



**CHW**

COMMUNITY HEALTH WORKER  
HEALTH DISPARITIES INITIATIVE

# NHLBI'S COMMUNITY HEALTH WORKER INITIATIVE Evaluation Report Summary

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The National Heart, Lung, and Blood Institute's  
Community Health Worker Initiative

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**U.S. Department of Health and Human Services**  
National Institutes of Health  
National Heart, Lung, and Blood Institute

## Background

### **Summary of the Community Health Worker Initiative (CHWI)**

The CHWI was designed by the National Heart, Lung, and Blood Institute (NHLBI) to improve health in minority and underserved communities by translating evidence derived from scientific studies and included in clinical practice guidelines into community practice. Ultimately, the goal of the CHWI is to reduce health disparities by improving health among groups that are disproportionately affected by cardiovascular disease (CVD). An expansion of the initiative to include asthma is just beginning, so that topic is not covered in this evaluation report.

The CHWI uses a community-based participatory approach involving community health workers (CHWs) in the implementation and evaluation of strategies to promote health. CHWs are trusted members of their communities and play a critical role in reducing health disparities by teaching community members about healthy lifestyle choices and providing preventive care guidance. They are known by various names. In Latino communities, they are called “promotores de salud.” In other communities, they may be called community health representatives, promotores, or patient navigators. The level of training of CHWs varies and they are typically volunteers. While CHWs are usually provided with job-related training, in most cases they have no formal professional or paraprofessional tertiary education. CHWs participating in this evaluation may or may not have received compensation.

One key component of the CHWI includes a set of tailored, evidence-based curricula developed by NHLBI to improve heart health that are designed for four specific groups of need—American Indians and Alaska Natives, Latinos, African Americans, and Filipinos. CHWs are trained to deliver the evidence-based curricula to community participants. There are four versions of the curricula:

1. “Honoring the Gift of Heart Health” (for American Indians and Alaska Natives, in English)
2. “Your Heart, Your Life/Su corazón, su vida”(for Latinos, in English and Spanish)
3. “With Every Heartbeat Is Life”(for African Americans, in English)
4. “Healthy Heart, Healthy Family” (for Filipinos, in English, with handouts in English and Tagalog)

Each curriculum includes a teaching manual to be used by the CHW, as well as activities, worksheets, and handouts for community participants. Participants can also receive risk factor and recipe booklets to supplement the educational sessions. The manual includes 10 lessons about reducing CVD disease and its risk factors, including topics on diet, physical activity, obesity, blood cholesterol, and high blood pressure. The sessions are:

1. “Are You at Risk for Heart Disease?”
2. “Act in Time to Heart Attack Signs”
3. “Be More Physically Active”
4. “What You Need To Know About High Blood Pressure, Salt, and Sodium”

5. “What You Need To Know About High Blood Cholesterol”
6. “Maintain a Healthy Weight”
7. “Manage Diabetes”
8. “Make Heart Healthy Eating a Family Affair”
9. “Eat in a Heart Healthy Way—Even When Time or Money Is Tight”
10. “Enjoy Living Smoke Free”

The curricula also include information and evaluation tools for CHWs to use for evaluating their own efforts, including data collection instruments to be completed by the participants and/or CHWs depending on the strategy.

### ***Strategies used in the Community Health Worker Initiative***

The CHWI uses a participatory approach involving CHWs and local community organizations to implement and evaluate program strategies. The CHWI program trains CHWs (Train-the-Trainer—Strategy 1), and CHWs can use one of three strategies to educate community residents (Strategies 2a, 2b, and 3). Sites choose which strategy they want to implement. The curricula can be used for any of the strategies.

The four strategies are:

- **Strategy 1—Train-the-Trainer:** CHWs are trained to deliver the Community Education curricula in their communities. The training aims to improve heart health knowledge and teaching skills of the CHWs.
- **Strategy 2a—Community Education:** Trained CHWs deliver the curricula to community members through group education classes.
- **Strategy 2b—Community Education with Screening:** Trained CHWs deliver the curricula to community participants. In addition, the participants are screened for risk factors (e.g. blood pressure) by trained health professionals prior to the start of the course and referred to community clinics if they present with elevated values.
- **Strategy 3—Lifestyle and Clinical Management:** Trained CHWs affiliated with community clinics deliver the curricula to clinic patients, targeting those identified as being at high risk for heart disease. Follow-up clinical management is done by clinic staff, and the CHW follows the patients to help them manage their risk factors.

### **Evaluation Goals**

This evaluation was conducted to find out whether the CHWI improves heart disease knowledge, awareness, and behaviors in the targeted minority, underserved communities. More specifically, the goals were to:

- Examine the effects of the CHWI interventions on heart health knowledge of the CHWs as well as heart health knowledge and self-reported health behaviors of the community participants. The knowledge and behaviors examined are those that have been associated with reduced risk factors for heart disease.

- Examine the effects of the CHWI Lifestyle and Clinical Management strategy on knowledge, behaviors, and clinical risk factors such as blood pressure, cholesterol, and blood glucose of the community patients who received the intervention.
- Obtain information to identify areas for improvement or for further research, including curricula, strategies, and evaluation methods and tools.

The CHWI does not include data on outcomes such as stroke, heart attack, or other heart disease morbidity or mortality. It is beyond the scope of this evaluation to make inferences about the impact of the CHWI on the incidence of heart disease. In addition, there is limited ability to examine CVD risk factors.

## Methods

The evaluation used a pre-post design that examined changes in heart health knowledge, self-reported health behaviors, and/or clinical measures from before to after the implementation of the CHWI intervention. There were no non-intervention comparison groups, so any pre-post changes in outcomes cannot be definitively attributed to the CHWI program. The analytic approach included all participants, whether they took both pretest and posttest surveys or not, while still taking advantage of having paired pre-post data where available.

The National Heart, Lung, and Blood Institute (NHLBI) contracted with The American Institutes for Research (AIR) to assist in conducting an evaluation of the CHWI. As part of the process, AIR staff worked with NHLBI staff to understand the CHWI program and strategies, clarify evaluation objectives, develop flowcharts to map how each strategy is applied, define logic models for the evaluation, compile available data, define the analytic approach, and analyze the available data.

Outcomes for the Train-the-Trainer strategy (strategy 1) focus on changes in heart health knowledge and teaching confidence of the CHWs who were trained. For each of the other three strategies (2a, 2b, and 3), which include a community education component, the outcomes of interest are changes in knowledge and self-reported behaviors among the community participants who attended the educational sessions. The outcomes were selected because prior research has shown that such behaviors affect the risk of getting heart disease.

Additionally, changes in clinical risk factors for heart disease were measured for strategy 3, Lifestyle and Clinical Management. These included blood pressure, cholesterol (total, LDL, and HDL), fasting blood glucose and hemoglobin A1c (HbA1c), and Body Mass Index (BMI).

Associations between participant characteristics (such as age, gender, and education level) and outcomes were examined, as well as associations between program characteristics (such as type of location or the trainer's experience) and outcomes. Regression techniques were used to estimate changes in the outcomes from before to after implementation of the CHWI program, controlling for other factors, such as participant or site characteristics. When possible, results were compared across curricula (e.g., by comparing the changes in knowledge for those using

the African American curriculum with those using the Latino curriculum) to help determine whether the tailored curricula that are part of the CHWI program had a different effect in different ethnic groups.

