

A Review and Report of Community-based Health Literacy Interventions

by

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A review and report of community-based health literacy interventions

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ABSTRACT

Background: A scoping literature review was conducted to identify and describe the state-of-the-art of community-based health literacy interventions. “Health literacy” and “community” were the core concepts used to identify relevant interventions for review and analysis. “Health literacy,” “community” and “community-based” are terms with a range of meanings, and the review aimed to find and report those interventions that intentionally brought together groups of people to participate in an intervention that addressed health literacy issues or tried to change health literacy skills, behaviors, status, or other outcomes as defined by researchers.

Methods: Literature searching was conducted using PubMed, selected EBSCO and Proquest databases, as well as Web of Science for relevant studies. Grey literature was searched on web sites to identify eligible community-based programs. Search results were limited to English publications from June 2010 to 2017, however no limit was applied to geographical location, participants, health topic, or intervention type. Two authors screened titles and abstracts and identified 170 references suitable for full-text analysis. Papers were reviewed using a standard template with descriptive categories about the intervention; and criteria from the CDC “Best Practices” for evidence-based practices and Guide to Community Preventive Services study designs.

Results: Of the 2,402 papers located with the search strategy, 74 papers met the inclusion criteria. Of the included papers, 55 reported that intervention communities were selected because of health literacy concerns; 63 reported that health literacy principles or techniques were used for content or program development; 54 used health literacy measures; and 53 included health literacy outcome information. Only two papers reported large magnitude effects.

Conclusions: A wide range of community-based health literacy interventions provide qualitative and quantitative evidence of positive outcomes; knowledge change was the most common outcome. Interventions can be strengthened in a number of ways to continue to build the body of knowledge about when and how to best address health literacy in community interventions.

Keywords: health literacy, community, community-based interventions

INTRODUCTION

This paper reports the results of a scoping literature review (Arksey and O'Malley 2005) to identify and describe community-based health literacy interventions. The Roundtable on Health Literacy, Health and Medicine Division, National Academies of Sciences, Engineering, and Medicine commissioned the Herschel S. Horowitz Center for Health Literacy, University of Maryland to review literature published since 2011 and describe the state-of-the-science of community-based health literacy interventions. The Roundtable asked for a review that summarized previous work on community-based health literacy interventions; described new interventions; used a published evaluation framework to evaluate interventions; and reported intervention effect sizes, when available. To identify relevant publications, the Roundtable also asked the review team to use broad definitions of “community” and “interventions” that could include policy and system level as well as individual and group level activities.

The concept and definition of “community” is central to framing this review. As McLeroy and colleagues noted in their editorial on a community-based interventions review paper, “The term *community-based* has a wide range of meanings” (2003, 529). They observe that too often *community-based* is equivalent to a description of an intervention setting rather than a way to think of communities as relationships and resources for meeting everyday needs. The Roundtable referenced the Institute of Medicine (IOM) health literacy report (Nielsen-Bohlman, Panzer, and Kindig 2004) and the Agency for Healthcare Research and Quality (AHRQ) updated systematic review (Berkman et al. 2011) as prior reports that included community health literacy interventions. Although neither report defined “community,” both used the word to refer to the physical places people conduct their everyday lives, distinct from hospitals and doctors’ offices. Community clinics and care providers seemed to occupy a middle zone between community and clinical care facility. In the IOM report, “community” also referred to social, cultural, and linguistic identity. Both reports included interventions in which the participants acted as individuals, not necessarily with explicit reference to social identities or bonds, and the community component was often a location, such as a community clinic or hospital.

Since these two reports, the Horowitz Center team located one other non-health topic specific community-level health literacy intervention review paper. Nutbeam, McGill, and Premkumar reported only seven interventions met their criteria to “improve health literacy with community (non-clinical) populations, ... in particular for interventions that are skills-directed and where improved interactive or critical health literacy is targeted as an outcome” (2017, 3). Their review uses “population” and “community” as roughly equivalent terms that describe people not engaged with clinical services. Because of differences in inclusion criteria, three (Chervin et al. 2012; Soto Mas, Ji, et al. 2015; Xie 2011) of the seven papers plus one related paper (Fleary 2012) in their review are in the present review.

Given the Roundtable’s stated interest in a wide-angle review, the lack of a consensus definition for “community-based health literacy intervention,” and the Nutbeam team’s small number of results, the Horowitz Center team created a broad working definition to help identify studies for this review. The intent was to, at a minimum, identify interventions with an element of “groupness” either in the researchers’ selection of intervention participants or in the intervention itself, such as a voluntary or continuing education class, community activity, or other event that

brought people in contact with each other for the health topic or issue. The ideal would have been to find interventions in which groups formed and sustained social identities and bonds as part of the health actions. To be inclusive, the team created the following definition of “community-based health literacy intervention” for the review:

Any purposeful, organized activity to help a group of people find, understand, use, or communicate about health information, services, or issues for themselves or their communities.

The focus on a group component helped the review team distinguish “individual interventions,” which were excluded, from “community interventions,” which were included. In “individual interventions,” individuals were recruited because they met stated demographic characteristics; once they consented, they participated in the intervention as individuals. Examples are one-on-one coaching or counseling; case management; home visits; and individual education to participate in a health screening. If the sole “community” component was that researchers used an organization, such as a community hospital or community health center to recruit individuals for an individual-based study, the review team excluded the paper. Studies with community health workers (CHWs) often created a “grey zone” when the paper was not clear if the CHWs, a community group, or both were the intended intervention group. Again, to be inclusive, the team included CHW interventions that aimed to improve their health literacy either as an endpoint or to intervene in a community. In “community interventions,” a group, such as a church congregation, residents of a senior housing complex, or members of a sporting club, shared a location, experience, or interest and participated in at least one group activity during the intervention.

In addition to distinguishing individual from community interventions, the team separated health literacy from health education interventions by looking for an application of the health literacy concept in the selection of the community; measures and outcomes; or material and program design elements. Health literacy is distinct from health education because the former cultivates flexible (and different) skills or processes that people can deploy in response to changing topics and circumstances, and the latter seeks to impart a non-transferable body of information about particular health conditions or practices; however, health education contributes to health literacy.

METHODS

The definition of “community-based health literacy intervention,” along with the search terms used in fourteen databases (Appendix A, Tables 1, 2 and 3), yielded 2,402 publications from traditional peer-reviewed academic sources as well as from unconventional sources or the “grey” literature. The team focused on identifying a discernable group of people targeted by the intervention as a primary means to distinguish community from non-community interventions. To be inclusive and provide a broad view of the science, the team allowed “health literacy” to describe the community, intervention, or measures and outcomes.

The following definitions guided the search strategy.

- **Community-based health literacy intervention:** Any purposeful, organized activity to help a group of people find, understand, use, or communicate about health information, services, or issues for themselves or their communities.
- **Health literacy:** Both how people find, process, understand, and communicate about health information and services to protect and promote their health, and how organizations and systems support or hinder people in these activities (modified definition from Healthy People, U.S. National Library of Medicine, and U.S. *National Action Plan to Improve Health Literacy*) (Healthy People 2020 n.d.; Selden et al. 2000; (DHHS) U.S. Department of Health and Human Services 2010).

The aim for the scoping review was to identify community-based health literacy interventions that have been developed, implemented, and evaluated since the Institute of Medicine health literacy report (Nielsen-Bohlman, Panzer, and Kindig 2004) and the evidence review from the Agency for Healthcare Research and Quality (Berkman et al. 2011). A literature search was conducted based on the guidelines outlined in Arksey and O’Malley’s scoping review framework (2005) and the PRISMA flow diagram for reporting standards in systematic reviews and meta-analyses (Moher et al. 2009). Three sets of conceptual key terms were developed in various combinations and Boolean operators to search electronic databases for peer-reviewed publications and grey literature (Appendix A, Table 1). The librarian (NT) designed different search strategies in close cooperation with the two first authors (CB, LM) (Appendix A, Table 2). The initial search was conducted using PubMed, ten EBSCO databases, two Proquest databases and Thomson Reuters’ Web of Science. These databases were selected as they offer extensive indexing of relevant literature, such as conference proceedings, reports, theses and dissertations. After reaching unanimous consensus on the search strategies, the librarian (NT) ran the searches on April 21st, 2017.

The inclusion and exclusion criteria for the initial search and subsequent refinements to the sample are in Table 1. In commercial library databases, searches were limited to peer reviewed studies published in English language during the time frame June 2010-2017. This time span was chosen to identify any new programs developed after the two reports by Nielsen-Bohlman, Panzer, and Kindig (2004) and Berkman et al. (2011). Common terms across all databases included “health literacy” and “community.” The key term “health literacy” was available in the controlled vocabulary in the majority of the databases, and the search was limited to that particular field. In all other instances, “health literacy” was limited to title or abstract fields.

Table 1. Criteria for inclusion and exclusion of papers in the review

Inclusion	Exclusion
<ol style="list-style-type: none"> 1. Published in English 2. Published between June 2010-2017 3. Peer reviewed articles (exceptions are theses, dissertations, web pages, posters, and professional/trade publications when enough) 	<ol style="list-style-type: none"> 1. Conceptual models 2. Associations between health literacy and another concept or variable 3. Intervention development or protocols 4. Formative research 5. Interventions focused on healthcare professionals or individuals (not groups) 6. Questionnaire or other instrument development

<p>information was included)</p> <p>4. Used a community sample</p> <p>5. “Health literacy” and “community” common terms</p>	<p>7. “Health literacy” and “community” absent in abstract</p> <p>8. Health knowledge or skills without a health literacy connection</p> <p>9. Community locations or settings, such as health center, used only for recruitment</p> <p>10. Review articles, but reference lists were searched for articles meeting inclusion criteria</p>
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Grey literature was searched using databases such as MedNar, EthOS, OpenDOAR, and Worldwidescience. The search terms included a combination of key terms as presented in Appendix A, Table 1. Additional references were obtained by exploring the web sites listed on PHPartners web site (PHPartners 2017), as well as library catalogs. In addition, all references of relevant review articles identified in the initial database searches were screened to find additional studies for inclusion.

Process to select papers and conduct full-text review

All references from the initial search were imported in Zotero, a citation management software, and duplicates were removed. References from Zotero were exported to Rayyan, a screening software for systematic reviews, which was used for screening titles and abstracts (Ouzzani et al. 2016). Rayyan caught duplicates that were not initially flagged by Zotero, and the librarian (NT) resolved these. The first two authors (CB, LM) independently screened the titles and abstracts in Rayyan. They jointly reviewed and discussed 33% of the references identified for inclusion and reached consensus. Next, they independently double-reviewed the remaining references and reached consensus by discussion for inclusion. Entries without abstracts were included in the pool of references if the title seemed it might fit the inclusion criteria. During the title and abstract review, the first two authors identified eight abstracts containing only protocols, descriptions of future projects, or projected results. The public health librarian followed up with authors to obtain related publications. Only one author had published results, but the study was not included in the final results. The first two authors also identified twenty review articles; the librarian reviewed the reference lists and added studies that met the inclusion criteria.

After the title and abstract screening, the first two authors trained three coders to use a template to review and record information from the full text articles (Appendix B). The template included criteria from the Roundtable’s initial call for a review paper, CDC’s “*Best Practices*” *Framework for Planning and Improving Evidence-based Practices* (Spencer et al. 2013), and the Guide to Community Preventive Services study design categories (DHHS 2001). Based on the full-text information, both the coders and the first two authors excluded additional articles because they did not include anything about health literacy, a community, and an intervention in the body of the paper. Once coding was complete, the first two authors reviewed and synthesized information on the remaining studies.

RESULTS

The literature search yielded 2,402 non-duplicate records for “health literacy” and “community” (Figure 1). Title and abstract review reduced the number to 170 articles for full-text review. The full-text review reduced the final corpus to 74 articles that met the inclusion criteria in Table 1. The 74 papers are listed in Table 3. Of the included papers, 55 reported that the intervention communities were selected because of health literacy concerns; 63 reported that health literacy principles or techniques were used for content or program development; 54 used health literacy measures; and 53 included health literacy outcome information [Note: one paper could include from one to four of the health literacy elements].

A majority (63%) of excluded results at the title and abstract stage included “knowledge” in the title or abstract; 16% included “skill.” Some abstracts mentioned health literacy, but the papers themselves did not treat health literacy in a substantive way; those papers were excluded. Other papers included health literacy only in the background discussion about the need for interventions; others concluded that health literacy had affected their results. In neither case did the authors explicitly address health literacy in the main intervention discussion, and the papers were excluded.

Mental health was the most frequent topic in the final set of papers. The review team chose to include the mental health literacy papers for two reasons. First, the interventions not only intended to develop community members’ knowledge of mental health symptoms and conditions but also their skills to communicate and support others experiencing a mental health condition. Second, the review yielded a significant number of articles on mental health literacy, and the number of articles and variety of groups involved are important findings in themselves. Nutbeam and colleagues (2017, 4) excluded mental health literacy articles in their review because of “...significant inconsistencies in the definition of mental health literacy and wide variation in measurement instruments.” Definitional inconsistencies are not specific to mental health papers, however, and readers will find variability in how health literacy is defined. Additionally, studies focused on health literacy varied in use of established, standardized instruments or researcher-created instruments. For these reasons, the papers on mental health literacy did not seem noticeably different than other papers in the review.

The results clustered by approaches to health literacy improvement, settings, and health topics. The one policy intervention is reported separately. The team chose not to report by community to avoid stigmatization that might come from calling out specific groups as “low health literacy.” Moreover, the lack of significant details about many of the intervention groups made it difficult to create meaningful community categories. As a convenience for readers, Table 2 reports the frequency of common labels researchers used to describe their intervention communities. Some papers may be counted in more than one category, and not all possible communities are in the table.

Figure 1. Flowchart for selection of papers for full-text review

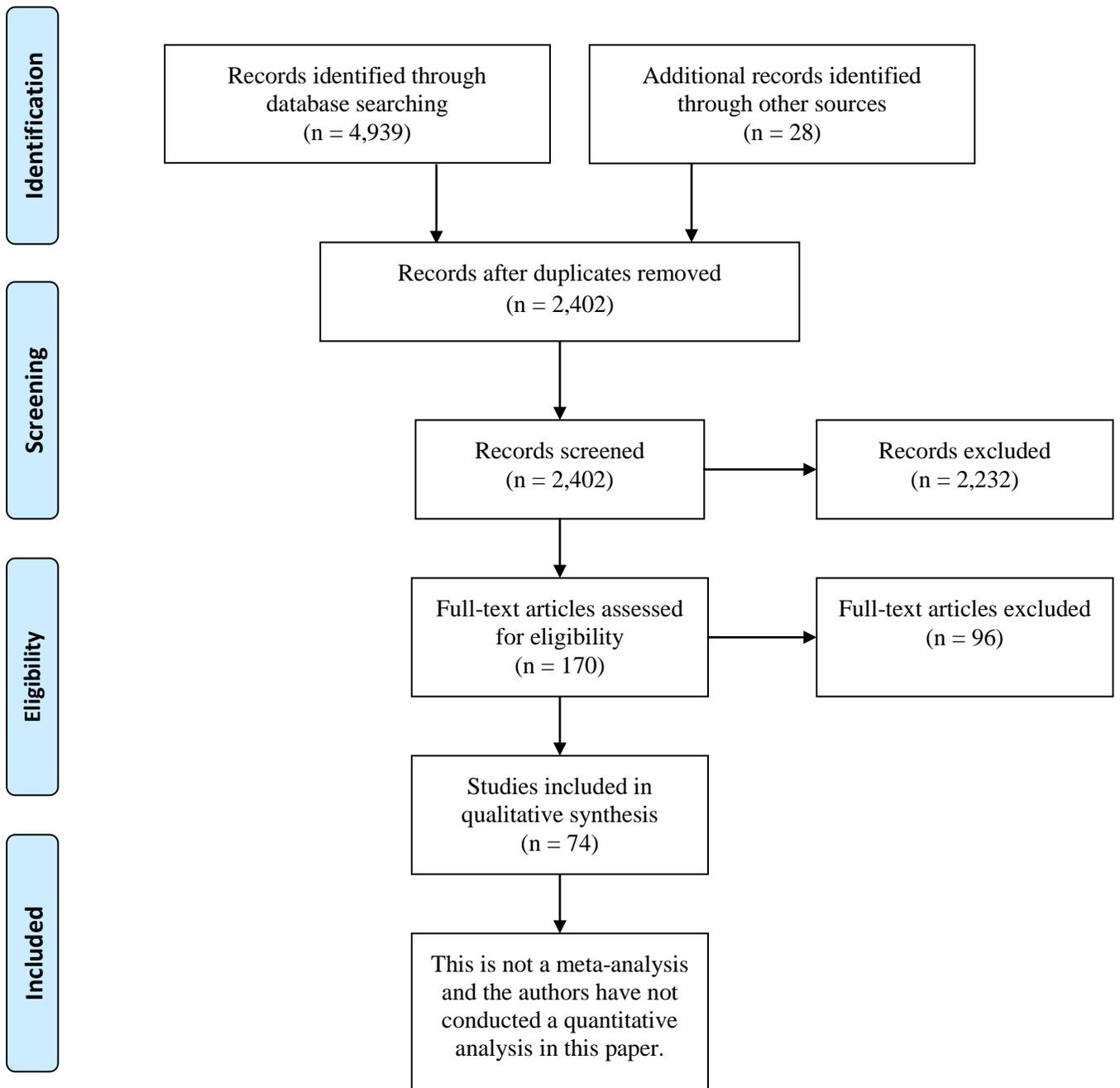


Table 2. Frequency of labels to identify intervention communities

Groups	Number of articles*
Asian	N = 15
Hispanic/Latino	N = 11
Rural	N = 9
School-aged children/youth	N = 8
Community health workers/Health coaches	N = 5
Immigrants	N = 6
Older adults	N = 6
Parents	N = 6
African American	N = 3

*Based on N=74 papers but column will not total 74 because articles could be in more than one category, and not all communities in the 74 papers are listed in the table.

