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Evaluation of a Community Health Worker Pilot Intervention to Improve Diabetes Management in Bangladeshi Immigrants with Type 2 Diabetes in New York City:

Bangladeshi Community Health Worker Evaluation

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Abstract

Purpose—The purpose of this study is to explore the impact and feasibility of a pilot Community Health Worker (CHW) intervention to improve diabetes management among Bangladeshi-American individuals with Type 2 diabetes living in New York City.

Methods—Participants were recruited at clinic- and community-based venues. The intervention consisted of six monthly, CHW facilitated group sessions on topics related to management of diabetes. Surveys were collected at baseline and follow-up time points. Study outcomes included clinical, behavioral, and satisfaction measures for participants, as well as qualitative measures from CHWs.

Results—Improvements were seen in diabetes knowledge, exercise and diet to control diabetes, frequency of checking feet, medication compliance, and self-efficacy of health and physical activity from baseline to 12 months. Additionally, there were decreases in A1C, weight, and BMI. Program evaluation revealed a high acceptability of the intervention, and qualitative findings indicated that CHWs helped overcome barriers and facilitated program outcomes through communal concordance, trust and leadership.

Conclusions—The intervention demonstrated high acceptability and suggested efficacy in improving diabetes management outcomes among Bangladeshi immigrants in an urban setting. The U.S. Bangladeshi population will continue to increase, and given the high rates of diabetes, as well as linguistic and economic barriers faced by this community, effective and culturally-tailored health interventions are needed to overcome barriers and provide support for diabetes management.

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Diabetes affects 25.8 million people in the United States and is a major cause of other diseases such as kidney failure, heart disease and stroke. This disease is associated with substantial direct and indirect costs with estimates as high as $174 billion in 2007.[1] Further, diabetes is increasing in the population;[2] it is estimated to affect 21% of the U.S. population by 2050.[3]

Nationally, Asian Americans have been found to be 30-50% more likely to have Type 2 diabetes compared to their White counterparts, despite lower obesity rates among Asian Americans compared to Whites; and South Asians have the highest odds of Type 2 diabetes.[4] The same trend has been shown in New York City (NYC); Asian Americans have the highest diabetes prevalence (16.1%) and impaired glucose metabolism (32.4%) compared to other racial groups,[5,6] and foreign-born South Asians are nearly 5 times as likely to have diabetes compared to U.S. born non-Hispanic whites.[7] Other national studies have also found striking differences in diabetes prevalence among Asian American subgroups.[8-10]

South Asians are a diverse group composed primarily of individuals from India, Pakistan, and Bangladesh. Compared to other Asian subgroups, South Asians and Bangladeshis are disproportionately at risk for diabetes. The World Health Organization estimates that the diabetic population in Bangladesh has tripled in the last decade to over 11 million in 2011.[11] In the U.S., Bangladeshis experienced the fastest growth rates of any Asian American subgroup between 1990 and 2000.[12] Community-based studies suggest that approximately one-quarter of this population has diabetes, and risk factors such as poor diet and lack of physical activity are prominent.[13-15] Studies in the UK have found that poor diabetes knowledge, health care utilization barriers, increasing acculturation, lack of physical activity, changing diets, and language barriers exacerbate diabetes disparities among Bangladeshis.[16-20]

U.S. Bangladeshis have a unique demographic profile that may affect their health. Among individuals 25 years of age and older, 17% have not completed high school (24% of females). Among all individuals, 44% speak English less than “very well”, 92% speak a language other than English at home, and 20% live under the poverty line .[21] NYC is home to the largest Bangladeshi population in the U.S.; from 1990 to 2000, the Bangladeshi population in NYC increased 471%, the highest percentage population increase for any Asian American group in the city.[22,23] Approximately 36% of Bangladeshis in the U.S. live in NYC, and 53% of these Bangladeshis speak English less than “very well”, 96% speak a language other than English at home, and approximately 30% live below the poverty line, compared to the citywide rate of 19%.[21]

The unique linguistic, social and economic barriers faced by this population may result in poor disease self-management, an essential aspect of diabetes control.[24] Community health worker (CHW) programs have been offered as a community-based, culturally relevant method to address health disparities and have great potential relevance for immigrant and minority populations, including Bangladeshi Americans. A fundamental attribute of CHWs is that they are indigenous to the community in which they work—ethnically, linguistically, socioeconomically, and experientially—providing a unique understanding of the norms, attitudes, values, and strengths of community members.[25] CHWs “bridge the gap” between community members and the health care system,[26] by facilitating culturally relevant information and strategies to improve health.[27] Though a recent review of CHW effectiveness indicated mixed results,[28] their importance in affecting health has been recognized by the CDC and the American Public Health Association.[29-31] Studies employing CHWs to improve diabetes outcomes have been found efficacious, [28] especially in minority communities.[32-41] Few studies on CHW effectiveness in Asian American

communities have been performed,[42,43] although there have been positive results in terms of diabetes management.[44-46]

Given that Bangladeshis are a growing population and also that there is a lack of previous studies examining the use of the CHWs within Bangladeshi communities in the U.S., the purpose of the study was to explore the impact and feasibility of the DREAM Project (Diabetes Research, Education, and Action for Minorities), a culturally and linguistically tailored CHW intervention to improve diabetes knowledge and management for Bangladeshis with Type 2 diabetes in NYC.

Methods

Research Design

The principles of community based participatory research (CBPR) served to orient the study framework by eliciting the active and equal partnership of community stakeholders throughout the research process.[47,48] With CBPR, partners contribute their knowledge and expertise in order to enhance the understanding of particular problems within a community and develop action-oriented solutions to address these problems. Our study was guided by a coalition of 15 academic, community, and healthcare partners representing the NYC Bangladeshi community. The intervention was delivered by 2 trained, bilingual Bangladeshi CHWs who are community leaders, one male and one female. The CHWs were active members of the coalition and a unique source of community knowledge, providing critical input and guidance on all phases of the research study. Community partners and CHWs were involved in the development of the research question, describing appropriate methodologies for data collection, ensuring data collection instruments and intervention curricula were culturally and linguistically tailored, and ensuring recruitment and retention efforts appropriately addressed community needs and barriers.

