk difference  $-0.046$ , 95% CI  $-0.09$  to  $0.00$ ,  $p=0.049$ ) and in the couples' arm (estimated risk difference  $-0.035$ , 95% CI  $-0.10$  to  $0.03$ ,  $p=0.287$ ). The coefficient is larger in magnitude and statistically significant in the men's arm. There is no evidence of a reduction in past-year experience of physical and/or sexual IPV

in the women's arm (estimated risk difference 0.02, 95% CI -0.04 to 0.08,  $p=0.464$ ).

The number of reported past-year cases of physical and/or sexual IPV in the control arm is 496 for the trial sample and 7930 for the full community sample. Accordingly, we can estimate the number of averted cases of past-year IPV in the men's arm (62 cases in the sample of direct beneficiaries, 868 in the sample of indirect beneficiaries) and in the couples' arm (47 cases in the sample of direct beneficiaries, 661 in the sample of indirect beneficiaries). The total number of estimated number of cases of past-year IPV averted in all intervention arms is 109 for the sample of direct beneficiaries and 1529 for the sample of all women in intervention communities.

### Cost-effectiveness

We analyse the unit cost of UBL for two specified target samples (direct and household-level beneficiaries and community-level beneficiaries), and the cost-effectiveness of UBL with respect to the number of past-year physical and/or sexual IPV cases averted in each sample. As noted above, the sample of direct and household-level beneficiaries includes 1180 women in each arm or 3840 women total in the three intervention arms. The sample of community-level beneficiaries includes all 18880 women per arm or 56640 women total. Using these estimates, we calculate the (annualised) cost of the intervention for each household-level beneficiary woman is 2015 US\$74, and the cost per community-level beneficiary is 2015 US\$5, as reported in [table 2](#). The estimated cost per case of IPV averted is 2015 US\$2726 for the sample of direct beneficiaries and 2015 US\$194 for the sample of community-level beneficiaries.

We also conduct a comparable analysis by arm. For the men's arm, the estimated cost per household-level beneficiary is 2015 US\$66, and the estimated cost per community-level beneficiary is 2015 US\$5. The estimated cost per case of past-year IPV averted in the sample of direct beneficiaries is 2015 US\$1430, and in the sample of community-level beneficiaries it is 2015 US\$102. The couples' arm does not perform as well, given that it is more costly to implement (\$115 per household-level beneficiary) and less effective (estimated cost of 2015 US\$3275 per case of past year averted in the sample of direct beneficiaries).

In addition, we calculate cost-effectiveness analysing the implementation costs of the intervention only, inclusive of training but exclusive of development, in order to inform a scenario of scale-up. Analysing implementation costs only for the full intervention, the estimated cost per household-level beneficiary is 2015 US\$67, and the estimated cost per community-level beneficiary is 2015 US\$5. The estimated cost per case of past-year IPV averted in the sample of direct beneficiaries is 2015 US\$2483, and the estimated cost per case of past-year IPV averted in the sample of community-level beneficiaries is 2015 US\$177.

**Table 2** Unit cost and cost-effectiveness of UBL development and implementation, 2015 US\$

Unit cost	
Per direct or household-level beneficiary	74
Per community-level beneficiary	5.2
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries	2726
Per case of past-year physical and/or sexual IPV averted among community beneficiaries	194
Unit costs: men's arm only	
Per direct or household-level beneficiary	66
Per community-level beneficiary	5
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries	1430
Per case of past-year physical and/or sexual IPV averted among community beneficiaries	102
Unit costs: couples' arm only	
Per direct or household-level beneficiary	115
Per community-level beneficiary	8
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries	3275
Per case of past-year physical and/or sexual IPV averted among community beneficiaries	233
Unit costs: implementation only	
Per direct or household-level beneficiary	67
Per community-level beneficiary	5
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries	2483
Per case of past-year physical and/or sexual IPV averted among community beneficiaries	177

IPV, intimate partner violence; UBL, Unite for a Better Life.