Magnitude of intervention effects

The Roundtable asked the review team to report the magnitude of intervention effects, when available. To assess magnitude, the team relied on reported effect sizes for statistically significant comparisons. One consequence of this methodological decision is that the results table (Table 3) does not include information on the amount of impact suggested by qualitative analyses. Notwithstanding that decision, the team acknowledges the value of those qualitative analyses, especially when trying to reflect with fidelity the perspectives and experiences of community members. The results table (Table 3) adopts the convention of characterizing effect sizes as small, medium, large, or very large. These characterizations are based on conventional standards for Cohen's *d*, for standardized regression weights (Cohen 1988; Sawilowsky 2009) and for odds ratios (Chen, Cohen, and Chen 2010). Of studies with quantitative outcomes that might have reported effects sizes, 84% (59) did not do so. Transparency about magnitude of effects is necessary for rational allocation of public health resources. The failure to calculate and disclose magnitude of effects is contrary to guidelines for reporting experiments (e.g., American Psychological Association 2010).

Effect sizes that were reported were mainly small, or small to moderate, varying by outcome measure. Only two studies reported any effects that attained large magnitude. One used fotonovellas with Latinas at high risk of depression and found large effects of the intervention on knowledge of depression and efficacy to seek help for that condition (Hernandez and Organista 2013). Another achieved very large magnitude increases in breast cancer and cervical cancer screening among Korean Americans by conducting a single educational session led by community health workers (Han et al. 2017).

Health literacy skill and capacity building

Seven articles reported interventions to improve or increase a group's health literacy skills or an organization's capacity to serve its clients or constituents; an eighth related paper on Ethiopian immigrants in Israel is discussed below in the culturally-sensitive interventions category. Most of these interventions occurred in countries other than those in North America and Western Europe. An intervention in Pakistan had a two-part purpose of increasing female college students' communication skills and sense of civic responsibility and increasing the iron-deficiency anemia knowledge of local women in a vocational education program (Ayub et al. 2015). The researchers described their program as a health literacy intervention because they aimed to create a trained, volunteer public health work force to help meet the needs of low literacy communities and build health knowledge. The researchers used pre and post-tests to identify statistically significant increases in students' perception of civic responsibility; students' perception of communication competency; and community women's knowledge of iron-deficiency anemia. Notably, the least educated community women showed the lowest knowledge gain.

The review identified several papers featuring the Ophelia (OPTimising Health LIterAcY and Access) approach developed by Richard Osborne and colleagues in Australia. A summary paper that reports intervention results from nine diverse sites in Australia met the inclusion criteria (Beauchamp et al. 2017). Readers can refer to the Ophelia protocol (Batterham et al. 2014), a Health Literacy Questionnaire validation study (Elsworth, Beauchamp, and Osborne 2016), and a detailed report of one of the nine sites (Goeman et al. 2016) [See results in Table 3 for Goeman et al] to learn more about the Ophelia model. The purpose of the nine interventions was to demonstrate "the successful application of the eight underlying principles to achieve development of health-literacy informed interventions with the potential to impact on health and health outcomes" (Beauchamp et al. 2017, 5). Each site had a primary service organization that led the project and defined its own intervention outcomes based on their clients' responses to the Health Literacy Questionnaire, a survey instrument designed and validated by the research team. In general, the intended outcomes were improving clients' health literacy or identifying ways to make information or services more accessible. The authors report that of the six sites that used the Health Literacy Questionnaire to measure intervention outcomes, four found effects ranging mainly from small to moderate. Qualitative evaluation methods found a range of improvements that included self-efficacy, communication with providers, information-seeking, and applying what was learned. Sites that involved volunteers reported they felt involved and useful in helping others.

A research team in the UK implemented an existing program called Self Care for People with the aim of increasing participants' self-care knowledge and skills and their confidence and intention to do self-care (White et al. 2012). The primary outcome was change in the number of general practitioner consultations between baseline and follow-up over a twelve-month period. The self-care program consisted of six three-hour sessions over a three to six-week period. Participants received a handbook and exercises. The classes were held in small group sessions in workplaces and community-service locations for parents. Comparing the intervention groups to similar locations used as controls, the team did not find a significant difference in use of general practitioner services after the self-care program. At the six and twelve month follow-ups, the researchers did find small but statistically significant improvements in intermediate outcomes

such as self-esteem and health literacy, defined as decisions about when to use services, intention to use services, and exposure to other self-care initiatives and resources.

In Shenzhen, China, a research team sampled communities by streets and residential buildings to be part of a health literacy intervention or control group (Zhuang et al. 2016). Both groups received basic health education through bulletin boards, posters, and health lectures; the intervention group also received text messages once a week for one year. The health content consisted of data, explanations, and recommended health behaviors encouraging action. Using a pre-post twenty-two item questionnaire with dimensions of health knowledge, behavior, and skill, researchers found that the intervention group had slightly higher health literacy scores after the year than the control group. The researchers also analyzed acceptability of receiving messages and cost-effectiveness.

A research team in Georgia, U.S., partnered with Meals on Wheels, a volunteer organization that delivers meals daily to homebound older adults. The team trained the volunteer drivers to deliver a health literacy skills intervention to the older adults they visited (Rubin et al. 2014). The intervention adapted a 2002 Meals on Wheels program used in southern Oregon as well as *Questions are the Answer* [Agency for Healthcare Research and Quality] and the *AskMe3* campaign [National Patient Safety Foundation]. The volunteers scored near the top of the range on the Short Test of Functional Health Literacy for Adults, and their assignment was to foster interactive health literacy skills with the older adult clients so they could communicate more effectively with their healthcare providers. The paper reported the results of the training workshop and clients' recall of the coaching they received. The volunteers scored the workshops as effective, and client recall of the coaching interventions was high. Using a sample of clients who received the coaching and were contacted in the twelve months following, 93% recalled the coaching events; 83% said they thought about "good questions for good health;" and more than 75% could recall a specific coaching practice.

One study interested in people's self-monitoring skills used a group class on either sugar sweetened beverage consumption or physical activity, behavioral diaries, and a teach-back call to assess people's accuracy in recalling messages and behaviors (Porter et al. 2016). The researchers measured participants' baseline health literacy with the Newest Vital Sign (Weiss et al. 2005). The researchers were interested in participants' ability to accurately complete food diaries and recall behavioral messages, as well as the amount of teach-back needed to confirm understanding. They found that overall, participants with the lowest levels of health literacy had the greatest difficulties with accuracy and recall and needed more teach-back. Compared to those who received the sugar-sweetened beverage content, the participants in the physical activity arm more accurately completed their diaries but recalled fewer behavioral messages and needed more teach-back (Porter et al. 2016).

An academic-community partnership in Long Island, New York used health literacy content in a mini public health curriculum for community residents (Goodman, Dias, and Stafford 2010). The goal was to bridge cultural divides and increase residents "science" and "research" literacy so they could participate in a community health collaborative. Residents asked for the training so they would be on "equal footing" with researchers. The curriculum consisted of eleven didactic sessions and four experiential workshops; sessions were held at public libraries because they

were accessible and trusted local spaces. Adult literacy instructors helped develop the curriculum. Outcome measures were knowledge change; participant satisfaction; and submission of a pilot grant proposal to the university partner. Pre and post-tests showed improved knowledge of public health research topics, and open-ended questions elicited positive responses to the curriculum with requests for more time spent on content and group activities. Ten of the thirteen community members in the sessions submitted pilot grant proposals.

Information-seeking interventions

Three projects focused on improving people's health information seeking skills. In Australia, a team of clinicians, consumer representatives, and librarians led free, public workshops to help adults improve their online skills to find and use evidence-based health information (Gray, Elliott, and Wale 2013). Workshop participants were overwhelmingly positive about the workshops' effects on knowledge, skills, attitudes, and potential impact on seeking behaviors. Participants also reported they intended to ask doctors new questions and change how they maintained their health and coped with chronic disease and pain. Higher income and being native born were associated with more positive reports about the workshops' impact. A similar intervention for working class community members in the Washington, D.C. area also found modest improvements in participants' ability to find and evaluate online information (Pomerantz et al. 2010). A computer skills and health information seeking improvement intervention in suburban Maryland targeted older adults (Xie 2011). The research team offered public library-based classes using materials from the National Institute of Aging to help older adults learn how to use MedlinePlus.gov and NIHSeniorHealth.gov. Pre and post-tests showed significant improvements in computer and Web knowledge, along with decreased anxiety, increased efficacy, and increased participation in healthcare.

Culturally-sensitive interventions to build knowledge and skills

Five interventions aimed to increase not only health knowledge but also behaviors and skills, such as communicating with others about health, seeking information, asking questions, and analyzing information, for distinct cultural groups; more interventions targeting cultural groups are discussed in the adult learners, chronic disease, mental health (other), and cancer sections. A project in a Midwestern U.S. city aimed to improve the functional, communicative, and critical health literacy skills of Iraqi immigrants for whom English is a second language (Hatamleh 2015). Using feedback from a community needs assessment, the researcher developed a three-hour educational session in Arabic that covered all types of health literacy skills and used a pre and post-test to examine the effects. Functional health literacy (understanding information; familiarity with available resources; and ability to complete forms) did not improve as much as participants' self-reported ability to communicate with providers and critically assess information.

A thirteen-year program in Israel aimed to help Ethiopian immigrants and improve their health by providing educational sessions and cultural liaisons and helping them communicate with healthcare workers (Levin-Zamir et al. 2011). The intervention also trained clinic staff to bridge cultural differences. The researchers reported improvements in clinic-patient relations;

availability and accessibility of health services; improved navigation; perceived well-being and self- management.

A health literacy model of behavior change was designed to help adults improve specific mental and physical health behaviors (Pleasant 2011). Facilitators varied in professional background and included physicians, nurses, nutritionists, physical therapists, social workers, and a pastor. Participants were recruited from a federally qualified community health center. Sessions were hosted in English and Spanish and held twice per week over a six-week period. Interactive sessions employed lecture, activity, and goal setting. A few of the positive health changes include improved health values (cholesterol, blood pressure), increased exercise, improved nutrition, and increased physical ability. Additionally, participants reported changes in behaviors and attitudes, as well as gains in health literacy, such as reading and understanding food labels.

Two interventions for Indonesian refugees and asylum seekers in New Hampshire focused on explaining safe medicine use, empowering individuals to understand and access the healthcare system, and improving communication with healthcare providers (Mancuso 2011). One intervention was a community program on safe medicine use and provided a lecture, question and answer session, brochures, and wallet cards. A second intervention was a health fair with prevention information; BMI, blood pressure, and cholesterol checks; instruction on how to read a food label; brown bag medicine check-ups; and referrals to local care providers. Organizers received positive evaluations from community participants and health professionals.

Adult learners and health literacy interventions

A sub-set of health literacy knowledge and skill improvement interventions focused on adult learners. Several projects examined the effects of integrating health literacy content in adult education programs (Brown, Collie-Akers, and Fernandez-Ortega 2015; Chervin et al. 2012; Freedman 2011; Muscat et al. 2016; Soto Mas, Cordova, et al. 2015; Soto Mas, Ji, et al. 2015). As Soto Mas et al. (2015; 2015) observed, the *National Action Plan to Improve Health Literacy* (DHHS 2010) calls for the integration of adult literacy curricula and health literacy content, but few examples exist of how to combine them. In one project, six adult education centers in the Northeast U.S. used a “study circles” approach to train adult education teachers to teach health literacy skills and integrate health literacy content in the curriculum (Rudd et al. 2005; cited in Chervin et al. 2012). The project goal was not only to improve adult learners’ health literacy skills and increase their self-efficacy, but also show how to teach health literacy as part of adult education. An evaluation found students' knowledge about health issues and self-efficacy increased significantly as a result of the health literacy instruction, and all six centers improved their capacity to teach health literacy. A knowledge and self-efficacy building intervention for primarily Latino adults attending adult community college or night school classes also found knowledge increases using either a fotonovela or brochure (Rodriguez 2015). A case study of a health literacy skills class in Atlanta, Georgia, described the effects of teaching functional health literacy skills to adult learners (Freedman 2011). The researcher was interested in how health literacy instruction could help adult learners take greater control of their health and use what they learned in everyday life. She found that “careful attention to environmental factors and instructional strategies” can improve learning and help students carry lessons into everyday health behavior change (Freedman 2011, 81).

Five interventions conducted in English-speaking countries specifically considered the issues of health literacy for non-native speakers of English (Brown, Collie-Akers, and Fernandez-Ortega 2015; Muscat et al. 2016; Otilingam et al. 2015; Soto Mas, Cordova, et al. 2015; Soto Mas, Ji, et al. 2015). Soto Mas and colleagues implemented their *Health Literacy and ESL Curriculum* with native Spanish-speakers in two different U.S. communities to see if they could improve participants' health literacy as measured by the Test of Functional Health Literacy in Adults (TOFHLA) (Soto Mas, Cordova, et al. 2015; Soto Mas, Ji, et al. 2015). The *Health Literacy and ESL Curriculum* is a twelve-unit package that includes traditional grammar, vocabulary, reading, writing, speaking, civic and life skills, math, and two health units. Certified English as a second language instructors teach the curriculum in six or twelve weeks. A six-week implementation in New Mexico used a local elementary school, large hotel chain (employer), and community church as classroom sites. Using the Spanish version, the research team found that total TOFHLA, raw numeracy, and reading comprehension scores increased significantly; only two participants scored inadequate functional health literacy at post-test compared to thirteen at baseline (Soto Mas, Cordova, et al. 2015). Using a control group and the English language TOFHLA to measure health literacy, a six-week implementation in Texas significantly increased the intervention group's TOFHLA's score compared to a control group (Soto Mas, Ji, et al. 2015).

Two interventions focused on nutrition topics and Spanish-speaking Latinas of Mexican origin (Brown, Collie-Akers, and Fernandez-Ortega 2015; Otilingam et al. 2015; see also Castañeda et al 2016 in the cancer section). A nutrition literacy project used the SNAP-ED program, a federal program to reduce food insecurity and improve nutrition and wellness of low-resource groups, to reach Spanish-speaking women with low literacy skills (Brown, Collie-Akers, and Fernandez-Ortega 2015). The researchers tried the intervention with SNAP-ED clients as well as bilingual peer educators. The clients chose MyPyramid, reading nutrition facts labels, and using portion control for meals as the skills they wanted to learn. A qualitative evaluation found that participants rated the workshop and curriculum "very useful." Otilingam and colleagues developed and tested *Buenos Hábitos Alimenticios para Una Buena Salud*, a program of two two-hour nutrition workshops for Latinas (2015). The workshops had culturally-relevant nutrition information and skill-building activities, such as reading nutrition facts labels and preparing low-fat meals. The workshops were held in a community clinic familiar to workshop participants. Researchers used the Newest Vital Sign as a health literacy pre and post-test and measured knowledge and self-reported health behaviors (Weiss et al. 2005). Compared to control groups, intervention groups showed health literacy, knowledge, and self-reported behavior improvements. Participants said the most important thing they learned was how to read nutrition labels.