Study Sample and Recruitment

Individuals were eligible to participate in the intervention if they (1) self-identified as Bangladeshi; (2) had received a physician diagnosis of Type 2 diabetes; (3) and were between the ages of 21 and 85 years. Participants were ineligible if they had serious health problems (e.g. terminal illness) or had participated in a previous cardiovascular disease study. The protocol was approved by the NYU Institutional Review Board in May 2010, and recruitment began in August 2010.

CHWs recruited subjects through a Health and Hospitals Corporation (HHC) hospital located in NYC and also through community outreach. Mailings were sent out to a list of Bengali diabetic patients obtained from the hospital database, face-to-face direct recruitment through tabling efforts took place in the hospital lobby, and referrals were made to the project through the hospital A1C clinic staff. In addition, advertisements were placed in Bengali ethnic media regarding the project and served as a source of recruitment. Finally, CHWs recruited participants from community outreach events such as cultural fairs and religious events. Recruitment occurred between August 2010 and November 2010. Seventy-three individuals were recruited for the pilot; 3 from advertisements, 25 from community outreach events, 9 from focus groups, 33 from hospital-lobby outreach, 9 from mailings to diabetic patients, and 3 from participant referrals. A total of 47 eligible individuals consented to participate in the study (64%). Of the consented individuals, 39 (83%) completed the baseline assessment. Twenty-six (67%) completed at least 4 of the 6 group educational sessions and 2 of the one-on-one visits, and were considered “completers” receiving the full intervention dosage.

Intervention

The intervention consisted of 6 monthly, CHW-facilitated 2.5-hour group sessions. The first session provides an overview of diabetes, including myths and facts, disease specific information, and blood glucose levels; subsequent sessions included the following topics: nutrition, physical activity, diabetes complications, stress and family support, and access to health care. All groups were separated by gender and conducted in Bengali, and sessions were held in clinical and community settings. To minimize attrition, evidence-based retention strategies by Balcazar and colleagues were implemented, including an extension of the intervention period to accommodate make-up sessions.[49] A "reminder" calendar was developed to help participants track healthful behaviors as well as reinforce attendance. In total, 46 sessions were offered over 9 months, with an average of 5 participants per session.

Study participants also received 3 one-on-one visits from CHWs at months 3, 6, and 9 of about 60 to 90 minutes in length, during which challenges and strategies for diabetes management were discussed. These visits were conducted at locations convenient to the participant, including their home, community locations, restaurants, and clinics.

The DREAM curriculum was adapted from existing curricula materials validated in minority communities, including the National Heart, Lung, and Blood Institute's Healthy Heart, the National Diabetes Education Program's Power to Prevent, and the Bangladesh Institute of Research and Rehabilitation in Diabetes Endocrine and Metabolic Disorders diabetes curriculum. Findings from a formative study were used to add culturally relevant topics and strategies to the curriculum, described in a previous publication.[13] All curriculum materials were developed in English, translated into Bengali by a certified translator, and reviewed for accuracy by CHWs. Group activities, physical exercise, and adult learning techniques were incorporated into all sessions.[50] Given the tailored nature of the curriculum, the intervention provided unique resources and techniques to promote diabetes management for this linguistically and socially isolated community; for example, culturally tailored diets and foods, gender specific exercises, and ways of negotiating social settings and situations particular to the community. Table 1 provides an overview of the curriculum and unique cultural components that were integrated.

Data Collection and Measures

Quantitative Data Collection—The primary research questions of interest included the impact of the intervention on HbA1c, weight, nutritional and physical activity behaviors, and access to healthcare. Study participants completed a baseline survey after consenting to be in the study. Follow-up assessments were conducted at 4.5, 9, and 12 months. Surveys were administered in Bengali by a trained interviewer. A participant satisfaction survey was administered by phone in Bengali at 12-months. Height and weight were obtained by CHWs during one-on-one visits at 2-, 4-, 6-, and 12-month time points. A1C measurements were obtained either through individual medical records or extracted from hospital patient records.

Demographic questions were adapted from the Census American Community Survey[51] and the Behavioral Risk Factor Surveillance Survey (BRFSS).[52] Two acculturation questions were adapted from a valid acculturation scale for immigrant populations, and a scale variable was reported.[53] A diabetes knowledge scale was adapted from the Diabetes Knowledge Test, designed and validated by the University of Michigan,[54] and additional questions on diabetes management and knowledge were adapted from the National Survey of People with Diabetes[55] and the BRFSS[52] Medication adherence for those on diabetes medication was measured using 8 adapted questions from the Hill-Bone medication compliance scale.[56] Adherence scores of 8 indicated perfect adherence to medication, and

higher scores indicated less adherence to medication. Self-efficacy questions on nutrition and physical activity, and the self efficacy health access scale were designed using Bandura's self-efficacy framework.[57] The health access self-efficacy scale included 7 questions on making health decisions, visiting the doctor and asking the doctor questions, knowing where to get to get medical care, and using transportation. Mental health questions were adapted from the Personal Health Questionnaire Depression Scale (PHQ-2), where 0 indicated low risk and 6 indicated high risk of depression.[58] Measures used on the participant satisfaction survey were adapted from other studies.[59,60] All questions were reviewed by coalition members and pilot tested with a subset of coalition members for relevance to the target community.

Qualitative Data Sources—CHWs completed detailed logs during one-on-one visits, documenting participant clinical outcomes and challenges to accessing healthcare and engaging in behaviors for improving diabetes management. All logs contained a narrative description of the interaction with the participant and proposed follow-up plan by the CHW.

Qualitative interviews were conducted with the CHWs at the program midpoint, 9-months, and 14-months to assess experiences in implementing the program, including barriers and facilitators to recruitment, retention, and diabetes management promotion. Interview questions were developed based on a review of relevant literature and conducted by the lead investigator and an independent evaluator. [28,61-63] Interviews were not tape-recorded, but detailed interview notes were compiled. Finally, two 4-hour strategic planning meetings and one 3-hour retreat were held with project staff, CHWs, and coalition members following completion of the pilot in order to assess program strengths and weaknesses. Meeting proceedings were recorded and minutes were transcribed and reviewed by 2 staff members.

