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Is quality affordable for community health systems? Costs of integrating quality improvement into close-to-community health programmes in five low-income and middle-income countries

Meghan Bruce Kumar,[1,2] Jason J Madan,[3] Maryline Mireku Achieng,[4] Ralalicia Limato,[5] Sozinho Ndima,[6] Aschenaki Z Kea,[7] Kingsley Rex Chikaphupha,[8] Edwine Barasa,[9,10] Miriam Taegtmeyer[1]

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For numbered affiliations see end of article.

Correspondence to
Meghan Bruce Kumar;
meghan.brucekumar@lstmed.ac.uk

ABSTRACT

Introduction Countries aspiring to universal health coverage view close-to-community (CTC) providers as a low-cost means of increasing coverage. However, due to lack of coordination and unreliable funding, the quality of large-scale CTC healthcare provision is highly variable and routine data about service quality are not trustworthy. Quality improvement (QI) approaches are a means of addressing these issues, yet neither the costs nor the budget impact of integrating QI approaches into CTC programme costs have been assessed.

Methods This paper examines the costs and budget impact of integrating QI into existing CTC health programmes in five countries (Ethiopia, Indonesia, Kenya, Malawi, Mozambique) between 2015 and 2017. The intervention involved: (1) QI team formation; (2) Phased training interspersed with supportive supervision; which resulted in (3) QI teams independently collecting and analysing data to conduct QI interventions. Project costs were collected using an ingredients approach from a health systems perspective. Based on project costs, costs of local adoption of the intervention were modelled under three implementation scenarios.

Results Annualised economic unit costs ranged from $62 in Mozambique to $254 in Ethiopia per CTC provider supervised, driven by the context, type of community health model and the intensity of the intervention. The budget impact of Ministry-led QI for community health is estimated at 0.53% or less of the general government expenditure on health in all countries (and below 0.03% in three of the five countries).

Conclusion CTC provision is a key component of healthcare delivery in many settings, so QI has huge potential impact. The impact is difficult to establish conclusively, but as a first step we have provided evidence to assess affordability of QI for community health. Further research is needed to assess whether QI can achieve the level of benefits that would justify the required investment.

Key questions

What is already known?

- The quality of close-to-community (CTC) healthcare services is highly variable and routine programme data are of poor quality.
- Quality of care provided by CTC providers can be improved through quality improvement (QI) approaches and measures.
- Stakeholders perceive QI approaches to be an additional and diversionary cost in resource-limited settings.

What are the new findings?

- Across the countries studied, capital costs of training are similar across implementation scenarios and represent a large proportion of the total cost of implementing QI approaches.
- Recurrent economic costs of QI per CTC provider range from $54 in Mozambique to $233 in Ethiopia, driven by costs of staff and volunteer time.
- The budget impact of national-scale QI for CTC programmes ranges from 0.03% to 0.58% of general government expenditure on health.

What do the new findings imply?

- Sustaining recurrent costs of QI for CTC programs is likely affordable within budget constraints if capital costs of training are supported.
- Systematic measuring of the benefits of QI on processes and outcomes should be a routine part of policy and practice to underpin investment decisions.

INTRODUCTION

Many governments struggling to achieve universal health coverage (UHC) in resource-poor settings are considering expanding healthcare coverage at low cost through the

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use of close-to-community (CTC) providers of healthcare.[1–6] Composed of a wide range of typologies, CTC providers are lay health workers with relevant training for their responsibilities. They include: community health volunteers, community health (extension) workers, nutrition counsellors and traditional birth attendants, among others.[1 7] CTC providers deliver a range of preventive, promotive and curative healthcare services at community level depending on context and policy[5 8 9] and have been found to be effective in expanding service coverage in certain contexts and clinical areas.[10 11] However, CTC providers face numerous challenges working at the interface between communities and health systems due to factors such as: working remotely (where it can be difficult to maintain standards), lower literacy rates, higher attrition rates, less education and fewer support structures than other professional, formal cadres of healthcare workers more closely linked to the formal health sector.[9 12] Additionally, efforts to consider quality at the health system or global level continue to leave out CTC providers and ignore the potential contribution of the community level to health system goals.[13–15]

