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SPECIAL ARTICLE

Community Guide Cardiovascular Disease Economic Reviews: Tailoring Methods to Ensure Utility of Findings

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The Community Preventive Services Task Force recommended five interventions for cardiovascular disease prevention between 2012 and 2015. Systematic economic reviews of these interventions faced challenges that made it difficult to generate meaningful policy and programmatic conclusions. This paper describes the methods used to assess, synthesize, and evaluate the economic evidence to generate reliable and useful economic conclusions and address the comparability of economic findings across interventions. Specifically, steps were taken to assess completeness of data and identify the components and drivers of cost and benefit. Except for the intervention cost of self-measured blood pressure monitoring intervention, either alone or with patient support, all cost and benefit estimates were standardized as per patient per year. When possible, intermediate outcomes were converted to quality-adjusted life year. Differences within and between interventions were considered to generate economic conclusions and inform their comparability. The literature search period varied among interventions. This analysis was completed in 2016. Although team-based care, self-measured blood pressure monitoring with patient support, and self-measured blood pressure monitoring within team-based care were found to be cost effective, their cost-effectiveness estimates were not comparable because of differences in the intervention characteristics. Lack of enough data or incomplete information made it difficult to reach an overall economic finding for the other interventions. The Community Guide methods discussed here may help others conducting systematic economic reviews of public health interventions to respond to challenges with the synthesis of evidence and provide useful findings for public health decision makers.

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INTRODUCTION

The nonfederal, independent Community Preventive Services Task Force (Task Force) was established in 1996 by the U.S. DHHS to identify population health interventions and recommend those that are effective, based on systematic reviews of the scientific and practice-based literature. Task Force findings and their associated systematic reviews are housed in the Guide to Community Preventive Services (www.thecommunityguide.org). The Centers for Disease Control and Prevention (CDC) provides technical and administrative support for the Task Force through its Community Guide Branch. The specific finding for each intervention recommended by the Task Force and the basis for such findings are reported in the Task Force Finding and Rationale Statement. Between 2012 and 2015, the Task Force recommended five interventions for their effectiveness in preventing and controlling cardiovascular disease (CVD). Systematic economic reviews for these interventions were conducted to provide

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information about their cost, benefit, cost–benefit, and cost effectiveness. The five interventions are as follows:

- Team-based care (TBC)—a health systems–level, organizational intervention that incorporates a multidisciplinary team including the patient, the patient's primary care provider, and other health professionals to improve patient care[1–3]
- Reducing out-of-pocket costs (ROPC)—program and policy changes that make healthcare services or medication more affordable to patients[4,5]
- Clinical decision support systems (CDSS)—computer-based information systems designed to assist healthcare providers in implementing clinical guidelines at the point of care[6–8]
- Community Health Workers (CHW)—frontline public health workers who serve to bridge communities with healthcare systems (http://www.thecommunityguide.org/cvd/CHW.html)
- Self-measured blood pressure monitoring (SMBP)—support and promote the use of personal blood pressure (BP) measurement devices in the management and treatment of high BP[9]

The objectives of the Community Guide systematic economic reviews are to provide evidence-based estimates of intervention costs and benefits and judgment of economic value based on these estimates. These reviews often face challenges that make it difficult to present and interpret their findings to generate meaningful policy and programmatic insights and conclusions. For example, heterogeneity in included studies is a challenge in most systematic reviews of effectiveness, and the challenge is compounded in systematic economic reviews as economic effects and consequences are added.

To address these challenges and derive valid and reliable economic estimates that can be used in the Task Force Finding and Rationale Statement, Community Guide economic methods attempt to filter out the noise introduced by heterogeneity and to elucidate key economic drivers. Economic value estimates from both a societal perspective and from the narrower perspective of potential implementers are often provided.[10] An additional challenge faced by Community Guide reviews stems from decision makers' desire to compare economic value estimates across interventions. Careful examination of the differences in intervention characteristics including the setting, context, and perspective of interventions reveals why this may often be inappropriate.

