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HRH2030 HUMAN RESOURCES FOR HEALTH IN 2030

PEPFAR U.S. President's Emergency Plan for AIDS Relief

TECHNICAL REPORT | DECEMBER 2019

Social Returns on Investments (SROI) in the Health Extension Program (HEP) in Ethiopia

Contents

ACKNOWLEDGEMENTS

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This publication was produced for review by the United States Agency for International Development. It was prepared by members of the HRH2030 consortium.

December 2019 (final version February 28, 2020)

Cooperative Agreement No. AID-OAA-A-15-00046

Cover photos: *(Main image) A community health volunteer (left) in Benishangul, Ethiopia refers a child to a district health facility. © 2011 Yolanda Barbera Lainez/IRC, Courtesy of Photoshare; (Top row) A mother and son in Ethiopia stand with a health extension worker (not pictured) who helps them to follow proper health, nutrition, and household practices. © 2013 SPRING Project, Courtesy of Photoshare; (Second row) A frontline health worker stands at her post in Mosebo village, Ethiopia © 2014 Nicole M. Melancon, Courtesy of Photoshare; (Bottom row left) A female health extension worker presents her vitamin A coverage targets and associated obstacles at her office in the Oromia region, Ethiopia © 2015 Amelie Sow-Dia, Courtesy of Photoshare; (Bottom row right) A health extension worker examines a child in the Amhara region, Ethiopia. © 2013 SC4CCM/JSI, Courtesy of Photoshare.*

Acronyms

AIDS	Acquired Immune Deficiency Syndrome
CHW	Community Health Worker
DHS	Demographic and Health Surveys
FGD	Focus Group Discussion
FMOH	Federal Ministry of Health
GDP	Gross Domestic Product
HC	Health Center
HDA	Health Development Army (volunteer community health workers)
HEP	Health Extension Program
HEW	Health Extension Worker
HIV	Human Immunodeficiency Virus
HRDD	Human Resources Development Directorate
HRH	Human Resources for Health
HRH2030	Human Resources for Health in 2030
KII	Key Informant Interviews
KMC	Kangaroo Mother Care
LiST	Lives Saved Tool
MCSP	Maternal and Child Survival Program
MICS	Multiple Indicator Cluster Surveys
NTQF	National Technical and Vocational Education and Training Qualification Framework
ORS	Oral Rehydration Solution
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PMTCT	Prevention of Mother-to-Child Transmission
RHB	Regional Health Bureau
ROI	Return on Investment
SNNPR	Southern Nations, Nationalities, and People’s Region
SROI	Social Return on Investment
TVET	Technical and Vocational Education and Training
UHEP	Urban Health Extension Program
USAID	United States Agency for International Development
VSL	Value of a Statistical Life
WHO	World Health Organization

Executive Summary

One of the largest programs globally that has formalized community health workers is the health extension program (HEP) in Ethiopia.

The HEP began in 2005 and now has deployed more than 42,000 health extension workers (HEW) throughout the country. HEWs are women aged 18 years or older with at least a 10th grade education. They are selected from the communities in which they reside, receive a minimum of 12 months training, and are on the government's payroll. HEWs improve access to and equity of healthcare by providing promotive, preventive, and selected curative services with special attention to women and children in rural areas. While there have been many studies examining the overall impact of the HEP, there have been no studies to date examining the social return on investment (SROI) in the program. This study applied a methodology for estimating the equity, empowerment, employment, and productivity returns from the investment in the HEP in Ethiopia.

The USAID-funded Human Resources for Health in 2030 (HRH2030) program developed a social return on investment (SROI) framework and methodology to guide the research. Five different survey tools were designed to collect data at all levels in Ethiopia to estimate the initial (2005) and implementation (2008-2017) costs of HEP. Twenty-three clinical and five non-clinical activities were analyzed to estimate the HEW contribution to saving maternal and child lives. These activities focus on maternal, neonatal, and child health and also include prevention of mother to child transmission of HIV (PMTCT) and family planning as defined in the HEP occupational standards. Benefits from the program were estimated across the following domains: equity, empowerment, employment, and productivity. A SROI was calculated for benefits per dollar invested in the program, by dividing the total benefits by costs. Data were collected and summarized for four regions—Amhara; Oromia; Southern Nations, Nationalities, and Peoples' Region (SNNPR); and Tigray.

The results in **Figure 1** show that there is variation across the four studied regions with regards to the social return on investment in HEP. The regional returns per dollar invested vary from $1.35 in Oromia to $1.88 in Amhara using the economic value of productivity and from $2.35 in Oromia to $4.64 in Tigray using the value of a statistical life (VSL).[1] The

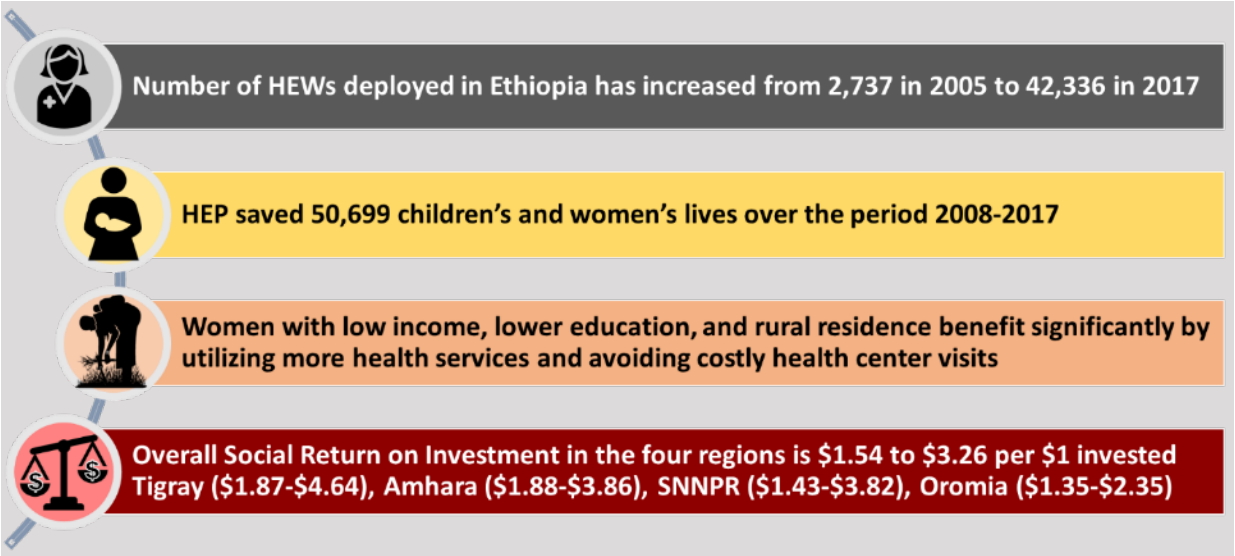

Figure 1. Achievements and Social Return on Investment in Ethiopia's Health Extension Program

[1] Based on published economic analyses, the methodology uses a projected increase in productivity of 2.5% per year, a working age of 18 to 56 years, and a 5% discount rate. Two methods are used for estimating productivity benefits. The first is a basic economic productivity based on the current GDP per capita of Ethiopia (768 USD) resulting in a woman adding $14,103 in economic value over her lifetime and a child contributing $28,488 in economic value (Dahn et al., 2015). The second productivity estimate used an upper-

average SROI ranges from $1.54 to $3.26 depending on the valuation of productivity, meaning that every dollar invested in HEP generates about a one and a half to three fold return, depending on the SROI model employed. **Table 1** presents a summary of HEP data and the SROI calculations.

These results show that HEP is having important impacts on women and child health in Ethiopia. Over the 10-year study period, on average, HEP saved the lives of more than 7,000 children each year. This is due in large part to the beneficial structure of the program allowing for low-income, lower-educated, and rural women to seek care more frequently in the presence of a HEW and a health post. Many of these women increased their overall utilization of healthcare proportionally more than better-off women.

The lives-saved estimates include about 300 lives saved for PMTCT, which is the only HIV-related service provided by the HEWs included in the study that took place in rural areas. Ethiopia faces a concentrated HIV epidemic that is mostly clustered in urban centers where HEWs are currently not concentrated geographically. In a generalized HIV epidemic setting a new cadre of community nurses similar to HEWs would be expected to have a much more substantial involvement in HIV treatment and care with much greater health and economic benefits.

There are areas where training and supportive supervision of HEWs can be strengthened and HEW performance improved to save additional lives. For example, Ethiopia experienced a decline in coverage for some key indicators such as vitamin A supplementation and treatment, which resulted in an annual—preventable—loss of more than 2,000 children's lives per year. The gains and losses result in a net number of 50,699 lives saved by the HEP. Additional lives could be saved by ensuring that HEW actively engage in highly effective interventions such as safe deliveries and post-natal care at health posts and at home when skilled birth attendance at health centers is not an option. With the expansion of the HEP into urban areas, HEWs should be expected to take on HIV testing, linkage to care and treatment and play a key role in HIV patient adherence and retention.

The variations in the magnitude of the SROI across the four study regions with a high return in Tigray and a relatively low return in Oromia suggests that the HEP operates at different levels of efficiency. In Tigray, comparatively few HEWs contribute significantly to maternal and child survival and productivity gains resulting in a high SROI there, which is not surprising, since coverage for key health services such as antenatal care, skilled birth attendance, and vaccinations are the best in the country and under-five mortality is the lowest outside Addis Ababa.

Other factors such as structural and geographic differences likely play a role as well where in Tigray people tend to live much closer to a health facility and financial constraints pose less of a barrier to care than in the Oromia region and SNNPR (Central Statistical Agency and ICF, 2016). In a study of district-level health management and health system performance district and health center management scores were highest in Tigray among the same four regions as in this SROI study (Fetene et al., 2019). As HEP is an expensive program, Ethiopia may want to consider health systems strengthening interventions that support HEWs in lower performing regions, such as supportive supervision and mentoring, performance monitoring and timely supplies of essential commodities. Further assessments may be useful to explore what the specific inefficiencies are in locations that do not see an improvement in health service utilization and health outcomes compared to other parts of the country.

Such an assessment of the HEP was completed recently (MERQ Consultancy, 2019) relying on an extensive collection of qualitative and quantitative data. Its findings complement this SROI study by answering some of the questions raised above and later in this report. The assessment found that while communities have a high demand for more comprehensive services at health post level, this demand has not been adequately addressed. Reasons cited include 1) the separation of clinical/curative services from health promotion and disease prevention; 2) a limited trust in the clinical competency of HEWs; and 3) a low awareness about service availability at health posts. The findings also suggest that availability and physical accessibility of health posts does not necessarily translate into people actually accessing services. The results of the assessment and recommendations align with our study findings of declining coverage for specific indicators in some geographic areas and a low level of HEW engagement in several life-saving interventions.

Thinking about an application of the SROI methodology beyond Ethiopia, this study has shown that in low-income settings, the SROI calculation can extrapolate broader societal values associated with increased health service utilization, hence emphasizing the social dimensions of the

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bound estimate for productivity that takes into account the Value of a Statistical Life (VSL); an accounting technique that estimates the additional value attributed to a life saved above and beyond the pure economic value. The VSL was estimated to be three times the economic value based on the GDP (Chang et al., 2017).

economic return. The SROI methodology was successfully adapted to a low-income setting, which is extremely important to provide an economic evaluation technique that offers an easier interpretation and less subjectivity than are inherent to cost-benefit or cost-effectiveness studies. The SROI methodology in this study is the first to measure and value equity, women's empowerment, health employment, and productivity benefits in a low-income setting, therefore expanding the traditional use of ROI analysis beyond the purely monetary return on a capital investment and the focus on cost-savings or 'cost-offsets' when applied in the context of health services and to some of the most vulnerable populations.

Table 1. Summary of Social Return on Investment in Ethiopia's Health Extension Program

HEP overall goal:	Create a healthy society and to reduce maternal and child morbidity and mortality rates.
Target population:	Women and children in the catchment areas of approximately 18,975 health posts
Population coverage target:	1,500 – 2,500 per HEW; predominantly in rural areas 3,000 – 5,000 per health post
Study regions:	Amhara, Oromia, SNNPR, and Tigray (87% of the country's population)
Health Extension Workers (2005/2017):	Ethiopia 2,737 / 42,336 — Study regions: 1,289 / 37,949
HEP start-up: 2005 **HEP implementation study period:** 2008 – 2017	
Maternal and child lives saved* (2008 – 2017, net after gains and losses)**:** 50,699 (incl. 2,500 for PMTCT)	
HEP costs	
Initial Investment costs **:	$289,180,818
Implementation costs (2008 – 2017)**:**	$1,397,711,543
Total costs:	$1,686,892,361
HEP benefits (2008 – 2017)	
Equity (total value):	$776,788,966
Empowerment (total value):	$177,359,537
Employment:	$201,908,648
Productivity:	(economic value) $1,448,735,423 (value of statistical life) $4,346,206,270
Total benefits:	(economic value) $2,604,792,575 (value of statistical life) $5,502,263,421
Social Return of Investment across four regions (2008 – 2017)	
Lower Bound (economic value)**:**	$2,604,792,575/$1,686,892,361 = **$1.54** or 154%
Upper Bound (value of statistical live)**:**	$5,502,263,421/$1,686,892,361 = **$3.26** or 326%

* Based on key service coverage and mortality indicators measured by DHS ** Initial Investment Costs use 2005 as a reference year

SROI in HEP: KEY FINDINGS and LESSONS LEARNED

- SROI results show that investing in HEP has more than returned its costs over a 10-year period with the potential to exceed a fourfold return where the program functions efficiently and effectively within an enabling health system support structure.
- Economic returns vary substantially between regions; regions with more HEWs per population and greater support costs do not necessarily produce a greater return.
- This study identified declining coverage for several key interventions that HEWs contribute to and points to the potential need for improving HEP performance.
- A methodology to assess the SROI in the health workforce was successfully implemented in a low-income setting and is novel by accounting for the social value of a health system attempting to achieve higher access to and utilization of healthcare instead of saving costs.
- This economic evaluation methodology offers an easier interpretation and less subjectivity that are inherent to cost-benefit or cost-effectiveness studies.
- The SROI methodology in this study is the first to measure and value equity, women's empowerment, health employment and productivity benefits in a low-income setting, therefore expanding the traditional use of ROI analyses.

