

# Diabetes Prevention: Interventions Engaging Community Health Workers

## Summary Evidence Table - Economic Review

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Program Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
<p><b>Author (Year):</b> Irvine (2011)</p> <p><b>Design:</b> RCT</p> <p><b>Economic Method:</b> Cost per QALY</p> <p><b>Funding Source:</b> UK National Institute for Health Research (NIHR programme grant [0606-1099])</p> <p><b>Monetary Conversions:</b> Index year 2009 in UK pounds</p>	<p><b>Location:</b> Norfolk, United Kingdom</p> <p><b>Setting:</b> Community</p> <p><b>Eligibility:</b> Recruited and referred patients age 45-70 with impaired fasting glucose (IFG) or type 2 diabetes.</p> <p><b>Sample Size:</b> Intervention 118 Control: 59</p> <p><b>Characteristics:</b> Mean age 59 Male 54% Post-16 education 3% Heart disease 4.5% BMI 32.4 Mean fasting glucose 6.9 mmol/l</p> <p><b>Time Horizon:</b> CHW intervention was 7 months.</p>	<p><b>Interventions:</b> Core: 4 group education sessions and physiotherapist-led exercise sessions in 3 months Maintenance: 4 monthly group sessions. These were peer-led sessions for exchange of ideas on achieving goals. Diet diaries and pedometers distributed. Also, participants received telephone peer-support from volunteers who themselves were diabetic.</p> <p><b>Additional Intervention:</b> Yes</p> <p><b>Team-based Care:</b> No</p> <p><b>Comparison:</b> Usual care with 2-hour session on diet and exercise plus pedometers.</p>	<p>7-month QALY based on EQ-5D decreased for both groups in trial but decrease was less for intervention. Incremental was 0.003 QALY.</p>	<p><b>Program cost of 226 per person over 7 months.</b></p> <p>Includes screening cost and staff time and pedometers (for both groups). Data Source: Tracked in study</p>	<p><b>Healthcare cost:</b> There was no significant difference in healthcare cost change comparing intervention to control group.</p> <p>Data came from patient reported utilization.</p> <p>Components included outpatient, inpatient, and medication. Not clear if emergency room visits included.</p> <p><b>Productivity:</b> NR</p>	<p>Cost per QALY gained 20,620 for those with impaired fasting glucose. Estimated using cost and QALY gained collected during trial period of 7 months.</p>

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	Recruitment in 2009.					
<p><b>Author (Year):</b> Kramer (2011)</p> <p><b>Design:</b> Pre post</p> <p><b>Economic Method:</b> Intervention cost only</p> <p><b>Funding Source:</b> Funding: Sanofi-Aventis</p> <p><b>Monetary Conversions:</b> Assumed index year 2009 in U.S. dollars</p>	<p><b>Location:</b> Pittsburgh, Pennsylvania</p> <p><b>Setting:</b> Community</p> <p><b>Eligibility</b> Adults with prediabetes and/or metabolic syndrome. Implemented by trained laypeople, diabetes educators</p> <p><b>Sample Size:</b> Intervention 81</p> <p><b>Characteristics:</b> White 96%; Mean age 53; Prediabetic 49%; Smoke 9%; High School or less 22%; Employed 74%.</p> <p><b>Time Horizon:</b> CHW intervention was 12 months. Recruitment started Sept 2008.</p>	<p>Group Lifestyle Balance (GLB)</p> <p><b>Interventions:</b> Community setting Modified Diabetes Prevention Program (group lifestyle balance program) 21 group sessions</p> <p>2-day training for delivering group sessions and implementing in local communities.</p> <p>Weekly sessions of approximately 1 hour. Receive GLB handouts, self-monitoring booklets, a fat- and calorie tracker, and pedometer. After weekly sessions, invited to attend group monthly meetings.</p> <p><b>Additional Intervention:</b> No</p> <p><b>Team-based Care:</b> No</p> <p><b>Comparison:</b> None</p>	<p>Mean values of outcomes: Weight loss 11.3 lbs Waist size reduced 1.8 in Cholesterol LDL reduced -4.6 mg/dL Fasting blood glucose reduced 2.9 g/dL Systolic BP reduced 7.1 mmHg Diastolic BP reduced 2.7 mmHg</p> <p>A1c Not reported</p>	<p><b>Program cost of \$320 per person</b></p> <p>Only salary plus benefits cost of diabetes educators included in cost.</p> <p>Data Source: Tracked in study</p>	<p><b>Healthcare cost:</b> NR</p> <p><b>Productivity:</b> NR</p>	<p><b>No summary measures</b></p> <p><b>Limitations:</b> No control group No cost of healthcare Incomplete intervention cost</p>