An Australian project adapted a UK adult and health literacy program and conducted a feasibility study of an integrated adult and health literacy curriculum to improve functional, communicative, and critical health literacy skills (Muscat et al. 2016). The study mainly enrolled culturally and linguistically diverse students who spoke a language other than English. The students reported being satisfied and engaged with the content and said they were better prepared to communicate with healthcare professionals, including asking questions. However, the results of the evaluation questionnaires showed improvements in topic-specific health literacy but no

significant improvement in a composite measure of generic functional, communicative, and critical health literacy skills (Muscat et al. 2016).

Early childhood education and health literacy interventions

The review includes three articles that involved Head Start programs, parents, or children (Burgette 2016; Fleary 2012; Stockwell et al. 2010). One included project aimed to improve community members' oral health through a health literacy intervention. The project focused on training Early Head Start teachers and staff so they could educate parents and children less than three years about good oral health and prevention, especially during pregnancy and for infants and young children (Burgette 2016). The educational intervention was Zero Out Early Childhood Caries. Baseline and 24-month reports indicated that children enrolled in this program were more likely to have had a dental visit and less likely to have negative quality of life results than children in the Medicaid control group. Parents' health literacy was not a significant factor for the Head Start children's results. A second intervention recruited mothers with children in a Texas Head Start program to participate in a five-week educational intervention about healthy lifestyles, including diet/nutrition, physical activity, sleep hygiene, parenting skills, and mental wellness (Fleary 2012); the mothers' knowledge about all topics increased. In New York City, researchers partnered with adult literacy experts to create a culturally appropriate educational program in English and Spanish and care kit for upper respiratory infections, based on U.S. Centers for Disease Control and Prevention (CDC) campaign materials (Stockwell et al. 2010). The purpose was to educate low income Latino parents with children in Early Head Start programs about appropriate care for upper respiratory infections. Researchers reported that parents' knowledge increased, and parents' attitudes about appropriate care changed.

Schools as health literacy intervention sites

This section reports on four studies that used schools as the setting for a health literacy intervention; three additional school-based and one university-based study are reported in the mental health section (Fung et al 2016; Hart 2012; Noble, Hedmann, and Williams 2015; Pinto-Foltz, Logsdon, and Myers 2011), and one additional school-based study is reported in the medicine section (Chang et al. 2015). An intervention in Spain and one in Portugal tried to change student, school, and community engagement for health improvement. One project examined how schools in low-income, immigrant communities in Spain could use family-oriented health programs to reduce inequalities and foster social inclusion (Flecha, García, and Rudd 2011). Using a case study evaluation approach, the researchers found that the schools that paid close attention to a community's expressed needs; created a welcoming space for community members to gather; and included the community's "cultural intelligence" or rich knowledge about their own experience and needs were the most successful in addressing the community's health literacy needs and improving adults' and children's health literacy. Pais and colleagues (2014) worked with high school students to enhance health literacy through a community profiling project. Students assessed community needs and resources and took a leadership role in working with community members, professionals, and political representatives to address identified needs. The authors present two case studies from secondary schools in Porto, Portugal. Students negotiated topics with their teachers and workgroups and selected examination of health rights and health care service costs. Students participated in every phase of

the research, created poster presentations, and discussed findings at a symposium at the University of Porto. Students said they valued the opportunity to share and listen to varied opinions during the poster symposium. Teachers observed students' increased ability to make critical judgements about past and present situations. The authors suggest the students' experience helped them exercise their citizenship, thus developing a foundation for critical health literacy in the future.

Diamond and colleagues (2011) used the Building Wellness Curriculum to design an after-school program for third through eighth grade students. Students came from urban communities, had high risk for chronic disease, and qualified for no-cost school lunches. Topics included food choices, healthy choices, body function, and skills about communicating with a health provider. The course was offered one semester each academic year over a span of six years and used discussion, in-class activities, reflection, and take home activities. Researchers used the REALM Teen to assess health literacy at years one, three, and six. Findings suggested consistent increases in knowledge and retention of information. Teachers' anecdotal reports indicate students demonstrated positive behavior changes and increased curiosity about health and the body. In contrast, a school-based project in Australia used general practice doctors and teachers to lead a health curriculum to increase high school students' health literacy, help-seeking behaviors, and access to local health services (Harrison, Ollis, and Savage 2016). Researchers found the students receptive to the doctors and teachers as health resources, but the volume of information was overwhelming and not sufficiently in-depth on key topics. The evaluation found that even though students could recall information, there was little improvement in student knowledge, confidence, help-seeking behavior, or ability or desire to access health services.

Other settings or topics for health literacy interventions

Son and colleagues (2016) worked with health care students to facilitate a three-day curriculum about "reproductive health literacy" at a juvenile detention center (see the cancer section for an additional study with incarcerated women, Ramaswamy, Simmons, and Kelly 2015). The authors described "reproductive health literacy" as knowledge, self-efficacy, and communication skills. Participants were female and average age 16 years. Study findings were increased knowledge about sexually transmitted infections and increased self-efficacy in condom use. However, there was no significant improvement in sexual autonomy or contraception use.

Adult residents of Richmond-Metro area participated in a computer-based intervention to increase health literacy about preterm births (Vanderbilt et al. 2016). The majority (95%) of participants were African American women; about 20% were male. Six modules included information about preterm births and related risk factors. The researchers state the modules used adult learning theory and plain language, among other techniques, to make the content accessible; the modules were reviewed by a range of experts, including health literacy experts. Women showed significant knowledge gains for all six modules. However, men did not show significant increases for the modules *Let's Talk Patient and Provider Communication* and *It Takes a Village*.

An intervention in Atlanta, Georgia, aimed to improve maternal and child health outcomes by building the knowledge of mothers who were homeless, had addiction problems, and lived in a

rehabilitation facility (Oves 2013). Information for the mothers pertained to newborn care, preventive services, and social services. The mothers participated in a six-hour class and received a manual. Using pre and post-tests, the researcher found increases in knowledge after the class and in a sub-sample at two to four months post-intervention.

Chronic disease risks and management

Eight interventions focused on low health literacy adult groups with respect to chronic disease risk reduction and disease self-management. The interventions integrated health literacy techniques, such as simplified content and easy, action-oriented recommendations, to improve health literacy and sometimes change behavior or physiological outcomes related to diabetes and cardiovascular risks or disease.

Chan's dissertation research in Hong Kong included two studies of older Chinese adults (average age 73 years) with one or more chronic diseases (2012); the researcher chose older adults with chronic diseases because the literature review identified older adults as having low health literacy. To improve their health literacy as well as other outcomes, one study examined the effects of multiple-exposure, group self-management classes on self-management behaviors; self-efficacy; health status; and health care use (Chan 2012). Chan's interventions used simplified content, including plain Chinese and concrete examples. Using an intervention and control group, the researcher found statistically significant improvements in all self-management behaviors and self-efficacy outcomes and half of the health status measures. No change in health care use was found. In the second study (Chan 2012), the researcher proposed that well-designed diabetes self-management programs could improve adherence, health literacy, and health outcomes (Chan 2012, 16). The plain Chinese-language intervention included multiple exposure, group diabetes educational sessions designed to improve a range of outcomes, including knowledge, quality of life, mental health, food consumption, and physiological measures. Using an intervention and control group, the researcher found statistically significant improvements in diabetes-related knowledge and quality of life; and reductions in total energy and saturated fat intake. No changes in physiological measures, such as blood sugar and blood pressure levels, or other nutritional and quality of life measures were found.

Lam also conducted an intervention with Chinese adults (45 years and older) in Hong Kong, again because of their low health literacy and its relation to chronic disease management; the purpose was to increase their physical activity and improve their diabetes outcomes (H. S. Lam 2014). Lam describes the intervention as culture, language, disease, and age appropriate, as well as theory-based and "health literacy-oriented," meaning "a patient self-care empowerment program to nurture patients' ability to obtain, understand, comprehend, and analyze the health information and services that they needed [sic]" (2014, 18). A nurse and certified exercise trainer led the six-week classes followed by a telephone follow-up. Compared to the control group that received standard diabetes education, the intervention participants doubled their physical activity levels from sedentary to acceptable levels; no health literacy results were reported.

Two different interventions targeted Korean-Americans with chronic conditions (K. B. Kim et al. 2014; M. T. Kim et al. 2015). One focused on older adults (average age 70 years) with high blood pressure who were selected because of low health literacy (K. B. Kim et al. 2014). A high

blood pressure management intervention for Korean-American older adults added a health literacy component to educate participants about words and phrases relevant to blood pressure as well as communication skills with providers (K. B. Kim et al. 2014). The team used a high blood pressure health literacy scale they had validated in other research. The intervention was delivered in small groups at churches and senior centers over six weeks. In comparison to the control group, the intervention group had better medication adherence; lower blood pressure; better health literacy scores at the 12 and 18 month follow-ups (but not the 6-month follow-up); more blood pressure knowledge; and less depression. In the other study with first-generation Korean-American immigrant adults (35 years or older), researchers selected the group because of low health literacy and reported problems even using health materials in their native language (M. T. Kim et al. 2015). The health-literacy component focused on building skills for tasks such as reading food labels and understanding medical terms and was done through two-hour group education sessions over six weeks. Although the researchers identified health literacy as a secondary outcome, it was not measured and reported separately in the results. The researchers found the intervention group improved on all outcomes of hemoglobin A1c levels, diabetes-related knowledge and self-efficacy, and quality of life in comparison to the control group (M. T. Kim et al. 2015).

An intervention on diabetes and blood pressure knowledge and self-efficacy involved older African Americans (average age 72 years) with low health literacy in senior affordable housing complexes in Washington, DC and Maryland (Bertera 2014). The researcher designed and tested educational materials featuring community members as “talent”; combined the African American tradition of oral storytelling with the Hispanic medium of fotonovelas; and provided group educational sessions. Using intervention and control groups and pre and post-tests, the researcher showed a statistically significant increase in intervention participants’ knowledge and self-efficacy. Using Chew et al.’s item set (2008), the researcher found intervention participants’ with the lowest scores reported the greatest gains in self-efficacy.

Two interventions were implemented with Hispanic community members [see the culturally sensitive interventions, adult learners, and mental health (other), and cancer sections for more interventions with Hispanic/Latino community members]. Using data from a community health needs assessment and feedback from community leaders, a team in Shelbyville, Kentucky, created an educational program “The Environment and Your Health” (Ramos et al. 2013). The curriculum placed special emphasis on cardiovascular disease and diabetes. Hispanic residents took two sets of health topic-specific classes nine months apart, and pre-post-tests showed significant knowledge gains. In Boston, MA, researchers adapted a successful cardiovascular risk reduction program for African American women (Love Your Heart) for low-income Hispanic women (Romero et al. 2016). Study participants were recruited from two predominantly Hispanic housing projects and one local community health center. They attended weekly 90-minute sessions for six weeks. Based on pre and post-test data, the culturally-tailored, Spanish language cardiovascular disease prevention program showed knowledge improvements after the program (Romero et al. 2016).

Mental health literacy interventions

Seventeen articles reported interventions to increase knowledge about mental health, increase confidence identifying a person with a mental health problem, and reduce social stigma about mental illness. The majority of the mental health literacy studies focused on depression, psychosis, and stigma, though other topics were covered. Communities participating in these interventions varied by occupation (coaches, police officers, college students, farmers, community health workers, and foster carers), age (older adults, school-aged youth), and by race/ethnicity (Asian, Latino, African). Intervention formats included traditional class settings, workshops for adult and student groups, and use of illustrated novels (fotonovelas).

The review identified seven papers using the Mental Health First Aid (MHFA) curriculum, a standard program in community mental health literacy research (Kitchener and Jorm 2008). The intervention focuses on improving knowledge, behavior, and attitudes towards people with mental health problems and encourages help-seeking and self-help strategies. The course is typically delivered in a group setting over multiple sessions for a total of twelve hours; however, two interventions used four-hour courses (L. M. Hart, Jorm, and Paxton 2012; Armstrong et al. 2011). Most articles describing an MHFA program included a topical breakdown of content used in training, such as an introduction to mental health disorders, mental health first aid, and practice-based skills (Armstrong et al. 2011).

Several interventions used a questionnaire to assess mental health literacy, which included a vignette about depression and one about schizophrenia/psychosis. The questionnaire and vignettes can be translated into community members' preferred languages and tailored in duration and delivery. Only one article described qualitative findings on use of MHFA in diverse community groups including social workers, religious leaders, and health professionals (Svensson, Hansson, and Stjernswärd 2015). Six focus groups were held to understand how the MHFA course influenced participants. Benefits of the course were described, including understanding and humility towards people with mental illness and useful advice on handling a mental health illness crisis.

Three interventions decreased stigmatizing attitudes about mental illness (A. Y. K. Lam, Jorm, and Wong 2010; Wong et al. 2017; Anderson and Pierce 2012; Armstrong et al. 2011). In addition to reducing stigma in adult Chinese immigrants in Melbourne, Australia, Lam and colleagues increased the participants' ability to recognize symptoms for depression and schizophrenia as well as beliefs about treatment, though there was no change in beliefs about seeking professional services for treatment (Lam et al. 2010). In another study focused on Chinese adults living in Hong Kong, Wong et al. improved ability to recognize symptoms of depression and schizophrenia and confidence offering help to others (2017). Similar to the Lam study, Wong and colleagues did not see a decrease in perceived dangerousness and dependency and suggest that traditional Chinese beliefs about mental health may require long-term strategies to change. Anderson and Pierce trained coaches and leaders of sports teams in rural settings in Australia to improve their understanding of mental health conditions, increase their confidence to assist those with mental illness, and decrease stigma (2012). Results indicated an increase in knowledge regarding their reported ability to identify depression and schizophrenia/psychosis, half of the coaches demonstrated an increase in self-confidence about helping someone experiencing mental illness, and stigma was reduced for three of every four participants. Armstrong and colleagues (2011) trained community health workers within rural communities in

India to reduce stigma, but there was only evidence of a minor reduction. However, ineffective but culture-typical pharmacological interventions (vitamins, herbal medicines and appetite stimulants) to treat mental health conditions decreased and three months after course completion, participants' ability to identify depression and psychosis remained statistically significant.

The Mental Health First Aid curriculum has been applied to other topic areas, such as preventing eating disorders (L. M. Hart, Jorm, and Paxton 2012) and raising awareness of drought-related mental health problems (C. R. Hart, Berry, and Tonna 2011). Hart and colleagues (2012) trained college students living in residence halls at the University of Melbourne to improve knowledge, behavior and attitudes toward people with eating disorders. Though there was no change in knowledge like other studies, participants demonstrated improved ability to recognize an eating disorder and appropriate mental health strategies, such as knowledge of effective treatments and informal help-seeking. Hart and colleagues (2011) described a program for people living in rural communities of New South Wales who had experienced severe drought. The intervention aimed to raise awareness among community members and rural farmers about mental health literacy and the effects of the drought on mental health resilience through community events. The program generated a free mental health telephone crisis line that received more than 270 calls from local farmers; booklets about local mental health services; and multiple community events and forums to raise awareness about mental health issues.

In addition to the seven MHFA studies, an additional ten papers in this section represented a wide variety of mental health interventions. Two studies focused on reducing mental illness stigma (Fung et al. 2016; Pinto-Foltz, Logsdon, and Myers 2011). Fung and colleagues recruited adolescents and adults in Hong Kong for five interactive three-and-a-half hour workshops. Findings demonstrated that both adolescent and adult intervention group participants increased mental health literacy and decreased stigma. Researchers observed that education is more effective for adolescents whereas contact is more important for adults. A ten-week program, called "In Our Own Voice", used narrative story-telling and videos to reduce mental illness stigma and improve mental health literacy in a sample of 13-17 year old girls attending two urban public high schools (Pinto-Foltz, Logsdon, and Myers 2011). Unlike the Fung intervention, stigma did not change post-intervention; however, mental health literacy scores increased at four and eight-week follow up.

Three interventions aimed to improve "dementia literacy" (Noble, Hedmann, and Williams 2015; Taylor et al. 2012; Rodriguez 2015). Noble and colleagues used a program called Old SCHOOL (Seniors Can Have Optimal Aging and Ongoing Longevity) Hip-Hop to train fourth and fifth grade students attending a school in Harlem, New York using three one-hour sessions with music, role play skits and short films to overcome cultural barriers and beliefs about Alzheimer's dementia, familiarize students with symptoms, and develop an appropriate response to them. Knowledge of symptoms about Alzheimer's disease increased after the intervention and was retained at the three month follow up. Researchers developed a sixteen-minute DVD titled "Looking out for Dementia" to educate three Aboriginal communities in Australia about dementia (Taylor et al. 2012). Findings reveal increased awareness about dementia as a health issue, appreciation by communities receiving information in their native language, and the need to describe dementia as a term that does not have a comparable term in some languages. A fotonovela educational intervention designed to increase knowledge of dementia and the benefits

of early diagnosis was implemented in thirteen community college and adult night school classes with English or Spanish speaking adults (Rodriguez 2015). Compared with a brochure with dementia content and Latino family photos and a brochure with no dementia content and Latino family photos, the fotonovela content was rated most highly by participants, although both the fotonovela and brochure with dementia content and culturally appropriate photos elicited knowledge increases.