Introduction to Health Extension Workers and the Health Extension Program

Community health workers (CHW) have played an important role in improving access to essential health care since long before the milestone International Conference on Primary Health Care (PHC) in Alma-Ata in 1978. Led by the World Health Organization (WHO), governments and donors have recently shown renewed interest in CHW programs to improve health outcomes and strengthen health systems (Fetene et al., 2016). These programs usually take the form of 'flooding' initiatives where large quantities of new CHWs are trained and then placed in various health facilities and communities around the country. Advocates of the CHW model believe that by quickly, but efficiently addressing the shortage of trained health staff, major gains can be made in improving maternal and child health. HEP in Ethiopia is one such program that—according to published literature—contributed substantially to improving the health status of the country's population since its inception.

While reports about successes of CHWs in general have relied largely on anecdotal evidence, common challenges of CHW programs have been identified: insufficient integration with formal health care providers, fragmented and disease-specific interventions, lack of clear work protocols, high turnover and variable performance of the workforce, and a history of low-quality evidence (Kangovi, 2015). The findings presented in this report address the last challenge by estimating the SROI in HEWs—a community health nurse and relatively new cadre of health workers in Ethiopia. USAID funded the HRH2030 program to develop a methodology for assessing the SROI in human resources for health (HRH), which was applied across four regions in Ethiopia. Eighty-seven percent of the country's population lives in these four regions—Amhara, Oromia, SNNPR, and Tigray.

HEP is a large-scale community healthcare program in Ethiopia, which integrates HEWs into the formal health system, provides comprehensive PHC, has standard operating procedures, and is based on rigorous training. The program was piloted in 2004/2005 in the Tigray Region of Ethiopia with only 40 HEWs. For this analysis, 2005 is referred to as the "start-up" year, which serves as the reference year for calculating the initial investment in preparing a HEW. HEP has grown substantially over the past 15 years and now includes more than 42,000 HEWs dispersed primarily in rural areas across the entire country working to improve the health of the citizens of Ethiopia (Bilal, Herbst, Zhao, Soucat, & Lemiere, n.d.). Besides expanding access to healthcare, HEP provides women an entry into the health profession and important employment opportunities. An urban HEP (UHEP), which is health center-based and implemented by health professionals other than HEWs, was added in 2009 so larger metropolitan areas could also benefit from the successes of the rural HEP. UHEP is not part of this study.

For this analysis, 2008 to 2017 is referred to as the implementation period. This period was selected for two reasons. Firstly, by 2008 HEP had matured into a program with clear objectives and implementation strategy; and, secondly, program information and lives saved data were readily available for this period. A review of the literature suggests that SROIs are assessed over varying periods ranging from one year (typical for a new social intervention) to 60 years (lifetime of a building). The 10-year period chosen for this study adequately captures HEP costs and benefits and produces stable SROI estimates. Adding more years is not expected to change the SROI in a material way.

Why a Social Return on Investment (SROI) Analysis?

Return on investment analyses, like other economic evaluation techniques, are used to estimate the financial gain on an investment in a program. Unlike cost-effectiveness analysis, where the financial investment is compared to the cost per life saved or disability adjusted life year (DALY) avoided, an ROI is the ratio of two monetary values; making the interpretation less subjective compared to effectiveness measures. The ROI calculation is simply the monetized "cost savings or offsets" divided by the investment.

> *The methodology for SROI and cost benefit analysis (CBA) overlap significantly, the only difference lies in the calculations with an SROI being the ratio between total benefits/costs, whereas a CBA is the difference between benefits and costs.*

According to this definition, ROI calculations have traditionally worked well in high-income settings, where health systems are attempting to reduce health care spending through reductions in high cost health care use such as emergency department use, readmission rates, and hospital inpatient visits; which all equate with high "cost offsets". However, in low-income settings, health systems are often attempting to achieve higher utilization (increased antenatal

care, increased skilled birth attendance, increased vaccinations), which are associated with increased costs rather than "cost offsets". Therefore, in low-income settings, the ROI calculation must extrapolate broader societal values associated with the increased health service utilization, hence emphasizing the social dimensions of the ROI or SROI. Adapting the SROI methodology to low-income settings is extremely important to provide an economic evaluation technique that offers an easier interpretation and less subjectivity than cost-effectiveness analyses. The SROI methodology in this study is one of the first in a low-income setting, where the traditional ROI analysis is expanded to incorporate broader social, economic, and productivity benefits rather than traditional "cost savings or offsets".

What Is a Health Extension Worker?

HEWs are community health nurses and begin as regular, everyday citizens looking to make a change within their respective communities. Many recruits are high-school graduates, since the requirements are that potential candidates must be 18 years or older, have completed Grade 10, be from the local community and speak the local language (Federal Ministry of Health, 2007) (World Health Organization & Global Health Workforce Alliance, n.d.). Furthermore, as in many settings, most of the HEW roles are filled by women. In more rural parts of Ethiopia, some men have become HEWs. Today, there are two levels of qualifications for HEWs, National Technical and Vocational Education and Training (TVET)-Qualification Framework (NTQF) levels III and IV. All HEWs undergo a year-long training to start out at a level III. After working as a level III HEW, many opt for an additional year of training to advance to level IV. Level IV HEWs perform a more comprehensive set of clinical activities than level III HEWs. Following graduation HEWs are usually deployed back into their home communities to build social cohesion and foster trustworthiness.

Who Do Health Extension Workers Serve?

A HEW's time is divided between promotion work in the community and clinical services within a basic health package provided at health posts. These health posts are small, two- or three-room facilities that act as a node for the surrounding community. Community members can visit these health posts and receive vaccinations and general medical care as defined in the basic health package provided by the Ethiopian Government. Preventive services are free while treatment services have a user fee. Each health post is staffed by two HEWs, who rotate between the community and working in the health post. But there are health posts where three or four HEWs are assigned depending on the population size. No other health professional cadres worked at health post level in the study areas. However, according to the recent national HEP assessment report, nurses and midwives are deployed to selected health posts to implement integrated community case management (iCCM) and other clinical services (MERQ Consultancy, 2019).

A single health post typically covers between 3,000 to 5,000 individuals; and in total nearly 20,000 health posts were constructed as part of the rapid expansion of HEP (Damtew, Chekagn, & Moges, 2016). For patients who need more advanced care, HEWs have the ability to refer them to higher level health centers. However, a gatekeeper function is not enforced in practice with patients bypassing the health post and seeking care directly from health centers or hospitals if they chose to do so. Health centers function similarly to the health posts, but they see more patients and are staffed by various health professionals, like health officers, midwives, nurses, and doctors, who treat higher-level ailments. Each health center has five corresponding health posts under its umbrella (**Figure 2**).

What Do Health Extension Workers Do?

During their training, which follows a standard curriculum, HEWs are educated in the implementation of a basic health package that consists of a set of preventative and curative

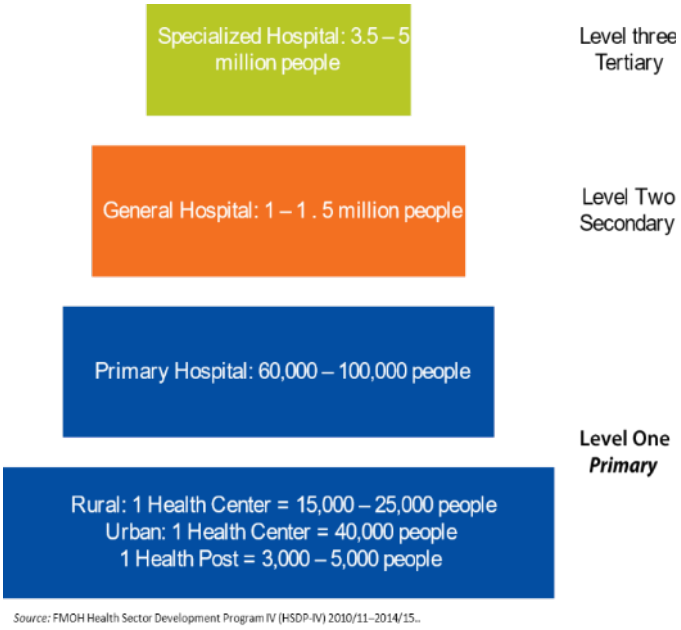

Figure 2. Structure of Ethiopia's Three-Tier Public Health System (from Wang et al, 2016)

services. The services within this basic health package fall under the following four categories: 1. hygiene and environmental sanitation, 2. family health services, 3. disease

prevention and control, and 4. health education and communication (World Health Organization & Global Health Workforce Alliance, n.d.). An occupational standards manual for HEWs describes their roles and responsibilities in detail[2]; **Table 4** and **Table 9** list the most important clinical and non-clinical tasks that HEWs contribute to directly based on HEW interviews. Over the years, this health package has grown with new services being added every couple of years. According to the occupational standards, HEWs should administer comprehensive Antenatal Care (ANC) including the provision of iron and folate supplements and Tetanus Toxoid immunizations, assist with clean and safe delivery at health posts via basic resuscitation skills, promotion of standard breastfeeding practices and clean post-natal practices and provide family planning including long-acting reversible methods (Bilal et al., n.d.; Ethiopian Ministry of Education, 2018; Windmeyer, 2017; Wright, 2015).

However, when asked about their involvement in specific health interventions, HEWs did not seem to conduct several of the life-saving activities including safe delivery care; instead, they played an educational and referral role. This also applies to any HIV-related tasks where HEWs have a very limited involvement in the form of educational messaging related to HIV and AIDS in general and PMTCT specifically and referral to health centers and hospitals. HIV/AIDS education includes information about the disease, its transmission, signs, where to get tested and treatment, and how to prevent becoming infected. According to the responsibilities ascribed to date, HEWs do not have any role in antiretroviral therapy including community-based drug refills and retention on treatment. Specific actions to ensure linkage to care are not spelled out in the job descriptions. One reason for the absence of these activities might be that the occupational standards for HEP are at least three years old. It may be timely for these guidelines to be updated to reflect the latest WHO and PEPFAR program guidance. Given the length and scope of their training, especially for level-IV HEWs, a much greater involvement in test and treat activities and ensuring retention would seem appropriate. For now, these services are provided at health centers and hospitals.

What Benefits Do Health Extension Workers Provide to Stakeholders?

The HEP offers many diverse benefits. For the community, members now have easy access to a trained health professional who can provide basic healthcare services in a timely manner. Before HEP, community members would likely have either had to walk to the larger health centers for medical care, spend additional funds to go to a hospital, or forgo healthcare entirely. The combination of health posts and HEWs has resulted in dramatic drops in child deaths, while greatly improving hygiene, sanitation and health outcomes (Damtew et al., 2016) (Wang, 2016). A recent study by Harvard Health Policy Review found that the maternal mortality ratio had plummeted over the fifteen-year period from 2000-2015, largely in part to HEP (Damtew et al., 2016).

In addition to providing medical care to those most in need, the HEP also offers women new opportunities they may not have had otherwise. While some women would have found other professions, many might have done low-paying agricultural labor or gone without a job if the employment as a HEW was not an option. HEP provides economic mobility since it offers a competitive salary that is adjusted upwards every couple of years. Furthermore, due to improvements to HEP over the years, HEWs now have the ability to increase their salary by attending additional trainings and learning new skills, which moves them from a level III to a level IV position. The program also provides economic benefits to community members since many of the health services the HEWs offer are free of charge or offered at a low user fee. Funds not spent on costly medical care are instead spent at nearby shops and businesses and funneled back into the local economy, creating lasting economic effects for the surrounding community.

Finally, on a societal level, HEP provides equitable solutions for those most in need. Whether a community member lives in a rural area, has less of an educational background, or is low-income, HEWs offer increased access to healthcare services to those who may have not consulted at a health center or hospital previously.

Ethiopia's Health Extension Program (HEP) Progress

HEP has grown considerably over the past 15 years—yearly refresher trainings and modules have been added so HEWs maintain competencies and also acquire new skills. One of the longer-term goals of the HEP is to create a seamless, countrywide, vertical health system by continuously expanding the initiative. HEP is a core component of

[2] Ministry of Education. (January 2018) Occupational Standard. Health Extension Service. NTQF Level III-IV

Ethiopia's health system and tracking population health status a key activity of HEWs. The government is hoping to become paperless in the coming years by moving HEW's population health status tracking system to tablets. In addition, some of the original health posts are in the midst of being upgraded to larger, second generation health posts (Federal Democratic Republic of Ethiopia Ministry of Health, n.d.).

HEP strategies for key health interventions focus on household and community levels and call for coordinated actions at all levels. Health centers have a crucial role to play in providing referral care and technical and practical support to HEP. Similarly, woreda health offices play an important role in support of the health centers and the health posts. The system is designed so at any level, an individual can be referred up the chain to the appropriate level of care. The HEP started in the year 2004 to 2005. **Table 2** shows the number of HEWs that were deployed in 2005, the start-up year, and the number of HEWs working in Ethiopia and in the four regions over the study period from 2008-2017. The average population served per HEW based on 2017 population data is very similar across regions (**Table 3**). This aligns well with the target set for HEP of approximately 1,500-2,500 population per HEW considering that HEWs predominantly serve rural areas. SNNPR has the largest proportion—90 percent— of its population living in rural areas among all regions, which is reflected in the lower population per HEW ratio.

This study takes a broad examination of the HEP over the period 2005 to 2017 to understand the costs and benefits of the programs to estimate a social return on investment. HEW turnover (within the HEP) has not been included in the cost calculations, because data were neither available in Ethiopia nor in published literature.

