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Authors
This report was composed by Jenna van Draanen, MPH, Primary Evaluator at Blink Evaluations and evaluation consultant for the South Asian Diabetes Prevention Program and Nick Petten, evaluation consultant for the South Asian Diabetes Prevention Program. Project supervision for this evaluation was provided by Neil Stephens, Program Coordinator: SADPP at Flemingdon Health Centre.

Collaborators
The evaluator would like to thank the South Asian Diabetes Prevention Program staff for their support, guidance and considerable input into the project. The SADPP team has been leaders in program development, implementation based on evidence and rigorous evaluation. Similar to the 2012-13 evaluation, this year’s evaluation placed a considerable burden on the team to not only lead and support the internal evaluation activities; but, as well, the external DPP-wide evaluation led by the MOHLTC evaluators. Without the significant contribution of these individuals, the evaluation would not have been possible.

Notable contributions from the following Flemingdon Health Centre staff:
- Ammara Shafique, Community Outreach Worker: SADPP
- Dilani Wickram, Registered Nurse: SADPP
- Nicole Reyes, Administrative Assistant: SADPP
- Priyenka Premachandiran, Community Outreach Worker: SADPP
- Sheela Kuttaiya, Registered Dietitian: SADPP
- Shobha Oza, Director, Community Engagement

Notable contributions from the following SADPP volunteers:
- Bincy Samuel
- Chaudhry Intiaz Ahmed
- Haider Akbarzada
- Hiba Iqbal
- Lakshmi Hariharan
- Kinza Chaudhry
- Lucky Nessa
- Mohammed Azeez
- Tabassum Ali
- Umme Hajiani
- Prashant Patil
- Trupti Patil

The evaluation was conducted with heavy collaboration from stakeholders, partners, and participants who will remain anonymous to preserve confidentiality. Their insight was invaluable to this project.
Executive Summary

This report highlights findings from the evaluation of the South Asian Diabetes Prevention Program (SADPP). Since its founding in 2009, SADPP has conducted program evaluations in 2010, 2011 and 2012. This particular evaluation was designed to strengthen and deepen the existing knowledge base of the program. SADPP was developed by Flemingdon Health Centre (FHC) in Toronto and is funded by Ontario’s Ministry of Healthy and Long-Term Care (MOHLTC). The overall goal of the program is to enhance equitable access to diabetes prevention services and resources for the South Asian communities in the North East region of Toronto, by offering language-specific and culturally-relevant services.

The evaluation, like the program, was approached from a health promotion lens with an understanding of the social determinants of health and the way they intersect with the program. The evaluation approach was one that was participatory in nature, having the evaluator work closely with the stakeholders to create a utility-focused evaluation. Accordingly, the evaluation was planned with significant input from the SADPP staff. Based on this input, the evaluation was focused on data quality, developing and revising the evaluation tools, focus groups, volunteer engagement, and supporting the MOHLTC’s joint Diabetes Prevention Programs (DPP) evaluation; that included FHC, Unison Healthy and Community Services and Anishnawbe Health Toronto.

Multiple methods were used in this evaluation. A comprehensive literature search was conducted, SADPP’s refined evaluation instruments were used and data from them was analyzed, a language-specific and culturally-relevant focus group was conducted, and questionnaires from the MOH evaluation activities were analyzed.

Data collected before and after Early Detection Clinics (the first encounters) during Jan and Mar 2014 indicated the following: there was significant change pre and post clinic on all of the questions asked. Overall participants significantly increased their understanding of what diabetes is, their understanding of what prediabetes is, their knowledge of what puts them at risk, and their understanding of why blood sugar increases in people who develop diabetes. Data from the third encounter revealed that every participant included in the survey reported trying to change their modifiable risk factors, with most participants listing diet changes, physical activity changes, or both. Specifically, participants reported: eating brown rice instead of white rice; consuming less sugar, fat, and salt; using less oil while cooking; and increasing fibre intake. Participants in the third encounters knew that physical activity reduced their risk of diabetes, and attributed this mainly to weight loss resulting from physical activity. In addition, participants listed activities like walking, stretching, and yoga that could help to reduce their risk. 50% of participants had been able to create a personal activity plan that fit with their schedule after attending SADPP. Finally, participants understood how resettlement can affect their health and put them at risk of developing diabetes. These participants have an enhanced understanding of depression; and while some of them are uncomfortable seeking mental health support, many are using coping mechanisms learnt at SADPP.

For those individuals already living with diabetes, a total of 17 randomly selected referrals were evaluated to measure successful attachment to diabetes education programs. 16 out of 17 were contacted by the DEP at the time of the evaluation call. 8 out of the 17 are successfully attached to a DEP (able to make and attend appointment). All of these individuals found the DEP referral to be useful. 4 out of the 17 participants declined DEP referrals. Another 4 out of the 17 participants state a DEP did contact them to schedule an appointment, but they were unable to make an appointment due to barriers (transportation, mobility issues, physically unfit). These participants would still like to attend a DEP, and subsequently SADPP for another referral. 1 out of the 17 participants was unreachable by the DEP or SADPP.

Out of the DEP group of 17, there were 13 participants who responded to questions about lifestyle modifications since attending the SADPP. A total of 11/13 people had made changes to their eating behaviours to be healthier since attending the program. Changes that were made to lifestyles included: limiting food quantity, not eating as many sweets, increasing fruit and vegetable consumption, eating less fat and oily food, and eating less meat. When asked about changes to physical activity levels, only 6/12 participants had made these changes including starting walking and yoga. Those who had not
become more active gave barriers of physical disability, expensive exercise classes, and the weather as reasons for not making changes to their lifestyle. A total of 8/11 participants who were called for DEP follow-up have been able to manage their stress better since attending SADPP with participants saying that they have been going to relatives houses, staying happy, and listening to devotional music.

Where SADPP had consent from participants to track and analyse the data, this evaluation did so. During April 2013 and March 2014, there were a total of 464 participants included in the analysis, to gather basic demographic data and create a participant profile. The large majority of SADPP participants are South Asian 95%, with the most common country of origin being India (127 participants, or 27%), followed by Afghanistan (86 participants or 19%), Sri Lanka (83 participants, or 17%), Pakistan (67 participants or 14%), and Bangladesh (44 participants or 9%). The most common first languages spoken by participants are Tamil (19%), Gujarati (16%), English (16%), Urdu (15%), Dari (11%), Hindi (7%) and Bengali (6%). The majority of participants are female (68% or 317 individuals), with only 32% males, and the average age is 47 years old.

The survey results for the MOHLTC’s Health Outcomes evaluation indicates that 62% of participants contacted 2-6 months after program attendance remembered their risk score. A total of 2% of participants were at very high risk, 67% of the participants were at high risk, 22% were medium risk, and 2% were at low risk.

In the focus group conducted, participants made repeated references to the fact that they learned important, useful, and practical topics while attending SADPP. Participants understood the importance of physical activity, however, many were unable to properly adapt the recommendations to their lifestyle. Participants mentioned that the lack of time and familial responsibilities were a major obstacle to healthy meal planning and exercising regularly. Focus group participants seemed to understand the importance of reducing stress and talking about it with family members. Conducting classes in South Asian languages was expressed to be important to participants and they offered recommendations to create more awareness of SADPP programming through various modes of communication.

Participants gave many examples of barriers to lifestyle change in the evaluation through many sources including surveys and the focus group. These included cost, lack of time, taste of healthy food, family considerations, poor weather, lack of transportation, physical disability, and the inability to control some aspects of stress. Some suggestions for addressing these barriers at a systemic level can be targeted at improving advocacy for this group and intervening in broader social determinants of health (such as food security, income, neighborhood resources, etc.).

For the evaluation, it was important to revisit the initial SADPP indicator guide and to update and critique it to improve data quality. Throughout the evaluation, several data quality training sessions and workshops were held between SADPP staff, Blink Evaluations staff, and volunteers. This allowed both the program and the evaluation to be more responsive, and to change and adapt to data improvement recommendations. SADPP went through a “data diagnosis” process to look at all existing tools and practices and make improvements where possible.

Overall, in the 2014 evaluation, participants were highly complementary of SADPP. They used every chance given (extra comments in surveys, focus groups, during observation, etc.) to tell us how much they valued the program. There is an abundance of data from the SADPP evaluation that indicates that participants’ experience change in their knowledge, skills, abilities, resources and even go on to make changes in lifestyle after the program. As seen with the data from the DEP follow-up surveys, the Physician Attachment tool, and the Second Step screening tool, participants are being connected with services that they require outside of SADPP’s scope. SADPP has seen tremendous growth since its inception and remarkable growth in the past year as well. This year, SADPP has strengthened their data quality and their volunteer engagement, which both contribute to increasing the quality of the evidence-based programming that SADPP is offering.

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1 SADPP may have added non-South Asians where referral services were either requested or deemed necessary by the multi-disciplinary team. The program is tailored to the South Asian population and the data primarily reflects this population.
Several recommendations can be made based on the results of this evaluation effort, and these can be directed towards different actors accordingly.

**Recommendations for SADPP**

1. Continue to develop innovative outreach activities that engage and target individuals who are currently left out of the screening process and attempt to provide equal access to SADPP (greater focus on those individuals and groups who do not access services).
2. Continue to deliver high quality programming that is consistent with the program’s language-specific and culturally-relevant principles in the community setting. If possible, according to community partners’ schedules, attempt to shorten the amount of time between encounters with participants.
3. Work with MOHLTC and TC-LHIN to build on the existing momentum and support for the South Asian screening tool by pursuing the systematic revision and validation of the tool, as planned in 2014-15. Additionally, SADPP has been regularly and proactively scanning the literature to keep the tool up to date which should continue.
4. With the investment of additional resources, continue to translate the valuable resources that SADPP offers participants, specifically slides in different languages and the South Asian Diabetes Prevention Care Kit beyond the current two languages. It is clear that participants benefit hugely from the language specific services and resources that SADPP develops and offers and this should continue.
5. Continue to actively engage the participating communities in program planning. Work with the South Asian communities to build capacity and community strength. The program is currently delivered from a South Asian perspective but those living with diabetes or at risk in the community with challenges accessing services can strengthen in strategic planning for SADPP.
6. Increase efforts to reach other people in the participant families to affect supporting behaviours and attitudes and to use social support as a mechanism to facilitate attachment, enrolment, and behaviour change.
7. Pursue relationships with DEPs and PCPs to smooth transitions in care and help to increase feedback from PCPs and DEPs on participant health status.
8. Continue to try to target younger populations (as the risk of diabetes in South Asian begins at an earlier age than other ethnicities) and continue to try to reach the most vulnerable South Asian participants, including those not currently connected to other community services.
9. Recent community engagement strategies launched within SADPP are excellent, and this type of community engagement should continue in the future. In addition, advocate for this population to receive support in Healthy Eating, Physical Activity and Mental Health.

**Recommendations for MOHLTC and TCLHIN**

10. There is a strong recognition of the risk factor that lack of physical activity plays, as well as the intention to increase the level of activity - but there is a gap in implementing it. The addition of a physical activity capacity complement to the SADPP’s multi-disciplinary team make up, (ex: Kinesiologist) to support the majority of SADPP participants where there are well-documented barriers between intention and implementation around physical activity to prevent diabetes.
11. With the allocation of appropriate additional resources, continue providing the attachment and enrollment aspects of the SADPP program and continually seek input from program participants and system stakeholders on these components. However, as attachment and enrolment may present limitations in our understanding of best client care, ensure there is a consistent focus on the Diabetes prevention elements.
12. Address gaps in system and coordination between actors to identify opportunities to promote better transitions in care.
13. Assist the Diabetes Prevention Programs (DPPs) in developing a better working relationship with DEPs and PCPs, with increased awareness of SADPP and its initiatives.
14. Develop new initiatives to offer more support for referrals, that help strengthen attachment and follow up of high-risk participants to DEPs, not only those living with diabetes.
15. Actively advocate for policies and processes that will counter discrimination towards South Asians, immigrants, and people living in poverty to address some of the root causes of developing diabetes, barriers to accessing services, and making lifestyle changes.

16. Consider developing interventions to target more systemic and structural determinants of health for this community, as most of their barriers to lifestyle change are social issues (i.e. underemployment, neighborhood safety, food insecurity, and low income).

17. Offer both funding and leadership to help SADPP achieve these recommendations and continue to grow as an exemplary language-specific and culturally relevant diabetes prevention program.
Introduction

This report highlights findings from the evaluation of the South Asian Diabetes Prevention Program (SADPP). Several previous evaluations have been conducted of SADPP, and this particular evaluation was designed to complement the existing knowledge of the program. Since the first evaluation focused on formative aspects of program development and foundation; and the second evaluation focused on enrollment, attachment, and impact; this third evaluation is focused on improving the data quality of the ongoing SADPP monitoring and evaluation activities. The evaluation also included client engagement in the form of focus groups and volunteer engagement through data collection and entry. This evaluation complements the MOHLTC evaluation across the DPP’s that is focused on assessing the progress of the DPP’s and better understanding their impact. This evaluation report will: introduce the program and the foundational theory driving the development of the program; highlight the quantitative and qualitative results of the evaluation work; report on findings from the mental health literature relevant to the program and some evidence from other diabetes prevention programs; and report on the benefits and challenges of the program, the program impact, and the progress since the last evaluation.

SADPP Components

Program Description
The South Asian Diabetes Prevention Program was developed by Flemingdon Health Centre (FHC) in Toronto and is funded by the Toronto Centre Local Health Integration Network. The overall goal of the program is to enhance equitable access to diabetes prevention resources for the South Asian communities in Toronto, by offering language-specific and culturally relevant services. The South Asian population is known to develop Type 2 Diabetes Mellitus (T2DM) at higher rates than other ethnic populations in Canada, and SADPP responds to and addresses the inequitable rates of diabetes in this population. The SADPP model involves screening participants for diabetes and prediabetes, providing education sessions on preventing diabetes and healthy living, and making referrals that are responsive to participants’ needs. A logic model describing the program activities, objectives, outputs, and outcomes can be seen in Figure 1.

Typical barriers to diabetes prevention that have been identified and targeted by SADPP include transportation, language, cost, and health literacy. SADPP addresses these barriers by setting up mobile clinics that provide free services in the community in languages that participants are comfortable speaking, as well as using culturally relevant practices. Screening sessions and materials are offered in South Asian languages and suggestions for lifestyle modifications are intended to reflect the daily lives and distinct diets and cultures of participants. The program team is able to achieve this level of cultural competence through the support of South Asian staff members who speak the languages. Screenings are conducted at locations where the target population meets regularly (for example places of worship, settlement and newcomer centres, public schools, etc.).
Figure 1. SADPP Program Logic Model
A multi-disciplinary team consisting of a registered nurse, a registered dietitian, community outreach workers, an administrative assistant, and a program coordinator deliver this community-based program. The SADPP community outreach workers connect with unique groups of South Asians by contacting an organization and developing a relationship with that group. After determining interest and coordinating schedules, the SADPP team arranges an Early Detection Clinic (EDC) for the organization’s members and the surrounding community. Efforts are made in particular to outreach to those individuals and communities who are marginalized, socially and economically disadvantaged, and do not traditionally access health promotion services particularly due to resettlement. SADPP’s outreach strategy consists of: person-to-person engagement in the community with prospective groups; conducting information sessions to recruit participants for the program; and collaborating with community leaders, volunteers, and key stakeholders to assist with program attendance, session logistics, and interpretation. The team will continue to work with each new group until participants have been through all three encounters.