Analysis

Quantitative Analysis—Frequencies of socio-demographic variables at baseline were run for 26 completers. Means and standard deviations (SDs) were run for age and years lived in the U.S. Frequencies of selected variables for the completers were run across baseline, 9-months, and 12-months to show changes over time, and Fisher's exact tests were used to detect differences across baseline and 12-months. . Paired t-tests were run for BMI, weight, and HbA1c between baseline and 12-months, and mean change scores and p-values are presented for each measure. Program evaluation surveys were also analyzed to determine feedback from participants about the DREAM program. Among non-completers (n=13), complete follow-up data were available for 8 participants, while 5 participants were lost to follow-up; follow-up findings on are not presented due to the small sample size. All analyses were carried out using SPSS version 19.0.

Qualitative Analysis—Notes from the CHW interviews and transcripts from the meetings and retreats were coded by 2 authors for themes related to feasibility, acceptability, and changes in outcomes among pilot participants. Narrative analysis techniques were utilized whereby segments of text that relate to themes were identified and core codes and secondary codes were assigned.[64,65] Relationships between codes within themes were also explored.

Results

Quantitative Results

Characteristics of Sample—Socio-demographic characteristics are presented for the 26 participants completing the program (Table 2). Fifty-eight percent were female, all were foreign-born, 92% were married, and 81% had public insurance. While 42% had a high school education or less, 39% had received a graduate level education.

Changes in Outcomes—Changes in the knowledge and management of diabetes are presented in Table 3. Significant increases in knowledge of diabetes were indicated through the diabetes knowledge scale ($p<0.001$) as well through individuals questions on diabetes knowledge. For example, at 12-months, 77% of individuals knew what A1C was, compared to 15% at baseline ($p<0.001$). There was also an increase in physical activity and diet as a way to control diabetes ($p<0.001$ and $p=0.054$), and the frequency of checking feet for sores and irritations increased from 27% to 77% daily between baseline and 12-months ($p<0.05$). Among those on medication for diabetes, compliance increased as measured by the Hill-Bone Compliance Scale for medication use, though the average change was not significant.

Changes in self-efficacy and health behaviors are presented in Table 4. Significant increases were indicated through a scale measuring self-efficacy in health access; the mean score increased from 4.0 at baseline to 4.4 at 12-months ($p<0.05$). Improvements in diet were also seen. Ninety-six percent of participants reported being moderately or very confident that they could stay on a healthy diet at 12-months compared to 81% at baseline; this was further evidenced by a decrease in the reported amount of soda consumed, an increase in baking foods instead of frying them, and an increase in eating fruits in place of sugary desserts. At 12-months, all participants were moderately or very confident that they could engage in physical activity regularly, and 89% of participants exercised at least several days a week compared to 52% at baseline.

Changes in mental and physical health indicators are presented in Table 5. Desired directional changes were seen in A1C, BMI, and weight, though these changes were not significant at $p<0.05$. Complete A1C data was available for a subset of the completers ($n=14$). Among this group, mean A1C decreased from 7.6% at baseline to 7.1% at 12-months. Mean BMI and weight also decreased; mean weight at 12-months was 154.8 compared to 157.4 at baseline. Significant changes were seen in mental health; the mean PHQ-2 scale decreased from 2.6 at baseline to 0.9 at 12-months, indicating a lower depression risk at the end of the study ($p<0.001$).

The program evaluation revealed that there was high acceptability of the CHW intervention. A majority of individuals (ranging from 89% to 96%) reported that the number of educational sessions, session length, total months involved, and number of one-on-one visits were “just right” as opposed to “too many” or “too few.” All individuals believed that DREAM was able to provide education and training on strategies to meet diabetes care goals, as well as social- and peer-support. All individuals reported that CHWs were respectful, honest, and provided useful diabetes information. The main factors prohibiting attendance included work conflicts (15%), transportation barriers (15%), and family obligations or influence (15%). A majority of participants expressed interest in serving as volunteers for future interventions.

Qualitative Results

The importance of community, including CHWs’ community concordance and leadership roles, emerged as key factors that increased the participants’ trust in CHWs. These led to overcoming barriers and facilitating acceptability and feasibility of the intervention.

Acceptability—Because CHWs were able to leverage unique access to and knowledge of community resources and shared participants’ cultural backgrounds, they were able to promote the study and increase acceptability. For example, CHWs stated “people are willing to be more honest with me than they are with doctors” and “people feel confidence in me to share things.” The community-university partnership of the DREAM project also facilitated acceptability. Though some participants initially expressed doubt as to the qualifications of CHWs to lead the program because they are non-clinicians, the CHWs’ connection to and

training at NYU School of Medicine were cited as credentials that facilitated trust with participants. The CHWs also encouraged participants to "drop-in" to their offices at any time; a number of participants did drop-in (and continued to do so after completing the program), further increasing trust in, rapport with, and commitment to the program.

Further, CHWs helped overcome language barriers for the largely limited English-proficient group and appealed to participants because they understood communal cultural norms. Finally, the DREAM project was viewed as a community resource and source of pride by participants and CHWs for being the first U.S. Bangladeshi diabetes program. CHWs noted it is "an honor" and "an opportunity and a privilege" to serve Bangladeshis. They described the program's graduation event as "very powerful for the Bangladeshi community because [participants] never get this kind of recognition for taking care of their health."

Feasibility—Qualitative results provided insight into retention issues and the organization and implementation of the pilot. Trust in CHWs and CHWs facilitating access to resources improved retention; mechanisms included direct support such as providing translation or linking participants to external resources such as food stamp benefits. Several barriers to retention emerged. Some participants traveled back to their home country during the intervention period for extended periods. Female participants often were not able to attend program components due to family obligations or lack of child care. Male participants, many of whom worked in service sector jobs such as taxi driving or restaurant work, were often restricted from attending sessions due to irregular and unpredictable work schedules.

In regards to intervention organization and implementation, facilitators included flexibility to host sessions in both community and clinic locations. For participants traveling abroad, "make-up" sessions were conducted by phone. For female participants, one-on-one visits were an important way to develop trust and allow expression of concerns about life stressors to the CHW. The CHWs motivated and educated participants to travel to sessions alone despite unfamiliarity with the NYC transportation system. Several barriers to the intervention organization were reported. The system for obtaining clinical measurements from participants was problematic, with numerous administrative hurdles to obtaining timely clinical data from hospital records as well as difficulties obtaining medical reports from private physicians. CHWs reported that scheduling three one-on-one visits with participants in addition to the 6 group sessions was challenging. Further, male participants were often reluctant to have one-on-one visits conducted in the home.

