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# CHWs to Increase Cancer Screening: 3 Community Guide Systematic Reviews

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## Abstract

**Introduction:** Many in the U.S. are not up to date with cancer screening. This systematic review examined the effectiveness of interventions engaging community health workers (CHWs) to increase breast, cervical, and colorectal cancer screening.

**Methods:** Authors identified relevant publications from previous Community Guide systematic reviews of interventions to increase cancer screening (1966 through 2013) and from an update search (January 2014 to November 2021). Studies written in English and published in peer-reviewed journals were included if they assessed interventions implemented in high-income countries; reported screening for breast, cervical, or colorectal cancer; and engaged CHWs to implement part or all of the interventions. CHWs needed to come from, or have close knowledge of, the intervention community.

**Results:** The review included 76 studies. Interventions engaging CHWs increased screening use for breast (median increase of 11.5 percentage points [pct pts]; interquartile interval [IQI] 5.5 to 23.5), cervical (median increase of 12.8 pct pts; IQI 6.4 to 21.0), and colorectal cancers (median increase of 10.5 pct pts; IQI 4.5 to 17.5). Interventions were effective whether CHWs

worked alone or as part of a team. Interventions increased cancer screening independent of race or ethnicity, income, or insurance status.

**Discussion:** Interventions engaging CHWs are recommended by the Community Preventive Services Task Force to increase cancer screening. These interventions are typically implemented in communities where people are underserved to improve health and can enhance health equity. Further training and financial support for CHWs should be considered to increase cancer screening uptake.

## INTRODUCTION

Breast, cervical, and colorectal cancers accounted for more than 419,000 new cancer diagnosis and 98,000 deaths in 2019.[1] The U.S. Preventive Services Task Force recommends screening for these cancers among age- and sex-appropriate populations at regular intervals.[2–4] Screening, with appropriate follow-up for abnormal test results, reduces cancer-related morbidity and mortality.[2–4] Screening rates in 2018[5] were below Healthy People 2020 targets,[6] especially for people from some racial and ethnic groups and people with lower incomes or who are uninsured.[7] Disparities in screening can lead to increases in late-stage cancer diagnoses and mortality among these populations.[8,9]

Interventions engaging community health workers (CHWs) have increasingly been used to provide culturally and linguistically appropriate healthcare services to under-resourced communities.[10,11] CHWs are trained frontline health workers who serve as a bridge between communities where people are underserved and healthcare systems. They are from, or have a close understanding of, the community served.[12] They often receive on-the-job training and work without professional degrees or titles.[13] CHWs may be paid or serve as volunteers,[14] and they may work independently or as part of a team that includes other healthcare professionals.[15]

Interventions engaging CHWs have shown effectiveness in improving health outcomes across a variety of other health conditions, including asthma,[16] diabetes,[17] and HIV infection.[18] Several systematic reviews have shown these interventions to be effective in increasing cancer screening, however they are limited to specific populations,[19,20] focus only on breast cancer screening,[21,22] or report broadly across various disease topics.[20,23] This systematic review is a comprehensive assessment of interventions engaging CHWs to increase screening for breast, cervical, and colorectal cancer across settings and populations, whether implemented alone or in a team of public health professionals. Extensive stratified analyses were conducted to identify characteristics of effective interventions engaging CHWs.

## METHODS

*Guide to Community Preventive Services* ("Community Guide") methods were used.[24–26] The search for evidence included 2 steps. First, reviewers identified relevant publications from studies included in previous Community Guide systematic reviews of interventions to increase breast, cervical, or colorectal cancer screening (included studies published 1966 through 2013).[27–30] Next, CDC librarians conducted an updated search for papers

published between January 1, 2014, and November 5, 2021, evaluating interventions to promote cancer screening. Databases for this review included PubMed, Medline, Embase, PsycINFO, Cochrane, and CINAHL. The detailed search strategy is available from www.thecommunityguide.org/topic/cancer.

Studies were included if they evaluated interventions engaging CHWs to increase breast, cervical, or colorectal cancer screening; engaged CHWs to implement part or all of the intervention; recruited and trained CHWs who were from or had close knowledge of the targeted community; reported 1 or more outcomes of interest; and were conducted in a World Bank-designated high-income economy[31] and published in English. Community Guide methods allow for an array of study designs to assess effectiveness of public health interventions. Studies were excluded if they were single group pre-post studies where the study population was not up to date with screening at baseline, since these studies would only provide favorable results and potentially bias the review finding.

Two review team members independently screened search results and abstracted qualifying studies. Differences were reconciled first by the 2 abstractors, with unresolved differences brought to full review team. Reviewers considered the following when assessing study quality of execution[25,26]: description of the intervention, population, and sampling frame; assessment of intervention exposure and outcome reliability; description and use of appropriate analytic methods; attrition (i.e., whether more than 20% of study population was lost to follow-up); ability to control for confounding or biasing factors. For RCTs, reviewers also assessed reporting of the randomization process,[25,26] accounting for missing outcome data due to loss to follow-up and controlling for cross-contamination bias. Reviewers described studies as having good (0–1 limitation), fair (2–4), or limited (>4) quality of execution. Studies with limited quality of execution were excluded from the analyses.[24,25]

Primary outcomes of interest were recent[2–4] or repeat screenings for breast (mammography), cervical (Pap test), or colorectal (colonoscopy, fecal occult blood testing [FOBT], fecal immunochemical test [FIT], sigmoidoscopy) cancers. Repeat screenings were defined as the completion of 2 or more consecutive, on-time tests.

Changes in recent or repeat screenings compared with no intervention were calculated separately for breast, cervical, and colorectal cancer screening (up to date with any colorectal cancer test, colonoscopy, FOBT or FIT, or sigmoidoscopy based on the recommended frequency). For studies with a comparison group and reporting baseline data, the net differences in pre-to-post-intervention screening use were calculated. If baseline data were unavailable, differences in post-intervention screening use were calculated. For studies without a comparison group, changes in pre-to-post-intervention screening use were calculated. Screening at the longest follow-up was used to determine post-intervention screening use. Participants lost to follow-up were imputed and treated as not up to date with screening whenever possible.

