Cost–effectiveness of community-based practitioner programmes in Ethiopia, Indonesia and Kenya

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Objective To assess the cost–effectiveness of community-based practitioner programmes in Ethiopia, Indonesia and Kenya.

Methods Incremental cost–effectiveness ratios for the three programmes were estimated from a government perspective. Cost data were collected for 2012. Life years gained were estimated based on coverage of reproductive, maternal, neonatal and child health services. For Ethiopia and Kenya, estimates of coverage before and after the implementation of the programme were obtained from empirical studies. For Indonesia, coverage of health service interventions was estimated from routine data. We used the Lives Saved Tool to estimate the number of lives saved from changes in reproductive, maternal, neonatal and child health-service coverage. Gross domestic product per capita was used as the reference willingness-to-pay threshold value.

Findings The estimated incremental cost per life year gained was $82 in Kenya, $999 in Ethiopia and $3396 in Indonesia. The results were most sensitive to uncertainty in the estimates of life-years gained. Based on the results of probabilistic sensitivity analysis, there was greater than 80% certainty that each programme was cost-effective.

Conclusion Community-based approaches are likely to be cost-effective for delivery of some essential health interventions where community-based practitioners operate within an integrated team supported by the health system. Community-based practitioners may be most appropriate in rural poor communities that have limited access to more qualified health professionals. Further research is required to understand which programmatic design features are critical to effectiveness.

Introduction

Community-based strategies have the potential to expand access to essential health services, especially in light of critical shortages in the health workforce.1 The term community health worker has been used to refer to volunteers and salaried, professional or lay health workers with a wide range of training, experience, scope of practice and integration in health systems. In the context of this study, we use the term community-based practitioner to reflect the diverse nature of this group of health workers.

Community-based practitioners have been found to be effective in delivering health services in low- and middle-income countries.2–4 A common premise is that community-based practitioners are more responsive to the health needs of local populations than clinic-based services, are generally less expensive and can promote local participation in health. They can also improve coverage and health equity for populations that are difficult to reach with clinic-based approaches.5–7

The aim of the present study is to assess the cost–effectiveness of community-based practitioner programmes with different design features across three countries – Ethiopia, Indonesia and Kenya – in which these initiatives have been implemented to scale.

Programme description

Globally, many different types of community-based practitioner programmes have evolved since 1978, when the first international conference on primary health care was held in Alma Ata, Kazakhstan, in the former Soviet Union. Community-based practitioners may operate in the public or private sectors and respond to single or multiple health issues.8,9 Specific design features of community-based programmes that work in one context may not work in another. The programmes described here differ markedly in their design, including the type of worker, level of training, scope of work, nature of supervision and the extent to which basic equipment is provided (Table 1).

Ethiopia launched its health extension programme in 2004 with a view to achieving universal coverage of primary health care.10 Districts with five to seven health centres are divided into administrative units covering a population of 5000 people, each with a health post staffed by two health extension workers. Health extension workers are women, trained and salaried by the government, who work in the community delivering primary health services and are trained to administer basic medicines and vaccines.

In Indonesia, the health system is decentralized with an emphasis on community health care.11 Primary maternal and child health-care services are provided at community health centres...
Community-based practitioner programmes

Table 1. Community-based practitioners programmes in Ethiopia, Indonesia and Kenya