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<p><b>Author (Year):</b> Krukowski (2013)</p> <p><b>Design:</b> RCT</p> <p><b>Economic Method:</b> Intervention cost</p> <p><b>Funding Source:</b> None reported</p> <p><b>Monetary Conversions:</b> Index year 2009 in U.S. dollars</p>	<p><b>Location:</b> Statewide in Arkansas, USA</p> <p><b>Setting:</b> Senior Centers</p> <p><b>Population:</b> Healthy persons =&gt;60 years old from 16 senior centers. 1 center dropped out.</p> <p><b>Sample Size:</b> Lifestyle 116 Attention control 112</p> <p><b>Characteristics:</b> Mean Age 71 Female 78% Caucasian 92% Mean BMI 37</p> <p><b>Time Horizon:</b> Intervention occurred 2008 through 2010.  Intervention length is 3 months. Follow-up at 4 months after end.</p>	<p><b>Intervention:</b> Two 12-session interventions delivered by lay health educators (LHE/CHW): Lifestyle Attention control</p> <p>The present study looks at cost of delivering the Lifestyle Intervention Intervention used Diabetes Prevention program (DPP) materials developed by others for group delivery.</p> <p>Delivered 12 weekly sessions in 8 centers by 20 trained CHWs. Mean of 2.9 CHWs per center. One center withdrew before randomization.</p> <p>CHWs trained by registered dietitians, health educators, and psychology fellows.</p> <p><b>Supervisor and Activities:</b> NR</p> <p><b>Team-based Care:</b> No</p>	<p>Mean value of outcomes: 4-month weight loss for Lifestyle group was 3.4 Kg, significantly greater than loss for Attention Control.</p> <p>HbA1c NR SBP NR Cholesterol NR BMI NR QALY NR DALY NR</p> <p>Significant improvement in patient confidence in self-care.</p>	<p><b>Cost of start-up plus ongoing processes</b> Cost per person \$165 Cost per center \$2731</p> <p>Components per person cost: Staff time and materials for training CHWs \$57.61 Patient supplies and devices \$71.40 Technical support for CHWs \$12.90 Other \$23.09</p> <p>Startup \$105.38 Ongoing \$59.62</p> <p><b>Component Included in Cost:</b> Trainer cost Training materials Calorie and fat counter booklets, Lesson binder, Pedometer, Calculators for each patient Weighing scale, Stadiometer for each senior center Personnel cost of technical support for CHW</p> <p><b>Components not Included:</b> CHW supervision CHW time and attendance</p>	<p><b>Healthcare cost per person per year:</b> NR</p> <p><b>Productivity:</b> NR</p>	<p><b>No summary economic outcomes reported.</b></p> <p><b>Cost-Effectiveness:</b> NR</p> <p><b>Cost per Unit Health Outcome:</b> NR</p> <p><b>Comment:</b> No monetary value assigned to work of the CHWs</p>