The SADPP model works through three participant encounters, plus an additional attachment and enrollment component:

1) The first encounter is a three-hour Early Detection Clinic (EDC), which involves a first-step screening to identify South Asian program participants who are at-risk of developing diabetes. Before the screening process begins, staff provides an interactive education and awareness workshop session about diabetes and prediabetes risk factors. Participants from South Asian communities are first screened at the EDC using an evidence-based tool tailored to the population which groups participants into categories of ‘Low Risk’, ‘Increased Risk’, ‘High Risk’, ‘Very High Risk’ and ‘Living with Diabetes’. Contrary to the CANRISK tool which is self-administered (18), SADPP’s screening tool is tailored to the South Asian population based on risk criteria for this specific population and is administered by the SADPP team at the three distinct stations of the EDC:

- **Station 1 (Risk Assessment)** – When participants begin the clinic, they meet with an outreach worker to initiate the risk assessment of the screening process.
- **Station 2 (Physical Activity and Anthropometrics)** – Next, participants move on to see the dietitian for the physical activity, BMI, and waist circumference assessment.
- **Station 3 (Cardiovascular Risk and Capillary Blood Glucose Testing)** – Finally, participants see the nurse for Cardiovascular Risk factors, blood-glucose testing, the risk score calculation, and subsequent referral. The blood glucose testing in this station is done for educational purposes to give clients an understanding of what a blood glucose value means, and to demystify the blood glucose testing process that might otherwise be intimidating in a clinical environment. The results are not used in risk score calculations as they are not considered to be well-suited for reliable risk-scoring. Furthermore, the purpose is to identify those participants who would gain from future follow-up and **Second Step Screening**.

- **Second Step Screening**: Those who are identified at the EDC with high glucose values are referred back to their Primary Care Providers (PCPs), or connected to new PCPs if they are unattached, for further examination and diagnosis. The
Registered nurse helps participants by completing a referral form which is sent directly to the PCP for Second Step Screening, where the PCP may perform further testing (ex: OGTT etc.). Those who are identified as living with diabetes are connected with Diabetes Education Programs (DEPs).

2) The second encounter is the Diabetes Prevention Workshop (DPW.) This is an interactive workshop focusing on the three pillars of diabetes prevention including healthy eating, physical activity and mental health. These three areas correspond to lifestyle issues that increase diabetes risk and impact South Asian individuals particularly as a result of resettlement in Canada (20, 21,22). This session includes a healthy salad preparation demonstration and practical advice for lifestyle modification tailored to South Asian communities. While participants leave the first encounter with an enhanced understanding of their own individual risk-factors, they leave the second encounter with enhanced knowledge and skills around making evidence-based modifications to their lifestyles.

3) The third encounter includes a Chat and Chai workshop for only the highest risk participants roughly one month after the second encounter, which revisits important prediabetes awareness and prevention concepts from the EDC and the DPW. At this session, participants are asked about lifestyle changes they have been attempting since attending the program and the clinicians help brainstorm tailored and practical solutions that respond to their personal barriers. Participants are then further referred to health providers such as social workers and dietitians as needed.

In response to requests from participants, SADPP developed Canada’s first-of-its-kind Diabetes Prevention Care Kit for South Asian individuals during 2010-11. Each of the 1000 kits contain an evidence-based handbook and DVD (in English/Urdu and English/Tamil) that reflect the content of the EDC and DPW (diabetes awareness, healthy eating, physical activity, and mental health), a healthy plate tool, a pedometer, measuring spoons, and a waist-measuring tape. Currently these kits are given out to highest risk participants at SADPP third encounter (Chat and Chai) sessions to fill the perceivable gap around language-specific and culturally relevant resources in Canada; as well as, reinforce key diabetes prevention messages delivered in the program.

4) The attachment and enrollment component was designed in 2012 and implemented in 2013-14 to better connect participants who are either unattached to PCPs or DEPs. This component involves a SADPP team member following up by telephone with participants to confirm that they were able to connect with the PCP or DEP that they were referred to and troubleshooting accordingly. This follow-up also allows SADPP to document enablers and barriers to accessing and remaining attached to these services. Recently, the SADPP has started referring all women with a past history of gestational diabetes mellitus (GDM) to Diabetes Education Programs (DEPs) to reduce the risk of development of T2DM in this subpopulation (Canadian Diabetes Association, 2013).

Screening Tool Description
The screening tool that SADPP uses at the EDC to provide participants with their individual risk score is derived from the multi-culturally validated CANRISK tool, but has been modified to reflect the distinctive characteristics of the South Asian population (contact the authors for access to the SADPP Risk Assessment Questionnaire). The tool is administered by the team to eliminate challenges related to health literacy and to improve the completion rate.
Program Theory and Logic Model
SADPP draws on theoretical underpinnings in their program operations. This is evidenced by the iteratively developed and chiseled program logic model (see Figure 1 above).

There was no explicitly stated theory used in the development of the South Asian Diabetes Prevention Program, as it evolved from an identified need in the community, however, the Theory of Triadic Influences (TTI) can be used to explain the program’s current approach to diabetes and behaviour change (Flay, Snyder, & Petraitis 2009). This particular theory has been chosen because of its comprehensiveness (Flay, Snyder, & Petraitis 2009). The TTI discusses three distinct streams of influence: intra-personal influences, interpersonal social influences, and cultural-environmental influences that each contribute to attitudes toward behaviors (Flay, Snyder, & Petraitis 2009). These influences affect the behaviour through underlying causes, distal pre-disposing influences, and proximal immediate predictors (Flay, Snyder, & Petraitis 2009). See Appendix C for an illustration of the TTI.

While SADPP does not attempt to alter the underlying causes affecting the behaviour, it does attempt to address some of the distal and proximal factors influencing behaviour change. The distal predisposing influences that are addressed include:

- **Sense of control** (P2) around developing diabetes
  - Through the program’s education about modifiable risk factors (see Appendix D)

- **Social competence** (P2) and **skills: social and general** (P3) for preventing diabetes
  - With education about how to monitor portion sizes and read Canada’s food guide

- **Perceived norms** (S3)
  - Presentations that show statistics about South Asian diabetes and ways to integrate healthy choices into current lifestyle

- **Motivation to comply** (S3)
  - With education around the consequences of risk factors

- **Others’ behaviours and attitudes** (S2)
  - Partially affected depending on which people attend the program and the degree to which they are influenced

- **Information/opportunities** (E2)
  - With the provision of information, the opportunity for blood glucose testing and risk factor determination, and the opportunity for referral

- **Interactions with social institutions** (E2)
  - Through programs coming to their natural gathering place and referring to other services

Areas of the TTI that are not as explicitly addressed in SADPP include **self-determination** and **interpersonal bonding**. Theoretically, addressing the above factors should translate into more
positive self-efficacy, behavioural control, social normative beliefs and attitudes toward behaviour. These combine to effect decisions/intentions resulting in a trial of the behaviour, and ultimately a behaviour change towards a healthier lifestyle. Overall, SADPP addresses many key aspects of behaviour change related to prediabetes, and based on the TTI, is likely to influence cognitions about prediabetes and diabetes. These theories will be tested in the evaluation.

Evaluation Description

SADPP Evaluation Approach

The evaluation, like the program, was approached from a health promotion lens with an understanding of the social determinants of health and the way they intersect with the program. The evaluation approach was one that was participatory in nature, having the evaluator work closely with the stakeholders to create a utility-focused evaluation. Accordingly, the evaluation was planned with significant input from the SADPP staff. Based on this input, the evaluation was focused on data quality, developing and revising the evaluation tools, focus groups, volunteer engagement, and supporting the MOHLTC evaluation.

SADPP Evaluation Objectives

1) The evaluation will identify key elements of data quality that can be improved for SADPP
2) The evaluation will determine the mechanisms of impact of SADPP on the South Asian population and barriers to lifestyle change implementation
3) The evaluation will improve the capacity of the volunteer resources in collecting and entering data for SADPP
4) The evaluation will improve the quality of data collected, entered, and analyzed by SADPP

Understanding that SADPP’s contact with clients is limited and that SADPP’s resources are finite, data quality improvement efforts will be done with feasibility at the forefront. Similarly, client burden will be considered and care will be taken not to overburden clients with evaluation participation. The evaluation will also take care not to overburden staff and volunteers or to change practices that will significantly increase workload.

SADPP Evaluation Questions

Based on the objectives outlined above, several guiding questions for the evaluation were created. The evaluation questions have been aligned with the needs of the program and have been designed to improve data quality. See the evaluation questions listed in Table 1 below.
Table 1. Evaluation Questions

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<tbody>
<tr>
<td>1.</td>
<td>What are SADPP’s current data practices? How can these best practices be aligned with</td>
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<td></td>
<td>best practices for data quality in community programs?</td>
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<tr>
<td>2.</td>
<td>What are enablers and barriers to lifestyle modification for South Asian participants?</td>
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<td></td>
<td>Specifically, what do participants describe as the reasons they do or do not make changes</td>
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<td></td>
<td>after attending SADPP? How do clients feel about the sessions they attend and the staff</td>
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<tr>
<td></td>
<td>delivery of material?</td>
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<tr>
<td>3.</td>
<td>What are SADPP’s program demographics and statistics? What risk factors are present in</td>
</tr>
<tr>
<td></td>
<td>SADPP’s client population? What data quality issues are compromising or enhancing current</td>
</tr>
<tr>
<td></td>
<td>data analysis?</td>
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<tr>
<td>4.</td>
<td>What are ideal diabetes screening and education indicators and how can they be best</td>
</tr>
<tr>
<td></td>
<td>measured in the SADPP population?</td>
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</table>

Methods

Multiple methods were used in this evaluation. Below is a description of each specific methodology.

Literature Review

A comprehensive literature search was conducted looking for both published research and unpublished grey literature pertaining to: diabetes prevention indicators used in data collection documents, data quality, mental health, and diabetes prevention program scope. The literature review is not intended to be a stand-alone document but instead it informed the development of the evaluation materials and the findings presented here.

Participant Questionnaires (7 instruments)

SADPP has developed 7 instruments for data collection and throughout the evaluation these instruments and the way they are used were studied and refined. In-person questionnaires were given to SADPP participants during the EDC. Telephone questionnaires were also given to SADPP participants during follow-up. SADPP volunteers who were trained by the evaluators conducted the data collection activities. Significant focus during the evaluation was devoted to revising, improving, and redeveloping the existing data collection tools for SADPP’s use. The evaluators analyzed the results from all of the data collected from the seven data collection tools that helped determine program outcomes and achievements.

Focus groups

One focus group was held to seek participant perspectives on the impact of the program on their knowledge, skills and abilities around diabetes prevention (specifically, enhanced awareness of risk factors, healthy eating, physical activity, mental health). The focus group was conducted using the Tamil language. SADPP covered the translation costs, while the evaluators covered the transcription costs.
Participant Questionnaire for MOH Evaluation
Questionnaires were given to 45 participants who attended a SADPP screening or workshop previously in the year. The Ministry of Health was responsible for post-test questionnaires and analysis.

Literature Review Results

Mental Health and Diabetes
The literature on mental health as a risk factor for diabetes, specifically for immigrant communities in North America, is limited; however, there have been several important findings that can help us to better understand diabetes risk for this group. We know that individuals with several types of mental health issues are at increased risk for the development of type II diabetes including: schizophrenia (Dixon et al, 2000), and depression (Anderson et al, 2001; Knol et al, 2006). The Canadian Diabetes Association 2013 Clinical Practice Guidelines have verified these risk factors, with estimates of the risk of diabetes increasing by 60% in individuals with depression (CDA, 2013).

Many people who have type 2 diabetes have other comorbidities such as anxiety and depression (CMHA, 2009). Two mutual risk factors that may contribute to diabetes in patients with serious mental illness are obesity and smoking, occurring at higher rates in this population (Brown et al, 2010), which is congruent with the other impacts of resettlement in this vulnerable population. Lifestyle factors (such as lack of emotional support, social networks, low socioeconomic status) combined with antipsychotic medications are associated with weight gain and metabolic abnormalities (Brown et al, 2010). Scholars have proposed that the relationship between type 2 diabetes and depression is bi-directional where patients with diabetes exhibit depressions at higher rates as compared to healthy patients (Kyrou and Tsigos, 2009; Golden et al, 2008).

Some studies have suggested that tools to measure acculturative and resettlement stress are inadequate and may not be accurately capturing the mental health impact of immigration for Asian immigrants (Salant and Lauderdale, 2003) and it may be underestimated as a result. Others have suggested that because previous literature had stressed the separate contributions of mental and physical disorders to disability and mortality, it has encouraged the exclusion of mental health from our efforts to improve health – and this is problematic (Prince et al, 2007). Thus the burden of mental disorders is likely to have been underestimated because of inadequate appreciation of the connectedness between mental illness and other health conditions. This is relevant to the discussion in the literature on the healthy immigrant effect and its intersection with health issues after resettlement, as many resettlement-related mental health issues are under-examined.

New immigrants face a lot of stress when arriving to a new country (CRCT, 2009). Chronic stress such as that related to the process of immigration and settlement may lead to the development of diabetes. These stresses can be attributable to the financial strain, climatic changes, gender roles, cultural differences or marginalization and language barriers. The resettlement stress paradigm, as described by several authors, provides a way of explaining why immigrants are not able to maintain the health status they arrive with. The model suggests that stressors like unemployment, poverty and lack of access to services are more common in recently immigrated
populations, combined with the potential of fewer resources to draw on than the native population, jeopardize health for these populations (Beiser, 2002; DeVoretz, 1995). Research also suggests that age may increase probability of illness for immigrants more profoundly than the native born population (Beiser, 2005; 18). Ethnic communities with type 2 diabetes have a higher prevalence of depression especially in the South Asian population as compared to the European population (Aujla et al, 2009); however, this data has not been replicated for a North American population. There is also evidence that inadequate access to screening and preventative programs may increase this risk (Kliwer et al, 1997; Beiser et al, 1993) and this may be due to a “false sense of security” (Saphir, 1997). Community-based studies have confirmed that 10-24 months after arrival is an especially high-risk period for depression (Bagheri, 1992; Beiser, 1988; Rumbaut, 1985; Rumbaut, 1988).