Fotonovelas, a form of health promotion delivered in an illustrated format, were also used in two additional studies (Hernandez and Organista 2013; Unger et al. 2013). Hernandez and Organista trained promotoras to deliver fotonovelas with depression and stigma information to Latinas 18 to 55 years old and at high risk for depression. This intervention increased depression literacy, decreased stigma, and increased help-seeking knowledge and behavior. Unger and colleagues used the Secret Feelings fotonovela in a Hispanic community to increase knowledge about depression. Knowledge gain was higher in the group receiving the fotonovela compared to those who received a text pamphlet. Stigma decreased significantly in the intervention group, though scores regressed close to baseline at follow up. Participants who received the fotonovela were more likely to report they shared the fotonovela with more than one other person compared to the group receiving the text pamphlet.

Two papers described the effect of community health workers (CHW) delivering mental health literacy programs in rural villages in India (Mindlis et al. 2015; Shidhaye et al. 2017). Mindlis and colleagues assigned villages to the intervention group if they had received CHW training to support their village needs, mental health education workshops, and community reintegration activities for people with mental health conditions. Intervention villages demonstrated increased mental health literacy about depression and lower levels of stigma; however, both intervention and control villages retained a fear of medications for potential addictive effects. Findings suggest that tailored interventions localized by village and delivered by CHWs may positively influence mental health literacy. Shidhaye and colleagues implemented a community education program (VISHRAM) in fifteen rural villages in Vidarbha, India to address mental health and suicide. CHWs conducted small group meetings, home visits, established partnerships and obtained buy-in from key stakeholders. The result was increased demand for mental health literacy services and request for treatment increased six-fold over the eighteen-month implementation and reached over 1400 participants. Another important finding was a decrease in the median cost of care from baseline, which was attributed to the likelihood that villagers no longer had to seek care in the private sector, obtained specialist services locally and at no cost, and CHWs advocated for mental health support and care.

Dowrick and colleagues (2013) aimed to increase understanding of and access to mental health services and described the “output” as improved health literacy. They designed an intervention to work at the community, healthcare system, and policy levels. Their target community was older adults and South Asian and Somali adults in the United Kingdom. The researchers used community engagement, primary care quality improvement, and tailored psychosocial services to provide improved service access. Group interventions were offered over eight to ten weeks for approximately one to two hours each and presented case examples of people experiencing anxiety and depression. Primary care practices also received training. Qualitative evaluation

suggests that participants in the intervention group that received the well-being program improved in comparison to those receiving usual care.

Two studies trained participants to assist individuals with mental illness or counsel children (Hansson and Markström 2014; Mosuro, Malcolm, and Guishard-Pine 2014). Swedish police officers were trained over three weeks for a total of thirty-one hours on mental health literacy (Hansson and Markström 2014). The training included a video about various types of mental health conditions and the opportunity for students to role play potential situations. The intervention group demonstrated an improved attitude toward people with mental illness, confidence in assisting someone with mental illness in accessing help, belief that medication and psychotherapy can help, and belief that people with mental illness can recover all improved. Mosuro and colleagues (2014) enrolled foster carers [parents/caretakers] in Great Britain in a nationally accredited thirty-hour course modified for foster carers that uses didactic teaching and role play sessions. The course was designed to increase carers' confidence in their mental health knowledge and ability to help counsel the children in their care. The post-course assessment demonstrated increased mental health awareness, but no impact on coping skills.

Following a devastating earthquake in Japan, Tuerk and colleagues (2013) developed an intervention to assess mental health literacy in the adult population of Mito, Japan. Participants completed questionnaires about feelings and experiences of posttraumatic stress during the two-and-a-half-hour training. Forty-one participants turned in their questionnaires after the training and results demonstrate that 27% met criteria for PTSD and 15% report the earthquake was the index event. Other findings from the surveys included problems of physical health in the past seven days and a lost sense of community. The researchers suggest that interventions such as these can address citizen concerns, inform subsequent outreach and training efforts, and help community members learn how others respond to natural disasters.

Interventions on medicines and health literacy

Six articles in the review pertain to medicine and health literacy. Outcomes of interest were knowledge, self-efficacy, and communication skills.

Two studies used games to deliver an intervention. The first recruited adults 18 to 64 years old from an urban, multi-ethnic community setting to assess how interactive, educational board games influenced participants' knowledge about medicines and communication skills with their pharmacist (Burghardt et al. 2013). Participants who played the games were significantly more likely to report intent to seek pharmacist medication advice in the future compared to control group participants. The second study to use games was a dissertation focused on older adults living independently in a retirement community (Creech 2014). Older adults participated in a single-session about medicine safety as part of a longer health class. The author used the Newest Vital Sign to assess health literacy (Weiss et al. 2005). Results demonstrated an increase in knowledge but not in self-efficacy.

Adherence was the focus of two studies in this review. The first describes a school-based program in Taiwan (Chang et al. 2015). Pharmacists and teachers developed a course to help primary and middle school students communicate with their doctor, read medicine labels and

instructions, take responsibility for taking their own medicines, and talk with their pharmacist and physician. Researchers noted an increase in knowledge, self-efficacy, and skills in the intervention groups compared to the control groups. The second study on adherence focused on older adults attending an inner-city day center (Martin, Kripalani, and DuRapau 2012). Researchers instructed participants on use of a personalized, illustrated daily medicine schedule, PictureRx. Participants also completed baseline measures, including one for health literacy using the Newest Vital Sign (Weiss et al. 2005). Twenty-five percent of participants had limited health literacy, and another 25% had a diagnosis of dementia. Six weeks later participants were re-assessed. Findings demonstrate that medicine adherence and self-efficacy improved after the intervention. Following the study, changes in program protocol included use of teach-back by nursing staff and revising medicine instructions to avoid acronyms and to instead use plain text descriptions.

Two studies focused on knowledge increase regarding antibiotics and complementary and alternative therapies. David and colleagues (2017) delivered a 60-minute seminar modeled after the *Ask Me 3* communication campaign to educate adults 18 and over about antibiotic resistance. Researchers used the Newest Vital Sign to assess participants recruited through local churches and YMCAs (Weiss et al. 2005). The slide presentation described the differences between viruses and bacteria, examples of when antibiotic use is appropriate, how antibiotics work, definition of antibiotic resistance and examples of what could cause antibiotic resistance, and steps to decrease the misuse. Knowledge scores increased, but the authors note that health literacy affected knowledge gains particularly in those with limited health literacy. Adults over age 65 living in a rural community participated in a seven-week course about complementary and alternative therapies (Shreffler-Grant, Nichols, and Weinert 2017). The course used face-to-face classes, webinars, and provided take home materials for participants. Researchers assessed health literacy using the Newest Vital Sign (Weiss et al. 2005), the Chew Health Literacy Screener (Chew et al. 2008), and a scale specific to complementary and alternative therapy literacy. Findings demonstrate health literacy mean scores increased but were not statistically significant.

Cancer and health literacy

Eight papers reported health literacy interventions about cancer primarily focused on increasing knowledge and self-efficacy. Most of the studies focused on women, and three of the studies addressed cost.

Culturally-tailored and peer-led interventions were used to increase knowledge about breast and cervical cancer. Using *promotoras* to facilitate the six-week course, *Nuestra Cocina: Mesa Buena, Vida Sana*, researchers delivered a cooking class to Latinas over the age of 40 (Castañeda et al. 2016). Topics in the course addressed women's health and cancer basics, navigation of screening services, dispelling myths about breast cancer, communicating with providers, and risk reduction strategies. Findings demonstrate an increase in knowledge and an increased likelihood to have a mammogram or colorectal cancer exam after the intervention. However, there was no significant increase in health literacy as measured by the Chew Health Literacy Screener, which assessed for confidence filling out medical forms, asking for help reading medical material, and interpreting written medications (Chew et al. 2008). Korean American women from twenty-three

ethnic churches in an urban setting participated in an intervention about breast and cervical cancer screening. Community health workers (CHW) received training and later trained participants in the CHW homes, food courts, and ethnic cafes and grocery stores (Han et al. 2017). Workshops were designed to build health literacy skills regarding medical terminology about screening, understanding medical instructions, and steps to navigate the health care system. Following the intervention, CHWs conducted monthly phone calls with participants and provided navigation support for up to six months. The researchers used an Assessment of Health Literacy in Cancer Screening (52 items) which assesses print literacy, numeracy and cancer specific terms. The intervention group had a higher likelihood of receiving mammograms and cervical cancer screening at six month follow up compared to control participants. Researchers assessed cost effectiveness using an incremental cost effectiveness ratio (ICER). The cost per screening for someone in the intervention group to receive screening compared to someone in the comparison group was \$236. More details about the cost effectiveness study can be obtained in Schuster et al (2015).

Two studies designed interventions on empowerment for adolescents and young adults. Researchers used a cervical cancer education program called “Sexual Health Empowerment (SHE) Project” delivered to women over age 18 in a county jail in Kansas City, Kansas (Ramaswamy, Simmons, and Kelly 2015). Session topics focused on increasing knowledge, reducing perceived barriers, improving self-efficacy and ability to communicate with providers, and navigate the health care system. Results demonstrate increased scores in knowledge about cervical cancer, increased self-efficacy for screening, and increased confidence in navigating providers and health systems. In a qualitative evaluation of the After Cancer Care Ends, Survivorship Starts for Adolescent and Young Adults (ACCESS AYA), researchers explored how it improved health literacy among participants. Participants included community health providers, AYA survivors, caregivers, and cancer advocates. One important finding among AYA survivors was the desire to practice self and community advocacy which may be tied to the program’s emphasis on self-advocacy with medical professionals. AYA survivors also described increased knowledge and establishing community connections with other survivors. Cancer advocates reinforced the need for education and dissemination of materials as well as in person group meetings for survivors to share information and experiences.

Environmental health risks, communication, and behaviors

Two papers reported interventions to clearly communicate environmental data and information in communities affected by health hazards (Paul et al. 2015; Ramirez-Andreotta et al. 2016). Both sets of researchers noted that communicating environmental risk data and recommendations in ways that motivate health protecting behaviors is especially challenging. One of the articles used health literacy as the core concept (Paul et al. 2015), and the other used environmental health literacy, which they define as an “understanding of the connection between environmental exposures and human health” (Ramirez-Andreotta et al. 2016). A paper on well water contamination identified low health literacy in the community as a contributing factor to low levels of recommended water testing behaviors (Paul et al. 2015). Community presentations on health risks and protective actions, an information campaign, community distribution of water kits and test results produced a three-fold increase in water testing. In the other intervention, researchers did two home visits with residents living in a Superfund designated area (Ramirez-

Andreotta et al. 2016). Researchers took biological samples from residents and environmental samples around the home. They also collected resident information with a questionnaire and asked residents to complete activity duration and dietary logs for the four days before the second home visit. Residents received individual and summary toxicity level reports and phone calls to discuss results. The community hosted three meetings. An evaluation showed residents used the information to cope, change family household behaviors, and take steps to reduce exposures.

Policy/system intervention

The review identified one paper reporting the effects of a national health policy change in Sweden that the authors stated was intended to increase population health literacy skills (Mahmud et al. 2010). The policy emphasized primary care, more individual responsibility for self-care, and population health. County councils were supposed to provide local primary care services (health squares) and health promotion initiatives to strengthen health and health literacy in communities. Researchers were interested in how the policy was implemented at local levels and how well it supported the policy goals. They analyzed thirty “health squares” (primary care centers) and found that people’s limited understanding of health promotion and empowerment concepts was a weakness but a strength was a wide choice of health information materials and individualized counseling with staff. The authors suggest that the actors in the policy/community process should build a common understanding of health promotion and empowerment so that the policy could be implemented as intended.

Excluded papers of interest for community health literacy interventions

Some excluded papers described interventions with interesting features relevant for community-based health literacy interventions. Even though the interventions did not match the inclusion criteria, the team believes the papers can foster discussion about how health literacy insights can contribute to the broad domain of community-based interventions. Some excluded papers may also suggest potential research partnerships and intervention designs that can benefit from health literacy insights.

Authors of included papers discussed their challenges in recruiting large numbers of community members or entire communities to participate in research. Therefore, three excluded papers on health literacy issues for recruitment and retention of community members in research studies are of special interest (Nagler et al. 2013; Pelto et al. 2016; Rexroth and Friedland 2010). These papers were not included in the review because they did not describe interventions and outcomes, but they could inform dialogues on community engagement and “research adherence,” that is community’s sustained interest and participation in research. Community members’ interest, willingness, and continued participation in a study could be a valuable community intervention outcome with health literacy being a prime contributor.

Three interventions helped health professions students be more effective communicators by interacting with community-dwelling members outside healthcare visits (Grice et al. 2014; Hjertstedt, Barnes, and Sjostedt 2014; Milford et al. 2016). These papers were excluded because the interventions focused on educating the students to interact one-on-one with individual

community residents. Nevertheless, these interventions show opportunities to get health professionals “out of the classroom and into the community,” as the title of one paper put it (Milford et al. 2016). One intervention trained first and second-year medical students to counsel Head Start children, parents, and staff on pediatric obesity prevention (Milford et al. 2016). An intervention for dental students sent them into older adults’ homes to educate them about oral health and measure their oral health literacy and oral health status (Hjertstedt, Barnes, and Sjostedt 2014). Third-year pharmacy students were assigned to older adults living in senior housing (Grice et al. 2014). The students used health literacy techniques such as AskMe3 and teach-back to collect health histories, do safety checks, and assess medicine use, among other tasks.

One study used an interesting environmental intervention design to increase health literacy but was excluded because people were recruited as individuals (Crim 2013). University faculty and staff were the target of an intervention to affect individual perceived health literacy and purchasing behaviors in on-campus eateries. The researcher designed and implemented a red, yellow, and green point of purchase labeling system to rate foods. Color-coded stickers, lighted menu boards, posters, emails, and table tents communicated the rating system. Exposure times were varied across the eateries: one eatery had the intervention for six weeks, the second for four weeks, and the third for two weeks. Comparing responses from a paper and pencil pre-test and an online survey post-test, 42% of respondents said the color coding influenced their awareness, understanding, and food choices but not intentions or knowledge. There was a significant increase in “green” food sales and significant decrease in “red” food sales, regardless of length of intervention.

Two examples – one from Bangladesh and the other from Venezuela – hint at how community-level interventions could be designed with health literacy outcomes that extend beyond individual knowledge and behavior change. Since the mid-1990s, a research group in Bangladesh has helped build communities’ capacity to address their own problems (Bhuiya, Hanifi, and Hoque 2016). Using a Participatory Rural Appraisal model, the researchers worked with rural, village-run organizations on a “self-help for health” program. The stated purpose was to build organizational capacity to address collective health problems, improve health literacy through individual awareness related to health improvements, and support participatory planning and monitoring in villages. Using intervention and comparison communities, surveys, project documents and work plans, and reports, researchers reported a number of improvements in the intervention community, including more organizational capacity as well as better health outcomes, such as lower infant mortality and increased vaccination. However, health literacy was mentioned only in the abstract, and villagers’ literacy rates were mentioned only in passing in the body of the paper. The paper does not explain what the intervention did to improve literacy or health literacy and if there were any changes.

In a second example, researchers in Venezuela described an advocacy and social mobilization intervention over a four year period to increase health literacy about breast cancer in Venezuela (Eid and Nahon-Serfaty 2015). They used health literacy as the justification as well as proposed outcome but did not explain how the campaign incorporated or tried to affect health literacy. Non-governmental organizations, physicians, scholars, journalists, public officials from state and municipal governments, and women who had experienced breast cancer created an action-

oriented network to develop advocates and activists, enhance patient-provider communication, and promote social dialogue among stakeholders. The network organized multiple activities such as national campaigns, a cancer walk, educational materials, digital media, conferences, and public opinion forums. Annual workshops taught attendees how to create messages about breast health to promote attitudinal and behavior changes. The focus of these efforts culminated in mobilizing multiple levels of local communities and national organizations for a national policy on breast cancer. However, the researchers did not report specific health literacy components.