### Sensitivity analysis

The results of the sensitivity analysis are presented in [table 3](#). In general, alternate assumptions around the cost structure (varying the discount rate and the useful life of investments in intervention development and training) generate limited variation in the estimated cost-effectiveness. In columns (1) through (5), the estimated cost per community-level beneficiary is between 2015 US\$5 and US\$6 (relative to 2015 US\$5.20 in the primary analysis), while the estimated cost per case of IPV averted varies between 2015 US\$191 and US\$209 (relative to 2015 US\$194 in the primary analysis). (When using coefficient estimates for perpetration of past-year physical and/or sexual IPV, the risk difference is estimated to be a reduction of 4.9 percentage points in the men's intervention arm, and a reduction of 3.0 percentage points in the couples' intervention arm, relative to a mean in the control arm of 38%.)

For the men's arm, the cost per community-level beneficiary is between 2015 US\$4 and US\$6 (relative to 2015 US\$5 in the primary analysis) and the estimated cost per

**Table 3** Sensitivity analysis for unit cost and cost-effectiveness for UBL implementation, 2015 US\$

	Sensitivity analysis					Using coefficient estimates: perpetration	Costs for men's arm only: high	Costs for men's arm only: low
	Fixed costs amortised 5 years	Fixed costs amortised 10 years	Discount rate: 0	Discount rate: 6%				
<b>Unit cost</b>								
Per direct or household-level beneficiary	83	76	76	79				
Per community-level beneficiary	6	5	5	5				
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries	2936	2694	2684	2771	2795			
Per case of past-year physical and/or sexual IPV averted among community beneficiaries	209	192	191	197	199			
<b>Unit costs: men's arm only</b>								
Per direct or household-level beneficiary							60	85
Per community-level beneficiary							4	6
Per case of past-year physical and/or sexual IPV averted among direct beneficiaries							1307	1851
Per case of past-year physical and/or sexual IPV averted among community beneficiaries							93	132

IPV, intimate partner violence; UBL, Unite for a Better Life.

case of IPV averted ranges from 2015 US\$93 to US\$132 (relative to 2015 US\$102 in the primary analysis).

## DISCUSSION

These cost estimates for UBL join a very limited literature around the cost and cost-effectiveness of interventions designed to prevent IPV in low-income contexts. In previous literature, the Intervention With Microfinance for AIDS and Gender Equity (IMAGE) intervention targeting prevention of HIV and IPV in South Africa reports that the cost per person reached is equal to 2004 US\$49 in the trial phase.<sup>20</sup> The SASA! intervention in Uganda reports a cost per person in the intervention communities ranging from 2011 US\$15 to US\$23.<sup>19</sup> A recent analysis of six pilots targeting violence against women and girls reported unit costs ranging from \$4 to \$1324.<sup>21</sup> The estimated cost per case of IPV averted was 2004 US\$813 for IMAGE and 2011 US\$485 for SASA!

Comparing UBL to IMAGE and SASA!, in general the cost per direct beneficiary and per year of IPV averted for direct beneficiaries is higher. However, the cost per community-level beneficiary (US\$5) is lower than the comparable cost in both previous trials. In addition, the cost per case of past-year IPV averted among all community-level beneficiaries (2015 US\$194) is about 75% lower than the cost per case of past-year IPV averted

in the IMAGE trial, and about 60% lower than the cost per case of past-year IPV averted in the SASA! trial. We argue that it is more appropriate to focus on the cost-effectiveness estimates calculated with respect to all community-level beneficiaries given that we have high-quality evidence that the effects for direct beneficiaries (included in the intervention) and other community-level beneficiaries were not significantly different (unlike the IMAGE evaluation, in which the effects for indirect beneficiaries were estimated to be zero), and given that SASA! is a community-level intervention for which the target sample is accordingly considered to encompass all eligible women in intervention communities.

If we use the cost-effectiveness estimates generated focusing on the men's arm, the estimated cost per year of IPV averted drops to 2015 US\$1430 within the sample of direct household-level beneficiaries and 2015 US\$102 within the sample of community-level beneficiaries. The latter estimate is 80% lower than the estimated cost per case of past-year IPV averted for the IMAGE intervention and 70% lower than the estimated cost per case of past-year IPV averted for the SASA! intervention.