Despite the perception that CTC provision of care is 'cheap', economic evaluation of the work of CTC providers and programmes is complex due to a unique combination of challenges. First, costing involving this cadre is complicated by its composition of primarily part-time and/or volunteer workers (who may pay out-of-pocket costs that are difficult to measure for food or transport to support the effectiveness of the programmes).[16] Second, drawing generalisable conclusions is also difficult as the responsibilities, training, supervision and remuneration of CTC providers between (and even within) countries vary widely.[7 17] These challenges are not unique to CTC programmes, but this is an area where challenges are particularly numerous and acute. Additionally, cost-effectiveness studies rely on causal, proximal clinical outcomes to an intervention and high-quality data.[18 19] With community health, however, the long-term benefits of the primarily preventive and promotive services provided by CTC health workers are challenging to measure and to attribute[20–22] and the quality of the data on both costs and benefits are questionable.[23–26] Few studies and models to date have taken this complexity sufficiently into account to collect real life data on the full set of services, focusing instead on a limited set of services and/or heavily on modelling.[18 27 28]

Policy makers are beginning to question whether CTC providers can achieve equitable service quality at low cost.[29] Evidence is growing for systematically incorporating quality improvement (QI) approaches into community health programmes in low-income and middle-income countries, especially in maternal and child health.[30–34] These community-level approaches appear to have been successful in terms of improving the quality and equity of services, but there is limited information about costs or cost-effectiveness of implementation.[32 34] This lack of financial data acts as a barrier to decision makers, who may perceive the financial and time costs of incorporating QI approaches to be high when compared with the urgency of further expanding coverage while under pressure to show progress towards UHC.[35 36] We set out to examine the costs of integrating QI approaches in community health programmes at a mid-level of administration in Ethiopia, Indonesia, Kenya, Malawi, Mozambique—five countries with established community health programmes addressing maternal and/or child health among other priorities at CTC level through preventive and promotive care (table 1). This study is a first, essential step towards assessing the cost-effectiveness of this approach.

METHODS

We nested this costing within REACHOUT, a consortium of research partners in community health conducting an implementation research study addressing the feasibility and effectiveness of QI at community level.[37] While the CTC providers' typology and responsibilities varied across the countries, we used a common approach to QI team establishment and training. Based on actual project costs, we have then taken a scenario planning approach to assess the costs and budget impact of a long-term Ministry of Health (MoH)-led adoption of this approach by public sector staff in each setting. We report (in 2017USD): total and annualised economic costs per country; total and average annual financial costs of the intervention per country; for the MoH-led adoption, we report the same and add the unit economic and financial costs of intervention per: catchment population, CTC provider, QI team trained and administrative area. We also report the budget impact of national scale-up of MoH-led QI.

The intervention

QI capacity development efforts were guided by a common approach across the study countries, as shown in figure 1. In all settings, after curriculum development and adaptation of the training materials, QI teams made up of CTC providers, supervisors and health facility staff (average eight people) were established. In Kenya and Ethiopia, project team and MoH partners decided in step 3 to form QI teams at both the community and the district levels. These teams were trained in three phases to conduct QI for community health using Plan-Do-Study-Act (PDSA) cycles. PDSA approaches are characterised by local selection, prioritisation and action on quality problems identified from local data.[38–42] Training content included: standards for quality in community health, quality assurance and QI concepts, community health information systems, supportive supervision, and so on. The three phases of training and exchange (implemented over 9–12 months) were interspersed with periods of implementation of QI by the teams, involving team meetings and interventions to improve quality supported by mentorship from supervisors, with

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Table 1 Intervention sites for quality improvement (QI) capacity development intervention[47 48 80–84]