| Feature                        | Ethiopia                          | Indonesia                                      | Kenya                                         |
|--------------------------------|-----------------------------------|------------------------------------------------|-----------------------------------------------|
| Start, year                    | 2004                              | 1989                                           | 2006                                          |
| Focus area                     | Maternal and child health (including antenatal, safe and clean delivery at the health post, immunization, growth monitoring and nutritional advice), family planning, immunization, adolescent reproductive health and nutrition | Maternal health: antenatal care, point-of-care tests e.g. malaria (in endemic regions) and HIV (only in Papua region), treatment such as for malaria, outreach care and providing safe delivery within a health facility and at home, postnatal checks, immunization | Maternal and child health prevention and promotion activities that link community members to the health system (registration, education, referral, follow-up) |
| Name of community-based practitioner | Health extension worker            | Village midwives                               | Community health workers                      |
| Corresponding category in ILO’s ISCO | 3253 (community health workers) | 3222 (midwifery associate professional)        | 3253 (community health workers)               |
| Type of volunteers             | Voluntary community health promoters | Community health volunteers and traditional birth attendants | None                                           |
| Population catchment area      | 2 workers for 5000 people          | 1 worker per village of 500–1500 people        | 50 workers for 5000 people                    |
| Primary base of service delivery | A local health post but spend 70% of their time on house-to-house visits | Sub-health posts and village clinics           | Community (home visits)                       |
| Initial training               | 1 year (government funded)         | Nursing academy 3 years (self-funded)          | 10 days training (government funded)          |
| One-off incentive kits         | Backpacks                         | Motorbikes                                     | Backpacks                                     |
| Salary                         | Annual salary of approximately $2400 | Annual salary of approximately $4250          | Unpaid                                        |
| Other financial incentives and allowances | None | Transport allowances; incentive per antenatal care, delivery assisted and postnatal care | None                                           |
| In-service training            | On-job training in relation to local interventions | Refresher training offered (but none administered in the district in 2012) | Quarterly updates (but none administered in the district in 2012) |
| Supervision structure          | Supervised by health centre and district health office personnel | Supervised by health centre and district health office personnel | Supervised by health centre personnel – community health extension workers at health centre level |

Table 2. Model assumptions

| Model assumptions          |
|---------------------------|
| Time horizon              | A one year time horizon was assumed |
| Discount rate             | 3% discount rate was applied for start-up costs and life years gained |
| Useful life of programme  | 10 years was applied in estimating annual equivalent costs |
| Attrition rate            | Attrition rate was assumed to be 0% for Kenya and Indonesia |
| Overhead cost             | An overhead cost of 15% was assumed |
| One way sensitivity analysis | The one-way sensitivity analysis was performed by varying all model inputs by ± 30% |
| Probabilistic sensitivity analysis | Model inputs were varied by ± 10%. Gamma distributions were specified for all cost inputs. Beta distributions were specified for attrition rate and overhead cost percentage. Normal distribution was specified for life years gained |

HIV: human immunodeficiency virus; ILO: International Labour Organization; ISCO: International Standard Classification of Occupations.
Note: Categories of programme have been developed by the REACHOUT consortium http://www.reachoutconsortium.org.

Research

Community-based practitioner programmes

Barbara McPake et al.

with services extended through village health posts, village birthing facilities and monthly outreach events. In each village, a trained midwife or nurse is assisted by community health volunteers who provide primary health care with a focus on prevention and health promotion activities. In Kenya, there are four tiers of service provision – community, primary care, primary (county) referral and tertiary (national) referral services. The Kenya community health strategy, rolled out in 2006, stipulates that community health services should provide services to community units of 5000 people, with each unit covered by 50 volunteer community-based practitioners, each responsible for disease prevention and control in 20 households. These community-based practitioners are linked to primary health facilities and supervised by government-employed community health extension workers.

Methods

We estimated incremental cost–effectiveness ratios for community-based practitioner programmes, using data from four districts: Shebedino (Ethiopia), south-west Sumba (Indonesia), Takala (Indonesia) and Kasa-rani (Kenya). In Indonesia, two districts were chosen to better reflect the diversity of context and programme implementation in that country. The main inclusion criteria for country selection were that programmes should be national in scale, performing
Table 3. Interventions and effectiveness of community-based practitioners programmes, Ethiopia, Indonesia and Kenya, 2007–2012

