Estimating the cost of scaling up VAWG programming

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Query: Estimating the cost of scaling up programming to prevent and respond to violence against women and girls: Preliminary estimates of the resources required to 2030.

Contents

List of Tables

Introduction

With over 30% of women worldwide experiencing physical, sexual and emotional violence in their lifetime, violence against women and girls (VAWG) is an urgent human rights concern [1]. In addition to identifying effective interventions to respond to and prevent violence, evidence on the relative cost-effectiveness of different approaches is required in order to inform the scale up of a global response to VAWG to 2030 as part of the Sustainable Development Goals (SDGs) [2]. Unfortunately, there is a serious dearth of evidence not only in terms of intervention effectiveness, but also the cost and cost-effectiveness of existing approaches. The aim of this report is to use existing evidence on the costs and cost effectiveness of primary and secondary prevention interventions drawn from a recent systematic review of gender responsive interventions for HIV [3] and an evidence review of approaches to scaling up VAWG programming [4] in order to generate estimates of the resources required to scale up VAWG programming to reach 500 million women and girls by 2030.

Background

Cost analysis of VAWG programming can provide policy makers involved in budgeting for programme planning and scale up. This section provides a brief background to the concepts of scale up, costing and the costs of scaling up as they are applied in the remainder of the document.

Scaling Up

Scaling up interventions broadly refers to expanding the coverage of an intervention or programme to reach a larger target audience. This may be applied to increases in inputs, outputs, or impact [5]. Increasing inputs may refer to additional finances, the addition of human resources or additional physical inputs such as equipment and materials. Scaling up outputs may refer to expanding access, improving efficiency of service delivery or broadening the scope of service delivery. Scaling up impact refers to reductions in morbidity and mortality as a result of the intervention. Often a multi-pronged approach is required and there may be trade-offs between each of the three areas. For example, rapid scale up through the addition of financial inputs may come at the cost of quality programming and equality of access. A slower scale up with a focus on providing culturally appropriate messaging may be linked to greater impact, but reduced outputs. Therefore, the implications of each approach should be carefully weighted and contextual factors likely to impact successful scale up considered [4].

Types of Costs

From the perspective of economic theory, the term ‘cost’ refers to the value of all resources used in producing a given output. These may be financial costs which are equal to actual expenditures, or opportunity costs, which reflect the value of the next best use of a particular resource. These two types of costs are commonly the same, but may differ where inputs are donated, as may be the case with volunteer time. In this case, the opportunity cost of volunteer time is equal to the next best use of that time, whether that would be paid employment or leisure time.

A cost analysis may be conducted from a provider (payer), client or societal perspective. The provider’s perspective typically includes all costs borne by the implementing organisation or the body responsible for paying for a service of programme. A costing conducted from the client perspective would include costs borne by the individual receiving the service. This may include transportation costs or the cost of time taken off work to participate in programme activities. Cost savings to individuals in the form of reduced health care expenditure may also be considered using this approach. A societal perspective includes the costs considered in the provider and client perspective as well as costs to auxiliary support services and family members or care givers.

Independent of the choice of perspective, an analyst conducting must consider whether the analysis will include the full cost of the intervention or the incremental costs only. A full economic costing includes all start up, overhead and management costs associated with delivering a programme. Where organisations delivery several programmes or interventions, shared costs such as those

related to management and administration are allocated to each programme area using a series of allocation factors, such as time or physical space allocation. In contrast, an incremental costing approach assumes that a functional organisation exists with management and administration structures already in place and only considers the additional cost of adding another programme area to the overall portfolio, over and above activities already taking place.

Economics of Scale Up

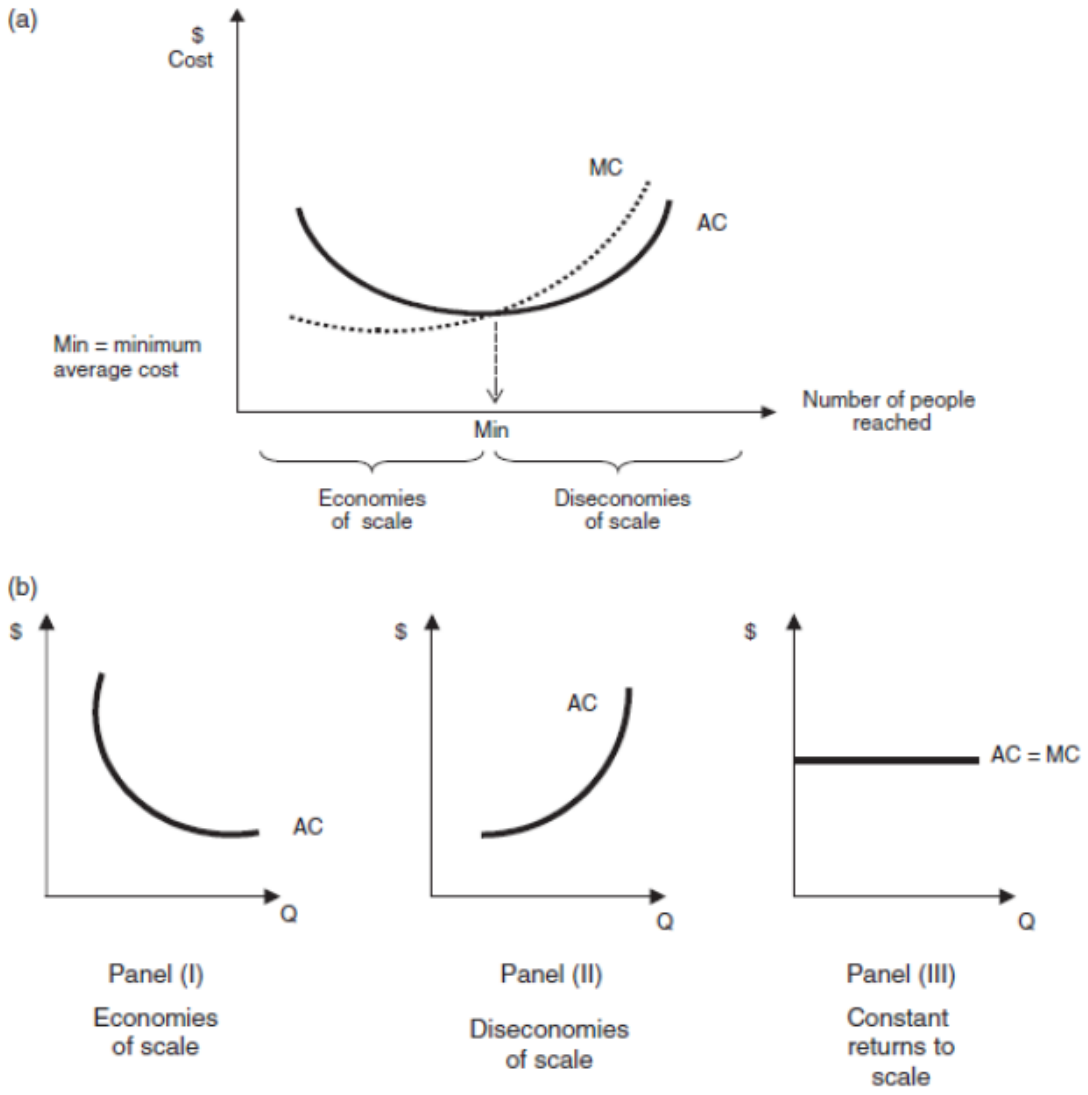
Common outputs of a cost analysis are the total cost of delivering an intervention over a specified period of time, the average cost per unit of output and/or the cost per unit of impact, where outputs may refer to the number of programme beneficiaries or programme activities conducted and impact relates to a change in health outcome, such as a case of violence prevented or a life year gained. Economic evaluations conducted in low-income setting commonly use a Disability Adjusted Life Year (DALY) as an out a composite measure of impact that considers changes in both mortality and morbidity [6].