Table 2. Number of HEWs Employed in Ethiopia and four Regions, 2005-2017

Region	Baseline 2005	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Amhara	246	5,901	8,151	9,494	9,545	9,595	9,646	9,697	9,748	9,798	9,849
Oromia	795	7,971	10,771	14,001	14,367	14,732	15,098	15,464	15,830	16,195	16,561
SNNPR	208	6,228	8,378	8,542	8,648	8,755	8,861	8,967	9,073	9,180	9,286
Tigray	40	1,202	1,652	2,052	2,081	2,109	2,138	2,167	2,196	2,224	2,253
4 Regions	1,289	21,302	28,952	34,089	34,641	35,191	35,743	36,295	36,847	37,397	37,949
Ethiopia	2,737	25,523	32,441	33,412	34,382	35,825	36,714	40,714	41,120	41,931	42,336

Table 3. Population per HEW

Region	Population in 2017	Population per HEW
Amhara	28,401,000	2,884
Oromia	39,692,000	2,397
SNNPR	18,276,000	1,968
Tigray	5,056,000	2,244
4 Regions	91,425,000	2,409

Methods

Framework for Analysis

The framework guiding the return on investment analysis proceeded in several stages as outlined in the diagram below. Each stage is described in more detail in this section.

Figure 3. Framework for the Social Return on Investment in HRH

Contribution Analysis and Selection of HEW Activity Focus Areas

To analyze the impact of HEP on equity, empowerment, employment, and productivity, the first step was to understand (1) what clinical and non-clinical activities the HEWs were participating in; and (2) how much HEWs were contributing to these activities in comparison to other health worker cadres serving the same population at health centers (health officers, midwives, nurses, and doctors). The assumption is that the lives saved are a product of health services delivered by HEWs and health workers at the health centers that support health posts.

To arrive at a list of clinical and non-clinical services that HEWs were participating in, we conducted a review of the literature and Government of Ethiopia documents (Bilal et al., n.d.; Chou, Friberg, Christian, Walker, & Perry, 2017; Ethiopian Ministry of Education, 2018; Windmeyer, 2017; Wright, 2015). This included standard jobs and activities of HEWs as described in the occupational standards for health extension services at NTQF Levels III-IV.

Based on key informant interviews and the occupational standards for the HEP, 23 different clinical and five non-clinical activities that HEWs contribute to were identified (**Table 4**). A survey was designed to ask HEWs as well as other health worker cadres at health centers: how many of each of these distinct activities they completed during the last week and month before the survey; for how many clients; and whether an activity was shared with another HEW. The responses from the surveys of HEWs and other health professionals were used to calculate a contribution score for each activity, estimating how much a HEW was contributing to each activity in comparison to all other health worker cadres. As part of their non-clinical activities, HEWs support PMTCT through promotion of breast feeding and referral, which is included in the lives-saved calculations. HEWs refer clients for antiretroviral therapy but have no direct involvement in HIV treatment or retention; these are the responsibility of health workers at health center level and above. While HEWs also provide HIV education that covers topics such as disease prevention or testing and treatment, these are not accounted for in lives-saved calculations because evidence about their impact on mortality is lacking. HEWs also provide the whole range of family planning activities from counseling to the provision of short- and long-acting modern contraceptives including injections and implants.

Lives Saved

Next, the Lives Saved Tool (LiST)[3] was used to map the 23 clinical and five non-clinical activities to maternal and child lives saved using the standard methodology available in the LiST (Chou et al., 2017). While HEWs mostly support maternal and child health, they also provide basic treatment services as defined in the minimum service package. The latter activities are not accounted for in the lives saved calculation, because necessary intervention and mortality data for these interventions were not available, which LiST requires for the lives saved calculations. Therefore, lives saved may be slightly underestimated given that maternal and child health are the priority for HEWs.

LiST uses effectiveness and affected fractions to estimate the lives saved from implementing the level of service based on the coverage indicators in each of the four regions. LiST uses an equation to estimate the mortality reduction and then lives saved for specific causes of death due to specified interventions that mapped to each of the 23 clinical and five non-clinical activities. Lives saved estimates are based on several data sources including Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), WHO, UNICEF, Countdown to 2030, and the Maternal and Child Survival Program (MCSP).

Table 4. Health Interventions that HEWs Contribute to based on HEW Interviews and HEP Occupational Standards

No	Clinical Interventions		Non-clinical Interventions
1	Calcium Gluconate	**24.**	Promotion of breast-feeding practices (PMTCT)
2	Vitamin A Supplementation	**25.**	Promotion of infant & young child feeding (PMTCT)
3	Tetanus Toxoid Vaccination	**26.**	Promotion of clean postnatal practices
4	Malaria case management & IPT	**27.**	Promotion of the use of ITN or indoor spraying
5	Treatment for Moderate/ Acute Malnutrition	**28.**	Promotion of personal hygiene & waste disposal
6	Measles-Single Doses		
7	Pentavalent Vaccine		
8	Rotavirus-Two Doses		
9	Oral Antibiotics for Pneumonia		
10	Zinc Supplementation		
11	Pneumococcal (PCV)-Three Doses		
12	Contraceptive Use		
13	Kangaroo Mother Care (KMC)		
14	Vitamin A for Treatment of Measles		
15	Zinc for Treatment of Diarrhea		
16	Oral Rehydration Solution (ORS) for Diarrhea		
17	Antibiotics for Dysentery		
18	Iron/Folate Supplement in Pregnancy		
19	Neonatal Resuscitation		
20	Immediate Assessment and Stimulation		
21	Labor and Delivery Management		
22	Syphilis Detection and Treatment		
23	Antibiotics for Neonatal Sepsis		

[3] LiST was developed by the Institute for International Programs at Johns Hopkins Bloomberg School of Public Health and funded by the Bill & Melinda Gates Foundation. It is housed within Spectrum, a software package maintained by Avenir Health.

The direction and magnitude of lives-saved estimates depend on trends in coverage for these key health interventions. Where trends are negative because of worsening coverage, children's and women's lives will be lost instead of gained. HEWs in Ethiopia focus on providing antenatal care, obstetric care, curative care for children, vaccinations, and family planning as well as health education and communication and environmental and sanitation community outreach. However, HEP in its current form does not address all healthcare priorities. For example, the pregnancy-related mortality ratio in Ethiopia is 412 maternal deaths per100,000 live births (Ethiopia DHS, 2016), but only 28 percent of births are attended by a skilled birth attendant. According to responses to interviews, HEWs do not contribute to these life-saving activities despite being included in their occupational standards. This is reflected in a high neonatal mortality rate of 43 per 1,000 live births in rural areas (World Bank, 2018).

Benefits

Four main benefits were estimated as a result of HEP: equity, empowerment, employment, and productivity.

- *Equity benefits* of HEP include cost savings due to access to health posts and the value of additional care sought by comparing women of different levels of income, education and geography
- *Empowerment benefits* of HEP are estimated as cost savings due to access to health posts by empowered and non-empowered women
- *Employment benefits* of HEP capture the value of HEW salaries spent in their communities
- *Productivity benefits* of HEP estimate the additional economic productivities of women and children whose lives are saved because of HEW activities

Health benefits are subsumed under productivity benefits through lives-saved and lifetime economic gains based on GDP; they are not calculated separately to avoid double-counting.

The *equity benefit* was estimated by calculating the increased use of a health post and costs per visit with a HEW present compared to the frequency and costs of a health center or hospital visit in the hypothetical absence of a HEW in the community. Frequency of use, costs (travel and out-of-pocket payments) and income (wealth), education, and geography information are based on exit interviews with women. The recall period for the use of health services was 30 days preceding the survey, which is a relatively short recall period to keep any potential recall bias to a minimum. The effect of the HEW presence was studied for three equity measures in the following groups: (1) low-income versus high-income women; (2) women with no formal education versus several levels of education; and (3) rural versus urban women. Access to a health post may affect utilization patterns differently for low-income, rural, and low-educated women than their better off counterpart. For example, a low-income woman may decide between no care or care at the health post while a better off woman may decide between care at a health post or health center. This study assessed all these options and based benefits on the changes in the frequency of visits to health posts and health centers and the additional visits to a health center avoided by having a HEW present in the community. A difference-in-difference method was used to estimate the changes in health service utilization and costs between the HEW presence and the hypothetical absence of a HEW in each equity group. Patients are charged a user fee for clinical services; however, preventive and educational services are free. A waiver system is in place for poor households. Private sector services in Ethiopia are mostly limited to urban areas. Dual practice by physicians and nurses is tolerated and may provide limited access to 'private' care in rural areas, but this study did not assess the use of private healthcare. Despite the availability of low-cost public services in Ethiopia and some access to community-based health insurance, the out-of-pocket spending was 38 percent of total health expenditures in 2016 (World Bank 2018).

The *empowerment benefit* was estimated by calculating the increased use of a health post with a HEW present in the community as compared to a health center or hospital in the hypothetical absence of a HEW in the community for low-empowerment versus high-empowerment women (**Annex 3** describes the methodology in detail). Empowerment was defined and measured by the level of possessions owned by each woman (house, land, title, etc. following the DHS methodology for calculating the wealth index) as well as independence with regard to household decisions, marriage, and use of contraception. The cost savings (travel and out-of-pocket payments) of visiting a health post as opposed to a health center, for lower-empowered women, was used to estimate the cost savings for each health center visit avoided.

The *employment benefit* was estimated by applying the "local multiplier effect" of additional employment of 37,949 HEWs by 2017 using a two-stage employment multiplier. The first stage of 73 percent was the estimated amount of salary that the HEW would spend in their local community. It was obtained from HEW interviews. The second stage of 97 percent was the estimated local spending by community shop owners based on interviews with the latter. The two-stage multiplier was applied to HEW salaries. The employment benefit was estimated by multiplying the salary of each HEW by the estimated amount of local spending per HEW plus the estimated amount of local commerce that remains in the community.

The *productivity benefit* was estimated by calculating the additional economic production to society that a child and a mother could contribute across their lifetime using the standard economic impact of lives saved analysis (Dahn et al. 2017). Based on published economic analyses, the methodology uses the current GDP per capita of Ethiopia (768 USD), a projected increase of 2.5 percent per year based on values commonly reported in the literature, a working age of 18 to 64 years and a five percent discount rate, which is common for ROI studies. Using this methodology, we made two productivity estimates. The first, estimated a basic economic productivity assuming that a woman would add $14,103 in economic value over her lifetime and a child would contribute $28,488 in economic value in Ethiopia. These values were derived from a similar study on the investment case for CHWs in a global context (Dahn et al., 2015). The second productivity estimate used an upper-bound estimate for productivity that took into account the value of a statistical life (VSL); an accounting technique that estimates the additional value attributed to a life saved above and beyond the pure economic value. The VSL was estimated to be three times the GDP effect based on the economic evaluation in a health working paper for the third edition of Disease Control Priorities in Developing Countries (Chang et al., 2017). Total benefits for all HEWs over the 10-year HEP implementation period and per HEW per year were calculated and are shown in **Table 6**.

Besides these four benefits, there are others that were not included in this study because of the effort required for collecting the necessary data. Such benefits include days of labor and school gained due to illness averted from increased access to healthcare at health posts. While this may result in underestimating the SROI, the effect would be negligible compared to productivity benefits from lives saved alone because of very low agricultural wages in Ethiopia.

Costs

All data on costs were collected through various survey tools listed below as well as secondary document review. Personnel, other operating, and capital costs data were collected for the current year (2018) as well as the start-up year (2005). Using 2018 cost data, per HEW costs were adjusted for inflation (15.6 percent annually) to calculate per HEW implementation costs for 2008 to 2017. Total costs for all HEWs over the 10-year HEP implementation period and per HEW costs per year were calculated for the initial investment and implementation period. Personnel costs include all of the costs related to HEP (salaries of HEW and program support staff at national, regional, zonal, and woreda levels) with the salaries of program support staff apportioned based on their level of involvement in HEP in each region.

SROI Calculation

The SROI measures the value of the benefits relative to the costs of achieving those benefits. The SROI was calculated as the monetary value of benefits per dollar invested in the program by dividing total net present value of benefits by the net present value of implementation plus initial investment costs (Lawlor et al., 208; Nicholls et al., 2012). A figure greater than one indicates that an investment of one dollar delivers a social value that is greater than the investment. A figure less than one indicates a positive return per dollar invested; however, its social value is less than the investment. The SROI calculation is the same as a cost-benefit ratio and different from a ROI calculation; the SROI is the benefit divided by the cost, and the ROI is the benefit minus the cost expressed as a proportion of the cost. The information used for SROI and ROI calculations is identical.