The IMAGE evaluation also reported additional evidence around cost and cost-effectiveness during a scale-up phase following the initial trial.<sup>20</sup> In the scale-up phase, cost per year of IPV averted fell to around 30%



of the comparable cost in the trial phase. A recent analysis of six pilot projects targeting violence against women and girls similarly found evidence of declines in unit costs between 20% and 40% when interventions were scaled up.<sup>21</sup> In order to ensure comparability across trials, this discussion has used the higher estimate derived from the trial phase. However, scale-up of UBL may similarly lead to a rapid increase in estimated cost-effectiveness. Sensitivity analysis demonstrates that these estimates are relatively robust to alternate assumptions about the cost parameters for the intervention.

This analysis also does not account for benefits of the UBL interventions other than violence averted. We only examine cases of past-year violence averted, and do not consider possible reductions in the intensity of IPV for women who nonetheless continue to experience violence. In addition, previous evidence suggests the UBL intervention had significant effects on a number of additional outcomes beyond IPV, including HIV-related knowledge and risk behaviours, social norms and intrahousehold task sharing. These broad impacts suggest this analysis is potentially underestimating the intervention's cost-effectiveness in a cross-sectoral framework. Given broader impacts, a cost-consequence analysis that assesses a broad range of benefits might be appropriate.<sup>28–30</sup>

This study has several weaknesses. First, as previously noted, there is imprecision in the cost-effectiveness estimates driven by uncertainty in the magnitude of the effects on outcomes. Second, it is not possible to use a final outcome measure such as a disability-adjusted life year (DALY) in this analysis, as the trial did not collect any general data on health outcomes and there is no DALY estimate corresponding to past-year exposure to IPV. This renders it more challenging to compare the cost-effectiveness of this intervention vis-à-vis other interventions related to women's health and well-being.

## CONCLUSIONS

The UBL programme, a gender-transformative educational intervention delivered within the context of a cultural ceremony, is effective in reducing past-year IPV in rural Ethiopia. This paper reports on the costs of developing and implementing the intervention and estimates its cost-effectiveness, suggesting that the cost per case of past-year IPV averted observed in this context is comparable to or lower than other IPV prevention interventions. Accordingly, the paper adds to a limited but growing literature analysing the relative effectiveness of interventions targeting at preventing IPV.

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**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information. All relevant cost data for the cost-effectiveness analysis here are included in the exhibits. The data linked to the analysis of the randomised controlled trial itself are published separately in conjunction with reporting of the primary results.

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## REFERENCES

- Devries KM, Mak JYT, Garcia-Moreno C, *et al*. The global prevalence of intimate partner violence against women. *Science* 2013;340:1527–8.
- Campbell JC. Health consequences of intimate partner violence. *Lancet* 2002;359:1331–6.
- Ellsberg M, Jansen HAFM, Heise L, *et al*. Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *Lancet* 2008;371:1165–72.
- Devries KM, Mak JY, Bacchus LJ, *et al*. Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS Med* 2013;10:e1001439.
- Stöckl H, Devries K, Rotstein A, *et al*. The global prevalence of intimate partner homicide: a systematic review. *Lancet* 2013;382:859–65.
- Wathen CN, MacMillan HL. Children's exposure to intimate partner violence: Impacts and interventions. *Paediatr Child Heal* 2013;18:419–22.
- Max W, Rice DP, Finkelstein E, *et al*. The economic toll of intimate partner violence against women in the United States. *Violence Vict* 2004;19:259–72.
- Roldós MI, Corso P. The economic burden of intimate partner violence in Ecuador: setting the agenda for future research and violence prevention policies. *West J Emerg Med* 2013;14:347–53.
- García-Moreno C, Jansen HAFM, Ellsberg M, *et al*. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet* 2006;368:1260–9.
- Pronyk PM, Hargreaves JR, Kim JC, *et al*. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet* 2006;368:1973–83.