Average unit cost estimates generated from a single intervention are typically a point estimate relating to costs and benefits accumulated over the course of a project and are a direct function of the relationship between cost and output/impact for a particular volume or scale of service delivery. As such, scale is a major determinant of average unit costs.

Of the types of costs that are incurred in the course of an intervention some may be recurrent, or variable, and some may be fixed. Recurrent or variable costs refer to those costs that vary directly with the number of clients served. An example may be the cost of post-exposure prophylaxis (PEP) for HIV for women who have experienced rape. In this case, a set dosage with a set cost will be provided to every woman served. If only one woman is served, the cost occurs once. If 100 women are served, the costs occurs 100 times. In each case the contribution of this recurrent cost to the total average unit cost will be the same.

Fixed costs typically refer to those costs that do not vary directly as a function of scale, at least in the short run. An example may be the cost of office space, where once an organisation has purchased or rented office space, the amount of space available remains the same regardless of the number of clients served. To illustrate the impact of fixed costs on average unit costs, consider two scenarios: in the first scenario only one client is served and in the second 100 clients are served. If only one client is served, the average unit cost of office space per client served would be equal to 100% of the office space costs. However, if 100 clients are served, the average unit cost of office space per client served would be divided by 100. The contribution of fixed costs to the total average unit cost will be dramatically lower in the second scenario. Where average costs continue to decrease as service volume increase, this is referred to as economies of scale. However, there may become a point at which the office space, or current staffing structure can no longer absorb more clients and additional inputs will be required to expand the scale of service delivery. This can lead to increasing average costs as service volume increases, a scenario referred to as diseconomies of scale. Where the majority of costs are variable, some interventions may experience constant returns to scale, that is, average costs remain the same, regardless of service volume. These scenarios are illustrated in Figure 1**.**

Figure 1. Relationship between volume of service delivery and average unit costs *(a) theoretical relationship between average unit costs and volume of service delivery, (b) scenarios in which only economies of scale, diseconomies of scale or constant returns to scale may be seen. AC=average cost, MC=marginal cost, Q=quantity of output. Source: Kumaranakaye, 2008 [7]*



In health interventions, 26-70% of unit costs are typically explained by variation in scale [7, 8]. Unfortunately, the exact contribution of scale is often not known as it cannot be estimated based on cost data from a single intervention. In order to fully appreciate the contribution of scale to average unit costs, a large multi-site study where each site delivers the same intervention at a different scale and each site is costed separately would be required. While is feasible and has been done with respect to HIV prevention [8], it has not yet been done in VAWG programming.

As programme costs may differ according to scale, they may also differ according to context. For example, the cost of inputs is likely to vary in different countries, or between urban and rural settings. There may also be differences in the specific manner in which an intervention is delivered across sites. This may be due to differences in technical efficiency (the process of combining inputs to produce a set of outputs), differences in intervention intensity or changes in delivery as implementers become more proficient over time (learning by doing). Again, these impacts are difficult to predict based on cost data from a single intervention.

Methods

Selecting Programmes to Scale Up

Investments in scaling up VAWG programming should be focused in interventions which have been rigorously evaluated and a causal link between the intervention and intervention outcomes established. Scaling up VAWG programming requires that interventions be implemented in a variety of settings. This requires evidence that interventions are not only effective in the original implementation setting, but also that intervention approaches can be generalised and adapted to a variety of settings. In addition to data about the effectiveness of interventions, estimating the cost of scaling up interventions requires, at a minimum, data about the cost of implementing the intervention, and ideally, a formal cost-effectiveness analysis, which links the costs to changes in health, social or behavioural outcomes.

Inclusion Criteria

In the case of VAWG, there is a limited evidence base with respect to effectiveness, and this evidence base is further narrowed when data on cost or cost-effectiveness is added as an additional requirement. For the purposes of this exercise interventions reported in a recent systematic review of gender responsive interventions for HIV [3] and an evidence review of approaches to scaling up VAWG programming [4] were reviewed. Interventions were selected on the basis of the following inclusion criteria:

1. Intervention outcomes relate to one of four pillars of the VAWG Theory of Change (ToC) [9]:
    a) Empower women and girls
    b) Change social norms
    c) Build political will and institutional capacity
    d) Provide comprehensive services
2. Some evidence of intervention effectiveness is reported or description of intervention outcomes provided; and
3. Total programme cost, programme scale and average cost per unit of output or impact are reported.