| Intervention                          | Shebedino, Ethiopia (2007 & 2010) | Sumba, Indonesia (2012) | Takala, Indonesia (2012) | Kasarani, Kenya (2010) |
|---------------------------------------|-----------------------------------|-------------------------|--------------------------|------------------------|
|                                       | Coverage change (%)               | Coverage (%)            | Coverage (%)             | Coverage change (%)    |
| Pregnancy                             |                                   |                         |                          |                        |
| Antenatal care                        | 8.9                               | 45.2                    | 96.0                     | 23.0                   |
| Tetanus toxoid administration         | 70                                | –                       | 96.0                     | –                      |
| Iron folate supplementation           | 74                                | 88.6                    | 98.0                     | –                      |
| Childbirth                            |                                   |                         |                          |                        |
| Skilled birth attendance              | –                                 | 50.5                    | 92.0                     | 26.0                   |
| Breastfeeding                         | Promotion of breastfeeding         | 8.4                     | –                        | 32.0                   |
| Postnatal care                        | Preventive postnatal care         | 11.2                    | 65.9                     | 100.0                  | –                      |
| Others                                | Hygienic disposal of children’s faeces | 1.1                     | –                        | –                      |
|                                       | Household ownership of ITN         | 7.9                     | –                        | –                      |
| Vaccines                              | BCG                               | 9.3                     | –                        | –                      |
|                                       | Polio                             | 9.1                     | –                        | –                      |
|                                       | DPT                               | 11.6                    | –                        | –                      |
|                                       | Measles                           | 11.8                    | –                        | –                      |
| Lives saved                           | National population               | 5299                    | 13930                    | 58471                  | 11894                  |
|                                       | Study population                  | 17                      | 16                       | 65                     | 13                     |

BCG: bacille Calmette-Guérin; DPT: diphtheria-pertussis-tétanos; ITN: insecticide-treated bed net.

Table 4. Effectiveness of community-based practitioners programmes by district and population group in Ethiopia, Indonesia and Kenya, 2012

| District, country | Population group | Lives saved | Life years gained |
|------------------|------------------|-------------|------------------|
|                  |                  | Total       | per 100 000 population |
| Shebedino, Ethiopia | Still birth | 5.40 | 1.94 | 151 |
|                  | < 1 month        | 4.21 | 1.52 | 117 |
|                  | 1–59 months      | 7.18 | 2.58 | 203 |
|                  | Maternal         | 0.01 | 0.005 | 0 |
|                  | Total             | 16.80 | 6.05 | 471 |
| Sumba, Indonesia | Still birth       | 2.22 | 0.78 | 65 |
|                  | < 1 month        | 12.76 | 4.50 | 373 |
|                  | 1–59 months      | -0.04 | -0.01 | -1 |
|                  | Maternal         | 1.44 | 0.51 | 38 |
|                  | Total             | 16.38 | 5.78 | 475 |
| Takala, Indonesia | Still birth       | 24.73 | 9.17 | 722 |
|                  | < 1 month        | 35.55 | 13.19 | 1038 |
|                  | 1–59 months      | -0.24 | -0.09 | -7 |
|                  | Maternal         | 5.31 | 1.97 | 142 |
|                  | Total             | 65.35 | 24.24 | 1894 |
| Kasarani, Kenya  | Still birth       | 0.41 | 8.22 | 11 |
|                  | < 1 month        | 0.74 | 14.88 | 21 |
|                  | 1–59 months      | 0.05 | 0.96 | 1 |
|                  | Maternal         | 0.11 | 2.27 | 3 |
|                  | Total             | 1.31 | 26.33 | 36 |

*There were 277788 people in Shebedino, 283818 people in south-west Sumba, 269805 people in Takala and 5000 people in Kasarani.*

Sources: Ethiopia; Indonesia: routine data reported by village midwives; Kenya.

*life years gained*
similar activities and with data available on effectiveness.

We assessed the cost–effectiveness of each programme from a government perspective. Costs and lives saved were estimated over a one-year time period. We assumed that all costs and benefits were additional to those that would have occurred in the absence of the programme (Table 2).

**Measurement of effectiveness**

Disability-adjusted life years and quality-adjusted life years have been widely used as measures of the effectiveness of health programmes. However, the disability and utility weights required to quantify these outcomes were not available for our study outcomes. We used life-years gained (LYG) as our measure of effectiveness. LYG is a validated measure of population health; though it does not account for quality of life, it is suitable for this study given the data available.