Outcomes were stratified based on whether CHWs delivered all or part of the intervention. “CHW alone” indicates CHWs independently delivered the entire intervention. Some studies with multiple study arms evaluated the effect of adding CHWs on cancer screening, such

as comparing CHW-delivered one-on-one education plus small media (videos and printer materials such as letters, brochures, and newsletters) small media alone.[32] For these studies, "CHW added" was used to indicate CHWs delivered the intervention as part of a team of public health or healthcare professionals and the effect of adding CHWs can be determined. "CHW in a team" indicates CHWs worked in a team and only overall effectiveness could be determined.

For summary measures, medians and interquartile intervals (IQI) were calculated for outcomes with >4 data points. For study arms where CHWs delivered part of the intervention and when both "CHW added" and "CHW in a team" can be determined, "CHW added" was used in summary measure calculations. For study arms that reported on multiple colorectal cancer screening tests, only 1 test result was used in summary measure calculations and tests were chosen in the following order: up to date with any colorectal cancer test, colonoscopy, FOBT or FIT, or sigmoidoscopy. Additionally, analyses were performed for each cancer type based on whether CHWs delivered all or part of the intervention.

Stratified analyses were performed using all included studies to examine the influence of settings, population characteristics, intervention characteristics, and CHW-specific characteristics on intervention effectiveness.

## RESULTS

### Search Yield

The review team identified 101 potentially relevant publications from previous Community Guide systematic reviews.[27–30] The updated search identified 73,578 publications, of which 437 underwent full text screening. Overall, 76 studies[32–107] met the inclusion criteria, with 39 studies reporting breast cancer screening,[32,34–39,42,43,47–49,52–57,60,62–64,71,75,76,78,80,83,85,87–93,95,104,106] 33 studies reporting cervical cancer screening,[36,38,39,41,46,47,49,51,52,56,59,68,72,73,77,78,81,83,84,86,87,93–100,103,104,106,107] and 24 studies reporting colorectal cancer screening[33,36,39,40,44,45,49,50,53,58,61,62,65–67,69,70,74,79,82,101,102,104,105] (Figure 1). The main reasons for exclusion among the 361 studies excluded during full text screening included reporting on interventions that did not engage CHWs, not reporting recent or repeat cancer screening outcomes, and duplicate studies included in previous Community Guide reviews. Summaries of included studies are available on The Community Guide website.[108–110]

### Quality of Execution Assessment

Included studies were individual RCTs,[33,34,37,39,41,44,46,53,58,60,63–65,68,75,77,80,84–86,90,93–95,97,99,100,102,107] group RCTs,[32,45,49,51,52,56,57,66,69,73,74,76,78,79,82,87,91,96,98,101,105] pre-post design with comparison group,[38,42,43,47,48,50,55,67,72,81,103] or pre-post only.[35,36,40,54,59,61,62,70,71,83,88,89,92,104,106] Ten included studies had good quality of execution;[40,43,44,47,55,76,85,90,100,107] the remaining studies had fair quality of

execution.[32–39,41,42,45,46,48–54,56–75,77–84,86–89,91–99,101–106] The most commonly assigned limitations were convenience sampling,[32,35–37,40–42,44–46,49,52,54,56–58,61–66,68,69,71–75,77–82,87–95,98,99,101,102,104–107] use of self-reported data without verification,[32,33,36–39,42,45,46,48,49,51,54,56,57,61–63,66–69,71,72,75–83,86,87,91,93,94,96–98,101,102,104,106] and lack of description for CHWs or the study population.[32,34,35,38,39,41,42,46,48,50–53,55,57–60,62–65,67,69–71,73,74,81,84,86,87,89,92,97–99,103,105,106]

## Study and Intervention Characteristics

Detailed description of CHW work and intervention characteristics can be found in Table 1 and Appendix Table 1. Studies were mostly conducted in the U.S.,[32–46,48–54,56–58,61–96,98–106] with 1 each in Australia,[59] Belgium,[55] Canada,[47] Hong Kong, China,[107] and the United Kingdom.[60] One study evaluated an intervention implemented in both the U.S. and Canada.[97] Most interventions were offered in urban settings.[32,36–38,42,44,47,49,50,53,56,60,65,66,68,70,75–82,84,87–92,95,97–99,101–103,106]

Interventions engaged CHWs to increase screening for breast,[32,34,35,37,42,43,48,54,55,57,60,63,64,71,75,76,80,85,88–92] cervical,[41,46,51,59,68,72,73,77,81,84,86,94,96–100,103,107] colorectal,[33,40,44,45,50,58,61,65–67,69,70,74,79,82,101,102,105] or multiple cancer types.[36,38,39,47,49,52,53,56,62,78,83,87,93,95,104,106] Most interventions engaged CHWs to deliver all[33,35,39,41,43,45,47,49,50,52,54,57,61,62,66,70–73,75,76,78,79,82–86,88,89,91,95,96,99–101,103,104,107] or a major part[32,34,36–38,40,46,48,53,55,56,60,63,65,67–69,74,77,80,90,92–94,97,98,102] of the intervention. CHWs increased demand for screening services through one-on-one[32–37,39,41,43,44,46,48–50,52,54–58,60,63–65,69,75,82,85–91,93–95,97–102,104] and group[35,36,38,40,42,45,47–49,51,56,59,61,62,66–69,71–74,76–84,87,89,92,96,98,101,103,105,107] education, client reminders,[39,44,47,53,66,70,88,89,100] and small media distribution.[67,73,86,88,90,103] CHWs increased clients' access to services by assisting with appointment scheduling,[35,37,39,47,49,50,68,70,71,73,75,77,79,80,85,88–90,97,98,100,103,104,106,107] providing translation,[47,73,97,103] arranging transportation[35,47,73,88–90,97,98,103] or childcare,[39] and reducing administrative barriers by completing paperwork and accompanying participants to appointments when needed.[39,40,47,49,50,53,75,79,88,89,98,104,107]