The literature indicates that individuals of Asian descent (South Asians and Chinese) are less likely to use mental health services than the general Caucasian population in Canada due to poor knowledge of mental health services, perceived stigma or language barriers and more reliance on family support (Tiwari and Wang, 2008). Additionally, some scholars have documented that elderly men and women of different ethnic groups may not understand depression in biomedical terms but rather may relate it to changes in mood (Lawrence, 2006). In one study, South Asians described depressive symptoms as “thinking too much in the heart” or “worrying too much” and “thoughts go around in your head” (Karasz, 2003).

Hence health care providers need to be sensitive to the cultural and linguistic barriers that exist for the South Asian community to seek help for mental illnesses. It is essential for the health care provider to pay attention to the psychological needs of the patient and not just provide treatment for physical aspects of health (Lai and Surood, 2008). Also, training is needed for health care providers in culturally related health beliefs and values that may assist to build trust and confidence between patient and provider. Lastly, culturally validated screening instruments for detecting depression are needed especially for older South Asian adults (Lai and Surood, 2008) and these should be integrated with screening for diabetes in this population.

**Program Scope Findings**
Diabetes is a global health crisis and it affects every part of a population’s well-being. Fortunately, the onset of type 2 diabetes can be prevented through individual behaviours with the support of community-health services. Considering the substantial social and economic costs of the complications associated with diabetes, national organizations and academic institutions have developed guiding frameworks, principles and recognition programs to assist community-level initiatives in the prevention of diabetes.

Within Canada, the leading organization that provides guiding frameworks on diabetes prevention comes from the Canadian Diabetes Association who disseminates their material in partnership with provincial ministries of health. In the US, the Center for Disease Control and Prevention have developed several guiding frameworks and recognition programs which several states have adopted to guide local efforts in diabetes prevention. In terms of specific programming, several specialized university departments have made recommendations on how diabetes prevention programs should be structured which will be explored in the following paragraphs.
Despite all the efforts to ensure quality and standardization for diabetes prevention in Canada, a recent 2013 report from the Office of the Auditor General on promoting diabetes prevention and control found Canada’s efforts to be substandard. The report’s three main findings were:

1. The Public Health Agency of Canada’s management practices for delivering programs and activities under the Canadian Diabetes Strategy are weak.
2. Federal diabetes activities are fragmented, and the impact of efforts and money spent has not been maximized.
3. Health Canada and the Agency have made little progress on collaborating to improve the limited diabetes surveillance information on Aboriginal peoples.

Among the report’s many recommendations, a focus on performance measures for community-based projects will maximize impact that can be shared publicly with Canadians and other community-based projects. For the purposes of the SADPP, its current efforts with population-specific tool revision and validation, early-detection, screening and education, comprehensive data collection, language-specific and culturally-relevant content development, understanding the program scope of other diabetes prevention programs across North America can be shared with other community-based initiatives and the Public Health Agency of Canada. This may assist in developing some common performance measures in order to properly assess the impact of each local effort.

Research-based Intervention Programs
The guiding frameworks presented below are explicitly based on the evidence gathered through the Diabetes Prevention Program (DPP) study. The DPP was a multi-ethnic study conducted in the US with more than 3,800 participants with impaired glucose intolerance (Ratner, 2007). The intervention included weekly sessions for 24 weeks and at least bi-monthly for the next 4 years. The lifestyle modification goals of the program were modest weight loss and an increase in physical activity. Other research-based intervention programs include a Finnish Diabetes Prevention Study which involved individuals visiting a nutritionist 7 times during the first year and 4 times each year after that (Alberti, Zimmet & Shaw, 2007; Saaristo, 2010). Additionally, guidance was individually tailored to each participant throughout the intervention.

Conducting diabetes prevention programs for marginalized and vulnerable populations present additional challenges and obstacles, including the need to address more systemic issues in the community. In a pilot program for diabetes prevention in hard-to-reach, low income, immigrant Hispanic populations the program scope involved community health workers that taught 7 Diabetes Empowerment Education Program modules in a ‘class’ format (Millard et al., 2010). Another program based in a First Nations community in Northwestern Ontario involved working with various community services and organizations, such as schools, stores, and various events to encourage physical activity and healthy eating (Ho, 2007). In both examples, there were additional programming elements that focused on the specific needs of the community.

Evidence-based Program Frameworks
The Diabetes Prevention Support Center at the University of Pittsburg have developed a program and curriculum called the Group Lifestyle Balance (GLB) Program, which many community-based health services across North America have adopted and, in some cases, adapted for the local community needs (2014). The GLB program was designed for non-diabetic, overweight individuals age 18 and older who have pre-diabetes and/or the metabolic syndrome. The GLB program recommends three phases which participants go through: 1)
core phase consisting of 12 weekly sessions, 2) the transition phase consisting of 4 bi-weekly/monthly sessions, and 3) the support phase consisting of 6 monthly sessions. Each session lasts about one hour and topics include healthy eating, physical activity and problem solving. The recommended goals for individuals to achieve include losing 7% of body weight and increasing physical activity to 150 minutes per week.

Pilot sites of Ontario’s Primary Care Diabetes Prevention Program (PCDPP) have adopted the GLB program to guide its efforts at preventing diabetes within Ontario (MOHLTC, 2012). Six sites have piloted the program across rural, urban and northern environments that have a multidisciplinary Family Health Team that can deliver the curriculum. According to the individual program’s websites, there exist only some slight deviations from the original structure of the program as developed by the University of Pittsburg (see Table 1). The PCDPP also recommends that during individual group sessions that trained lifestyle coaches review client journals, weigh each client, assist in the creation of weekly ‘to-do’ lists, and supply pedometers. Considering the resources available at each site, some programs rely on external services and partners (gyms, mental health services, grocery stores, etc.) to encourage all the lifestyle changes necessary to prevent diabetes.

Within the US, many local health agencies follow the guidelines and recommendations from the Center for Disease Control and Prevention’s (CDCP) National Diabetes Prevention Program (2013). Similar to the University of Pittsburg’s GBL program, the CDCP’s efforts are informed by the Diabetes Prevention Program (DPP) study that involved a very large sample of multicultural patient populations in the US. In addition to the a comprehensive curriculum provided for free on their website, the CDCP recommends a structure that includes: 1) 16 one-hour core sessions during the first 16-26 weeks, 2) followed by a minimum of 6 post-core monthly sessions. The CDCP recommend that body weight loss and physical activity be recorded at at least 80% of sessions. The CDCP also recommend the use of a Lifestyle Coach who can receive specialized training through The Diabetes Training and Technical Assistance Center at Emory University (2014). The CDCP maintains a registry of programs across the US and has a recognition program to ensure quality, consistency and broad dissemination of the lifestyle intervention. The YMCA’s Diabetes Prevention Program uses the recommendations from the CDCP in its efforts to prevent diabetes within its local communities (2014). There are over 100 participating YMCA centers in the US that deliver a diabetes prevention program.

Unison Health and Community Services is a Canadian program located in Toronto, Ontario that delivers a diabetes prevention program through various community health centres and is guided by recommendations from the Canadian Diabetes Association (n.d.). The program includes an outreach worker, health promoter and registered dietician and is partnered with 6 community centres. The program conducts diabetes-risk screening questionnaires in the community and offers group and individual counseling sessions. Another Canadian program located in Toronto, Ontario that caters specifically to Aboriginal People is the Diabetes Prevention and Management for Seniors Program at Anishnawbe Health Toronto (2011). Their diabetes prevention program includes a multi-disciplinary team of dieticians, diabetic nurse educators, social workers and an outreach worker who deliver a culturally-based program based on Traditional and Western healing approaches. Their services include: community workshops, community kitchens, screening access, intake and referrals to primary healthcare practitioners, health assessments, and diabetic education.
In the programs mentioned so far, none of them mention delivering curriculum and facilitating workshops in languages other than English, with the exception of the CDCP’s inclusion of Spanish language curriculum resources. Reducing barriers to participation is an integral part of any community health initiative, especially for newly immigrated populations with English as a second language or who do not speak English at all. The Latino Diabetes Prevention and Management Program of Long Beach, California is an example of a diabetes prevention program who conduct sessions in a language other than English and structure their programs to reduce non-attendance (2014). In order to reduce the loss of participants between group sessions and individual sessions, they offer individual sessions directly after the group session. Participants are expected to be involved in the program for 11 weeks and are offered glucose monitoring machines, test strips, consultations with dietician and referrals to local health services.

**SADPP’s Focus on Screening**
Among the few guiding frameworks identified in this report on how diabetes programs could operate, there is a focus on individual case management. This is evidenced by a focus on the length and structure of the recommended programs. For example, the GLB program recommends that participants attend at least 22 sessions over the course of a year where they are individually monitored through weighing and tracking of physical activity. The CDCP program recommends a similar length of time and that those individuals be monitored and tracked throughout the program. In the addition, to qualify for the CDCP’s Diabetes Prevention Recognition Program, programs need to be based directly on the DPP research-based curriculum that supports individual participant’s progress through a comprehensive curriculum (see CDCP Diabetes Prevention Recognition Program, 2011). In addition, the GLB and CDCP recommend the use of specially trained practitioners, or Lifestyle Coaches, that work directly with individual cases.

The current program scope of SADPP does not include individual case management. Instead, the program focuses on screening and referrals within the target community in order to maximize the amount of individuals being assessed for their risk of diabetes. SADPP relies on its community partners to provide one-on-one follow-up, such as PCPs, the Diabetes Education Program, registered dietitians (RD), community health centres and other community-based health services to complete the circle of care of individuals. Participants have been supported in their lifestyle changes with referrals to community-based RDs close to their homes, community nutrition programs (Newcomer Cooking Skills at Scarborough Centre for Healthy Communities), and to Eat Right Ontario for language-specific diet queries that can be resolved from the comfort of their homes over the phone.

From its formation, SADPP was created as a multi-disciplinarily delivered program to respond to the absence of language-specific and culturally relevant diabetes prevention services and resources for South Asians in the North East Region of Toronto. The explicit overall goal of this program is to enhance equitable access to these very services and resources. The well-defined scope of the program is group based intervention, not individual interventions. The outcomes for South Asian participants of the SADPP are:
1. Enhanced awareness of individual risk factors
2. Enhanced knowledge around diabetes and pre-diabetes
3. Enhanced skills and knowledge to make lifestyle modifications to prevent diabetes
4. Enhanced system navigation and attachment to services
<table>
<thead>
<tr>
<th>Guided by...</th>
<th>Involved?</th>
<th>Target population</th>
<th>Length</th>
<th>Structure</th>
<th>Topics</th>
<th>Session specifics</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Pittsburg Diabetes Prevention Support Center</td>
<td>adapted from the Diabetes Prevention Program (DPP), Group Lifestyle Balance Program</td>
<td>non-specific, guiding agency</td>
<td>1 year</td>
<td>core: 12 weekly sessions, transition: 4 bi-weekly/monthly sessions, support: 6 monthly sessions</td>
<td>healthy eating, physical activity, problem-solving</td>
<td>each session is one hour long,</td>
<td>Lose 7% of body weight, increase physical activity to 150 minutes per week</td>
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<tr>
<td>CDCP Diabetes Prevention Recognition Program</td>
<td>Lifestyle Coaches trained via The Diabetes Training and Technical Assistance Center at Emory University</td>
<td>non-specific, guiding agency</td>
<td>1 year</td>
<td>16 one-hour core sessions during first 16-26 weeks, followed by a minimum of 6 post-core monthly sessions</td>
<td>Introduction to national program, self-monitoring, healthy eating, physical activity, overcoming barriers, calories, problem solving, strategies, stress, motivation</td>
<td>body weight loss, physical activity recorded at at least 80% of sessions</td>
<td></td>
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<tr>
<td>YMCA Diabetes Prevention Program</td>
<td>Therapeutic Lifestyle Changes (TLC), National Institutes of Health research, CDCP</td>
<td>non-specific, guiding agency</td>
<td>12 months</td>
<td>16 one-hour, weekly sessions, followed by monthly sessions</td>
<td>healthy eating, physical activity, reducing stress, problem solving, etc.</td>
<td>monthly maintenance sessions</td>
<td>Lose 7% of body weight, increase physical activity to 150 minutes per week</td>
</tr>
<tr>
<td>Alberta Health Services - Diabetes Prevention and Wellness Program</td>
<td>Individual counseling and follow-up sessions, group counselling,</td>
<td>non-specific, guiding agency</td>
<td></td>
<td>Insulin initiation and education, gestational diabetes, paediatric diabetes (one location offered with Paediatrician)</td>
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<tr>
<td>Unison Health and Community Services</td>
<td>funded by LHIN and guided by Canadian Diabetes Association Clinical Practice Guidelines</td>
<td>non-specific, guiding agency that identifies South Asian, Chinese, African and Latin ancestry with high risk of diabetes</td>
<td>diabetes-risk screening questionnaire conducted in the community, group workshops, individual counselling</td>
<td>diabetes, nutrition, healthy cooking and physical activity</td>
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<tr>
<td>Program</td>
<td>Responsible Healthcare Workers</td>
<td>Delivery Method</td>
<td>Key Outcomes</td>
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<tr>
<td>Diabetes Prevention and Management Program at Anishnawbe Health Toronto</td>
<td>Dietician, diabetes nurse educators, social workers, outreach worker</td>
<td>11 weeks in total</td>
<td>Screening, intake, health assessments, referrals to PCPs, community workshops and kitchens, diabetic education</td>
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<tr>
<td>Latino Diabetes Prevention and Management Program in Long Beach, California</td>
<td>Dietician, diabetes nurse educators, social workers, outreach worker</td>
<td>11 weeks in total</td>
<td>Screening, intake, health assessments, referrals to PCPs, community workshops and kitchens, diabetic education</td>
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<tr>
<td>Pilot sites for Ontario’s Primary Care Diabetes Prevention Program</td>
<td>Family Health Team, Lifestyle Coach (aka, dietician, registered nurse, exercise physiologist) and administrative support</td>
<td>core: 12 weekly sessions, transition: 4 bi-weekly/monthly sessions, support: 6 monthly sessions</td>
<td>healthy eating, physical activity, motivation, time, stress management, journaling</td>
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<tr>
<td>Algonquin DPP</td>
<td>local community</td>
<td>weekly for 10 weeks, bi-weekly for 10 weeks</td>
<td>lose 7% of body weight, 2.5 hours of physical activity per week</td>
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<tr>
<td>Owen Sound DPP</td>
<td>local community</td>
<td>weekly for 10 weeks, bi-weekly for 10 weeks</td>
<td>lose 7% of body weight, 2.5 hours of physical activity per week</td>
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</tr>
<tr>
<td>Markham DPP</td>
<td>local community</td>
<td>Core phase: weekly sessions for 12 weeks, maintenance: bi-weekly for 14 weeks</td>
<td>lose 7% of body weight, 2.5 hours of physical activity per week</td>
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<tr>
<td>East Elgin Pre-diabetes Program</td>
<td>FHT and community support (Diabetes Education Center, local gyms, mental health, etc.)</td>
<td>weekly group meetings for first 3 months, followed by monthly sessions for 9 months</td>
<td>lose 7% of body weight, increase physical activity to 150 minutes per week</td>
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<tr>
<td>Sandy Lake Health and Diabetes Project</td>
<td>Schools and community-wide</td>
<td>local Aboriginal community</td>
<td>Morning snack program, collaboration with local grocery store, radio programs, walking events</td>
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</tbody>
</table>
Results of Quantitative Findings

Pre/Post Data analysis from EDC

Data on knowledge of several key indicators was collected using in-person written surveys from 38 individuals who participated in SADPP’s clinics between January 2014 and March 2014. Data collected before and after Early Detection Clinics (the first encounters) in 2014 indicated the following: there was significant change pre and post clinic on all of the questions asked.