DISCUSSION

This review's results show that a wide variety of community-based health literacy interventions exists, and these interventions have positively affected several types of outcomes for many different groups of people. The outcomes range from knowledge to changes in social norms, healthcare service use, or physiological measures, with knowledge change being the most frequent outcome. As noted in the results section, however, relatively few papers reported quantifiable results expressed as pre and post-test differences between intervention and comparison groups. Many studies were designed with only an intervention group measured at pre and post-test, leading to the not-especially-surprising finding that knowledge usually increased, as did related outcomes such as self-efficacy. In addition to these results, four broad themes emerged from the full-text review.

Community engagement in planning and implementing interventions

The first theme pertains to the seriousness with which researchers are engaging with communities to design interventions. The many positive results may reflect, in part, that interventions frequently incorporated community perspectives and input even at formative stages, leading to interventions that participants often characterized as a good fit. High levels of community involvement at multiple stages in the intervention process are appropriate and admirable for health literacy improvement work. To the degree that health literacy and cultural competence are conceptually linked, community involvement ensures that interventions are relevant, understandable, and useful in helping communities protect and promote health. Also, community specificity may partially account for the number of unique intervention designs and implementations, a low number of randomized trials, and frequent use of qualitative evaluations and self-report data in the final set of papers.

A few papers illustrated intervention failure when community perspectives were not appropriately considered. An evaluation found that school-based health programs for immigrant and culturally marginal school children and parents in Spain often ignored the *expressed needs of the community* and community members' *cultural intelligence* [italics in original] (Flecha, García, and Rudd 2011). The researchers concluded "the course [on how to keep children from being involved with drugs] failed because the abilities and knowledge that the participants had acquired from their experience with drugs in their families were ignored" (Flecha, García, and Rudd 2011, 213). The negative consequences for health literacy were that family members did not have sufficient trust in the school and teachers as information sources and were less interested in participating in the planned activities.

Community specificity may also help account for the low number of replicated interventions, the Mental Health First Aid and Ophelia models being notable exceptions. The Australian adult literacy program and the U.S. Meals on Wheels health coaches adapted existing interventions for new communities (Beauchamp et al. 2017; Muscat et al. 2016; Rubin et al. 2014). Researchers were more likely to create their own materials and programs, and sometimes measurement tools, than try an intervention effective with a different community, setting, or topic. Encouraging researchers to publicly share their instruments, materials, and program designs may motivate more adaptation or replication with appropriate cultural considerations. A few research teams have posted their materials online: Georgia Meals on Wheels (Rubin et al. 2014), Australian Ophelia model (Beauchamp et al. 2017), and *Buenos Hábitos Alimenticios para una Buena Salud* (Otilingam et al. 2015).

Reporting back to communities characterizes community-engaged research, although report-back is not an element in the CDC “Best Practices” framework nor an activity the included papers typically addressed. Two excluded papers did not report interventions but did discuss the health literacy and ethical issues as well as experiences and recommended practices for reporting biomonitoring and environmental exposures to individuals and communities (Brody et al. 2014; Ohayon et al. 2017). The papers indicate that reporting back clear and useful information to communities should be the norm. One set of authors concludes, “Thoughtful report-back can strengthen research experiences for investigators and participants and expand the translation of environmental health research in communities (Brody et al. 2014, 40).

Health literacy components of interventions

A second theme pertains to the way “health literacy” was used in interventions. The review team did not have pre-conceived ideas about when and how health literacy would appear in an intervention. Instead, through the review process, four ways emerged that health literacy was included at one or more points in an intervention. The included papers described interventions that (a) identified or characterized the community of interest as “low health literate”; (b) used a health literacy instrument or measure to advance the analysis; (c) designed programs or materials using health literacy principles or techniques; or (d) assessed changes in knowledge, self-efficacy, skills, behaviors, or other outcomes that authors considered to be health literacy or related to health literacy. Table 3 refers to these possible loci of health literacy in interventions as (a) community, (b) measurement, (c) content, or (d) outcome, respectively. On the one hand, the appearance of health literacy considerations at multiple points in an intervention is a positive sign that researchers take health literacy seriously as a pervasive factor in intervention effectiveness. On the other hand, the lack of consistency in using these four elements (or others the field may be interested in) is a sign that researchers do not share a common view of when health literacy should be considered in interventions.

A couple of examples illustrate problems created when the health literacy concept is inconsistently applied. During the full-text review, the review team excluded many articles that used “health literacy” in the title or abstract only and not in the body of the paper. The interventions were typically trying to increase knowledge; sometimes self-efficacy, empowerment, or other factors related to health attitudes and behaviors; and change one or more

health behaviors. The papers, however, did not address explicitly the four health literacy components. In a school-based health program to change family knowledge and behaviors for diabetes, researchers aimed to train healthy adolescents to become health coaches for family members with diabetes (Gefter et al. 2016). The researchers described a group – low income ethnic minority students from families with diabetes – with a high likelihood of having low health literacy. However, the researchers do not report health literacy measures, techniques, or outcomes for the students or intervention; yet, the abstract conclusion says “...this program can increase health knowledge and some psychosocial assets of at-risk youth and holds promise to empower these youth with *health literacy* [emphasis added] and encourage them to adopt healthy behaviors” (Gefter et al. 2016). A culturally adapted cardiovascular risk reduction program for African Americans manifests a similar approach (Brewer et al. 2016). The researchers describe many contextual factors that would suggest limited health literacy being a major consideration for both community members and the intervention implementation and results. However, health literacy was not evident in the intervention itself or the actual results.

At the very least, inconsistencies in the ways “health literacy” is invoked in an intervention can create problems when developing coherent reporting schemes for comparative reviews such as this one. From a scientific perspective, the lack of explicit and consistent use of “health literacy” to inform intervention design, implementation, and reporting may impede building the body of knowledge about what characterizes effective and ineffective community-based health literacy interventions. As evidenced by the examples above, interventions may also append “health literacy” without sufficient evidence to warrant the connection.

Health literacy and knowledge outcomes

The review team expected to find many knowledge-building interventions, and the third discussion theme pertains to how to think about knowledge improvement as a community intervention outcome. Although increasing health knowledge is popular, it can also be a disparaged outcome when researchers, practitioners, and policymakers expect every intervention to result in behavior or health status change. The review team found many community interventions aimed to increase participants’ knowledge of a health topic or healthcare generally. Because it is axiomatic that educational interventions almost always increase short if not medium-term knowledge, it would be easy to dismiss knowledge interventions and results as finding the obvious. From another perspective, however, the large number of knowledge-building interventions is also a sign of a fundamental and structural problem in many communities. In addition to the well-documented problem that many health information materials are a poor match for people’s skills, the studies in this review also show large-scale problems with communities’ limited information awareness and access. Even in countries such as the U.S. with universal public education and an abundance of communication channels and information sources, low levels of health knowledge are an ongoing problem; moreover, prior research shows health knowledge and health literacy are related (Hom et al. 2012; Dennison et al. 2011; Williams et al. 1998). The included studies paint a picture of many communities cut off from the large amount and variety of health information that exists beyond their personal and collective experiences. As a team of Australian researchers observed about the adult education students in their intervention, “Students had limited or no formal experience learning about issues regarding their health” (Muscat et al. 2016, 5).

One excluded paper – a cardiac risk reduction intervention with African American church-goers in Rochester, Minnesota (Brewer et al. 2016) – is instructive about the large and ongoing need to build knowledge in communities, but the limited role that health literacy insights have played in shaping many community interventions. The researchers for this intervention note an abundance of information about how to prevent cardiovascular disease, examples of successful cardiac risk reduction interventions for African Americans, and yet an extremely low level of ideal cardiac health among African Americans. Yet this information had not diffused in the African American community in Rochester. The intervention came about when three African American churches in Rochester asked local researchers for help with a health and wellness program, and the researchers introduced church-goers to a culturally adapted version of *Life's Simple 7*, the American Heart Association's cardiac risk reduction program. Not surprisingly, the researchers found they had to tackle low levels of cardiac health knowledge as well as other factors to show improvements in health outcomes. This study and many others in the review suggest low levels of knowledge about reliable health information remain an ongoing problem that could negatively affect the development of higher level skills, such as effective communication and critical analysis. A continued focus on knowledge-building as part of health literacy interventions may be necessary because communities often come to interventions isolated from the larger universe of science-based health information and lacking foundational knowledge that affects health literacy.

Challenges applying an evaluation framework

The last discussion theme addresses the fit between evaluation frameworks for public health interventions generally and the community-based health literacy interventions in this review. The review team considered several evaluation models before selecting the CDC “Best Practices” framework (Spencer et al. 2013). The framework assesses the impact and quality of real-world programs to improve health and includes the general categories of Effectiveness, Reach, Feasibility, Sustainability, and Transferability. Each general category has several sub-components. The framework includes a separate set of criteria about evidence quality, but the review team did not agree with definitions for “weak,” “moderate,” and “strong” evidence. The team specifically disagreed with the rating that all peer reviewed studies are “strong” in quality. The team decided not to use the “Best Practices” evidence quality categories and instead reported on the study design categories from the Guide to Community Preventive Services ((DHHS) U.S. Department of Health and Human 2001).

The review team applied the CDC “Best Practices” framework to individual papers, but the framework was not especially useful to identify papers for inclusion. Few papers had the majority of the information in the framework, especially under Feasibility, Sustainability, and Transferability. The team included as much information about Effectiveness and Reach as papers reported. However, under the Effectiveness category, the majority of papers did not report the magnitude of the effects; the significance of the intervention and results; the benefits or risks of the intervention for the intended population/group; or how the intervention contributed to health equity. Under the Reach category, papers typically did not discuss how many people the researchers intended to reach or could have reached with the intervention. The review template is included as Appendix B in the hope that it will stimulate discussion about future intervention

design and reporting. For the current review, the “Best Practices” framework categories appear better suited to be guides to what community health literacy interventions should consider and report than helpful pointers to evaluate what has already been published.

CONCLUSION

The Horowitz Center review team identified a wide variety of community-based health literacy interventions, encompassing different communities, topics, settings, and outcomes. Researchers applied the health literacy concept to choose communities of interest; design or apply measures; design or adapt materials and programs; and identify outcomes. Although few included papers reported the magnitude of effects, they did contain a wide range of qualitative and quantitative data that can be used to inform future research; knowledge change was the most frequent outcome. Many of the challenges in conducting the review came from distinguishing between health literacy and health education interventions and between individual and community-based interventions. The team also grappled with the frequent ambiguities in the role health literacy played in defining relevant outcomes. The final included set of papers reflects the team’s assessment that however difficult it is to draw meaningful distinctions, they can be drawn, and the tensions produced by the exercise can be interesting and productive in advancing health literacy and public health theory and practice.

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APPENDIX A

Searching strategies

Table 1. Keywords for searching the literature

Concept 1: “Health literacy”	Concept 2: “Community”	Other terms for consideration in searching the grey literature
Main concept	<p>Terms often found in citations:</p> <ul style="list-style-type: none"> • community based • community dwelling • community level • community sample • community outreach • community based treatment centers • community health worker <p>Locations mentioned in citations:</p> <ul style="list-style-type: none"> • health fairs • factories • beauty schools • churches • nail salons • bars • family planning clinics • community health centers 	<p>Synonyms for “intervention”:</p> <ul style="list-style-type: none"> • intervention • service • program <p>Intended outcomes of the health literacy intervention:</p> <ul style="list-style-type: none"> • education* • awareness • communication • promotion • knowledge • skills • understanding • comprehension <p><i>*Note:</i> In search results, there were variations of "education," such as "adult education," "nutrition education," and "self-management". To be considered for inclusion, citations with all these terms must cross with health literacy because there was a huge number of publications on chronic disease self-management that do not have health literacy aspects.</p>

Table 2. Search strategies in commercial library databases

Databases by vendor		Filters	Queries	Total results
	EBSCO			
1	Academic Search Complete	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	1,214
2	CINAHL	Academic journals, dissertations, CEUs; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	27
3	Education Source	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	373
4	ERIC	Peer-reviewed; Publication date from 2010-2017; English	TI "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	10
5	Health Policy Reference Center	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	486
6	Health Source: Nursing/Academic Edition	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	633

Databases by vendor		Filters	Queries	Total results
EBSCO				
7	Professional Development Collection	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	123
8	PsycINFO	Academic journals, books, dissertations; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	441
9	Social Sciences	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	212
10	SocINDEX	Scholarly (peer reviewed) journals; Publication date from 2010-2017; English	SU "health literacy" AND (community OR communities) AND AB (education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	150
US National Library of Medicine				
11	PubMed	Publication date from 2010/05/01 to 2017/12/31; English	((("health literacy"[MeSH Major Topic] OR "health literacy"[Title/Abstract])) AND community) AND ((education[Title/Abstract] OR awareness[Title/Abstract] OR communication[Title/Abstract] OR promotion[Title/Abstract] OR knowledge[Title/Abstract] OR skills[Title/Abstract] OR understanding[Title/Abstract] OR comprehension[Title/Abstract])) NOT (("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy"))	752

Databases by vendor		Filters	Queries	Total results
Thomson Reuters				
12	Web of Science	Timespan: 2010-2017. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.	TITLE: ("health literacy") AND TITLE: (community OR communities)	76
ProQuest				
13	Dissertations & Theses Global	Publication date from 2010-05-01 to 2017; English	su("health literacy") AND (community OR communities) AND ab(education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	142
14	Public Health	Peer reviewed; Publication date from 2010-05-01 to 2017; English	mesh("health literacy") AND (community OR communities) AND ab(education OR awareness OR communication OR promotion OR knowledge OR skills OR understanding OR comprehension) NOT ("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy")	86

Table 3. Detailed search strategy in PubMed (performed April 12, 2017)

Search #	Searches	Query	Items found
#1	Concept 1: "health literacy"	"health literacy"[MeSH Major Topic] OR "health literacy"[Title/Abstract]	4214
#2	Concept 2: "community"	community	591711
#3	Intervention outcomes	(education[Title/Abstract] OR awareness[Title/Abstract] OR communication[Title/Abstract] OR promotion[Title/Abstract] OR knowledge[Title/Abstract] OR skills[Title/Abstract] OR understanding[Title/Abstract] OR comprehension[Title/Abstract])	1733538
#4	Key terms excluded from results	"information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy"	2338
#5	(1 AND 2 AND 3) NOT 4	((("health literacy"[MeSH Major Topic] OR "health literacy"[Title/Abstract])) AND community) AND ((education[Title/Abstract] OR awareness[Title/Abstract] OR communication[Title/Abstract] OR promotion[Title/Abstract] OR knowledge[Title/Abstract] OR skills[Title/Abstract] OR understanding[Title/Abstract] OR comprehension[Title/Abstract])) NOT (("information literacy" OR "media literacy" OR "computer literacy" OR "digital literacy"))	742

APPENDIX B

Codes and directions for community-based health literacy intervention review

Please note: All coding is about the intervention and its results, not an evaluation of the intervention.

For example: For the “description” coding label, describe the intervention, not the evaluation of the intervention. Another example: record the intervention reach, not the evaluation reach.

“Author statement” means the information is explicitly written in the paper.

Intervention Basics		
Background questions	Coding label	Coding directions
What is the intervention?	Description	Record 1-2 sentence description of the intervention. Record the type of intervention: individual-level; group-level; community-level; system-level; or policy-level. People recruited from communities to participate in educational sessions or classes should be coded as group-level.
What is the topic?	Topic	Record the intervention’s topic, such as dementia, HIV, or mental health
What is the health literacy definition used?	Definition	Record the author’s health literacy definition, including all variations using “literacy;” if none is provided, record “none”
What are the format, delivery method, and setting?	Format	Record the <u>format</u> , including number of times intended target population was exposed, duration of exposure, and total length of time intervention was in the field; <u>delivery method</u> , such as counseling, group presentations, community meetings, class, or mass media; and <u>setting</u> , such as community center, place of worship, clinic, or neighborhood; examples are not exhaustive and record all available descriptive details
Did the intervention team use health literacy instruments?	Instruments	Record yes or no and list the instrument(s) used to measure health literacy, including all variations using “literacy”
When and where did the intervention happen?	Time and place	Record the year(s) when the intervention happened and any location details, such as city, state, or country names; if none provided, record “none”

CDC Best Practices Framework

Public health impact elements/questions	Coding label	Coding directions
Effectiveness: extent to which the intervention achieves the desired outcomes		
What are the intervention's desired outcomes?	Desired outcomes	Record and label intended primary and other outcomes provided by authors; if none provided and the paper is exploratory or a needs assessment, remove paper from pool
To what extent does the intervention achieve the desired outcomes?	Achieved outcomes	Record and label achieved primary and other outcomes provided by authors
What is the magnitude of the effect?	Magnitude	For quantitative outcomes, record the magnitude of effect and confidence intervals by primary and other outcomes; if no quantitative results, record "none"
What is the outcome's significance to public health, systems, or organizational outcomes?	Significance	Record any author statements about how important the intervention's outcome is for public health, systems, or organizational outcomes; if no author statements, record "none"
What are the intervention's benefits or risks?	Benefits/risks	Record any author statements about how the intended target population benefitted from the intervention or was put at risk or harmed by the intervention; if no author statements, record "none"
Does the intervention promote health equity?	Health equity	Record any author statements about how the intervention affected health disparities or health equity; if no author statements, record "none"

Table continues on next page.