## CHW Work Characteristics

The Community Health Worker Core Consensus Project recommends 10 core roles frequently performed by CHWs that can improve community health.[111] CHWs often performed several of these core roles in combination, such as providing cultural mediation among individuals, communities, and health and social service systems;[32–41,43–49,52,56,58,59,61–64,66–69,71–80,82,83,85–91,93–104,107] providing culturally appropriate education and information;[32–52,55,56,58–66,68,69,71–105,107] providing coaching and social support;[32–41,43,44,47–50,52,54,56,57,61–72,75–80,82,83,85–95,97,98,100,102–105,107] and building individual and community capacity[32–45,47–52,54–59,61–80,82–92,94–103,105–107]

(Table 1). In roughly half of the interventions, CHWs conducted outreach[32–35,39,41–49,52,54,56,57,60,66,71,72,77–82,85,86,89,91,93–95,97,98,100,101,104,106] and provided care coordination, case management, and system navigation services.[34–37,39,47,49–54,58,65,66,68,70,71,73–77,80,85,88–90,93,95,97–100,103,104,106,107] In very few studies, CHWs advocated for individuals and communities[80] or implemented individual and community assessment and participated in evaluation and research.[104] No CHWs provided direct services since all cancer screenings need to be delivered in healthcare settings. In most interventions, CHWs performed 4 or more core roles.[32–41,43–45,47–50,52,54,56,58,61–66,68,69,71–80,82,83,85–91,93–95,97–104,107]

Nearly all included studies reported that CHWs were matched to the community in which they served.[33–58,60–69,71–86,88–107] Many studies did not report on the educational background of CHWs, however most studies reported that CHWs received formal training,[32–36,38,39,41,43–50,52–58,60–73,75–80,82,83,85,86,88–96,98–105,107] approximately half reported that CHWs received supervision of their performance, and several reported that CHWs received some form of reimbursement for their services.[35,36,38,49,54,64,66,68,77,79,80,82,85,90,91,101,105]

## Demographic Characteristics of Participants in Included Studies

Detailed information on demographic characteristics of study participants can be found in Table 2. Study participants had a median age of 54 years.[32–34,36,37,39,42,46,47,51,56–58,60,61,63–66,68–72,74,76–78,80–86,88–91,93,100–103,105,107] Across studies evaluating interventions to increase colorectal cancer screening, a median of 68% of participants were female.[33,39,40,44,45,50,53,58,61,65,66,69,70,74,79,82,101,102,104,105] Thirty[36–38,42,43,46,48,49,52,53,57,61,72,74–76,78,79,82,83,90,92–95,101,102,104,105,107] of the included studies reported a majority of participants with annual household incomes less than $40,000 and 5 studies[33,47,65,87,106] focused on low-income communities. Three-quarters of participants had a high school education or less.[36–39,42,43,46,48,51,56,57,61,63,66,67,69,73,75,76,83–87,91,94,95,100,102,103,105]

Fifty-two[32,35,36,38,41–46,48,49,51,52,54,56–58,61,62,66,68,69,72–84,88–93,95–101,103,104,106] of the 71 U.S. studies implemented interventions among racial and ethnic minority populations. Among the other U.S. studies, a median 50% of participants self-identified as White,[33,34,40,50,53,64,65,67,85,86,94,105] 33% as Black or African American,[34,37,50,53,65,67,85,87,94,105] 29% as Asian-American,[39,50,65,102] 45% as Hispanic or Latino,34,37,40,42,50,65,102 and 1 study reported 42% of participants were American Indian/Alaska Native.[85]

## Changes in Breast Cancer Screening

Interventions engaging CHWs increased recent breast cancer screening by a median of 11.5 pct pts (IQI: 5.5 to 23.5; 16 study arms had 0% baseline)[32,34–39,42,43,47–49,52–56,60,62–64,71,75,76,78,80,83,85,87–93,95,104,106] (Table 3). Interventions increased screening when stratified by “CHW alone,” “CHW added,” and “CHW in a team,” with “CHW in a team” demonstrating the greatest increase (Table 3). One study[57] provided narrative results and reported no change in mammography screening rates.

Two studies[38,62] provided results on repeated screening and reported a 1.2 pct pts decrease in mammography maintenance among intervention participants (range: −7.6 to 22.0).

### Changes in Cervical Cancer Screening

Interventions increased recent cervical cancer screening by a median of 12.8 pct pts (IQI: 6.4 to 21.0; 14 study arms had 0% baseline).[36,38,39,41,47,49,51,52,56,68,72,73,77,78,81,83,84,86,87,93–100,103,104,106,107] Interventions increased screening when stratified by "CHW alone," "CHW added," and "CHW in a team," with "CHW in a team" demonstrating the greatest increase (Table 3). Two studies provided narrative results and reported increased Pap test use.[46,59] One study[38] provided results on repeated screening and reported 22.0 pct pts increase in Pap test maintenance among intervention participants.