Country *Region*	Administrative unit (district or equivalent)	QI teams	Setting	Catchment population	CTC providers	# of CTC providers supervised	Focus of CTC programme	Policy ratio of CTC providers to population
Ethiopia *Southern Nations, Nationalities and Peoples' Region, Sidama Zone*	Shebedino *woreda**	1 Community QI team at *woreda** level 9 Community QI teams covering health centre catchments: Abela health centre Galuko-hirreye health centre Gebre-kirstos health centre Mero kawado health centre Telamo health centre Fura health centre Dobe toga health centre Morocho negasha health centre Dulacha health centre	Rural, medium-remote	244 489	Health extension workers	68	Preventive, curative, family planning	2:5000
Indonesia *Cianjur district*	Cianjur district	4 Community QI teams covering three *puskesmas*† Cikalongkulon *Pukesmas*† Ciranjang 1 *Pukesmas*† Ciranjang 2 *Pukesmas*† Gekbrong *Pukesmas*†	Suburban, medium-remote	188 323	*Puskesmas* midwives	47	Maternal health (including delivery)	~1:5000–6000 general population (but serve women)
Kenya *Nairobi county*	Embakasi West subcounty Kasarani subcounty Lang'ata subcounty	3 Community QI teams at subcounty 9 Community QI teams covering community units: Maili Saba Unit Bangladesh Unit Southlands Unit Raila Unit Gitari Marigu Unit Housing Development Dept Unit City Carton Unit Matopeni Unit Ribakia Unit	Urban, non-remote	737 460	Community health volunteers Community health extension workers	1530	Preventive	1:500 1:2500
Malawi	Mchinji, Salima districts	2 Community QI teams at district level	Rural, remote	213 206	Health surveillance assistants	121	Preventive, curative	1:1000
Mozambique *Maputo province*	Manhiça, Moamba districts	2 Community QI teams at district level	Rural, non-remote	214 388	Agentes polivalentes elementares	68	Preventive, curative	~1:500–2000

**Woreda* is the Amharic word for district, at the level below Zone in the Ethiopian health system.
†*Puskesmas* is the Bahasa word for community health facility.
CTC, close-to-community.

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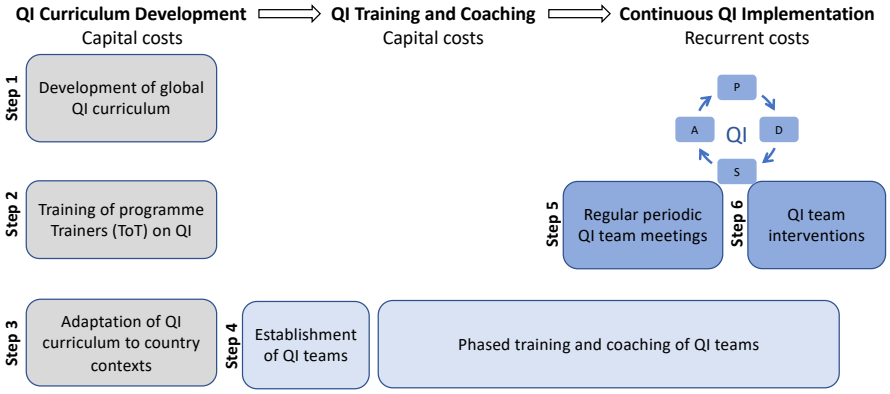

Figure 1 Common approach to capacity development for quality improvement (QI) for close-to-community (CTC) healthcare across countries.

the expectation that implementation could be continued indefinitely in what is termed 'continuous QI'. Examples of QI priorities tackled include: improving timeliness of reporting by CTC providers; improving follow-up of pregnant women referred for antenatal care; reducing rates of unskilled delivery. These priorities were selected and improvement was measured by the teams using local community health information systems and data.

Study site selection

The common approach to QI in community health was implemented with 21 QI teams in 11 administrative areas of the five countries serving a total of 1.6 million people in their catchment areas. In each country, study sites were selected for the QI intervention in collaboration with stakeholders from the community and MoH building on earlier supportive supervision interventions for the CTC programme (see table 1). Further description of the CTC provider typologies in each of the study sites including selection, training and responsibilities can be found in Supplementary File 1.[43]

Costing approach

The costing took a health systems perspective, taking into account health system resource and time costs (we differentiate that from health system costs, as CTC providers may not be salaried individuals whose time is explicitly valued by the health system).[44 45] Specifically, we collected and report both economic and financial costs of the intervention, as well as the budget impact of national scale-up based on the financial costs only. Financial costs refer to outlay of money; economic costs encompass financial costs and opportunity costs of time, even where people are already salaried or are volunteers and their time is 'free'. An ingredients approach was used to assess the costs of each phase of the intervention in the following categories: staff time (encompasses volunteer time), lodging/ transport, communication, venue, refreshment, stationery.[46] In our model, costs incurred during the training are treated as capital costs while the QI implementation represents recurrent costs of the intervention. The useful life of the training is taken as 4 years (ie, all participating staff would receive full retraining in year 5). Details of specific cost adjustments made at each of the steps of the intervention when calculating country costs can be found in Supplementary File 2.