Four interventions were identified as meeting the inclusion criteria and these data were used to model the cost of scaling up over a 15 year time horizon. This time horizon was selected to broadly match the time to the 2030 SDGs. The interventions are: Intervention with Microfinance for AIDS & Gender Equity (IMAGE), The SASA! Community Mobilisation Intervention, the Refenste Model of Post Rape Care Services and the Soul City Edutainment Series. Each intervention is described in brief below.

Descriptions are drawn directly from the evidence review of approaches to scaling up VAWG programming [4] (Sections 4.2.1 and 4.2.2) and supplemented with reference to the original papers reporting costs and outputs/outcomes.

Intervention Descriptions

The **IMAGE** trial in South Africa combined a poverty-focussed microfinance initiative with a gender and HIV training curriculum called *Sister for Life*. The microfinance component was implemented by the NGO Small Enterprise Foundation targeting women above 18 years and living in the poorest households. Groups of 5 women served as guarantors for each other's loans and all 5 had to repay their loans before the group could qualify for further credit. Lending groups of about 40 women met fortnightly to repay loans, apply for additional credit, and discuss business plans. These meetings served as avenues for introducing the *Sister for Life* participatory learning programme to address IPV and HIV, starting with 10 one-hour training sessions, covering topics such as gender roles, cultural beliefs, relationships, communication, HIV and IPV. In a second phase, the programme encouraged wider community mobilisation to engage both youth and men in the intervention communities, as a form of collective action. Women recognised as "natural leaders" by their peers undertook another week of training and then worked with their centres to address priority issues. The training curriculum

was delivered alongside microfinance services by a separate team of trainers over a 12-month period [10]. This approach significantly reduced levels of IPV by 55% and improved household wellbeing, social capital and gender-equitable attitudes [11, 12]. IMAGE is currently being scaled up in South Africa, reaching 15,000 additional participants as of 2011 [13], and is being replicated in Tanzania and Peru.

The IMAGE trial links directly to the first pillar of the VAWG ToC; empowering women and girls.

The economic evaluation of the IMAGE trial was conducted from the provider's perspective and used an incremental approach, that is, the cost of *Sister for Life* in addition to the microfinance component was considered. This is because the microfinance component was considered to be cost neutral [14]. The cost of developing the *Sister for Life* materials was included in the overall analysis. The impact measure for the cost effectiveness analysis was DALYs averted. Total cost, cost per person reached and cost per DALY averted were reported for both the trial phase in which 855 women were reached, and the scale up phase, in which 2,598 women were reached [14].

SASA! is a community mobilisation intervention in Kampala, Uganda aimed at preventing violence against women through changing the "community attitudes, norms and behaviours that underlie power imbalances between men and women and support both HIV risk behaviours and the perpetration of violence against women" [15, 16] The intervention is designed to take communities through four stages of change beginning with identifying linkages between violence and HIV risk, followed by raising awareness, supporting men and women affected by violence to change and taking action to prevent violence. Intervention activities are conducted by community activists, community and institutional leaders, health care workers and police all of whom are supported and mentored by SASA! staff and provided with bi-monthly training opportunities. SASA! was evaluated using a community cluster randomised trial which ran over four years from 2008-2011 and showed a 52% reduction the number of women who had experienced physical IPV in the 12 months preceding the end line survey. The intervention has already been rolled out both nationally and regionally with approximately 80 sites using the materials by 2012.

The SASA! intervention links to the first and second pillars of the VAWG ToC; empowering women and girls and changing social norms.

A full economic evaluation of the SASA! community cluster randomised trial in Kampala, Uganda was conducted from the provider's perspective. The cost of developing SASA! materials development from 2005-2007 was estimated separately and included as an input in the costing of the implementation in the context of the trial. All research costs related to running the trial were excluded. Total and annual costs were reported along with cost per person in the intervention community and cost per case of past year physical violence averted [17].

The **Refentse** model of post rape care services, implemented from 2003-2006 in one district hospital South Africa is a five part intervention model, including the establishment of a sexual violence advisory committee, the formulation of a hospital rape management policy, a training workshop for service providers, designated examining room, and community awareness campaigns [18]. Key measures of improvement were the quality of post rape care, provision of HIV counselling and testing, completion of a full 28 day course of PEP and number of clients served. Over the course of the intervention completion of the 28 day course of PEP drugs increased from 20% to 58% [18].

The Refentse model links to the third and fourth pillars of the VAWG ToC; building institutional capacity and providing comprehensive services.

A formal economic evaluation of the Refentse model was not conducted. In the mains study results paper the total cost and cost per client with and without start-up costs were reported [18].

Soul City series - The Soul City Institute for Health and Development in South Africa supports an ongoing 'edutainment' programme through a weekly television drama that portrays characters confronting violence, HIV, alcohol abuse and other social problems. The typical series includes 13 one-hour episodes of primetime television series, 45 fifteen minute radio drama episodes, three

booklets distributed at the community level and an advertising campaign on a related topic. Series 4 dealt specifically with partner violence and promoted new norms and community behavioural responses to violence. An evaluation in the form of a national survey found a consistent association between exposure to the series and both support-seeking and support-giving behaviour in response to violence. The series has run for over 10 seasons in South Africa and the Institute is building regional capacity in delivering such programmes for social change in other countries [19].

The Soul City edutainment approach links to the second pillar of the VAWG ToC; changing social norms.