A paired t-test was used to analyze change in participant answers to four Likert questions before and after SADPP attendance. Overall participants significantly increased their understanding of what diabetes is (p< 0.001), their understanding of what prediabetes is (p<0.001), their knowledge of what puts them at risk (p<0.001), and their understanding of why blood sugar increases in people who develop diabetes (p<0.001). This represents dramatic change in knowledge on all of the indicators that SADPP attempts to educate participants in. With the increased commitment to data quality and participant engagement, SADPP is going to start reporting back these pre and post-test results to the community groups during the DPW session (2nd encounter) to demonstrate the significant change in knowledge and to build self-efficacy and capacity-building in the group.

The overall group ratings for understanding what diabetes is changed from an average of 3.6 to 4.6 on a 5-point rating scale. The overall rating for understanding what prediabetes is changed from an average of 2.4 to 4.6 on a 5-point rating scale. Personal risk factor knowledge similarly changed in the group from 3.5 to 4.7 and understanding the relationship between blood sugar and diabetes went from an average of 2.7 to 4.6. These changes can be seen in Figure 2 below.

**Figure 2.** Participant Change in Key Indicators Pre and Post EDC

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand diabetes</td>
<td>3.605263158</td>
<td>4.657894737</td>
</tr>
<tr>
<td>Understand prediabetes</td>
<td>2.421052632</td>
<td>4.578947368</td>
</tr>
<tr>
<td>Know personal risk</td>
<td>3.5</td>
<td>4.657894737</td>
</tr>
<tr>
<td>Understand blood sugar and diabetes</td>
<td>2.736842105</td>
<td>4.578947368</td>
</tr>
</tbody>
</table>
This group of participants had slightly different demographic characteristics than the larger group of SADPP participants, with the average age being 41 years old (younger than average), and 88% being female (higher percentage of female than average). To better understand this population, some of their risk factors have been presented here. A total of 89% of this group was at some risk for developing diabetes, with 33% at high risk, and 28% each at very high risk and increased risk. Only 11% of participants were at low risk for developing diabetes. This can be seen visually in Figure 3.

**Figure 3.** Risk Scores for Participants in the Pre-Post Group

![Pre-Post Group Risk Score](image)

In terms of some modifiable risk factors, 82% of participants in this group were at high risk due to their BMI (with the remaining 18% at no risk). For physical activity, 47% were at high risk, 12% were at increased risk, and 41% were at no risk. This breakdown can be seen in Figure 4.

**Figure 4.** Pre-Post Group Physical Activity Risk

![Pre-Post Group Physical Activity Risk](image)

In the blood sugar category, 33% of participants have been told they previously had elevated blood glucose levels and thus were at high risk on this indicator (the remaining 67% were at
low risk). For risk based on family history, 41% were at high risk due to their familial diabetic prevalence.

This sample of participants were also asked to list risk factors pre and post EDC, and qualitatively more people listed sugary foods and sweets in the pre-test than the post test, and in the post-test participants were more likely to list multiple risk factors. A word cloud of the risk factors listed before and after can be seen in Figure 5, respectively, below.

**Figure 5.** Word Cloud of Listed Risk Factors

<table>
<thead>
<tr>
<th>PRE Word Cloud of risk-factors identified</th>
<th>POST Word Cloud of risk-factors identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweets, sugar and eating habits came up predominantly before the workshop</td>
<td>More informed and accurate representation of risk-factors after the workshop. Almost no mention of sugar causing diabetes (a prevailing myth)</td>
</tr>
</tbody>
</table>

**Other sources of Follow-up Data**

*Chat and Chai (Third Encounter) Data*
At this session, participants are asked about lifestyle changes they have been attempting since attending the SADPP. Data was collected using in-person written surveys from nine high and very high risk participants who attended these sessions between October 2013 and January 2014. All but one participant (89%) knew the difference between modifiable and non-modifiable risk factors. Every participant included in the survey reported trying to change their modifiable risk factors, with most participants listing diet changes, physical activity changes, or both. Specifically, participants reported: eating brown rice instead of white rice; consuming less sugar, fat, and salt; using less oil while cooking; and increasing fibre intake. A total of 75% of participants used Canada’s Food Guide, with the non-users saying that they were on other restricted diets or did not do their own cooking. When prompted, all participants said they made changes to their grocery shopping. A substantial proportion reported making changes to the way they cooked traditional food (63%), and increasing their fruit and vegetable intake (88%). *Figure on next page.*
Six people responded that they knew what depression was (63%), with the other three participants not providing answers. In terms of the stress in their own lives, participants noted that they were stressed being away from the homeland, or stressed by worrying about resources and family back in their birth country. Another individual said they were stressed by caring for high-needs children. Participants responded to their stress in different ways, with some being involved in religious activities or prayer, some trying to keep busy or ignore it, others keep a positive attitude, and others reported becoming politically and socially active to try to change conditions that are causing stress. A majority of individuals who responded (4/5 participants) said that they would not be comfortable receiving stress management services.

Participants knew that physical activity reduced their risk of diabetes, and attributed this mainly to weight loss resulting from physical activity. In addition, participants listed activities like walking, stretching, and yoga that could help to reduce their risk. Only 50% of participants had been able to create a personal activity plan that fit with their schedule.
During the sampling of the data between October 2013 and Dec 2014, SADPP identified 3 individuals who were referred by the registered nurse for second-step screening. Only one person was contacted by SADPP volunteers to evaluate their experience with second-step screening, so these results will be interpreted as a case study. The individual contacted remembered that their blood sugar level was borderline when they were screened at the SADPP Early Detection Clinic. At the clinic this individual was educated and screened for her risk factors for diabetes, which besides her South Asian ethnicity, included decreased physical activity, increased BMI and waist circumference. In addition to these risk factors, her fasting blood glucose level was 6.6 mmol/L. The program’s RN referred the participant back to her doctor, outlining the risk factors and elevated glucose level. This consequently initiated a conversation between the participant and her primary care provider, which led the participant to discussed diabetes with their doctor and had an OGTT performed.

Diabetes Education Program Referral Data
For those individuals already living with diabetes, a total of 17 randomly selected referrals were evaluated to measure successful attachment to diabetes education programs. 16 out of 17 were contacted by the DEP at the time of the evaluation call. 8 out of the 17 are successfully attached to a DEP (able to make and attend appointment). All of these individuals found the DEP referral to be useful. 4 out of the 17 participants declined DEP referrals. Another 4 out of the 17 participants state a DEP did contact them to schedule an appointment, but they were unable to make an appointment due to barriers (transportation, mobility issues, physically unfit). These participants would still like to attend a DEP, and subsequently asked SADPP for another referral. 1 out of the 17 participants were unreachable by the DEP or SADPP.

Out of the DEP group of 17, there were 13 participants who responded to questions about lifestyle modifications since attending the SADPP. A total of 11/13 people had made changes to their eating behaviours to be healthier since attending the program. Changes that were made to lifestyles included: limiting food quantity, not eating as many sweets, increasing fruit and
vegetable consumption, eating less fat and oily food, and eating less meat. When asked about changes to physical activity levels, only 6/12 participants had made these changes including starting walking and yoga. Those who had not become more active gave barriers of physical disability, expensive exercise classes, and the weather as reasons for not making changes to their lifestyle. A total of 8/11 participants who were called for DEP follow-up have been able to manage their stress better since attending SADPP with participants saying that they have been going to relatives houses, staying happy, drinking cold water, and listening to devotional music.

**Figure 8. DEP Contact Outcomes (random sampling)**

On the left you will see that, 8 out of 17 individuals were able to set up appointments, and the reasons given for the rest not being able to set up appointments include: having physical limitations (including recent surgery and pain in legs), having travel scheduled, and having difficulty in transportation. 4 of the 17 people contacted did not have interest in attending a DEP—these can be considered declined referrals. Only one individual offered a reason for not attending and this individual cited family reasons for not being interested in the program, but did not give a more specific response. The individuals that were able to set up appointments both found the DEP to be useful, and each attended three sessions at the time of the questionnaire. Some comments on the referral to the DEPs from participants include: “It was very good and helpful,” and “The program was very interesting and I understand all kind of activity which diabetic person needed.”

Of the DEP group, 13 people responded to questions about lifestyle change since attending the program. A total of 11/13 people had made changes to their eating behaviours to be healthier since attending the program. Changes that were made to lifestyles included: limiting food quantity, not eating as many sweets, increasing fruit and vegetable consumption, eating less fat and oily food, and eating less meat.

When asked about changes to physical activity levels, only 6/12 participants had made these changes including starting walking and yoga. Those who had not become more active gave barriers of physical disability, expensive exercise classes, and the weather as reasons for not
making changes to their lifestyle. A total of 8/11 participants who were called for DEP follow-up have been able to manage their stress better since attending SADPP with participants saying that they have been going to relatives’ houses, staying happy, drinking cold water, and listening to devotional music. Two barriers that were given for not making these changes were lack of time, and not knowing what to do for stress relief. Several participants commented at the end of the interview that they would like a DEP referral and do not believe that they were given one yet. Although participants stated that DEPs haven’t contacted them, according to data obtained from the SADPP’s and the DEP’s databases, some of these individuals have actually attended an appointment with the DEP. This misinformation could be related to confusion surrounding the term ‘referral’ or questions getting misinterpreted in translation.

**Figure 9.** Overall DEP Referral status (Accurate as of Mar 31, 2014)

Overall, the 2013-14 augmentation of capacities across SADPP’s multi-disciplinary team have demonstrated observable improvements with referral and attachment processes, as highlighted to the left. Before 2013, referrals to Diabetes Education Programs were processed using the DEP’s individual referral form. Since alignment with the Diabetes Leaders meetings led by the TC-LHIN, all SADPP external referrals are now being administered through the TC-LHIN Central Referral System – using the central referral form. TC LHIN’s Central Referral Services faxes SADPP’s participant referrals to respective DEPs/DECs across the GTA and then follows-up with the them to confirm if the referral can be marked received by SADPP. TC-LHIN Central Referral System then forwards status updates to SADPP, where it is noted on SADPP’s database as referral confirmed received by
respective DEP/DEC. It may appear that it is out of scope for TC-LHIN Central Referral System’s to follow-up with external DEPs to confirm the attachment element of the referral. As a result confirming attachment status from the external DEP/DEC remains a challenge, as noted in the graph on the previous page.

After using the central referral form, SADPP has experienced an increase in the response rate of some DEPs – specifically Scarborough Centre for Healthy Communities and DECNET. The feedback from these DEPs are focused specifically on the following:

1. Individuals who have declined/refused to book appointments
2. Individuals who are difficult to contact
3. Individuals who are out of the country

These participants are noted on the SADPP database as “non-compliant referrals”. Where possible non-compliant referrals are followed up by the SADPP team to:

1. Better understand the cause of non-compliance,
2. Counsel the participant on the value of attachment to the DEP and
3. Find ways to bridge their barriers to accessing the DEPs.

Consistent leadership from the TC-LHIN, alignment between DEPs and DPPs and relationship-building with external DEPs will likely best support the reporting on the attachment statistics moving forward.

**Physician Referral and Attachment Data**

*Figure 10. Overall DEP Referral status (Accurate as of Mar 31, 2014)*

Randomly selected referrals were evaluated to measure successful attachment to Primary Care Providers. (Note: this is not represented on the left) In the physician follow up calls, 4/11 participants interviewed contacted the doctor that SADPP set them up with, attended the appointment, and discussed their diabetes risk. One of these four individuals did not find the appointment helpful, and did not like the doctor they were referred to. The other three individuals reported finding the referral very useful and each said that it impacted their health. Specifically, these participants appreciated that they were able to find a family doctor who spoke their language and was their preferred gender. One person said it had a positive impact as her doctor was able to prescribe any necessary medicine as well as iron pills which helped with some
issues she was having. Another individual said it changed their food habits, and another individual felt more confident in the ability to control their risk of diabetes by changing their food habits and having regular follow ups with the family doctor.

Of those who did not make contact with a physician, one person found their own doctor and did not need the referral, one person felt the doctor they were referred to was too far away, and 4/11 participants do not remember receiving a referral.

**Database analysis**

Where SADPP had consent from participants to track and analyse the data, this evaluation did so. During April 2013 and March 2014, there were a total of 464 participants included in the analysis, to gather basic demographic data and create a participant profile. The large majority of SADPP participants are South Asian (95%), with the most common country of origin being India (127 participants, or 27%), followed by Afghanistan (86 participants or 19%), Sri Lanka (83 participants, or 17%), Pakistan (67 participants or 14%), and Bangladesh (44 participants or 9%). The most common first languages spoken by participants are Tamil (19%), Gujarati (16%), English (16%), Urdu (15%), Dari (11%), Hindi (7%) and Bengali (6%). The majority of participants are female (68% or 317 individuals), with only 32% males, and the average age is 47 years old.

**Countries of Origin**

![Countries of Origin](image)

Data from the SADPP's database between 2013-14 where consent for usage was provided was analysed for countries of origin.

This population has many modifiable and non-modifiable risk factors for diabetes. The overall risk scores for the participants seen in April 2013 and March 2014 can be seen in Figure 12 below. A total of 85% of the population is at risk of developing diabetes with 33% at increased risk, 36% at high risk and 16% at very high risk of getting the disease. For some of the specific modifiable risk factors, SADPP participants are at very high overall risk levels.
With physical activity, the vast majority of participants (52%) are in the high risk category, with a further 26% in the increased risk category, and only 22% in the low risk category, according to self-report physical activity data. A chart showing this breakdown can be seen below.

