Cost analysis of HIV/AIDS Information, Education & Communication programs at Maternal & Child Health Posts in Bandung, Indonesia

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Abstract

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ABSTRACT

Background Indonesia has one of the fastest growing HIV epidemics in Asia. Lack of knowledge of HIV and stigma are two causes underlying this increasing infection rate. Information, Education & Communication (IEC) about HIV/AIDS is implemented in maternal & child health posts (MCHPs) to tackle these causes. To advice policy-makers on the priority of HIV/AIDS interventions in Indonesia, cost data are required. However, reliable data on the costs of HIV/AIDS IEC at MCHPs are lacking.

Aim To assess the societal costs of HIV/AIDS IEC at MCHPs in Bandung, Indonesia in 2016.

Methods The study was conducted at three MCHPs in Bandung, Indonesia from April till May 2017. Health care costs were collected by interviewing stakeholders, using a micro-costing approach. Non-health care costs were based on a survey among 38 visitors of the MCHPs. Besides, the costs of upscaling the IEC presentation to 12 times a year were measured.

Results In 2016, the average societal costs of the HIV/AIDS IEC equalled USD 337.13 per MCHP and USD 0.51 per visitor. Of the societal costs, household costs formed the largest costing category (42.6%), followed by personnel (26.4%) and supplies (15.2%). The program was mainly funded by community donations. Upscaling the program would change the societal costs to USD 788.76 annually and USD 0.47 per visitor.

Conclusion As the annual societal costs are low, HIV/AIDS IEC at MCHPs would get high priority when considering the cost criteria. However, other relevant criteria should be considered to determine its definitive priority among alternative HIV/AIDS interventions in Indonesia.
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<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>IDU</td>
<td>Injecting Drug User</td>
</tr>
<tr>
<td>FSW</td>
<td>Female Sex Worker</td>
</tr>
<tr>
<td>MSM</td>
<td>Men who have sex with men</td>
</tr>
<tr>
<td>NAC</td>
<td>National Aids Commission</td>
</tr>
<tr>
<td>KPA</td>
<td>National Aids Commission</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>NASAP</td>
<td>National AIDS Strategy and Action Plan</td>
</tr>
<tr>
<td>IEC</td>
<td>Information, Education &amp; Communication</td>
</tr>
<tr>
<td>MCHP</td>
<td>Maternal &amp; Child Health Posts or <em>Posyandu</em></td>
</tr>
<tr>
<td>WPA</td>
<td>Warga Peduli Aids: Civil society organization concerned with HIV/AIDS</td>
</tr>
<tr>
<td>MCDA</td>
<td>Multi-Criteria Decision Analysis</td>
</tr>
<tr>
<td>NICHE</td>
<td>Nijmegen International Center of Health Systems Research and Education</td>
</tr>
<tr>
<td>REVISE</td>
<td>Rethinking the Valuation of Interventions to improve priority Setting</td>
</tr>
<tr>
<td>CHC</td>
<td>Community Health Clinic or <em>Puskesmas</em></td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
Introduction

With an estimated number of 36.7 million people living with HIV worldwide, the virus causes a major global health issue. In 2015, 2.1 million people were newly infected with HIV and 1.1 million people died from AIDS globally (1). Although many countries worldwide have managed to bring a halt to the growing HIV epidemic, the incidence in Indonesia is still increasing annually (2, 3). In fact, Indonesia has one of the fastest growing HIV epidemics in Asia (4). The country, which counts about 250 million inhabitants, has an estimated prevalence of 690,000 people living with HIV (5). With this prevalence, it accounts for a quarter of the total number of people living with HIV in the Asian and Pacific region. The incidence in Indonesia has been estimated to be 73,000 in 2015, compared to 69,000 in 2010. This emphasizes the growing HIV infection rate in this country. Furthermore, the number of AIDS-related deaths has increased from 18,000 in 2010 to 35,000 in 2015 (3). Although the prevalence among the total adult population is estimated to be only 0.27 percent, there is considerable variation within and between different regions and provinces in Indonesia, with the prevalence ranging from 0.1 to more than 3.0 percent (6). Provinces with the highest number of cases in 2014 were DKI Jakarta, East Java and West Java, emphasizing that Java is among the islands with the highest HIV epidemic in Indonesia (2). Besides the fact that the HIV epidemic concentrates in certain regions, the prevalence also peaks considerably within certain risk groups, including Injecting Drug Users (IDUs), Female Sex Workers (FSWs) and Men who have Sex with Men (MSM). In fact, the prevalence reaches 28.8 percent among IDUs, 5.3 percent among FSWs and 25.8 percent among MSM (7).

One of the causes underlying the high HIV epidemic in Indonesia is the lack of knowledge of HIV transmission and prevention. According to a survey performed by the Ministry of Health of Indonesia, only 19 percent of Indonesian youth (15-24 years) has a comprehensive knowledge of HIV and AIDS. Moreover, severe misconceptions exist among 64 percent of youth. These misconceptions include the belief that you can tell a person’s HIV status from sight alone, that eating nutritious foods and taking antibiotics can reduce the risk of HIV transmission and that mosquito bites can transmit HIV. Similar misconceptions were found among 70 percent of IDUs and 33 percent of FSWs (8). Besides the lack of knowledge of HIV, another factor that impedes an effective response to the HIV epidemic is stigma. HIV-related stigma is defined by UNAIDS as ‘the negative beliefs, feelings and attitudes towards people living with HIV, groups associated with people living with HIV and other key population at higher risk of HIV infection. Stigma and discrimination are recognized as key barriers to HIV prevention, treatment, care and support. Besides, these factors have been shown to weaken the ability of individuals and communities to prevent HIV transmission (9).