## Results

### Descriptive Data

This evaluation is based on data from 25 sites where one or more strategy was implemented between 2007 and 2010. The data were collected locally by the CHWs using tools provided by the NHLBI, which received a Clinical Exemption from NIH’s Office of Management and Budget (OMB) Office.

Strategy 1 trained 320 CHWs. A total of 1,148 community participants were educated through strategies 2a, 2b, or 3.

As summarized below and illustrated in Figure 1, not all of the CHWs trained through Strategy 1 delivered the program during this evaluation period. However, anecdotal information shows that many of them went on to deliver the program at later dates.

Also, not all of the CHWs who delivered the program were trained during the timeframe of data collection for this evaluation. Some were trained prior to the start of data collection for this evaluation and some received training from alternative sources. Information linking specific CHWs to implementation of the curricula is not available due to resource limitations.

**Figure 1: Number of sites, CHWs, and community participants by strategy**

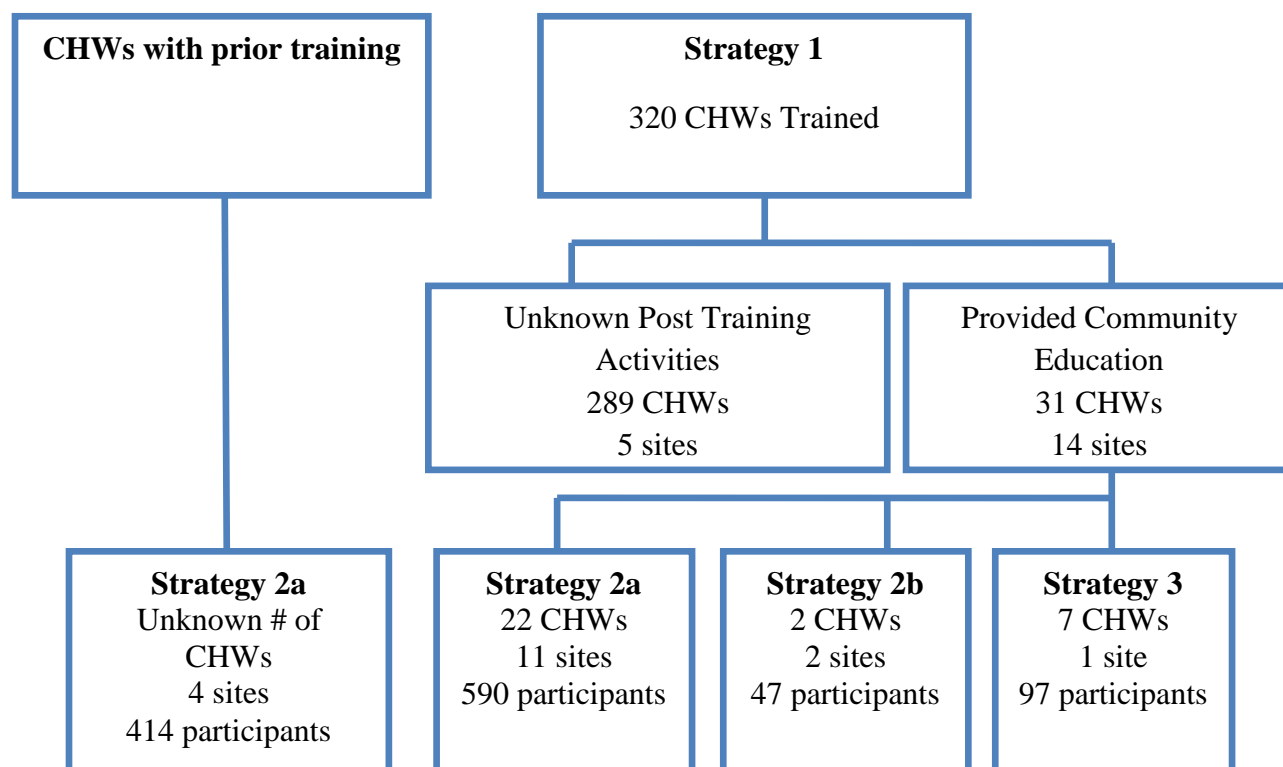


Table 1 and Figure 1 give the number of participants evaluated by curriculum and strategy. The number of CHWs and participants is as follows:

- 320 CHWs were trained in strategy 1, train-the-trainer. During the time frame of this evaluation, at least 31 delivered one or more curriculum. However, complete reporting information on the trainer's activities after receiving training was not provided by some sites, so the actual number of CHWs delivering the curricula is unknown.
- 1,004 community participants were educated by CHWs using Strategy 2a. Of those, 590 participants were educated by 22 CHWs and the remaining 414 participants were educated by CHWs who were trained outside of this program.
- 47 community participants/patients were educated by 2 CHWs using strategy 2b, which includes community education as well as clinical screening.
- 97 community participants/patients were educated by 7 CHWs using strategy 3, the lifestyle and clinical management strategy, which includes community education as well as clinical risk factor management.

**Table 1: CHWI program participants by curriculum and strategy**

| Curriculum  | Strategy 1:<br>Train-the-Trainer | Strategy 2a:<br>Community Education | Strategy 2b:<br>Community Education with Screening | Strategy 3:<br>Lifestyle and Clinical Management |
|---|----------------------------------|-------------------------------------|--|--|
| <b>African American</b><br>(7 sites, 563 participants)              | 209                              | 354                                 | 0  | 0  |
| <b>American Indian/Alaska Native</b><br>(4 sites, 123 participants) | 9                                | 67                                  | 47   | 0  |
| <b>Filipino</b><br>(5 sites, 227 participants)                      | 48                               | 82                                  | 0  | 97   |
| <b>Latino</b><br>(9 sites, 555 participants)                        | 54                               | 501                                 | 0  | 0  |
| <b>ALL Curricula*</b><br>(25 sites, 1,468 participants)             | <b>320 (247)</b>                 | <b>1,004 (849)</b>                  | <b>47 (47)</b>                                     | <b>97 (73)</b>                                   |

\*Total in parenthesis represents the number of matched pre and post tests.

Table 2 summarizes the demographic and select CVD risk factor characteristics of participants across the 4 strategies. A large majority of participants were women in all strategies. The typical CHW who was trained in Strategy 1 was in their mid-40s. About half had worked previously as community health educators, but only about one-third had taught about heart disease. The average length of experience as a CHW was eight years. In addition, these participants had a relatively high level of education as nearly two-thirds were college graduates.

For strategies 2a, 2b, and 3, most participants were females. Participants in strategy 2a tended to be in their mid-40s, and those in strategies 2b and 3 tended to be in their 60s. Between one-third and three-fourths of participants had a history of heart disease, depending on the strategy; and between one-fourth and one-third had been told by a health professional that they had diabetes.