Data on the actual costs in local currency of QI capacity development and functioning were collected retrospectively (March–July 2017) from country research teams using a combination of structured questionnaire on activities and a spreadsheet for unit resource costs (Supplementary Files 3 and 4). Project costings for consumables were calculated by multiplying units of resources consumed by market rates in May 2017. For other categories, that is, salaries, venue, transport, communication, actual project expenses incurred were used. Data were provided by implementation and finance team members from each REACHOUT country partner institution and validity of data was confirmed through back-checking financial reporting and audited information. Salaries for the public sector staff involved in intervention activities were obtained from public documents referenced here; where not available they were estimated from available data.[47–52] Where available, actual value of employment benefits were used. Where not available, an assumption of 15% of salary was applied. We excluded outcome-related costs, for example, costs averted due to improved health, as outside the scope of the study.

Annual costs are reported in 2017USD and exchange rates from May 2017 were used.[53] For details of cost adjustments made at each of the steps of the intervention when calculating country costs, see Supplementary File 2. (NB country costs cannot be added together to compute the actual total project cost due to these adjustments). A discount rate of 3% was applied to future costs; because

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inflation was only relevant to the development (sunk) costs, this is not accounted for in the model. Data were input and managed in Microsoft Excel V.15.32.

Scenario planning and sensitivity analysis

Based on project costing, we present three scenarios for adoption of the intervention in each country, which we term 'MoH-led QI'. These scenarios assume the interventions were to be repeated across the same administrative area and population as the project-led approach. Specifically, we present the economic costs of MoH-led QI per administrative area of the intervention (table 1) by step of the intervention (figure 1). Where multiple levels of QI teams were involved (ie, in Kenya and Ethiopia), we have included costs for both and described this as increased intensity of intervention.

All scenarios for MoH-led QI involved the following modifications to the project costs: (1) dropping all development costs as sunk costs incurred by REACHOUT (steps 1–3); (2) health system staff acting as trainers (step 4); and (3) periodic mentorship at quarterly QI team meetings (step 5). Deterministic sensitivity analyses were conducted around 'best' case and 'worst' case scenarios for MoH-led QI, based on the level of involvement required of project staff in the scale-up and the frequency of QI team meetings and interventions (Supplementary File 5 for details).

Budget impact analysis

Budget impact analysis was conducted by comparing the financial costs of MoH-led QI, scaled up linearly to national level based on the total number of administrative areas in the country, with the annual general government expenditure on health (GGHE). GGHE was chosen as a comparator for the budget impact analysis for two reasons: first, financing for community QI is unlikely to be a repurposing of community/preventive care budgets. In part, this is due to the reliance on unpaid or low-paid staff in current community/preventive care budgets, making this a misleading comparison (in addition to the variability in pay levels for CTC providers between contexts). Also, what is proposed is a systemic change to the health system, given how CTC providers are used (across a broad spectrum of health areas) and could be supported by general government funding. The argument is for government investment, so need to compare with GGHE. Second, as community/preventive care budgets are often not earmarked in externally available documents, using these as the basis of budget impact analysis would require us to estimate a percentage of GGHE rather than relying on empirical data. Specific analyses for each health system or even budget-holding unit with more granular data would still be required for ultimate financing decisions—this analysis is indicative of broader trends in investment in community health systems and quality across systems.

GGHE data were obtained from the National Health Accounts database (on 6 October 2017)[54] and inflated from 2014USD (the most recent year to have complete data) to 2017USD,[55] assuming no change in expenditure over these 3 years as GGHE as a portion of total government expenditure has remained constant for some time. We have not included salaries of public sector staff as financial costs in the budget impact analysis because no additional staff were hired to conduct the QI activities.

Ethical approval

Country research activities described herein were governed under national approvals; details available in Supplementary File 6.

Patient and public involvement

Co-development of research questions in the wider REACHOUT sproject was done with relevant government counterparts and community health stakeholders in each country; patients were not directly involved in any way. Results will be disseminated to participants through technical working groups in each country as relevant.

RESULTS

Total costs of project-led QI intervention

The economic costs of developing the intervention, establishing and training 29 QI teams, and mentoring those teams through one completed QI cycle were incurred across the 11 administrative areas in the five countries as part of the REACHOUT project. These ranged from $11 351.32 (Mozambique) to $333 589.89 (Kenya) and show the full costs of the dedicated technical project teams, curriculum development and training. When aggregated across countries, costs of conducting the three phases of training made up about 70% of the total costs and were driven largely by people-time and by the intensive, phased nature of the training. Training costs varied widely between the five countries and were greatest in Kenya at $267 111 (where the highest number (12) of teams were trained), and were least in Indonesia at $3868, where the project team limited costs of this phase through use of available public sector venues. The total recurrent costs of implementation across countries (incurred in QI team meetings and QI interventions) were similar to development costs in year 1 (15%–16% of the total costs).