Efficacy—In terms of health behaviors, one-on-one visits helped to reinforce messages regarding nutrition and physical activity. In the case of female participants, the one-on-one visits allowed the CHW to view participants in their home setting and provide tailored advice on how to make changes to diet and physical activity. The CHWs also reported that learning about A1C or specialist care enabled participants to request this information from their physicians or obtain referrals for appointments. CHWs were also able to affect self-efficacy and social support. CHWs helped participants learn about their patient rights and how to ask questions of their physician. Participants developed relationships both with the CHWs and with other participants through the intervention and supported activities. Additionally, CHWs reported having an impact on family members and encouraging family support during the one-on-one visits.

Discussion

Overall, the DREAM project demonstrated high acceptability and suggested efficacy of a diabetes management program among individuals completing the pilot program. Participants reported positive feedback about the program and about the CHWs, particularly regarding

the linguistically- and culturally-tailored nature of the program. Moreover, our qualitative findings demonstrate some of the mechanisms through which CHWs can improve knowledge and facilitate support by serving as a bridge to the health care system and providing culturally and linguistically tailored health education information. Additionally, many participants felt that they could share things with their CHWs that they could not share with their doctors, suggesting that CHWs serve a unique role in facilitating trust in the healthcare system. Both quantitative and qualitative pilot findings demonstrated high appropriateness and acceptability to the target community, indicating that the pilot can be successfully translated into a full intervention.

Positive changes were seen among the participants between baseline and 12-months. Individuals demonstrated a greater knowledge and practice of diabetes management (e.g. participants reported taking part in behaviors other than medication adherence in order to control their diabetes), had improved self-efficacy of behaviors to improve their health (e.g. diet and exercise), and showed a decrease in weight and A1C, clinical measures that generally take a long time to change. The program facilitated social and family support between CHWs and participants, between participants, and between participants and their family members.

After implementation of the pilot intervention, several feasibility barriers were highlighted through our data. Congruent with CBPR methods, challenges from the pilot study have been reviewed by the DREAM coalition and used to adapt the full intervention, which is currently being implemented. These barriers to feasibility and how they are being addressed in the full intervention are summarized in Table 6. In particular, we address the low retention rates, limited clinical data, challenges to location and timing of the intervention components, and lack of a control group during our pilot intervention. Modifications that were made to the full intervention regarding retention rates and scheduling challenges addressed the issues of workability and adequacy of the intervention. Further, we address methodological challenges by including a control group in our full intervention as well as streamlining data collection processes. Our full intervention, which includes both an intervention and a control group, is displaying high retention rates, and clinical data is being collected in an orderly manner for all participants.

Several limitations should also be mentioned. First, due to a high attrition rate and loss to follow-up, there was incomplete data from participants who did not complete the pilot. Additionally, quantitative findings are based on a small sample size and the one-sample design does not allow us to compare our results to a control group. However, the sample reported in this paper is similar to or larger than several other diabetes pilot studies[66,67] and our findings are encouraging. Although limited clinical data was obtained from the participants due to administrative problems, the available data indicates a positive change in clinical outcomes.

Conclusion and Implications

Our study is the first to report on the results of a pilot CHW intervention to improve diabetes management in the NYC Bangladeshi community. As such, it fills an important gap in the literature on developing culturally-tailored interventions for underserved minority communities. Our study findings indicate that the CHW model is acceptable in this community and helps to facilitate and foster social support and self-efficacy, important factors in promoting diabetes management. Another major strength of our study is the use of both qualitative and quantitative methods to assess the feasibility, acceptability, and outcomes of the pilot. Further, few evaluations of CHW programs have examined the particular impact of the CHW on participant outcomes. Our qualitative findings provide

contextual information that may inform efforts to understand the mechanisms by which CHWs potentially influence health outcomes. Finally, in highlighting some of the unique challenges faced by immigrant community members in participating in health promotion projects, our study findings provide important insight into and recommendations for ways that programs can be tailored to meet the needs of the target population.

The U.S. Bangladeshi population size will continue to increase in coming years. Given the high rates of diabetes and numerous linguistic and economic barriers faced by this community, effective and culturally-tailored health care interventions are needed to overcome barriers and provide support for diabetes management. The development, implementation, and evaluation of innovative programs that include local ethnic and cultural norms, build upon community assets, and are conducted in partnership between community and university will provide important information to improve diabetes management programs and the health of communities.

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References

1. Centers for Disease Control and Prevention. National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011. Department of Health and Human Services, Centers for Disease Control and Prevention; Atlanta: 2011.
2. Engelgau MM, Geiss LS, Saaddine JB, et al. The evolving diabetes burden in the United States. Ann Intern Med. 2004; 140:945–950. [PubMed: 15172919]
3. Boyle JP, Thompson TJ, Gregg EW, Barker LE, Williamson DF. Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. Population Health Metrics. 2010; 8:29. [PubMed: 20969750]
4. Lee JW, Brancati FL, Yeh HC. Trends in the prevalence of type 2 diabetes in Asians versus whites: results from the United States National Health Interview Survey, 1997-2008. Diabetes Care. 2011; 34:353–357. [PubMed: 21216863]
5. Thorpe LE, Upadhyay UD, Chamany S, et al. Prevalence and control of diabetes and impaired fasting glucose in New York City. Diabetes Care. 2009; 32:57–62. [PubMed: 19114627]
6. Rajpathak SN, Gupta LS, Waddell EN, et al. Elevated risk of type 2 diabetes and metabolic syndrome among Asians and south Asians: results from the 2004 New York City HANES. Ethnic Dis. 2010; 20:225–230.
7. Gupta LS, Wu CC, Young S, Perlman SE. Prevalence of diabetes in New York City, 2002-2008: comparing foreign-born South Asians and other Asians with U.S.-born whites, blacks, and Hispanics. Diabetes Care. 2011; 34:1791–1793. [PubMed: 21715521]
8. Bhalodkar NC, Blum S, Rana T, Kitchappa R, Bhalodkar AN, Enas EA. Comparison of high-density and low-density lipoprotein cholesterol subclasses and sizes in Asian Indian women with Caucasian women from the Framingham Offspring Study. Clin Cardiol. 2005; 28:247–251. [PubMed: 15971461]
9. Bhopal R, Unwin N, White M, et al. Heterogeneity of coronary heart disease risk factors in Indian, Pakistani, Bangladeshi, and European origin populations: cross sectional study. BMJ. 1999; 319:215–220. [PubMed: 10417082]