**Table 2: Demographic and health status characteristics of participants by strategy**

|  | Strategy 1<br>n=320 | Strategy 2a<br>n=1,004 | Strategy 2b<br>n=47 | Strategy 3<br>n=97 |
|--|---------------------|------------------------|---------------------|--------------------|
| <b>Female</b>  | 86%                 | 75%                    | 81%                 | 84%                |
| <b>Race</b>  |                     |                        |                     |                    |
| Alaska Native  | 0%                  | 0%                     | 0%                  | 0%                 |
| American Indian  | 3%                  | 7%                     | 53%                 | 0%                 |
| Asian  | 1%                  | 0%                     | 0%                  | 0%                 |
| Black/African American   | 58%                 | 34%                    | 0%                  | 0%                 |
| Native Hawaiian/Pacific Islander                                 | 15%                 | 9%                     | 0%                  | 100%               |
| White  | 18%                 | 39%                    | 47%                 | 0%                 |
| Not specified  | 5%                  | 12%                    | 0%                  | 0%                 |
| <b>Hispanic or Latino</b>  | 19%                 | 48%                    | 0%                  | 0%                 |
| <b>Average Age (in years)</b>                                    | 45                  | 48                     | 65                  | 69                 |
| <b>Told by a health care professional that you have diabetes</b> | N/A                 | 23%                    | 34%                 | 35%                |
| <b>Family history of heart disease</b>                           | N/A                 | 37%                    | 70%                 | 33%                |
| <b>Worked as Community Health Educator (CHE) Before</b>          | 50.3%               | N/A                    | N/A                 | N/A                |
| <b>Used manuals to teach community members</b>                   | 38.4%               | N/A                    | N/A                 | N/A                |
| <b>Average length of experience as CHE (in years)</b>            | 8                   | N/A                    | N/A                 | N/A                |
| <b>College Education</b>   | 83%                 | N/A                    | N/A                 | N/A                |

### ***Effects of the program on CHWs and participants***

For the most part, NHLBI's CHWI interventions had positive effects on knowledge, attitudes, confidence, and/or behaviors related to heart health.

For the CHWs trained as part of strategy 1, overall knowledge of heart health and knowledge of several specific topics, such as dietary habits and food serving size, increased after the training.

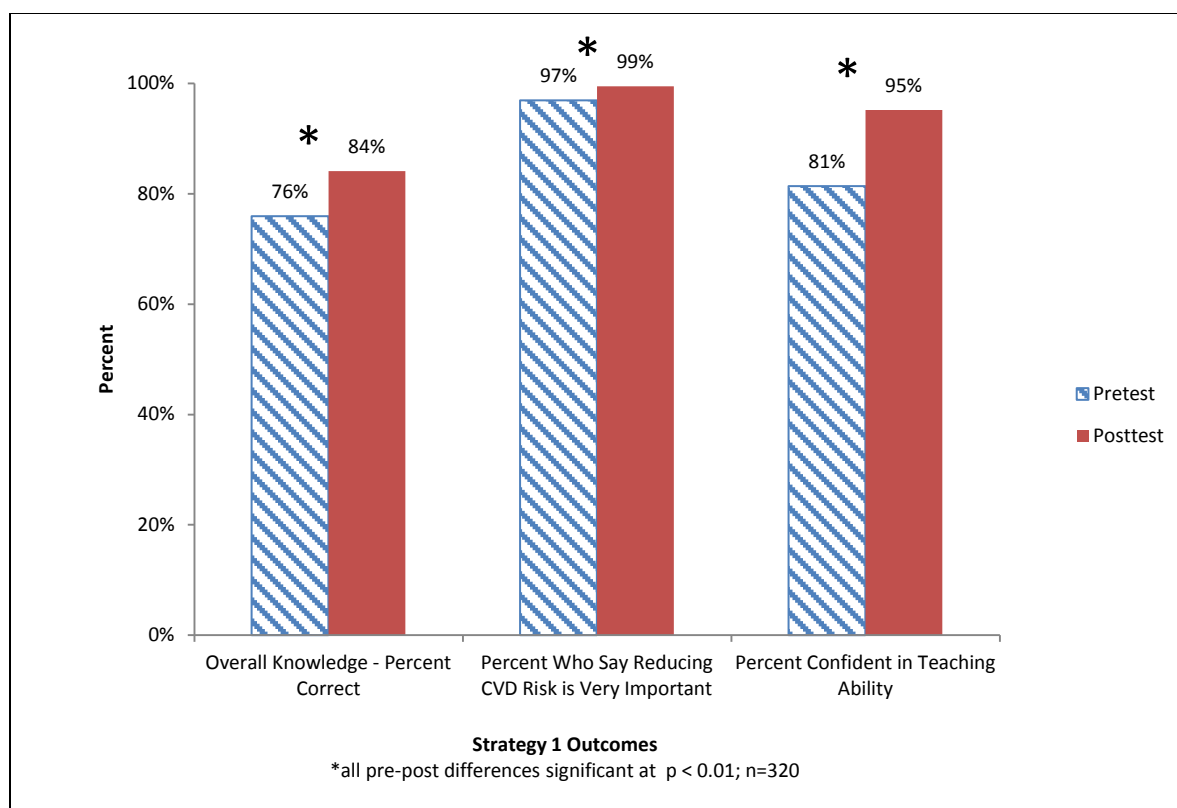
With some exceptions, overall knowledge increased for community participants in strategies 2a, 2b, and 3. In addition, the self-reported practice of certain heart healthy behaviors increased, and participants progressed to those stages of behavior change more closely aligned with practicing heart healthy behaviors regularly and maintaining them. Changes in self-reported confidence in cooking heart healthy food varied. Finally, most participants reported that they shared the information learned during the sessions with family and friends.

### Results for strategy 1—Train-the-Trainer

The CHWs trained had high scores in knowledge and perceived importance of teaching confidence at baseline. However, there was still room for improvement and the Train-the-Trainer strategy (Figure 2 and Table 3) was associated with significant improvements in:

- Knowledge of heart health, overall and by topic (e.g. dietary habits, food serving size)
- Perceived importance of reducing heart disease risk
- Self-confidence in teaching the CHWI manual

**Figure 2: Pretest vs. posttest scores for Strategy 1—Train the Trainer**





**Table 3: Pretest and posttest scores for topic specific measures for Strategy 1- Train-the-Trainer**

| Measure  | Pretest Score |                       | Posttest Score   |            |
|--|---------------|-----------------------|------------------|------------|
|  | Mean          | (95% CI) <sup>1</sup> | Mean             | (95% CI)   |
| Overall Heart Health Knowledge                   | 76%           | (73%, 79%)            | 84% <sup>‡</sup> | (81%, 87%) |
| a. Risk factor assessment scenarios <sup>2</sup> | 75%           | (68%, 83%)            | 79%*             | (72%, 87%) |
| b. Dietary Habits                                | 80%           | (77%, 83%)            | 85% <sup>‡</sup> | (83%, 88%) |
| c. Food serving size                             | 67%           | (61%, 73%)            | 78% <sup>‡</sup> | (73%, 84%) |
| d. Risk factors for heart disease                | 63%           | (58%, 69%)            | 78% <sup>‡</sup> | (73%, 84%) |

\*Pre-post difference significant at  $p < 0.05$ ; <sup>†</sup> $p < 0.01$ ; <sup>‡</sup> $p < 0.001$ ;  $n=320$ , matched pairs=247

### Results for strategy 2a—Community Education

The Community Education strategy generally increased knowledge, attitudes, and behaviors from pre- to post intervention. As shown in Figures 3 and 4, there was no change in self-reported smoking and binge drinking, which were extremely low at pre-test. However, the following measures significantly increased:

- The frequency of self-reported practices of food-related behaviors associated with heart health, both overall and in specific areas (salt and sodium, cholesterol and fat, and weight management).
- Self-report of being physically active
- General knowledge of heart health
- Self-confidence in cooking heart healthy food
- Stage of change toward improving heart health behaviors

<sup>1</sup> The confidence intervals shown in this table represent the interval around the point estimates (the means) for each outcome, both pre and post. This interval is not equivalent to the confidence interval around the *difference* between the pretest and posttest mean scores, which is *not* displayed in the table. Because the analysis is based on paired observations, there is greater statistical power for the tests of mean differences, which, as discussed above in the section on statistical power, reduces variance, which in turn decreases the size of the standard errors and thus the width of the confidence intervals. The significance levels reported in the table (indicated by the footnote symbols) are based on these confidence intervals derived from a statistical test of the *differences* in means from pretest to posttest. These caveats apply to all subsequent tables displaying confidence intervals. In addition, it should be noted that confidence intervals for dichotomous outcomes are asymmetrical. This asymmetry results from the fact that the dichotomous outcomes are first transformed into logits (using a logarithmic function). To transform the results back into units that make sense (such as odds ratios and predicted probabilities), SAS applies an exponential function. Thus, the asymmetry is due to the fact that an exponential function is used in calculating the confidence intervals. Generally, the upper bound of the CI will be closer to the mean than the lower bound of the CI.

