



Public health program planning logic model for community engaged Type 2 diabetes management and prevention



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ABSTRACT

Diabetes remains a growing epidemic with widening health inequity gaps in disease management, self-management knowledge, access to care and outcomes. Yet there is a paucity of evaluation tools for community engaged interventions aimed at closing the gaps and improving health. *The Guide to Community Preventive Services (the Community Guide)* developed by the Task Force on Community Preventive Services (the Task Force) at the Centers for Disease Control and Prevention (CDC) recommends two healthcare system level interventions, case management interventions and disease management programs, to improve glycemic control. However, as a public health resource guide for diabetes interventions a model for community engagement is a glaringly absent component of the *Community Guide* recommendations. In large part there are few evidence-based interventions featuring community engagement as a practice and system-level focus of chronic disease and Type 2 diabetes management. The central argument presented in this paper is that the absence of these types of interventions is due to the lack of tools for modeling and evaluating such interventions, especially among disparate and poor populations. A conceptual model emphasizing action-oriented micro-level community engagement is needed to complement the *Community Guide* and serve as the basis for testing and evaluation of these kinds of interventions. A unique logic model advancing the *Community Guide* diabetes recommendations toward measureable and sustainable community engagement for improved Type 2 diabetes outcomes is presented.

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1. Background

The Task Force on Community Preventive Services was established by the U.S. Department of Health and Human Services (DHHS) in 1996 to develop a guide on successful and not-so successful community-based health promotion and disease prevention interventions (Truman et al., 2000). The Task Force produced *The Guide to Community Preventive Services (Community Guide)* based on systematic review and assessment of the quality of available scientific evidence of interventions identified as effective strategies for disease prevention (Task Force on Community Preventive Services, 2002). As an evolving document, the *Community Guide* serves as a reference tool for planning community-based interventions involving both population and clinical care system solutions to address several disease areas. One such area the *Community Guide* covers is interventions for diabetes mellitus (diabetes) (CDC, 2012).

Diabetes has become an increasing public health concern with adult and child obesity reaching epidemic proportions (CDC, 2011). Over the next decade, costs associated with treatment, rehabilitation and lost productivity associated with the disease are projected to rise at an exponential rate. In addition, racial and socioeconomic health equity gaps are also expected to widen if improperly or inadequately addressed (Peek, Cargill, & Huang, 2007). The *Community Guide* recommends health care system level interventions (case management and disease management) and diabetes self-management education (DSME) for improving glycemic control (blood sugar levels) in persons with diabetes (Norris et al., 2002). The recommendations are as follows:

1.1. Health care system level interventions

- Case Management—Assign a case manager to plan, coordinate, and integrate care for people with diabetes.
- Disease Management—Identify everyone with diagnosed diabetes in the community or health care delivery organization and implement care plans proven to be effective then track, measure, and manage health outcomes.

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1.2. Diabetes self-management education (DSME)

- Provide diabetes DSME in community gathering places for adults with Type 2 diabetes such as community centers, libraries, and places of worship.
- Provide diabetes DSME in the home for children and adolescents with Type 1 diabetes.

Based on the available evidence considered robust or sufficiently effective, the recommendations suggest that health care system level interventions like disease management will: (a) lower blood sugar levels by improving physician monitoring for diabetic retinopathy (eye disease); (b) prevent foot lesions and nerve damage; and (c) monitor for signs of possible kidney damage. DSME on the other hand, which can be implemented both in community and health care delivery settings, will improve an individual's control over the disease by increasing knowledge of diet, exercise and medication. Both interventions are believed to improve the patient's outcomes through affecting psychosocial mediators such as self-efficacy, social support and health beliefs (Schulz et al., 2005; Jack, Liburd, Spencer & Airhihenbuwa, 2004).

However, a disconnection remains between the *Community Guide* Type 2 diabetes recommendations and tested models of community engagement. Evidence-based presentations of models of community engagement aligned with the recommended diabetes interventions from the *Community Guide* can further efforts for more effective and sustainable outcomes in the fight against Type 2 diabetes. The logic model and recommendations that follow highlight such links and aim to advance thinking and discourse toward realizing and sustaining capacity building, efficacy and social investment among key community change agents for lower diabetes risk factors and improved health. The

logic model inputs, activities and desired outcomes focus on Type 2 diabetes as an example of a preventable chronic disease requiring intensive community engagement coupled with diligent and well thought-out case management, disease management and DSME intervention (Fig. 1).

2. Rethinking community engagement

At its core, public health research and practice is shaped greatly by community engagement on a variety of levels, but significant concerns remain regarding authentic community ownership and sustainability from such efforts. Whether defined as community outreach, community mobilization or community organizing, relationships between civic and social groups, residents, local organizations and public health professionals are central to health promotion and prevention (Jones & Wells, 2007; Kieffer et al., 2004; Minkler & Wallerstein, 2003). The intensity and degree of engagement will be defined by the model of engagement chosen for a given context or environment. *The Principles of Community Engagement* [Second Edition] has defined four main models that influence engagement. The four models include Social Ecological Model, Active Community Engagement Continuum (ACE), Diffusion of Innovation and Community-Based Participatory Research (CBPR) (CDC, 2013).