Survey Instruments

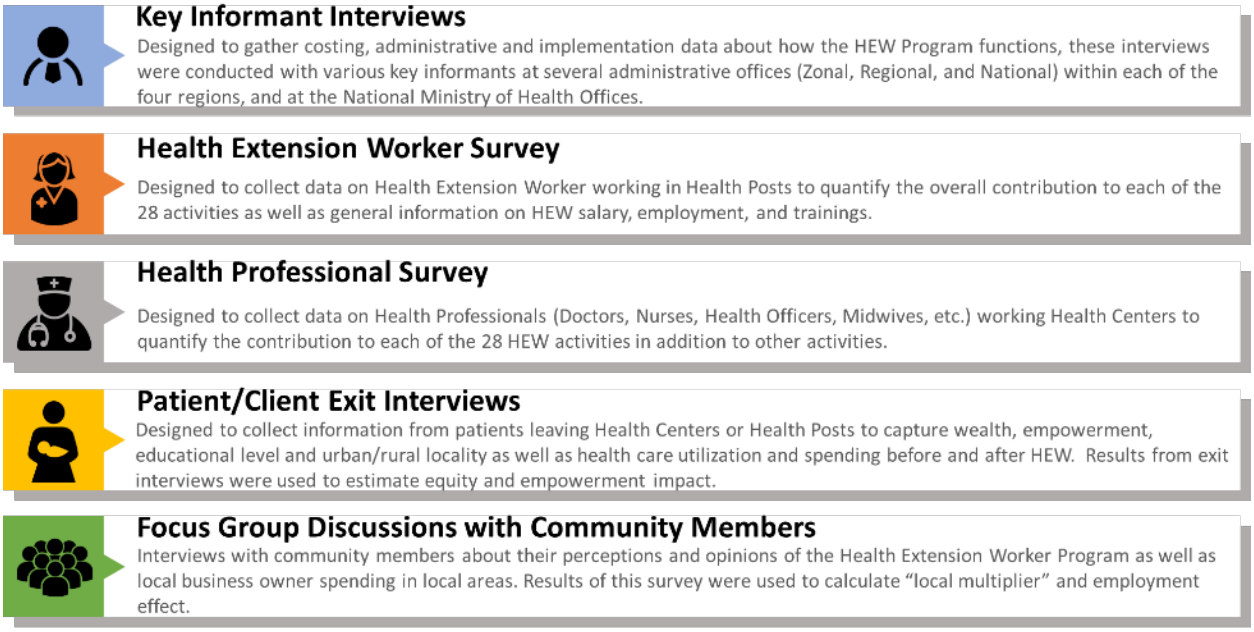

Figure 4. Survey methods and their contribution to the SROI analysis

The following five surveys were developed to capture data for each phase of the analysis: HEW Survey, Health Professional Survey, Focus Group Discussion Tools (FGD), Patient/Client Exit Interview, and Key Informant Tool. **Figure 4** shows how each survey method contributed to the benefit and cost estimates and the overall SROI calculation.

HEW and health center staff surveys provided quantitative information about HEW contributions to healthcare. Healthcare use and out-of-pocket cost information came from client exit interviews. Quantitative information about HEP costs came from key informant interviews; qualitative information about HEP operations and evolution also came from these interviews as well as focus groups.

Table 5. Sample size

Region	SNNPR	Oromia	Amhara	Tigray	Total
Zone	**Sidama**	**Arsi**	**North Shewa**	**Eastern Zone**	
Woreda	**Awasa Zuriya**	**Tiyo**	**Angolalla Tera**	**Kilte Awulaelo**	
# of HC's	4	4	4	4	16
KII HC Cadres	16	16	16	16	64
HC Exit Interviews	28	28	28	28	112
# of HP's	15	15	15	15	60
Exit Interviews of HP's	30	30	30	30	120
HDA Interviews	15	15	15	15	60
Officials KII at RHB Zone	2	2	2	2	8
KII at Ministry of Health	X	X	X	X	4
FGD (1 per region)	1	1	1	1	4

Table 5 shows the sample size for each survey instrument. The four regions with the largest population were selected for this study. In each region, one woreda was purposefully selected based on accessibility, as this study was conducted during the rainy season. Four health centers and three to four health posts per health center were purposefully selected in each woreda based on accessibility. When multiple health professionals of the specific cadre were present at health centers, one was selected through simple random sampling. Otherwise, any available health professional for each included cadre was interviewed. One HEW and one health development army volunteer (HDA) was randomly selected in each health post. For exit interviews, seven clients were randomly selected in each health center, and two clients were randomly selected in each health post.

Limitations

There were several limitations in the study and design. First, the sample size was limited to four woredas due to travel and logistics constraints during the rainy season. Second, because HEWs exist in all woredas and health center catchment areas throughout Ethiopia, there are no control areas without HEWs for comparison. We therefore asked clients about their care seeking behavior in the presence of HEWs and in the hypothetical absence of a HEW. Third, benefits of a community-based healthcare program, such as the one examined in Ethiopia, can be broad. Based on discussion with the team and other parties, the areas of benefit chosen for this study were limited to equity, empowerment, employment, and productivity. The assessment of equity and empowerment benefits relied on women's recall during health facility exit interviews, which are affected by recall bias, although recall bias was limited by keeping the recall period short. In addition, the three dimensions of equity (income, education, and geography) benefits and empowerment benefits overlap to an unknown degree. However, this effect on the SROI is small compared to the overall equity and productivity gains. Finally, the costing analysis encompassed costs at the point of service delivery as well as the support system of HEP. Therefore, the program costs were higher compared to cost estimates of CHW program assessments that only account for point of service costs.

Results

HEP began in 2003/2004; and by the end of 2005, 2,737 HEWs had been deployed throughout Ethiopia. This study focused on the regions of Amhara, Oromia, SNNPR, and Tigray where 1,289 HEWs had been deployed by the end of 2005. By 2017, 42,336 HEWs have been employed throughout Ethiopia, with 37,949 working in the four study regions (**Table 2**). The results for the analysis of the social return on investment in HEP include initial investment costs with 2005 as the reference year as well as the recurrent costs over 10 years of program implementation from 2008 to 2017. The overall SROI estimates will be shown first, followed by a detailed analysis of benefits, lives saved, and program costs. Detailed results by region are shown in **Annex 2**.

Based on the analysis in the four regions shown in **Table 6**, the SROI in HEP in Ethiopia is between $1.54 and $3.26 for every dollar invested. This means that for every dollar Ethiopia invests in HEP, the country can expect productivity, equity, empowerment, and employment benefits that amount to one and a half to more than three times this investment. A SROI greater than one dollar per dollar invested indicates that the HEP's economic benefits exceed Ethiopia's investment in this program. The difference between the lower and higher estimate is due to the different valuation of lives saved to estimate productivity benefits. The lower SROI uses an economic value per live saved that is based on Ethiopia's per capita GDP to estimate lifetime earnings. The higher value applies the value of a statistical life, which is three times the economic value and based on people's willingness to pay for small reductions in mortality risks. The value of a statistical live is a more realistic estimate how much a person would pay for life-saving interventions than an estimate based on the national GDP, which is low in many low- and middle-income countries.

The social return on investment in HEP in Ethiopia is between $1.54 and $3.26 for every dollar invested and greater than one in all four regions

All four regions show a SROI greater than one, even though they vary between a low of $1.35/2.35 (economic value/VSL) in Oromia to a high of $1.88 economic value in Amhara and $4.63 VSL in Tigray. The reasons why Oromia's SROI is lower than in the other regions are unfavorable trends in service coverage for the interventions included in the LiST analysis. For example, between 2000 and 2016, Oromia had the significantly lower increases in women's use of modern contraception and in children being fully immunized compared to the other three regions. The region also had stagnating or declining rates for tetanus immunization before birth and saw a decline in the use of oral rehydration solution in children with diarrhea and children receiving vitamin A supplementation. These trends resulted in relatively fewer lives saved and lower productivity benefits compared to the other regions. As **Table 7** shows, while Oromia has by far the most HEWs with more than 16,000, the number of lives saved is significantly lower than in Amhara and SNNPR.

Table 6. Social Return on Investments in the Health Extension Program

Region	Avg. Benefits Economic Value (per HEW per year)	Avg. Benefits VSL (per HEW per year)	Avg. Initial Investment Costs (per HEW)	Avg. Recurrent Costs (per HEW per year)	Avg. Total Costs (per HEW per year)
Amhara	$8,423	$17,283	$9,336	$3,549	$4,483
Oromia	$5,822	$10,154	$5,476	$3,781	$4,329
SNNPR	$6,223	$16,580	$7,275	$3,619	$4,346
Tigray	$10,350	$25,692	$17,307	$3,814	$5,544
Total 4 Regions	$6,864	$14,499	$7,620	$3,683	$4,445
Region	**Total Benefits Economic Value (2008-2017)**	**Total Benefits VSL (2008-2017)**	**Total Costs (2008-2017)**	**SROI (based on economic value)**	**SROI (based on VSL)**
Amhara	$829,533,266	$1,702,187,985	$441,518,790	**$1.88**	**$3.86**
Oromia	$964,220,638	$1,681,589,438	$716,872,845	**$1.35**	**$2.35**
SNNPR	$577,852,854	$1,539,640,563	$403,584,594	**$1.43**	**$3.81**
Tigray	$233,185,816	$578,845,436	$124,916,132	**$1.87**	**$4.63**
Total 4 Regions	$2,604,792,575	$5,502,263,421	$1,686,892,361	**$1.54**	**$3.26**

VSL = Value of a Statistical Life (3 times the economic value)

The average benefits per HEW per year (**Table 6**) and the ratio of lives saved to the number of HEWs are highest in Tigray. The larger number of lives saved compared to the other three regions is due to high coverage levels for key health interventions such as child immunization, tetanus protection at birth, treatment of diarrhea in children, and vitamin A supplementation for children and women after birth. Tigray achieves a high SROI despite having the highest initial investment costs per HEW. These costs are about two to three times those in other regions because the region has a relatively small number of HEWs that are supported by a relatively large number of staff at national, regional, woreda, and health center levels (Tigray is the only of the four regions that has no zonal support structure). Average recurrent costs are relatively homogenous across the four regions and vary around $3,700 per HEW per year.

Benefit Analysis

HEP produces substantial economic benefits from almost $7,000 to $14,500 per HEW per year (**Table 7**). The lower estimate is based on the economic value of productivity. The higher value is based on the value of a statistical life. This means that HEP is a good investment with a high return given that Ethiopia invests about $4,500 per HEW per year. In a broader economic context, the economic benefits produced by a HEW compare favorably to a productivity of less than $5,000 for general labor (World Bank Group, 2015) and $2,000 for agricultural labor per year in Ethiopia (McCullough, 2015). The following describes how much each of the different benefits – productivity, equity, empowerment, and employment – contribute annually to the overall estimate per HEW.

Productivity benefits are derived from lives saved and make by far the largest contribution with about $4,000 in economic value or about 60 percent of total benefits per HEW per year, except in Oromia. There the economic value is about $2,000 per HEW per year, because relatively fewer lives are saved there than in the other regions and equity benefits alone are higher than the economic value of productivity gains in the region.

Second to productivity gains, equity benefits are the next highest contributor with about $2,000 or 30 percent of total benefits per HEW per year. The average is lowest in SNNPR with less than $400 per HEW per year, because it had the lowest out-of-pocket expenditures of $1 for a health center visit among all four regions, where it varied between $5 and $6 per visit. Equity benefits for disadvantaged women (low-income, rural, or no formal education) are based on the number of additional health post visits and the reduction in the number of health center visits because of the availability

of HEWs compared to better off women (high-income, urban or, any level of formal education).

Table 8 shows that low-income women visit health posts relatively more frequently following the introduction of HEWs than their high-income counterparts. Low-income women have substantially fewer (2.5) visits to health centers since having access to HEWs in their communities, which results in substantial savings of out-of-pocket expenses. When comparing the benefit for women living in rural areas to women in an urban location, this results in 2.3 more visits to health posts for rural women or more than 15,000 visits per year for all health posts in a health center's catchment area. Rural women in Tigray benefitted the most in relative terms. Similarly, women with no formal education benefit from more visits to health posts, and they also visit health centers more frequently. Additional visits to health centers increase costs, but they are desirable from a social perspective, because it is assumed that HEP improves peoples' health and productivity and hence disposable household income. Overall, the education benefit is less pronounced than income and geographic location except for Amhara.

Empowerment and employment benefits amounted to about $500 or less than 10 percent of total benefits per HEW per year (**Table 7**). This is the monetary value derived from visits to health posts instead of health centers comparing women with low and high levels of empowerment. Women who feel empowered according to their level of control of household assets and decision-making benefit from more visits to health posts and health centers. Like the effect on rural women, women with low levels of empowerment in Tigray seem to benefit relatively more than similar women in the other regions.

The benefit due to health employment (**Table 7**) varied by the size of the employment multipliers, which were derived from interviews with HEWs and local shop owners. The multipliers were lowest in Amhara, where the employment benefit was less than $200 per HEW per year and highest in Tigray with more than $700 per HEW per year. Compared to extremely low agricultural wages in Ethiopia between $180 to $475 annually, the employment of women as HEWs contributes substantially to the local economy based on an annual salary that varies between $1,250 and $1,650.