Other modifiable risk factors, such as BMI, saw similar distributions. For this group of participants, again the vast majority (65%) was at high risk according to their BMI. A further 15% were at increased risk, 16% at low risk, and 4% at very high risk. Waist circumference as a risk factor had 44% of participants in the high risk category, 34% in the increased risk category, and 22% in the low risk category. For blood sugar risk, on the other hand, only 19% of participants are in the high risk category (see Figure 14).
SADPP participants also have increased diabetes risk from non-modifiable risk factors, such as family history, history of gestational diabetes, ethnicity, and age. For example, 39% of the population was at high risk due to having relatives with diabetes. In addition, 7% were at high risk due to previously developing diabetes during pregnancy. Most participants in this cohort (40%) were at low risk due to their age, with 32% at increased risk, 14% at high risk, and 10% at very high risk for developing diabetes based on their age.

SADPP participants come from various locations across the Greater Toronto Area in addition to the local community of Flemingdon (see Figure 16). The location of the participants reflects the location of the community programs that are held by SADPP in various community centers, religious centers and health centers. However, a large proportion of participants come from
the local community around Flemingdon Health Center (see Figure 17).

Figure 16. Location of SADPP Participants based on Postal Codes

Figure 17: Location of SADPP Participants based on Postal Codes

Ministry of Health Survey Data

Context
Taking a constructively critical look at the tool developed for the MOHLTC’s Health Outcomes survey, several concerns arise that should be addressed in the evaluation report. Firstly, the tool is not based on causal program logic and has no grounding in expectations from the program logic model. Clarifying expected outcomes and measuring them carefully and intentionally is an important step, without which substantiated claims about program efficacy cannot be made. Moreover, without a control group, and solely relying on post-intervention, self-report with a long recall time is not an ideal methodology upon which to learn about program performance. It is dangerous to search for meaning in results without pre-clarifying how these results are expected to happen, or specifying a priori what should be examined. This is often referred to as fishing in data analysis, and is part of a larger phenomenon of black box evaluation – in which the mechanisms by which results are obtained remain unexamined.
Furthermore, the data collection tool would have been stronger, more relevant and responded to the concerns articulated above with greater consultation and collaboration between the DPPs (Unison, Anishnawbe and Flemingdon). For example, the relevance of the tool is lessened because it examines individual participant risks and outcomes for a program that does group-based interventions. Moreover, the burden on program staff and participants during data collection for this tool was significant. Lastly, many of the items measured in the tool suggest that sustained behavior change is expected from SADPP’s very brief interactions with participants (Which are limited to 2 sessions, each 3 hours long.) The program was designed as a screening and education program, but does not have the resources to support participants in a longer behavior-change process. All of these considerations should indicate that the data be treated with significant caution and extrapolations should not be done lightly.

**Findings**
The findings from the Ministry of Health survey will be described in detail elsewhere (specifically, in the MOH Evaluation Report) and thus, they will be reported in a truncated version here. Individuals who had attended SADPP were contacted by volunteers who conducted surveys in the languages participants were comfortable speaking. A total of 45 participant responses are included in the analysis. The survey results for the MOHLTC evaluation indicates that 62% of participants contacted 2-6 months after program attendance remembered their risk score. A total of 2% of participants were at very high risk, 67% of the participants were at high risk, 22% were medium risk, and 2% were at low risk.

**Figure 18.** Participant Risk Scores (This graphic represents the analysis from the MOHLTC’s analysis)
A large proportion of participants correctly identified that they could control diabetes risk (40/45 or 89%). When asked what they could do to reduce their risk of diabetes, 60% identified that losing weight would help, 51% said increased physical activity, 47% said eat fewer calories, and 17% said that they could eat less sugar.
Figure 20. Reduce stress and change eating habits

Respondents to question asking if they could reduce their stress to reduce risk for diabetes. Especially as stress related to resettlement can put this population at risk.

60% said they could reduce their stress. Ninety-six percent of the participants surveyed had made changes to their eating habits when asked in the follow-up survey. More specifically, 51% of individuals have been eating more fruit, 64% reported eating more vegetables, 42% reported eating less fried foods, 24% are eating less salt, 16% said they are eating less sugar, 16% said they were eating more fiber, and 49% noted that they had made changes to the way they cook traditional meals. The majority of participants (56%) reported eating 5-10 servings of fruit and vegetables every day.

In terms of barriers to eating fruits and vegetables, the most commonly cited problems included: cost, difficulty getting to the grocery store, not planning meals, difficulty with breaking habits, surrounding individuals not eating healthy, and family not being supportive.

Participants reported moderate levels of physical activity, with 49% reporting physical activity 2-4 days per week, 24% reporting 1 day per week, 16% reporting 5-7 days per week, and 7% saying that they never exercise.
In terms of barriers to physical activity, commonly mentioned barriers included: bad weather, time and other demands, feeling unsafe in neighbourhood, no good exercise programs, and feeling tired, stiff, or sore. There was a substantial report of participants who had started walking more since attending the program (64%), and also in participants who had socialized in their community (47%) and sought support to manage stress (27%).

Chi-square tests were used for categorical variables to determine relationships between demographic data and some of the outcomes reported above. Likelihood of being advised about maintaining a healthy weight was statistically related to age of participants (p=0.02) and likelihood of following advice on healthy weight was statistically related to the age (p=0.001) and sex of participants (p=0.008) with women being more likely to act on this advice. Age was significantly correlated with frequency of physical activity (p = 0.03).

Results of Qualitative Findings

One focus group was conducted in February 2014 for the purpose of gathering feedback on the SADPP. The focus group was conducted in the Tamil language with 5 participants from the local community. A volunteer that spoke Tamil and English was used to recruit participants and facilitate the focus group. A Tamil-speaking volunteer note taker was also used during the focus group.

The stated purpose of conducting the focus group is to obtain rich, in-depth, qualitative data from past program participants. The goals of the focus group were:

1) to gain participant feedback on SADPP programming,
2) to better understand why participants struggle with changing their lifestyles, and
3) to figure out what SADPP can do to bridge the gap between lifestyle change desire, and intention and implementation.

Qualitative analysis was conducted on the data from the focus groups with particular attention given to the fact that the focus group was conducted in Tamil and then translated into English for analysis. The translated script of the focus group was analyzed using a classical content analysis technique that groups chunks of data according to themes. This process of chunking gives an idea of how many times each theme came up during the focus group and can be represented quantitatively (see Figure 22). In addition, because of the language translations the analysis included the consideration of the notes taken by the note taker, which was written in English.

Figure 22. Mentions of Concepts

Feedback on SADPP Programming
With respect to what participants learned from the group and individual sessions and still remembered, participants brought up topics relating to food and diet the most, followed by physical exercise. Many of the statements around this topic were framed within making lifestyle modifications to habits and behaviours that they learned were unhealthy and may lead to diabetes.

Comments included:
“*When we are purchasing the food I used to check the calories, now, example sodium, or cholesterol level, and fat measurements, etc.*”

“*We learn how to control the diabetes with our food style, about pre-diabetes, it can be controlled now.*”

Another participant said,
“*We learn how to control the diabetes with our food style, about pre-diabetes, it can be controlled now.*”

When asked whether the program was useful, comments included:
“*Yes, it’s useful, because now we learn about the calories measurements. We know how much we have to use it for*”
breakfast, lunch, and dinner.”
“So it was very useful information in these sessions.”
“...this is very useful information... to prevent the diabetes. So these are very good
information for us.”

Several references were made to measurements, including food portion sizes, calories, amount
of sugar and the amount of oil used in cooking. Participants also mentioned the usefulness of
Canada’s Food Guide (typically provided in the participant’s own language) that was supplied
through programming, as evidenced by this comment,
“...they gave a food chart which mentioned what you had to eat, morning or noon or
evening. This chart is very useful. Now we know the food side effect, everything we got it
through this chart.”

Participants made several references to physical activity—mostly in the sense that they know it
is important without specific references to how they’ve incorporated it into their daily lives.
Comments on physical activity included:
“And also we learned about the exercise and the breathing, and also especially walking.
Its 10 minutes if you walk continuously only the fat will burn.”

“I used to walk in the malls, then walking outside to get the more fresh air...”

Participants’ Struggles with Lifestyle Changes

When asked questions about barriers to changing their lifestyle for the prevention diabetes,
many participants acknowledged the useful information and recommendations from the
program, however, cited a number of challenges to fully adopting those changes. Many of the
challenges come from a lack of time to cook healthy meals and exercise regularly. Some of the
comments relating to time include:
“When we are eating we should have food control system, avoid the short eats, people
used to watching TV and eating. We should not eat always. Avoid frying items, and the
time factors, long hours of work we used to eat anything. Because of the kind of
situation.”

When asked whether they exercise regularly, one participant mentioned,
“No, I sleep around 12:00 clock we are busy with computers or TV or drama but we are
not going outside. We are always inside the home. Even our children don’t have the time
to take us out.”

In order to compensate for the lack of dedicated exercise time, one participant communicated
their alternative solution,
“It’s difficult. We are not spending time for exercise but we are doing work in homes
such as laundry, cleaning, etc. Sometime we cannot do as per class instructions. But for
example, instead of five days exercise, we are doing three days. Sometimes we used to
go for walk after lunch.”

In regards to food preparations and diet, some participants mentioned challenges relating to
cooking for households with differing diets and tastes. When asked why they couldn’t change
their food menu to the recommendations, one participant mentioned,
“Because of the tasting problems, in the house should follow the diet, but it’s not practically possible because we have to cook for our children.”

Another participant mentioned,

“It’s very difficult to follow.... if we are alone, we can do it. Better to avoid outside food.”

Many positive lifestyle changes were also mentioned during the focus group. Participants mentioned adopting healthy shopping habits, such as checking nutritional information on packages, walking inside and outside malls for exercise, avoiding buying cheap, unhealthy snacks and not keeping sweet foods in easily accessible areas, like their cars. Most of these comments were attributed to the knowledge they learned during the SADPP sessions. In terms of managing stress, participants seemed to have understood the importance of managing and talking about stress. When asked how you can avoid stress, one participant offered the response,

“Positive thinking, time management, don’t carry all the problems one place to another.”

In response to whether SADPP talked about stress, one participant answered,

“Yes, mainly the stresses in your place, we have to talk with the children, we have to talk with all other peoples. I have to change my lifestyle according to this country and then it will be okay.”

**What can SADPP do to Bridge the Gap Between Lifestyle Change Desire, and Intention and Implementation**

When asked about what else SADPP can do to help in the prevention of diabetes, participants offered several recommendations. In terms of the structure of the educational sessions, some of the recommendations include increasing the time duration of the classes or having more sessions and using more visual examples. In addition to using visuals to deepen the learning, one participant offered an interesting recommendation,

“Instead of class training, take outside... with the fun we can learn more.”

When asked what they need other people to do to help change their lifestyle, one participant mentioned,

“Attending these type of classes, third person advice is always is very good. Language is always very important. Example, for the local language so then we can easily understand and encourage and motivate the participants.”

When asked what the program can do to make it easier to make lifestyle changes, one participant spoke about the gap in time between classes. They mentioned,

“Time gap between the two classes was long. We don’t know why this long gap. We almost forget this program. So it should not be.”

This participant offered the suggestion of quicker follow-ups after the sessions and a newsletter to keep in contact and remind them of the program. Another participant offered similar recommendations,

“...they need more advertisement for this kind of program. Through newspaper, flyers, and TV.”

In terms of healthy eating and diets, there were several mentions of wanting to know more about different kinds of oils used in cooking. Also, participants expressed interest in more specific food recommendations and visuals to demonstrate healthy meals. There were just a few
mentions about doctors and the positive role that SADPP played in making the connection between clients and doctors.

Summary of Focus Group Findings

- Participants made many references to the fact that they learned important topics while attending programming.
- Most participants found the information to be useful and practical in their individual lives.
- Participants appreciated the material given out, such as the food chart and an unspecified document.
- Participants understood the importance of physical activity, however, many were unable to properly adapt the recommendations to their lifestyle.
- Participants mentioned that the lack of time and familial responsibilities was a major obstacle to health meal planning and exercising regularly.
- Participants seemed to understand the importance of reducing stress and talking about it with family members.
- Conducting classes in South Asian languages was expressed to be important to participants.
- Participants expressed their wanting of more classes, at longer lengths and shorter intervals between classes.
- Participants offered recommendations to create more awareness of SADPP programming through various communication vehicles.
Discussion

Returning to the Original Evaluation Questions

To ground our discussion in the original evaluation questions, we have presented them again here with a recap of the data supporting the themes in each evaluation question. Evaluation questions help to give structure to investigations into program function and impact, and at the end of the evaluation it is helpful to reflect on how the data collection and analysis efforts as well as the evaluation process furthered understanding of the themes in the evaluation questions.

1. What are SADPP’s current data practices? How can these best practices be aligned with best practices for data quality in community programs?

SADPP’s data practices were explored in depth throughout the evaluation. The team went through a “Data Diagnosis” exercise to examine how data is being collected, and for what purposes. The indicators that SADPP relies on in their data collection were also reviewed and tweaked to conform to current best practices for community programs. Best practices surrounding data quality and community programs were explored in the literature review for the evaluation.

2. What are enablers and barriers to lifestyle modification for South Asian participants? Specifically, what do participant describe as the reasons they do or do not make changes after attending SADPP? How do clients feel about the sessions they attend and the staff delivery of material?

A wealth of data was gathered from both qualitative and quantitative sources on enablers and barriers to lifestyle change. The most significant barriers described were in the social and environmental determinants of health, and this is an area that SADPP has little control over in participants’ lives. These are reported throughout this document, and summarized in the “Feedback on Benefits” and “Challenges and Barriers” section below.

3. What are SADPP’s program demographics and statistics? What risk factors are present in SADPP’s client population? What data quality issues are compromising or enhancing current data analysis?

A significant volume of data was analyzed and reported on SADPP client demographics, risk factors, and behaviours. These are spread throughout the report, however, much of this information is centrally located in “Database Analysis” section of the Quantitative Findings. Throughout the evaluation, several processes were changed to enhance the quality of this data and the analysis. These changes have been touched on below in the section on “Progress Since the Last Evaluation” and have been detailed in the Interim Evaluation Report.
4. What are ideal diabetes screening and education indicators and how can they be best measured in the SADPP population?

The literature review on data quality, the analysis and revision of SADPP’s seven tools, and the revisions to the indicator guide, all helped to answer this question of what the ideal diabetes screening indicators are. Our data diagnosis exercise, the data quality protocols, and the workshop on data quality all helped to answer how they best be measured in the SADPP population. Substantial changes to the tools and procedures that SADPP uses are reflective of the evaluation progress in this area, and they are up to date with the most current evidence. A summary of the ideal diabetes screening and education indicators can be seen in the Indicator Guide in Appendix A.