Total costs of MoH adoption of QI intervention

When MoH-led adoption of the QI approach is modelled for the same sites, the economic costs per administrative district are less than the project-incurred costs in each country, showing that unit costs of the intervention were higher for the project than those that would be faced by local decision makers. The annualised economic costs range from $4250.07 in Mozambique to $102 339.98 in Kenya (see table 2 for details of country costs). In sites where teams deliberately selected or prioritised QI problems that could be solved at low cost without additional project funding, the capital costs of training (incurred in year 1) represent a larger percentage of the total spend. Ethiopian and Malawian project teams provided

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Table 2 Financial and economic costs of Ministry of Health-led quality improvement for community health in each country (2017USD)

Country	Financial costs			Unit annual financial costs per:					Economic costs			Unit annualised economic cost per:				
	Capital costs of training	Annual recurrent costs	Average annual cost	Administrative area	QI team trained	QI team member	CTC provider supervised	Capita	Capital costs of training	Annual recurrent costs	Annualised cost	Administrative area	QI team trained	QI team member	CTC provider supervised	Capita
Ethiopia	8509.25	9034.92	11 324.13	11 324.13	1258.24	179.75	166.53	0.05	12 326.54	13 959.67	17 275.84	17 275.84	1919.54	274.22	254.06	0.07
Indonesia	2008.98	62.15	602.62	200.87	150.65	20.78	12.82	0.00	3371.14	6536.81	7443.74	2481.25	1860.94	256.68	158.38	0.03
Kenya	84 853.87	16 938.84	39 766.82	13 255.61	3313.90	414.24	25.99	0.05	259 211.01	32 605.21	102 339.98	34 113.33	8528.33	1066.04	66.89	0.14
Malawi	4878.76	4316.62	5629.14	2814.57	2814.57	201.04	46.52	0.03	9210.99	8932.05	11 410.06	5705.03	5705.03	407.50	94.30	0.05
Mozambique	4963.79	588.03	1923.42	961.71	961.71	83.63	28.29	0.01	7001.19	2366.56	4250.07	2125.03	2125.03	184.79	62.50	0.02

CTC, close-to community; QI, quality improvement.

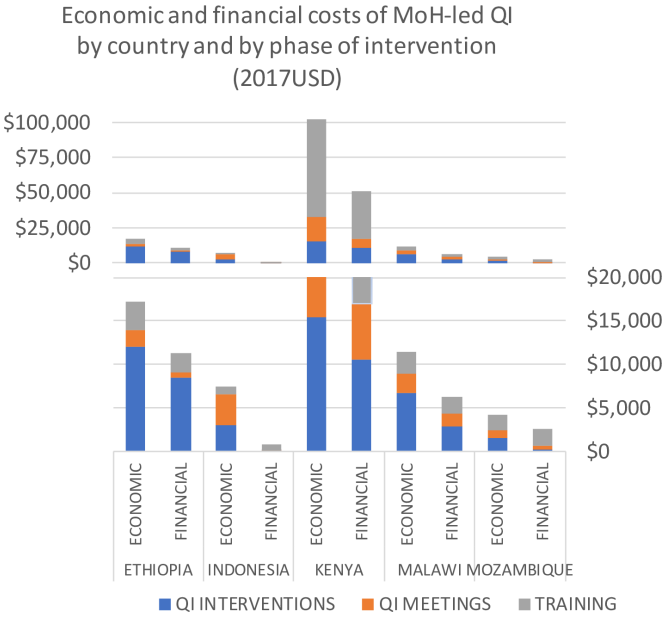

Figure 2 Annualised economic costs and average annual financial costs of Ministry of Health (MoH)-led quality improvement (QI) (by country and by step; 2017USD).

additional external 'project funds' to the QI teams when developing QI interventions (to cover items such as venue for refresher training of CTC providers, transportation for QI team to visit field facility sites and test new tools), which increased implementation costs. The average annual financial costs are lower in all sites than the annualised economic costs, as expected (figure 2). This is because a QI approach to community health requires an ongoing investment of time from existing staff in the form of trainings and meetings.