The objectives of this paper are to demonstrate how economic review methods developed for The Community Guide enabled the derivation of valid, reliable, and useful economic estimates that could be used as the basis of Task Force economic findings for five very different Task Force–recommended interventions aimed at preventing and controlling CVD and to illustrate how additional considerations about differences in intervention characteristics may inform the comparison of economic conclusions across interventions.

METHODS

Consistent with Community Guide processes, candidate CVD prevention interventions for systematic review were identified by Community Guide staff in consultation with subject matter experts from CDC's Division for Heart Disease and Stroke Prevention and from other federal, state, and local agencies. High blood pressure, dyslipidemia, smoking, and diabetes are all major risk factors for CVD that can be modified by medication and improvement in physical activity and nutrition.[11] Candidate interventions were prioritized based on their expected impact on these modifiable risk factors, the need to address primary and secondary prevention across a range of populations and settings, and on known obstacles to reaching treatment goals, such as adherence to medication regimens. For the top five prioritized interventions, systematic reviews were first undertaken of their effectiveness in achieving their intended outcomes.[1,3–6,8] Because the Task Force recommended all five interventions based on evidence of their effectiveness, systematic economic reviews were subsequently completed for them.[2,5,7,9]

General Community Guide economic review methods involving standard inclusion criteria and methods for searching, including, and abstracting studies and adjusting study results are available on The Community Guide website (www.thecommunityguide.org/about/economic-reviews) and in the published literature.[12] The primary contribution of this paper is to discuss additional methodological considerations used to handle the unique challenges with the economic reviews of these CVD prevention interventions.

For each of the five economic reviews, the team used the definition and description of the intervention developed by the effectiveness review team, along with additional input from subject matter experts, to identify the components of intervention cost and changes in healthcare cost and productivity due to the intervention. Next, the team ascertained the cost and benefit drivers to form the ideal set of components that was compared against the components for which information was available in the included studies to assess the "completeness" of the reported economic estimates. All cost and benefit estimates were adjusted to 2015 U.S. dollars using the consumer price index.[13] The literature search period, listed in The Community Guide website, varied among interventions. This analysis was completed in 2016.

Intervention cost components fell into one of three broad resource categories: capital goods, labor, and materials. Capital goods involve equipment or software that can be used multiple times before they have to be replaced, having a useful life that generally exceeds a calendar year. Labor, comprising personnel expenditure, and materials are measured in units of time and quantities per unit of time, respectively. These costs over an intervention's 1 year of operation are fully charged against the intervention's benefit measured over the same 1 year period. However, the cost of a capital good to be assigned against the 1 year of intervention benefit would be the total cost of acquisition divided by its useful years of service.

The likely implementers of the interventions were deduced from definitions by the Community Guide CVD effectiveness review team because many of the studies were evaluations of funded trials and provided sparse details about implementation. SMBP and ROPC constitute healthcare resources directly consumed by patients and paid for by patients or their health insurance plans. CDSS interventions are generally paid for by clinics and other organizations that provide direct care, with expectation of savings from greater efficiency and quality of care. On the other hand, TBC and CHW interventions bring together healthcare personnel from different organizations into patient-centered relationships and activities that may not be matched by a similarly coordinated reimbursement system for their services. Therefore, although these interventions are implemented by the healthcare system, the payment arrangement for TBC and CHW interventions is often not clear.

Acknowledgment of the likely implementer is important in informing what the appropriate perspective should be when estimating costs and benefits. The general methods for Community Guide economic reviews assume a societal perspective that considers all costs and benefits of the intervention, regardless of who pays and who benefits. When societal benefits are shown to be greater than societal cost, it may be assumed somewhat simplistically that any mismatch between cost bearers and beneficiaries is remedied by public funds to fill gaps in compensation, time, and resources that participants bring to the intervention. Given the limitations of this assumption, for some interventions, the Task Force has chosen to assess and consider the incentives for likely implementers in terms of their specific return on investment. This was the case for ROPC interventions, where the review took a health plan payer's perspective because the intervention is implemented by, and the reduced cost for the patient is ultimately borne by, the plan or insurer.

