



Check for updates

PREPRINT

Undergoing Peer Review

METHOD ARTICLE

REVISED

What Will It Cost? A New Costing Matrix for Community Health Worker Programs

[version 2; peer review: awaiting peer review]

Ama Essuman¹, Shegufta Shefa Sikder¹, Kate O'Brien², Marielle Hart³,
Feven Mekuria⁴, Hafijul Islam⁵, Grace Joduku⁶

¹Global Health Team, Cooperative for Relief and Assistance Everywhere [CARE], Washington, DC, USA²Consultant, Healthcare Industry, Boulder, CO, USA³Global Health Policy Expert, Washington, DC, USA⁴Global Health Team, Cooperative for Relief and Assistance Everywhere [CARE], Atlanta, GA, USA⁵Nutrition Team, Cooperative for Relief and Assistance Everywhere [CARE], Dhaka, Bangladesh⁶Health and Nutrition Team, Cooperative for Relief and Assistance Everywhere [CARE], Juba, South Sudan

v2 First published: 18 Nov 2025, 2:378
<https://doi.org/10.12688/verixiv.2286.1>

Latest published: 24 Mar 2026, 2:378
<https://doi.org/10.12688/verixiv.2286.2>

Open Peer Review

Approval Status Awaiting Peer Review

Any reports and responses or comments on the article can be found at the end of the article.

Abstract

Background

We developed a Community Health Worker (CHW) program costing matrix to support evidence-based planning and budgeting. Applied in two case studies, the matrix highlighted funding gaps across recruitment and hiring, onboarding and training, integration and recognition, and retention for formally recognized, predominantly female CHW programs operating in both stable and fragile health systems. Policymakers, donors, and implementation partners can use the matrix to guide strategic investments of limited resources.

Methods

CARE collaborated with pro bono healthcare consultants to design the matrix. Through stakeholder consultations and field-level insights, we identified key barriers to CHW performance and mapped them into actionable factors and associated tasks. We converted time and staffing requirements into monetary values using local salary data. We piloted the matrix in Bangladesh and South Sudan, representing contrasting contexts: a lower-middle-income country with an established CHW system and a low-income country with an emerging

one.

Results

In both countries, clearly defined CHW responsibilities, salaries and benefits were partially or fully unmet factors. In Bangladesh, additional gaps included payments and incentives, training curricula, promotion pathways, and job mobility. In South Sudan, gaps appeared in technology and logistical support, employee satisfaction, and supervision. We estimated that addressing these gaps would require approximately US\$7.1 million annually in Bangladesh (0.07% of annual government health expenditure) and US\$298,414 in South Sudan (0.05% of annual government health expenditure), to enable CHWs to deliver services effectively within their catchment areas.

Conclusions

The CARE CHW costing matrix provides a practical, low-cost tool for planning and budgeting CHW programs across health systems of varying maturity. By considering factors affecting a predominantly female workforce and aligning financial planning with operational realities, the matrix helps stakeholders invest efficiently in community health.

Keywords

Costs and cost analysis, community health workers, global health, health planning, developing countries, health resources, delivery of healthcare, health policy



This article is included in the [Gates Foundation gateway](#).

Corresponding authors: Ama Essuman (ama.essuman@care.org), Shegufta Shefa Sikder (shefa.sikder@care.org)

Author roles: **Essuman A:** Conceptualization, Investigation, Validation, Writing – Original Draft Preparation, Writing – Review & Editing;

Sikder SS: Conceptualization, Investigation, Methodology, Validation, Writing – Original Draft Preparation, Writing – Review & Editing;

O'Brien K: Conceptualization, Methodology, Writing – Review & Editing; **Hart M:** Writing – Review & Editing; **Mekuria F:**

Conceptualization, Investigation, Writing – Review & Editing; **Islam H:** Validation, Writing – Review & Editing; **Joduku G:** Validation

Competing interests: No competing interests were disclosed.

Grant information: Gates Foundation INV-076961

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Copyright: © 2026 Essuman A *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Essuman A, Sikder SS, O'Brien K *et al.* **What Will It Cost? A New Costing Matrix for Community Health Worker Programs [version 2; peer review: awaiting peer review]** VeriXiv 2026, 2:378 <https://doi.org/10.12688/verixiv.2286.2>

First published: 18 Nov 2025, 2:378 <https://doi.org/10.12688/verixiv.2286.1>

REVISED Amendments from Version 1

We included a data availability statement.