### Changes in Colorectal Cancer Screening

Interventions engaging CHWs increased colorectal cancer screening overall using colonoscopy, FOBT, FIT, or sigmoidoscopy by a median of 10.5 pct pts (IQI: 4.5 to 17.5; 7 study arms had 0% baseline).[33,36,39,40,44,45,49,53,58,61,62,65,66,69,70,74,79,82,101,102,104,105] Interventions increased screening when stratified by "CHW alone," "CHW added," and "CHW in a team," with "CHW in a team" demonstrating the greatest increase (Table 3). Colorectal cancer screening increased whether using colonoscopy (median increase of 10.5 pct pts; IQI: 7.1 to 13.0; 0 study arms had 0% baseline),[39,61,62,70,104] or FOBT or FIT (median increase of 7.8 pct pts; IQI: 5.2 to 16.5; 2 study arms had 0% baseline).39,40,44,45,49,58,61,62,66,70,101,102,104,105 A small increase in screening was observed when sigmoidoscopy was used alone (median increase of 3.5 pct pts; IQI: −2.3 to 58.5; 0 study arms had 0% baseline).[61,62,104] Four studies reported an increase in screening using either colonoscopy or sigmoidoscopy (range: 3.7 to 8.6 pct pts; 0 study arms had 0% baseline).[45,49,66,101] Two studies provided narrative results and reported increases in colorectal cancer screening using any test.[50,67] No studies provided results on repeated screening.

### Stratified Analysis Based on Intervention Characteristics

Single factor stratified analyses were performed across all 76 included studies. Detailed results can be found in Appendix Table 2. Interventions engaging CHWs produced similar increases in cancer screening whether inside[32–45,48,49,51–54,56,58,61–66,68–89,91–96,98–106] or outside[47,55,60,107] the U.S. Interventions that were designed to increase demand for and access to cancer screening services[35,37,39,40,47,49,53,68,70,71,73,75,77,79,80,85,88–90,97,98,100,103,104,107] resulted in larger increases in screening than interventions increasing demand alone.[32–34,36,38,41–45,48,51,52,54–56,58,60–66,69,72,74,76,78,81–84,86,87,91–96,99,101,102,105] Only 1 study[106] was designed to improve access to services alone.

Screening increased regardless of the number of intervention components, but larger increases were observed when CHWs implemented 4 or more components.[35,39,47,49,73,88–90,97,98,103] Greater increases in screening were reported for interventions that provided

group education[35,36,38,40,42,45,47–49,51,56,61,62,66,68,69,71–74,76–84,87,89,96,98,101,103,105,107] than those that provided one-on-one education.[32–34,36,37,39,41,43,44,48,49,52,54–56,58,60,64,65,69,75,82,85–91,93–95,97–102,104] Among interventions that increased access to services, largest increases were observed when CHWs assisted with translation[47,73,97,103] or addressed transportation barriers.[35,47,73,88–90,97,98,103]

Interventions were effective whether CHWs delivered services face-to-face,[34,35,38,40–42,45,48,51,60–63,68,71,72,76,78,81,83,84,87,91,92,94–96,98,103,105,106] remotely,[37,53,55,64,65,70,102] or a combination of the two,[33,36,39,43,44,47,49,52,54,56,58,66,69,73–75,77,79,80,82,85,86,88–90,93,97,99–101,104,107] with slightly larger increases in screening reported when both methods were used. Interventions were effective across different levels of intensity as similar increases were reported when CHWs met with study participants one[34,35,41,47,60,63,71,72,88,97,99,105,106] or more times.[32,33,36,40,42,43,45,49,51–56,61,62,64–66,68–70,75–80,82–86,89–91,93–96,98,100,101,103,104,107] The duration of interventions with multiple sessions ranged from half a month to 60 months (median: 4 months). While interventions were effective across durations, slightly larger effects were reported by studies with longer intervention durations.[34,36–38,49,51,54,56,58,81,83,85–89]

### Stratified Analysis Based on CHW Work Characteristics

Detailed results can be found in Appendix Table 3. Interventions were effective across the 9 types of core roles CHWs performed in the included studies, though interventions where CHWs provided care coordination, case management, and system navigation[34–37,39,47,49,51–54,58,65,66,68,70,71,73–77,80,85,88–90,93,95,97–100,103,104,106,107] or focused on building individual and community capacity[32–45,47–49,51,52,54–56,58,61–66,68–80,82–92,94–103,105–107] reported the largest increases. No clear pattern was observed across the number of core roles CHWs performed.

### Stratified Analysis Based on Demographic Characteristics

Detailed results can be found in Appendix Table 4. Interventions were effective for age-appropriate populations with different racial, ethnic, and socioeconomic backgrounds. Interventions engaging CHWs were effective across racial and ethnic groups examined; however a larger increase was observed among Asian-American populations (median increase of 12.1 pct pts; IQI: 6.1 to 45.3)[38,45,51,56,66,68,73,74,77,79–82,97–99,103] than Black or African-American (median increase of 7.8 pct pts; IQI: 2.2 to 14.0)[32,42,48,54,61,62,69,75,91,95] or Hispanic or Latino populations (median increase of 8.6 pct pts; IQI: 1.4 to 14.0).[36,41,43,44,49,52,72,78,83,84,92,93,100,101,104,106] Even though only a few studies recruited exclusively from American Indian Alaskan Native[58] or Pacific Islanders,[35,76,96] large increases in screening use were observed. Screening use increased for populations with different educational, employment, insurance, and income levels, with the largest increase observed among low-income communities.[47,65,87,106] Interventions were effective regardless of whether participants had a regular source of health care.

Interventions implemented among populations with baseline screening rates of 0%[33,34,37,41,43,44,47,51–53,55,56,58,60,64,65,72–74,76,79,85,86,90,93,94,96,100,103,107] or below

50%[35,38,39,45,48,49,61,62,66,70,77,78,83,87,89,91,95,97–99,101,102,104,106] reported greater increases than those implemented among populations with higher baseline screening rates, although screening use increased across baseline levels.