Looking at the growing HIV epidemic in Indonesia, it is clear that big efforts should be made to prevent HIV transmission and lower the burden of disease. Since 1994, the National AIDS Commission (NAC or KPA) has been established, chaired by the Coordinating Minister for People’s Welfare of Indonesia. Their goal is to prevent the spread of HIV, address the needs of people living with HIV/AIDS and to coordinate HIV activities of government, nongovernmental organizations (NGOs), private sector and community (6). In all provinces in Indonesia, provincial and district AIDS commissions have been established. The NAC develops a National AIDS Strategy and Action Plan (NASAP), which serves as a tool for all partners in the response to HIV and AIDS to take the right decisions and implement appropriate strategies (10).

Several strategies are available in order to bring a halt to the HIV epidemic in Indonesia, including Voluntary Testing and Counseling, harm reduction among IDUs, prison-based HIV and AIDS programs and Prevention of Sexual Transmission programs (10). Another available HIV/AIDS intervention is called Information, Education and Communication (IEC), a program developed to target stigma and lack of knowledge and to combat the existing mis-
conceptions about HIV/AIDS, thereby achieving a change in risky behavior and prevent HIV transmission. Various HIV/AIDS IEC programs have been implemented in developing countries, focusing on different population groups, like youth, religious groups or men and women of reproductive age. Literature shows that community-based HIV prevention programs are effective in improving knowledge of HIV/AIDS among the target population (11, 12). Furthermore, attitudes towards HIV/AIDS are improved and risky sexual behavior is reduced by the programs. In Indonesia, HIV/AIDS IEC programs have been implemented at maternal & child health posts (MCHPs or the so-called posyandus), where trained volunteers disseminate HIV/AIDS-related information to mothers and pregnant women.

Thus, several HIV/AIDS strategies are available in Indonesia. However, when implementing all available strategies, budget requirements should be considered. In fact, the NASAP 2010-2014 shows that when implementing all components of the Action Plan, an amount of USD 208 million would be required in 2014 (10). When looking at the available fund of USD 97 million in this year, this would mean that Indonesia faces a financial gap of approximately USD 111 million (13). This funding gap shows that Indonesia is not able to implement all interventions described in the NASAP, emphasizing that there is a need for prioritizing the best strategies for this country. A Multi-Criteria Decision Analysis (MCDA) is a method to support such priority setting. MCDA allows trade-off between various criteria and rank ordering of a comprehensive set of interventions. With this method, policy makers can fund the available interventions according to the ranking obtained with the MCDA, until their budget is exhausted. This results in the optimal spending of resources in a resource limited setting (14). One important criteria considered in an MCDA, is cost-effectiveness. In order to measure the cost-effectiveness of an intervention, there is a need for comprehensive data on the costs that are faced when implementing the program.

In order to determine the priority of the HIV/AIDS IEC program in maternal & child health posts in Indonesia, the program should be considered in an MCDA. However, reliable data on costs of these HIV/AIDS IEC programs in Indonesia are scarce. Available literature is often outdated and only provides the costs of HIV prevention programs in general or the costs of mass media campaigns, peer education and school-based education (15-17). Moreover, the costs of a prevention program are highly dependent on the specific type of program and the setting in which it is implemented. Therefore, a reliable analysis of the costs of HIV/AIDS IEC programs at maternal & child health posts in Indonesia is needed.

**Objectives**

This study primarily aims to assess the societal costs of HIV/AIDS information, education and communication programs at maternal & child health posts in Bandung, Indonesia in 2016. In addition, the sub-aim of this study is to collect some qualitative data on the effectiveness of the program.

This study is part of the NICHE (Nijmegen International Center of Health Systems Research and Education) project of Radboud University Medical Center, which aims to improve global health by strengthening health systems through policy-driven, empirical research and education. Within the NICHE project, the current study contributes to the REVISE (Rethinking the Valuation of Interventions to improve priority SEtting) 2020 project, which aims to make a difference in the way priorities are set in low and middle income countries and in the Netherlands.

**Methods**

**Study setting and population**

The study was conducted at three MCHPs in Bandung city, which counts approximately 2.6 million inhabitants (18). Bandung is the capital of West-Java, a province having an HIV epidemic comparable to the national picture (19). In Indonesia, every city is subdivided into kecamatan or districts. Each district is divided into kelurahan or villages, which are the lowest level of government administration. Villages are divided into Rukan Warga or community groups, which are further divided into Rukan Tetangga or neighbourhood groups. On community group level, the maternal &
child health posts are organized, which serve approximately 120 households (20). MCHPs are organized every month and serve as a place where pregnant women or mothers can come with their children for a health check, like weight-, length- and blood pressure measurements. Besides, the MHCP provides IEC about a wide range of health topics, among which HIV/AIDS. Staff of the MCHPs exists of trained volunteers (the so-called health cadres). Besides the volunteers, one or more staff members of the Community Health Centres (CHCs or the so-called Puskesmas), a higher-level health facility in Indonesia, support the volunteers every month.

In general, the HIV/AIDS IEC program consists of two activities: an IEC stand where information is disseminated face-to-face about a wide range of topics, among which HIV, and a presentation in which HIV/AIDS-related information is provided. At each MCHP, the HIV/AIDS IEC stand is organized every month, whereas the HIV/AIDS IEC presentation is organized only 3-4 times a year. The program is coordinated by Warga Peduli Aids (WPA), a civil society organization concerned with HIV/AIDS, with each district having one WPA volunteer who coordinates the HIV/AIDS IEC activities.