Any further responses from the reviewers can be found at the end of the article

Introduction

Community Health Workers (CHWs) have become vital members of health systems, especially in low- and middle-income countries (LMICs) and underserved rural areas. They are usually recruited from the communities they serve and are the frontline link between marginalized populations and formal health systems.¹ Their roles encompass promotive, preventive, and limited curative care, making them crucial in closing access gaps, promoting universal health coverage (UHC), and enhancing health system resilience.¹⁻³

Globally, CHWs are increasingly recognized for their roles in tackling both immediate and long-term public health issues, from infectious diseases like HIV, tuberculosis, and malaria to broader concerns such as maternal and child health, malnutrition, and social determinants of health.³⁻⁵ During health emergencies (including pandemics), CHWs have shown their ability to adapt and serve as trusted community agents.³ Numerous case studies, spanning Brazil to Nepal and Pakistan, demonstrate their success in improving health outcomes, including reducing neonatal mortality, enhancing antenatal care, and increasing adherence to newborn care practices.⁴⁻⁶

Strong evidence supports the cost-effectiveness of countries investing their national budgets in CHWs. Well-supported programs deliver high returns on investment (ROI), with estimates reaching up to 10:1, mainly due to increased economic productivity from a healthier population, reduced health system costs, and better epidemic control.^{3,7,8} CHW programs in low-resource areas have resulted in notable cost savings by decreasing emergency room visits and hospitalizations, while maintaining relatively low per capita costs.^{6,9}

Despite the cost-effectiveness of investing in CHWs, CHW programs are often underfunded, poorly integrated into national health plans, and marginalized in public health funding priorities.^{3,8} Traditional costing methods often fail to account for key operational factors such as supervision, supply chains, digital data systems, fair pay, unpaid domestic work, childcare duties, and unsafe working conditions, factors critical to the optimal functioning of a CHW force that is predominantly female (70%).^{3,10} Oversight of these factors results in inefficient planning in the budgeting of CHW programs, potentially leading to wrong assumptions on the cost-effectiveness and essential roles CHW programs can play to fill the gaps towards achieving UHC.

In response to these limitations, this paper introduces a comprehensive CHW costing matrix that fills critical gaps in costing models. Building on CARE's recent CHW and costing studies, and tools such as the CHW Assessment and Improvement Matrix (CHW-AIM), this new CHW costing matrix incorporates prioritized domains for health program effectiveness and accounts for key gender-related factors that influence CHW performance, including unsafe working conditions and pay challenges.^{3,11} In addition, we present two case studies applying the costing matrix in South Sudan and Bangladesh to reflect operational realities. By aligning CHW investments with expected health system performance and economic returns, this new CHW costing matrix gives policymakers, donors, and implementation partners actionable insights to inform effective planning and budgeting of national community health worker programs.

Methods

The matrix was developed with the help of pro-bono consultants from the healthcare industry through a structured four-step process, spanning May 2024 to September 2025. First, we identified key barriers to CHW performance based on stakeholder input and field-level insights. Next, we mapped actionable factors to each barrier, ensuring that every factor corresponded to a specific, feasible task. These were then consolidated into a core set of programmatic factors essential for effective CHW implementation. Finally, for each task, we identified the staff member responsible and assigned labor costs using standardized formulas that translated time and staffing requirements into monetary values based on local salary data.

Following this four-step process, we validated the data through structured interviews and collaborative workshops with CARE International teams in the USA, Bangladesh, and South Sudan. These engagements allowed for iterative refinement of the list of barriers and corresponding factors, ensuring that all relevant elements were accurately captured. Secondary data sources, including national and international labor and commodity cost databases, NGO costing reports, and peer-reviewed literature, were used to inform unit cost estimates and align the identified factors with existing

evidence. The matrix is designed to rely primarily on publicly available government data, which NGO specialists are adept at locating and interpreting, enhancing its usability in low-resource settings.

We then piloted the costing matrix in Bangladesh and South Sudan to demonstrate its utility and adaptability across a variety of health system contexts. These countries were selected to reflect a spectrum of health system functionality and income levels.^{12,13} Bangladesh, a World Bank lower-middle-income country, represents a relatively high-functioning system with an established CHW infrastructure, while South Sudan, a low-income country, illustrates a fragile context with limited system capacity and operational challenges.