Reach: extent to which the intervention affects intended and critical target population(s)		
What is the intervention's intended and critical target population?	Intended population	Record all details of the intended and critical target population. Details may include but aren't limited to gender, age, race/ethnicity, SES, preferred language, and literacy skill level. Record if the intervention targeted individuals with similar issues, concerns, or information or service use, such as a community clinic; groups, such as families or community members in a class; or general community members defined by location, cultural identity or other group characteristic
To what extent does the intervention reach the intended and critical target population?	Reach	Record all information about people and communities recruited for and completing the intervention, including control groups; if provided, report proportion of the intended population actually reached and potential reach of the intervention
How representative are the people or communities reached through the intervention compared with those ultimately affected by the problem?	Representativeness	Record any author statements, positive or negative, about population representativeness; information may be located in limitations discussion; if no author statements, record "none"
Feasibility: extent to which the intervention can be implemented		
What are the barriers to implementation?	Barriers	Record any author statements about barriers to implement the intervention; if no author statements, record "none"
What are the facilitators to implementation?	Facilitators	Record any author statements about facilitators or what made it easier to implement the intervention; if no author statements, record "none"
Which resources are necessary to fully implement the intervention?	Resources	Record any author statements about resources, such as facilities, personnel, or materials, to implement the intervention; if no author statements, record "none"
What is the cost-effectiveness of the intervention?	Cost-effectiveness	Record any author statements about costs or cost-effectiveness of the intervention; if no author statements, record "none"
Sustainability: extent to which the intervention can be maintained and achieve desired outcomes over time		
	Sustainability	Record any author statements about how the intervention did or could continue past the initial implementation; if no author statements, record "none"
Transferability: extent to which the intervention can be applied to or adapted for various contexts		
	Transferability	Record any author statements about other contexts in which the intervention was tried or adapted for use; include details of adaptations if provided; if no author statements, record "none"

Drop down lists for the cells

Study design	Coding label	Notes
Randomized trial (experiment)	Randomized trial	
Non-randomized “trial” with 1 or more comparison groups	Non-random trial	
Cohort study	Cohort	
Case-control study	Case-control	
Time series study	Time	
Before-after study	Before-after	Include pre-post test questionnaires here
Cross-sectional study	Cross	
Non-comparative study	Non-compare	
Other	Other	

Table 3. Included Studies

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Anderson and Pierce 2012)	Intervention focused on coaches and leaders of sports teams as a means of reaching particularly young males in rural communities who might otherwise not be reached by a mental health literacy initiative.	Football/net ball coach training in rural Victoria, Australia	Mental health	Community mental literacy program focused on sports team coaches and other club leaders to assist them in providing mental health first aid (MHFA) by improving their understanding of mental health conditions, increasing their confidence to assist those with mental illness and decrease stigmatizing attitudes. Two phases from 2007-2009. Training length not discussed.	Measures Content Outcomes	Before-after study	At pre-training, 51% felt 'not at all confident' or 'a little bit confident' to help someone experiencing mental illness. Following training, 90% felt 'moderately confident' or 'quite a bit confident' that they could help (p<0.0010. Numbers who correctly identified depression and schizophrenia/psychosis vignettes: depression 73% pre-training, 92% post training (p=0.007). Psychosis 35% pre-training, 77% post-training (p=0.003).	Not reported
(Armstrong et al. 2011)	Rural community health workers with little understanding of mental health. Participants were 21 to 59 years old, majority female, and married. Half the participants (46.9%) had not completed high school.	Rural Bangalore district, India	Mental health	Mental health training program intended to serve as introductory education to community health workers. Intervention included in person training and a manual covering introduction to mental health and disorders, mental health first aid, practice-based skills and mental health promotion. Training in three groups of 23-24 participants by two facilitators between May and October 2010. Training is a four-day	Measures Content Outcomes	Before-after study	Percentage of participants able to correctly identify depression and psychosis increased from 22.7% preintervention to 43.9% 3 months following intervention (p=<.05). Percentage of participants using potentially useless pharmacologics such as vitamins including tonics and herbal medicines, appetite stimulants and sleeping pills decreased 3 months following intervention (p<0.001)	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				course. Adapted mental health literacy (MHL) survey.				
(Ayub et al. 2015)	Lower health literacy, education and SES women in Pakistan - ages 15 to 46 years.	Vocational training site provided by local NGO	Civic responsibility, communication skills, iron deficiency anemia	A service learning intervention designed to increase health literacy about iron-deficiency anemia (IDA) among college students as well as community members 30-item questionnaire developed to assess health literacy. Training was an eight-hour session led by 13 trained students in small groups of 5-6 participants.	Community Measures Content Outcomes	Before-after study	Knowledge about causes and symptoms of IDA and about sources of iron increased following the intervention, particularly among women who had completed at least high school.	Not reported
(Beauchamp et al. 2017)	See article for details.	9 rural/ metropolitan, small/large hospitals, community health centers or municipalities	Health literacy, Ophelia approach	Ophelia Victoria used a participatory design process. Each of 9 sites identified different needs and approaches to improving health literacy in their community. Interventions included reforming health care navigation systems, training for web-based health information searching, and direct instruction in health literacy. Used Health Literacy Questionnaire	Measures Content Outcomes	Before-after study	Outcomes varied across sites and intervention approaches but included increases in selected health literacy scores	For 6 sites that reported pretest-to-posttest changes in Health Literacy Questionnaire (HLQ) scores, effect sizes varied from zero for subscales 4, 5, and 9 to small for subscales 2 and 8, to moderate for subscales 2, 5, 6, and 7.

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Bertera 2014)	Community dwelling African Americans, older adults, lower health literacy	Local community setting for group education	Diabetes and cardiovascular disease	Educational intervention using storytelling slideshows with images/narration from community members to increase awareness of diabetes prevention and management, high blood pressure, and cardiovascular disease among older, lower SES African Americans. Three-year study. Intervention was administered in educational sessions lasting 2.5 to 3 hours. Low health literacy tested using 16-item instrument.	Community Measures Content Outcomes	Non-randomized trial	Eating decision scores, knowledge of high blood pressure, and self-efficacy in those two domains increased from pre- to post ($p < .001$) for the intervention group. Greatest benefit for lowest health literacy and oldest participants ($p < .01$).	Not reported
(Brown, Collie-Akers, and Fernandez-Ortega 2015)	Limited resource, low-literacy Mexican English language learners, specifically women	Supplemental Nutrition Assistant Program (SNAP) conducted by community health workers	Nutrition literacy	Train the trainer model, using CHWs & existing SNAP-Ed nutrition curriculum to help Mexican-immigrant English learner women to improve nutrition literacy.	Community Content	Before-after study	At the end of the series, participants lost 35 cumulative pounds. All expressed their intention to share their newly learned nutrition literacy skills.	Not reported
(Burgette 2016)	Early Head Start parents and children under 3 years old	Early Head Start (EHS) program	Oral health	EHS teachers and staff trained to promote better oral health outcomes among children and families. Curriculum focused on oral health during pregnancy, baby teeth, steps for a healthy	Community Content	Non-randomized trial	Early Head Start children were more likely to have a dental visit and less likely to have negative quality of life effects than children in the Medicaid control group. Results showed similar improvements in dental use regardless of	Moderating effect of health literacy was nil.

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				smile, classroom tooth-brushing program and oral health preventive services.			parents' health literacy levels.	
(Burghardt et al. 2013)	Urban, minority, economically disadvantaged population – primarily African American	Community pharmacy	Medicine literacy and communication skills	Interactive educational board games played in a health party setting. The health party included educational games, health screening booths, music, and prizes. Event done to encourage community members to ask their pharmacist for medication advice. Event was in two major aisles of pharmacy for four hours.	Community Content	Before-after study	Game participants were significantly more likely than the control group to indicate they would seek pharmacist medication advice in the future (p=0.03), potential for drug-drug interactions (p<0.001), aware of coupons (p=0.01), & pharmacist review (p=0.01)	Not reported
(Castañeda et al. 2016)	Mexican heritage, Spanish speaking, Latina women (over 40) living in the southern border region of San Diego	Community health center	Health literacy, breast cancer	Health education program delivered via a culturally tailored Spanish cooking class series, Nuestra Codina: Mesa Buena, Vida Sana delivered by a CHW. Sessions were on 1) women's health and cancer basics, 2) HL and navigation of screening services, 3) dispelling BC myths, 4) communicating with providers, 5) risk reduction strategies and 6) graduation. Used Chew Health Literacy Screener and NVS.	Community Measures Content Outcomes	Before-after study	Participants increased cancer knowledge, nutrition-related behavior/skills, self-reported cancer screenings from pre- to post-test. BC knowledge increased, participants more likely to have cancer screening at post-test and correctly read a nutrition label. No change in BC cultural beliefs, health literacy, and screening intentions.	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Chan 2012a) Note: single dissertation with 2 studies	Older adults with one or more chronic diseases in Hong Kong	Community centers	Chronic disease	CDSMP (chronic disease self-management program) is delivered in six 2.5-hour group sessions by a professional or lay person.	Community Content	Non-randomized trial	After adjusting for demographic variables, the intervention group had significant improvements in all self-management behaviors and self-efficacy outcomes, and 5 of 10 health status measures (all $p < .05$). The Health care utilization was not affected by the intervention. Older lay leaders and professionally trained leaders were equally effective.	Illiteracy/low education level interacted with the treatment on fatigue level such that low literacy individuals who received the intervention obtained a disproportionately high level of fatigue reduction. The effect size for this interaction was moderate.
(Chan 2012b) Note: single dissertation with 2 studies	Older adults with non-insulin dependent diabetes in Hong Kong	Community centers	Diabetes	DMSMP (diabetes mellitus self-management program) was 8 weekly 2-hour sessions that delivered disease related information, teaching and practicing routine self-management tasks and generic self-management skills, enhancing psychosocial support, promoting exercise and modifying unrealistic beliefs and negative attitudes toward disease.	Community Content	Randomized trial	The intervention group improved in diabetes knowledge more than did the control group ($p < .0005$). Significant reductions of total caloric ($p = .018$) and saturated fat intakes ($p = .03$) were also found for the intervention group only.	Not reported
(Chang et al. 2015)	Primary and middle school students in Taiwan and their teachers	Schools	Medicine literacy	Community pharmacist and school partnership program to enhance teachers' capacities in implementing correct medication use education. Goal to enhance teacher and student competencies. Self-administered	Content Measures Outcomes	Non-randomized trial	Program in primary and middle schools significantly enhanced students' knowledge, self-efficacy, and skills in correct medication use and pain medication literacy ($P < 0.001$)	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				online questionnaire developed on five core abilities for correct medication use and pain medication literacy.				
(Chervin et al. 2012)	Adult learners - primarily of color and immigrant and low-income populations	6 adult education centers	Adult learners' health literacy skills	Health literacy instruction in adult education curricula to increase adult learners' health literacy; capacity-building of adult education centers' teaching of health literacy skills. Used S-TOFHLA.	Community Measures Content Outcomes	Before-after study	Health literacy scores increased from pretest to posttest for both ESL and nonESL adult basic education students ($p < .001$). Qualitative analyses suggested that the intervention also enhanced self-efficacy.	Not reported
(Creech 2014)	Older adults dwelling in an independent living facility	Retirement community	Medication management	Brief low-HL tailored single intervention, established within monthly health education seminar series, on medication management issues. Content was anecdotal/ game show formats. Used NVS.	Community Measures Content Outcomes	Before-after study	The intervention more than doubled knowledge scores in 100% of participants. However, SE scores were not significantly changed.	Not reported
(David et al. 2017)	Community members in Tulsa	Churches, YMCA	Antibiotic use/resistance	Thirty-minute education sessions addressed appropriate antibiotic use and how to reduce resistance. Used NVS	Measures Content Outcomes	Before-after study	Average score on antibiotic knowledge test increased following the intervention ($p < .005$).	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Diamond et al. 2011)	Low-income, minority youth from 3rd to 8th grade (pilot study focused on urban communities of high need - at risk for chronic disease and qualified for no-cost lunches)	After-school program	Chronic disease and substance abuse	Building Wellness is a youth health literacy 6-year curriculum targeting low-income youth from 3 rd to 8 th grade. Lessons on asthma, obesity/overweight, accidental injury, and drug/alcohol use. REALM-Teen assessment tool used.	Community Content Measures Outcomes	Before-after study	Program increased knowledge and retention of information across years. Instructor reports show positive behavior change and an increase in curiosity about health and the body. Participants reported regularly checking nutrition labels of their snacks, washing their hands without prompting, and asking their doctor questions during appointments. Based on observations, participants display self-efficacy and confidence in their ability to deal with health issues.	Not reported
(Dowrick et al. 2013)	Older immigrants, especially from Somalia, Pakistan, and Bangladesh	Varied across 7 sites, including 1 community center	Mental health	The AMP Development Partnership was a multifaceted model incorporating local communities, primary care teams and well-being therapists. The final element of the project was a psychosocial intervention with three arms: individual intervention, group intervention, and “signposting” to available services.	Content	Randomized trial	The intervention revealed no statistically significant differences relative to usual care for the measured outcomes: self-reported well-being, depression, anxiety, functioning, and overall health. Qualitative findings were encouraging.	Not reported
(Fleary 2012)	Mothers of young children in Head Start, Early Head Start programs	Familiar community locations	Caretakers’ health literacy and child wellness with respect to diet	A module based intervention focusing on helping mothers with children in head start programs understand	Community Measures Content Outcomes	Before-after study	Knowledge of the relation between nutrition and disease and parental encouragement of child physical activity declined	For all significant pretest to posttest changes, effect sizes were small.