Feedback on Benefits

Overall, in the 2014 evaluation, participants were highly complementary of SADPP. They used every chance given (extra comments in surveys, focus groups, during observation, etc.) to tell us how much they valued the program. Specifically, with the rich focus group data presented above we can see that participants value the content delivered in the session and feel that they learned a great deal of important information during the programming. Participants also felt that the topics were relevant and the advice was practical in their daily lives. Many participants stressed the important of programming being offered in South Asian languages and in community settings.

SADPP has seen tremendous growth since its inception and remarkable growth in the past year as well. This year, SADPP has strengthened their data quality and their volunteer engagement, which both contribute to increasing the quality of the evidence-based programming that SADPP is offering.

For example, SADPP required linguistically proficient and culturally competent volunteers to conduct activities for the evaluation and for long-term SADPP responsibilities. Blink Evaluations engaged with the volunteers to train them on data quality and SADPP client relations and documented a dramatic change in the volunteer engagement practices from the beginning to the end of the evaluation. In general, the volunteers were a very engaged group of individuals from the local community who received communications training and skills from their work with SADPP. Many of them had some personal experience of family and friends with diabetes and seemed genuinely interested in the topic area—rather than a general interest in volunteering regardless of the subject matter. This is a very positive aspect of SADPP’s volunteer program and illustrates one spoke in the volunteer engagement hub-and-spoke model. SADPP develops capacities in volunteers, who support SADPP with program/evaluation related activities. This model is clearly supported and appreciated by volunteers. As the evaluation progressed, it was clear that the volunteers gained immensely from the one-on-one staff time with the team and program manager, where they walked through the logic, intention and principles of the training that they had. The use of volunteers that are of the same culture as the focus group participants was another success. In addition to speaking the same language, volunteers were able to relate to the participants through casual conversations about cultural norms and experiences. These conversations helped to make the participants feel more comfortable and relaxed during data collection and programming, which serves to enhance the quality of the data being obtained.
A major asset of the SADPP program is its location at a community health centre, which affords it many facilities including meeting space, kitchens and other amenities. The food offered in SADPP programming is culturally appropriate, abundant and demonstrates a healthy meal. Having the support of the community health centre, and being located in the community is important to the participants and a benefit of the program, and it also helps SADPP to deliver their program effectively. SADPP offers high quality, evidence-based programming to their participants, and they are able to see demonstrable change in their participants’ knowledge, skills, and self-efficacy before and after attending the program. The culturally-competent model has been featured in a forthcoming peer-reviewed publication in the Canadian Journal of Diabetes (for a preview of the article, see Appendix B).

In addition to their regular high-quality and effective program delivery, SADPP has had many successes with community engagement and advocating for marginalized communities. Some relevant examples include:

- During 2012-2014 SADPP conducted a number of Early Detection Clinics at a mosque prominent in the newcomer community; Madinah Mosque. Subsequent to the encounters with the worshippers at the mosque, the clinicians analysed the groups’ risk-profile and identified a number of high-risk participants. Most of the challenges revolved around participants were at high risk as a result of their age, BMI, lack of physical activity, family history, cardiovascular risk and gestational diabetes (in addition to being an at high risk population.) Consistent with the multi-disciplinary model, the community outreach and clinical teams set up meetings at Madinah Mosque, to highlight the risk profile of the group especially the lack of physical activity. As a result, SADPP connected the mosque with Women’s College who are now rolling out an 18 week program involving physical activity classes to women that attend the
mosque, this also includes participants that were screened by SADPP. This is a model of systems coordination and program advocacy in the community that is both language-specific and tailored to be culturally-relevant for greatest efficacy.

- East End Community Health Centre (EECHC) where 55% were found to be High/Very High Risk were transitioned to an Urdu-speaking dietitian for ongoing education. This ongoing education at EECHC itself, bridges two barriers which we have seen participants face in the past - language and transport.
- Collaborations with Toronto Public Health for better transition of educational workshops for participants who have expressed greater engagement. Here there is the potential for future collaborations with Toronto Public Health: (Examples below)
  - TPH to train a leader in the community to start a walking group
  - Suggestions for Community Centre Free/low fee physical activity programs
  - Container/community gardening
  - Smoking cessation
  - Grocery tours + Shopping on a budget
  - Healthy cooking demos
  - Stress reduction programs

Impact of Program

There is an abundance of data from the SADPP evaluation that indicates that participants experience change in their knowledge, resources, skills, and even go on to make changes in lifestyle after the program. Participants demonstrated a statistically significant change in knowledge before and after the EDC program that they attended. Additionally, participants are more knowledgeable about risk factors after the program. Participants are able to recall their risk status and still speak highly of the program even after an extended period of time has passed since their clinic or workshop.

Many participants surveyed attempt lifestyle changes after attending the program, especially changes to healthy eating and their diet. A significant proportion (in all of the various survey tools used) also increased their physical activity and reduced their stress after the program. This is a huge accomplishment and represents a highly successful and impactful program.

SADPP programing specifically targets and engages with one of the most vulnerable groups of the population: recent immigrants and resettled South Asian populations. Many of the participants have language barriers, literacy barriers, food insecurity, inadequate housing, low income, and other structural and social barriers. SADPP engages with people using a social determinants of health lens and offers a program that eliminates barriers to access such as: transportation, child care, income, language, and cultural competence.

Follow up care

As seen with the data from the DEP follow-up surveys, the Physician Attachment tool, and the Second Step screening tool, participants are being connected with services that they require outside of SADPP’s scope. Here, we see about 50% of participants following up and accessing the services that SADPP is recommending for them. This is a high follow-up rate for this type of referral, and we would not expect all participants to use these additional services. Several participants expressed very legitimate reasons for not needing the additional resources, or deciding that they did not want to pursue them. An area for growth here is making sure that
participants know what the referral is and are aware of what is happening when it occurs, as several participants did not recall the referrals they were given. It is likely that the issue is not in missing referrals, but instead in participant misunderstanding or recall. Participants expressed gratitude for the services that they were connected with, and would like to continue to be connected with other services in the community.

To better understand this data it is important to note that many of the participants at the time of surveys over the phone were hard to reach, even when multiple phone calls were made, at multiple times and days. As well, some of the participants were out of the country at the time of the evaluation project. Finally, participants may not understand the word referral as it is used in the evaluation surveys and as a clinical term. Future recommendations would be to simplify the language by talking about an appointment that was set up for a participant.

SADPP is not funded to provide follow-up care and, even with the additional component of attachment and enrolment offered during the 2012-2013 evaluation year, it is still not possible to offer comprehensive transitions without expanding beyond the specified scope of the program. Specifically, DEPs are not required to follow-up on final attachment from the referrals that SADPP is giving them, and there is no incentive for them to do this. Previous evaluation efforts highlighted the need for more streamlined referrals in the diabetes management system in Toronto, and the current gaps in the system that represent critical points for participants and the potential for people to get lost to follow-up. However, leadership and support from the Toronto Central Local Health Integration Network’s Central Referral Coordination team have significantly increased coordination between DPP’s like SADPP and Diabetes Education Programs, as well as Diabetes Education Centres.

**Challenges and barriers**
Participants gave many examples of barriers to lifestyle change in the evaluation through many sources including surveys and the focus group. These included cost, lack of time, taste of healthy food, family considerations, poor weather, lack of transportation, physical disability, and the inability to control some aspects of stress. Some suggestions for addressing these barriers at a systemic level can be targeted at improving advocacy for this group and intervening in broader social determinants of health (such as food security, income, neighborhood resources, etc.).

SADPP experienced difficulty administering the MOHLTC tool as the core program was already operating at full capacity before the additional internal evaluation requirements were added. These additional requirements were completed successfully, but with considerable drain on personnel and resources. These barriers to expansion and extra components of programming are significant and should be considered when discussing program scope.

SADPP would like to expand their portfolio of language-specific and culturally relevant resources even further through the reproduction of the Diabetes Prevention Care Kits in Urdu and English, as well as translating the Care Kit into at least another 3 languages.

As well, SADPP is exploring with the TC-LHIN and MOHLTC resources to support the revision of the screening tool, based on the CDA’s Clinical Practice Guidelines (2013) and follow it with tool-validation; with support from MOHLTC/TC-LHIN. As SADPP’s screening tool was first developed in 2009 and revised in 2012, this is an excellent time to bring this important screening tool into current evidence and practice.
Emotional/mental and spiritual dimensions
As indicated in the literature reviewed for this evaluation, stress is a difficult reality for many recent immigrants and mental health is a substantial contributor to diabetes in the South Asian population. SADPP was a pathfinder in adding mental health to their programming and understanding the triadic influences on diabetes – and this understanding has expanded further in recent years. Now, the SADPP’s encounters with individuals focus even more on mental health and emotional care for their participants and can offer referrals and suggestions for participants who are struggling in this area.

Progress since the last evaluation

Revised Indicator Guide
Since the last evaluation, SADPP has developed a revised indicator guide. Indicators are measures that we use to better understand the world that we live and work in. They can aid in understanding, comparison, and improvement – and most critically – they help us to measure abstract things (such as improved health) more concretely. An indicator guide is often used to list and describe core indicators that are being used regularly to highlight their feature and better understand each question’s properties. This indicator guide will serve to describe and define all of the key indicators being used in the SADPP data collection. It will provide information on data sources for each indicator, as well as classify them by type, time of measurement, and provide information about the strengths and weaknesses of the choice of this question for measurement.

For the evaluation, it was important to revisit the initial SADPP indicator guide and to update and critique it to improve data quality. Only the core indicators have been included in this guide for the sake of space. There are many related indicators in the evaluation that have been designed to provide contextual information to support the core indicators and to triangulate other data, however, these are not listed as core indicators. The indicator guide can be found in Appendix A.

Data Quality Process Changes
Throughout the evaluation, several data quality training sessions and workshops were held between SADPP staff, Blink Evaluations staff, and volunteers. This allowed both the program and the evaluation to be responsive and to change and adapt to data improvement recommendations. SADPP went through a “data diagnosis” process to look at all existing tools and practices and make improvements where possible.

This has been detailed extensively in the interim evaluation report, but some examples will be offered here for illustrative purposes. For example, a script has been modified by the SADPP team to use with the administration of the data collection tools to ensure consistency in the instructions given. SADPP has quickened the turn-around time between data collection and data entry and is using volunteer capacities to upload data now as well. Furthermore, with the new tools, analysis features have been built into the software to allow for instant data analysis and regular feedback loops for the team and the participants.

To eliminate bias, SADPP has started to print the EDC and DPW forms single sided (so that participants cannot see their “pre” answers when they are completing the “post”). Double-barreled questions were eliminated from all data collection tools. For example, this is why
question 1 on the DPW was changed from “I know what Canada’s Food Guide is and I know how to use it,” to “I know how to use Canada’s Food Guide”.

Building on Data Quality Learning from Past SADPP Evaluations

It is important to build on the evidence that has been collected in previous SADPP evaluation efforts. Some key lessons learned from previous SADPP evaluations that will help our focus on data quality include:

Learning about the composition of the SADPP client profile during previous evaluations (November 2009-April 2010 and November 2012-April 2013) has helped us to better understand client needs and how services should be targeted. We use this information to improve data quality by translating data collection materials into the most prevalent languages and by being sensitive to demographics during client calls (for example, knowing that most of the participants are women who are often out in the afternoon picking up kids from school allows SADPP to focus on calling in the morning and the evening).

Data from previous evaluations suggest that differences are evident in participant’s knowledge, attitudes, and intention to change before and after SADPP participation. Knowing that these trends have emerged, SADPP can now target their efforts on improving the quality of the pre-post data collected by standardizing the time of administration, the mode of administration, the instructions given to participants, and the timing of data entry. Information from previous focus groups was useful for developing a foundational understanding of how participants view the SADPP program. Using this foundational knowledge, SADPP can now use future focus groups to ask more targeted questions of participants.

Conclusions

Overall, in the 2014 evaluation, participants were highly complimentary of SADPP. They used every chance given (extra comments in surveys, focus groups, during observation, etc.) to tell us how much they valued the program. There is an abundance of data from the SADPP evaluation that indicates that participants experience change in their knowledge, resources, skills, and even go on to make changes in lifestyle after the program. As seen with the data from the DEP follow-up surveys, the Physician Attachment tool, and the Second Step screening tool, participants are being connected with services that they require outside of SADPP’s scope. SADPP has seen tremendous growth since its inception and remarkable growth in the past year as well. This year, SADPP has strengthened their data quality and their volunteer engagement, which both contribute to increasing the quality of the evidence-based programming that SADPP is offering. This program should continue to offer the valuable services that they deliver in the community and should continue to pursue new opportunities to strengthen services and serve participants.
Recommendations

Several recommendations can be made based on the results of this evaluation effort, and these can be directed towards different actors accordingly.

Recommendations for SADPP

1. Continue to develop innovative outreach activities that engage and target individuals who are currently left out of the screening process and attempt to provide equal access to SADPP (greater focus on those individuals and groups who do not access services).
2. Continue to deliver high quality programming that is consistent with the program’s language-specific and culturally-relevant principles in the community setting. If possible, according to community partners’ schedules, attempt to shorten the amount of time between encounters with participants.
3. Work with MOHLTC and TC-LHIN to build on the existing momentum and support for the South Asian screening tool by pursuing the systematic revision and validation of the tool, as planned in 2014-15. Additionally, SADPP has been regularly and proactively scanning the literature to keep the tool up to date which should continue.
4. With the investment of additional resources, continue to translate the valuable resources that SADPP offers participants, specifically slides in different languages and the South Asian Diabetes Prevention Care Kit beyond the current two languages. It is clear that participants benefit hugely from the language specific services and resources that SADPP develops and offers and this should continue.
5. Continue to actively engage the participating communities in program planning. Work with the South Asian communities to build capacity and community strength. The program is currently delivered from a South Asian perspective but those living with diabetes or at risk in the community with challenges accessing services can strengthen in strategic planning for SADPP.
6. Increase efforts to reach other people in the participant families to affect supporting behaviours and attitudes and to use social support as a mechanism to facilitate attachment, enrolment, and behaviour change.
7. Pursue relationships with DEPs and PCPs to smooth transitions in care and help to increase feedback from PCPs and DEPs on participant health status.
8. Continue to try to target younger populations (as the risk of diabetes in South Asian begins at an earlier age than other ethnicities) and continue to try to reach the most vulnerable South Asian participants, including those not currently connected to other community services.
9. Recent community engagement strategies launched within SADPP are excellent, and this type of community engagement should continue in the future. In addition, advocate for this population to receive support in Healthy Eating, Physical Activity and Mental Health.