Through these pilots, we identified redundancies and streamlined the matrix for final use. The case studies validate the matrix's applicability across varied environments, highlight its ability to identify gaps in CHW program design, surface cost drivers that are often overlooked, and support strategic planning by mapping funding needs, clarifying roles, and informing partner contributions. These findings also underscore the importance of interpreting matrix results within country-specific contexts, as final cost estimates remain sensitive to local factors such as inflation, currency volatility, population dynamics, and public health priorities.

The final matrix comprises 14 factors organized into four domains that reflect the CHW employment lifecycle: recruiting and hiring, onboarding and training, retention, and integration and recognition. Together, these domains capture the full spectrum of programmatic inputs required to support CHWs, from recruitment through long-term system integration. [Table 1](#) provides definitions of all factors.

Table 1. Domains and factors of the Community Health Worker (CHW) costing matrix.

Domain	Factor	Definition
Recruiting & Hiring	1. Clearly defined CHW* responsibilities, with broad hiring criteria	Accurate and comprehensive job descriptions, including expectations for responsibilities beyond healthcare delivery (i.e., organizing community activities, sharing local government information, etc.). Lived experiences (i.e., caring for family and community members) are weighted similarly to schooling when making hiring decisions.
	2. CHW salary and benefits	Ensure “livable” wages (as defined by the labor law/regulations in the country). Benefits may include paid time off, sick leave, maternity leave, caregiver leave, transportation, direct deposit, and timely payment, mental health support (screenings, access to services, training on stress management and self-care).
	3. Payments and incentives	Compensation for expanded job descriptions or tasks; applies where CHWs are unpaid or underpaid. May include additional payments tied to expanded responsibilities, without requiring additional hours.
Onboarding & Training	4. Certification for CHWs	Standardized assessment of knowledge and skills of CHWs at initial hire and repeated at regular intervals thereafter.
	5. Expanded training curriculum	Country- or county-specific content, which may include technology/data collection, disaster preparedness and response, caregiver fatigue and work-life balance, workplace violence/harassment, and other gaps identified in employee surveys.
	6. Technology and support	Provision of devices for CHWs to minimize paper record-keeping; ongoing tech support and updates. Includes community health information management systems (e.g., DHIS2**) with point-of-care applications for digital service delivery.

Table 1. *Continued*

Domain	Factor	Definition
Retention	7. Employee satisfaction	Regularly conducted employee surveys to assess job satisfaction, monitor gaps, and inform improvements.
	8. Support for supervisors	Training supervisors in monitoring and addressing CHW burnout and stress. Includes regular reflective sessions to review, troubleshoot, and provide on-the-job support.
	9. Workplace safety	Ensuring safety while traveling to and from work and while on duty. Includes treatment and support for victims, plus anonymous reporting mechanisms for violence or harassment.
	10. Promotions and career development	Merit-based promotions, leadership development programs, and mentorship opportunities where experienced CHWs guide newer CHWs.
	11. Internal transfers/job mobility	Clear, fair processes for internal transfers to accommodate personal needs while maintaining employment continuity.
Integration & Recognition	12. Integration with and recognition by the MoH***	Formal integration within the health system, including referral privileges and data system integration. Regular reports to the MoH and recognition mechanisms such as awards for high-performing CHWs/clinics.
	13. Community empowerment and engagement	Community education on the value and roles of CHWs to strengthen trust and utilization.
	14. Accountability	Ensuring CHW workloads align with job descriptions, tasks are distributed fairly, and breaks are provided. Includes regular reporting on system performance and gaps to the MoH.

This table defines all domains and associated factors included in the CHW costing matrix, developed to assess program readiness and identify gaps in workforce support. Each factor corresponds to a specific operational or structural element required for effective CHW program performance.

*CHW – Community Health Worker,

**DHIS2 – District Health Information Software 2,

***MoH – Ministry of Health.

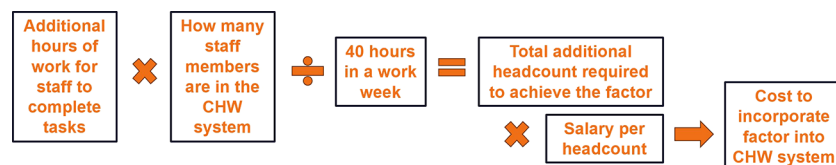


Figure 1. Formula for calculating additional costs of unmet CHW program factors. This figure illustrates the calculation used to estimate the additional annual cost of integrating unmet factors into CHW programs, based on workforce time requirements, staffing numbers, and local salary data.

The matrix calculates labor costs using the formula illustrated in **Figure 1**, assuming a 40-hour workweek and a 52-week year.