<sup>2</sup> Participants were presented with several scenarios and asked to identify the risk factors for CVD.

Figure 3: Pretest vs. posttest scores for food-related behavioral outcomes for strategy 2a

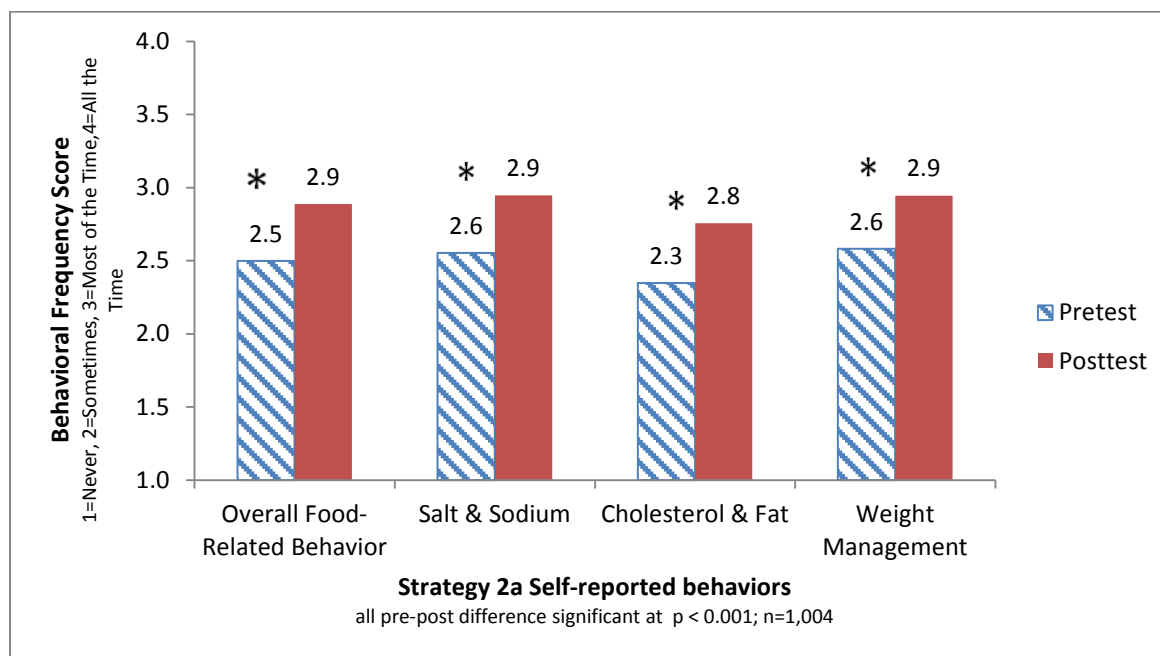
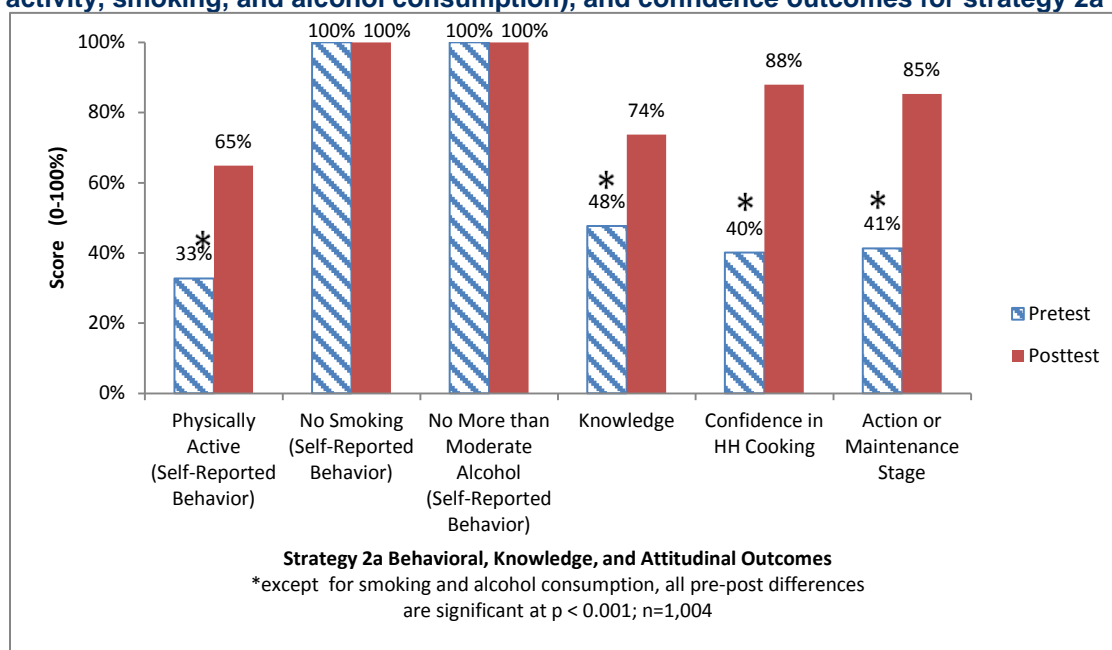


Figure 4: Pretest vs. posttest scores for knowledge, attitude, self-reported behavior (physical activity, smoking, and alcohol consumption), and confidence outcomes for strategy 2a