An economic evaluation of the 4th Soul City series as an HIV and violence prevention intervention was performed. As part of this evaluation the total cost and costs allocated to four themes addressed in the series: prevention of HIV transmission, prevention of violence against women (VAW), high blood pressure and small business. The cost per individual reached is reported for the HIV and VAW themes. The evaluation notes overall high levels of exposure to the VAW theme through television, radio and print mediums (55-65% of relevant population exposed) [20], the link to behaviour change is tenuous. The final analysis includes an estimate of the cost per item adjusted action change related to VAW but the meaning of this is not well described and is not comparable to an international standard of cost-effectiveness. For this reason only the cost per person reached is used for the purposes of this exercise.

Scenario Descriptions

Three main scale up scenarios were modelled for each of the four interventions with costs reported for Year 1, Year 5, Year 10 and Year 15. The total costs over the full 15 years is also reported. The main scenarios vary according to the rate of scale up and the level of coverage each year. Of the four interventions included, IMAGE and Refentse target individuals, while SASA! and Soul City target the broader community context in which violence occurs. For this reason, the absolute number of people assumed to be reached by community interventions is multiplied by a factor of three, but the pattern of scale up remains the same. Table 1 shows the coverage levels assumed for individual interventions and Table 2 shows the coverage levels for community interventions.

Scenario 1 shows low initial coverage rates, possibly reflecting scale up in only a few settings to start with followed by consistent increases. Scenario 2 shows high initial coverage and rapid scale up to the target of 500 million women per year reached by year 5. This level of coverage is then sustained until year 15. Scenario 3 shows a similar high level of initial coverage in year one but a more moderate increase in year 5 with the 500 million target reached in year 10 and sustained in year 15.

Table 1. Description of Scale Up Scenarios by Number of Individuals Reached by Year for Interventions Targeting Individuals

	Year 1	Year 5	Year 10	Year 15	Total
Scenario 1	10,000,000	100,000,000	200,000,000	500,000,000	810,000,000
Scenario 2	100,000,000	500,000,000	500,000,000	500,000,000	1,100,000,000
Scenario 3	100,000,000	250,000,000	500,000,000	500,000,000	850,000,000

Table 2. Description of Scale Up Scenarios by Number of Individuals Reached by Year for Interventions Targeting Communities

	Year 1	Year 5	Year 10	Year 15	Total
Scenario 1	30,000,000	300,000,000	600,000,000	1,500,000,000	2,430,000,000
Scenario 2	300,000,000	1,500,000,000	1,500,000,000	1,500,000,000	3,300,000,000
Scenario 3	300,000,000	750,000,000	1,500,000,000	1,500,000,000	2,550,000,000

For each of the three coverage scenarios, two cost scenarios were modelled. In cost scenario A, Year 1 costs were assumed to be equal to trial phase costs (or the equivalent total costs including start-up costs) and for all subsequent years, 'scale up' costs, were used. These scale up costs were derived from the original economic evaluation for IMAGE. For SASA! were only trial costs are available, a reduction in costs proportionate to that seen in IMAGE was calculated. For Refenste, the total costs minus start-up costs were used for the scale up phase. For Soul City, the total cost of the intervention was used for the trial phase cost and the VAW component only costs were used for the scale up costs. The exception to this pattern is Scenario 1. In this scenario, coverage rates are low initially.

In cost scenario B, costs followed the same pattern in terms of trial and scale up costs, but all costs were assumed to be 20% less at the outset and to decrease annually by 20%, reflecting economies of scale as coverage increases. All scenarios are indicated with both the coverage and cost scenario, for example coverage scenario 1 and cost scenario A is referred to as scenario 1A and coverage scenario 1 and cost scenario B is referred to as scenario 1B.

Adjusting for Differential Timing

Costs for IMAGE, SASA! and Refentse were initially reported in United States Dollars (USD) and Soul City costs were reported in both South African Rand (ZAR) and USD, but were reported in different years. All Soul City costs were converted to USD using the annual average exchange rate from ZAR to USD in the year in which they were reported [21] and brought forward to 2014 USD using the US GDP deflator [22] (the most recent year for which a GDP deflator is available for both the US and the UK) and converted to 2014 Great British Pounds (GBP) using the annual average exchange rate for 2014 [21].

All costs were then modelled forward in 2014 GBP. However, to account for inflation between 2014 and 2016, final costs were adjusted upwards by 1.5% per annum between 2014 and 2016. This figure is an estimate generated based on the average GDP deflator in the UK from 2010 to 2014 [23].

All annual and total estimates are presented in 2016 GBP in the main text and the present discounted value of the total investment for each scenario is presented in an appendix. Note that due to inflation over the time period to 2030, estimates presented in 2016 GBP may not adequately reflect the value of the investment required in the future. As the specific rate of future inflation is unknown this cannot be adjusted in advance.

Results

The inputs used to model each of the scale up scenarios are presented in Table 3. All total and unit cost estimates presented are in 2014 USD.

For each of the interventions, three separate tables are presented containing the results of both combinations of the coverage and cost scenarios. Estimates related to IMAGE scale up are presented in Table 4 (scenarios 1A and 1B), Table 5 (scenarios 2A and 2B) and Table 6 (scenarios 3A and 3B). Estimates related to SASA! scale up are presented in Table 7 (scenarios 1A and 1B), Table 8 (scenarios 2A and 2B) and Table 9 scenarios 3A and 3B). Estimates related to scale up Refentse are presented in Table 10 (scenarios 1A and 1B), Table 11 (scenarios 2A and 2B) and Table 12 (scenarios 3A and 3B). Finally, estimates related to Soul City scale up are presented in Table 13 (scenarios 1A and 1B), Table 14 (scenarios 2A and 2B) and Table 15 (scenarios 3A and 3B).

In coverage scenario 1, a total of 4,522,880 DALYs may be averted over 15 years of implementation reaching a total of 810,000,000 women with the IMAGE intervention. In cost scenario A with constant unit costs, the total undiscounted investment in 2016 GBP is approximately 9.6 billion. In cost scenario B, assuming a decrease of 20% in costs, the total undiscounted investment in 2016 is approximately 6.5 billion.