We used the Lives Saved Tool (LiST) to estimate the number of lives saved due to changes in coverage of reproductive, maternal, neonatal and child health interventions. The Lives Saved Tool models the impact of scaling-up the coverage of proven interventions on maternal, neonatal and child mortality by integrating evidence on intervention effectiveness and demographic projections of mortality.

To estimate the number of lives saved, we adjusted coverage data to a target level of coverage. For Ethiopia and Kenya, target coverage data were obtained from empirical studies evaluating the impact of each country’s programme. For Indonesia, coverage data were obtained from routine data reported by village midwives.

The Lives Saved Tool uses national demographic data to produce estimates of lives saved in a national population. Therefore, national estimates of lives saved were scaled down to district level based on the proportion of the national population in each study district. We classified lives saved in four age groups: live births; children younger than 1 month; children aged between 1 and 59 months and mothers. For each category, the number of lives saved was multiplied by the remaining life expectancy at the time death was averted. The resulting LYG were discounted using a 3% annual discount rate. Remaining life expectancies were obtained from life tables.

**Cost estimates**

The financial cost (for the year 2012 or earlier when necessary) of each programme was estimated from data collected between August and September 2013 from each country. Local currencies were converted to international dollars using purchasing power parity exchange rates (available at http://data.worldbank.org/indicator/PA.NUS.PPP). We report all cost data in international dollars ($). Cost data included start-up costs and recurrent costs. Equivalent annual costs were estimated by annuitizing total start-up cost based on a useful life of 10 years and a 3% discount rate. In the Ethiopian model, an attrition rate of 1.1% was applied to account for attrition after training of community-based practitioners. However, due to lack of relevant data, the attrition rate was assumed to be zero in the Indonesian and Kenyan models. Recurrent costs were estimated based on operational processes of the programme in 2012 and combined with annual start-up costs to obtain estimates of total annual cost of the programme. Overhead costs equivalent to 15% were added to account for cost incurred at higher administrative levels. Incremental cost of medicines and vaccines attributed to changes in coverage of reproductive, maternal, neonatal and child interventions were included for only the Ethiopian model but excluded from the Kenyan and Indonesian models due to lack of data. Unit cost data were collected from a variety of sources including prices, health workers’ payroll records, key informant interviews and supply catalogues for medicines and supplies.

For all districts, incremental cost–effectiveness ratios were expressed as incremental cost per LYG; the detailed cost–effectiveness model is available from the authors. Cost–effectiveness was assessed using each country’s national gross domestic product (GDP) per capita as the reference willingness-to-pay threshold value.

**Sensitivity analyses**

We did two sensitivity analyses. First, we did a univariate sensitivity analysis. The impact of each model parameter (costs, LYG, attrition rate, discount rate, percent overhead cost and useful life of programme), on the results was assessed by sequentially varying each parameter over a specified range (± 30%) while holding the other parameters constant. Second, we did a probabilistic sensitivity analysis. An appropriate probability distribution was fitted around each parameter mean and varied within lower and upper bounds (± 10). All cost inputs were specified as gamma distributions; LYG was specified as a normal distribution and attrition rate and percentages (used in estimating overhead costs) were specified as beta distributions. Parameter uncertainty was propagated through the model using 5000 Monte Carlo simulations and the results presented as cost–effectiveness acceptability curves.

**Results**

**Programme effects**

Coverage and change in coverage of interventions affected by the programme are shown in Table 3. We used these results to calculate the number of lives saved. Overall, the numbers of lives saved increased in all districts, varying from 5.78 lives saved per 100,000 population in south-west Sumba to 26.33 lives saved per 100,000 population in Kasarani. In Shebedino, more children’s lives were saved in the older cohort (1–59 months) compared to the younger cohort (younger than 1 month).