1. Calculate the total headcount required to achieve a factor:

$$\text{Total additional headcount} = \frac{(\text{additional hours of work required to complete task}) \times (\text{Number of staff members in the CHW system})}{40 \text{ hours in a work week}}$$

Headcount, as used in this formula, refers to the number of full-time equivalent staff required to complete a task.

2. Calculate the additional cost to the health system:

$$\text{Cost to incorporate factor in the health system} = \text{total additional headcount} \times \text{annual salary per headcount}$$

Table 2. Gaps identified through application of the CARE CHW costing matrix in Bangladesh and South Sudan.

Domain	Bangladesh	South Sudan
Recruiting and Hiring	- Clearly defined CHW responsibilities with broad hiring criteria* - Salary and Benefits* - Payments and Incentives	- Clearly defined CHW responsibilities with broad hiring criteria - Salary and Benefits
Onboarding and Training	Curriculum*	Technology and Support
Retention	- Promotions and Career Development - Internal transfers/Job mobility	- Employee Satisfaction* - Support for Supervisors
Integration and Recognition	N/A	N/A

This table summarizes the factors identified as unmet or partially unmet in Bangladesh and South Sudan through application of the CHW costing matrix. It highlights key areas requiring additional investment to support CHW performance, including roles and responsibilities, supervision, remuneration, and training.

*Factor partially met by health system, i.e., some cadres of staff within the CHW program have the factor addressed, while some do not.

Results

To assess the utility and adaptability of the costing matrix across multiple health system contexts, we piloted it in Bangladesh and South Sudan. Unmet factors common to both countries include clearly defined CHW responsibilities with broad hiring criteria, and salaries and benefits. Table 2 summarizes all unmet factors. Applying the matrix estimates that addressing these gaps would require US\$7.1 million annually in Bangladesh (US\$0.04 per capita; 0.07% of government health expenditure) and US\$298,414 in South Sudan (US\$0.026 per capita; 0.05% of government health expenditure), to enable CHWs to deliver services effectively within their catchment areas. Population figures are from 2023 WHO data, and financial data are based on 2022 World Bank per capita health expenditure and GDP data.^{14,15} Complete costing matrices and calculations for both countries are shown in Figures 2 and 3 below (Table 2).

For both countries, CHW responsibilities were not clearly defined. In South Sudan, Boma Health Workers (BHWs) provide primary health care services, including integrated community case management and drug distribution. The Department of Health is considering formally expanding BHW roles to include surveillance of neglected tropical diseases and malaria screening and treatment. This expansion may require skills beyond the current literacy and numeracy requirements, leaving job descriptions (JDs) unclear. In Bangladesh, several cadres of frontline community health workers (CHWs), including Family Welfare Visitors (FWVs), Family Welfare Assistants (FWAs), Sub-Assistant Community Medical Officers (SACMOs), and Community Health Care Providers (CHCPs), require updated job descriptions (JDs) to reflect rising workloads driven by population growth. Organizational structures for managing these cadres are also under revision. The SACMO position and JD will remain, but SACMOs will be consolidated under the Department of Health and based at Union Health and Family Welfare Centers.

For CHCPs, however, major challenges persist. Community clinics have not fully achieved their original purpose of driving disease prevention, and health education and counseling services remain limited. Moreover, CHCPs lack clear supervisory structures at the field level. Because the Community Clinic Health Support Trust (CCHST) and the Directorate General of Health Services (DGHS) operate under separate management, no dedicated HR staff from CCHST directly supervise CHCPs. In practice, Health Inspectors (HIs) and Assistant Health Inspectors (AHIs) provide oversight, but this arrangement functions poorly.

Regarding salary and benefits, both countries reported gaps. Current compensation does not reflect the expanded responsibilities and skills required of CHWs. In South Sudan, BHWs receive US\$50/month without benefits; adjustments may be considered if JDs are revised. In Bangladesh, CHCPs receive a fixed salary of approximately \$137 per month (currently in negotiation in country). In contrast, Health Assistants (HAs) and FWAs earn between approximately \$130 and \$300 per month respectively, depending on grade and tenure. Unlike other government CHWs, doctors, and nurses who receive pensions, gratuity, leave, and medical coverage, CHCPs are entitled only to basic leave (annual, maternity) and do not receive pensions or salary increments. A recent government circular has confirmed annual salary increments for CHCPs, and adding pensions for CHCPs is currently under review. CHCP positions were shifted to a lower grade under the new revenue system, which secured their jobs but reduced their status. Together with limited benefits, this downgrade could diminish motivation.