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		<p><b>Other Team Members:</b> Technical support for CHW from registered dietitian, health educator, psychology fellows</p> <p><b>Comparison:</b> LHE led Attention control (Memory intervention)</p>		<p>CHW salary Space and overhead DPP translation materials (since already developed)</p> <p><b>Data Source:</b> Tracked in project</p>		
<p><b>Author (Year):</b> Lawlor et al (2013)</p> <p><b>Design:</b> RCT</p> <p><b>Economic Method:</b> Cost of intervention and health care cost.</p> <p><b>Funding Source:</b> NIDDK Award R18DK069901</p> <p><b>Monetary Conversions:</b> Index year 2010 in U.S. dollars</p>	<p><b>Location:</b> Forsyth County, NC</p> <p><b>Setting:</b> Community</p> <p><b>Population:</b> Eligibility based on fasting blood glucose</p> <p><b>Sample Size:</b> 301 patients Control 150 Intervention 151</p> <p><b>Characteristics:</b> Mean age 57.9 Mean BMI 32.7 Female 57.5% White 73.8%; African American 24.6% SES: NR</p> <p><b>Time Horizon:</b></p>	<p>Healthy Living Partnerships to Prevent Diabetes (HELP PD)</p> <p><b>Intervention:</b> This is a Diabetes Prevention Program (DPP) translation.  Lifestyle group intervention Delivered by CHWs who were community members with well controlled diabetes Registered dietitians trained, monitored, and supported CHWs</p> <p>Goal to reduce weight by 7%, by low calorie diet Moderate physical activity, primarily brisk walking 180 min/week</p> <p><b>CHW Activities:</b></p>	<p>Mean outcomes: Fasting blood glucose reduced 4.35 mg/dL Body weight reduced 4.59 kg</p> <p>SBP NR DBP NR Cholesterol NR</p> <p>QALY NR DALY NR</p>	<p><b>Cost per person per year (with patient time and supplies)</b> Intervention <math>16.85+850/2+13836/2=\\$7360</math> Enhanced Usual Care <math>16.85+142/2+12881/2=\\$6528</math> Difference \$832</p> <p><b>Cost per person per year (without patient time and supplies)</b> <math>16.85+850/2=\\$442</math> Enhanced Usual Care <math>16.85+142/2=\\$88</math> Difference \$354</p> <p><b>Component Included in Cost:</b></p> <p><b>Screening Staff</b> Assays for initial screening \$16.85 per person</p>	<p><b>Healthcare cost per person per year</b> Intervention <math>5177/2=\\$2589</math> Enhanced Usual Care <math>7454/2=\\$3727</math> Difference - <math>2277/2=(\\$1139)</math></p> <p><b>Components:</b> Inpatient, ER, outpatient visits, outpatient procedures, medication</p> <p><b>Source:</b> Patient report</p> <p><b>Productivity</b></p> <p><b>Components:</b> Income loss due to absence due to illness or treatment Income loss due to premature mortality</p>	<p><b>2-Year Total Cost per Person</b> <math>16.85+850+13836+5177=\\$19880</math> Enhanced Usual Care <math>16.85+142+12881+7454=\\$20494</math> Difference (\$614)</p> <p><b>Conclusion:</b> Cost-Saving</p> <p><b>Cost-Effectiveness</b> NR</p> <p><b>Cost per Unit Health Outcome</b> NR</p> <p><b>Limitations</b> NR</p>

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	<p>The intervention likely occurred during 2007-2008. Data collected 2007-2011.</p> <p>Intervention length was 24 months. Phase 1 6 months and Phase 2 18 months.</p>	<p>Lead 26 weekly lifestyle group meetings in Phase 1 and 18 monthly group meetings in Phase 2 Managed participants and attendance</p> <p><b>Supervisor and Activities:</b> Registered dietitian Train, monitor, and support CHWs 3 individual sessions per participant in Phase 1 Client reminders</p> <p><b>Additional Intervention::</b> No</p> <p><b>Team-based Care:</b> No</p> <p><b>Other Team Members:</b> Exercise specialist</p> <p><b>Comparison:</b> Enhanced usual Care. Two individual sessions with dietitian and monthly newsletter, client reminders plus usual care.</p>		<p>CHW (Phase 1 \$100 per week Phase 2 \$200 per month) Dietician Exercise specialist 48% overhead</p> <p><b>Supplies</b> Study materials and newsletters Pedometers Scales Workbooks DVDs</p> <p><b>Patient time</b> Exercise, shopping, cooking, and transport</p> <p><b>Patient supplies</b> Exercise classes and equipment Food items Transportation</p> <p><b>Data Source:</b> Reported by participants in terms of resources used.</p>		