Table 7. Benefits from the Health Extension Program (2008-2017)

Benefit Item	Benefit Value	Assumptions
Valuation of Benefits		
HEW employment multiplier (average) Local spending multiplier (average)	73% 97%	Percent of HEW salary spent on goods & services Percent spent locally vs. more than 50km away
GDP per capita (2017)	$768	Basis for the economic value of productivity gains
Lifetime economic productivity of a woman **	$14,103	Based on GDP per capita
Lifetime economic productivity of a child **	$28,488	
Value of a Statistical Life (VSL) of a woman **	$42,309	Assessed at three times the economic value of productivity gains
Value of a Statistical Life (VSL) of a child **	$85,464	

Lives Saved (2008-2017) †

Region	*Children*	*Women*	*Total Lives Saved*	*No. of HEWs*	
Amhara	15,375	(95)	15,280	9,849	Lives saved are based on the contribution to health services by HEWs and health center staff. Based on HEW interviews, HEWs contribute 55% and health center staff 45% to all primary care services. Only the HEW contribution is presented.
Oromia	12,696	(193)	12,503	16,561	
SNNPR	16,951	(116)	16,835	9,286	
Tigray	6,062	19	6,081	2,253	
4 Regions	**51,084**	**(385)**	**50,699**	**37,949**	

Benefit Item	Benefit Value	Assumptions
Benefits by Type (2008-2017)		
Total Equity Benefit Total amount • Low Income vs. high income • Rural vs. urban • No education vs. any level of education	*$2,047/HEW/year* $776,788,966 $290,098,105 $352,949,856 $133,741,005	Benefits are based on the difference-in-difference between disadvantaged and better-off women with HEWs present compared to their hypothetical absence. Values are based on travel & out-of-pocket costs collected by client exit interviews.
Empowerment Benefit • Low empowerment vs. high empowerment	*$467/HEW/year* $177,359,537	Empowerment is based on women's control over household assets and decision-making (see Annex 3).
Employment Benefit Total	*$532/HEW/year* $201,908,648	Applies the multipliers above to HEW salaries. Multipliers were derived from interviews with HEWs and local shop owners.
Productivity Benefit • Economic Value Total • Value of a Statistical Life (VSL) Total	*$3,818/HEW/year* $1,448,735,423 *$11,453/HEW/year* $4,346,206,270	Multiplies the number of lives saved by the productivity unit values for a woman or child listed above.
Total Benefits (2008-2017)		
Economic Value	$2,604,792,575	Sum of all four types of benefits.
Value of a Statistical Life (VSL)	$5,502,263,421	
Average Benefits per HEW per Year		
Economic Value	$6,864	Annual average over the 10-year period including initial investment and recurrent costs.
Value of a Statistical Life (VSL)	$14,499	

* Discounted at an annual rate of inflation of 0.156; ** Growth rate of 0.025, discounted at 0.05 annually; † From Lives Saved Tool (LiST)

Table 8. Equity and Empowerment Benefits per Region

Benefits (2017)	Average visits per woman	Ahmara	Oromia	SNNPR	Tigray	Total
Number of Health Posts (2017)		4,925	8,281	4,643	1,127	18,975
Number of Health Centers (2017)		834	1,320	726	202	3,082
Equity - Household Income (low vs. high)						
Additional visits in a year to HPs in one HC catchment area by low income women compared to high income	0.4	641	504	607	189	1,942
Visits to one HC avoided by low income women compared to high income	2.5	4,009	3,152	3,797	1,181	12,138
Total Value from consulting at HP and savings from avoided HC visits		$20,627,094	$26,264,091	$2,685,769	$1,573,785	$51,150,738
Total number of visits benefitting low income clients per year per region		3,878,002	4,826,944	3,197,345	276,685	12,178,976
Equity - Geography (rural vs. urban)						
Additional visits in a year to HPs in one HC catchment area by rural women compared to urban women	2.3	4,091	4,376	4,089	2,595	15,151
Additional visits to one HC by rural women compared to urban women	0.3	534	571	533	338	1,976
Total Value from consulting at HP		$20,515,957	$35,527,227	$2,819,041	$3,370,673	$62,232,898
Total number of visits benefitting rural clients per year per region		3,857,108	6,529,369	3,356,002	592,594	14,335,073
Equity - Formal Education (no education vs. any level of education)						
Additional visits in a year to HPs in one HC catchment area by women without education compared to women with formal education	0.9	1,443	418	350	425	2,636
Additional visits to one HC by women without education compared to women with education	1.2	1,924	557	467	567	3,515
Total Value from consulting at HP		$14,936,861	$7,006,935	$ 498,076	$1,139,637	$23,581,509
Total number of visits benefitting clients without education per year per region		2,808,209	1,287,769	592,947	200,358	4,889,283
Women's Empowerment (empowered vs. not empowered)						
Additional visits in a year to HPs in one HC catchment area by empowered women compared to women not empowered	0.6	812	903	556	535	2,805
Additional visits to one HC by empowered women compared to not empowered	1.1	1,488	1,655	1,019	981	5,143
Total Value from consulting at HP		$10,202,410	$18,367,386	$ 960,010	$1,742,620	$31,272,425
Total number of visits benefitting empowered clients per year per region		1,918,107	3,375,649	1,142,869	306,368	6,742,993
Value per visit						
Average value per visit		$ 5.32	$ 5.44	$ 0.84	$ 5.69	$ 4.32

Lives Saved Analysis

HEWs are tasked with many primary prevention and primary care activities focused on antenatal care, obstetric care, curative care for children, vaccinations, and family planning, as well as health education and communication, environmental hygiene and sanitation, and community outreach. Based on HEP occupational standards and key informant interviews this was narrowed down to 23 clinical activities and five non-clinical activities (see **Table 4** and **Table 9**), which HEWs are actually carrying out on a regular basis. Any clinical activities that HEWs did not contribute to were not included such as workplace health or use of mobile technology, even if they were listed in the occupational standards guideline for HEP. For other activities such as prenatal, delivery, and postnatal care HEWs contribute mostly through promotion and referral, but they do not seem to carry out some of the life-saving interventions as described in their occupational standards. HEWs were then asked through structured interviews how often they carried out these activities in the week and month before the survey. It was important to understand how much HEWs are contributing to these activities in comparison to higher-level healthcare providers at health centers (medical officers, nurses, etc.). The assumption is that the overall number of lives saved is a product of health services delivered by HEWs and health professionals at health centers.

For family planning, all the relevant indicators provided by DHS are incorporated in the lives saved estimates. This includes total fertility rates, unmet need, contraceptive prevalence rate for each modern method, plus tetanus toxoid vaccination rates. For HIV, this includes the promotion of exclusive breast feeding and infant and child feeding practices in the context of PMTCT.

Table 9 (on the following page) shows the level of contribution by HEWs for each of the clinical and non-clinical activities. For interventions that should be carried out by HEWs, but that show zero lives saved in the table, data were not available to make these estimates. This means that the number of lives saved is somewhat underestimated cause of the lack of data. However, this only happened for a small number of activities that HEWs carry out infrequently. The number of lives saved determines the size of productivity benefits for the SROI calculations. HEWs contribute substantially to most of the 28 interventions with 55 percent overall (Amhara 52%, Oromia 53%, SNNPR 62%, and Tigray 55%), which was measured directly through interviews. The contribution of health professionals at health centers to the same list of 28 interventions is 45 percent. Of course, health center staff carry out many additional life-saving interventions that HEWs are not involved in and are therefore not included in this study.

Results from the Lives Saved Tool (LiST) show that across all categories of clinical and non-clinical services, a total number of 50,699 maternal and child lives were saved by HEP between 2008 and 2017 (**Table 9** shows a detailed list of the number of lives saved by activity). However, this number represents the net effect of positive and negative trends in health outcomes that HEP impacts. HEWs contributed to saving a total of 71,191 children's and 326 women's lives due to improved service coverage including about 3,000 lives saved for PMTCT.

Table 9. Lives Saved and Contribution by HEWs to Clinical and Non-clinical Interventions

Lives Saved and Contribution by HEWs to Clinical Interventions												
	Maternal Lives Saved				Stillbirth & Child Lives Saved				HEW Contribution, %			
Intervention	Amhara	Oromia	SNNP	Tigray	Amhara	Oromia	SNNP	Tigray	Amhara	Oromia	SNNP	Tigray
Calcium Gluconate	-	-	-	-	-	-	-	-	-	50	-	100
Vitamin A Supplementation	-	-	-	-	(226)	(3,740)	(1,082)	527	85	69	66	97
Tetanus Toxoid Vaccination	(0)	1	(6)	(11)	(53)	83	(293)	(372)	42	39	53	91
Malaria Treatment	-	88	6	37	-	-	-	-	-	65	17	83
Treatment for Moderate/ Acute Malnutrition	-	-	-	-	497	1,890	1,536	298	30	72	100	81
Measles-Single Doses	-	-	-	-	7,965	6,839	3,875	1,941	79	70	58	77
Pentavalent Vaccine	-	-	-	-	-	-	-	-	73	61	72	74
Rotavirus-Two Doses	-	-	-	-	965	1,819	986	369	71	66	75	71
Oral Antibiotics for Pneumonia	-	-	-	-	83	(148)	3,365	537	12	34	63	48
Zinc Supplementation	-	-	-	-	-	-	-	-	13	50	75	44
Pneumococcal(PCV)-Three Doses	-	-	-	-	4,845	6,579	4,752	1,033	75	70	79	42
Contraceptive Use***	(139)	(350)	(164)	(40)	-	-	-	-	43	49	47	39
KMC*	-	-	-	-	-	-	-	-	44	76	100	35
Vitamin A for Treatment of Measles	-	-	-	-	(1,564)	(10,255)	(1,634)	236	87	83	50	33
Zinc for Treatment of Diarrhea	-	-	-	-	502	2,305	1,639	191	29	48	73	32
ORS for Childhood Diarrhea**	-	-	-	-	525	(88)	2,414	354	31	45	67	30
Antibiotics for Dysentery	-	-	-	-	-	(31)	-	(3)	-	29	-	24
Iron/Folate Supplement. in Pregnancy	-	-	-	-	55	63	60	25	39	41	55	20
Neonatal Resuscitation	-	-	-	-	-	-	-	54	-	-	-	4
Immediate Assessment and Stimulation	-	-	-	-	-	955	-	5	-	68	-	1
Labor and Delivery Management	-	7	-	1	-	379	-	20	-	5	-	0
Syphilis Detection and Treatment	-	-	-	-	-	51	-	-	-	6	-	-
Antibiotics for Neonatal Sepsis	-	-	-	-	-	-	-	-	-	-	-	-
Total lives saved	**(140)**	**(254)**	**(165)**	**(12)**	**13,595**	**6,701**	**15,619**	**5,217**	**50**	**58**	**71**	**58**

Lives Saved and Contribution by HEWs to Non-clinical Interventions												
	Maternal Lives Saved				Stillbirth & Child Lives Saved				HEW Contribution, %			
Intervention	Amhara	Oromia	SNNP	Tigray	Amhara	Oromia	SNNP	Tigray	Amhara	Oromia	SNNP	Tigray
Promotion of breast feeding practices (PMTCT)	-	-	-	-	(174)	1,315	18	(284)	73	57	43	62
Promotion of infant & young child feeding (PMTCT)	-	-	-	-	382	741	409	213	48	44	51	90
Promotion of clean postnatal practices	45	61	49	31	764	1,415	1,068	770	42	39	53	91
Promotion of the use of ITN or indoor spraying	-	-	-	-	-	-	-	-	-	87	49	55
Promotion of personal hygiene & waste disposal	-	-	-	-	808	2,524	(162)	146	77	58	55	96
Total lives saved	**45**	**61**	**49**	**31**	**1,780**	**5,995**	**1,332**	**845**	**48**	**60**	**50**	**74**

* KMC - Kangaroo Mother Care
**ORS - Oral Rehydration Solution
*** Contraceptive use include Implant, IUCD, Pill, Injection, Female Condom & Other family planning methods
Lives saved are aggregates from 2008-2017

These gains were partly offset by a decline in coverage for certain key activities (vitamin A treatment or supplementation and tetanus toxoid vaccination) with a total of 20,107 children's and 711 women's lives lost[4]. These child deaths could be avoided by strengthening the local health system for key life-saving interventions and substantially increasing coverage. To emphasize, saving lives is a result of an efficient and effective health system that includes health posts and health centers that are adequately supported, supervised and equipped and regularly supplied with essential drugs and commodities; having trained health professionals including HEWs is necessary but not sufficient.

Each of the 28 clinical and non-clinical interventions has a different impact on lives saved, positive or negative. Among the interventions with a positive impact because of increasing coverage, immunizations saved most lives of almost 42,000 children or about 60 percent of all children's lives saved. This was followed by treatment of diarrhea with ORS and zinc with 12 percent, treatment of malnutrition with six percent and treatment of pneumonia with antibiotics also with six percent, which saved the lives of over 16,000 children together. Among non-clinical activities, breast feeding and infant and child feeding practices in the context of PMTCT saved more than 3,000 lives, mostly in Oromia and SNNPR, or four percent of all children's lives saved. Amhara and Tigray saw declining trends and a loss of more than 450 children's lives for these interventions. Safe post-natal practices saved 187 women's lives and over 4,000 children's lives or six percent of all children's lives saved. HEW support of sanitation, hygiene, and waste disposal practices saved 3,316 children's lives or five percent of all children's lives saved. Among the interventions with a negative impact because of decreasing coverage, vitamin A supplementation accounted for 18,500 children's lives lost or 92 percent of the total number of children's lives lost. Declining coverage in Oromia was worst among the four regions with about 14,000 children's lives lost.

Cost Analysis

The costs of HEP are estimated through personnel costs (at all levels of the country), other (non-personnel) operating costs to run the program and capital investments including the building of 18,975 health posts as well as other expenses for equipment and supplies. Besides HEW salaries, personnel costs include the salaries of health professionals at woreda, zonal, and regional health offices that are dedicated to HEP. Personnel costs also include a fraction of the salaries of national Ministry of Health staff that support HEP based on the proportion on HEWs in a region.

Cost data summarized in **Table 10** are based on government documents about HEP supplemented by key informant interviews at regional and national level health offices. The cost of the initial investment in getting a HEW started with 2005 as the reference year and the recurrent costs to maintain program operations between 2008 and 2017 were calculated separately. HEP—including all operating support from health center to national levels— is an expensive program costing approximately $169 million a year or an average of almost $4,445 per HEW per year for initial investment and recurrent costs combined. The salaries of level IV HEWs are about on par with nurses and midwives. The salary costs for level III and IV HEWs amount to 38 percent of total personnel costs overall and vary between 25 percent in Tigray and 44 percent in Oromia.

National, regional, zonal (except Tigray), and woreda support structures are similar in all four regions, which explains the relatively low proportion of direct HEW personnel costs in Tigray with a small population where far fewer HEWs work than in the other regions. This also explains why the initial investment costs of more than $17,000 are over twice the average of $7,600 per HEW in the four regions. Recurrent personnel costs are $1,244 on average per HEW per year and highest in Tigray and Oromia with $1,444 and $1,415 respectively; they are $1,107 in SNNPR and lowest in Amhara with $1,039.