Factor	Is factor being met by current CHW system? (If no, go to next column; If yes, go to next row)	Staff member responsible (actual job titles will vary by geography)	Grade	Average Annual salary for staff member (USD)*	Average Annual salary for staff member (BDT)*	Additional hours/week per responsible staff member	How many of these staff members exist in system	Total additional headcount required	Total headcount cost to incorporate factor into CHW system	Total cost (USD)
Recruiting and Hiring	Clearly defined CHW responsibilities, with broad inclusive hiring criteria (specifically for FWVs, FWAs SACMOs)	yes	Civil surgeon	\$ 6,925.00	845,127	0	487	0	\$ -	\$ 7,100,826.70
		yes	Medical Officers	\$ 3,348.00	408,590	0	40162	0	\$ -	
	SACMO (Health)	no	Upazila Health and Family Planning Officer	\$ 3,000.00	366,120	4	492	49	\$ 147,600.00	
	SACMO (FP)	yes	MO-MCHFP	\$ 3,348.00	408,590	0	540	0	\$ -	
	FWV reports	yes	Family Planning Inspector	\$ 2,760.00	336,830	0	4500	0	\$ -	
	FWA indirectly reports	yes	Assistant Upazila Family Planning Officer	\$ 2,424.00	295,825	0	355	0	\$ -	
	CHCP	yes	Assistant Health Inspectors	\$ 1,652.00	201,610	0	19150	0	\$ -	
	Salary and Benefits - should be annual not monthly	no	Sub-Assistant Community Medical Officer	\$ 1,488.00	181,596	4	7927	793	\$ 1,179,537.60	
		yes	Family Welfare Visitors	\$ 1,632.00	199,169	0	4,286	0	\$ -	
		no	Family Welfare Assistants	\$ 1,524.00	185,989	4	20,000	2000	\$ 3,048,000.00	
	receive salary but no benefits (can get bonus)	no	Community Health Care Promoters	\$ 1,728.00	210,885	4	13,822	1382	\$ 2,388,441.60	
	Payments and Incentives	no						0	\$ -	
	Certification for CHWs	yes	Civil surgeon	\$ 6,925.00	845,127		487	0	\$ -	
		yes	Medical Officers	\$ 3,348.00	408,590		40162	0	\$ -	
Onboarding and Training	SACMO (Health)	yes	Upazila Health and Family Planning Officer	\$ 3,000.00	366,120	0	492	0	\$ -	
	SACMO (FP)	yes	MO-MCHFP	\$ 3,348.00	408,590	0	540	0	\$ -	
	FWV reports	yes	Family Planning Inspector	\$ 2,760.00	336,830		4500	0	\$ -	
	FWA indirectly reports	yes	Assistant Upazila Family Planning Officer	\$ 2,424.00	295,825		355	0	\$ -	
	CHCP	yes	Assistant Health Inspectors	\$ 2,424.00	295,825	0	19150	0	\$ -	
	Curriculum	yes	Training lead/ consultants	\$ 420.00	51,257	0	200	0	\$ -	
		yes	CHCP		-			0	\$ -	
		no	FWA/FWV		-			0	\$ -	
	Technology and support	yes	Tech lead	\$ 1,000.00	122,040	0	200	0	\$ -	
	Employee satisfaction	yes	Upazila Health Officer	\$ 3,000.00	366,120	0	700	0	\$ -	
		yes	deputy director family planning	\$ 7,914.00	965,825	0	64	0	\$ -	
		yes	Upazila FP Officer	\$ 3,000.00	366,120	0	3000	0	\$ -	
		yes	District Civil Surgeon	\$ 6,925.00	845,127	0	487	0	\$ -	
	Support for supervisors	yes	Upazila Health and Family Planning Officer	\$ 3,000.00	366,120	0	492	0	\$ -	
Retention	Workplace safety	yes	Medical Officers	\$ 3,348.00	408,590	0	40162	0	\$ -	
	Promotions and Career Development	no	Civil Surgeon	\$ 6,925.00	845,127	2	487	24	\$ 168,623.75	
	Internal Transfers/ job mobility	no	Civil Surgeon	\$ 6,925.00	845,127	2	487	24	\$ 168,623.75	
	Integration with MoH and recognition by MoH	yes	Upazila Health and Family Planning Officer	\$ 3,000.00	366,120		492	0	\$ -	
	Community empowerment and engagement	yes	Sub-Assistant Community Medical Officer	\$ 124.00	15,133	0	7927	0	\$ -	
	Accountability	yes	Civil Surgeon	\$ 6,925.00	845,127		487	0	\$ -	

Figure 2. Final costing matrix – Bangladesh. This figure presents the complete CHW costing matrix as applied to Bangladesh, showing all domains and factors, including those identified as unmet or partially met, with associated cost implications.