Recommendations for MOHLTC and TCLHIN

10. There is a strong recognition of the risk factor that lack of physical activity plays, as well as the intention to increase the level of activity - but there is a gap in implementing it. The addition of a physical activity capacity complement to the SADPP’s multi-disciplinary team make up, (ex: Kinesiologist) to support the majority of SADPP participants where there are well-documented barriers between intention and implementation around physical activity to prevent diabetes.
11. With the allocation of appropriate additional resources, continue providing the attachment and enrollment aspects of the SADPP program and continually seek input from program participants and system stakeholders on these components. However, as attachment and enrollment may present limitations in our understanding of best client care, ensure there is a consistent focus on the Diabetes prevention elements.

12. Address gaps in system and coordination between actors to identify opportunities to promote better transitions in care.

13. Assist the Diabetes Prevention Programs (DPPs) in developing a better working relationship with DEPs and PCPs, with increased awareness of SADPP and its initiatives.

14. Develop new initiatives to offer more support for referrals, that help strengthen attachment and follow up of high-risk participants to DEPs, not only those living with diabetes.

15. Actively advocate for policies and processes that will counter discrimination towards South Asians, immigrants, and people living in poverty to address some of the root causes of developing diabetes, barriers to accessing services, and making lifestyle changes.

16. Consider developing interventions to target more systemic and structural determinants of health for this community, as most of their barriers to lifestyle change are social issues (i.e., underemployment, neighborhood safety, food insecurity, and low income).

17. Offer both funding and leadership to help SADPP achieve these recommendations and continue to grow as an exemplary language-specific and culturally relevant diabetes prevention program.
References


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<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Definition</th>
<th>Time</th>
<th>Data source</th>
<th>Data Quality Considerations</th>
<th>Q#</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>“I understand what diabetes is”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree) Measures knowledge of diabetes – a purposeful and important indicator for SADPP</td>
<td>Asked right before and after EDC</td>
<td>Pre-post questionnaires with program participants</td>
<td>Used in a pre-post design this question provides a powerful quick reference point for change in diabetes knowledge. Likert scales are commonly used and accurate and sensitive in detecting pre-post change. If it is difficult to detect change in the pre-post on this item, consider switching from a 5-item scale to a 7-item scale. *May not be indicative of long-term knowledge retention (true for all pre-post indicators) *All self-report data subject to social desirability bias</td>
<td>Pre-EDC Q1</td>
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<td>2</td>
<td>“I understand what pre-diabetes is”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree) Measures knowledge of pre-diabetes – a purposeful and important indicator for SADPP</td>
<td>Asked right before and after EDC</td>
<td>Pre-post questionnaires with program participants</td>
<td>Used in a pre-post design this question provides a powerful quick reference point for change in pre-diabetes knowledge. Likert scales are commonly used and accurate and sensitive in detecting pre-post change. If it is difficult to detect change in the pre-post on this item, consider switching from a 5-item scale to a 7-item scale. *May not be indicative of long-term knowledge retention (true for all pre-post indicators) *All self-report data subject to social desirability bias</td>
<td>Pre-EDC Q2</td>
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<td>3</td>
<td>“I know what puts me at risk of developing Diabetes” Probe: “Do you know what is affecting your personal chance of developing diabetes?”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree) Measures knowledge of risk factors – a purposeful and important indicator for SADPP and one that is expected to change after EDC</td>
<td>Asked right before and after EDC</td>
<td>Pre-post questionnaires with program participants</td>
<td>Used in a pre-post design this compares perceived change in risk factor knowledge. A Likert scale here can help to measure change quickly and reliably while improving the ease of analysis compared to a long list of risk factors. It also measures perceived knowledge, which is indicative of how participants assess their own learning – a distinct and important indicator from clinician assessment of risk factor learning.</td>
<td>Pre-EDC Q3</td>
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<tr>
<td>4</td>
<td>“I understand why people at risk</td>
<td>Asked on a likert scale from 1-5</td>
<td>Asked right</td>
<td>Pre-post question</td>
<td>This question measures understanding of some of the more clinical content of the EDC and tackles</td>
<td>Pre-EDC</td>
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<td>Q4</td>
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<td>of developing diabetes have a higher blood sugar“</td>
<td>(strongly agree - strongly disagree)</td>
<td>before and after EDC</td>
<td>the essence of understanding the disease of diabetes. This question is important to SADPP’s expected outcomes, and should show significant change before and after if participants are comprehending the clinical concepts. There is a risk that if participants find the material confusing they will not rate their understanding very highly.</td>
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<td>Measures knowledge of the relationship between diabetes and blood sugar – a difficult concept and an important one for participants to grasp</td>
<td>naires with program participants</td>
<td>Used in a pre-post design this question provides a powerful quick reference point for change in clinical knowledge.</td>
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<td>“Name two risk factors that can increase the chance of developing diabetes”</td>
<td>Free text response</td>
<td>Asks right before and right after EDC</td>
<td>This free-text question assesses participant knowledge of risk factors and recall ability and provides an opportunity to confirm the information collected in Q3. If there is no observable change pre/post, try increasing the number of risk factors recalled from 2 to 4 or 5. There is a risk with this question that participants will know 2 risk factors before starting the program.</td>
<td>Pre-EDC</td>
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<td></td>
<td>Assesses actual knowledge of risk factors – provides confirmation of assessment of Q3</td>
<td>Pre-post questionnaires with program participants</td>
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<td>“I know how to use Canada’s food guide”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree)</td>
<td>Asked right before and after DPW</td>
<td>Used in a pre-post design this question provides a powerful quick reference point for change in ability to use the Food Guide. Likert scales are commonly used and accurate and sensitive in detecting pre-post change. This question is highly specific with the reference to Canada’s Food Guide, which is helpful - and will provide more accurate responses than, for example, asking someone if they know how to make healthy food choices.</td>
<td>Pre-DPW</td>
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<td></td>
<td>Measures knowledge how to use Canada’s Food Guide before and after being taught this information by SADPP</td>
<td>Pre-post questionnaires with program participants</td>
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<td>Q1</td>
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<td>“Name two eating habits that can increase your risk”</td>
<td>Free text response</td>
<td>Asked right before</td>
<td>This free-text question assesses participant knowledge of eating habits and recall ability and provides an opportunity to see change in</td>
<td>Pre-DPW</td>
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<td></td>
<td>Assesses actual</td>
<td>Pre-post questionnaires</td>
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<td>Q2</td>
<td>of diabetes”</td>
<td>knowledge of unhealthy eating habits and right after DPW</td>
<td>with program participants</td>
<td>knowledge after SADPP exposure. If there is no observable change pre/post, try increasing the number of eating habits recalled from 2 to 4 or 5. There is a high risk with this question that participants will know 2 unhealthy eating habits before starting the program – and therefore, it would be impossible to detect change. This question may need to be altered to be more useful, however, it should first be tested in the population to determine usefulness.</td>
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<td>8</td>
<td>“I understand how unmanaged stress, especially long-term stress from resettling in a new country like Canada, can lead to diabetes.” Probe: “Do you know how having long-term stress in your life can increase your risk of diabetes?”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree) Measures knowledge of the relationship between mental health and diabetes – and specifically for South Asian immigrants. This is a difficult concept and an important one for participants to grasp</td>
<td>Asked right before and after DPW</td>
<td>Pre-post questionnaires with program participants</td>
<td>This question measures understanding of some of the more clinical/mental health content of the DPW and tackles the essence of understanding the social risk factors of diabetes. This question is important to SADPP’s expected outcomes, and previous evaluations revealed that participants struggle to understand mental health connections so it is important to capture this. There is a risk with this question that if participants find the material confusing they will not rate their understanding very highly, and there is potential for understanding to actually decrease in the event that participants realize that they do not know much about this issue (i.e. the phenomenon that you don’t know what you don’t know may cause understanding to decrease with exposure to the material). This is not likely, and this question should be tested in the population before deciding how useful it will be.</td>
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<td>9</td>
<td>“Stress only affects a person mentally, not physically”</td>
<td>Asked on a likert scale from 1-5 (strongly agree - strongly disagree) Measures understanding of the connection between mental and physical health.</td>
<td>Asked right before and after DPW</td>
<td>Pre-post questionnaires with program participants</td>
<td>This question measures change in knowledge about mental health and stress. This is again important to SADPP’s expected outcomes because previous evaluations revealed that participants struggle to understand mental health connections. A Likert scale is appropriate for this question because participants can demonstrate change without fully understanding the concept. Consider re-ordering questions to put this question before DPW Q3 because it has the potential to bias the response to this question by confirming that there is a link between stress and diabetes.</td>
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<td>Question</td>
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<td>Prompt: “Do you understand the benefits of physical activity on your personal risk factors?”</td>
<td>Measures participant understanding of the link between physical activity and risk of developing diabetes for you personally.</td>
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<td>Likert scale from 1 (strongly agree) to 5 (strongly disagree)</td>
<td>Asked on a likert scale from 1 to 5.</td>
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<td>Pre- and post-DPW questionnaires with program participants</td>
<td>Asked right before and after program participation.</td>
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<td>This question is highly specific, and this means it has a higher chance of producing reliable results and measuring what you actually intend to measure. Likert scales are commonly used and accurate and sensitive in detecting pre-post change.</td>
<td>Used in a pre-post design this question provides a powerful quick reference point for change in understanding personal benefits of physical activity.</td>
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APPENDIX B. Peer reviewed Publication in the Canadian Journal of Diabetes

How to Offer Culturally Relevant Type 2 Diabetes Screening: Lessons Learned from the South Asian Diabetes Prevention Program

Author Disclosures

No authors have a conflict of interest to report.

Author Contributions

All authors contributed substantially to conception and design, or acquisition of data, or analysis and interpretation of data, and drafted the article or revised it critically for important intellectual content and gave final approval of the version to be published.
ABSTRACT

The literature on diabetes in the South Asian population clearly states the high-risk status of this group, yet there is a lack of effective models of culturally relevant, community-based screening and education programs for such a group. The South Asian Diabetes Prevention Program (SADPP) was developed to enhance equitable access to diabetes prevention resources for the South Asian communities in Toronto, by offering language-specific and culturally relevant services. The SADPP model works through three participant education sessions, plus an additional attachment and enrollment component. The screening tool that SADPP uses to provide participants with their individual risk score at the first education session is derived from the multi-culturally validated CANRISK tool, which has been modified to reflect the distinctive characteristics of the South Asian population. After analyzing the risk scores, 32% of participants were at Increased Risk, 40% were at High Risk, 21% were at Very High Risk, and only 7% were found to be at Low Risk of developing diabetes. Evaluations of the program conducted in 2010 and 2013 revealed that the program is achieving its objectives and that participants increase their knowledge and self-efficacy related to diabetes prevention after program participation. Participants reported that the presentation from the nurse and dietitian, the question-and-answer time, the healthy eating demonstration, the multiple languages of delivery, and the convenient location were especially beneficial. Those working in the field are encouraged to adapt this model and to contribute to the development of culturally relevant, community-driven diabetes prevention programs.

Key words: Prevention; Diabetes Mellitus, Type 2; Screening Program; culturally relevant; South Asian; language-specific; community based; Early Detection
INTRODUCTION
The literature on diabetes in the South Asian population clearly states the high-risk status of this group (1, 2). Research on diabetes prevalence in Ontario shows that almost 12% of the immigrated South Asian population living in Ontario is living with Type 2 Diabetes, compared to 5.2% of the general population (2). Additionally, it is well-known that both prediabetes and diabetes disproportionately affect socially and economically disadvantaged groups, including recent immigrants (3). The need for culturally relevant programming is evident and this is reflected in both research discourse and professional practice (4, 5).
Emerging literature also dictates the vital importance of prevention, and highlights screening programs as a key component of prevention efforts (6, 7). However, there is no evidence that screening efforts lead to improved cardiovascular outcomes (8). Screening in high-risk populations has proven to be an effective practice (9,10,11), especially two-step screening (12). The most accurate screening modalities are invasive and time consuming, and not likely suitable for community level, population-based screening (13). Thus, screening people who are known to be at risk of developing type 2 diabetes through a simple method that combines risk-factor assessment with simple blood glucose testing may be an effective public health strategy. This approach has been evaluated in other populations with encouraging results (,14,15,16,17), but there is a lack of evidence on the efficacy of screening approaches in the South Asian population (8).

Unfortunately, there is a paucity of evidence on effective models of culturally relevant, community-based screening and education programs, especially for the South Asian population in Ontario. A diabetes screening and awareness program was developed in Alberta for the Indo-Asian population (18). Research from this program has further emphasized the need for culturally relevant community-based diabetes prevention strategies for high risk populations in this country (5, 18). This paper will share evidence and models of practice from the South Asian Diabetes Prevention Program (SADPP) for other groups working to develop culturally relevant diabetes programs in the field.

PROGRAM DESCRIPTION
The South Asian Diabetes Prevention Program was developed by Flemingdon Health Centre (FHC) in Toronto and is funded by the Toronto Centre Local Health Integration Network. The overall goal of the program is to enhance equitable access to diabetes prevention resources for the South Asian communities in Toronto, by offering language-specific and culturally relevant services. The SADPP model involves screening participants for diabetes and prediabetes, providing education sessions on preventing diabetes and healthy living, and making referrals that are responsive to participants’ needs. A logic model describing the program activities, objectives, outputs, and outcomes can be seen in Figure 1. Program Logic Model.

Typical barriers to diabetes prevention that have been identified and targeted by SADPP include transportation, language, cost, and health literacy. SADPP addresses these barriers by setting up mobile clinics that provide free services in the community in languages that participants are comfortable speaking, using culturally relevant practices. Screening sessions and materials are offered in South Asian languages and suggestions for lifestyle modifications are intended to reflect the daily lives and distinct diets and cultures of participants. The program team is able to achieve this level of cultural competence through the support of South Asian staff members who
speak the languages. Screenings are conducted at locations where the target population meets regularly (for example places of worship, settlement and newcomer centres, public schools, etc.).

A multi-disciplinary team consisting of a registered nurse, a registered dietitian, community outreach workers, a database-entry assistant, and a program coordinator delivers the activities of SADPP. The SADPP community outreach workers connect with unique groups of South Asians by contacting an organization and developing a relationship with that group. After determining interest and coordinating schedules, the SADPP team arranges an Early Detection Clinic (EDC) for the organization’s members and the surrounding community. Efforts are made in particular to outreach to those individuals and communities who are marginalized, socially and economically disadvantaged and; do not traditionally access health promotion services particularly due to resettlement. SADPP’s outreach strategy consists of: person-to-person engagement in the community with prospective groups; conducting information sessions to recruit participants for the program; and collaborating with community leaders, volunteers, and key stakeholders to assist with program attendance, session logistics, and interpretation. The team will continue to work with each new group until participants have been through all three encounters.