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[4] The lives saved analysis related to contraceptive prevalence yielded negative numbers for women, which seems counterintuitive, because mCPR increased and TFR decreased consistently over the last 20 years in Ethiopia. The reason for the apparent negative effect of HEWs on maternal mortality is that we are only accounting for MCH interventions that HEWs contribute to. Increased contraceptive use leads to fewer births with a relatively larger proportion being first pregnancies, which carry a higher mortality risk (hence the negative numbers). This is offset by better delivery and postnatal care. However, HEWs are not contributing to those services directly, and we therefore do not show these lives saved in our analysis. Most life-saving maternal health interventions are delivered by health center staff. While the HEWs are promoting and delivering family planning, the negative maternal lives saved are an artefact of our methodology. We included these numbers in our analysis to be consistent with only considering the contribution of HEWs. This only affects mCPR, other indicators with negative lives saved such as vitamin A supplementation showed a decline in coverage.

Table 10. Cost estimates for the HEP in four regions (Amhara, Oromia, SNNPR, and Tigray)

Cost Item	Costs	Assumptions
Annual HEW Salary Costs		
HEW Level III Annual Salary (2018)	$1,158	Based on MOH information and validated through interviews.
HEW Level IV Annual Salary (2018)	$1,636	
Average Initial Investment Costs per HEW (Baseline 2005) *		
Number of HEWs (2005)	1,289	Based on previously published numbers (Bilal et al.)
Initial Personnel Costs	$6,505	Based on 2005 discounted costs; includes support staff.
Initial Other Operating Costs	$657	Incl. training materials, recruitment, initial training, PHC kits, uniforms and job aids.
Initial Capital Costs	$457	Incl. health post construction, equipment, computer, motorbike and vehicle (apportioned), all amortized.
Average Initial Investment Costs	$7,620	A one-time cost at the start-up of a new HEW.
Average Recurrent Costs per HEW per Year (2008-2017) *		
Number of HEWs (2017)	37,949	MOH information
Recurrent Personnel Costs	$1,244	HEWs, a portion of HC staff & support staff, discounted
Recurrent Other Operating Costs	$1,673	Incl. refresher training, PHC kits, uniforms and job aids.
Recurrent Capital Costs	$766	Replacement costs, all amortized
Average Recurrent Costs	$3,683	An annual cost.
Average Costs per HEW per Year *		
Average Initial and Recurrent Costs	$4,445	Self-weighted by number of HEWs per region
Total Costs (2008-2017) *		
Initial Costs	$289,180,818	Cost estimates are derived from publicly available documents if available, key informant interviews and the health professionals and HEW surveys,
Recurrent Costs	$1,397,711,543	
Total Costs	$1,686,892,361	

* Discounted at an annual rate of inflation of 0.156

Discussion

This is the first study in Ethiopia to examine the social return on investment in its HEP, and one of the first studies globally to estimate all four benefits of equity, women's empowerment, health employment, and productivity from a community health nurse program. The results show that initiating and implementing a national program, such as HEP in Ethiopia, is an expensive endeavor, but can save at least 7,000 children's lives every year at its current level of implementation in well-performing regions and even more with improved coverage for some key interventions and ensuring that HEWs implement the full scope of their responsibilities per HEP occupational standards. Seven-thousand children's lives amount to about four percent of the annual number of under five deaths in the four study regions, which stood at 177,000 in 2015 and was 9,800 in Tigray alone.

While a four percent reduction in the number of child deaths may not seem high, it is a considerable achievement given that this only accounts for the work done by HEWs in a real programmatic context rather than the controlled environment of a pilot test. While higher estimates of lives saved and reductions in child mortality have been published, exceeding 50 percent (Jones et al., 2003), these are derived from hypothetical scenarios achieving universal health coverage for all maternal, neonatal, and child health interventions with proven effectiveness, which is unrealistic at present for countries like Ethiopia. A more realistic estimate of 12,500 children's lives saved in 2015 by a hypothetical increase in coverage for key interventions was produced for South Africa, which could theoretically reduce child mortality by 21 percent (Chola et al., 2015). This again was a synthetic estimate[5] assuming the involvement of the entire public health sector, not a subset of community-based health workers as in Ethiopia.

The lives-saved estimates include about 300 lives saved for PMTCT, which is the only HIV-related service provided by the HEWs included in the study that took place in rural areas. Ethiopia faces a concentrated HIV epidemic that is mostly clustered in urban centers where HEWs are currently not concentrated geographically. In a generalized HIV epidemic setting a new cadre of community nurses similar to HEWs would be expected to have a much more substantial involvement in HIV treatment and care with much greater health and economic benefits.

The SROI was as high as a $4.63 on a $1 investment in one region (Tigray). Despite these positive results, the SROI is lower than expected in some regions with ample health systems resources such as in the Oromia region. Additional lives could be saved in several key areas by strengthening health systems performance that results in increased health service utilization and improved health outcomes.

One of the reasons for the lower SROI in some regions in comparison to others is the varying level of coverage for certain healthcare activities. For example, for the following seven of the 28 health interventions there was stagnation or a reduction in coverage rates between 2000 and 2015 resulting in negative lives saved for at least one region: tetanus toxoid vaccination, oral antibiotics for pneumonia, vitamin A for treatment of measles, antibiotics for dysentery, ORS for childhood diarrhea, and vitamin A supplementation. While lives saved due to family planning were negative, this number was small and an artifact of the methodology of attribution of benefits to HEWs only. The coverage rates used in the lives saved calculations were extracted from reliable published DHS data and other comparable sources. To assess why coverage rates and lives saved vary considerably across regions and have declined for some interventions that are supported by HEWs, additional investigations need to be conducted.

It is interesting that while the HEWs are supposed to be tasked with saving both women's and children's lives, most of the impact of the program has been on saving children's lives. The reason for these results is that some of the activities that save the highest number of maternal lives, such as eclampsia and pre-eclampsia management, safe deliveries and clean birth practices, are activities that HEW contribute to very little or not at all based on HEW interviews, despite being part of their job description. Many maternal lives have been saved in Ethiopia from an increase in coverage from these activities, but higher-level health workers and not HEWs are conducting these activities. Examining the possibilities of increasing HEW activities with regard to pregnancy-related disease detection and prevention and postnatal care should be considered.

This study incorporates a sensitivity analysis related to the largest benefit of HEP – productivity of women and children whose lives were saved. By applying the value of a statistical

[5] A class of model-dependent estimates generally formed by applying national or global estimates to subgroups (e.g., type of intervention or health worker) for which data do not exist, assuming the validity that these national or global estimates apply to these subgroups.

life calculation, the SROI increases from a healthy $1.54 return to $3.26 per dollar invested for all regions combined. Once a life is saved, the assumption is that this individual will contribute to an increased productivity as they enter the work force, which is normally accounted for using the average GDP per capita of the country. Given the low GDP per capita in countries like Ethiopia, a VSL estimation is often used to estimate the value of an additional life saved beyond the economic valuation. Historically, VSL has been used by agencies such as the Environmental Protection Agency to estimate the value of small reductions in the risk of dying from environmental catastrophes or large environmental effects such as air pollution. VSL is now more commonly being used in health-related cost-benefit studies. Using VSL in SROI assessments is less common but suggested in situations where the low GDP per capita may undervalue the full productive benefit of saving a life.

The interest in estimating the SROI in health care programs is growing as investors and program personnel need information on whether programs deliver value for money and whether an investment is worth expanding. The benefit of doing an SROI is that a control group is not needed (Grovet, 2015; UNM Health Sciences Center, 2017).

This is the first SROI to be done on a health extension worker program in sub-Saharan Africa. ROIs have been done for other health cadres in other settings and are often found to vary around 2:1. However, much higher ratios or 10:1 have been published (Dahn et al. 2017), but such values are often based on synthetic or ex-ante estimates instead of an ex-post assessment using primary data such as this SROI study.

The SROI in HEP is also impressive when comparing it with ROIs for public health interventions in general. A systematic review of programs in high-income countries found a median ROI of 2.2 for health promotion and of 4.1 for local health programs (Master et al., 2017). Many programs such as lifestyle improments and adopting healthy behaviors show an ROI between 1 and 2.

The SROI in HEP incorporates several new methodologies for estimating the equity and empowerment benefits for the women using the services of a HEW. Given the dearth of prior reseach on such estimations for HRH, the methods presented above should be reviewed and improved as additional SROIs are conducted in other countries.

Conclusions

Ethiopia has invested significantly in an extremely important program to save maternal and child lives, which is essential for achieving universal health coverage in the country. The SROI results from this study show that investing in HEP has more than returned its value over a 10-year implementation period with the potential to exceed a fourfold return where the program functions efficiently and effectively within an enabling health system support structure. The methodology used to assess the SROI in the health workforce in low-income settings is novel and accounts for the social value of a health system attempting to achieve higher utilization—for example, increased antenatal care, increased skilled birth deliveries, increased vaccinations—instead of saving or "off-setting" costs.

While the economic returns overall are impressive in comparison to other ROI assessments, this study has also identified potential room for improvements in HEP's performance. Coverage for several key interventions that HEWs contribute to substantially worsened during the study period in some or all four regions, hence lowering the SROI. In addition, HEWs do not seem to fully implement all activities described in their occupational standards; ensuring that this is done would further increase the economic return of HEP. With the expansion of the HEP into urban areas, HEWs should be expected to take on HIV testing, linkage to care and treatment and play a key role in HIV patient adherence and retention.

Given that HEWs are well-trained for these tasks and that their wages are close to those of nurses and midwives, such performance issues warrant further investigation. The results also show that economic returns vary substantially between regions where regions with more HEWs and more spending on program support do not necessarily produce greater returns. While this study was not designed to assess the HEP efficiencies, this, too, would be recommended for further study especially since Ethiopia makes substantial investments into this program every year.

Thinking about an application of this methodology beyond Ethiopia, this study has shown that in low-income settings, the SROI calculation can extrapolate broader societal values associated with the increased health service utilization, hence emphasizing the social dimensions of the economic return. The SROI methodology was successfully adapted to a low-income setting, which is extremely important to provide an economic evaluation technique that offers an easier interpretation and less subjectivity that are inherent to cost-effectiveness studies. The SROI methodology in this study is the first to measure and value equity, women's empowerment, health employment, and productivity benefits in a low-income setting, therefore expanding the traditional use of ROI analysis beyond the purely monetary return on a capital investment and the focus on cost-savings when applied in the context of health services for some of the most underserved and hard-to-reach populations.

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Annex 2. Detailed SROI Results by Region

Amhara — Population (2017): 28,401,000 — Lives Saved in 10 years; Children: 15375; Women: (95) — Number of HEWs (2017): 9849

BENFITS	Equity	Empowerment	HEW Employment Multiplier	Productivity	Total	Average Per HEW Per Year
Economic Value (w/o VSL)	$ 318,053,594	$ 57,862,307	$ 17,290,007	$ 436,327,359	$ 829,533,266	$ 8,423
Value of a Statistical Life	*- same -*	*- same -*	*- same -*	$ 1,308,982,078	$ 1,702,187,985	$ 17,283

COSTS	Personnel	Other Operating	Capital	Total	Average Per HEW Per Year
Recurrent Costs	$ 102,347,352	$ 170,930,957	$ 76,290,556	$ 349,568,865	$ 3,549
Initial Investment	$ 80,875,263	$ 6,491,576	$ 4,583,086	$ 91,949,925	$ 9,336
Total Costs				$ 441,518,790	$ 4,483

SROI	Economic Value	Totals	Value of Statistical Life	Totals
	Total Benefits	$ 829,533,266	Total Benefits	$ 1,702,187,985
	Total Costs	$ 441,518,790	Total Costs	$ 441,518,790
	SROI without VSL	188	SROI with VSL	386

Oromia — Population (2017): 39,692,000 — Lives Saved in 10 years; Children: 12696; Women: (193) — Number of HEWs (2017): 16561

BENFITS	Equity	Empowerment	HEW Employment Multiplier	Productivity	Total	Average Per HEW Per Year
Economic Value (w/o VSL)	$ 390,184,845	$ 104,169,441	$ 111,181,953	$ 358,684,400	$ 964,220,638	$ 5,822
Value of a Statistical Life	*- same -*	*- same -*	*- same -*	$ 1,076,053,199	$ 1,681,589,438	$ 10,154

COSTS	Personnel	Other Operating	Capital	Total	Average Per HEW Per Year
Recurrent Costs	$ 234,369,065	$ 269,991,957	$ 121,831,632	$ 626,192,654	$ 3,781
Initial Investment	$ 73,760,915	$ 10,933,462	$ 5,985,814	$ 90,680,192	$ 5,476
Total Costs				$ 716,872,845	$ 4,329

SROI	Economic Value	Totals	Value of Statistical Life	Totals
	Total Benefits	$ 964,220,638	Total Benefits	$ 1,681,589,438
	Total Costs	$ 716,872,845	Total Costs	$ 716,872,845
	SROI without VSL	135	SROI with VSL	235

SNNPR	Population (2017): 18,276,000	Lives Saved in 10 years; Children: 16951; Women: (116)		Number of HEWs (2017): 9286	
BENFITS	**Equity**	**Empowerment**	**HEW Employment Multiplier**	**Productivity**	**Total**	**Average Per HEW Per Year**
Economic Value (w/o VSL)	$ 34,044,980	$ 5,444,635	$ 57,469,385	$ 480,893,854	$ 577,852,854	$ 6,223
Value of a Statistical Life	*- same -*	*- same -*	*- same -*	$ 1,442,681,563	$ 1,539,640,563	$ 16,580

COSTS	Personnel	Other Operating	Capital	Total	Average Per HEW Per Year
Recurrent Costs	$ 102,836,183	$ 159,904,810	$ 73,285,880	$ 336,026,872	$ 3,619
Initial Investment	$ 56,382,803	$ 6,119,801	$ 5,055,117	$ 67,557,721	$ 7,275
Total Costs				$ 403,584,594	$ 4,346

SROI	Economic Value	Totals	Value of Statistical Life	Totals
	Total Benefits	$ 577,852,854	Total Benefits	$ 1,539,640,563
	Total Costs	$ 403,584,594	Total Costs	$ 403,584,594
	SROI without VSL	**143**	**SROI with VSL**	**381**