The overall costs of MoH-led QI show high intercountry variability (figure 2), in part due to the differences in the sites (table 1) in terms of geography, population density and the wage differential. In Kenya and Ethiopia where two levels of QI teams were formed, the impact on cost is demonstrated in a high resource-level difference in both sites, as well as a high unit cost per CTC provider supervised in Ethiopia and a high unit cost per QI team member trained in Kenya.

Based on the scenarios described in Supplementary File 5, active adoption (ie, greater ownership by public sector staff in training and more frequent QI interventions) drove up the annualised economic costs in each country by 7%–21% while more passive adoption led to decreased costs of 67%–92% of the base case values, with the greatest variability observed in Indonesia and Malawi (Supplementary File 7). Training, which is a relatively static cost across scenarios, represented a smaller proportion of the costs in these two sites, increasing sensitivity to the different levels of activity in the intervention phase.

Unit costs of MoH-led QI for community health

As shown in table 2, the costs of MoH-led QI per capita are between <0.01–0.5 (financial) and 0.02–0.14 (economic). The annualised economic costs per administrative area

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are between $2125 (Mozambique) and $34 113 (Kenya). Despite that variation, the annualised economic costs per CTC provider supervised are much closer, ranging from $62 (Mozambique) to $254 (Ethiopia). Mozambique presents the lowest economic costs overall and economic unit costs in all cases except per QI team trained, for which unit costs in Indonesia and Ethiopia are lowest (table 2). The average financial cost per CTC provider supervised ranges from $12 in Indonesia to $166 in Ethiopia.

In both Ethiopia and Kenya, the intensity of the intervention was much greater, involving formation of two levels: district-equivalent QI teams and community QI teams. Ethiopia was the most expensive site in which to embed the intervention across the key indicators of cost per CTC provider supervised. The number of health extension workers in Shebedino *woreda* is almost equivalent to the number of QI team members, so these unit costs appear very close. The Ethiopian costs are dominated by the cost-heavy intervention that was chosen by the woreda (district) community QI team, which was a 4-day refresher training exercise. In Nairobi, the site of the Kenyan intervention and the other outlier due to cost, high density of both CTC providers and population make it appear high cost at the administrative unit level, yet more affordable at these more granular unit levels (table 2). Mozambique had the least expensive intervention in terms of absolute costs and this remained true across all indicators. Indonesia, as the only Asian context, was the least expensive site to conduct the intervention financially, showing similar cost structures and constraints despite very different geography and health system structures.

Budget impact of MoH-led QI for community health

Annual government spending on health ranged from $15–16 per capita in Ethiopia and Malawi to $49 per capita in Kenya, whereas the annualised financial costs of MoH-led QI is between <$0.01 to $0.05 per capita. Based on scaling up the average annual financial costs of the intervention per administrative district to nationwide coverage, the budget impact of MoH-led QI for community health represents less than 0.53% of the GGHE in all countries. The impact of MoH-led QI on annual government budgets varies somewhat by these levels of health expenditure, as Ethiopia has the lowest GGHE and the highest costs, so it shows the greatest budget impact, though still low (at 0.53%). In Kenya, the other study site that implemented 'two-level' community QI, budget impact of national-scale community QI is 0.16% of GGHE, and in the three other study countries the budget impact is 0.03% or less of GGHE. Also relevant to budgeting is the fact that the financial outlay would be greatest in year 1, when the training occurs, with low recurrent financial outlay; after annualisation this variation is masked.

DISCUSSION

Summary of findings

We found that the economic costs of integrating QI approaches into community health range from $62 to $254 per CTC provider, with the most expensive unit cost incurred in Ethiopia. Collecting costs was a complicated exercise across the countries and intercountry variability was high. The largest component of costs of our phased training model were capital costs of capacity development generated in the training portion of the intervention, out of which the biggest cost driver was the time of existing public sector staff. In sites reporting high financial outlays, these were driven in part by the selection of venues and trainers, as well as general higher cost of living particularly in Nairobi. Greater intensity of the intervention (ie, two levels of QI teams; more teams per administrative area) was correlated to higher costs, both economic and financial. In Ethiopia, Kenya and Malawi, QI interventions drove up costs as teams were provided additional financing to use for interventions rather than working within existing resources. Across settings, national scale-up of the approach would have a budget impact of between 0.02% and 0.03% (in Indonesia, Malawi, Mozambique) up to 0.16% (Kenya) and 0.53% (Ethiopia) relative to the GGHE.