10. Oza-Frank R, Ali MK, Vaccarino V, Narayan KM. Asian Americans: diabetes prevalence across U.S. and World Health Organization weight classifications. Diabetes Care. 2009; 32:1644–1646. [PubMed: 19509010]
11. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care. 2004; 27:1047–1053. [PubMed: 15111519]
12. Barnes, JS.; Bennett, CE. The Asian Population: 2000. Washington, D.C: 2002.
13. Islam N, Tandon D, Mukherji R, et al. Understanding barriers and facilitators to diabetes control andprevention in the New York City Bangladeshi community: a mixed-methods approach to inform the development of a community health worker intervention. Am J Public Health. 2012; 102:486–490. [PubMed: 22390512]
14. Patel VV, Rajpathak S, Karasz A. Bangladeshi immigrants in New York City: a community based health needs assessment of a hard to reach population. J Immigr Minor Health. 2011
15. Rianon NJ, Rasu RS. Metabolic syndrome and its risk factors in Bangladeshi immigrant men in the USA. J Immig Minor Health. 2010; 12:781–787.
16. Choudhury SM, Brophy S, Fareedi MA, Zaman B, Ahmed P, Williams R. Examining the effectiveness of a peer-led education programme for Type 2 diabetes and cardiovascular disease in a Bangladeshi population. Diabetic Med. 2009; 26:40–44. [PubMed: 19125759]
17. Choudhury SM, Brophy S, Williams R. Understanding and beliefs of diabetes in the UK Bangladeshi population. Diabetic Med. 2009; 26:636–640. [PubMed: 19538240]
18. Hayes L, White M, Unwin N, et al. Patterns of physical activity and relationship with risk markers for cardiovascular disease and diabetes in Indian, Pakistani, Bangladeshi and European adults in a UK population. J Public Health Med. 2002; 24:170–178. [PubMed: 12831085]
19. Rhodes P, Nocon A. A problem of communication? Diabetes care among Bangladeshi people in Bradford. Health Soc Care Community. 2003; 11:45–54. [PubMed: 14629232]
20. Rhodes P, Nocon A, Wright J. Access to diabetes services: the experiences of Bangladeshi people in Bradford, UK. Ethn Health. 2003; 8:171–188. [PubMed: 14577994]
21. US Census Bureau. 2008-2010 American Community Survey 3-Year Estimates. http://factfinder.census.gov/
22. CSAAH. Community Health Needs & Resource Assessment: An Exploratory Study of South Asians in NYC. NYU Center for the Study of Asian American Health; New York: 2007.
23. AAFNY. Profile of New York City's Bangladeshi Americans: 2005-2007. Asian American Federation Census Information Center; New York: 2009.
24. Hsu CC, Chen L, Hu YW, Yip W, Shu CC. The dimensions of responsiveness of a health system: a Taiwanese perspective. BMC Public Health. 2006; 6:72. [PubMed: 16542462]
25. Love MB, Gardner K, Legion V. Community health workers: who they are and what they do. Health Educ Behav. 1997; 24:510–522. [PubMed: 9247828]
26. Krieger JK, Takaro TK, Allen C, et al. The Seattle-King County healthy homes project: implementation of a comprehensive approach to improving indoor environmental quality for low-income children with asthma. Environ Health Perspect. 2002; 110(Suppl 2):311–322. [PubMed: 11929743]
27. Martin MA, Hernandez O, Naureckas E, Lantos J. Reducing home triggers for asthma: the Latino community health worker approach. J Asthma. 2006; 43:369–374. [PubMed: 16801141]
28. Viswanathan M, Kraschnewski JL, Nishikawa B, et al. Outcomes and costs of community health worker interventions: a systematic review. Med Care. 2010; 48:792–808. [PubMed: 20706166]
29. Diabetes community health workers. Diabetes Educ. 2003; 29(818):821–814.
30. American Public Health Association Resolution. Recognition and support for community health workers' contribution to meeting out nation's health care needs. 2002.
31. Centers for Disease Control and Prevention. Community health workers and Promotores de salud: Critical connections in communities: Centers for Disease Control and Prevention Department of Health and Human Services. 2003.
32. Anderson-Loftin W, Barnett S, Sullivan P, Bunn PS, Tavakoli A. Culturally competent dietary education for southern rural African Americans with diabetes. Diabetes Educ. 2002; 28:245–257. [PubMed: 11924302]