## DISCUSSION

This systematic review found that interventions engaging CHWs increased breast, cervical, and colorectal cancer screening use. Findings from this review served as the basis for Community Preventive Services Task Force (CPSTF) recommendations to use these interventions to increase screening for breast cancer by mammography,[108] cervical cancer by Pap test,[109] and colorectal cancer by colonoscopy or FOBT.[110] Currently, there are approximately 67,000 CHWs employed in the U.S. and this number is expected to grow by 16% from 2021 to 2031.[112]

Downstream health benefits from increases in breast, cervical, and colorectal cancer screening could include earlier diagnosis and treatment and reduced cancer-related morbidity.[2–4,113] Interventions produced similar results whether inside or outside the U.S. They were effective across different settings with different population and intervention characteristics, suggesting intervention composition can be flexible. CHWs worked alone or as part of a team and implemented interventions with a heterogeneous mix of components, duration, and intensity. This suggests that decision makers have flexibility in considering the local population, needs, and context when designing interventions and determining the optimal extent of CHW involvement.

Interventions where CHWs delivered the intervention with other team members (“CHW in a team”) were more effective at increasing screening than those where CHWs independently delivered the entire intervention (“CHW alone”). One possible explanation is that interventions engaging CHWs as part of a team tend to deliver more intervention components (median of 4 components) when compared with interventions CHWs deliver services alone (median of 1 component). Both the current review and the previous Community Guide reviews on multicomponent interventions[27–29] found that cancer screening increased with the number of intervention components.

Interventions engaging CHWs were more effective when designed to increase both demand for and access to cancer screening services, as found in previous Community Guide reviews.[27–29] Nearly all studies included in this review provided either group or one-on-one education. Interventions where CHWs provided group education reported larger increases in cancer screening than those with one-on-one education. Similar findings were reported by Seven et al., who compared the effects of group versus individually delivered education on breast cancer screening.[114] These findings may suggest that social norms and modeling play an important role in motivating participants to obtain screening, as seeing others like themselves overcome similar barriers to receive cancer screening could influence participants’ decision to receive screening.[115] Studies have shown that group education resulted in similar cancer screening rates,[116,117] knowledge,[116] or satisfaction with care[118] when compared with individual education while costing less.[117]

For interventions offering multiple sessions, those spanning 6 months or longer were more effective than those with shorter durations. This might suggest that extending the overall duration of interventions might lead to a greater increase in cancer screening. Programs may choose to retain CHWs once trained and continue offering services on a recurring basis.

Several core roles were either not reported or not performed by CHWs included in this review. These roles include advocating for individuals and communities, implementing individual and community assessment, providing direct services, and participating in evaluation and research. Interventions engaging CHWs already apply many elements of community-based participatory research to assess community needs. Involving CHWs in needs assessment could ensure a community's needs are understood and addressed. CHWs can also provide valuable input from intervention conceptualization through evaluation.

Most studies did not report on CHW reimbursement and the review team cannot determine whether CHWs received payments for their services, and no conclusions could be made on whether providing reimbursement could improve intervention effectiveness. Policies regarding payment from insurance payers vary by state, with only 7 authorizing Medicaid or other insurer reimbursement for CHW services.[119] In other countries, community health workers such as social prescribing link workers[120] in the United Kingdom and Aboriginal and Torres Strait Islander Health Workers in Australia[121] are paid positions.

Several interventions reported additional benefits of engaging CHWs in the delivery of services. CHWs reported satisfaction with their work[55,105] and that the experience had a positive impact on their personal development.[47] CHWs in one study expressed an interest to continue their work.[66] Participants expressed gratitude to CHWs[35] and some reported wishing to participate as CHWs in the future.[68] One study reported an increase in check-up appointments in the intervention city, possibly indicating the intervention increased general healthcare usage in addition to increasing screening.[38]

Interventions were effective when implemented among uninsured and low-income populations and when focusing on specific racial and ethnic groups. This is particularly important because in 2018, people without health insurance or with incomes below 139% of the federal poverty level had lower cancer screening use than their counterparts.[5] Asian American persons, American Indian persons, and Alaska Native persons also had lower cervical and colorectal cancer screening rates than other racial and ethnic groups. Foreign-born persons are less likely to be screened for breast, cervical, and colorectal cancers than those born in the U.S.[122] Interventions where CHWs provided language translation services[47,73,97,103] reported large increases in screening, suggesting language is an important barrier faced by non-English speaking populations. CHWs often closely identify with the populations they serve and can be especially effective at addressing the existing disparities and improving health equity.

Advances in technology have led to a rapidly changing healthcare industry and provide opportunities for CHWs to utilize different intervention delivery methods. Video conferencing technologies allow for face-to-face communication via a remote connection, potentially expanding the reach of one-on-one or group education, especially for those

in rural areas or with transportation barriers. As medical facilities continue to integrate telemedicine and adopt new technologies, there may be increased opportunities for streamlining appointment scheduling, allowing CHWs to better serve their clients.

Additional research and evaluation are needed to fill remaining gaps in the evidence base. The impact of interventions engaging CHWs on repeat screening could not be determined, and few studies included American Indian/Alaska Native populations. Also, more evidence is needed to determine if intervention effectiveness is influenced by the supervision, training, or compensation of CHWs, or by involving CHWs in research and evaluations.

### Limitations

This review has several limitations. Over half of the included studies provided limited description of interventions or populations and many relied on convenience sampling. Some studies relied on self-reported screening results without verification. However, while self-reported breast, cervical, and colorectal screening outcomes are often overestimated, these measures are still considered reasonably valid.[123–126] Lastly, publication bias cannot be ruled out, and it is possible that studies with null results are missing from the dataset.