In coverage scenario 2, a total of 8,934,084 DALYs may be averted over 15 years of implementation reaching a total of 1,100,000,000 women with the IMAGE intervention. In cost scenario A with

constant unit costs, the total undiscounted investment in 2016 GBP is approximately 16.5 billion. In cost scenario B, assuming a decrease of 20% in costs, the total undiscounted investment in 2016 is approximately 8.8 billion.

Table 3. Intervention inputs used to model scale up scenarios, 2014 USD

IMAGE			
	Parameter	**Trial**	**Scale Up**
	Coverage	855	2598
	Outcome (DALYs Averted)	4.77	14.51
	DALYs per participant	0.0056	0.0056
	Cost Per Person	29.53	8.86
	Cost Per DALY Averted	5,289	1,587
	Total Cost	25,253	23,024
SASA!			
	Parameter	**Trial**	**Scale Up***
	Coverage	10334	31401
	Outcome (Past year physical IPV averted)	1202.00	3652.39
	Case averted per person reached	0.1163	0.1163
	Cost Per Person	18.24	5.47
	Cost per past year physical IPV averted	460	138
	Total Cost	553,252	504,432
Refentse			
	Parameter	**Total**	**No Start Up Costs**
	Coverage	409	409
	Cost Per Person	132	38
	Total Cost	52,510	37,316
Soul City 4th Series			
	Parameter	**Total**	**VAW Component**
	Coverage	8068000	8068000
	Cost Per Person	0.40	0.17
	Total Cost	3,187,226	1,397,113

* Scale up values based on decrease in costs proportionate to that seen in the change in costs seen in IMAGE

In coverage scenario 3, a total of 7,538,133 DALYs may be averted over 15 years of implementation reaching a total of 850,000,000 women with the IMAGE intervention. In cost scenario A with constant unit costs, the total undiscounted investment in 2016 GBP is approximately 14.2 billion. In cost scenario B, assuming a decrease of 20% in costs, the total undiscounted investment in 2016 is approximately 7 billion.

In coverage scenario 1, scaling up the SASA! intervention to reach 2,430 community members over 15 years could avert more than 280,000 cases of past year physical violence. In cost scenario A with constant unit costs, the total undiscounted investment in 2016 GBP is approximately 17.8 billion. In cost scenario B, assuming a decrease of 20% in costs, the total undiscounted investment in 2016 is approximately 26 billion.

In coverage scenario 2, where 3.3 billion community members are reached, approximately 560,000 cases of past year physical violence could be averted. In cost scenario A, the total undiscounted investment to achieve this outcome is approximately 30.5 billion 2016 GBP. In cost scenario B, with decreasing unit costs, the total investment in 2016 GBP is approximately 20.7 billion.

Table 4. Annual and total cost estimates for IMAGE scale up scenarios 1A and 1B

Scenario 1A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	10,000,000	100,000,000	200,000,000	500,000,000	810,000,000
Outcome (DALYs Averted)	55838	558380	1116760	2791901	4,522,880
Cost Per DALY Averted	5,289	5,289	1,587	1,587	2,090
Total Cost (2014 GBP)	295,346,312	2,953,463,116	1,772,215,464	4,430,538,660	9,451,563,551
2016 GBP	**299,776,506**	**2,997,765,062**	**1,798,798,696**	**4,496,996,739**	**9,593,337,004**
Scenario 1B					
Coverage	10,000,000	100,000,000	200,000,000	500,000,000	810,000,000
Outcome (DALYs Averted)	55,838	558,380	1,116,760	2,791,901	4,522,880
Cost Per DALY Averted	5,289	1,587	1,587	51,587	1,410
Total Cost (2014 GBP)	236,277,049	2,362,770,493	3,780,432,788	7,560,865,576	6,379,480,330
2016 GBP	**239,821,205**	**2,398,212,050**	**3,837,139,280**	**7,674,278,560**	**6,475,172,535**

Table 5. Annual and total cost estimates for IMAGE scale up scenarios 2A and 2B

Scenario 2A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	100,000,000	500,000,000	500,000,000	500,000,000	1,100,000,000
Outcome (DALYs Averted)	558,380	2,791,901	2,791,901	2,791,901	8,934,084
Cost Per DALY Averted	5,289	1,587	1,587	1,587	1,818
Total Cost (2014 GBP)	2,953,463,116	4,430,538,660	4,430,538,660	4,430,538,660	16,245,079,094
2016 GBP	**2,997,765,062**	**4,496,996,739**	**4,496,996,739**	**4,496,996,739**	**16,488,755,281**
Scenario 2B					
Coverage	100,000,000	500,000,000	500,000,000	500,000,000	1,100,000,000
Outcome (DALYs Averted)	558,380	2,791,901	2,791,901	2,791,901	8,934,084
Cost Per DALY Averted	5,289	1,207	1,016	813	979
Total Cost (2014 GBP)	2,362,770,493	3,544,430,928	2,835,544,742	2,268,435,794	8,742,746,162
2016 GBP	**2,398,212,050**	**3,597,597,392**	**2,878,077,913**	**2,302,462,331**	**8,873,887,355**

Table 6. Annual and total cost estimates for IMAGE scale up scenarios 3A and 3B

Scenario 3A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	100,000,000	250,000,000	500,000,000	500,000,000	850,000,000
Outcome (DALYs Averted)	558,380	1,395,951	2,791,901	2,791,901	7,538,133
Cost Per DALY Averted	5,289	1,587	1,587	1,587	1,861
Total Cost (2014 GBP)	2,953,463,116	2,215,269,330	4,430,538,660	4,430,538,660	14,029,809,765
2016 GBP	**2,997,765,062**	**2,248,498,370**	**4,496,996,739**	**4,496,996,739**	**14,240,256,911**
Scenario 3B					
Coverage	100,000,000	250,000,000	500,000,000	500,000,000	850,000,000
Outcome (DALYs Averted)	558,380	1,395,951	2,791,901	2,791,901	7,538,133
Cost Per DALY Averted	5,289	1,207	1,016	813	925
Total Cost (2014 GBP)	2,362,770,493	1,772,215,464	2,835,544,742	2,268,435,794	6,970,530,699
2016 GBP	**2,398,212,050**	**1,798,798,696**	**2,878,077,913**	**2,302,462,331**	**7,075,088,659**