Sustainability of the approach

Sustaining QI approaches (or 'MoH-led QI') for community health will depend on financial commitment to take on recurrent costs by the subnational administrative units and national decision makers. In Malawi, Kenya and Indonesia, study countries with some decentralisation of health financing allocation decisions, the district (or equivalent administrative) level management has indicated a commitment to allocate funds to cover the recurrent costs for the year following the end of the project-led intervention. This financial commitment would likely come from the general health budget rather than the community health or preventive care budget, which is misleading in its size—it relies on unpaid or underpaid staff, the specifics of which varies by country, as well as heavy external financing. Because this is a system-wide change to the health system, given that CTC providers are used across a broad range of health areas and are a cadre of human resources for health, the argument for government investment is beyond the community budget to the GGHE. Given the wide range of services offered and benefits of high-quality CTC care, a societal perspective might be optimal,[3 12 56 57] but benefits are beyond the scope of this study.

Despite the limited budget impact of this intervention, workload may be a challenge to the recurrent time costs. Time is a non-financial outlay, which is positive for the inclusion of the approach into local budgets going forward, although it may present challenges related to workload of mid-level health systems management staff. A reduction in meeting frequency may be feasible after the initial intensive start-up/mentorship phase of

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implementation to reduce recurrent time costs as well as financial costs; in the base case, we used a quarterly frequency to reflect this (rather than the original monthly design). However, as Greenhalgh *et al* write, diffusion of effective innovations in high-functioning health service delivery organisations is a notorious challenge,[58] so it is likely to be a greater challenge where resources are limited.

The project-led intervention has been conducted on a pilot scale in each country, so it is not known whether these unit costs are similar at scale or whether economies of scale or scope might be achieved.[59] The use of budget impact analysis was an attempt to address affordability at scale.[60]

In looking at affordability of scale-up, the costs of the phased training and mentorship intrinsic to the intervention design as described are higher than a traditional one-off workshop training. Reduced costs for training might also be achieved by inclusion of the QI material into in-service training for CTC providers and supervisors. Another option is a one-time external investment to cover training costs that would then be sustained by leveraging domestic cofinancing for the recurrent costs.

Benefits of the QI approach can be difficult to capture

For policy makers and donors to be convinced by costing data, they must first be convinced of the benefits of what is being costed, and this has created a challenge for QI approaches generally. We have not presented data on the individual improvements achieved by the 29 improvement teams included in our study, which are similar to those observed by other community QI projects from several settings in sub-Saharan Africa.[31–34 61–65] Immediate process outcomes of the QI approach we used included: improved supervision and integration of the community health programme to the health system, consensus building across levels of the health system on priority problems and improved data quality on critical health service areas—all of which have been shown to support improved performance of CTC providers.[5 9 43 66 67] The health impacts of integrating QI are harder to attribute due to the complex, iterative and locally driven nature of the approach. Measuring and attributing the downstream benefits of a service delivery intervention that are intrinsically valuable to a decision maker or population is challenging.[20 68–72] Adding to the challenges of potential confounding, in 'Step Six' of the intervention (figure 1), QI teams have the freedom to design and test QI interventions to address locally relevant problems they select (in contrast to having a standard QI intervention imposed by higher-level or external stakeholders). These have greater potential to directly affect and yield benefits in priority health areas. However, this freedom or choice makes it challenging to evaluate outcomes systematically across intervention sites, as they are likely to be yielded in different health areas depending on the QI intervention selected by each QI team.

Community health services are often a low priority for domestic investment in health systems despite being shown to be cost-effective.[18 19 27 73] The interventions that are funded out of the health budget are more often those that are most visible (facilities, ambulances) or urgent and curative (tertiary care) that can show immediate impact and benefit to the politician, rather than those with longer-term population-wide benefits like community health and preventive services.[74] Where funded, the focus of investment in community health has been on increasing coverage towards UHC with limited emphasis on quality. Here we show that with a small additional investment, coverage of the population by CTC providers can potentially be transformed into meaningful coverage through improved performance and stronger linkages to higher-level healthcare services and providers.