Data collection and cost estimation

The costs of the HIV/AIDS IEC program were measured at three MCHPs in three different districts of Bandung: Rancasari, Buah Batu and Sumur Bandung. Costs were estimated from a societal perspective, following the World Health Organization (WHO) guidelines for cost analysis in primary health care (21). Data collection took place in April and May 2017 and focussed on the societal costs made in 2016 in Indonesian Rupiah (IDR).

During the cost analysis, a distinction was made between health care costs and non-health care costs. Health care costs are costs incurred by consumption of resources in the health care system, whereas non-health care costs are costs made by visitors because of seeking or undergoing care.

Data on health care costs were collected by interviewing stakeholders involved in the program, among which WPA coordinators, staff from the Bandung Aids Commission (KPA Bandung) and CHC staff. The WPA coordinator of each district signed informed consent prior to the interviews. Health-care costs were further divided into capital costs and recurrent costs. Capital costs were defined as costs incurred for resources that last longer than one year. Recurrent costs were defined as costs incurred for resources that are purchased regularly. All inputs related to the program were identified and classified into categories. After identification and classification, detailed economic cost data were collected using a micro-costing approach (22).

Capital costs were divided into the following categories: Space (building and furniture), training and equipment. Capital costs were estimated annually with a discount rate of 3% (22). These annual costs were based on the working life of the capital resource and the costs of purchasing that resource in 2016. The working life of buildings was assumed to be 20 years, of trainings to be 10 years and of furniture and equipment to be 5 years, based on general agreements. Purchase costs of the buildings in Rancasari and Sumur Bandung were based on market prices in the specific area in 2017, with an inflation rate of 3% taken into account. Renting costs of the building in Buah Batu were based on expert opinion, as no comparable buildings were available in the area. Furniture costs were based on market prices. Costs of initial training and equipment were based on expert opinion.

Recurrent costs were divided into the following categories: Personnel, training, equipment and supplies. Recurrent costs were calculated by multiplying the costs of a resource unit by the yearly quantity of usage of the resource unit. Data on quantity of usage were based on expert opinion. Personnel included volunteers, an external speaker, a coordinator, CHC staff and cleaning staff. The value of the leisure time of volunteers was based on the salary they earn at their other job, or on the minimum salary in Bandung alternatively (23). Personnel costs of CHC nurses were based on salary scales determined by the provincial government of West Java (24). Salaries of CHC doctors, speakers and cleaning staff were based on expert opinion. Costs of trainings were based on data documented by KPA Bandung, one of the providers of the recurrent trainings. Recurrent equipment costs were
based on market prices. Supply costs were based on market prices or expert opinion alternatively.

Non-health care costs included one category: household costs. These are costs made by women when attending the HIV/AIDS IEC program at the MCHP and include travel costs and productivity loss costs. Productivity loss costs were defined as the income that the visitors miss because of spending their time at the HIV/AIDS IEC program and were based on the value of their leisure time. Non-health care costs were obtained with a survey among visitors, containing questions about their monthly income, daily working hours, monthly expenditure, travel time and travel costs. Besides, the questionnaire contained questions about the opinion of the visitors on the effectiveness of the HIV/AIDS IEC program, like its accessibility, clarity, duration and quality of the teacher (appendix 1). Unanswered questions were excluded from the calculations.

Questionnaires were handed out at two MCHPs in Rancasari district and at one MCHP in Buah Batu and Sumur Bandung. For calculation of household costs, questionnaires of all MCHPs were included. For analysis of the effectiveness data, only questionnaires were included of those 3 MCHPs at which the health care costs were measured as well, as this enabled us to study the relation between costs and effectiveness.

All costs were allocated for the HIV/AIDS IEC program according to the appropriate percentages for each MCHP. Allocation of buildings was based on both the usage time and the square meters of the building. Allocation of furniture, personnel and equipment was based on the usage time of the inputs for HIV/AIDS IEC compared to the total usage time. Allocation of cleaning personnel was based on square meters of the building only.

Cost data were both registered and analyzed in Microsoft Office Excel 2007. The societal costs in 2016 and the societal costs paid for providing HIV/AIDS IEC to one visitor were calculated for each MCHP. Eventually, the societal costs measured at the three MCHPs were averaged. All costs were converted from IDR to USD using the 2016 Official Exchange Rate (13).

During data collection, costs were categorized per funder. A distinction was made between costs funded by CHCs, KPA Bandung, NGOs, the government and the community. Community funding consisted of all costs paid by people living in the community, including costs made by the visitors (household costs), costs donated by visitors or other people living in the community and the value of the leisure time of the volunteers, who live in the same community as well.