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<p><b>Author (Year):</b> Ockene et al (2012)</p> <p><b>Design:</b> RCT</p> <p><b>Economic Method:</b> Cost of intervention</p> <p><b>Funding Source:</b> NIDDK Grant R18 DK067549-01; Partial NIDDK Center Grant 5 P30 DK32520</p> <p><b>Monetary Conversions:</b> Index year assumed 2006 in U.S. dollars</p>	<p><b>Location:</b> Lawrence, MA</p> <p><b>Setting:</b> Multiple in Community including Senior Center, YWCA, Greater Lawrence Family Health Center (GLFHC)</p> <p><b>Population:</b> 78% from GLFHC Recruit from public announcements and area physicians Multiple eligibility criteria including Latino and risk of diabetes based on validated algorithm.</p> <p><b>Sample Size:</b> 312 patients Control 150 Intervention 162 Study completion 94%</p> <p><b>Characteristics:</b> Mean Age 52 BMI 33-34 Female 74% Diabetes Prevalence 11.8%</p>	<p>Lawrence Latino Diabetes Prevention Project (LLDPP)</p> <p><b>Intervention:</b> This is a Diabetes Prevention Program (DPP) translation.</p> <p>Home-based individual sessions One 1 hr and two 0.5 hour. Group sessions in Senior Center One 1.5 hrs and twelve 1 hour. Home visits 40 instances for missed group sessions</p> <p><b>Goals</b> Improve nutrition Increase walking by 4000 steps a day from baseline</p> <p><b>Components:</b> Focus groups to identify knowledge, attitudes, challenges and intervention adapted to information gathered.</p> <p>Dietary advice on Latino foods Video tape novella Goal setting</p>	<p>Mean reductions: HbA1c 0.07 Body weight 2.5 lbs BMI 0.46</p> <p>Reductions in calories % from fat and saturated fat. Increase in dietary fiber. No change in physical activity.</p> <p>SBP NR DBP NR Cholesterol NR</p> <p>QALY NR DALY NR</p>	<p><b>Cost per person per year</b> \$661</p> <p><b>Component Included in Cost:</b> No details provided</p> <p><b>Data Source:</b> Tracked in study and from interventionists' logs.</p>	<p><b>Healthcare cost per person per year</b> NR</p> <p><b>Productivity:</b> NR</p>	<p><b>No summary estimates included</b></p> <p><b>Cost-Effectiveness:</b> NR</p> <p><b>Cost per Unit Health Outcome:</b> NR</p> <p><b>Limitations:</b> Short follow-up Low attendance at group sessions</p>

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	<p>Race/Ethnicity Dominican 60% Puerto Rican 40% SES: Illiteracy 30% English fluency 49% Mostly low-income Less than high school 59% Unemployed 54%</p> <p><b>Time Horizon:</b> Intervention likely occurred during 2004-2007. Data collected 2004-2007.</p> <p>Intervention length was 12 months.</p>	<p>Meals at sessions with discussion on preparation methods Session reminders Transportation Supplied pedometers Set up safe walking and exercise areas</p> <p><b>CHW Activities:</b> Intervention sessions delivered by 3 CHW, with High School plus some nutrition education in college.</p> <p><b>Supervisor and Activities:</b> CHWs trained by behavioral psychologist CHWs also trained and supervised by registered dietitian Semiannual booster training</p> <p><b>Additional Intervention:</b> No</p> <p><b>Team-based Care:</b> No</p> <p><b>Other Team Members:</b> No</p> <p><b>Comparison:</b> Usual Care.</p>				