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Table 6. Cost–effectiveness of community-based practitioners programmes, Ethiopia, Indonesia and Kenya, 2012

|/shebedino, ethiopia | Sumba, Indonesia | Takala, Indonesia | Kasarani, Kenya |
|---------------------|-----------------|------------------|----------------|
| Incremental cost, $ | 470 958         | 1 612 125        | 4 679 205      | 2 986          |
| Life years gained   | 471             | 475              | 1 894          | 36             |
| ICER (range), $/LYG | 999 (998–1 001) | 3 396 (3 391–3 402) | 2 470 (2 469–2 477) | 82 (82–82) |

ICER: incremental cost–effectiveness ratio; LYG: life years gained; $: international dollars.
Conversely, in south-west Sumba, Takala and Kasarani districts, more lives were saved in the younger cohort, compared to the older cohort (Table 4).

**Costs**

Costs differed across the countries, reflecting differences in the design and operational features of the programmes (Table 5), available at: [http://www.who.int/bulletin/volumes/93/9/14-144899](http://www.who.int/bulletin/volumes/93/9/14-144899). For example, pre-service training costs were considerably higher in Ethiopia compared to Kenya, capturing differences in the length of pre-service training (1 year in Ethiopia versus 10 days in Kenya). Annual salary costs for Indonesia were considerably higher than in Ethiopia, reflecting differences in the educational attainment between the community-based practitioners and local economic factors. In Kenya, cost of stationery and registers contributes the highest proportion to total cost accounting for over 50% of total cost. This reflects the low level of other costs including the volunteer status of the practitioners in Kenya and the government perspective taken.

**Cost–effectiveness**

Incremental costs per LYG were $999 in Shebedino, $3396 in south-west Sumba, $2470 in Takala and $82 in Kasarani (Table 6). All three programmes were cost-effective when using the willingness-to-pay threshold value as a reference.

Univariate sensitivity analyses (Fig. 1, Fig. 2, Fig. 3, Fig. 4) show that cost–effectiveness is most sensitive to uncertainties in the estimates of LYG. The probabilistic sensitivity analyses suggested that the programmes in all four study districts are likely to be cost-effective (>80% probability) assuming a willingness-to-pay threshold of one to three times each country’s GDP per capita.

**Discussion**

Given the assumptions made, we find each community-based practitioner programme to be cost-effective and to improve coverage of essential services. Several studies have also found a variety of community-based programmes to be cost-effective compared to facility-based interventions delivered by other types of health workers. Cost–effectiveness was most sensitive to uncertainty in the estimation of LYG. Given that LYG were estimated indirectly from coverage data or in the case of Kenya from potentially less robust evidence on coverage change, further research on the effectiveness of community-based practitioner programmes should be a priority.

The community-based practitioner programmes in the four study districts appear to have contributed to saving lives. However, there were differences across population categories which can be explained by differences in the reproductive, maternal, neonatal, and child health interventions used to estimate the additional lives saved. In south-west Sumba, Takala, and Kasarani districts, data on the effect of the community-based practitioner programme were only available for interventions targeting neonatal health. In Shebedino district, data were available mostly for interventions targeting the health of older children.

The analysis has several limitations. It is possible that by choosing programmes for which some effectiveness evidence was available, well-functioning programmes may have been selected. On the other hand, the approach used may have underestimated cost–effectiveness, since it was not possible to capture the full range of effects produced by community-based practitioners. Although community-based practitioners address a wide range of health conditions in different contexts, this study restricted the assessment to interventions with clear health benefits. In theory, a broader assess-
ment of the impact might have increased the effectiveness of the community-based practitioner programmes under study, by capturing their positive contribution in other health services areas, as well as other domains, including reduced morbidity and wider social benefits.

We may have under or overestimated cost-effectiveness by using a government rather than a societal approach; neither societal costs nor potential societal benefits were captured in this study. We did not account for possible interactions between the new community-based practitioner programmes and other established health system features. This has implications for estimates of the incremental costs and benefits of the community-based practitioner programmes assessed.

For Ethiopia and Kenya, there was a mismatch in the time periods from which cost and effectiveness data were obtained, since we relied on evidence of effectiveness from historical studies. Furthermore, a one year time horizon may bias incremental cost-effectiveness estimates for newly implemented programmes whose benefits are only fully realized several years after implementation. However, this is unlikely to be the case in this study given that the programmes assessed have been implemented at scale for years and are well established.