Assumptions
As MCHPs do not record or document most of their data, several assumptions had to be made during the analysis. First of all, several cost data relied on expert opinion. It is assumed that the interviewees were competent enough to provide accurate cost estimations. Second, it was assumed that the value of the leisure time of volunteers and visitors of the program was comparable to the salary at their other job, or, in case they were unemployed, comparable to the minimum salary. Third, training- and leaflet costs were obtained in an interview with KPA Bandung. However, the MCHPs had also received trainings and leaflets from other organizations, among which CHCs and NGOs. It was assumed that the costs made by other organizations are comparable with the costs made by KPA. Furthermore, it was assumed that the purchase costs per square meters of the buildings in Ranchasari and Sumur Bandung were comparable to the purchase costs per square meters of a building in the same area. Lastly, because the HIV/AIDS IEC program is only a small activity within the MCHP and most inputs are shared with the other MCHP activities, allocations had to be taken into account to calculate the costs specifically for the HIV/AIDS IEC program. It was assumed that each visitor of the HIV/AIDS IEC stand visits 4 stands on average (allocation = 0.25). As the visitors of the HIV/AIDS IEC presentations are invited for the presentation specifically, it was assumed that they come to the MCHP for the HIV/AIDS IEC only (allocation = 1). Costs of general trainings for health cadres, costs of utilities (such as water and electricity) and maintenance costs for vehicles used for delivery were omitted, as the allocation for the HIV IEC of these costs was assumed to be approximately 0.
I. de Bresser, A.Y.M. Siregar, R. Baltussen (2017)

Upscale scenario
The societal costs paid in 2016 for providing the HIV/AIDS IEC program were scaled up from providing the HIV/AIDS IEC presentation 3-4 times a year to 12 times a year. This upscale scenario was simulated in Microsoft Excel 2007, by changing the calculations in the original cost data. A linear relation between the frequency of the presentation and the number of visitors was assumed. The average annual societal costs and average societal costs per visitor after upscaling were measured.

Sensitivity analysis
As several cost calculations relied on assumptions, a sensitivity analysis was performed in order to determine the impact of variation in a variable on the societal costs. The analysis was performed on the biggest assumption, i.e. underlying the two largest costing categories. In order to determine the impact of variation of the uncertain variable, a plausible 15% over- and underestimation of the variable was presumed. After 15% subtraction and addition to the initially assumed value, the change in societal costs was measured.

Results
The HIV/AIDS IEC stand in Ranchasari was visited by 3 people, in Buah Batu by 6 people and in Sumur Bandung by 15 people every month. Besides, each HIV/AIDS IEC presentation was visited by 30 people in Rancasari, 15 people in Buah Batu and 21 people in Sumur Bandung. Thus, the average HIV/AIDS IEC stand was visited by 8 people per month and the average HIV/AIDS IEC presentation by 22 people per presentation. The average yearly number of visitors per MCHP of both the HIV/AIDS IEC stand and the HIV/AIDS IEC presentation was 641.

Cost data
As shown in table 1, the societal costs of the HIV/AIDS IEC at MCHPs in 2016 were USD 337.13 on average. When looking at the costs per district, the table shows that the societal costs were USD 413.33 at the MCHP in Sumur Bandung, compared to USD 395.51 in Rancasari and USD 202.44 in Buah Batu. Furthermore, the total health care costs at the MCHP in Buah Batu (USD 82.43) were lower than in Rancasari (USD 281.69) and Sumur Bandung (USD 216.62).

<table>
<thead>
<tr>
<th>Type of cost</th>
<th>Economic costs</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rancasari</td>
<td>Buah Batu</td>
<td>Sumur Bandung</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>HEALTH CARE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital (annual)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building and furniture</td>
<td>16,93</td>
<td>1,92</td>
<td>11,72</td>
<td>10,19</td>
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<tr>
<td>Training</td>
<td>8,81</td>
<td>4,40</td>
<td>0,60</td>
<td>4,60</td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>0,08</td>
<td>0,08</td>
<td>-</td>
<td>0,05</td>
<td></td>
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<tr>
<td>Recurrent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel</td>
<td>129,72</td>
<td>16,33</td>
<td>120,88</td>
<td>88,97</td>
<td></td>
</tr>
<tr>
<td>Training</td>
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<td>13,71</td>
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<tr>
<td>Equipment</td>
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<td>0,08</td>
<td>0,68</td>
<td>0,28</td>
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<tr>
<td>Supplies</td>
<td>58,46</td>
<td>25,81</td>
<td>69,05</td>
<td>51,10</td>
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</tr>
<tr>
<td>Sub-total health care</td>
<td>281,69</td>
<td>82,43</td>
<td>216,62</td>
<td>193,58</td>
<td></td>
</tr>
<tr>
<td>NON-HEALTH CARE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td>113,82</td>
<td>120,00</td>
<td>196,81</td>
<td>143,55</td>
<td></td>
</tr>
<tr>
<td>Societal costs</td>
<td>395,51</td>
<td>202,44</td>
<td>413,44</td>
<td>337,13</td>
<td></td>
</tr>
<tr>
<td>Societal costs per visitor</td>
<td>3,14</td>
<td>1,73</td>
<td>0,25</td>
<td>0,51</td>
<td></td>
</tr>
</tbody>
</table>

IEC = Information, Education & Communication, MCHPs = Maternal & Child Health Posts, USD = United States Dollar, IDR = Indonesian Rupiah
The societal costs for providing HIV/AIDS IEC to one visitor were USD 0.51 on average. When comparing the societal costs per visitor between the districts, it can be observed that the societal costs per visitor were highest in Rancasari (USD 3.14), followed by Buah Batu (USD 1.73) and lowest in Sumur Bandung (USD 0.25).

In the cost profile in figure 1, the contribution of each costing category to the annual societal costs of HIV/AIDS IEC at MCHPs is expressed. The figure shows that at the MCHP in Rancasari, personnel costs and household costs formed the largest costing categories (32.8% and 28.8% respectively). At the MCHP in Buah Batu, the share of costs incurred by the visitors (household costs) was substantially the largest (59.3%), followed by recurrent training costs (16.7%). Similar with Rancasari, the household costs and personnel costs in Sumur Bandung had the largest contribution to the annual societal costs (47.6% and 29.2% respectively). When looking at the average cost profile, household costs formed the largest costing category, followed by personnel costs (26.4%), costs of supplies (15.2%) and recurrent training costs (11.4%).