RESULTS

Characteristics of Interventions and Included Studies

Table 1 describes the body of economic evidence for each of the CVD interventions in terms of characteristics that differed substantially among the interventions. The number of studies reporting economic outcomes ranged from four for interventions engaging CHWs to prevent CVD to 31 for TBC to control BP. This range in size of the body of economic evidence affected the quantity and quality of available economic information, which in turn impacted the strength and usefulness of the overall economic evidence.

The interventions were also distinguished by whose behavior they sought to influence and how. The target population for ROPC was patients, and of interest was their adherence to treatment—particularly medication. CDSS interventions were used to guide and inform clinical decision making by healthcare providers to prevent or control patients' CVD risk factors. The remaining three interventions targeted healthcare providers and their care behavior, as well as patient participation in their own care: for SMBP interventions through home-based BP monitoring, for TBC interventions through interaction with their healthcare providers, and for CHW interventions through engagement with the CHWs as a bridge to the healthcare system and resources.

Two interventions were specifically aligned with patient self-interest: ROPC because it reduces patients' out-of-pocket costs for treatment—particularly for medication—thereby improving patients' adherence to treatment; and SMBP because it increases patients' participation in the healthcare process and makes them more proactive in self-management of their health. In contrast, for TBC, CDSS, and CHW interventions, the expectation is that they will improve patient health by altering provider behavior through better communication among providers.

All five interventions focused on older populations (mean age >50 years) and females (varying from 50% to 66%). Although all interventions except ROPC included RCTs—the ideal study design—the percentage of RCT varied from 50% for CHW interventions to 100% for SMBP within TBC. As for the risk factor foci, high BP was a risk factor focus of all five interventions and the sole focus for the SMBP and TBC interventions whereas ROPC added dyslipidemia. The CDSS and CHW interventions were multifocal and sought to reduce multiple CVD risk factors. Because the included studies measured and reported health outcomes related to their specific risk factor foci, cost effectiveness measured as cost per unit change in health outcome also differed across these studies. Hence, the cost effectiveness computed from one study of a CHW intervention to prevent CVD may be \$X per milligram/deciliter reduction in low-density lipoprotein whereas from another CHW study it may be \$Y per millimeter of mercury reduction in systolic blood pressure (SBP), and the two cannot be compared directly or grouped together to estimate the overall cost effectiveness of CHW interventions to prevent CVD.

A number of studies included other interventions in addition to the primary intervention of interest. When interventions are combined and the comparison is to usual care, the reported economic and other effects are due to the combination and cannot be attributed to the single intervention that was the focus of the review. These challenges with disentangling the effects of combined interventions were especially relevant for the ROPC review, which included studies where ROPC was combined with TBC and disease management interventions, and for the CDSS review, which included studies that combined CDSS with TBC and quality improvement interventions. In the case of SMBP interventions, the very different levels of economic resource use associated with

Table 1. Intervention Characteristics

Intervention of interest	Number of studies in economic review	Target population	Who implements?	Patient characteristics	Study design	Risk factor focus	Additional interventions combined with the intervention of interest and percent of studies with that combination[a]
TBC	31	Healthcare providers and patients	Healthcare system	Mean age 60 years Female 57%	RCT 64% Pre–post with comparison 23% Pre–post without comparison 13%	High BP	CDSS 10% Disease registry 6% SMBP 13% ROPC or VBID 6% Case management 3%
ROPC	9	Patients	Health insurance plan	Mean age 54 years Female 50%	Pre–post with comparison 56% Pre–post without comparison 44%	Adherence to treatment for high BP and dyslipidemia	TBC 22% Disease management 22%
CDSS	21	Healthcare providers	Clinics	Mean age 57 years Female 56%	RCT 71% Pre–post without comparison 29%	High BP, dyslipidemia, diabetes, smoking, physical activity, nutrition	TBC 24% Provider incentives 9% Provider audit and feedback 5% Patient phone reminders or report to patient 28% Quality improvement 38%
SMBP used alone	8	Patients and healthcare providers	Patient or health insurance plan	Mean age 57 years Female 50%	RCT 75% Pre–post without comparison 25%	High BP	None
SMBP with patient support	8	Patients and healthcare providers	Patient or health insurance plan	Mean age 59 years Female 55%	RCT 80% Pre–post without comparison 20%	High BP	Call center 25%
SMBP within TBC	8	Patients and healthcare providers	Patient or health insurance plan	Mean age 62 years Female 52%	RCT 100%	High BP	Telemedicine 25% Web interface 25% Case management 12%
CHW	4	Healthcare providers and patients	Healthcare system	Mean age 62 years Female 66%	RCT 50% Pre–post without comparison 50%	High BP, dyslipidemia, smoking, physical activity, nutrition	TBC 100%

[a]Studies are not mutually exclusive.