## CONCLUSIONS

The CPSTF also recommends interventions engaging CHWs to increase breast,[108] cervical,[109] and colorectal cancer screening,[110] improve cardiovascular disease management,[127] diabetes prevention,[128] and diabetes management.[129] The findings that provided the basis for those recommendations, combined with findings from the current review, suggest that interventions engaging CHWs are effective in preventing and managing multiple chronic conditions. A systematic review of the economic evidence found that interventions engaging CHWs to increase cervical and colorectal cancer screening use are cost-effective, and interventions to increase colonoscopy use are associated with net healthcare cost savings.[130] As of June 2016, 6 states had enacted laws to authorize a certification process for CHWs, 5 of which authorized the creation of a standardized curricula based on core competencies.[111] Additionally, 7 states authorized Medicaid or other insurer reimbursement for services performed by CHWs.[119] Standardizing the role of CHWs and providing certification opportunities could ensure CHW proficiency and increase their credibility. Allowing for reimbursement could also encourage more people to become CHWs, reduce attrition, and enable more decision makers to fund interventions that engage CHWs.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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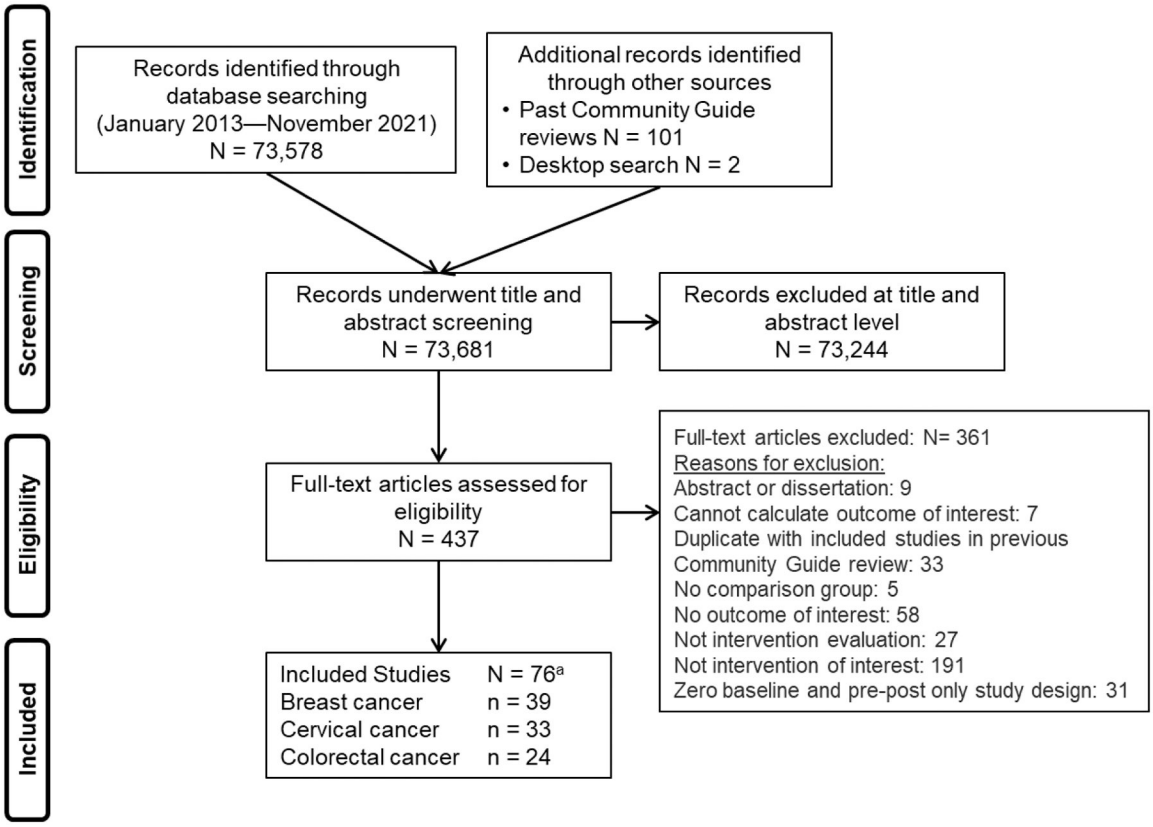


**Figure 1.**

Search process and results.

[a]Some interventions focused on more than 1 cancer type.

**Table 1.**

CHW Work Characteristics of Included Studies

| Characteristics | Number of studies reporting | Citations |
|---|---|---|
| Level of involvement in intervention delivery | | |
| Implemented everything | 39 | 33, 35, 39, 41, 43, 45, 47, 49, 50, 52, 54, 57, 61, 62, 66, 70–73, 75, 76, 78, 79, 82–86, 88, 89, 91, 95, 96, 99–101, 103, 104, 107 |
| Implemented majority of components | 27 | 32, 34, 36–38, 40, 46, 48, 53, 55, 56, 60, 63, 65, 67–69, 74, 77, 80, 90, 92–94, 97, 98, 102 |
| Implemented minority of components | 10 | 42, 44, 51, 58, 59, 64, 81, 87, 105, 106 |
| Received formal training | | |
| Yes | 65 | 32–36, 38, 39, 41, 43–50, 52–58, 60–73, 75–80, 82, 83, 85, 86, 88–96, 98–105, 107 |
| Not reported | 11 | 37, 40, 42, 51, 59, 74, 81, 84, 87, 97, 106 |
| Supervision of CHW performance | | |
| Yes | 31 | 33, 35, 36, 38, 39, 46, 47, 52, 53, 55, 63, 65, 67, 69, 71, 75, 76, 78, 82–91, 94, 95, 102 |
| Not reported | 45 | 32, 34, 37, 40–45, 48–51, 54, 56–62, 64, 66, 68, 70, 72–74, 77, 79–81, 92, 93, 96–101, 103–107 |
| CHWs matched to the community | | |
| Yes | 72 | 33–58, 60–69, 71–86, 88–107 |
| Not reported | 4 | 32, 59, 70, 87 |
| Reimbursement | | |
| Yes | 19 | 35, 36, 38, 45, 49, 54, 62, 64, 66, 68, 77, 79, 80, 82, 85, 90, 91, 101, 105 |
| Not reported | 57 | 32–34, 37, 39–44, 46–48, 50–53, 55–61, 63, 65, 67, 69–76, 78, 81, 83, 84, 86–89, 92–100, 102–104, 106, 107 |
| Core roles[111] | | |
| Cultural mediation among individuals, communities, and health and social service systems | 61 | 32–41, 43–49, 52, 56, 58, 59, 61–64, 66–69, 71–80, 82, 83, 85–91, 93–104, 107 |
| Providing culturally appropriate education and information | 70 | 32–52, 55, 56, 58–66, 68, 69, 71–105, 107 |
| Care coordination, case management, and system navigation | 38 | 34–37, 39, 47, 49–54, 58, 65, 66, 68, 70, 71, 73–77, 80, 85, 88–90, 93, 95, 97–100, 103, 104, 106, 107 |
| Providing coaching and social support | 59 | 32–41, 43, 44, 47–50, 52, 54, 56, 57, 61–72, 75–80, 82, 83, 85–95, 97, 98, 100, 102–105, 107 |
| Advocating for individuals and communities | 1 | 80 |
| Building individual and community capacity | 70 | 32–45, 47–52, 54–59, 61–80, 82–92, 94–103, 105–107 |
| Providing direct services | 0 | |
| Implementing individual and community assessments | 1 | 104 |
| Conducting outreach | 41 | 32–35, 39, 41–49, 52, 54, 56, 57, 60, 66, 71, 72, 77–82, 85, 86, 89, 91, 93–95, 97, 98, 100, 101, 104, 106 |