33. Aubert RE, Herman WH, Waters J, et al. Nurse case management to improve glycemic control in diabetic patients in a health maintenance organization. A randomized, controlled trial. Ann Intern Med. 1998; 129:605–612. [PubMed: 9786807]
34. Babamoto KS, Sey KA, Camilleri AJ, Karlan VJ, Catalasan J, Morisky DE. Improving diabetes care and health measures among hispanics using community health workers: results from a randomized controlled trial. Health Educ Behav. 2009; 36:113–126. [PubMed: 19188371]
35. Brown SA, Garcia AA, Kouzekanani K, Hanis CL. Culturally competent diabetes self-management education for Mexican Americans: the Starr County border health initiative. Diabetes Care. 2002; 25:259–268. [PubMed: 11815493]
36. Castillo A, Giachello A, Bates R, et al. Community-based Diabetes Education for Latinos: The Diabetes Empowerment Education Program. Diabetes Educ. 2010; 36:586–594. [PubMed: 20538970]
37. Gary TL, Batts-Turner M, Bone LR, et al. A randomized controlled trial of the effects of nurse case manager and community health worker team interventions in urban African-Americans with type 2 diabetes. Controlled Clin Trials. 2004; 25:53–66. [PubMed: 14980748]
38. Philis-Tsimikas A, Walker C, Rivard L, et al. Improvement in diabetes care of underinsured patients enrolled in project dulce: a community-based, culturally appropriate, nurse case management and peer education diabetes care model. Diabetes Care. 2004; 27:110–115. [PubMed: 14693975]
39. Staten LK, Scheu LL, Bronson D, Pena V, Elenes J. Pasos Adelante: the effectiveness of a community-based chronic disease prevention program. Prev Chronic Dis. 2005; 2:A18. [PubMed: 15670471]
40. Thompson JR, Horton C, Flores C. Advancing diabetes self-management in the Mexican American population: a community health worker model in a primary care setting. Diabetes Educ. 2007; 33(Suppl 6):159S–165S. [PubMed: 17620396]
41. Vetter MJ, Bristow L, Ahrens J. A model for home care clinician and home health aide collaboration: diabetes care by nurse case managers and community health workers. Home Healthc Nurse. 2004; 22:645–648. [PubMed: 15359179]
42. Nguyen TT, McPhee SJ, Bui-Tong N, et al. Community-based participatory research increases cervical cancer screening among Vietnamese-Americans. J Health Care Poor Underserved. 2006; 17:31–54. [PubMed: 16809874]
43. Tu SP, Taylor V, Yasui Y, et al. Promoting culturally appropriate colorectal cancer screening through a health educator: a randomized controlled trial. Cancer. 2006; 107:959–966. [PubMed: 16865681]
44. Beckham S, Bradley S, Washburn A, Taumua T. Diabetes management: utilizing community health workers in a Hawaiian/Samoan population. J Health Care Poor Underserved. 2008; 19:416–427. [PubMed: 18469413]
45. Han HR, Kim KB, Kim MT. Evaluation of the training of Korean community health workers for chronic disease management. Health Educ Res. 2007; 22:513–521. [PubMed: 17032707]
46. Kim MT, Han HR, Song HJ, et al. A community-based, culturally tailored behavioral intervention for Korean Americans with type 2 diabetes. Diabetes Educ. 2009; 35:986–994. [PubMed: 19934458]
47. Israel BA, Schultz AJ, Parker EA, Becker AB. Community-Based research: A partnership approach to improve public health. Annu Rev Public Health. 1998; 19:173–202. [PubMed: 9611617]
48. Minkler, M.; Wallerstein, N., editors. Community-based participatory research for health. Jossey-Bass; San Francisco: 2003.
49. Balcazar HG, Byrd TL, Ortiz M, Tondapu SR, Chavez M. A randomized community intervention to improve hypertension control among Mexican Americans: using the promotoras de salud community outreach model. J Health Care Poor Underserved. 2009; 20:1079–1094. [PubMed: 20168020]
50. Knowles, M. The Modern Practice of Adult Education. Association Press; New York: 1980.
51. US Census Bureau. 2012. American Community Survey http://www.census.gov/acs/www/. Accessed February 16

52. CDC. Behavioral Risk Factor Surveillance System. 2012. http://www.cdc.gov/brfss/. Accessed February 16
53. dela Cruz FA, Padilla GV, Agustin EO. Adapting a measure of acculturation for cross-cultural research. Journal of transcultural nursing : official journal of the Transcultural Nursing Society / Transcultural Nursing Society. 2000; 11:191–198. [PubMed: 11982107]
54. Fitzgerald JT, Funnell MM, Hess GE, et al. The reliability and validity of a brief diabetes knowledge test. Diabetes Care. 1998; 21:706–710. [PubMed: 9589228]
55. Harris, J.; McGee, A.; Andrews, F.; D'Souza, J.; Sproston, K. The National Survey of People with Diabetes. Healthcare Commission; 2007.
56. Krousel-Wood M, Muntner P, Jannu A, Desalvo K, Re RN. Reliability of a medication adherence measure in an outpatient setting. Am J Med Sci. 2005; 330:128–133. [PubMed: 16174996]
57. Bandura, A. Self-Efficacy Beliefs of Adolescents. Information Age Publishing; 2006. Guide for Constructing Self-Efficacy Scales; p. 307-337.
58. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001; 16:606–613. [PubMed: 11556941]
59. Griffin JA, Gilliland SS, Perez G, Helitzer D, Carter JS. Participant satisfaction with a culturally appropriate diabetes education program: the Native American Diabetes Project. Diabetes Educ. 1999; 25:351–363. [PubMed: 10531855]
60. Felix-Aaron KL, Bone LR, Levine DM, Rubin HR. Using participant information to develop a tool for the evaluation of community health worker outreach services. Ethnic Dis. 2002; 12:87–96.
61. Brownstein JN, Bone LR, Dennison CR, Hill MN, Kim MT, Levine DM. Community health workers as interventionists in the prevention and control of heart disease and stroke. Am J of Prev Med. 2005; 29:128–133. [PubMed: 16389138]
62. Norris SL, Chowdhury FM, Van Le K, et al. Effectiveness of community health workers in the care of persons with diabetes. Diabetic Med. 2006; 23:544–556. [PubMed: 16681564]
63. Swider SM. Outcome effectiveness of community health workers: an integrative literature review. Public Health Nurs. 2002; 19:11–20. [PubMed: 11841678]
64. Mishler, EG. Research Interviewing: context and narrative. Harvard University Press; Cambridge: 1986.
65. Riessman, CK. Narrative Analysis. Newbury Park: Sage Publications: 1993.
66. D'Eramo-Melkus G, Spollett G, Jefferson V, et al. A culturally competent intervention of education and care for black women with type 2 diabetes. Appl Nurs Res. 2004; 17:10–20. [PubMed: 14991551]
67. Mauldon M, Melkus GD, Cagganello M. Tomando Control: a culturally appropriate diabetes education program for Spanish-speaking individuals with type 2 diabetes mellitus--evaluation of a pilot project. Diabetes Educ. 2006; 32:751–760. [PubMed: 16971708]