BP, blood pressure; CDSS, clinical decision support systems; CHW, community health workers; ROPC, reduced out-of-pocket cost; SMBP, self-measured blood pressure; TBC, team-based care; VBID, value-based insurance design.

Table 2. Intervention Cost: Components and Estimates

Intervention	Capital	Materials	Labor	Labor or capital intensive	Intervention cost: Median (IQI) (in 2015 $)
TBC	Rent		Provider time in team-based activities[a]	Labor intensive	$309 ($166, $728) per patient per year
ROPC		Cost of ROPC for covered products or services[a,b]		NA	$172 ($70, $530) per patient per year
CDSS	Software; system development and implementation[a]		Operating and maintenance cost; staff training	Capital intensive	$56 ($23, $73) per patient per year[c]
SMBP monitoring					
SMBP alone	Home BP device[a]		Patient training; PCP reviews of BP reports	Capital intensive	$60 ($55, $74) per patient
SMBP with patient support	Home BP device; systems for patient support[a]		Patient training; PCP reviews of BP reports	Capital intensive	$174 ($63, $362) per patient
SMBP within team-based care	Home BP device		Patient training; PCP reviews of BP reports: Provider time in team-based care[a]	Labor intensive	$733 ($279, $947) per patient per year
CHW			CHW time; CHW training; CHW supervisor time[a]	Labor intensive	$157 ($22, $395) per patient per year[d]

[a]Cost drivers.
[b]All studies were for ROPC for medications.
[c]Estimated overall sizes of CDSS implementations with 5-year life of capital.
[d]Two of the four estimates were poor, with one reporting only a nominal stipend for the CHW.
BP, blood pressure; CDSS, clinical decision support systems; CHW, community health workers; IQI, interquartile interval; NA, not applicable; PCP, primary care provider; ROPC, reduced out-of-pocket cost; SMBP, self-measured blood pressure; TBC, team-based care.

SMBP alone, SMBP with patient support, and SMBP within TBC prompted the economic review team to stratify the evidence into these three types of SMBP interventions. All studies of CHW interventions were TBC interventions where the CHW activities were an additional element of care, but where the CHW was not necessarily part of the care team. TBC itself is a complex intervention because it combines specialized labor in team arrangements for patient care. Therefore, interventions that included TBC were considered to be a combination intervention when the addition was a non-labor intervention, such as financial incentives, BP monitors, or CDSS.

Components Analysis

No studies in the reviews reported effects of intervention on productivity of patients at their worksites. Therefore, what is discussed below are components identified from the studies included in the five reviews pertaining only to intervention cost and change in healthcare costs due to intervention. Discount rates for costs and benefits in modeled studies including studies to translate SBP reductions to quality-adjusted life year (QALY) saved varied from 0% to 6%. For most other studies, the discount rates were not relevant as follow-up periods varied between 9 and 18 months.

Intervention Cost: Components and Estimates

Table 2 presents the components and estimates of intervention cost. For SMBP alone, the components of intervention cost included costs for the BP-monitoring device, patient training on correct use of the device, any telemetry device to transmit the BP readings, and the cost of generating summary reports for the healthcare provider. For SMBP with additional support, the costs of other devices (e.g., smartphones); staff; development of interactive software; and other information technology necessary to support patient self-care were added. SMBP within TBC added the cost of administrative and medical staff engaged in TBC activities. For CHW intervention, salaries for CHWs and their supervisors, training cost, infrastructure and equipment cost including cost of workspace and personal computing, and cost of supplies and materials, such as food preparation items, patient education, and CHW training materials were the common cost components. The cost of acquiring and operating CDSS included development and implementation cost and cost of staff time and other resources for