- 11 Jewkes R, Nduna M, Levin J, *et al.* Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial. *BMJ* 2008;337:a506–5.
- 12 Abramsky T, Devries K, Kiss L, *et al.* Findings from the Sasa! study: a cluster randomized controlled trial to assess the impact of a community mobilization intervention to prevent violence against women and reduce HIV risk in Kampala, Uganda. *BMC Med* 2014;12:122.
- 13 Doyle K, Levitov RG, Barker G, *et al.* Gender-transformative Bandebereho couples' intervention to promote male engagement in reproductive and maternal health and violence prevention in Rwanda: Findings from a randomized controlled trial. *PLoS One* 2018;13:e0192756.
- 14 Gupta J, Falb KL, Lehmann H, *et al.* Gender norms and economic empowerment intervention to reduce intimate partner violence against women in rural Côte d'Ivoire: a randomized controlled pilot study. *BMC Int Health Hum Rights* 2013;13:46.
- 15 Wagman JA, Gray RH, Campbell JC, *et al.* Effectiveness of an integrated intimate partner violence and HIV prevention intervention in Rakai, Uganda: analysis of an intervention in an existing cluster randomised cohort. *Lancet Glob Health* 2015;3:e23–33.
- 16 Hossain M, Zimmerman C, Kiss L, *et al.* Working with men to prevent intimate partner violence in a conflict-affected setting: a pilot cluster randomized controlled trial in rural Côte d'Ivoire. *BMC Public Health* 2014;14.
- 17 Ellsberg M, Arango DJ, Morton M, *et al.* Prevention of violence against women and girls: what does the evidence say? *Lancet* 2015;385:1555–66.
- 18 Remme M, Siapka M, Vassall A, *et al.* The cost and cost-effectiveness of gender-responsive interventions for HIV: a systematic review. *J Int AIDS Soc* 2014;17:19228.
- 19 Michaels-Igbokwe C, Abramsky T, Devries K, *et al.* Cost and cost-effectiveness analysis of a community mobilisation intervention to reduce intimate partner violence in Kampala, Uganda. *BMC Public Health* 2016;16:196.
- 20 Jan S, Ferrari G, Watts CH, *et al.* Economic evaluation of a combined microfinance and gender training intervention for the prevention of intimate partner violence in rural South Africa. *Health Policy Plan* 2011;26:366–72.
- 21 Torres-Rueda S, Ferrari G, Orangi S, *et al.* What will it cost to prevent violence against women and girls in low- and middle-income countries? Evidence from Ghana, Kenya, Pakistan, Rwanda, South Africa and Zambia. *Health Policy Plan* 2020;35:855–66.
- 22 Sharma V, Leight J, Verani F, *et al.* Effectiveness of a culturally appropriate intervention to prevent intimate partner violence and HIV transmission among men, women, and couples in rural Ethiopia: findings from a cluster-randomized controlled trial. *PLoS Med* 2020;17:e1003274.
- 23 Leight J, Deyessa N, Verani F, *et al.* An intimate partner violence prevention intervention for men, women, and couples in Ethiopia: additional findings on substance use and depressive symptoms from a cluster-randomized controlled trial. *PLoS Med* 2020;17:e1003131.
- 24 Leight J, Deyessa N, Verani F, *et al.* Community-Level spillover effects of an intervention to prevent intimate partner violence and HIV transmission in rural Ethiopia. *BMJ Glob Health* 2021;6:e004075.
- 25 Michaels-igbokwe C, Ferrari G, Torres-rueda S. *Guidelines for conducting cost analyses of interventions aimed at preventing violence against women and girls in low- and middle-income settings*, 2020.
- 26 Central Statistical Agency. Ethiopia demography and health survey report [online], 2016. Available: <http://www.ethiodemography.org/SNNPR.html> [Accessed 1 May 2020].
- 27 Central Intelligence Agency. CIA factbook: ethiopia [online]. Available: <https://www.cia.gov/library/publications/the-world-factbook/geos/et.html> [Accessed 1 May 2020].
- 28 Drummond MF, O'Brien B, Stoddart GL. Methods for the economic evaluation of health care programmes, second edition. *American Journal of Preventive Medicine* 1998;14:243.
- 29 Coast J. Is economic evaluation in touch with society's health values? *BMJ* 2004;329:1233–6.
- 30 Jan S, Pronyk P, Kim J. Accounting for institutional change in health economic evaluation: a program to tackle HIV/AIDS and gender violence in Southern Africa. *Soc Sci Med* 2008;66:922–32.