| Characteristics | Number of studies reporting | Citations |
|---|---|---|
| Participating in evaluation and research | 1 | [104] |

CHW, community health worker.

**Table 2.**

Population Characteristics of Study Participants

| Characteristics | Number of Studies Reporting | Citation | Distribution Median (IQI) |
|---|---|---|---|
| Age | | | |
| Reported in years | 46 | 32–34, 36, 37, 39, 42, 46, 47, 51, 50–58, 60, 61, 63–66, 68–72, 74, 76–78, 80–86, 88–91, 93,100–103,105,107 | 54 years (46 to 60) |
| Reported in ranges | 25 | 35, 38, 43–45, 48–50, 52, 53, 59, 67, 73, 75, 79, 87, 92, 94–99, 104, 106 | Not applicable |
| Not reported | 5 | 40, 41, 54, 55, 62 | Not applicable |
| Sex[a] | | | |
| Female | 20 | 33, 39, 40, 44, 45, 50, 53, 58, 61, 65, 66, 69, 70, 74, 79, 82, 101, 102, 104, 105 | 68% (57% to 76%) |
| Male | 20 | 33, 39, 40, 44, 45, 50, 53, 58, 61, 65, 66, 69, 70, 74, 79, 82, 101, 102, 104, 105 | 32% (24% to 43%) |
| 100% Female | 2 | 36, 67 | Not applicable |
| Not reported | 1 | 62 | Not applicable |
| Race and ethnicity, U.S. only (71 studies) | | | |
| American Indian/Alaska Native | 1 | 85 | 42% |
| Asian-American | 4 | 39, 50, 65, 102 | 29% (9% to 46%) |
| Black or African American | 10 | 34, 37, 50, 53, 65, 67, 85, 87, 94, 105 | 33% (27% to 50%) |
| Hispanic/Latino | 7 | 34, 37, 40, 42, 50, 65, 102 | 45% (12% to 58%) |
| White | 12 | 33, 34, 40, 50, 53, 64, 65, 67, 85, 86, 94, 105 | 50% (22% to 85%) |
| Recruited specific populations | | | |
| 100% American Indian/Alaska Native | 2 | 46, 58 | Not applicable |
| 100% Asian American | 18 | 38, 45, 51, 56, 66, 68, 73, 74, 77, 79–82, 97–99, 101, 103 | Not applicable |
| 100% Black or African American | 12 | 32, 42, 48, 54, 57, 61, 62, 69, 75, 90, 91, 95 | Not applicable |
| 100% Hawaiian and Pacific Islander | 3 | 35, 76, 96 | Not applicable |
| 100% Hispanic/Latino | 15 | 36, 41, 43, 44, 49, 52, 72, 78, 83, 84, 92, 93, 100, 104, 106 | Not applicable |

| Characteristics | Number of Studies Reporting | Citation | Distribution Median (IQI) |
|---|---|---|---|
| 100% Serbo-Croatian | 2 | 88, 89 | Not applicable |
| Not reported | 3 | 63, 70, 71 | Not applicable |
| Employment status | | | |
| Employed | 36 | 36, 38, 42, 43, 45, 49, 51, 54, 56, 61, 63, 66–68, 72–74, 76–84, 86, 87, 90, 94–96, 101, 102, 104, 107 | 48% (27% to 58%) |
| Not reported | 40 | 32–35, 37, 39–41, 44, 46–48, 50, 52, 53, 55, 57–60, 62, 64, 65, 69–71, 75, 85, 88, 89, 91–93, 97–100, 103, 105, 106 | Not applicable |
| Income[b] | | | |
| ≥50% with annual household income less than $40,000 | 30 | 36–38, 42, 43, 46, 48, 49, 52, 53, 57, 61, 72, 74–76, 78, 79, 82, 83, 90, 92–95, 101, 102, 104, 105, 107 | Not applicable |
| Focused on low-income communities[c] | 5 | 33, 47, 65, 87, 106 | Not applicable |
| Not reported | 34 | 34, 35, 39–41, 44, 50, 51, 54–56, 58–60, 62, 64, 67, 68, 70, 71, 73, 77, 80, 84, 85, 88, 89, 91, 96–100, 103 | Not applicable |
| Education | | | |
| Less than high school education | 37 | 33, 36, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, 61, 66–69, 73–75, 77–82, 85–87, 89, 94, 95, 99, 100, 103, 104, 106 | 41% (28% to 64%) |
| High school graduate or equivalent | 25 | 33, 36, 39, 42, 43, 45, 46, 51, 54, 61, 66, 67, 69, 73–75, 79, 85–87, 94, 95, 97, 100, 103 | 31% (25% to 36%) |
| More than high school education | 33 | 33, 36, 37, 39, 42, 43, 45, 46, 51, 56, 57, 61, 63, 66, 67, 69, 73–76, 79, 83–86, 91, 94, 95, 100, 102, 103, 105, 107 | 32% (16% to 55%) |
| Not reported | 18 | 34, 35, 41, 44, 47, 50, 53, 55, 58–60, 62, 64, 65, 70, 88, 92, 96 | Not applicable |
| Insurance status | | | |
| Insured | 46 | 32, 33, 36–38, 40, 42, 43, 45, 46, 48–54, 56, 57, 65–67, 70–72, 74, 76, 78–86, 90, 93, 94, 96, 100, 101, 103, 104, 106, 107 | 67% (46% to 81%) |
| 100% insured | 8 | 34, 39, 47, 55, 59, 60, 88, 92 | Not applicable |
| Not reported | 20 | 35, 41, 44, 58, 61–64, 68, 69, 73, 77, 87, 91, 95, 97–99, 102, 105 | Not applicable |