We cannot answer several policy-relevant questions concerning the design, use and scale-up of community-based practitioner initiatives. This is because there is limited empirical evidence on the influence of different design features (e.g. contents and duration of training, amount and type of supervision, or level of remuneration). Volunteer community-based practitioners describe a range of motivations, many of which are intrinsic and relate to personal, family or community value systems. However, this does not preclude the desire for financial remuneration and for predictability of payments. Community health strategies that are highly dependent on volunteers tend to have high attrition rates, lower reporting and intermittent attendance at supervision. For example, in Kenya, if reliable data about these factors and their implications had been available and included, using volunteers may not have been as cost-effective as our model suggests. Reimbursement and volunteering raise complex ethical and economic questions, which have led to a revision in Kenya’s community health strategy.

There is growing awareness that delegating tasks to community-based practitioners with shorter training is not a sufficient answer to the health workforce challenges faced by many health systems. Effective task sharing requires a comprehensive and integrated reconfiguration of health-care teams, a revision in their scope of practice and supportive regulatory frameworks. In contexts where community-based practitioners operate within an integrated team supported by the health system, community-based approaches are likely to be cost-effective for delivery of some essential health interventions. However, it should not be assumed that initiatives disjointed from health system support or with radically different design features than those described in this study are equally cost-effective. Overall, community-based practitioners should not be seen as a low-cost alternative to the provision of standard care, but rather a complementary approach of particular relevance in rural poor communities that have limited access to more qualified health professionals.

There is an opportunity to accelerate progress towards universal health coverage by integrating community-based practitioners in national health-care systems.

| Model inputs | Incremental cost-effectiveness ratio range ($a) |
|--------------|-----------------------------------------------|
| Life years gained | |
| Cost: financial incentives (village midwives) | |
| Cost: annual salary of village midwives | |
| Cost: construction of health post | |
| Overhead: % of total cost | |
| Cost: financial incentives (volunteers) | |
| Cost: stationery | |
| Cost: supervisory meeting | |
| Cost: midwife kit | |
| Cost: motobikes | |
| Cost: Initial training (volunteers) | |
| Cost: supervisory visits | |
| Cost: in-service training | |
| Cost: equipment | |
| Cost: training (traditional birth attendants) | |
| Discount rate | |
| Useful life of programme | |

*International dollars, 2012.

Here is a table showing the cost components for different programmes:

| Model inputs | Incremental cost-effectiveness ratio range ($a) |
|--------------|-----------------------------------------------|
| Life years gained | |
| Cost: one-off incentives and starter kits | |
| Cost: supervisory visits | |
| Cost: equipment (chalk board) | |
| Discount rate | |
| Useful life of programme | |

*International dollars, 2012.

Fig. 3. Sensitivity analysis, Takala district, Indonesia

Fig. 4. Sensitivity analysis, Kasarani district, Kenya

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However, more attention needs to be given to understanding costs and cost-effectiveness from both a government and societal perspective, especially in a policy context in which there are growing calls for scaling up these programmes. There are numerous policy issues that neither our study nor the available research can adequately address, such as how context and design elements affect cost-effectiveness. Mixed methods research is needed to develop a more nuanced understanding of the determinants of the costs and effectiveness of community-based practitioner programmes in different contexts.

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La costoeficacia de los programas de médicos de ámbito comunitario en Etiopía, Indonesia y Kenia

Objetivo Evaluar la costoeficacia de los programas de médicos de ámbito comunitario en Etiopía, Indonesia y Kenia.