Table 7. Annual and total cost estimates for SASA! scale up scenarios 1A and 1B

Scenario 1A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	30,000,000	300,000,000	600,000,000	1,500,000,000	2,430,000,000
Outcome (Past year physical IPV averted)	3,489,452	34,894,523	69,789,046	174,472,615	282,645,636
Cost per past year physical IPV averted	460	157	47	47	62
Total Cost (2014 GBP)	547,200,000	5,472,000,000	3,283,845,397	8,209,613,492	17,512,658,888
2016 GBP	**555,408,000**	**5,554,080,000**	**3,333,103,078**	**8,332,757,694**	**17,775,348,772**
Scenario 1B					
Coverage	30,000,000	300,000,000	600,000,000	1,500,000,000	2,430,000,000
Outcome (Past year physical IPV averted)	3,489,452	34,894,523	69,789,046	174,472,615	282,645,636
Cost per past year physical IPV averted	460	125	100	80	91
Total Cost (2014 GBP)	437,760,000	4,377,600,000	7,004,160,000	14,008,320,000	25,827,840,000
2016 GBP	**444,326,400**	**4,443,264,000**	**7,109,222,400**	**14,218,444,800**	**17,697,127,754**

Table 8. Annual and total cost estimates for SASA! scale up scenarios 2A and 2B

Scenario 2A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	300,000,000	1,500,000,000	1,500,000,000	1,500,000,000	3,300,000,000
Outcome (Past year physical IPV averted)	34,894,523	174,472,615	174,472,615	174,472,615	558,312,367
Cost per past year physical IPV averted	460	47	47	47	54
Total Cost (2014 GBP)	5,472,000,000	8,209,613,492	8,209,613,492	8,209,613,492	30,100,840,475
2016 GBP	**5,554,080,000**	**8,332,757,694**	**8,332,757,694**	**8,332,757,694**	**30,552,353,082**
Scenario 2B					
Coverage	300,000,000	1,500,000,000	1,500,000,000	1,500,000,000	3,300,000,000
Outcome (Past year physical IPV averted)	34,894,523	174,472,615	174,472,615	174,472,615	558,312,367
Cost per past year physical IPV averted	460	38	30	24	37
Total Cost (2014 GBP)	4,377,600,000	6,567,690,793	5,254,152,635	4,203,322,108	20,402,765,536
2016 GBP	**4,443,264,000**	**6,666,206,155**	**5,332,964,924**	**4,266,371,939**	**20,708,807,019**

Table 9. Annual and total cost estimates for SASA! scale up scenarios 3A and 3B

Scenario 3A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	300,000,000	750,000,000	1,500,000,000	1,500,000,000	2,550,000,000
Outcome (Past year physical IPV averted)	34,894,523	87,236,307	174,472,615	174,472,615	471,076,060
Cost per past year physical IPV averted	460	47	47	47	55
Total Cost (2014 GBP)	5,472,000,000	4,104,806,746	8,209,613,492	8,209,613,492	17,786,420,237
2016 GBP	**5,554,080,000**	**4,166,378,847**	**8,332,757,694**	**8,332,757,694**	**18,053,216,541**
Scenario 3B					
Coverage	300,000,000	750,000,000	1,500,000,000	1,500,000,000	2,550,000,000
Outcome (Past year physical IPV averted)	34,894,523	87,236,307	174,472,615	174,472,615	471,076,060
Cost per past year physical IPV averted	460	38	30	24	36
Total Cost (2014 GBP)	4,377,600,000	3,283,845,397	5,254,152,635	4,203,322,108	17,118,920,139
2016 GBP	**4,443,264,000**	**3,333,103,078**	**5,332,964,924**	**4,266,371,939**	**17,375,703,941**

Table 10. Annual and total cost estimates for Refentse scale up scenarios 1A and 1B

Scenario 1A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	10,000,000	100,000,000	200,000,000	500,000,000	810,000,000
Cost Per Person	132	132	38	38	51
Total Cost (2014 GBP)	1,322,999,568	13,229,995,681	7,656,559,319	19,141,398,297	41,350,952,865
2016 GBP	**1,342,844,562**	**13,428,445,616**	**7,771,407,709**	**19,428,519,271**	**41,971,217,158**
Scenario 1B					
Coverage	10,000,000	100,000,000	200,000,000	500,000,000	810,000,000
Cost Per Person	106	31	25	20	11
Total Cost (2014 GBP)	1,058,399,654	3,062,623,727	4,900,197,964	9,800,395,928	9,021,221,346
2016 GBP	**1,074,275,649**	**3,108,563,083**	**4,973,700,933**	**9,947,401,867**	**9,156,539,666**

Table 11. Annual and total cost estimates for Refentse scale up scenarios 2A and 2B

Scenario 2A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	100,000,000	500,000,000	500,000,000	500,000,000	1,100,000,000
Cost Per Person	132	38	38	38	64
Total Cost (2014 GBP)	13,229,995,681	19,141,398,297	19,141,398,297	19,141,398,297	70,654,190,572
2016 GBP	**13,428,445,616**	**19,428,519,271**	**19,428,519,271**	**19,428,519,271**	**71,714,003,430**
Scenario 2B					
Coverage	100,000,000	500,000,000	500,000,000	500,000,000	1,100,000,000
Cost Per Person	106	31	25	20	35
Total Cost (2014 GBP)	10,583,996,545	15,313,118,637	12,250,494,910	9,800,395,928	38,147,610,092
2016 GBP	**10,742,756,493**	**15,542,815,417**	**12,434,252,334**	**9,947,401,867**	**38,719,824,244**

Table 12. Annual and total cost estimates for Refentse scale up scenarios 3A and 3B