**Funding**

In table 2, an overview is provided of the funders of the HIV/AIDS IEC program at the three MCHPs. At all three MCHPs, the main funder of the HIV/AIDS IEC was the community, which funded USD 304.92 (76.1%) in Rancasari, USD 142.88 (70.6%) in Buah Batu and 336.18 (81.3%) in Sumur Bandung. In both Rancasari...
Table 2. Funders of HIV/AIDS IEC at MCHPs per district in Bandung, Indonesia in 2016 (in USD and % of societal costs).

<table>
<thead>
<tr>
<th>Funder</th>
<th>Rancasari</th>
<th>Buah Batu</th>
<th>Sumur Bandung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs (USD)</td>
<td>%</td>
<td>Costs (USD)</td>
<td>%</td>
</tr>
<tr>
<td>CHCs</td>
<td>8.04</td>
<td>13.42</td>
<td>22.03</td>
</tr>
<tr>
<td>KPA Bandung</td>
<td>80.92</td>
<td>42.70</td>
<td>21.67</td>
</tr>
<tr>
<td>NGOs</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Government</td>
<td>1.63</td>
<td>3.41</td>
<td>12.96</td>
</tr>
<tr>
<td>Community*</td>
<td>304.92</td>
<td>142.88</td>
<td>336.18</td>
</tr>
<tr>
<td>Societal costs</td>
<td>395.51</td>
<td>202.42</td>
<td>413.44</td>
</tr>
</tbody>
</table>

IEC = Information, Education & Communication, MCHPs = Maternal & Child Health Posts, USD = United States Dollar, IDR = Indonesian Rupiah

*Community funding include household costs paid by visitors, donations from community citizens and leisure time values paid by voluntarily personnel.

and Buah Batu, the second largest funder was KPA Bandung, with an annual funding of USD 80.92 (20.5%) and USD 42.70 (21.1%) respectively. In Sumur Bandung, CHC was the second largest funder (USD 22.03 (5.6%)), followed by KPA Bandung (USD 21.67 (5.2%)).

Effectiveness

In total, the questionnaire was filled in by 10 women at the MCHP in Rancasari, 5 women in Buah Batu and 13 in Sumur Bandung. The respondents in Rancasari gave the program an average mark of 8.4, based on the quality of the teacher, the accessibility, clarity and duration of the program. In Sumur Bandung, the HIV/AIDS IEC program was scored with an 8.2. The lowest mark was given to the program in Buah Batu, with an 8.0 on average. The average mark given to the HIV/AIDS IEC program by all respondents was an 8.2.

Respondents in Rancasari filled in that their knowledge of HIV/AIDS had increased from 6.8 before the HIV/AIDS IEC till 7.2 after the HIV/AIDS IEC program. In Sumur Bandung, this increase reached from 7.4 till 8.4. The largest increase was found in Buah Batu, reaching from 4.8 till 9.0. On average, the knowledge of HIV/AIDS among all respondents was judged to increase from 6.3 before the IEC till 8.2 after the IEC.

One improvement option that was frequently mentioned by the respondents (10 out of 28 respondents), was to increase the frequency of the HIV/AIDS IEC presentations.

Upscale scenario

The upscale analysis showed that when intensifying the frequency of the HIV/AIDS presentation from 3-4 times a year to 12 times a year, the annual societal costs of the whole program will become USD 788.76. Moreover, the annual societal costs paid for providing the HIV/AIDS IEC program to one visitor, will become USD 0.47. Compared to the costs measured in 2016, the program will cost USD 451.63 more when upsampling the frequency of the HIV/AIDS presentation. The societal costs per visitor will become USD 0.04 lower when upscaling the intervention.

Sensitivity analysis

In table 3, the results of the sensitivity analysis on the assumption underlying the two largest costing categories, are shown, i.e. the assumption that the leisure time value of unemployed volunteers and visitors is comparable to minimum salary. The table shows that if the value of the leisure time deviated 15% from the initially assumed value, the average societal costs and the average societal costs per visitor would vary 6% from the initially calculated societal costs. The average societal costs would deviate USD 18.88 from the initial societal costs (USD 337.13). The average societal costs paid for providing HIV/AIDS IEC to one visitor would deviate USD 0.03 from the initial societal costs per visitor.
I. de Bresser, A.Y.M. Siregar, R. Baltussen (2017)

Discussion

Main findings

This study examined the societal costs of HIV/AIDS IEC programs at maternal & child health posts in Indonesia in 2016. The societal costs paid in 2016 for providing the program at one MCHP were USD 337.13. Moreover, the costs for providing the program to one visitor were USD 0.51. These results indicate that the HIV/AIDS IEC program at maternal & child health posts is a low-cost intervention. The low costs can be mainly explained by the fact that many cost inputs are shared with other activities at the MCHP, resulting in a low allocation for the HIV/AIDS IEC program.