Tigray	Population (2017): 5,056,000	Lives Saved in 10 years; Children: 6062; Women: 19		Number of HEWs (2017): 2253	
BENFITS	**Equity**	**Empowerment**	**HEW Employment Multiplier**	**Productivity**	**Total**	**Average Per HEW Per Year**
Economic Value (w/o VSL)	$ 34,505,548	$ 9,883,155	$ 15,967,303	$ 172,829,810	$ 233,185,816	$ 10,350
Value of a Statistical Life	*- same -*	*- same -*	*- same -*	$ 518,489,430	$ 578,845,436	$ 25,692

COSTS	Personnel	Other Operating	Capital	Total	Average Per HEW Per Year
Recurrent Costs	$ 32,536,011	$ 34,228,398	$ 19,158,743	$ 85,923,152	$ 3,814
Initial Investment	$ 35,850,709	$ 1,406,464	$ 1,735,807	$ 38,992,980	$ 17,307
Total Costs				$ 124,916,132	$ 5,544

SROI	Economic Value	Totals	Value of Statistical Life	Totals
	Total Benefits	$ 233,185,816	Total Benefits	$ 578,845,436
	Total Costs	$ 124,916,132	Total Costs	$ 124,916,132
	SROI without VSL	**187**	**SROI with VSL**	**463**

Ethiopia (4 Regions)	Population (2017): 91,425,000	Lives Saved in 10 years; Children: 51,084 ; Women: (385)	Number of HEWs (2017): 37,949			
BENFITS	**Equity**	**Empowerment**	**HEW Employment Multiplier**	**Productivity**	**Total**	**Average Per HEW Per Year**
Economic Value (w/o VSL)	$ 776,788,966	$ 177,359,537	$ 201,908,648	$ 1,448,735,423	$ 2,604,792,575	$ 6,864
Value of a Statistical Life	*- same -*	*- same -*	*- same -*	$ 4,346,206,270	$ 5,502,263,421	$ 14,499

COSTS	**Personnel**	**Other Operating**	**Capital**	**Total**	**Average Per HEW Per Year**
Recurrent Costs	$ 472,088,610	$ 635,056,123	$ 290,566,810	$ 1,397,711,543	$ 3,683
Initial Investment	$ 246,869,690	$ 24,951,303	$ 17,359,825	$ 289,180,818	$ 7,620
Total Costs				$ 1,686,892,361	$ 4,445

SROI	**Economic Value**	**Totals**	**Value of Statistical Life**	**Totals**
	Total Benefits	$ 2,604,792,575	Total Benefits	$ 5,502,263,421
	Total Costs	$ 1,686,892,361	Total Costs	$ 1,686,892,361
	SROI without VSL	**154**	**SROI with VSL**	**326**

Annex 3. Methodology Details

Data and Methods

Data collection moved forward using two methods: (1) primary data collection around several topics including the HEW program, various input variables, health worker contribution at health posts and health centers and (2) desk reviews and key informant interviews designed to gather present and past costing data. Phase one consisted of delineating how various health professionals (HEWs, nurses, HDA's, health officers, etc.) at health posts and health centers contribute to the administration and promotion of specific health services, as well as gathering data from patients and clients who 'exit' a center or post after receiving these same services. The second phase consisted of interviews with key informants at various administrative levels of Ethiopia and thorough reviews of Ministry of Health and HRH Directorate documents in order to find costing data relating to the initial, recurrent, capital, and personnel costs of creating, sustaining, and scaling-up the program.

Four largely agrarian regions - Oromia, Amhara, SNNPR, and Tigray - were included in the study through purposive sampling efforts. These four regions were selected because they account for nearly 38,000 out of the total 42,000 HEWs currently working in the country. In each of these regions, a single zone was selected through a simple random sampling of all zones within that respective region. Then, within each zone, one woreda (district) was also selected by using simple random sampling techniques.

Within the selected woreda, four health centers and fifteen health posts were included as the final sample for each region. All health centers and their associated health posts were taken as a single sampling frame for the administration of the health professional, HEW, HDA, and patient/client exit interviews. However, where the number of health centers were more than four, or health posts were more than fifteen in the selected woreda, the facilities were selected by using simple random sampling.

Study Population, Size, and Sampling Procedures

The study involved six different study groups at national, regional, zonal, health facility, and community levels. The study groups and process of participants' selection for each category are described below:

Key Informant Interview (KII) with Health Program Managers

A total of 12 key informant interviews were conducted. These included four key informant interviews (KII) at the Federal Ministry of Health (FMoH) and eight KII's in the four regions included in the study. Two directorates of the FMoH were identified based on their relevance to the HEWs' training, deployment, and management. These personnel were involved with the Human Resources Development Directorate (HRDD) and tasked with planning and coordinating pre-service education and training of HEWs. One senior advisor who has been working with HRDD for more than 15 years was purposively selected and interviewed. The FMOH also has a dedicated Health Extension Program Directorate whose primary responsibility is to lead the planning, management, monitoring, and evaluation of the HEP in the country. Three senior technical advisors and program managers were purposively selected and interviewed based upon their long-standing association with the HEP. In addition, eight KII's were conducted in four regions. These include, one zonal and one regional health bureau expert in three regions (Amhara, Oromia, and SNNPR) and two regional health bureau experts in Tigray Region (as there is no zonal structure in Tigray region). Like the interviews in FMoH, the KII subjects in the regional and zonal levels were purposively selected based on their experience and relationship with the HEP. All KII's were conducted by trained data collectors using semi-structured data collection tools designated for national, regional, and zonal levels. All interviews were voice recorded using digital voice recorders and transcribed by the data collectors. In addition to the audio, data collectors also took notes of key points during the interview to augment the information collected from transcription.

Health Professionals Survey (Medical Doctors, Nurses, Midwives, and Health Officers)

A total of 64 health professionals were interviewed in all four regions. Within the selected 16 health centers, these health professionals were providing technical oversight and referral linkages to health posts that were included in this study. In each health center, four different categories of health professionals – (medical doctors, health officers, midwives, and nurses) were included. During times when multiple staff were working at a facility on a given day, these professionals were selected through simple random sampling. Otherwise, any available health professional among those categories of health professionals was interviewed. Face-to-face interviews of all the health professionals were conducted by trained data collectors using tablets with CSPro data entry software. The data entry form was designed using a structured data collection tool for health professional interviews but revised and adjusted after pre-testing in the health center during data collectors' training.

Health Extension Workers (HEWs) Survey

A total of 60 HEWs were interviewed in 60 health posts and four regions. In each health post selected, one HEW was randomly selected (one out of two or three HEWs in each health post) and interviewed in each health post. Face-to-face interviews of each HEW were conducted by a trained data collector using tablets with CSPro data entry software. The data entry form was designed using a structured data collection tool for health professional interviews but revised and adjusted after pre-testing in the health center during data collectors' training.

Health Development Army (HDA) Interview

HDAs are volunteer community health workers who link the health service demands at the community levels to health extension workers at the health posts. In each health post selected, one HDA was interviewed for a total of 60 HDA interviews in all four regions. Face-to-face interviews of each HDA were conducted by trained data collectors using tablets with CSPro data entry software. A data entry form was designed using a structured data collection tool for HDA interviews.

Patient/Client Exit Interviews

A total of 232 client exit interviews were conducted in four regions. In each health selected, seven health center users (clients) were randomly selected and interviewed while two health post users were randomly selected and interviewed in each health post. A total of 112 interviews in 16 health centers and 120 client exit interviews in 60 health posts were conducted across the four regions. Face-to-face interviews of each HDA were conducted by trained data collectors using tablets with CSPro data entry software. The data entry form was designed using a structured data collection tool for HDA interviews.

Community-level Focus Group Discussions (FGD)

One FGD was conducted in each region with community members associated with purposively selected, peri-urban health posts for a total of four FGD interviews in all RHBs. All FGDs were conducted by trained data collectors and using semi-structured data collection tools designated for community-level FGD. All FGDs were voice recorded using digital voice recorders and transcribed by the data collectors. In addition to the audio, data collectors also took notes of key points during the interview and augmented the information during transcription.

Table A. Sample Selection

Region	SNNPR	Oromia	Amhara	Tigray	Total
Zone	**Sidama**	**Arsi**	**North Shewa**	**Eastern Zone**	
Woreda	**Awasa Zuriya**	**Tiyo**	**Angolalla Tera**	**Kilte Awulaelo**	
# of HC's	4	4	4	4	16
KII HC Cadres	16	16	16	16	64
HC Exit Interviews	28	28	28	28	112
# of HP's	15	15	15	15	60
Exit Interviews of HP's	30	30	30	30	120
HDA Interviews	15	15	15	15	60
Officials KII at RHB Zone	2	2	2	2	8
KII at Ministry of Health	X	X	X	X	4
FGD (1 per region)	1	1	1	1	4

Data Collection

Six tools were developed to capture the data for this study. They are as follows: Health Development Army Volunteer (HDA) Survey, Health Extension Worker (HEW) Survey, Health Professional Survey, Focus Group Discussion Tools (FGD), Patient/Client Exit Interview and Key Informant Tool. Each tool is described below.

Key Informants at National/Regional/Zonal Level: Designed to gather data about how the HEW program functions, these interviews were conducted with various key informants at several administrative offices (zonal, regional, and national) within each of the four regions and at the national Ministry of Health offices. Since the program is rather decentralized, these interviews allowed the team to collect data about how the program is managed at each level of the government. Much of the data gathered through the key informant interviews was used to inform the costing portion of the analysis.

Health Extension Worker Survey: The purpose of this survey was to gather background data on health extension workers working in health posts, while also quantifying each HEW's overall contribution to improving health outcomes. For the background information, general information on salary, employment, and trainings attended were gathered from interviews with the HEWs. In terms of the 'contribution' portion of this survey, HEWs were asked to provide or recall the number of specific health interventions they administered or promoted in their community within the past month. Such data on HEW activities and responsibilities were gathered in order to estimate the impact HEWs were having on the improvement of these specific health indicators over time. In order to check for 'double counting' of activities or responsibilities, several checks were created: (1) The data collection team was instructed to take pictures of the HMIS reports in order to cross-verify that the gathered data was accurate and (2) HEWs were asked to confirm if they were reporting for themselves alone, or sharing said activities with the other HEW working at the health post.

Interviews with other Health Professionals: This survey was nearly identical to the HEW survey, however, instead of asking HEWs working in health posts about their work, this survey was designed to gather data on other health professionals (doctors, nurses, health officers, midwives, etc.) working health centers. Again, participants were asked about their work history, trainings and salary, as well as the number of health services administered and their contribution to these various health activities. Like the HEW survey, as a means to prevent double-counting, participants were asked if they shared their responsibilities with other health professionals in the health center, as well as the number of health professionals they shared these tasks with, if any.

Interview with Health Development Army Leaders: This survey was also very similar to the HEW and HP surveys, but instead involved interviews with leaders of the health development army (HDA). HDA's are informal, unpaid positions undertaken by members of the community to support the HEW in their work. A single HDA leader oversees around 10 HDAs. However, while HEWs focus a majority of their time on the administration and

promotion of clinical and non-clinical services, HDAs mainly assist with promotional activities. Therefore, while the previous interviews were concerned more with the administration of services, clinical or non-clinical, the HDA leader survey focused on the promotion of specific activities.

Patient/Client Exit Interviews: This survey consisted of more than 200 exit interviews with patients/clients who were leaving health centers or health posts after receiving care from a HEW or other health professional. This interview consisted of a condensed wealth index, a baseline empowerment index, background demographic information, as well as questions about each woman's individual utilization of health services. These exit interviews were mainly designed to parse out the equity differences in improvements to health outcomes that could be attributed to HEW program. Patient/client exit interviews took place at randomly selected subsets of health posts and centers within each of the regions chosen for the health center and health post interviews.

Focus Group Discussions with Community Members: The sixth and final survey consisted of discussions with various influential community members about their perceptions and opinions of the health extension worker program. While participation varied, a decision was made to include local shop owners in the discussion. This was intentional one. In order to assess how the health extension worker program is affecting the local economy, a "local multiplier" was calculated based upon the answers of these shop owners. Data gathered from this stage was used to inform portions of the costing tool.

Costing SROI Excel Tool

In order to calculate the final SROI, four separate Excel costing tools corresponding to the four regions included in this study were created. Each individual costing tool was further divided into four parts: (1) Input Information, (2) Initial Costs – (Initial Personnel, Initial Recurrent and Initial Capital), (3) Final Costs – (Final Personnel, Final Recurrent and Final Capital), and (4) the Regional SROI.

Input Information

The Input Information details the background demographic and salary information collected from each region.

START-UP INITIAL COSTS – (INITIAL PERSONNEL, INITIAL RECURRENT, AND INITIAL CAPITAL)

The Start-up Costs section was separated into three distinct cost calculations: Initial Personnel, Initial Recurrent, and Initial Capital. For the purposes of our analysis, all three of these cost calculations refer to costs associated with the "start-up" phase of the health extension worker program. We defined this period to be between 2004 to 2005 on the Gregorian Calendar and used 2005 as the base year for all cost calculations. All costs were gathered in 2018 Birr and then deflated down to 2005 levels using the average inflation rate over the period. Much of the data were gathered from the varying surveys and tools we created as well as from the key informant interviews we conducted across the country.

(1) Start-up Personnel - The initial personnel costing included the number of staff, as well as their corresponding salaries at the national, regional, zonal/district, woreda, health center, and health post levels. For each level, only those personnel who were directly working on the start-up of the HEW program were included. If a category of personnel worked less than full time on the HEW program their level of effort was estimated. Salary levels were extracted from publicly available documents if available, key informant interviews and the health professional and HEW surveys. All salaries were gathered in 2018 Ethiopian Birr and then converted to 2018 USD using average inflation rate over the period. As stated above, all initial costs were deflated to 2005 using the World Bank Inflation Calculator.