Scenario 3A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	100,000,000	250,000,000	500,000,000	500,000,000	850,000,000
Cost Per Person	132	38	38	38	72
Total Cost (2014 GBP)	13,229,995,681	9,570,699,148	19,141,398,297	19,141,398,297	61,083,491,423
2016 GBP	**13,428,445,616**	**9,714,259,636**	**19,428,519,271**	**19,428,519,271**	**61,999,743,795**
Scenario 3B					
Coverage	100,000,000	250,000,000	500,000,000	500,000,000	850,000,000
Cost Per Person	106	31	25	20	36
Total Cost (2014 GBP)	10,583,996,545	7,656,559,319	12,250,494,910	9,800,395,928	30,491,050,774
2016 GBP	**10,742,756,493**	**7,771,407,709**	**12,434,252,334**	**9,947,401,867**	**30,948,416,535**

Table 13. Annual and total cost estimates for Soul City scale up scenarios 1A and 1B

Scenario 1A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	30,000,000	300,000,000	600,000,000	1,500,000,000	2,430,000,000
Cost Per Person	0.40	0.40	0.17	0.17	0.20
Total Cost (2014 GBP)	11,851,362	118,513,618	103,900,334	259,750,835	494,016,148
2016 GBP	**12,029,132**	**120,291,322**	**105,458,839**	**263,647,097**	**501,426,391**
Scenario 1B					
Coverage	30,000,000	300,000,000	600,000,000	1,500,000,000	2,430,000,000
Cost Per Person	0.32	0.14	0.11	0.09	0.05
Total Cost (2014 GBP)	9,481,089	41,560,134	66,496,214	132,992,427	250,529,864
2016 GBP	**9,623,306**	**42,183,536**	**67,493,657**	**134,987,314**	**254,287,812**

Table 14. Annual and total cost estimates for Soul City scale up scenarios 2A and 2B

Scenario 2A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	300,000,000	1,500,000,000	1,500,000,000	1,500,000,000	3,300,000,000
Cost Per Person	0.40	0.17	0.17	0.17	0.27
Total Cost (2014 GBP)	118,513,618	259,750,835	259,750,835	259,750,835	897,766,122
2016 GBP	**120,291,322**	**263,647,097**	**263,647,097**	**263,647,097**	**911,232,614**
Scenario 2B					
Coverage	300,000,000	1,500,000,000	1,500,000,000	1,500,000,000	3,300,000,000
Cost Per Person	0.32	0.14	0.11	0.09	0.14
Total Cost (2014 GBP)	94,810,894	207,800,668	166,240,534	132,992,427	601,844,524
2016 GBP	**96,233,058**	**210,917,678**	**168,734,142**	**134,987,314**	**610,872,192**

Table 15. Annual and total cost estimates for Soul City scale up scenarios 3A and 3B

Scenario 3A					
	Year 1	**Year 5**	**Year 10**	**Year 15**	**Total**
Coverage	300,000,000	750,000,000	1,500,000,000	1,500,000,000	2,550,000,000
Cost Per Person	0.40	0.17	0.17	0.17	0.30
Total Cost (2014 GBP)	118,513,618	129,875,417	259,750,835	259,750,835	767,890,705
2016 GBP	**120,291,322**	**131,823,549**	**263,647,097**	**263,647,097**	**779,409,065**
Scenario 3B					
Coverage	300,000,000	750,000,000	1,500,000,000	1,500,000,000	2,550,000,000
Cost Per Person	0.32	0.14	0.11	0.09	0.14
Total Cost (2014 GBP)	94,810,894	103,900,334	166,240,534	132,992,427	497,944,190
2016 GBP	**96,233,058**	**105,458,839**	**168,734,142**	**134,987,314**	**505,413,353**

In coverage scenario 3, reaching 2,550,000,000 community members with the SASA! intervention over 15 years could lead to more than 470,000 cases of past year physical violence averted. In cost scenario A, the total undiscounted investment associated with this level of coverage is 26.4 billion 2016 GBP. In cost scenario B, the total undiscounted investment would be 17.4 billion 2016 GBP.

Reaching 810,000,000 women who have experienced rape over 15 years with the Refentse model of post rape care (coverage scenario 1) would cost approximately 42 billion 2016 GBP in cost scenario A and 9.2 billion in cost scenario B. In coverage scenario 2, reaching 1.1 billion women over 15 years with the Refentse model of post rape care would cost approximately 72 billion 2016 GBP (undiscounted) in cost scenario A and 39 billion 2016 GBP (undiscounted) in cost scenario B. Coverage scenario 3 assumes that 850 million women are reached over 15 years with Refentse post rape care services. This level of coverage would cost 62 billion 2016 GBP (undiscounted) in cost scenario A and 31 billion 2016 GBP (undiscounted) in cost scenario B.

Reaching 2,430,000,000 community members with the Soul City edutainment series over 15 years (coverage scenario 1) would cost approximately 500 million 2016 GBP (undiscounted) in cost scenario A and 250 million in cost scenario B. In coverage scenario 2, reaching 3.3 billion community members over 15 years with Soul City would cost approximately 911 million 2016 GBP (undiscounted) in cost scenario A and 602 million 2016 GBP (undiscounted) in cost scenario B. Coverage scenario 3 assumes that 2.55 billion community members are reached over 15 years with Soul City materials. This level of coverage would cost 780 million 2016 GBP (undiscounted) in cost scenario A, and 505 million 2016 GBP (undiscounted) in cost scenario B.

Discussion

By far the most expensive intervention considered in this exercise is the Refentse model of post rape care. This analysis assumes very high levels of service delivery, which may exceed actual demand in practice. A costly component of this intervention may be PEP for HIV, which, while critical to an intervention in setting with high levels of HIV prevalence, may be less so in low prevalence settings. The unit cost estimates may also be driven by health care provider costs, which are likely to be higher in South Africa (as a middle income setting) compared to other lower income settings. This difference may be important as it would not be uncommon for personnel costs to make up more than 50% of unit costs in interventions based in a health facility. Finally, while rates of PEP completion increased over the course of the intervention, no other outcome measures were formally evaluated and results of this intervention, which was implemented in only one district hospital may not be replicated elsewhere.