Based on information from the piloting process, promotions and job mobility in South Sudan are not merit-based. In Bangladesh, no formal leadership development programs for CHWs exist within the government system. Supervisor support also varies in South Sudan; supervision is limited by a lack of mobility, affecting accountability, whereas in Bangladesh, supervision follows the existing structure but could be strengthened. BHWs in South Sudan are formally recognized by the Ministry of Health and receive targeted training, although operational challenges such as supply gaps persist.

Finally, Bangladesh's CHW curriculum largely emphasizes technical competencies, but challenges persist in identifying suitable trainers at the local level and addressing the varied needs of health workers with different experiences. Post-training follow-up is limited, leaving gaps in assessing impact and supporting continuous learning. In addition, weak planning for rollout and bureaucratic delays in fund release further slow implementation.

Discussion

Bangladesh

Bangladesh's health system has experienced recent political upheaval, with the 2024 government overthrow leading to an interim administration responsible for the health and family planning ministries. The interim government has paused operational plans, slowed hiring and procurement, and faces challenges in financing sectoral priorities, with national elections anticipated in February 2026. A reform commission report indicates 40% of health sector positions remain vacant, prompting recruitment efforts for Family Welfare Visitors (FWVs), Family Welfare Assistants (FWAs),

	Factor	Is factor being met by current CHW system? (If no, go to next line)	Staff member responsible (actual job titles will vary by geography)	Average Annual salary for staff member (USD)*	Additional hours/week per responsible staff member	How many of these staff members exist in system	Total additional headcount required	Total headcount cost to incorporate factor into CHW system	Sum Total cost
Recruiting and Hiring	Clearly defined CHW responsibilities, with broad inclusive hiring criteria - BHWs	no	County health Director	\$600	8	128	26	\$15,360	\$298,414.40
		no	Boma Health supervisor; \$100/mo	\$1,200	8	128	26	\$30,720	
	Salary and benefits	no	BHWs	\$600	2	6408	320	\$192,240	
	Payments and incentives	yes	BHWs	\$0	0	0	0	\$0	
Onboarding and Training	Certification for CHWs	yes	Boma Health supervisor; \$100/mo	\$1,200	0	128	0	\$0	
	Curriculum	yes	Training lead/consultants	\$4	60	0	0	\$0	
	Technology and support	no	Tech lead	\$17,500	16	2	1	\$14,000	
	Employee satisfaction	yes	Field operations staff	\$0	0	0	0	\$0	
Retention		no	Boma Health supervisor; \$100/mo	\$1,200	8	128	26	\$30,720	
	Support for supervisors	no	Boma Health supervisor; \$100/mo	\$1,200	4	128	13	\$15,360	
		no	Administrative staff	\$6	16	6	2	\$14	
	Workplace safety: Ensure safety getting to and from work and while on the job	yes	Administrative staff	\$0	0	0	0	\$0	
	Promotions and Career Development: Merit-based promotions, from within when possible	yes	Administrative staff	\$0	0	0	0	\$0	
	Internal Transfers/ job mobility	yes	Administrative staff	\$0	0	0	0	\$0	
	Integration with MoH and recognition by MoH	yes	Policy makers/Advocacy	\$0	0	0	0	\$0	
Integration and Recognition	Community empowerment and engagement	yes	Administrative staff	\$0	0	0	0	\$0	
	Accountability	yes	Supervisors	\$0	0	0	0	\$0	

Figure 3. Final costing matrix – South Sudan. This figure presents the complete CHW costing matrix as applied to South Sudan, showing all domains and factors, including those identified as unmet or partially met, with associated cost implications.

Sub-Assistant Community Medical Officers (SACMOs), and Community Health Care Promoters, as outlined in a five-year sector plan.