Table 1

Curriculum overview and cultural components

Session Topic	Session Overview	Tailored Cultural Components
Diabetes 101	**1** Myths and Facts **2** What is Diabetes? **3** Signs and Symptoms of Diabetes **4** Types of Diabetes **5** Risk Factors for Diabetes **6** Blood Glucose Levels (BGL) **7** Diabetes Management	**1** Dispelling common cultural misconceptions regarding diabetes (e.g., diabetes is caused by eating too many sweets) **2** Discussion re: diabetes prevalence in AAPI communities **3** Discouraging common practice of reducing medications when participants feel better
Nutrition	**1** Healthy Eating **2** Calories and Portion Size and Control **3** All About Fiber **4** Avoiding Sugar **5** Carbohydrate counting **6** Managing BP and Reducing Salt Intake **7** Managing Cholesterol & Fat Intake **8** Heart Healthy Eating **9** Label Reading **10** Healthy Eating Habits	**1** Serving from the kitchen rather than from communal bowl/platter (for portion control) **2** Healthy substitutions for ghee (clarified butter) **3** Healthy options for preparation of chai tea (e.g. substituting condensed milk for skim milk) **4** Whole wheat/grain options for rice & chappati (bread) **5** List of Bangladeshi fish high in Omega-3s **6** Bengali alternatives to high fat desserts **7** Managing cultural expectations for eating in other homes when invited as a guest (e.g. having a snack beforehand so that you're less likely to eat as much)
Physical Activity	**1** Introduction **2** Types of Activities **3** Goal Setting & Monitoring **4** Practice activity	**1** Discussion re: common sports/activities in Bangladesh and how to incorporate (e.g. badminton, cricket) **2** Review of Yoga & Tai-Chi exercises **3** Home-based exercise/activities for women
Diabetes Complications	**1** Long Term Complications of Diabetes **2** Diabetes and Eye Disease **3** Diabetes and Nerve Damage **4** The Importance of Foot Care for Diabetics **5** Diabetes and Heart Disease **6** Gum Disease and Diabetes **7** Kidney disease and Diabetes **8** Smoking and Diabetes	**1** Dispelling common cultural misconceptions regarding diabetes complications (e.g. diabetes is cured once A1C is <7%) **2** Instruction on how to brush and floss properly **3** Discussion of potential complications of smokeless tobacco usage (e.g. paan, guthka)
Social Support & Stress	**1** Effects of Stress on Physical and Emotional Health **2** Effects of Stress on Diet, Smoking, & Physical Activity **3** Stress Management Techniques **4** Effects of Family Support on Managing Stress	**1** Herbal remedies for stress relief (e.g. fennel seed tea, ginger paste compress for the forehead)

Session Topic	Session Overview	Tailored Cultural Components
Management	**5** Herbal and Home Remedies for Stress Relief	
Access to Healthcare	**1** Uninsured **2** Unemployed **3** Small-Business **4** Low-Income **5** Medicare Benefits **6** Generic drugs and alternatives	**1** Health access for undocumented immigrants **2** Review of Patient Bill of Rights & Language Access Laws **3** Review of HHC Options Program

Table 2

Sociodemographics of pilot participants, n=26

	N	%
Gender		
Male	11	42.3
Female	15	57.7
Age		
Mean (SD)	53.4(9.4)	
Marital status		
Married	24	92.3
Widowed/Divorced	2	7.7
Place of birth		
Outside of U.S.	26	100.0
Years lived in U.S.		
Mean (SD)	14.4(7. 8)	
Employment		
Employed	8	30.8
Housewife/Stay at home	12	46.2
Unemployed/Retired	6	23.1
Education		
Primary/Secondary	5	19.2
High school	6	23.1
College	5	19.2
Graduate and beyond	10	38.5
English speaking fluency		
Fluently/Very well	6	23.1
Well/Not well/Not at all	20	76.9
Income		
$25,000 or less	8	30.8
More than $25,000	4	15.4
Don't know/Missing	14	53.8
Insurance		
Public	21	80.8
Private	3	11.5
No insurance	2	7.7
Acculturation, Mean (SD)	1.4 (0.5)	
1=Low acculturation		
5=High acculturation		

Table 3

Knowledge and management of diabetes (n=26)

	Baseline N (%)	9-Months N (%)	12-Months N (%)	p-value
Diabetes Knowledge Scale	7.4 (2.0)	9.6 (1.7)	10.9 (1.3)	<0.001
Out of 13 questions, mean (SD)				
13 = Highest score				
Do you know what Hemoglobin A1c or HbA1c is?				<0.001
Yes	4 (15.4)	17 (65.4)	20 (76.9)	
No	14 (53.8)	7 (26.9)	2 (7.7)	
Refused/Do not know	8 (30.8)	2 (7.7)	4 (15.4)	
HbA1c is a test that is a measure of your average blood sugar for the past:				<0.001
3 Months	5 (19.2)	20 (76.9)	24 (92.3)	
Other amount	3 (11.5)	4 (15.4)	1 (3.8)	
Refused/Do not know	18 (69.2)	2 (7.7)	1 (3.8)	
Diabetes currently				0.427
Not under control/Glucose level high	2 (7.7)	3 (11.5)	1 (3.8)	
Controlling with medication	12 (46.2)	8 (30.8)	10 (38.5)	
Under control/Doing well	10 (38.5)	15 (57.7)	15 (57.7)	
Do not know/Missing	2 (7.7)	0 (0.0)	0 (0.0)	
How do you manage your diabetes? (select all that apply)				
Medication/Insulin	23 (88.5)	23 (88.5)	24 (92.3)	1.000
Physical activity/Exercise	13 (50.0)	18 (69.2)	25 (96.2)	<0.001
Diet	17 (65.4)	19 (73.1)	24 (92.3)	0.054
Traditional medicine	0 (0.0)	0 (0.0)	1 (3.8)	1.000
When did you last get a check-up for blood glucose/diabetes?				1.000
Past 6 months	26 (100.0)	26 (100.0)	25 (96.2)	
Past 12 months	0 (0.0)	0 (0.0)	1 (3.8)	
How often do you get your blood sugar tested?				0.251
Daily	7 (26.9)	13 (50.0)	9 (34.6)	
Weekly	7 (26.9)	6 (23.1)	12 (46.2)	
Monthly	3 (11.5)	1 (3.8)	0 (0.0)	
Every 6 months	4 (15.4)	2 (7.7)	0 (0.0)	
When I feel sick	1 (3.8)	1 (3.8)	2 (7.7)	
Never/Missing	4 (15.4)	3 (11.5)	3 (11.5)	
About how many times in the past 12 months has a health professional checked you for HbA1c?				0.096
Once	1 (3.8)	4 (15.4)	1 (3.8)	
Twice	3 (11.5)	6 (23.1)	8 (30.8)	