Across several scenarios, SASA! requires a greater investment than IMAGE. This is likely a function of the assumption that 3 times more people would be reached as compared to IMAGE given that it is a community based intervention rather than an individual intervention. Unfortunately, the outcomes considered are not directly comparable, making it difficult to ascertain which intervention is likely to represent greater value for money. The DALY outcome reported in IMAGE has the advantage of incorporating a number of sequelae associated with intimate partner violence including depression, anxiety, alcohol consumption, drug abuse, self-harm, smoking, cervical cancer, HIV/AIDS, sexually transmitted disease, femicides and injury [14]. The SASA! outcome is more focused, and considers only changes in physical violence. This is a limited view of the impact of SASA!, as changes in sexual violence, the acceptability of violence and concurrent sexual partnerships in male community members were also noted as secondary outcomes in this intervention [24]. What the economic evaluations of both IMAGE and SASA! do not capture are the costs to participants associated with participating in intervention activities, or changes in health and social service resource utilisation as cases of violence either decrease (leading to a decrease in resource utilisation) or as women become more likely to report cases of violence (in which case resource utilisation of auxiliary services would increase).

The Soul City intervention has the potential to provide high levels of coverage at relatively low cost. Unfortunately, the evaluation of this intervention does not provide convincing evidence that this

approach is effective in changing behaviours associated with VAWG and provides no discussion at all of women's experiences with violence following the intervention. Evaluating outcomes is complicated by the fact that the evaluation was of the 4th Soul City series, meaning that survey respondents may have been previously exposed to 3 series, making it impossible to determine the exact level of exposure, and outcomes associated with exposure that was achieved from the 4th series.

In all coverage and cost scenarios, the assumption of constant unit costs results in a higher total cost estimate compared to assuming that economies of scale can be achieved through decreasing unit costs. In this exercise, diseconomies of scale associated with such high levels of cost are not considered, and it is possible that the assumed sustained decrease unit costs may not be realised in practice. Indeed, it is possible that as coverage levels become very high, the cost of reaching additional women or community members may be higher as these individuals may be more difficult (and therefore more costly) to reach.

In this analysis, scale up of each of the interventions identified was considered individually. In practice, there may be combinations of two or more interventions that could be scaled up in different settings to achieve optimal coverage and impact. Further, these interventions are considered as standalone programmes. In practice, VAWG programming may be overlaid on existing interventions to achieve development synergies and impact across outcomes targeted by other sectors. For example, conditional or unconditional cash transfers are one area that has shown outcomes related to both education and HIV. Overlaying a VAWG programming component onto such an intervention may achieve additional benefits for a reduced investment of a co-financing approach were used [4].

In addition to the caveats noted above, this analysis has several important limitations. Firstly, scaling up VAWG programming across multiple and varied cultural contexts is likely to entail considerable refinement of intervention materials initially, and over the 15 year time frame considered. These costs are not explicitly included in the sense that the number of times materials would need to be changed is not calculated; however, these costs are implicitly included in trial phase costs and total costs. Secondly, cost estimates associated with scaling up the SASA! are based solely on the decreases in unit costs achieved between trial and scale up in the IMAGE intervention. In reality these interventions are very different in their programming approach and the context in which they were implemented, making this an imperfect approach. Thirdly, converting all costs to 2014 USD and then to converting to GBP may have resulted in different estimates compared to a process of converting all costs to GBP in the year in which they were reported and then using the UK GDP deflator. It is unclear what the magnitude of this difference may be, nor which approach is more correct given that the costs of the intervention were generally not incurred in either currency.

A more broad limitation of this analysis is the lack of rigorously evaluated evidence of which interventions to scale up and a lack of cost data on which to model the cost of scale up [4]. Where effectiveness has not been established, plans for scale up should include a formal evaluation component so that effectiveness can be established alongside the scale up, and where effectiveness cannot be established, the intervention can be modified or restructured. Scaling up ineffective interventions is at best wasteful, and at worst, harmful. Future work on evaluating VAW interventions should ideally include a formal economic evaluation component, incorporated into the initial study design. Such data would be invaluable in providing more accurate and informed estimates of the costs associated with scaling up of effective VAWG programming.

Conclusions

Scaling up individual VAWG interventions over the next 15 years may cost anywhere from 250 million to 71 billion 2016 GBP depending on the specific approach used. Combining interventions may provide additional benefits at an additional cost. As interventions are scaled up in a variety of settings, economic evaluations should be conducted in order to provide more robust evidence of the cost effectiveness of interventions in a variety of settings and to better understand how unit costs are likely to change at different levels of service delivery.

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Appendix: Present Discounted Value of Total Cost Estimates

When considering future investments, it is common practice to adjust for differential timing in expenditure. This approach accounts for alternative use of resources allocated now to specific purpose in the future. In the present case, the discounted value of the total investment for each intervention assumes that the total amount of funding required over 15 years is made now, and that amount is invested to earn a return over time. This means that the discounted present values presented in this appendix are consistently lower than those presented in the main text as it is assumed that the total amount of funding would not only be committed, but made available to invest and earn a return for use in future years. As this may be an unrealistic assumption, these values are made available only as supplementary information.

All estimates are discounted at an annual rate of 3.5% which is in line with recommendations of the National Institute of Clinical Excellence in the UK.

Table A 1. Total discounted costs according to intervention and coverage/cost scenario

	IMAGE	SASA!	Refentse	Soul City
Scenario 1A	6,773,094,283	12,549,656,788	29,709,823,261	345,034,649
Scenario 1B	9,551,866,607	17,697,127,754	13,188,735,211	173,235,469
Scenario 2A	12,554,962,710	23,263,212,848	54,702,579,210	682,480,148
Scenario 2B	8,760,835,306	16,232,971,957	38,218,494,659	470,757,294
Scenario 3A	10,661,787,417	19,755,233,656	46,523,433,261	571,488,257
Scenario 3B	7,246,295,071	13,426,588,603	31,675,177,900	381,963,782