The country maintains approximately 148,000 CHWs (60,000 government-paid) across multiple cadres, including Community Health Care Providers (CHCPs), FWAs, and Health Assistants (HAs), supplemented by NGO-supported cadres such as Bangladesh Rural Advancement Committee.^{3,5} Government policy establishes one community clinic per 6,000 – 10,000 people, with over 13,000 clinics operational, staffed primarily by CHCPs providing primary care.³ CHWs are recruited locally, trusted and supported by communities, and contribute to maternal, neonatal, and child health outcomes, particularly in rural areas and urban slums.^{3,4}

Our analysis highlighted gaps in JDs for frontline workers, including FWVs, FWAs, SACMOs, and CHCPs, reflecting increased workloads and evolving population needs. The interim government plans to consolidate SACMOs under the Department of Health, with services delivered from Union Health and Family Welfare Centers. For CHCPs, community clinics have yet to fulfill their intended role in disease prevention, and health education and counseling services are largely absent. The matrix also identified opportunities to improve supervision, promotion pathways, and integration across service centers, as well as to align salaries and incentives with expanded responsibilities. Application of the matrix revealed redundancies in retention, integration, and recognition categories and indicated the need to streamline onboarding, training, and supervision processes. Overall, the matrix provides a structured approach to inform human resource planning, enhance accountability, and guide policy adjustments amid ongoing health system reforms.

South Sudan

South Sudan's CHW programs operate in a fragile context, characterized by decades of conflict, weak infrastructure, and severe resource constraints. The country exhibits some of the world's poorest health indicators, including maternal mortality of 1,150 per 100,000 live births and under-five mortality of 99 per 1,000 live births.¹⁶ The national health system remains fragile, with limited human resources and frequent disruptions due to insecurity.

The government launched the Boma Health Initiative (BHI) in 2017 to formalize CHW services by deploying salaried BHWs across 2,136 Bomas (a local administrative designation like a district).^{16,17} BHWs complement CHWs based at primary health care units (PHCUs) and are supervised by county health officers.¹⁶ Approximately 56% of the population lives ≥ 5 km from a health facility, making BHWs the primary source of healthcare access for these communities.^{16,17} BHI provides essential services including maternal and child health, disease surveillance, and drug distribution, with strong community engagement in selection and oversight.¹⁷

Operational challenges persist, including insecurity, inconsistent donor funding, fragmented supply chains, high dropout rates in vaccination programs, limited training, and weak supervision.¹⁶ Salaries represent a major cost driver, with BHWs currently compensated US\$50/month, although additional responsibilities may require adjustments to pay and benefits. Expanding BHI services to include neglected tropical disease surveillance and malaria treatment as planned will increase workload and supervisory demands, with implications for costs, motivation, and service quality. Despite these constraints, expanded coverage could avert over 113,000 deaths from 2018 to 2028, highlighting the program's potential impact.¹⁷ The matrix facilitates understanding the financial and operational implications of scaling CHW services in South Sudan, particularly under fragile conditions.

Strengths and limitations

This costing matrix provides a standardized yet flexible framework to guide strategic planning and budgeting for essential health workers in resource-constrained settings, using publicly available government data. It captures both operational and financial aspects often overlooked in traditional costing tools, including the specific needs and experiences of female health workers who make up most of the CHW workforce. Unlike earlier frameworks, the matrix is simple and can be applied by in-country teams with minimal technical support, making it adaptable across various contexts.^{2,6,7,9,11,18,19}

However, several limitations should be acknowledged. First, cost estimates are sensitive to local factors, including inflation, currency fluctuations, population dynamics, and public health priorities. Second, some matrix factors, particularly those related to retention, recognition, and supervision, may require contextual interpretation, as implementation can vary widely across cadres and regions. Third, the matrix relies on available data, which may be incomplete or outdated in fragile settings. Furthermore, the application of the matrix assumes that CHWs are formalized members of the national health workforce, which may not always be the case across different contexts. In many settings, CHWs are primarily regarded as volunteers and often lack a legal or regulatory framework to ensure consistent payment or compensation for their work.¹

Finally, the tool does not capture all indirect costs, such as transportation, supply chain gaps, or infrastructure needs, which may influence overall program costs and efficiency.

Conclusions

The CARE CHW costing matrix is a simple yet comprehensive tool for mapping community health workforce needs, identifying gaps, and informing resource allocation. Its application in Bangladesh and South Sudan demonstrates its potential to guide evidence-based policy and support health system planning across both fragile and stable contexts. Given the central role of CHWs in delivering integrated health services, budgeting processes should address essential factors for program effectiveness, including clearly defined roles, responsibilities, and remuneration. We envisage the matrix serving as a practical, low-cost, and adaptable decision-support tool that ministries of health and international partners can apply across health systems of varying maturity and organization. Its added value lies in recognizing factors affecting a majority female workforce such as safety, fair pay, workload balance, and career advancement, often overlooked in traditional costing models. By aligning financial planning with workforce realities, the matrix offers a feasible approach to improving CHW program design and optimizing investment in community health.