	Baseline N (%)	9-Months N (%)	12-Months N (%)	p-value
Three times	1 (3.8)	3 (11.5)	8 (30.8)	
Four times	0 (0.0)	4 (15.4)	6 (23.1)	
None/Don't know/Never heard of A1C	21 (80.8)	9 (34.6)	3 (11.5)	
When was the last time you had an eye exam in which your pupils were dilated?				0.088
Within the past month	4 (15.4)	7 (26.9)	12 (46.2)	
Within the past year	14 (53.8)	16 (61.5)	12 (46.2)	
Within the past 2 years	5 (19.2)	1 (3.8)	2 (7.7)	
Refused/Do not know	3 (11.5)	2 (7.7)	0 (0.0)	
About how often do you check your feet for sores or irritations?				0.026
Daily	7 (26.9)	14 (53.8)	20 (76.9)	
Weekly	6 (23.1)	3 (11.5)	3 (11.5)	
Monthly	3 (11.5)	4 (15.4)	1 (3.8)	
Yearly	1 (3.8)	1 (3.8)	0 (0.0)	
Never/Don't know	9 (34.6)	4 (15.4)	2 (7.7)	
Are you currently on medication for diabetes?				1.000
Yes	24 (92.3)	23 (88.5)	24 (92.3)	
Hill-Bone Compliance Scale				
Fully compliant	6 (25.0)		10 (41.7)	0.227
Mean ± DS (8=perfect compliance)	11.2 ± 3.6		9.5 ± 2.0	

Table 4

Changes in self-efficacy and health behaviors (n=26)

	Baseline N (%)	9-Months N (%)	12-Months N (%)	p-value (BL-12M)
Diet/Nutrition				
How confident are you that you can stay on a healthy diet?				0.540
No/Very little confidence	4 (15.4)	1 (3.8)	1 (3.8)	
Moderate confidence	5 (19.2)	8 (30.8)	7 (26.9)	
Very confident	16 (61.5)	17 (65.4)	18 (69.2)	
How many glasses of soda do you drink every day?				0.069
None/Less than 1 glass a day	19 (73.1)	23 (88.5)	25 (96.2)	
1 - 3 glasses	7 (26.9)	3 (11.5)	1 (3.8)	
Do you eat fruits instead of desserts or snacks that contain high amounts of sugar?				0.055
Never/Sometimes	16 (61.5)	17 (65.4)	8 (33.3)	
Most of the time/All the time	10 (38.5)	9 (34.6)	16 (66.7)	
Do you bake or grill foods instead of frying them?				<0.001
Never/Sometimes	19 (73.1)	21 (80.8)	4 (15.4)	
Most of the time/All the time	7 (26.9)	5 (19.2)	22 (84.6)	
Physical Activity				
How confident are you that you can engage in physical activity regularly?				0.383
No/Very little confidence	2 (7.7)	1 (3.8)	0 (0.0)	
Moderate confidence	7 (26.9)	3 (11.5)	5 (19.2)	
Very confident	17 (65.4)	21 (80.8)	21 (80.8)	
How often do you do physical activity?				0.002
Never/Rarely	12 (48.0)	3 (11.5)	3 (11.5)	
Several days a week/Everyday	13 (52.0)	23 (88.5)	23 (88.5)	
Self Efficacy in Health Access				0.025
Self Efficacy Scale, Mean (SD)	4.0 (0.9)	4.3 (0.8)	4.4 (0.7)	
1=Low, 5=High				
How would you describe your general health?				0.002
Excellent/Good	11(42.3)	21 (80.8)	22 (84.6)	
Fair/Poor	15 (57.7)	5 (19.2)	4 (15.4)	

Table 5

Changes in physical and mental health (n=26)

	Baseline	12-Months	
A1C (%), N=14			0.141
Mean (SD)	7.6 (1.3)	7.1 (0.8)	
BMI (kg/m^2), N=25			0.125
Mean (SD)	29.1 (6.8)	28.6 (6.6)	
Weight (lbs.), N=25			
Mean (SD)	157.4 (30.8)	154.8 (30.1)	
12-Months	154.8 (30.1)		
Change in weight	−2.5 (1.6)		
Weight change, N (%)			
Lost 10 or more lbs	N/A	6 (23.1)	
Loss less than 10 lbs	N/A	7 (26.9)	
Stayed the same weight	N/A	3 (11.5)	
Gained 1 to 5 lbs	N/A	6 (23.1)	
Gained more than 5 lbs	N/A	4 (15.4)	
PHQ-2 Scale, Mean (SD)	2.6 (1.9)	0.9 (1.6)	<0.001
0=Low Risk, 6=High Risk			

Table 6

Challenges Experienced During Pilot and Modifications Made to the Full Intervention

Challenges During Pilot	Reason	Modification Made to Full Intervention
Limited clinical data for participants	Clinical data was extracted from patient medical records or hospital files. Tests for A1C were not ordered for patient at 3-month intervals. There were also administrative hurdles to obtaining the data.	Recruitment for the full intervention has been limited to affiliated clinics. A study physician will order lab tests at appropriate intervals for participants and staff can access these results from the data warehouse. Participants can obtain lab tests without an appointment at the clinic sites.
Low retention	Long periods of travel to Bangladesh; lack of childcare for female participants; irregular work schedules for male participants	Individuals that report planned travel to Bangladeshi for more than 1 month during the intervention period are excluded from the intervention and included in the subsequent round of the intervention; childcare is available for participants during sessions; numerous incentives offered during intervention
Scheduling group sessions & one-on-one visits	Findings convenient locations for one-on-one visits; CHWs spent much time in scheduling	The intervention has been condensed into 5 group sessions and 2 one-on-one visits; 1 additional CHW hired
Cannot make comparisons to a control group	Small sample size /one group design	Recruited individuals will be assigned to a treatment and wait-list control group. The full intervention is powered for meaningful group comparisons