The cost data were based on the average of the costs measured at three MCHPs in three different districts in Bandung. The investigated MCHPs were different in size (i.e. number of staff and visitors), which explains the difference in annual societal costs of the HIV/AIDS IEC program measured at each MCHP. In fact, the HIV/AIDS IEC at the MCHP in Sumur Bandung was more than twice as expensive as in Buah Batu (USD 413.33 and USD 202.44 respectively). Although the annual societal costs measured at the MCHP in Sumur Bandung were highest, the societal costs paid for providing HIV/AIDS IEC to one visitor were lowest in this district (USD 0.25 per visitor, compared to USD 1.73 and USD 3.14 in Buah Batu and Ranchasari respectively). This suggests that the MCHP in Sumur Bandung was most efficient, paying the lowest costs for one visitor. The major reason for this high efficiency is the number of visitors of the program, which was very high in Sumur Bandung (1680 visitors annually). The MCHPs in Ranchasari and Buah Batu had a lower number of visitors (respectively 126 and 117 visit-

ors annually), resulting in a less efficient program. Thus, increasing the number of visitors might be an appropriate solution for reducing the costs per visitor. This would also result in one MCHP covering a bigger area of the district, so that less MCHPs need to be organized to reach all mothers and pregnant women in the district. This might in turn result in a more efficient program.

When interpreting the cost data, it should be noted that costs paid by all members of the society are included, with most costs being funded by the community itself. In fact, only USD 59.53 up to USD 90.59 (differing per MCHP) of the societal costs were paid by other funders, among which the government, KPA Bandung, community-health clinics and NGOs. Thus, HIV/AIDS IEC at MCHPs is a program that needs only little financial support of governmental organizations or NGOs to keep running properly. It is important to note that community donations might be prone to fluctuations in the economic situation of Indonesia. This might be interesting to take into account when continuing the program in the upcoming years.

Along with the main goal of this study to collect the costs of the HIV/AIDS IEC program at MCHPs, its sub-aim was to provide some data on the effectiveness of the program. On average, the visitors of the HIV/AIDS IEC program gave the program an 8.2, based on the quality of the teacher, the accessibility of the program, the clarity of the information about HIV/AIDS and the duration of the program. These results suggest that the visitors were content with the program. Moreover, the visitors have judged that their knowledge has increased with a mark of 1.9 (from 6.3 before the HIV/AIDS IEC till 8.2 after). This mark on knowledge in

Table 3. Sensitivity analysis on the value of leisure time of unemployed volunteers and visitors, based on a 15% under- and overestimation of the initial assumed value.

<table>
<thead>
<tr>
<th>Type of costs</th>
<th>Initial value (USD)</th>
<th>Value after correction (USD)</th>
<th>Deviation from initial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- 15%</td>
<td>+ 15%</td>
<td>Absolute (USD)</td>
</tr>
<tr>
<td>Average annual societal costs</td>
<td>337.13</td>
<td>318.25</td>
<td>356.01</td>
</tr>
<tr>
<td>Average societal costs per visitor</td>
<td>0.51</td>
<td>0.48</td>
<td>0.54</td>
</tr>
</tbody>
</table>
crease was highest in Buah Batu, with an increase of 4.2 compared to 1.0 in Sumur Bandung and 0.4 in Rancasari. This indicates that the HIV/AIDS IEC program at the MCHP in Buah Batu, for which the lowest societal costs were paid in 2016, was possibly the most effective of the three. Besides quantitative data on the effectiveness of the HIV/AIDS IEC at MCHPs, the questionnaire resulted in one particular improvement suggestion that was mentioned by 10 out of 28 respondents: to increase the frequency of the HIV/AIDS IEC presentations. In current practice, this presentation is provided 3-4 times a year. It might be an option to provide it during every MCHP opening day, i.e., every month. Increasing the frequency might improve the effectiveness of the program, as the information regarding HIV/AIDS is repeated more often to the visitors of the MCHPs.

In the upscale scenario, it was studied what this increase in frequency of the HIV/AIDS IEC presentation would mean for costs of the program. The analysis showed that compared to the current practice, an extra amount of USD 451.63 should be paid annually to achieve the upscale scenario. However, when considering the costs per visitor, it was shown that the upscale scenario would be as efficient as current practice, paying USD 0.47 per visitor compared to USD 0.51 in current practice. Nevertheless, the question remains whether the increase in annual societal costs is affordable.

Limitations
Although the methods of this study were largely based on the guidelines as described in the WHO manual for cost analysis in primary health care (21), this study had some limitations. At first, the sample selection in this study was not performed randomly. The three specific MCHPs where the data collection took place were selected based on practicality reasons, i.e., those specific MCHPs were open during the data collection period. Therefore, the costs and effectiveness results should be extrapolated to the whole of Indonesia with caution, as it is not sure whether the research sample is representative to all MCHPs in the country. However, the research sample included MCHPs that were all different in size and expertise. Thus, the varying types of MCHPs in Indonesia might be well-represented.

Second, the survey was performed among 37 visitors in total, of which 35 were used for the non-health care costs calculations and 28 for effectiveness data analysis. Although this research sample is too small to draw valid conclusions, the non-health care costs seem to be valid, i.e., the answers corresponded with expert opinion that most visitors are housewives and travel to the MCHPs by foot. Effectiveness data, on the contrary, should be interpreted with caution. Moreover, it must be noted that the opinion of the visitors is not the most relevant outcome measure to study effectiveness. Other outcome measures, such as number of HIV infections averted or change in preventive behavior, would be more interesting.