Table 3. Changes in Healthcare Cost: Major Components and Estimates

Intervention	Time horizon in months Median (IQI)	No. of studies with any healthcare cost	No. of studies modeling long-term healthcare costs	Percent of studies reporting healthcare cost for all causes	Major components and percent of studies reporting each component					Change in healthcare cost per patient per year: Median (IQI) (in 2015 $)
					Outpatient	Medication	Inpatient	ER	Labs	
TBC	12 (6, 24)	21	2	29	76	86	52	29	0	$71 (–$255, $346)
ROPC	24 (12, 24)	7	0	38	100	100	100	71	0	–$127 (–$633, –$18)
CDSS	12 (12, 120)	15	4	40	67	53	60	27	27	–$70 (–$463, $5)
SMBP monitoring										
SMBP alone	12 (12, 60)	8	2	1	10	71	4		2	–$148 (–$316, –$89)
SMBP with patient support	9 (6, 39)	6	2	0	100	83	67	33	17	–$3 (–$58, $62)
SMBP within team-based care	18 (15, 42)	5	0	60	100	40	100	60	40	$369 ($57, $549)
CHW	12 (12, 24)	4	0	75	50	75	75	50	25	–$262 (–$2,886, $562)

CDSS, clinical decision support systems; CHW, community health workers; ER, emergency room visit; IQI, interquartile interval; ROPC, reduced out-of-pocket cost; SMBP, self-measured blood pressure; TBC, team-based care.

day-to-day use and maintenance. For ROPC intervention, the major cost component is the cost of providing reduced cost medications to existing and new users. The intervention cost for TBC was the cost of setting up and running TBC and included provider time, patient time, rent, and utility.

The identified cost drivers demonstrated the labor-intensity of TBC and CHW interventions and the capital intensity of CDSS and SMBP alone or SMBP with additional support interventions. In the case of CDSS, the sum of acquisition cost distributed equally over 5 years of use and the recurring operating cost was divided by the number of patients to produce an annual cost per patient. For SMBP alone and SMBP with patient support, per patient one-time purchase cost for BP devices was reported rather than spreading out the small outlay ($50 to $75 per unit) over the life span of the devices. On the other hand, for the combined SMBP and TBC interventions, the TBC component made this a labor-intensive intervention, and the cost to implement was therefore best expressed in per patient per year terms.

Healthcare Cost: Components and Estimates

Table 3 shows the estimates and major components of changes in healthcare cost, as reported in the included studies. The completeness of healthcare cost estimates from the included studies is reflected by the percentage of studies in the review that included each important component of healthcare costs (i.e., outpatient visits, medication costs, inpatient visits, emergency room [ER] visits, and laboratory work). The median time horizon for the economic estimates for each intervention is also provided, under the expectation that the full impact of improvements in the patients' health due to intervention takes longer to show as changes in healthcare cost. Given the practical and resource limits on the length of trials, some studies modeled long-term healthcare cost, and the number of studies that did so is also identified in Table 3.

Studies that evaluated the effect on healthcare cost most often included the component of outpatient visits, followed by medication and inpatient stays. ER and labs tests were less frequently included in the estimates. Most of the studies estimated change in healthcare cost during a 9–12-month horizon, not long enough to capture benefits from reductions in inpatient stays and ER use for the intervention group compared with the group with uncontrolled CVD risk factors. Healthcare expenditures assessed were usually specific to the risk factor or condition that was the focus of the intervention, but some studies counted all healthcare encounters regardless of their cause. This was particularly true for SMBP with TBC and for CHW interventions, where 60% and 75% of the studies, respectively, reported healthcare costs

from all causes. CHWs take on many roles to improve patients' access to health care and may help improve identification and treatment of multiple diseases for the patients. However, one of the four studies within CHW intervention was a community-wide trial conducted among the elderly in multiple locations, with the analysis based on the entire eligible population and included all healthcare costs and not just those specific to CVD.