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
			and nutrition, physical activity, and sleep	what it means to eat right, get sufficient physical activity and sleep, engage in healthy parenting and manage stress and mental wellness for themselves and their children. Intervention materials were informed by members of the community and Head Start programs. Developed own measure for health literacy. Study completed in three phases over a two-year period. Four group interventions, intervention was 5 sessions, 1.5 hour each.			following the intervention (p<.05). General knowledge and beliefs about nutrition, about physical activity, and about sleep hygiene at post-test and at delayed post-test exceeded pretest (p<.05). Reported increases in children's vegetable and fruit intake increased from pretest to posttest (p<.05). Knowledge about relations between stress and physical health increased from pretest to post-test (p<.05).	
(Flecha, García, and Rudd 2011)	Children and parents in low-SES, immigrant & cultural minority areas connected to local schools	Pre-primary and primary schools in Spain	Health literacy skills	Health programs with different topics for school children at 6 schools and parents in the surrounding community	Community Measures Outcomes	Case study	Qualitative analysis suggested that community-based approaches helped vulnerable families make health decisions and gain access to and use healthcare services.	Not applicable
(Freedman 2011)	Adult African American learners in an adult education class	Adult literacy center in Atlanta, Georgia	Health literacy skills	Classes over a 12-week period with two classes a week, each two-hours long, to teach functional health literacy skills to adult learners.	Community Measures Outcomes	Case study	Multiple strategies from cognitive psychology and adult learning theories help adults learn health literacy skills and carry health behavior change into everyday life.	Not applicable
(Fung et al. 2016)	Hong Kong Chinese adolescent students and adults	School and community-based service	Mental health	Five 3.5 hour workshops facilitated by volunteers. The program also provided direct contact/service	Content Measures Outcomes	Other – post-test only with comparison group	At post-test Student and adult/volunteer participants had a higher level of mental health literacy and lower level of	Not reported

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Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				opportunities with people recovering from mental illness and required design of school-based mental health promotion materials. Self-developed measures.			stigma toward individuals with mental illness, compared to those who did not participate in the program.	
(Goeman, Conway, et al. 2016)	Older adults with Diabetes in community housing receiving home nursing support	Nursing homes	Diabetes, health literacy	Ophelia approach supports healthcare services and providers to codesign interventions that are responsive to the health literacy needs of their client. The project encompasses nine diverse healthcare services but this study focuses on a home nursing service. This intervention included materials and training for home nursing service nurses and client materials for diabetes education and support. Used Health Literacy Questionnaire	Community Measures Content Outcomes	Before-after study	Diabetes Knowledge Questionnaire scores did not change due to the intervention. Scores on 2 Health Literacy Questionnaire subscales—sufficient information to manage health and understanding health information sufficiently to guide action--did increase from pre-to-post-test.	Small effect sizes were found for increments in the 2 Health Literacy Questionnaire subscales that showed increases following the intervention. As predicted, zero effect was found on subscale 5 (appraisal of health information).
(Goodman, Dias, and Stafford 2010)	Community leaders, including community health workers, leaders of faith and community based organizations, and community members improving	Libraries in Suffolk County, NY	Scientific & research literacy	CARES training (Research Empowering Social Change) was an academic and community partnership consisting of a 15-week public health curriculum to train community members about evidence-based	Content	Before-after study	Post-test showed CARES fellows increased their knowledge and understanding of research (p<.005). Qualitative analysis showed that participants increased their capacity to participate as research partners. 10 of the 13	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
	minority health			public health, increase community members' scientific literacy and develop the infrastructure for community-based participatory research to analyze and address health disparities in the community. Included 11 didactic 3-hour training sessions and 4 experiential workshops.			fellows submitted pilot grant proposals for feedback.	
(Gray, Elliott, and Wale 2013)	Adults (18+) responding to ad for free community workshops to improve ability to find/use online health information	Public library in major Australian city	Health information seeking skills	A team of clinicians, consumer representatives, and librarians provided 11, two-hour workshops for adults to improve their ability to find and use evidence-based health information online.	Content	Before-after study	97% of participants agreed/strongly agreed the workshop improved knowledge of and skills to find and use evidence-based health information; 78% strongly agreed/agreed the workshop improved their attitude toward information; and 93% strongly agreed/agreed the workshop would change the way they access health information online. After the workshops, people also said they would ask a doctor new questions and change how they manage their health, chronic disease, or pain.	Not reported
(Han et al. 2017)	Adult (18+) Korean American women attending 1 of 23 ethnic churches in DC, Maryland, and Baltimore metro	Church	Mammogram, Pap-smear	This study was designed to test a community health worker intervention to increase mammogram and pap-screening among Korean	Community Content Measures Outcomes	Randomized trial	Greater likelihood of intervention group to receive mammograms and Pap-screening at 6-month follow-up. Also, increased health literacy and positive perception about	Effect sizes were large. After adjusting for covariates, the odds of participants receiving mammograms at 6 months were 18.5 times higher than for controls. The odds of participants getting Pap tests

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
	area			American women. CHWs delivered health literacy skills training in 1.5-2hr meeting. Used Assessment of Health Literacy in Cancer Screening.			cancer screening.	were 13.3 times higher than controls. Effect sizes were even higher when comparing intervention group participants who read all materials with those who did not.
(Hansson and Markström 2014)	Adults participating in police officer training at the University of Sweden	Police officer training sessions at university	Mental health	This study used a three-week intervention to improve attitudes and mental health literacy among police officers attending training at the University of Sweden. Community Attitudes Toward Mental Illness (CAMI), Mental Health Knowledge Scale (MAKS), Reported and Intended Behavior Scale (RIBS).	Measures Outcomes	Before-after study	Improved attitude, positivity about future interactions, and improved mental health literacy as compared to comparison group	Effect sizes for differences between intervention and control group increments immediately following the intervention were small to for 2 attitude change items and for 1 intention to act item, and moderate for 4 mental health literacy items. At 6-months following the intervention, the effect size was small for total attitudes and for intentions to work with mentally ill persons, and small to moderate for 3 mental health literacy items.
Harrison, Ollis, and Savage, 2016	Secondary school students	Schools in Geelong, Victoria, Australia	Student knowledge of and access to local health services; health literacy; help-seeking behaviors	Doc & Teens program delivered in schools by general practice doctors and teachers. Health literacy survey used.	Content Measures Outcomes	Other - Health curriculum using discussion and activities during school	Teachers and students rated the curriculum favorably but little documented improvement in knowledge; mismatches in curriculum and what students wanted to learn	Not reported
(Hart, Berry, and Tonna 2011)	People living in rural communities in New South Wales significantly impacted by drought	Neighborhood	Mental health	This purpose of the Rural Adversity Mental Health Services program was to disseminate information and organize community social events to raise mental health literacy and the	Content	Non-comparative study	Training of communities in Mental Health First Aid, training of mental health workers to develop 15 local health, agriculture and financial service networks, free mental health telephone line which took calls from 270	Not applicable

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				effects of drought on mental health. Training offered 2007-2010, over 3000 people received.			local farmers, multiple community events designed to raise awareness about drought-related mental health issues.	
(Hart, Jorm, and Paxton 2012)	Undergraduate students living in residence halls at the University of Melbourne	University	Mental Health, eating disorders	This single 4-hour classroom-style program was designed to provide Mental Health First Aid training to improve knowledge, behavior, and attitudes toward people with eating disorders. Used Mental Health Literacy Questionnaire for Bulimia Type Eating Disorders.	Content Measures Outcomes	Before-after study	No change in mean scores of knowledge of symptoms of eating disorders. Post intervention improvement found in problem recognition and knowledge of appropriate Mental Health First Aid Strategies (p<.005). The intervention had no effect on a measure of stigmatization nor on contact with persons experiencing eating disorders.	Not reported
(Hatamleh 2015)	Adult Iraqi immigrants (18+) in U.S. with English as a second language	Islamic community center in a large Midwestern city in U.S.	Health literacy skills (functional & complex)	3-hour Arabic language educational program based on adult learning principles and topics identified through a community needs assessment (self-management; provider communication about medicines, tests, and forms) Used Test of All Aspects of Health Literacy Scale (AAHLS).	Community Measures Content Outcomes	Before-after study	Average total health literacy score following intervention exceeded the pretest average (p<.001). This pattern was evident for communicative and critical health literacy subscales, but not for functional health literacy.	Not reported
(Hernandez and Organista 2013)	Latina immigrants at high risk for	Community center	Mental health	This study replicated the effectiveness of a Spanish language	Community Content	Randomized trial	Results indicate significant improvements in	Very large effect sizes emerged for the difference between intervention group

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
	depression			fotonovela, a form of Entertainment–Education (E–E), designed to increase depression literacy, decrease stigma, and increase help-seeking knowledge and behavior in Latinos. Specifically, this study evaluated a fotonovela delivered in a multifaceted approach to health education used by promotoras. Used Short Test of Functional Health Literacy.	Measures Outcomes		depression knowledge, self-efficacy to identify the need for treatment, and decreased stigma in experimental as compared to control group participants. Findings support the application of E–E health literacy tools such as fotonovelas, delivered in multifaceted approaches to health education used by promotoras, to Latinas at risk for mental health concerns.	members and controls in increment in (a) knowledge about depression and (b) self-efficacy to identify need for treatment. Effect size for differences in decrement in stigma and increment in intent to seek treatment were both moderate.
(Kim et al. 2014)	Korean American older adults	Churches and senior centers in the Baltimore-Washington D.C. region	High blood pressure	Community-based clinical trial to test the efficacy of a comprehensive management program to reduce blood pressure and increase health literacy. Six two-hour sessions over six weeks. Used the HBP health literacy scale.	Community Content Measures Outcomes	Randomized trail	Participants in intervention group had better medication adherence; lower blood pressure; better health literacy scores at the 12 and 18 month follow-ups; more blood pressure knowledge; and less depression.	Not reported
(Kim et al. 2015)	Korean American adults with type 2 diabetes	Community center in Ellicott City, Maryland	Diabetes	Community-based, multimodal behavioral self-help intervention program with six two-hour in-class training sessions over six weeks to help first generation Korean American immigrants with diabetes achieve	Community Measures Content Outcomes	Randomized trail	Participants in health literacy-oriented program on physical activity behavior doubled their physical activity and attained acceptable levels.	Not reported

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Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				better glycemic control and restore their self-confidence for their diabetes management.				
Lam 2014	Chinese middle-aged and older adults with diabetes	Diabetes centers in 2 hospitals in Hong Kong	Diabetes and physical activity	A nurse and certified exercise trainer led a 6-week group program using books and audiotapes to encourage participants to increase their physical activity. Six-week program with one 60-minute lesson a week at diabetes center. Used Chinese Health Literacy Scale for Diabetes (CHLSD).	Content Measures Outcomes	Randomized trial	Participants in health literacy-oriented program on physical activity behavior doubled their physical activity from the sedentary to the internationally acceptable level	Not reported
(Lam, Jorm, and Wong 2010)	Adult Chinese immigrants able to read and write basic Chinese	Recruited at social service agencies	Mental Health	Impact of Mental Health First Aid (MHFA) 12-hour training course on mental disorder knowledge and attitudes to people with mental illness in a Chinese community in Melbourne. Instrument adapted for mental health literacy.	Community Measures Outcomes	Before and after study	The intervention produced significant positive change in the level of mental health literacy (at least $p < .05$) and reductions in stigmatizing attitudes ($p < .005$). There was no change from pre-to-post-test in the belief that professional care would help someone experiencing depression or schizophrenia.	Not reported
(Levin-Zamir et al. 2011)	Ethiopian immigrants living in Israel	Community clinic	Health care access	Refuah Shlema program: promote the health of the Ethiopian community via improved communication between primary care workers (physicians,	Community	Other	Qualitative & quantitative evidence showed improvements in: (i) clinic staff-patient relations; (ii) availability & accessibility of health services, and health system navigation without increasing service	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
				nurses, pharmacists, and administrative staff) and immigrants, based on the concepts of communication, advocacy and health literacy.			expenditure; (iii) perception of general well-being; (iv) self-care practice with regards to chronic conditions. Evidence significantly contributed to sustaining the program for 13+ years.	
(Mahmud et al. 2010)	30 “health squares” (collaborations between state-owned pharmacy and county councils)	Communities in Sweden	Health promotion and health literacy	Policy intervention to create new health promotion settings in communities and encourage individual responsibility.	Community	Policy analysis	Analysis of goals, activities, stakeholders, factors affecting policy implementations showed intentions to use Health Squares for health promotion and health literacy, but did not share understanding of the concept.	Not applicable
(Mancuso 2011)	Indonesian refugee and asylum seekers	Health fair	Cardiovascular health and safe medicine use	Staff nurses and nursing and pharmacy students provided health checks and information on a range of health topics at a health fair.	Community Content	Program evaluation via survey	Participant satisfaction with the health fair was positive.	Not reported
(Martin, Kripalani, and DuRapau 2012)	Community-dwelling older adults in this study were enrolled at an inner-city adult day center. They generally had low measured health literacy.	Inner-city adult day center	Medication adherence	Participants were given a personalized, illustrated daily medication schedule (PictureRx™). Six weeks later, their medication self-efficacy and adherence were assessed. NVS used.	Community Measures Content Outcomes	Before and after study	Adherence to Refills and Medications Scale (ARMS) (p<.05) and Self-Efficacy for Appropriate Medication Use Scale (SEAMS) (p<.001) scores improved after intervention.	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Mindlis et al. 2015)	People living rural villages in India	Community center	Mental health and depression	This study compared knowledge and attitudes toward depression in villages where educational programs have targeted mental illness and stigma versus control villages. Series of interventions.	Community Measures Content Outcomes	Non-randomized trial – post-test only	Intervention villages showed higher levels of literacy regarding depression and lower levels of stigma, adjusting for sociodemographic variables.	Effect of residence in a treatment village was moderate.
(Mosuro, Malcolm, and Guishard-Pine 2014)	Foster carers in Great Britain	Training for foster carers	Mental health	This study examined the impact of a 30-hour counseling skills training course delivered over 3 months on foster carers' confidence in their counseling skills.	Community Content Measures Outcomes	Before-after study	Participants' confidence in their knowledge and understanding of the mental health needs of children in care increased after the intervention (p<0.01). The intervention had no effect on caregivers' coping skills.	Not reported
(Muscat et al. 2016)	Socially disadvantaged adults with low literacy	Adult education colleges in Australia	Health literacy	Australian adaptation of UK Skilled for Health Program with content about managing health conditions and disease prevention/health promotion embedded in literacy instruction. 80-90 hours of instruction either 8hrs/wk for 10weeks or 5hrs/wk for 18 weeks. Functional health literacy course-content specific measure developed.	Community Measures Content Outcomes	Cross-sectional study	Quantitative results showed improvements in participants' functional health literacy skills and confidence; very little change in mean total functional, critical, and communicative health literacy scores from baseline. Qualitative analysis identified positive student and teacher engagement with course content and self-reported improvements in health knowledge, attitudes, and communication with healthcare professionals.	Not reported
(Noble, Hedmann, and Williams 2015)	Elementary school students in Harlem, NY	Schools	Alzheimer's disease (AD) and Dementia	In 3 one-hour age appropriate sessions over three consecutive	Content Measures	Before-after study	Awareness of AD symptoms increased following the intervention	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
			health literacy	days, the intervention used play, dance, and rap music to teach elementary school children to recognize AD symptoms and develop appropriate responses to them.	Outcomes		and at delayed posttest (p<.01).	
(Otilingam et al. 2015)	Mexican origin Latinas living in Los Angeles County	Clinic	Nutrition	Culturally tailored, theory-based nutrition education workshops taught in small groups included goal-setting and information about health eating. A second intervention arm provided information about brain health. Each workshop was two hours long. NVS used.	Community Measures Content Outcomes	Randomized trial	Among those assigned to combined intervention arms, there was statistically significant gain in health literacy (p <= .005), knowledge about dietary fat (p <05). There was no pre-to-post-test difference in outcomes for those given just the module about diet and brain health nor for those in a control group.	Not reported
(Oves 2013)	Homeless mothers residing in a residential rehabilitation facility in Atlanta, GA	Residential rehabilitation facility	Maternal & child health	A 6-hour maternal health literacy training to increase the healthcare knowledge of mothers, who have been homeless	Community Measures Content Outcomes	Before-after study	Pre-posttest shows training positively impacted reported maternal child health knowledge; 2-4-month follow-up survey to 11% of the total sample showed women retained a considerable amount of knowledge.	Not reported

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(Pais, Rodrigues, and Menezes 2014)	School-aged adolescents	School and community organization	Formal and non-formal education for youth and children to promote health literacy	Study 2 presents four intensive case-studies in schools where adolescents used community profiling, a participatory research methodology, to explore health rights and access to healthcare in both a historical and prospective vision.	Content	Other	Community profiling projects regarded by pupils and teachers as meaningful learning experiences, with a positive impact on their socio-political development. Pupils increased knowledge about citizen health rights and the national health care system.	Not reported
(Paul et al. 2015)	Rural residents who use wells for water supply	Households in Tuftonboro, NH	Water contamination	Community presentations on water contamination and protective actions; community informational campaign; well water testing service for residents to make testing accessible and reduce inconvenience.	Community	Other	Intended outcome was increase in well water testing; after the intervention, state lab received more than triple the number of water tests than in prior 6 years	Not reported
(Pinto-Foltz, Logsdon, and Myers 2011)	Females ages 13-17 in ninth and tenth grade in public high schools in southern urban area of US	Public high schools	Mental health literacy in adolescents	"In Our Own Voice" is a 60-minute program was examined for feasibility, acceptability, and initial efficacy among female high school students in two southern US schools. In Our Own Voice Knowledge Measure, developed by Wood and Wahl (2006).	Community Measures Content Outcomes	Randomized trail	The intervention did not reduce mental illness stigma or improve mental health literacy at one week follow up. The intervention did not reduce mental illness stigma at 4 and 8 weeks follow up. The intervention did improve mental health literacy at 4 and 8 weeks follow up.	Not reported