(2) Start-up Recurrent – Initial recurrent cost categories included development of training package, equipment, uniforms, printing, and training activities for the start-up phase in 2005. If 2005 values were not available, costs were deflated using 2018 values. For some items with reported variation in costs, we created high, medium, and low cost and quantity values for potential sensitivity analysis.

(3) Start-up Capital –Capital goods included all equipment, building, and other capital items (motorbikes and vehicles) provided at the start-up of the program. All the item quantities were based on either the number

provided in each health post in the region, health center, or administrative office. All capital items were amortized using standard amortization that considered total cost, three percent depreciation and estimated useful life. 'Useful life' referred to the average number of years a respective item lasts before it needs to be replaced.

IMPLEMENTATION COSTS – (PERSONNEL, RECURRENT, AND CAPITAL COSTS OVER THE PERIOD 2008 TO 2017)

The implementation cost categories were defined in the same ways as the start-up cost categories – personnel, recurrent, and capital. Data were extracted for the most recent year 2018 and then deflated over the years 2008 to 2017 according to the World Bank World Development Indicator values.

(1) Personnel – The implementation personnel calculation captured the number of and current salaries for all personnel at all levels within Ethiopia that were working with the HEW program as of 2018. All salaries are in 2018 Ethiopian Birr and were obtained either through our primary data collection efforts, or through secondary literature reviews and documents. The levels included in the personnel cost calculation were the same as in the start-up personnel cost calculation: national, regional, zonal/district, woreda, health center, and health post levels.

(2) Recurrent – The implementation recurrent costs were calculated similarly to the start-up recurrent cost calculation, including costs for equipment, uniforms, utilities, and training.

(3) Capital – The implementation capital cost calculation included the construction cost for health posts and furnishing, refrigerators, bicycles, office equipment, motorbikes, and vehicles. As with the start-up capital cost calculation all costs were obtained in 2018 Birr amounts and amortized using useful life and a three percent depreciation value.

Implementation Costs from 2008 to 2017: A per HEW value was calculated using the 2018 cost values for personnel, recurrent, and capital items and the 2018 current number of HEWs in each region. These per HEW values were deflated to account for actual 2008 to 2017 costs. The per HEW cost for personnel, recurrent, and capital for 2008 to 2017 were multiplied by the actual number of HEW deployed in each region in each implementation year to arrive at the yearly implementation costs for the period.

Sample

Table B below summarizes the samples surveyed in each region.

Table B. Surveyed Sample

Region	Zone	Woreda	Health Center (HC)	Health Post (HP)	Exit Survey Sample Size	
					HC	HP
Amhara	North Shewa	Angolalla Tera	Chacha	Bura	7	2
				Chach		2
				Cheki		2
				Ruksi		2
				Seriti		2
			Kotu	Elani	7	2
				Fito		2
				Godanamamas		2
				Golba		2
				Kotu		2
			Tengego	Asabahir	7	2
				Tengego		2
			Tsegereda	Addis Amba	7	2
				Kitalegn		2
				Tsegereda		2
Oromia	Arsi	Tiyo	Beriti	Beriti	7	2
			Bilalo	Bilalo	7	2
				Burka Chilalo		2
				Dosha		2

				Tulu Kuche		2
			Golja	Alko	7	2
				Ketar Qote Bula		2
				Morkicha		2
				Tulu Chebi		2
			Gonde	Akiya	7	2
				Denkaka Konicha		2
				Gonde		2
				Gora Silingo		2
				Kubate		2
				Kulumsa		2
Region	**Zone**	**Woreda**	**Health Center (HC)**	**Health Post (HP)**	**Exit Survey Sample Size**	
					HC	**HP**
SNNPR	Sidama	Awasa Zuria	Jara Dado	Jara Dado	7	2
				Jara Damuwa	7	2
				Jara Hinesa		2
				Jara Karara		2
			Mekbasa Korke	Gallo Argessa		2
				Mekbasa Korke	7	2
				Sama Ejersa		2
			Shamena	Beke Lalima		2
				Shamena Germama		2
				Shamena Medre Genet	7	2
				Shamena Sefera		2
			Tankaka	Doyo Chale		2
				Emoshe Humo		2
				Kajima		2
				Unbulo Tankaka		2
Tigray	Eastern Zone	Kilte Awulaelo	Abereha Weatsebeha	Aynalem	7	2
				Gnefel	7	2
				Gule		2
				Debre Berhan		2
			Agulae	Fidus		2
				Mesanu	7	2
				Tsabat		2
			Beati Akor	Bet Korkos		2
				Debre Tsion		2
				Hayelom	7	2
				Adi Ekli		2
			Negash	Awda		2
				Gemad		2
				Tsaeda Naela		2
				Tsahla		2

Lives Saved

The LiST Tool Spectrum Software was used to calculate the impact of the HEW program by calculating the number of mother and children lives saved from a specific set of interventions that can be implemented by HEWs. The LiST Tool used effectiveness and affected fractions to estimate the lives saved from implementing the level of service based on the coverage indicators each of the four regions. The LiST Tool used an equation to estimate the mortality reduction and then lives saved from specific cause of death due to specified interventions. The calculation was used to estimate the impact of the 23 different maternal and child health interventions as well as six non-clinical prevention activities on maternal mortality, stillbirth, and deaths for children under one year of age.

Benefits

Benefits were calcaluted for four domains: Equity, Empowerment, Employment, and Productivity.

Equity

Equity benefits were calculated through exit interview surveys. These surveys were administered to 232 patients or clients leaving either a health post or health center within each of the four regions. Equity benefts were estimated for income, geography (urban/rural), and education. Female patients leaving health posts and health centers were asked to estimate the total number of visits that they made to their local health post or health center in the last year. The same individual was then also asked to estimate how many times a year they would have gone to their health center or hospital if there was no HEW in their local community. These were estimated to be visits saved by now having a HEW in the community. The income, geography, and education of each woman was estimated through the exit interview. A difference-in-difference technique was used to calculate the additional visits to a health center saved by having a HEW present in the community for low-income women (versus high-income), rural women (versus urban), and no education (versus some education). The median of the sample was estimated, and high and low equity groups were created based on the median number. These savings for each visit were calculated as the value of the visit that would have been made to the higher-level facility, which was calculated as the out-of-pocket expenditure for a health center visit, as reported by women visiting the center, as well as twice the travel costs to the health post for each woman. The visits saved for each woman were estimated as the percentage of yearly visits saved to all health centers in each region. Yearly visits saved were calculated based on the additional visits that would have been made to health centers based on the reported visits women said they would have made if the HEW was not in their village. Additional visits were calculated based on the average annual maternal and child health visits make to health centers in the regions based on monthly reported data from the HMIS.

Empowerment

Empowerment levels were captured through exit interview surveys. These surveys were administered to 232 patients or clients leaving either a health post or health center within each of the four regions. Within this exit interview survey, we estimated the impact on female empowerment through the HEW program in two ways: (1) via official DHS questions and (2) through predesigned questions about utilization and decision-making patterns.

We searched through the four previous iterations of the Ethiopian Demographic Health Survey (DHS 2000, 2005, 2011, and 2016) and compiled a set of twelve questions that assessed different methods of female empowerment. Some of these questions evaluated standard female empowerment or agency via their possession or ownership over various items, such as the title/deed to their house or plot of land. We also included other questions that also asked about patient/client input with regard to education, marriage, and contraception choices (see questions below). Once the data were gathered, we created twelve separate dummy variables corresponding to each of the twelve empowerment questions above. We then calculated an average empowerment level for each subject by taking an average of the twelve questions which for which each woman answered in a positive empowerment direction. The median of the sample was estimated, and high- and low-empowerment groups were created based on the median number.

Women were then asked how many times they go to the health post now and how many times they would have gone to the health center or higher-level facility if the HEW were not present. A difference-in-difference technique was used to calculate the additional visits to a health center saved by having a HEW present in the community for low-empowerment women versus high-empowerment women. These savings for each visit was calculated as the value of the visit that would have been made to the higher-level facility, which was calculated as the out-of-pocket expenditure for a health center visit, as reported by women visiting the center, as well as twice the travel costs to the health post for each woman. The visits saved for each woman were estimated as an additional percentage of yearly visits saved to all health centers in each region.

Employment

Employment benefts were calculated using a local multiplier calculation. The local multiplier considered the percent of HEWs salary that they reported they spent in their local areas as opposed to an area more then 50km from the health post. This was then multiplied by the reported local spending patterns of several shop keepers from each region, reporting on the percent spent locally versus more than 50km away for supplies, rent, taxes, etc. A local multiplier number was calculated for each region and was applied to all HEW salaries.

Productivity

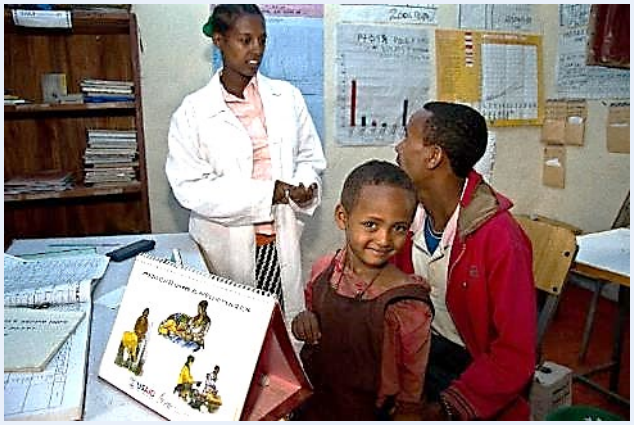
Two productivity calculations were conducted. The first estimate for productivity was calculated based on a standard methodology used in producitivity analysis, which accounted for the GDP per capita of Ethiopia over time and the potential contribution to GDP for surviving women and children assuming they enter the workforce at age 18 and exit the workforce at age 56. The calculation also considered a growth rate of 2.5 percent per year and a discount rate of 5 percent. The second calcuation considered that there may be an additional value to a life saved above and beyond the pure economic value. An estimate of this value of a life is called the value of a statistical life (VSL) and has been mostly estimated in developed countries around the world. The estimate takes into consideration an individual's own valuation of the benefits of saving a life. The standard example given is "a willingness to incur a cost of $100 in order to reduce the risk of death by 1/10,000 implies a VSL of at least $1 million, which is $100 divided by 1/10,000" (Alkire et al. 2012). VSL numbers depend on willingness to pay studies. There have been few willingness to pay studies done in developing countries, including Ethiopia. For this reason, we use the standard equation for the relation between income in a developed countries, the developed country VSL, and the income in the developing country to estimate the VSL ratio multiplier for Ethiopia. The ratio multiplier was estimated at 3.0 and this was used to estimate the upper bound productivity figures (Chang et al. 2017).

Social Return on Investment

Social return on investment was calculated at the total benefits divided by the total costs plus investment over the period 2008 to 2017. Total benefits included equity, empowerment, employment, and productivity benefits. Total costs included personnel, recurrent, and capital cost for the investment year 2005 as well as the implementation over the period 2008-2017. Social return on investment was calculated separately for all four regions (Tigray, SNNPR, Oromia, and Amhara) as well as overall for the entire country.

Empowerment Questions Circle all that apply	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**	Continue to Question
Do you own a House? (one or more properties)	**Alone ***	**Jointly w/ Partner**	**Both Alone + Jointly**	Do not own a house			X
Do you own Land? (one or more properties)	**Alone**	**Jointly**	**Alone + Jointly**	Do not own land			X
Do you possess the Title/Deed for your House?	**Woman's name is on title/deed**	Woman's name is NOT on title/deed	Does not have a title/deed	Don't know/Missing			X
Do you possess the Title/Deed for your Land?	**Woman's name is on title/deed**	Woman's name is NOT on title/deed	Does not have a title/deed	Don't know/Missing			X
Do you own/use a Bank Account/Mobile Phone?	**Own a bank account**	**Own a mobile phone**	**Use phone for financial transactions**	**Use both for financial transactions**			X
Who is/was the person making the decision about a woman's first marriage?	**Myself**	Parents	Other Family or Relative	Other			X
How often does your husband/partner participate in household chores?	**Almost every day**	At least once a week	Rarely				X
Which methods of contraception do you use?	Not currently using	Any traditional method	**Pill, IUD, M/F Sterilization, Injectables**	**M/F Condom**	**Other**		X
A woman is justified in:	a. Refusing to have sexual intercourse with her husband if she knows he has sex with other women b. Asking that they use a condom if she knows that her husband has an STI c. Saying no to their husband if they do not want to have sexual intercourse						

* Responses in **bold** are counted as 'empowered'



A child visits a health extension worker with his father in the Amhara region, Ethiopia. Credit: © 2013 SC4CCMIJSI, Courtesy of Photoshare

Program Partners

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- University Research Company (URC)

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HRH2030 strives to build the accessible, available, acceptable, and high-quality health workforce needed to improve health outcomes.

Global Program Objectives

1. **Improve performance and productivity of the health workforce.** Improve service delivery models, strengthen in-service training capacity and continuing professional development programs, and increase the capacity of managers to manage HRH resources more efficiently.
2. **Increase the number, skill mix, and competency of the health workforce.** Ensure that educational institutions meet students' needs and use curriculum relevant to students' future patients. This objective also addresses management capability of pre-service institutions.
3. **Strengthen HRH/HSS leadership and governance capacity.** Promote transparency in HRH decisions, strengthen the regulatory environment, improve management capacity, reduce gender disparities, and improve multi-sectoral collaboration for advancing the HRH agenda.
4. **Increase sustainability of investment in HRH.** Increase the utilization of HRH data for accurate decision-making with the aim of increasing investment in educating, training, and managing a fit-for-purpose and fit-for-practice health workforce.

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This material is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of cooperative agreement no. AID-OAA-A-15-00046 (2015-2020) in partnership with The U.S. President's Emergency Plan for AIDS Relief. The contents are the responsibility of Chemonics International and do not necessarily reflect the views of USAID or the United States Government.

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