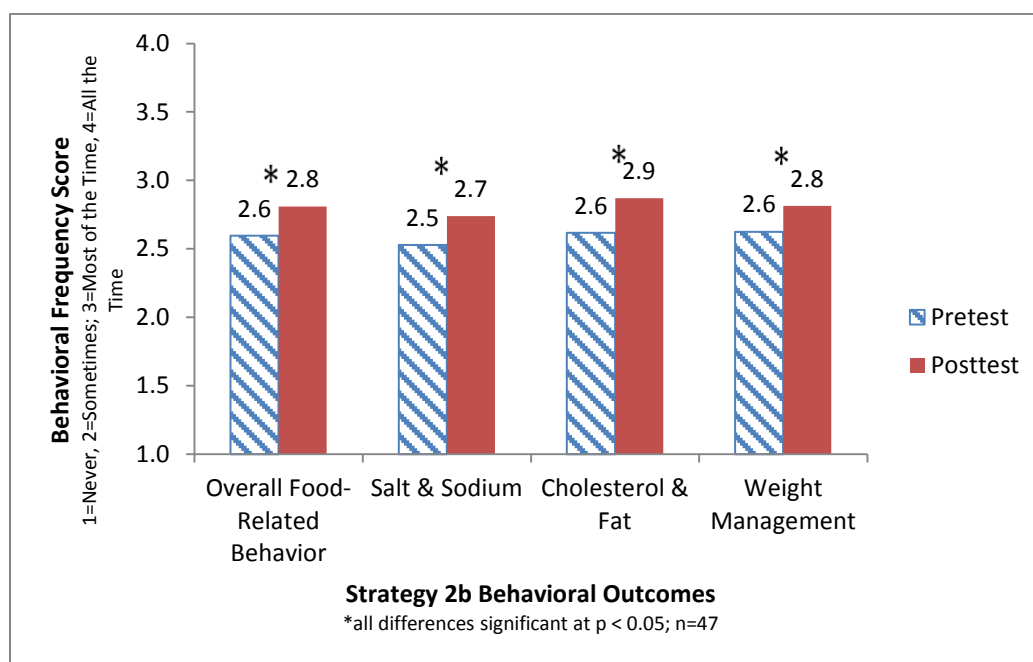


## Results for strategy 2b—Community Education with Screening

At baseline, the average score on the knowledge section was 61 percent and heart healthy behaviors were being employed “Sometimes”. Community Education with Screening improved knowledge and certain, but not all, behaviors. This strategy was implemented using the American Indian/Alaska Native curriculum at only two sites with 47 community residents. Key outcomes (Figure 5 and 6; some data not shown), were:

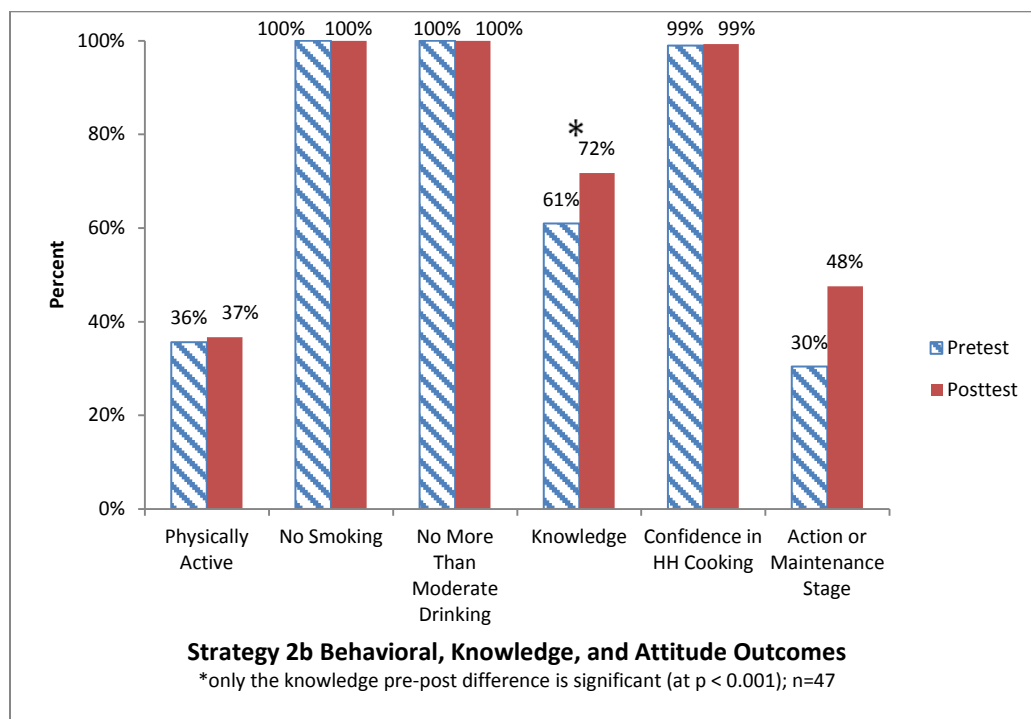
- Self-reported food-related behaviors that favor heart health increased significantly overall and in specific areas (salt and sodium, cholesterol and fat, and weight management).
- Being physically active did not increase.
- There was no change in reported smoking and binge drinking<sup>3</sup>, which were extremely low at pre-test.
- General knowledge of heart health significantly improved.
- Self-confidence in cooking heart healthy food had no significant change; however, almost every participant was already “confident” or “very confident” before the program started.
- Stage of behavior change toward improving heart health improved significantly, with more people either practicing or maintaining these behaviors.

**Figure 5: Pretest and posttest scores for food-related behavioral outcomes for strategy 2b**



<sup>3</sup>For the alcohol consumption items were coded into three categories: binge drinking, moderate drinking, and no drinking. Anyone who reported drinking alcohol, except those at a binge drinking level, was coded in the ‘moderate drinking’ category.

**Figure 6: Pretest vs. posttest scores for behavioral, knowledge, and attitudinal outcomes for strategy 2b**

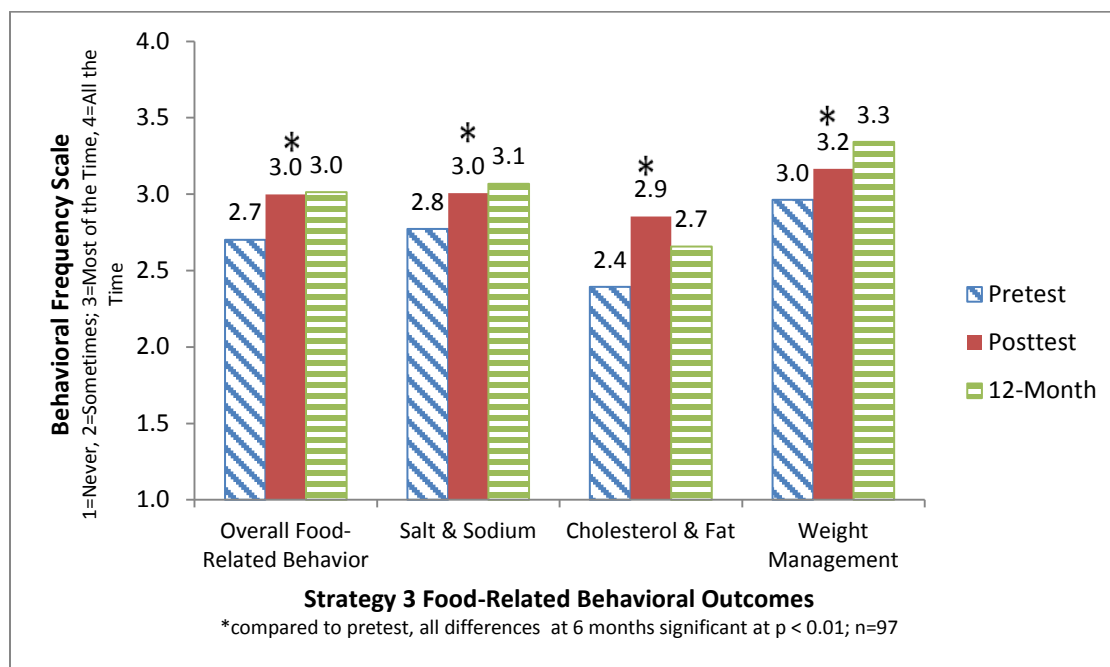


### Results for strategy 3—Lifestyle and Clinical Management

The Lifestyle and Clinical Management strategy included the same measures as the educational strategies (2a and 2b) plus a clinical component unique to strategy 3. Measures from both components were collected at baseline; the self-reported outcomes (knowledge and behaviors) were collected again after the completion of the curriculum; and the clinical measures were collected again about 6 months after baseline. Both the survey and clinical outcomes were collected again 12 months after baseline. Strategy 3 was implemented using the Filipino curriculum at a single site with 97 patients. As shown in Figure 7:

- Self-reported practice of food-related behaviors that favor heart health increased after the completion of the curriculum and held steady after 12 months. For specific behaviors (salt and sodium, cholesterol and fat, and weight management), there was a significant increase after the completion of the curriculum, but results varied from the time that curriculum is completed to 12 months.