The SADPP model works through three participant encounters, plus an additional attachment and enrollment component:

1) The first encounter is a three hour Early Detection Clinic (EDC), a first-step screening to identify South Asian program participants who are at-risk of developing diabetes. Before the screening process begins, staff provide an interactive education and awareness session about diabetes and prediabetes risk factors. Participants from South Asian communities are first screened at the EDC using an evidence-based tool tailored to the population which groups participants into categories of ‘Low Risk’, ‘Increased Risk’, ‘High Risk’, ‘Very High Risk’ and ‘Living with Diabetes’. Contrary to the CANRISK tool which is self-administered (18), SADPP’s screening tool is tailored to the South Asian population based on risk criteria for this specific population and is administered by the SADPP team at the three distinct stations of the EDC:

- Station 1 (Risk Assessment) – When participants begin the clinic, they meet with an outreach worker to initiate the risk assessment of the screening process.
- Station 2 (Physical Activity and Anthropometrics) – Next, participants move on to see the dietitian for the physical activity, BMI, and waist circumference assessment.
- Station 3 (Cardiovascular Risk and Capillary Blood Glucose Testing) – Finally, participants see the nurse for Cardiovascular Risk factors, blood-glucose testing, the risk score calculation, and subsequent referral. The blood glucose testing in this station is done for educational purposes to give clients an understanding of what a blood glucose value means, and to demystify the blood glucose testing process that might otherwise be intimidating in a clinical environment. The results are not used in risk score calculations as they are not considered to be well-suited for reliable risk-scoring. Furthermore, the purpose is to identify those participants who would gain from future follow-up and Second Step Screening.
**Second Step Screening:** Those who are identified at the EDC with high glucose values are referred back to their Primary Care Providers (PCPs), or connected to new PCPs if they are unattached, for further examination and diagnosis. The Registered nurse helps participants by completing a referral form which is sent directly to the PCP for *Second Step Screening*, where the PCP may perform further testing (ex: OGTT etc). Those who are identified as living with diabetes are connected with Diabetes Education Programs (DEPs).

2) The second encounter is the *Diabetes Prevention Workshop (DPW)*, which is an interactive workshop focusing on the three pillars of diabetes prevention including healthy eating, physical activity and mental health. These three areas correspond to lifestyle issues that increase diabetes risk and impact South Asian individuals particularly as a result of resettlement in Canada (20, 21,22). This session includes a healthy salad preparation demonstration and practical advice for lifestyle modification tailored to South Asian communities. While participants leave the first encounter with an enhanced understanding of their own individual risk-factors, they leave the second encounter with enhanced knowledge and skills around making evidence-based modifications to their lifestyles.

3) The third encounter includes a workshop for only the highest risk participants roughly one month after the second encounter, which revisits important prediabetes awareness and prevention concepts from the *EDC* and the *DPW*. At this session, participants are asked about lifestyle changes they have been attempting since attending the program and the clinicians help brainstorm tailored and practical solutions that respond to their personal barriers. Participants are then further referred to health providers such as social workers and dietitians as needed.

In response to requests from participants, SADPP developed a Diabetes Prevention Care Kit for South Asian individuals. The kits each contain an evidence-based handbook and DVD (in English/Urdu and English/Tamil) that reflect the content of the EDC and DPW (diabetes awareness, healthy eating, physical activity, and mental health), a healthy plate tool, a pedometer, measuring spoons, and a waist-measuring tape. Currently these kits are given out to highest risk participants at SADPP third encounter sessions to reinforce key diabetes prevention messages delivered in the program.

4) The attachment and enrollment component was designed in 2012 to better connect participants who are either unattached to PCPs or DEPs. This component involves a SADPP team member following up by telephone with such participants to confirm that they were able to connect with the PCP or DEP that they were referred to and troubleshooting accordingly. This follow-up also allows SADPP to document enablers and barriers to accessing and remaining attached to these services.

**SCREENING TOOL DESCRIPTION**

The screening tool that SADPP uses at the EDC to provide participants with their individual risk score is derived from the multi-culturally validated CANRISK tool (19), but has been modified to reflect the distinctive characteristics of the South Asian population (contact the authors for access to the SADPP Risk Assessment Questionnaire). The tool is administered by the team to eliminate challenges related to health literacy and to improve the completion rate.
The SADPP Risk Assessment Questionnaire includes sections on: country of origin, age, family history, previously elevated blood sugar, physical activity, BMI, waist circumference, cholesterol, cardiovascular disease and blood glucose measurements. South Asians have a higher proportion of body fat than other ethnic groups and as such the World Health Organization has suggested lower cut-off points for BMI and waist circumference in Asian populations (23). These unique cut-offs are reflected in the modified screening tool. The physical activity assessment was also modified from CANRISK to better reflect current guidelines which include frequency, intensity, duration and type of physical activity (21, 24). The mother and father ethnicity question was changed because for South Asian participants it is unnecessary to ask for the race of both the mother and the father (if either one is SA, it will produce the same risk score). The question on educational attainment was removed as participants were uncomfortable with sharing this information in a public setting. Finally, CANRISK includes a question on fruit and vegetable consumption that was not included in the SADDP tool because it was felt to be too subjective and the reliability of the self-report information was felt to be low.

Additionally, after risk scoring a simple blood test using a capillary blood glucose monitor is performed to enhance awareness around abnormal glycemic values. Participants with high blood glucose values are referred to their PCP for Second Step Screening. Each risk factor is assigned a score based on a scoring system modified from CANRISK. The screening tool concludes with the summation of individual risk factors participants leave the EDC with a heightened awareness of their own personal risk status. While the risk categories are felt to remain sufficiently close to the CANRISK categories to maintain the same risk progression, the exact predictive value of the tool is not yet known and will be further tested through a systematic validation process. Additionally, the risk scoring tool is currently utilized for the needs of the program as a way to target and re-engage with the most at-risk participants for the third encounter.

EVIDENCE FOR THE PROGRAM MODEL
The SADPP program continually responds to emerging program evidence and attempts to make changes to the program to improve iteratively. The program was developed in 2008 after an initial needs assessment in the community. Results from two program evaluations conducted in 2009-10 and 2012-13 will be briefly offered below.

All clients provided informed consent and this study was reviewed by the University of Toronto research ethics board. Emerging evidence for this program model comes from focus groups, pre-post questionnaires, and follow-up calls conducted with past participants. A total of four focus groups were done, with participant who attended at least two SADPP sessions in 2010. Self-administered questionnaires were given to participants who attended a SADPP screening or workshop in January and February 2013. This generated 35 matching pre-test and post-test responses which were analyzed using SPSS Version 19.0. Follow-up calls were done with 35 participants between 1-6 months after participants finished the program. Demographic data comes from the SADPP database of 685 participants. Analysis of 2013 data reveals that the top five countries of origin for participants are: India, Sri Lanka, Pakistan, Bangladesh, and Afghanistan. SADPP also serves individuals who speak many different South Asian languages including, in order of prevalence, Urdu, Tamil, Hindi, Gujarati, Bengali, Dari, and Punjabi. The average age of participants was 51 years old, with 35% male and
65% female participants. The average BMI of the participants was 27.4 (SD +/- 4.4); much higher than the WHO cut-off of 23 for an increased risk of developing chronic diseases (23). After analyzing the risk scores for the 491 South Asian participants that were assessed using the risk scoring matrix, 32% were found to be at Increased Risk, 40% were at High Risk and 21% of participants were at Very High Risk of developing diabetes. Only 7% were found to be at Low Risk.

Differences were evident in participant’s knowledge, attitudes, and intention to change before and after SADPP participation. Participants reported knowing much more about risk factors for developing diabetes when asked the same question before and after SADPP participation (p < 0.001). Increases in self-efficacy related to reducing diabetes risk were seen before and after participation with a jump in responses from 51% to 70% of participants agreeing with the statement, “I am confident I can reduce my personal risk of diabetes” (p = 0.037).

Follow-up calls done with participants indicated that many had made changes to their lifestyle since their last interaction with SADPP. A total of 86% of these participants reported making changes to their diet including examples of: reducing total carbohydrate, sugar, fat and sodium intake and increasing fibre and vegetable consumption. An identical proportion (86%) of participants reported some increase to their activity levels since SADPP participation by: more walking, yoga, joining an exercise facility, climbing stairs, and cycling. Follow-up data revealed that participants struggled after the program with maintaining a personal physical activity plan and understanding the connection between diabetes and mental health. Participants identified wanting more support to make lifestyle changes in these areas.

Participants in all focus groups appreciated how informative the sessions were. They also highlighted the way the program raised their awareness and described the information provided as alarming and critical in highlighting the seriousness of the disease. These participants reported that the presentation from the dietitian and nurse, the question-and-answer time, and the healthy eating demonstration were especially beneficial. Additionally, participants noted added comfort due to the multiple languages of delivery and the convenient location. Participants recognized several persistent barriers to change including: taste or food preference, cultural cooking, transportation, bad weather, lack of time, family responsibilities, habit, age, the cost of healthy food, financial stress and discomfort with conventional nutrition/exercise programs.

LESSONS LEARNED
Lessons learned throughout the SADPP implementation and evaluation process for those looking to implement a similar program include:

- The multi-disciplinary team model allows for the contribution of expertise from distinct professions and strengthens the overall program.
- Keeping open lines of communications with the funder is necessary, especially in sharing successes, gaps, and opportunities.
- Nurturing a team culture that is open and innovative gives staff permission to lead and creates a balance of teamwork and autonomy.
- Investing time in outreach planning and strategy allows effective reach of the intended target population and more effective program delivery overall.
Building and nurturing relationships with all partners (clinical and community) leads to increased uptake and effectiveness of the program.

Using project management principles as the program is operationalized is helpful in maintaining organization and maximizing learning.

Playing a strong advocacy role in highlighting system-gaps and resource-gaps in culturally-relevant and language-specific programs and resources will help to ensure sustainable resources are funded and developed.

CONCLUSIONS AND FUTURE DIRECTIONS
Overall, SADPP is an example of an innovative model that has shown success in reaching many of its objectives. Since the inception of the program in 2009, SADPP has screened over 3200 South Asians in the Toronto Area and this diabetes prevention program model has been scaled up to other sites and different cultural groups. The program has been able to reach a high-risk population group, many of whom have been negatively affected by the resettlement process, and has been able to increase awareness of diabetes risk factors in this population. The impact of the program is clear in the changes seen in program participants. SADPP has developed an evidence-based screening tool, specifically designed for the South Asian population and will pursue systematic validation of this tool for further use. Currently, long-term follow-up with participants is out of scope for this program, based on funding restrictions and program parameters determined by the funder. However, longer term follow-up beyond the third encounter including re-assessment with this population is necessary to determine development of diabetes and the preventative benefit of the program. This is a direction that SADPP will explore further, in consultation with the funder in the future.

SADPP will continue to work on screening underserved and younger populations who are at risk of developing diabetes. Those working in the field are encouraged to use similar models as they design programs that are responsive to the many diverse cultural communities across Canada and to contribute to the evidence base of how to develop culturally relevant, community-driven diabetes prevention program.
APPENDIX C. Theory of Triadic Influences Diagram

Note: In this chapter, we consider the three streams and six sub-streams in the reverse order, or mirror image, compared to our previous presentations. This is in response to suggestions from others that it is easier for many people to think persons outward to the environment and iteratively from left to right.
APPENDIX D. SADPP Modifiable Risk Factors

Overall risk - assessment

At Low Risk
- Continuing a healthy lifestyle. Check your blood glucose every year, as you are still at risk due to your ethnicity and other risk factors.

At increased risk of developing type 2 diabetes
- Aim to reduce the modifiable risk factors by including lifestyle changes recommended at the upcoming Diabetes Prevention Workshop. Check your blood glucose every year.

At high risk of developing type 2 diabetes
- At this risk level, you have been identified as being at high risk of developing type 2 diabetes. At a second step, you are being referred to your family physician for conclusive testing and diagnosis. It is strongly recommended that you attend the upcoming Diabetes Prevention Workshop. Check your blood glucose every year.

Currently living with type 2 diabetes
- Need Diabetes Management. You will be contacted with a Diabetes Education Management program that is convenient for you to regularly attend. (As well, you are encouraged to attend the upcoming Diabetes Prevention Workshop.)

Risk factors I can change

- Lack of physical activity
- Being overweight
- Having abdominal obesity
- Unhealthy diet (e.g., high in calories, high in sugar, salt, fat)
- High cholesterol
- High blood pressure
- Stress
- Other health problems related to insulin resistance

Three things I would like to do...
1. Attend the diabetes prevention workshop on
   Date: __________  Time: __________
2. __________
3. __________

This is a screening tool and in no way confirms a diagnosis

Name: __________________________ Date: __________

Registered Dietitian

Body Measurements

<table>
<thead>
<tr>
<th>Body Mass Index (BMI) for South Asians</th>
<th>My BMI: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5 to 22.9: No Risk</td>
<td></td>
</tr>
<tr>
<td>23.0 to 24.9: Increased Risk</td>
<td></td>
</tr>
<tr>
<td>25.0 to 29.9: High Risk</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Weight: ______ lbs ______ kg</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Waist Circumference</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asian: Maximum or equal to 90 cm</td>
</tr>
<tr>
<td>General Population: Maximum or equal to 102 cm</td>
</tr>
<tr>
<td>Woman Less than or equal to 80 cm</td>
</tr>
<tr>
<td>Woman Less than or equal to 85 cm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Waist circumference: ______ cm</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Healthy Range</th>
<th>Increased Risk</th>
<th>High Risk</th>
</tr>
</thead>
</table>

A modest weight loss of 5-10% from initial body weight can substantially improve insulin sensitivity (ADA, Clinical Practice Guidelines 2009), and may prevent or delay the onset of type 2 diabetes.

What is my 5-10% ______ Goal weight range: ______

Registered Nurse

Finger pricking test

<table>
<thead>
<tr>
<th>My blood glucose value ______ mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random</td>
</tr>
</tbody>
</table>

What my test results mean?

<table>
<thead>
<tr>
<th>Normal</th>
<th>High Value</th>
<th>Need further testing</th>
</tr>
</thead>
</table>

HbA1C Blood Glucose Value

<table>
<thead>
<tr>
<th>This test may be performed anytime, regardless of your last meal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal: 4.0 - 7.9 mmol/L</td>
</tr>
<tr>
<td>Prediabetes: 8.1 - 11.0 mmol/L</td>
</tr>
<tr>
<td>High Value: More than 11.1 mmol/L</td>
</tr>
</tbody>
</table>

FASTING Blood Glucose Value

<table>
<thead>
<tr>
<th>You must not eat or drink anything except water for at least 8 hours before this test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal: 4.0 - 6.0 mmol/L</td>
</tr>
<tr>
<td>Prediabetes: 6.1 - 9.9 mmol/L</td>
</tr>
<tr>
<td>High Value: More than 7.6 mmol/L</td>
</tr>
</tbody>
</table>