Furthermore, because several data on the HIV/AIDS IEC program were undocumented, various assumptions had to be made, as described in the ‘Assumptions’ section of the Methods. Some obtained data relied on expert opinion, like salary of staff and costs of staff trainings. However, as no other resource was available, this was the best alternative method to obtain those data. Besides, the stakeholders that were interviewed were the coordinators of the program and were therefore likely competent enough to provide reliable estimations. Although in total 6 assumptions were made, the sensitivity analysis focused on one of them: the one that was underlying the biggest costing categories. The other assumptions were underlying relatively small categories and were therefore assumed to have no substantial impact on the societal costs. The assumption that the value of the leisure time of unemployed volunteers and visitors was equal to the minimum salary of Bandung, was underlying the two biggest costing categories: the household costs and the personnel costs. Therefore, a sensitivity analysis was highly required to investigate the effects of this assumption on the societal costs. However, the sensitivity analysis showed that if the value of leisure time would deviate 15% from the minimum salary, the societal costs paid for providing the HIV/AIDS IEC at one MCHP during a whole year would only deviate USD 18.88, which is a 6% deviation from the initial annual societal costs. Moreover, the costs paid for providing the HIV/AIDS IEC program to
one MCHP visitor would only deviate USD 0.03. Based on this sensitivity analysis it can be concluded that the biggest assumption has not considerably affected the societal costs measured in this study. Furthermore, as this study was performed in 2017, it was not possible to obtain the market prices of some furniture and supplies in 2016. In those cases, market prices in 2017 were taken as an approximation of the market price in 2016. As those furniture and supplies did not form a big costing category of the total societal costs, this has probably not affected the annual societal costs severely. The same complication applies to the non-health care costs and effectiveness data, which were measured with questionnaires collected in 2017. However, as the program has not changed substantially within the past years, the non-health care costs and opinions of the visitors on the effectiveness of the program in 2017 might probably be comparable with those in 2016.

Available literature & future research
Until now, no other studies have collected the costs of the HIV/AIDS IEC programs specifically at maternal & child health posts in Indonesia. In order to determine the validity of the obtained cost data, the results of different studies need to be compared. Before extrapolating the obtained costs to the whole of Indonesia, the results of this study should therefore be confirmed with similar micro-costing studies in other regions in Indonesia. The positive results on the effectiveness of HIV/AIDS IEC programs were found in other studies as well. A review which focused on the effectiveness of community-based interventions concluded that these interventions have positive effects on improving knowledge and lowering HIV transmission (12). However, this review included effectiveness studies on many different types of community-based interventions in many different countries, none of which was comparable with the HIV/AIDS IEC at MCHPs in Indonesia. Therefore, the effectiveness of the HIV/AIDS IEC program at MCHPs should be confirmed in a large effectiveness study, taking relevant outcome measures, like number of HIV infections averted or change in preventive behavior, into account. Eventually, cost and effectiveness data should be combined to calculate the cost-effectiveness of the HIV/AIDS IEC program at MCHPs.

Furthermore, the upscale scenario of providing the HIV/AIDS IEC presentation every month instead of the current 3-4 times a year need to be further investigated. Although the results indicate that the efficiency of the program (i.e. the costs paid for one visitor) will not change, the question remains whether the society can afford the increase in societal costs that need to be paid annually. This question should be answered by investigating whether any funding organization involved in the program is willing and/or able to fund this investment. Besides, a cost-effectiveness study should investigate whether the presumable increase in effectiveness due to upscaling can outweigh the increase in annual costs.

Recommendations
The efficiency of the HIV/AIDS IEC program at MCHPs turned out to be determined by the number of visitors of the program. Thus, inviting more visitors to the HIV/AIDS IEC would be an alternative to increase its efficiency. As the MCHP in Ranchasari had enough space and personnel, we recommend the WPA coordinator to invite more visitors to the program. At the MCHP in Buah Batu, space and number of personnel was limited. Therefore, we do not recommend inviting more visitors to the program, as this would probably affect the effectiveness of the intervention.

The HIV/AIDS IEC program turned out to be mainly funded by donations from people living in the community. The amount of donations might be dependent on the economic situation in Indonesia. When continuing the program in the upcoming years, it is therefore recommended to preserve an amount of money to buffer decreases in community donations.

Conclusion
HIV/AIDS information, education & communication programs at maternal & child health posts in Indonesia in 2016 is a low-cost intervention. Scaling up the IEC presentation would increase the annual societal costs of the program, but would not affect the efficiency. These cost data contribute to the determination of the priority of HIV/AIDS IEC at MCHPs among alternative interventions in Indonesia. When considering the cost criteria only, the
intervention would receive high priority in Indonesia. However, other criteria should be considered as well, in order to inform policymakers on the priority of the HIV/AIDS IEC programs at MCHPs in Indonesia.

Acknowledgements
My gratitude goes to all WPA volunteers and KPA staff who participated the interviews and provided plenty of data that were needed for this study. Besides, I would like to thank all my colleagues from the PRISMA team and Padjadjaran University, who have put a lot of efforts in assisting me during this research. My special gratitude goes to Muhammad Putra Hutama, who helped me with all the practicalities during data collection. Finally, I would like to thank Prof. Dr. Rob Baltussen and Dr. Adiatma Yudistira Manogar Siregar for supervising me during my internship.
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23. Pikiran Rakyat. Inilah UMK Jabar 2016 yang Ditetapkan Gubernur 2015 [ ]
Appendix 1: Questionnaire

Questionnaire

Please answer the following questions by writing down your answers, or by ticking (✓) the appropriate box (□). If you have trouble in answering a question, do not hesitate to ask the enumerator.

A. RESPONDENT PROFILE

1. ID: ........................................................................................................................................

2. Place of stay : ................................................................................................................................

3. Sex: □ Male 1 □ Female 2

4. Age: ............ year

5. Last degree of completed education:


6. Current marital status:

□ not yet married 0 □ married 1 □ divorced 2 □ widowed 3

7. Number of children: ............

B. OCCUPATION AND INCOME

8. What is your current occupation? (may give more than one answer, proceed no 12 if non-paid job)

........................................................................................................................................................