For countries where this QI approach has been piloted through the REACHOUT project, the policy implications of affordability need to be contextualised beyond what is presented in the budget impact analysis here. Sub-national 'use cases' for adoption of this QI approach are being developed jointly with national policy makers. These cases will bring out multiple feasible locally relevant scenarios for adoption and scale-up of the approach, considering current staffing ratios, strategy development and budget cycles. Following on from discussions of affordability, assessment of whether QI for community health is a good investment requires a quantification of the benefits yielded by the intervention coupled with this cost analysis. To assess cost-effectiveness and relevance to UHC, further data on benefits derived from the intervention are required as well as an assessment of the reach of those benefits on the target population. Further, a qualitative exploration of decision space for the various funders of community health and their values in terms of benefits is planned to supplement the findings of this study, building on the abovementioned work by McCollum *et al*.[74]

Strengths and limitations of the study

Having robust, primary cost data collected and compared across countries and specifically looking at quality of care is very valuable, given the global focus on quality under UHC.[12 13 15 75 76] At the same time, a major limitation of this (any) intercountry analysis is the differences in contexts. Variations in health systems, administrative units, CTC provider tasks and typology (Supplementary File 1) were easier to identify and describe than aspects of hierarchy, expectations of training allowances, donor and project fatigue, but these less tangible aspects also affect the design and cost of getting a QI approach for community health to work. Nevertheless, findings around affordability and cost drivers were robust across contexts. We emphasised contextualisation of the intervention to each country, encouraging country teams to adapt while maintaining fidelity to the intervention design within a given set of restrictions.[77–79] In step 3 (figure 1), the intervention explicitly asked teams to adapt the global

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curriculum as appropriate to their context, bringing in local trainers and approaches as well as modifying the composition of the QI teams to best reflect existing health system structure, management and reporting lines. This is most clearly exemplified by the varied intensity of the intervention in Ethiopia and Kenya as compared with the other three settings, in addition to minor modifications due to variations in health system structures and supervisory approaches.

Significant challenges were faced in three of the five countries to estimate the costs of participation of public sector staff (as trainees and facilitators) due to sensitivity around salary data. In Malawi, public sector salaries were not publicly available and we received confidential estimates from multiple sources in addition to the limited public reference data. In Indonesia, the range of salaries within each tier is wide, reflecting the years of service of the individual more strongly than their level of responsibility. In Kenya, public sector expenses for participation in trainings were split into several categories (per diem, dinner allowance, workshop sitting allowance, local transport allowance). These were additional to the costs of mobilisation (referring to the phoning and follow-up with supervisees to ensure attendance) and facilitation but not applicable to all, making the actual costs of participation in training difficult to calculate but possible to estimate. In contrast, in Ethiopia and Mozambique public sector staff salaries are publicly available and presented no difficulty. The sensitivity around salary information reflects both transparency by the government and cultural values related to money and privacy.

CONCLUSION

CTC providers are a key component of healthcare provision in many settings. QI for community health has the possibility of bringing CTC providers more definitively under the umbrella of human resources for health, better aligning community interests with the health system's work. By integrating QI into community health services, policy makers hope to ensure the quality of the services delivered is being measured and improved (where required), leading to increased demand-side confidence in and utilisation of these services. As a first step towards assessing whether QI for CTC healthcare services is affordable, we have provided a detailed breakdown of the costs of community-level QI. Further research is needed to assess whether this type of intervention can achieve the level of benefits required to justify this investment, as decision makers work towards the domestic and global goals of universal access to high-quality healthcare services.

Author affiliations
[1]Department of International Public Health, Liverpool School of Tropical Medicine, Liverpool, UK
[2]Center for Humanitarian Emergencies, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA
[3]Warwick Medical School, University of Warwick, Coventry, UK
[4]Research and Strategic Information, LVCT Health, Nairobi, Kenya
[5]Eijkman-Oxford Clinical Research Unit, Eijkman Institute for Molecular Biology, Jakarta, Indonesia
[6]Community Health Department, University of Eduardo Mondlane, Faculty of Medicine, Maputo, Mozambique
[7]School of Public and Environmental Health, Hawassa University, Hawassa, Ethiopia
[8]Health Systems & HIV/AIDS Dept, Research for Equity and Community Health (REACH) Trust, Lilongwe, Malawi
[9]Health Economics Research Unit, KEMRI-Wellcome Trust Research Programme, Nairobi, Kenya
[10]Centre for Tropical Medicine, Nuffield Department of Clinical Medicine, Oxford University, Oxford, UK

Twitter @kumeghan

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