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<p><b>Author (Year):</b> Smith (2010)</p> <p><b>Design:</b> Modeled on 2 studies</p> <p><b>Economic Method:</b> Cost per QALY gained</p> <p><b>Funding Source:</b> U.S. Air Force Award Number W81XWH-04-2-003</p> <p><b>Monetary Conversions:</b> Index year is 2000 in U.S. dollars</p>	<p><b>Location:</b> Multiple, Pennsylvania, USA</p> <p><b>Setting:</b> General practice clinics</p> <p><b>Eligibility</b> BMI=&gt;25 kg/m<sup>2</sup> or metabolic syndrome.</p> <p><b>Sample Size:</b> Not reported for model</p> <p><b>Characteristics:</b> Age 55 Female 75% African American 27% Treated hypertension 85% History of cardiac arrest/MI 1.9% Stroke 1.9% Vascular disease 4.7%</p> <p><b>Time Horizon:</b> Modeled over 36 months.</p>	<p>Modified Diabetes Prevention Program (mDPP) Group Lifestyle Balance (GLB)</p> <p><b>Interventions:</b> Modified DPP (group sessions) to help patients with metabolic syndrome lose weight and improve at least one metabolic syndrome component. Total of 12 group sessions. Program included patient screening for eligibility.</p> <p>Staffed by trained CHWs and health professionals.</p> <p><b>Additional Intervention:</b> No</p> <p><b>Team-based Care:</b> No</p> <p><b>Comparison:</b> Modeled usual care</p>	<p><u>12-month outcomes</u></p> <p>Based on modeling and mDPP metabolic syndrome risk reduced by 16.2% compared to reduction of 12.1% for usual care. Incremental</p> <p>QALY due to mDPP was 0.01.</p> <p>A1c, BP and lipids not reported.</p>	<p><b>Program cost of \$219 per person</b></p> <p>Includes staffing and screening. No details provided on components.</p> <p>Data Source: NR</p>	<p><b>Healthcare cost:</b> Included in the net cost in Markov modeling but not reported separately</p> <p><b>Productivity:</b> NR</p>	<p>Net cost of program plus healthcare cost was \$34</p> <p>QALY gained was 0.01</p> <p>Cost per QALY gained \$3,420</p> <p><b>Limitations:</b> No details on intervention cost</p>
<p><b>Author (Year):</b> Vadheim (2010)</p>	<p><b>Location:</b> Montana, United States</p>	<p><b>Interventions:</b> Adapted Diabetes Prevention Program.</p>	<p>10-month changes</p>	<p><b>Program cost of \$557 per person over 10 months.</b></p>	<p><b>Healthcare cost:</b> NR</p> <p><b>Productivity:</b></p>	<p>No summary measure</p> <p><b>Limitation:</b> No control group</p>



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<p><b>Design:</b> Pre to post</p> <p><b>Economic Method:</b> Intervention cost only</p> <p><b>Funding Source:</b> Montana State Legislature and CDC (U32/CCU8227 43-05).</p> <p><b>Monetary Conversions:</b> Index year 2008 in US dollars.</p>	<p><b>Setting:</b> Rural community</p> <p><b>Eligibility:</b> Adults at risk for diabetes or CVD</p> <p><b>Sample Size:</b> Intervention 84</p> <p><b>Characteristics:</b> Age 51 Male 12% Hypertension 44% High total cholesterol 42% Pre-diabetic 13%</p> <p><b>Time Horizon:</b> CHW intervention was 10 months.</p>	<p>16 weekly group sessions followed by 6 monthly group sessions. Staffed by diabetes educators and nurse.</p> <p><b>Additional Intervention:</b> No</p> <p><b>Team-based Care:</b> No</p> <p><b>Comparison:</b> None.</p>	<p>Weight loss 7.5 kg (7.5% of initial weight)</p>	<p>Includes education materials, participant incentives, CHW salary and training. Not clear if supervision cost included. Also includes cost of additional staff, nurse.</p> <p>Data Source: Tracked in study</p>	<p>NR</p>	

**Abbreviations**

QALY, quality-adjusted life year  
 BP, blood pressure  
 NR, not reported  
 HbA1c, Glycated hemoglobin  
 ER, emergency room  
 CVD, cardiovascular disease

RCT, randomized controlled trial  
 SBP, systolic blood pressure  
 DBP, diastolic blood pressure