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(Pleasant 2011)	Underserved communities	The Urban Health Plan (UHP) is a federally qualified community health center (FQHC)	Overall health, chronic disease	A program to increase health literacy and health behaviors among participants. Program was twice a week for six weeks.	Content Measures Outcomes	Other	Participants on average emerged from the program healthier in terms of physical and mental health. Participants experienced positive, statistically significant improvements in multiple indicators reflecting their physical health, fitness levels, self-reported health status, healthy behaviors, knowledge about health, attitudes toward their own ability to be healthy, amount of sleep, and nutrition choices, levels of stress and depression.	Not reported
(Pomerantz et al. 2010)	Working-class members of the community, especially disenfranchised people w. little or no experience with the Internet and online health information resources	Community centers, libraries	Health information seeking skills	Workshops on how to navigate the Internet, locate reliable health information online, and apply evaluation criteria. Two-three-hour Internet workshops.	Community Measures Outcomes	Before-after	Workshops showed modest improvement in post-test scores and postcards showed that people found the workshops interesting and helpful.	Not reported
(Porter et al. 2016)	Residents of 8 southwest rural Virginia counties with documented health disparities (population is 48% female; 94% white; 42% a high school education or less; average annual income is \$48,104.27)	Classes in rural, southwestern VA (location of classes not reported)	Health behaviors, with focus on sugar sweetened beverage consumption or physical activity	Classes, behavioral diaries, and a teach-back call to motivate and build skills for health behaviors, accurate completion of diaries, and personal action plans. This was a six-month program. Used NVS.	Community Measures Content Outcomes	Cross-sectional study	Participants with lower health literacy had lower accuracy with diary completion, recalled fewer behavior messages correctly, and required significantly more rounds of teach-back. There were outcome differences between participants in the beverage versus physical activity program.	Not reported

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(Ramaswamy, Simmons, and Kelly 2015)	English-speaking women over age 18 in a county jail in Kansas City, Kansas	Jail	Cervical cancer	The Sexual Health Empowerment (S.H.E.) Project was a five-session two-hour cervical cancer education program over 5 days implemented in a jail. The goal was to increase cervical cancer knowledge, reduce barriers, and reduce self-efficacy and confidence when navigating health systems. Used Short Test of Functional Health Literacy in Adults.	Community Content Measures Outcomes	Other	Increased confidence in navigating providers and health systems (p=.02). Changes in knowledge and self-efficacy were not statistically significant.	Not reported
(Ramirez-Andreotta et al. 2016)	Predominately white, rural	Homes	Environmental health	Conducted interviews of families living on a Superfund site to determine whether communication materials that imparted knowledge of biometric results were effective and whether these efforts improved environmental health literacy.	Community Measures Outcomes	Cross-sectional study	In the interviews, participants reported implementing the exposure-reducing actions.	Not reported
(Ramos et al. 2013)	Hispanic males in rural areas of Shelbyville, Kentucky	Not listed	Health literacy and disparities	Impact of culturally-tailored health classes on the health knowledge of Hispanic residents of a rural town. Program had two phases, two-hour sessions. Health literacy assessment using	Community Measures Content Outcomes	Before-after study	improved performance scores in 100% of participants in Phase II Overall knowledge: Participants scored 80% better on heart disease and stroke posttest, pretest knowledge of nutrition	Not reported

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				standardized measures not completed, but HL indicators were used from Shelbyville Health Assessment.			was low (20/25 scored below 50%) and overall posttest scores were 80%. 100% of participants showed improved scores in Phase II.	
(Rodriguez 2015)	Adult community college and night school class attendees (consisting of English- and/or Spanish-speaking adults (N = 212; 91% Latino)	Schools	Dementia	This dissertation evaluated a dementia-themed Fotonovela (graphic novel) to measure increase and maintenance of knowledge of dementia and improvement of self-efficacy and intention to help a family member with signs of dementia.	Community Content	Randomized trail	Groups who received dementia education via Fotonovela or standard brochure improved knowledge compared to placebo. Fotonovela was not superior to brochure. Dementia knowledge increase maintained at 3w follow-up in both groups compared to placebo. Not many differences between Fotonovela and brochure in qualitative feedback, but the Fotonovela was favored—participants found it easier to read, and more enjoyable to read.	Not reported
(Romero et al. 2016)	Hispanic women ages 18 to 85 with self-reported Spanish language preference and at least one or more self-reported risk factors for CVD including high blood pressure, high cholesterol, diabetes, excess weight, and/or smoking.	Community center	CVD	This study adapted their own previously-successful 12-week program into a 6-week course in Spanish to focus on CVD awareness among Hispanic women. Six-week program with one 90-min session/week.	Community Content	Before-after study	The mean CVD knowledge score for all participants increased from 39% to 66% post intervention (Fig. 6). Completion of the program was associated with a 68 % increase in overall mean CVD scores. There was a statistically significant increase in knowledge scores across all five CVD domains. 57% increase in mean dietary knowledge score (43.7% (0 weeks), 68.7% (6 weeks), p<0.001).	Not reported

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(Rubin et al. 2014)	Meals on Wheels volunteers	Not listed	Aging	<p>This intervention trained 73 Meals on Wheels volunteers to be health literacy coaches to reach a "hardly reached" population.</p> <p>Three to four-hour training workshops for coaches. One booster one-hour session.</p> <p>Used Short Test of Functional Health Literacy for Adults.</p>	Community Measures Content	Before-after study	<p>Positive ratings for the workshop in self-reported learning, utility, quality of planning, and quality of workshop execution.</p> <p>Learned new information about communicating with older adults M=6.63, SD=1.09; Increase on knowledge test from pretest to posttest was statistically significant (t70=3.57; p<.001). Does not give scores for improved health literacy.</p>	Not reported
(Schuster et al. 2015)	Korean American women overdue for mammograms and pap tests	Church	Breast and cervical cancers	<p>This paper aimed to determine the cost-effectiveness of an intervention. The intervention was aimed at increasing breast and cervical cancer screenings of Korean American women.</p>	Community Content	Randomized trial	<p>Cost-effectiveness ratio of intervention was estimated to be US\$236 per screening, without program development costs. This program offered a more cost-effective approach for promoting cancer screening.</p>	Not reported
(Shidhaye et al. 2017)	Rural community members in India	Villages in India	Mental health	<p>VISHRAM was a multi-layered community program based in rural India, aimed to address mental health and suicide.</p>	Community Measures Content Outcomes	Before-after study	<p>Prevalence of current depression decreased from 14.6% to 11.3% at 18m (P=0.005). Contact coverage was six-times higher at 18m post-survey, remaining after controlling for socio-demographics (4.3% to 27.2%, p<0.001).</p> <p>Significant improvement in many mental health literacy indicators. Most individuals with current</p>	Not reported

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							depression sought care from general physicians, in line with the key message to seek help from these practitioners.	
(Shreffler-Grant, Nichols, and Weinert 2017)	Rural older adults	Senior citizen center in small rural community	Health literacy	<p>Program aimed to improve health literacy of older rural adults through (CAM) complementary and alternative therapies. Sessions aimed to improve health literacy so participants could make more informed health decisions.</p> <p>Seven-week program, 4 sessions; sessions 1-1.5 hours long.</p> <p>NVS and single item HL measure used.</p>	Community Content Measures Outcomes	Before-after study	<p>Increased comfort in using electronic sources to seek information, satisfaction with scheduling and format of sessions other than webinars. Information on communicating with health care professionals helpful (M=4.63 on 1-5 scale with 5 = definitely); increased comfort in using electronic sources to seek health info (M=4).</p> <p>Health literacy mean scores improved, but not statistically significant (pre: 70.3, post: 71.47, range 60-81), scale is 21 to 84.</p>	Not reported
(Son et al. 2016)	Incarcerated youth	Cuyahoga County Juvenile Detention Center (CCJDC)	Reproductive health	An interactive three-day curriculum was implemented in a juvenile detention center with the goal of increasing reproductive health knowledge and teachers' comfort level teaching the topic.	Community Measures Content Outcomes	Cohort	<p>Increased knowledge regarding STIs and self-reported confidence in condom use (P= .002). Self-efficacy in contraception use and sexual autonomy did not significantly improve.</p>	Not reported

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(Soto Mas et al. 2015)	Hispanic members of the Santa Barbara/Martinez town community	Local elementary school (Site 1), large hotel chain (Site 2), & community church (Site 3)	Health literacy	Study explored the feasibility of using different community settings for improving health literacy among adult Spanish speakers through an English language program. The study used a pre-experimental, single arm pretest–posttest design, and implemented the Health Literacy and ESL Curriculum. Curriculum is 12 units (approx. 45min) implemented over 6 weeks. Spanish TOFHLA used.	Community Measures Content Outcomes	Before-after study	TOFHLA scores increased significantly in all sites; numeracy increased significantly in sites 2 and 3; and reading comprehension significantly improved in site 3. The Fisher’s exact test based on the proposed level change index yielded a non-statistically significant association between site and a change in health literacy level.	Not reported
(Soto Mas, Ji, et al. 2015)	Spanish speaking adults living in El Paso, TX	3 different community locations	Health literacy	English-as-a-second-language (ESL) instruction for improving health literacy among Spanish-speaking adults. Twelve-units that can be implemented in 6 or 12 weeks. Used the TOFHLA.	Community Measures Content Outcomes	Randomized trail	Intervention participants had significant average change score on TOFHLA after intervention (p <0.01). Percent of intervention participants at inadequate functional health literacy level decreased at posttest by 30% and adequate functional health literacy increased by 24%. Control group percent at the inadequate functional health literacy level decreased at posttest by 11% and adequate functional health literacy increased by 21%.	Not reported

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(Stockwell et al. 2010)	Latino Early Head Start (EHS) parents in Washington Heights, NY	University-affiliated Early Head Start in NYC	Upper respiratory infections (URI)	This intervention aimed to increase health literacy regarding upper respiratory infections because of treatment misconceptions, especially in the Latino community. Used Knowledge, Attitudes, Practices (KAP) instrument.	Community Content Measures Outcomes	Before-After study	Increased knowledge, attitudes, & health literacy. Positive change in care practices and decreased incorrect medication usage.	Not reported
(Svensson, Hansson, and Stjernswärd 2015)	Western and Northern Sweden Diverse organizations and occupational groups represented.	Premises booked by the local coordinators in 6 cities	Mental health first aid	This was a qualitative study using participants in Sweden to explore the effects of mental health first aid on participants. Training is a 12-hour course.	Content	Qualitative analysis of participants' responses to training	Participants found the program practical, regardless of their professional orientation and experience. Participation in the course, for people with mixed experience of meeting those with mental health issues, appears to contribute to an increased confidence and inclination to act when meeting a person suspected of having mental health problems.	Not applicable
(Taylor et al. 2012)	Aboriginal Australian community members	3 Aboriginal communities in Australia	Dementia	This study piloted a dementia education program (16min DVD) in English and in three Aboriginal languages.	Community Content	Qualitative analysis of focus group responses	Resource was effective in raising awareness of dementia as a health issue for remote Indigenous communities. Qualitative work identified elements that helped or hindered the communication of the dementia education message.	Not applicable

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(Tuerk et al. 2013)	Residents of Mito Japan, area hit by a devastating earthquake	Community auditorium	Post-traumatic stress, mental health	Trainings were held to address posttraumatic stress after an earthquake in Japan. Questionnaires were distributed and integrated into the training to increase mental health literacy. Training was 2.5 hours.	Community Content Measures Outcomes	Post-event survey	27% met criteria for probable PTSD with 15% reporting that the recent earthquake was the index event. Intervention yielded positive screening rates of 8% for probable PTSD, and 4% for probable PTSD related to earthquake. Physical health problems in the past 7d and loss of sense of community related to PTSD symptoms, after controlling for covariates.	Not reported
(Unger et al. 2013)	Southern California Hispanic community	Community adult school, Los Angeles Unified School District (LAUSD)	Depression	Participants randomized to fotonovela or NIH low-literacy text pamphlet about depression, with the goal of increased long-term depression knowledge and dissemination of information through social networks. 30-minutes with either fotonovela or pamphlet.	Community Content	Randomized trial	Increased depression knowledge in both groups $p < .05$, retained at 1m, but decreased. Knowledge increase significantly larger for fotonovela at post ($p < .05$), but not followup. Antidepressant stigma decreased in fotonovela, not in comparison group ($p < .05$), follow-up regressed to pre-test. Mental healthcare stigma decreased in fotonovela ($p < .05$), not in comparison group; further decreased at followup ($p < .05$). Self-efficacy increased in both groups and remained significant at follow-up ($p < .05$). Seek help experienced ceiling effect, no differences. Fotonovelas more likely to be shared and not thrown away ($p < .01$).	Not reported

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(Vanderbilt et al. 2016)	Participants were required to be over the age of 18, pass the computer skills test with a 70% or higher, live in the Richmond-Metro area community serviced by one of the resource centers	Resource centers in participants' communities	eHealth Literacy, preterm birth health literacy	This computer-based intervention sought to increase health literacy regarding preterm birth. Five computer-based educational modules, approximately one hour each.	Community Content Measures Outcomes	Before-after study	Increased knowledge in health literacy and preterm birth. Findings suggest computer-based modules developed (intervention) to educate adults in an underserved community about preterm birth and health literacy has the potential to decrease health disparities.	Not reported
(Vollmer Dahlke et al. 2017)	Adolescent and young adult (AYA) cancer survivors ("participants were clinicians, AYA cancer survivors, caregivers, and cancer advocates affiliated with the Seton Healthcare Family in Austin, Texas")	Medical practices and hospitals	Cancer	This qualitative study provided assessment of a cancer literacy program aimed at increasing health literacy among adolescent and young adult cancer survivors and their healthcare providers. Two annual half-day interactive educational sessions.	Community Measures Content Outcomes	Other	Evaluation results highlight the need to continue to build both survivor and professional resources to address the unique impact of cancer on AYA cancer survivors.	Not reported
(White et al. 2012)	People taking self-care skills training courses in parent and child groups and in workplaces within intervention Primary Care Trusts (PCTs).	Non-clinical settings	Self-care	This 12-month study evaluated a self-care skills training course (Self Care for People, SC4P) within workplace and parent and toddler group settings. The course was six, three-hour sessions over a three to six-week period. This study did not attempt to change health behavior, and states that it is policy-driven. Primary outcome:	Measures Outcomes	Before-after study	No change in use of General Practitioner services. Increased use of out-of-hours and secondary care services. At 6 month follow-up, statistically significant small positive effects on self-esteem, well-being and anxiety scores for intervention group. At 12 month follow-up, statistically significant	The intervention effect size was small for using services in the follow-up period; for using out-of-hour services; and for outpatient visits. The effect on hospital admissions was small to moderate.

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				change in number of GP consultations between baseline and follow-up. HL scale developed by research team.			small positive effects seen on recovery locus of control, health literacy and self-esteem scores, and on knowledge of adult cough for intervention group.	
(Wong et al. 2017)	Ages 18+ with ability to understand Chinese	Not specified	Mental health	This study presented a 12-hour Mental Health First Aid (MHFA) course with the aim of increasing mental health recognition knowledge, and reducing stigma among participants. Used mental health literacy scale.	Community Measures Outcomes	Non-randomized trial	Participants who received training in MHFA progressed from pretest to posttest on mental health literacy items, destigmatization, and efficacy in offering help. The same pattern was found for the delayed posttest, except for two mental health literacy items. Whereas treatment groups were equivalent at pretest, a post-test and delayed posttest the MHFA group exceeded the control, except for two mental health literacy items.	Effect sizes were small for differences between pretest and posttest and differences between pretest and posttest scores on mental health literacy, efficacy for helping, and destigmatization; excepting moderate effect sizes for pretest to post-test changes in two mental health literacy items.
(Xie 2012)	Adults ages 60-89	Public libraries	E-health literacy in older adults	This study was a 4-week 2x/week 2-hour course that trained participants on how to use a computer, the Internet, and how to navigate two NIH websites to improve adult (age 60+) access to and use of high quality health information on the Internet.	Community Content Measures Outcomes	Before-after study	All hypotheses were supported, except H4. Dependent t-tests indicated that computer anxiety significantly decreased from pre- to post-intervention, while computer interest and efficacy significantly increased. Participants (78%) reported that what they learned from the training had affected their participation in their own health care.	Not reported

Author	Community	Setting	Topic	Intervention	Health Literacy Component	Study design	Outcomes	Magnitude
(Zhuang et al. 2016)	Adults ages 18+ living in Shenzhen, China	Cell phone	Health literacy	<p>This study explored using SMS (text) messages to deliver health education and aimed to improve the health literacy of a community in China.</p> <p>Intervention group received conventional health education measures and health education messages once a week for 1 year.</p> <p>Used rapid assessment of health literacy (RAHL).</p>	Community Measures Content Outcomes	Before-after study	Public health literacy scores increased 1.5 points, from 61.8 to 63.3, after SMS intervention for 1 year ($p<0.01$); increase greater for males than females ($p<0.01$); frequency of high health literacy scores was greater for the intervention than control group (22.03% to 30.93% vs. 22.07% to 20.82%).	Not reported