The direction of effect of the intervention on healthcare cost is indicated by the sign on the estimates. Based on medians, TBC and SMBP within TBC interventions were healthcare cost increasing and the other interventions were healthcare cost saving. However, zero or "no change" is within the interquartile interval for TBC, CDSS, CHW, and SMBP with patient support. SMBP within TBC was cost increasing everywhere within the interquartile interval. ROPC and SMBP-alone interventions were healthcare cost saving everywhere in the interquartile interval. A healthcare cost–increasing finding could be attributed to insufficient follow-up period to capture savings in hospital in-patient stays and ER visits for patients in the intervention group compared with those in the control group.

Task Force Economic Finding Statements

An intervention's economic evidence is always reported in the rationale section of Task Force Finding and Rationale Statement. Additionally, when sufficient and consistent estimates of cost effectiveness or cost–benefit are available or can be derived, the Task Force makes a specific finding based on economic evidence that appears alongside the finding based on the effectiveness evidence. The Task Force considers an intervention to be cost effective when its cost per QALY saved is less than a widely accepted and relatively conservative benchmark of $50,000.[14]

In the set of reviews for CVD prevention, complete assessments of both cost and benefit were rare. In particular, none of the included studies in the reviews included the monetized value of productivity improvements from averted morbidity and mortality. Hence, cost–benefit analyses were incomplete and often insufficient for the Task Force to reach a conclusion. For interventions that targeted BP control, the change in SBP reported was translated to QALY saved based on two translation formulae provided in two publications.[15,16] This was done where studies also reported the intervention cost and change in healthcare cost so that cost per QALY saved could then be computed.

Table 4 summarizes Task Force statements of economic finding for the five interventions, with "no finding" indicating that either there was mixed evidence or not enough data on which the Task Force could deliberate. The cost-effectiveness estimates were mixed in the case of SMBP monitoring alone, with two studies showing an increase in SBP, two indicating averted healthcare cost exceeding the cost of intervention, and one study reporting cost per QALY saved >$50,000. Therefore, the Task Force had no finding statement for SMBP alone, whereas it found SMBP monitoring to be cost effective when implemented with additional patient support or within TBC. For ROPC intervention, studies neither reported cost per QALY nor clinical outcomes such as changes in BP that could be used to calculate cost-effectiveness ratios. Regarding evidence for cost savings, three studies on value-based insurance design indicated mixed findings, with two reporting that intervention cost was higher than averted healthcare costs whereas the third found that the intervention was cost neutral. For CDSS, results were inconsistent partly because of the incomplete assessment of the cost of implementing CDSS and its impact on healthcare cost. In addition, some studies implemented CDSS within systems-level organizational change, such as TBC, complicating interpretation of economic outcomes. For CHW intervention, none of the included studies provided cost-effectiveness information, and there was not enough evidence to determine cost–benefit.

Comparative Assessment of Economic Conclusions Across Interventions

The evidence from these systematic economic reviews showed that TBC, SMBP with additional support, and SMBP within TBC were all cost effective. It may be tempting to rank these three interventions in a league table to state that SMBP with additional support is most cost effective and TBC is least cost effective. However, SMBP within TBC is a specific application of TBC, and the methods used showed how these interventions varied in terms of intervention characteristics and specific cost and benefit drivers. Most importantly, the objective of the SMBP intervention was to make the patients more proactive in their self-care whereas TBC emphasized collaboration among all team members, including patients, to improve patient health outcomes. In general, all five interventions for which economic reviews were conducted are distinct based on their main purpose, and it is not proper to use estimated cost-effectiveness ratios to generate comparative statements about their economic value.