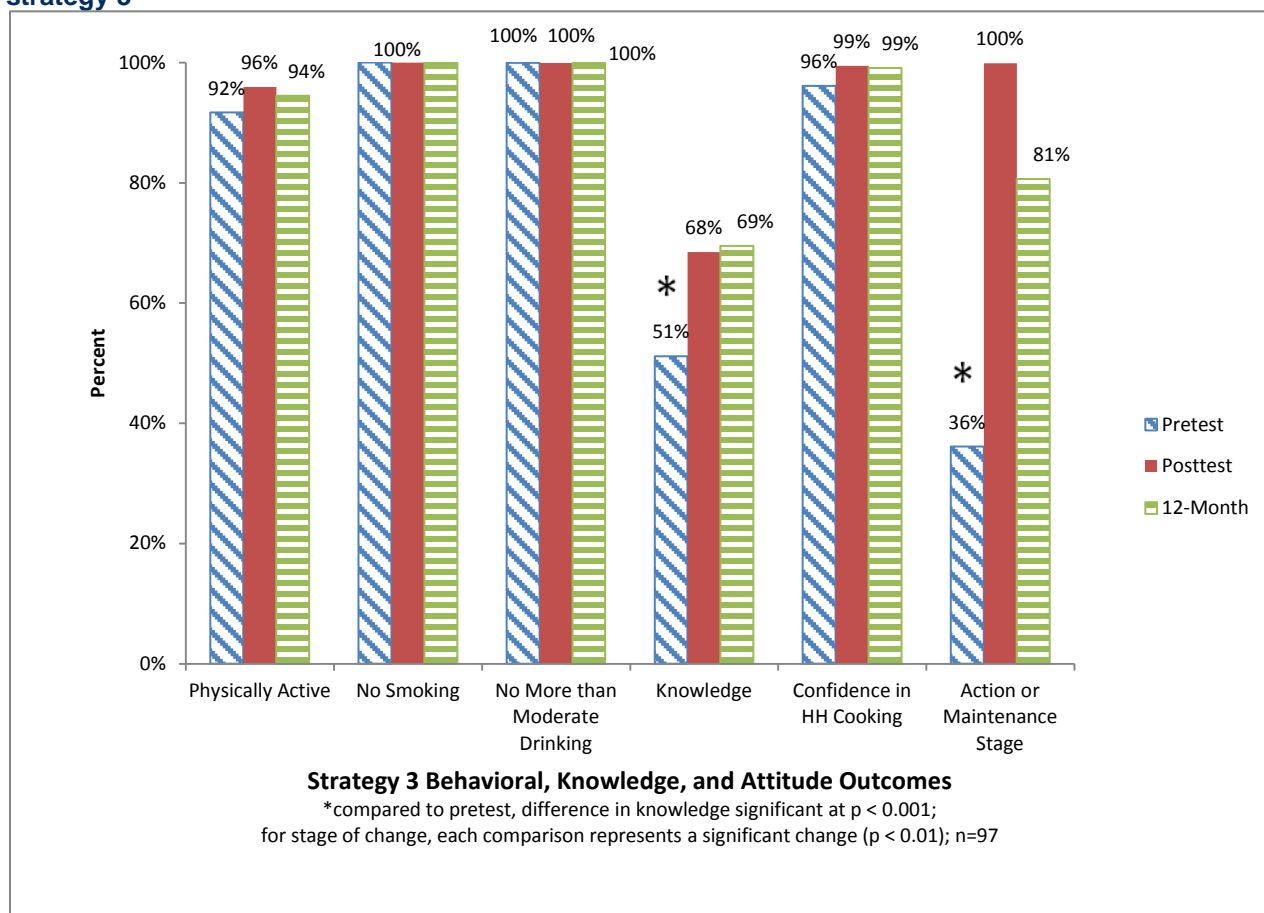
Figure 7: Pretest vs. posttest scores for food-related behavioral outcomes for strategy 3



As shown in Figure 8, for other aspects of the educational component, results varied:

- General knowledge of heart health increased significantly after the completion of the curriculum, and the increase was maintained at 12 months.
- Self-confidence in cooking heart healthy food did not change; all participants reported being “confident” or “very confident” at pretest.
- The percentage of patients progressing to stages of change more closely aligned with practicing heart healthy behaviors increased significantly - the number reporting either practicing or maintaining those behaviors tripled from pretest to posttest, though there was some decrease at 12 months.
- The percent of patients who reported being physically active, not smoking, or not engaging in binge drinking of alcohol did not change over time; however, reported rates of these behaviors was extremely low at pretest.

**Figure 8: Pretest vs. posttest scores for behavioral, knowledge and attitudinal outcomes for strategy 3**

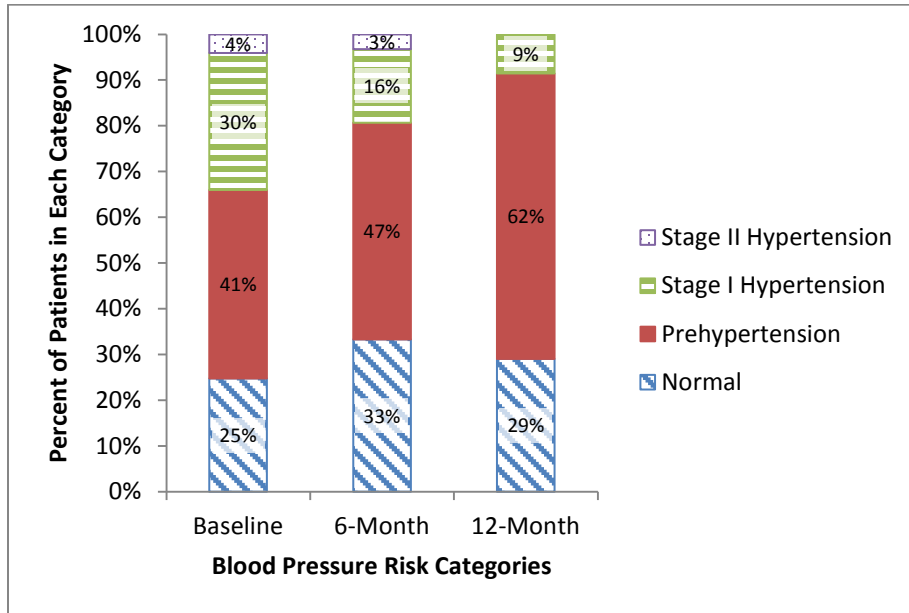


For the clinical component (Figures 9 and 10)<sup>4</sup>:

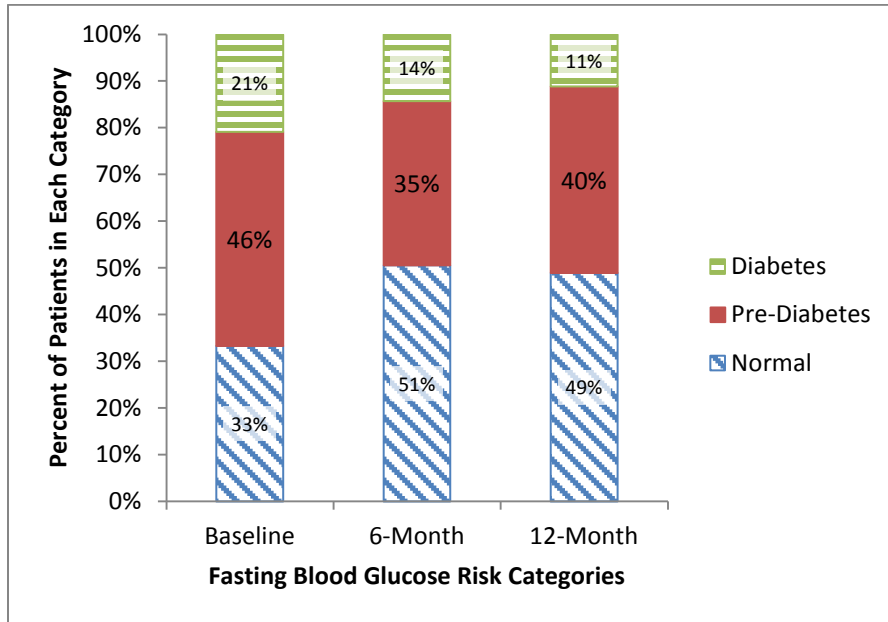
- The percent of participants in “normal” categories for hypertension and diabetes increased, and the percent in the at risk categories decreased from baseline to 6 months, with the improvements sustained at 12 months
- Body mass index, low density cholesterol (LDL-C), and hemoglobin A1c (HbA1c) did not change.

<sup>4</sup> Blood pressure was coded as (1) normal if the systolic pressure was less than 120 mmHg and the diastolic pressure was less than 80 mmHg, (2) pre-hypertension if the systolic pressure was between 120 and 139 mmHg or the diastolic pressure was between 80 and 89 mmHg, (3) stage I hypertension if the systolic pressure was between 140 and 159 mmHg or the diastolic pressure was between 90 and 99 mmHg, (4) stage II hypertension if the systolic pressure was equal to or more than 160 mmHg or the diastolic pressure was equal to or more than 100 mmHg. Fasting blood glucose was coded as (1) normal if less than 100 mg/dL, (2) pre-diabetes if between 100 and 125 mg/dL, (3) diabetes if equal to or more than 126 mg/dL.

**Figure 9: Change in risk categories for blood pressure from baseline to 12 months for strategy 3**



**Figure 10: Change in risk categories for fasting blood glucose from baseline to 12 months for strategy 3**



## ***Variations by curriculum for strategy 1 and strategy 2a***

The analysis of the results by curriculum focused on the two strategies that had representation from all four curricula (strategies 1 and 2a). Participants from all sites using a particular curriculum were pooled and comparisons were made across curricula. The number of participants varied widely, however, depending on the curriculum and strategy.

### **Strategy 1: Train the Trainer**

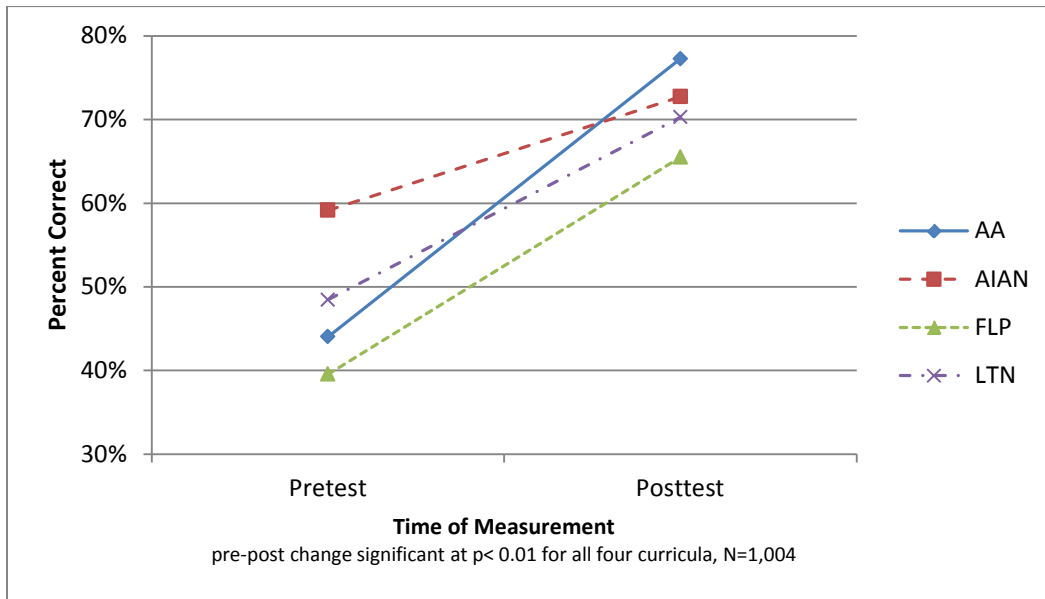
- Overall knowledge of heart health (Train-the-Trainer, strategy 1) increased by 8 percentage points each across the groups of sites using the African American, Filipino, and Latino curricula. Overall knowledge did not change in the sites using the curriculum for American Indians and Alaska Natives.

### **Strategy 2a: Community Education**

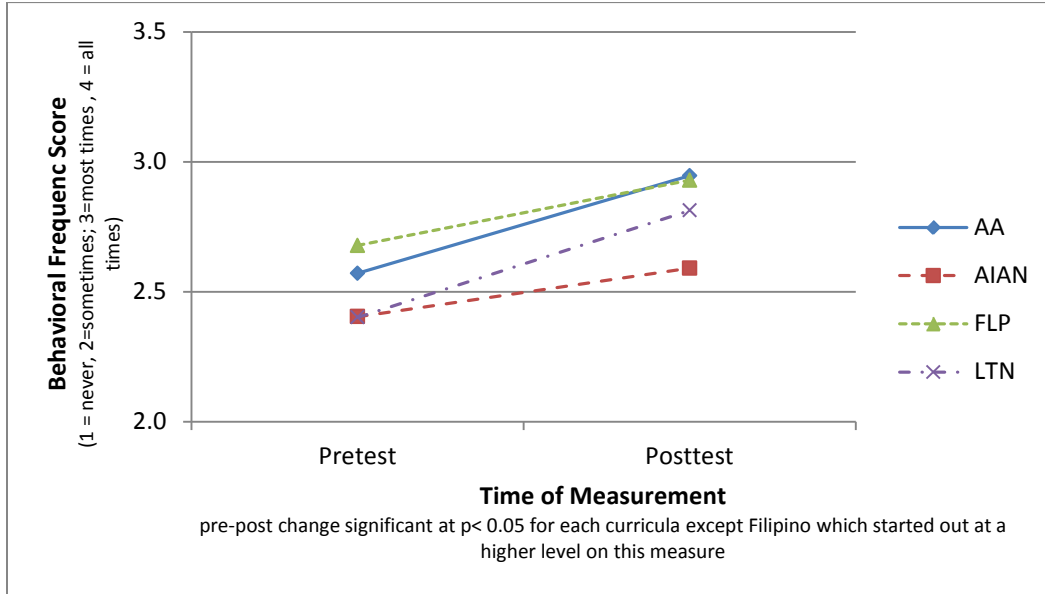
- As shown in Figure 11, heart health knowledge (Community Education, strategy 2a) improved by 33 percentage points for the sites using the African American curriculum, 14 percentage points for the sites using the American Indian and Alaska Native curriculum, 26 percentage points for the sites using the Filipino curriculum, and 22 percentage points for the sites using the Latino curriculum. These improvements *within* each curriculum were statistically significant.
- When comparing *across* curricula, knowledge increase among those using the African American curriculum was significantly greater than the increases among those using either the American Indian and Alaska Native or Latino curricula; and the increase among those using the Latino curriculum was significantly greater than that among those using the American Indian and Alaska Native curriculum.
- As shown in Figure 12, food-related behaviors that are thought to promote heart health (Community Education, strategy 2a) increased significantly—from between 0.2 to 0.4 points on a 4-point scale. The results were statistically significant for all sites except the Filipino site. As shown in the figure, the Filipino site started out at a higher level on this outcome, so there was not as much room for improvement. Nevertheless, they did see improvement and at post-test had the second highest score on this scale.