9. What is your average monthly income?
(if you have more than one occupation, please state the total income)

Rp ........................................

10. How many hours do you work per day?

..........hours

11. How many days do you work per week?

.......... days

12. To fulfill your own monthly needs, do you also receive money from other people? Please state in the following table as well as the amount.
I. de Bresser, A.Y.M. Siregar, R. Baltussen (2017)

<table>
<thead>
<tr>
<th>No</th>
<th>Receive money from</th>
<th>Last month amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Parents</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>2</td>
<td>Siblings</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>3</td>
<td>Other relatives</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>4</td>
<td>Children</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>5</td>
<td>Friends</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>6</td>
<td>Selling own goods</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>7</td>
<td>Borrow from ….</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>8</td>
<td>Others, please state.........</td>
<td>Rp…………………</td>
</tr>
</tbody>
</table>

13. Please state and detail your own monthly expenses.

<table>
<thead>
<tr>
<th>No</th>
<th>Expenses</th>
<th>Last month amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>House rent/mortgage</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>2</td>
<td>Electricity, water, telephone</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>3</td>
<td>Water</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>4</td>
<td>Telephone</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>5</td>
<td>Transport/gasoline</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>6</td>
<td>Cellphone credit</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>7</td>
<td>Food at home</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>8</td>
<td>Food out of home</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>9</td>
<td>Entertainment (i.e. snacks, cinema)</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>10</td>
<td>Cigarettes</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>11</td>
<td>Health/doctor fee</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>12</td>
<td>Medication</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>13</td>
<td>Savings</td>
<td>Rp…………………</td>
</tr>
<tr>
<td>14</td>
<td>Others, please state............</td>
<td>Rp…………………</td>
</tr>
</tbody>
</table>

14. Who is currently staying with you?

To fill the following tabel:
- Please circle the number of the person who is currently living with you, if he/she is not on the list, please state on number 7-10
- Please state the occupation of the person (including housewife, students, or unemployed) and his/her income
<table>
<thead>
<tr>
<th>Family member/accompanying person</th>
<th>Occupation</th>
<th>Monthly income</th>
<th>Does this person accompany you to the posyandu?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Father</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>2 Mother</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>3 Older sibling</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>4 Younger sibling</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>5 Spouse</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>6 Child</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>7</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>8</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>9</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
<tr>
<td>10</td>
<td>......</td>
<td>Rp................</td>
<td>□</td>
</tr>
</tbody>
</table>

15. How do you reach the posyandu?

- [ ] 1. On foot
- [ ] 2. Bicycle
- [ ] 3. Motorcycle
- [ ] 4. Motorcycle taxi
- [ ] 5. Car
- [ ] 6. Public transport (car)
- [ ] 7. Taxi
- [ ] 8. Public transport (bus)
- [ ] 9. Others, please state………..

16. How long is your travel time to reach the posyandu?

............ minutes

17. How far is the travel distance to reach the posyandu?

............ metres

18. On your visit to the posyandu, how much do you spent in average for:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Two way transport for yourself</td>
<td>Rp...........</td>
</tr>
<tr>
<td>2. Two way transport for person(s) accompanying you</td>
<td>Rp...........</td>
</tr>
<tr>
<td>3. Registration</td>
<td>Rp...........</td>
</tr>
<tr>
<td>4. Medical treatment</td>
<td>Rp...........</td>
</tr>
<tr>
<td>5.</td>
<td>Rp...........</td>
</tr>
<tr>
<td>6.</td>
<td>Rp...........</td>
</tr>
<tr>
<td>7.</td>
<td>Rp...........</td>
</tr>
</tbody>
</table>

19. How much time did you spend at the posyandu?

............ minutes
20. How much time did you spend on the HIV IEC?

......... minutes

C. HIV IEC MEETING

21. For what primary purpose did you visit the posyandu today?

☐ For the HIV IEC meeting
☐ Other:..............................................................................................................................
........................................................................................................................................

22. How did you hear about the HIV IEC meeting?

☐ I heard it today when visiting the posyandu
☐ I heard it from friends or relatives
☐ I heard it from family
☐ I heard it from the health cadre
☐ I heard it when I visited the posyandu previously
☐ Other:..............................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

23. Was this your first time visiting the HIV IEC meeting?

☐ Yes
☐ No

IF NO, how often do you visit an HIV IEC meeting? *Please give an indication per year

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

24. What mark would you give the HIV IEC meeting from 1 up to 10 regarding the accessibility of the meeting? Please explain.

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

25. What mark would you give the HIV IEC meeting from 1 up to 10 regarding the clarity of the information? Please explain.

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
26. What mark would you give the HIV IEC meeting from 1 up to 10 regarding the duration of the meeting? Please explain.
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................

27. What mark would you give the HIV IEC meeting from 1 up to 10 regarding the quality of the teacher? Please explain.
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................

28. What did you learn in the HIV IEC meeting?
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................

29. From 1 up to 10, how much did you feel like you possessed all the knowledge about HIV prevention before attending the meeting?
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................

30. From 1 up to 10, how much do you now feel like you possess all the knowledge about HIV prevention after attending the meeting?
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................

31. What are positive aspects of the HIV IEC meetings?
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................................................................................................................................................................................
................................................................................................................................................................................

32. What do you think that could be improved of the HIV IEC meetings?
................................................................................................................................................................................
................................................................................................................................................................................
................................................................................................................................................................................