Métodos Se estimaron los porcentajes incrementales de costoeficacia para los tres programas desde un punto de vista gubernamental. Se recopilaron los datos de coste de 2012. Se estimaron los años de vida ganados en base a la cobertura de los servicios de salud reproductiva, materna, neonatal e infantil. En el caso de Etiopía y Kenia, las tasas de cobertura de antes y después de la implantación del programa se obtuvieron a través de estudios empíricos. En el caso de Indonesia, la cobertura de las intervenciones de los servicios de salud se estimó a través de datos rutinarios. Se utilizó la herramienta “Live Saved Tool” para estimar el número de vidas salvadas gracias al cambio en la cobertura de los servicios de salud reproductiva, materna, neonatal e infantil. El producto interior bruto per cápita se utilizó como el valor de umbral de referencia para la disposición a pagar.

Resultados El coste incremental estimado por año de vida ganado fue de 82 dólares internacionales ($) en Kenia, 999 dólares internacionales en Etiopía y 3 396 dólares internacionales en Indonesia. Los resultados fueron más sensibles a la incertidumbre en las estimaciones de años de vida ganados. Basándose en los resultados de análisis de sensibilidad probabilísticos, hubo una certeza de más del 80% de que todos los programas eran costoeficaces.

Conclusión Es probable que los enfoques de ámbito comunitario sean costoeficaces para suministrar algunas intervenciones sanitarias esenciales en los lugares en los que los médicos de ámbito comunitario operan dentro de un grupo integrado apoyado por el sistema sanitario. Los médicos de ámbito comunitario pueden ser más apropiados en comunidades rurales pobres que tengan acceso limitado a profesionales de la salud más cualificados. Se requiere de más investigación para comprender qué características de diseño programático son cruciales para la efectividad.

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## Table 5. Costs of community-based practitioners programmes, in international dollars, Ethiopia, Indonesia and Kenya, 2012

| Cost category                      | Shebedino, Ethiopia | Sumba, Indonesia | Takala, Indonesia | Kasarani, Kenya |
|-----------------------------------|---------------------|------------------|-------------------|-----------------|
| **Start-up cost**                 |                     |                  |                   |                 |
| Pre-service training              | 8 848               | –                | 5 383             | 729             |
| One-off incentives/starter kits   | 84                  | 7 390            | 11 381            | 233             |
| Construction of new health posts  | 83 806              | 817 593          | 668 940           | –               |
| Equipment                         | 15 437              | 5 213            | 12 284            | 25              |
| Total start-up costs              | 108 515             | 830 196          | 697 988           | 988             |
| **Direct recurrent cost**         |                     |                  |                   |                 |
| Annual salary of community-based practitioners | 181 094             | 323 471          | 762 248           | –               |
| In-service training               | 16 303              | 35 620           | 1 484             | –               |
| Other monetary incentives and allowances | –                  | 254 398          | 2 334 921         | –               |
| Medicines\(^b\)                   | 13 413              | –                | –                 | –               |
| Stationery (registers, books)     | –                   | 38 579           | 38 579            | 1 552           |
| Total direct recurrent costs      | 210 810             | 652 069          | 3 137 232         | 1 552           |
| **Indirect recurrent costs**      |                     |                  |                   |                 |
| Supervisory visits                | 97 409              | 5 964            | 3 460             | 186             |
| Supervisory meetings              | 7 245               | 259              | 10 715            | –               |
| Total indirect recurrent costs    | 104 654             | 6 223            | 14 174            | 186             |
| **Other costs**                   |                     |                  |                   |                 |
| Total volunteer costs             | –                   | 21 646           | 310 521           | –               |
| Overhead costs                    | 47 320              | 101 991          | 519 289           | 261             |
| **Total cost**                    | **470 958**         | **1 612 125**    | **4 679 205**     | **2 986**       |

\(^a\) Total cost annuitized based on 10 years useful life of programme and 3% discount rate.
\(^b\) Only cost of medicines and vaccines for which available estimates of changes in coverage are attributable to the community-based practitioners programme were included. These data were only available for the Ethiopian model.

Notes: Cost is estimated on the basis of 75 community-based practitioners in Shebedino, 76 community-based practitioners and 2315 volunteers and traditional birth attendants in south-west Sumba, 182 community-based practitioners and 2298 volunteers and traditional birth attendants in Takala, and 50 community-based practitioners in Kasarani. Totals may differ due to rounding.