Data availability statement

This method article does not generate or analyze any new datasets. All data used to illustrate the costing matrix are publicly available or come from non-identifiable institutional program information used only for demonstration. No new data were produced, and no dataset is associated with this manuscript.

Acknowledgements

The authors are grateful to Dr. Emmanuel Ojwang and John Manyang with CARE South Sudan for their contributions to the piloting process in South Sudan. We are also grateful to Joyce Sepenoo, Marie Haller, Emily Janoch, Erin Meegan, and Crystal Lander with CARE USA for their review.

References

- Olaniran A, Smith H, Unkels R, *et al.*: **Who is a community health worker? – a systematic review of definitions.** *Glob. Health Action.* 2017; **10**(1): 1272223.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Morrow M, Sarriot E, Nelson AR, *et al.*: **Applying the Community Health Worker Coverage and Capacity Tool for Time-Use Modeling for Program Planning in Rwanda and Zanzibar.** *Glob. Health Sci. Pract.* 2021; **9**: S65–S78.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#) | [Reference Source](#)
- Lopez C: **Community Health Worker Programs: Gaps and Solutions|A Multi-Country Study.** 2024.
- Sacks E, Morrow M, Story WT, *et al.*: **Beyond the building blocks: integrating community roles into health systems frameworks to achieve health for all.** *BMJ Glob. Health.* 2019; **3**(Suppl 3): e001384.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Liu A, Sullivan S, Khan M, *et al.*: **Community health workers in global health: Scale and scalability.** *Mt Sinai J. Med.* 2011; **78**(3): 419–435.
[Publisher Full Text](#)
- Nepal P, Schwarz R, Citrin D, *et al.*: **Costing Analysis of a Pilot Community Health Worker Program in Rural Nepal.** 2020; **8**.
[Reference Source](#)
- Collins D, Griffiths U, Birse S, *et al.*: **Calculating the Costs of Implementing Integrated Packages of Community Health Services: Methods, Experiences, and Results From 6 sub-Saharan African Countries.** *Glob. Health Sci. Pract.* 2023; **11**: e2200472.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#) | [Reference Source](#)
- Masis L, Gichaga A, Zerayacob T, *et al.*: **Community health workers at the dawn of a new era: 4. Programme financing.** *Health Res. Policy Syst.* 2021; **19**: 107. BioMed Central Ltd.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Mirambeau AM, Wang G, Ruggles L, *et al.*: **A cost analysis of a community health worker program in rural Vermont.** *J. Community Health.* 2013; **38**(6): 1050–1057.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Janoch E, Rodriguez M, Turner B: **Our Best Shot: Women Frontline Health Workers in Other Countries Are Keeping You Safe from COVID-19.** 2021. Accessed October 5, 2025.
[Reference Source](#)
- Ballard M, Bonds M, Burey JA, *et al.*: **Community Health Worker Assessment and Improvement Matrix (CHW AIM) Updated Program Functionality Matrix for Optimizing Community Health Programs.** 2018.
- World Health Organization: **South Sudan [Country overview].** 2025. Accessed September 14, 2025.
[Reference Source](#)
- World Health Organization: **Bangladesh [Country overview].** 2025. Accessed September 14, 2025.
[Reference Source](#)
- World Health Organization: **WHO Global Health Observatory data repository.** 2025. Accessed September 16, 2025.
[Reference Source](#)
- The World Bank Group: **Current health expenditure (% of GDP) - South Sudan, Bangladesh |Data.** 2025. Accessed September 14, 2025.
[Reference Source](#)
- Lutwama GW, Kok M, Jacobs E: **An exploratory study of the barriers and facilitators to the implementation of community health worker programmes in conflict-affected South Sudan.** *Confl. Heal.* 2021; **15**(1): 82.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Gilmartin C, Collins D, Driwale A: **South Sudan Boma Health Initiative Costing and Investment Case Analysis.** 2019.
- Management Sciences for Health: **Community Health Planning and Costing Tool (Version 2.0) Handbook.** 2020.
- Bowser D, Okunogbe A, Oliveras E, *et al.*: **A Cost-Effectiveness Analysis of Community Health Workers in Mozambique.** *J. Prim. Care Community Health.* 2015; **6**(4): 227–232.
[PubMed Abstract](#) | [Publisher Full Text](#)