DISCUSSION

Systematic economic reviews of public health interventions are beset with challenges that make it difficult to draw meaningful conclusions about the economic evidence. This article uses Community Guide economic

Table 4. Community Preventive Services Task Force Economic Findings for the Five Interventions

Intervention	Economic evidence	Task Force economic finding
TBC	Limited cost–benefit estimates 15 cost-effectiveness estimates Median (IQI) cost per QALY saved based on two conversions: $10,561 ($6,295, $24,375) and $15,209 ($9,064, $35,100)	Intervention is cost effective
ROPC	Value-based insurance designs: two studies with intervention cost exceeding averted healthcare costs, 1 study cost neutral No cost per QALY saved estimates	No economic finding—limited/mixed evidence
CDSS	Limited cost–benefit/cost-effectiveness information	No economic finding—inconsistent/ incomplete assessment of cost and benefit
SMBP monitoring		
SMBP alone	No cost–benefit estimates Cost per QALY saved from one study $100,000 and $144,000 Two studies cost-saving Two studies ineffective	No economic finding—mixed evidence
SMBP with patient support	No cost–benefit estimates Median (IQI) cost per QALY saved based on two conversions: $2,800 ($526, $5,100) and $4,000 ($757 to $7,400)	Intervention is cost effective
SMBP within team-based care	No cost–benefit estimates Median (IQI) Cost per QALY saved based on two conversions: $7,500 ($4,600, $79,200) and $10,800 ($6,600, $114,000)	Intervention is cost effective
CHW	Limited evidence on cost–benefit estimates No cost per QALY saved estimates	No economic finding—limited evidence

CDSS, clinical decision support systems; CHW, community health workers; IQI, interquartile interval; QALY, quality-adjusted life year; ROPC, reduced out-of-pocket cost; SMBP, self-measured blood pressure; TBC, team-based care.

reviews for five CVD interventions to illustrate how the Community Guide economic team implements simple, transparent, and effective methods to address the wide variability in cost and benefit estimates reported by individual studies in order to generate useful and valid conclusions on the economic merits of the interventions. Intervention effects, objectives, settings, expected implementers, and significant contextual factors are all important elements that are carefully considered in Community Guide reviews. Moreover, this article also identifies how Community Guide economic methods address the handling of intervention cost and benefit components and calculating cost-effectiveness estimates based on intermediate CVD outcomes.

For SMBP alone and CDSS, the cost of the BP monitor and computer-based information systems, respectively, were significant drivers of cost. For SMBP within TBC, the personnel costs for TBC became the dominant component of costs. For ROPC interventions, the free or subsidized-price coverage for medications constituted the major cost component. For CHW intervention, the cost focused on total cost, with a CHW included as an additional element of TBC. In the case of benefits, averted productivity losses were not estimated in the individual studies for any of the interventions, and all benefit values were underestimated as a result. On the other hand, cost savings could be overestimated when averted healthcare costs in the individual studies considered healthcare costs from all causes including diabetes and hypertension. For the CHW intervention, 75% of studies estimated benefits based on reduced healthcare costs from all causes. Also, it was not possible to tease out the economic effect of the primary intervention when it was combined with other interventions. Finally, when studies reported a decline in SBP, the Community Guide economic team used formulae from published studies to derive cost per QALY estimates. The identification of components and drivers of costs and benefits, the assessment of completeness of estimates based on what components they included, and the reporting in terms of medians and interquartile ranges enabled the Task Force to make informed economic judgment. For the five CVD prevention interventions discussed here, TBC, SMBP with additional patient support, and SMBP within TBC were found to be cost effective. However, this paper explained why the cost-effectiveness estimates should not be used for comparing and ranking such heterogeneous interventions to provide their relative economic values.

An evidence gap across all five interventions relates to the lack of any information about averted productivity losses. Also, an important limitation of Community Guide economic reviews is that they do not involve primary economic modeling. These methods have therefore been developed to get as much useful information as

possible out of the available data and analyses in existing literature.

CONCLUSIONS

In the past, the paucity of economic evaluation studies restricted the use of systematic economic reviews of public health interventions to derive valid and reliable conclusions regarding the economic merits of these interventions. Although the quantity and quality of economic evaluations of public health interventions are improving over time, this paper underscores the need for systematic economic reviews to adopt appropriate methods and pay careful attention to intervention characteristics, study limitations, and cost and benefit drivers to make informed and useful conclusions about the economic value of these interventions. The Community Guide economic methods discussed here may be helpful to others who are attempting to undertake such reviews to synthesize and communicate the economic evidence on public health interventions.

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