[a]Only studies examining intervention impact on colorectal cancer screening.

[b]Seven studies provided income data measured in various ways and could not be summarized.

[c]Study authors stated interventions were implemented in communities with low income, but no specific numbers provided.

**Table 3.**

Impact of Interventions Engaging CHWs on Breast, Cervical, and Colorectal Cancer Screening

| **Cancer type/ Screening test/ Effect of CHW** | **Citations** | **Median (IQI)** |
|---|---|---|
| Breast cancer | | |
| Mammography | | |
| Overall (42 study arms) | 32, 34–39, 42, 43, 47–49, 52–56, 60, 62–64, 71, 75, 76, 78, 80, 83, 85, 87–93, 95, 104, 106 | Median increase of 11.5 percentage points (IQI: 5.5 to 23.5) |
| CHW alone (21 study arms) | 35, 39, 43, 47, 49, 52, 54, 55, 62, 71, 75, 76, 78, 83, 85, 88, 89, 91, 95, 104 | Median increase of 9.2 percentage points (IQI: 4.7 to 22.8) |
| CHW added (6 study arms) | 32, 34, 43, 48, 60, 80 | Median increase of 11.0 percentage points (IQI: 2.3 to 13.5) |
| CHW in a team (17 study arms) | 34, 36–38, 42, 43, 48, 53, 55, 56, 63, 64, 87, 92, 93, 106 | Median increase of 13.7 percentage points (IQI: 9.1 to 29.7) |
| Cervical cancer | | |
| Pap test | | |
| Overall (31 study arms) | 36, 38, 39, 41, 47, 49, 51, 52, 56, 68, 72, 73, 77, 78, 81, 83, 84, 86, 87, 93–100, 103, 104, 106, 107 | Median increase of 12.8 percentage points (IQI: 6.4 to 21.0) |
| CHW alone (18 study arms) | 39, 41, 47, 49, 52, 72, 73, 78, 83, 84, 86, 95, 96, 99, 100, 103, 104, 107 | Median increase of 13.7 percentage points (IQI: 7.6 to 20.2) |
| CHW added (3 study arms) | 68, 77, 94 | Median increase of 11.0 percentage points (Range: 6.4 to 16.8) |
| CHW in a team (10 study arms) | 36, 38, 51, 56, 81, 87, 93, 97, 98, 106 | Median increase of 15.4 percentage points (IQI: 3.0 to 34.0) |
| Colorectal cancer | | |
| Colonoscopy, FOBT/FIT, or sigmoidoscopy | | |
| Overall (25 study arms) | 33, 36, 39, 40, 44, 45, 49, 53, 58, 61, 62, 65, 66, 69, 70, 74, 79, 82, 101, 102, 104, 105 | Median increase of 10.5 percentage points (IQI: 4.5 to 17.5) |
| CHW alone (15 study arms) | 33, 39, 40, 45, 49, 61, 62, 66, 70, 79, 82, 101, 104 | Median increase of 10.5 percentage points (IQI: 4.0 to 13.0) |
| CHW added (4 study arms) | 44, 102, 105 | Median increase of 6.5 percentage points (IQI: 5.1 to 29.7) |
| CHW in a team (8 study arms) | 33, 40, 45, 58, 62, 74, 93, 96, 104, 107 | Median increase of 16.1 percentage points (IQI: 4.4 to 27.3) |
| Colonoscopy | | |
| CHW alone (7 study arms) | 39, 61, 62, 70, 104 | Median increase of 10.5 percentage points (IQI: 7.1 to 13.0) |
| FOBT/FIT | | |

| Cancer type/ Screening test/ Effect of CHW | Citations | Median (IQI) |
|---|---|---|
| Overall (17 study arms) | 39, 40, 44, 45, 49, 58, 61, 62, 66, 70, 101, 102, 104, 105 | Median increase of 7.8 percentage points (IQI: 5.2 to 16.5) |
| CHW alone (12 study arms) | 39, 40, 45, 49, 61, 62, 66, 70, 101, 104 | Median increase of 7.7 percentage points (IQI: 3.7 to 17.9) |
| CHW added (4 study arms) | 44, 102, 105 | Median increase of 6.8 percentage points (IQI: 5.1 to 29.8) |
| CHW in a team (3 study arms) | 44, 58, 102 | Median increase of 13.5 percentage points (Range: 12.5 to 28.6) |
| Sigmoidoscopy | | |
| CHW alone (5 study arms) | 61, 62, 104 | Median increase of 3.5 percentage points (IQI: −2.3, 58.5) |
| Colonoscopy or sigmoidoscopy | | |
| CHW alone (4 study arms) | 45, 49, 66, 101 | Median increase of 6.6 percentage points (IQI: 4.3, 8.2) |

CHW, community health worker; FIT, fecal immunochemical test; FOBT, fecal occult blood test; IQI, interquartile interval; pct pts, percentage points.