**Figure 11: Pre-post change in percent of correct responses to heart health knowledge questions, by curriculum**



**Figure 12: Pre-post change in frequency of overall heart healthy food-related behaviors, by curriculum**



## Variation by participant characteristics

In general, participants who had more room for improvement tended to have greater gains. For example:

- At the start of strategy 2a, participants varied widely in knowledge about heart health and the frequency of engaging in behaviors associated with heart health.
- Those with less knowledge, and those who engaged in these behaviors less frequently, *made greater gains* than those who started the community education sessions with greater knowledge or those who already engaged in these behaviors more frequently.
- When the education sessions were completed, the range of differences across participants decreased. In other words, the “gap” narrowed.
- For strategy 3, those who had elevated levels of blood pressure and hemoglobin A1c were more likely to maintain increases in heart healthy behaviors between the end of the education component and month 12, compared with those with normal levels.

## Limitations of the Evaluation

This evaluation of the CHWI was limited because of a non-comparative design, problems with the quality of the evaluation data, and differences in the amount of information available for the evaluation:

- **Limited evaluation design:**
  - There was no comparison group, and pre-to-post changes may have been attributed to motivation or other factors, and not necessarily caused by the intervention. The way to control for this issue is to have a comparison group with the same motivation and that is comparable with respect to other factors (on average) to the intervention group. A randomized design accomplishes this goal.
  - The evaluation used a convenience sample not specifically intended to be representative of those who could benefit from the CHWI program or others in the community whose health is an issue. A larger number of more representative participants would improve this issue.
  - Some participants did not provide posttest data, and it was difficult to match pre to posttests in some cases. As described in the methods section, the analytic models adjusted for this problem. This approach, however, does not take the place of a high follow-up measurement rate.
- **Variation in implementation across sites:** The content and implementation of the strategies were flexible and based on program resources or community needs. Thus, it was not possible to assess to what degree the program was implemented as originally designed.
- **Limitations with measurement instruments:** The questionnaires used to gather information from participants were developed specifically for use in the CHWI

evaluation. As such, most survey items had not been used in other research and had not been evaluated for their validity or reliability.

- **Limitations of self-report information:** Self-report data on food consumption and other health-related behaviors (e.g., physical activity) are subject to forms of measurement error, including healthy-user bias and errors in recall, which may inflate reports of socially desirable behaviors. Clinical risk factor data (e.g., blood pressure, LDL-cholesterol, and BMI) are more objective measures, but they were only available in a portion of the participants (13%).
- **Problems with data quality:** The evaluation data collection instruments were part of the CHWI manual, and a session on evaluation is part of the Train-the-Trainer strategy. However, not all CHWs used the evaluation forms and procedures as they were intended, and procedures for data entry were not followed consistently across the sites. For example, individual identifiers were not always used correctly, so differentiating one participant from another, and identifying paired measurements from the same participant, was sometimes difficult.

## Program Recommendations

The following recommendations are made to improve the program:

- Provide additional planning and training to ensure a common intervention program with high fidelity to the intervention. Standardize implementation of intervention strategies as much as possible to enhance the comparability of the program across sites. For example, instead of having three community education strategies have one. A focus on working with clinical sites will allow measurement of objective risk factors.
- Make objective clinical risk factors a stronger focus of the program. Changes in self-reported behaviors may not translate into improved health, but the clinical outcomes are objective and meaningful. Focus on outcomes that are proven to increase cardiovascular risk: blood pressure, LDL-Cholesterol, and BMI. Provide feedback to the participants about their objective risk factor levels.
- In training the CHWs (Strategy 1), identify the strengths and skills as well as the needs of the participants in the beginning so that the training can be tailored to fit the needs of the trainees. Include core competency training, such as communication and teaching skills, and provide opportunities to practice communicating information and receive feedback.
- Design the program to assure all participants receive all sessions. Provide a longer program when possible (based on literature showing six months or more of intervention is needed). Extensions beyond the curricula length could include follow up sessions and assistance with clinical adherence.

## Evaluation Recommendations

Future evaluations of the CHWI can be improved by addressing its limitations, for example:

- Develop an evaluation design before beginning the program in new sites. Include process, impact, and outcome evaluations.
- Incorporate a comparison group into the design. One strategy would be to stage implementation of the CHWI over time, comparing a “wait-listed” group with a group receiving the program. The ideal situation would be to assign these groups randomly after determining eligibility.
- Use the community or CHW as the unit of assignment and analysis, rather than individual community participants. This approach allows one to keep the program and comparison groups separate so a comparative analysis is more accurate.
- Improve data collection by defining data needs ahead of time; ensure that all data needed for the evaluation are collected.
- Test and revise the questionnaires to assure the questions are measuring what is intended.
- Tailor data collection tools for use by CHWs, develop easier-to-use data collection instruments and self-directed modules, and improve the evaluation chapter in the manual.
- Provide more training on evaluation, data collection, and data entry at the local level through the Train-the-Trainer strategy.
- Alternately, have centrally-trained data collectors who are reimbursed or hired as part of the contract.
- Collect objective outcome data on all participants, including biological risk factors such as blood pressure level, LDL-cholesterol, and BMI.
- Assure a high measurement rate even if all participants do not attend all sessions.
- As the primary impact/outcome analysis, analyze pre-post changes in the objective measures in a CHW group compared to a comparison group, controlling for differences between the groups (potential confounding variables).
- If a comparison group is not possible, analyze changes from pre-to-post intervention in all participants, attempting to obtain data even on those who did not attend all sessions.

## Conclusions

NHLBI’s CHWI interventions had positive effects on knowledge, attitudes, confidence, and behaviors related to heart health. For the CHWs trained as part of strategy 1, overall knowledge of heart health and knowledge of several specific topics, such as dietary habits and food serving size, increased after the training. For community participants, heart health knowledge increased, the self-reported practice of certain heart healthy behaviors increased, certain clinical measures improved and were sustained at 12 months (e.g. blood pressure), and participants progressed to

stages of change more closely aligned with practicing heart healthy behaviors regularly and maintaining them.

This limited evaluation provides preliminary evidence on increases in knowledge, improved cardiovascular risk factors, and increased healthy behaviors related to prevention of heart disease associated with the Community Health Worker Initiative. Further evaluation studies using more sophisticated designs are needed to gather conclusive evidence on its effectiveness.

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