The most familiar of these is perhaps the Community-Based Participatory Research model (CBPR) as it has been elevated as the optimal public health intervention approach over the last decade or so (Higgins & Metzler, 2001; McKnight, 2000). CBPR collaborations however are primarily meant to help researchers initiate, refine and often redefine research questions and develop and disseminate culturally and linguistically appropriate questionnaires and health literature. One of the underlying premises of

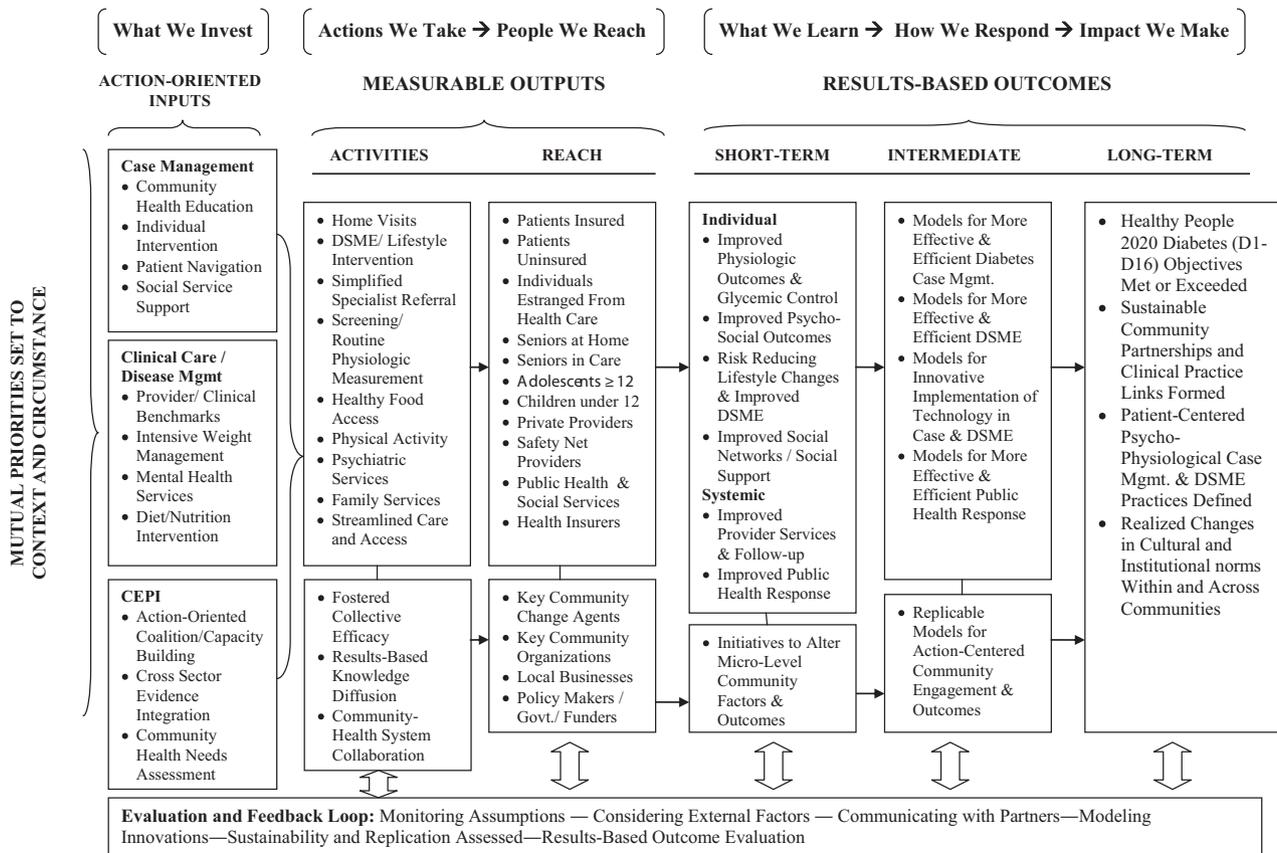


Fig. 1. Draft logic model for community engaged Type 2 diabetes intervention.

CBPR is that the research will directly benefit the community in which the collaboration occurs. Yet as some researchers have pointed out these collaborations and community partnerships are difficult to maintain. Some of the challenges and factors that precipitate the breakdown of CBPR collaboration are the absence of sustained funding, dissolved or poorly constructed capacity and lack of institutions committed to furthering knowledge or strengthening partnerships (Israel et al., 2006; Shalowitz et al., 2009). In some of the poorest communities where both the research and intervention needs are the most significant, competition for scarce resources such as viable space, leadership talent and engaged citizenship can disband a CBPR partnership soon after the first steps are taken (Burke et al., 2013; Griffith et al., 2010; Israel et al., 2010). Therefore, predominantly, community organizations and participants are engaged only through “project” or research cycles, and have life lines that extend as far as or just slightly beyond these projects.

A fifth model it seems is needed to meet and overcome the challenges posed by traditional CBPR approach. First, the Research “R” in CBPR, which itself can be a barrier, especially in communities where the term “research” evokes a visceral response from the legacies of nefarious investigation, should be eliminated. Second, the Participatory “P” should be redefined in a way that adds value to collaboration and inclusion. For many communities being a ‘participant’ in research may be interpreted as being a ‘subject’ of passing exploration or experimentation. Currently in typical community-based approaches the participatory “P” suggests a relationship formation being driven by or constructed within a dominant research agenda—the “R”. Stated differently under a typical CBPR model, without the preceding research agenda and funding setting the table far too often there is no lasting basis to sustain community interests. Consequently, post conclusion of the effort participation wanes and the relational breakdown begins. These suggested changes are not merely about rearranging or dropping letters. Advancing the implementation of interdisciplinary, and evidence-based practiced interventions, especially within communities that are the most vulnerable, requires removing of any potential stigmas.

A proposed model to address this issue may be called Community Engaged Practiced Intervention (CEPI). CEPI is discussed here as a valid strategy for building stronger and lasting community-based intervention and research models. CEPI is a model where scientific and public health professionals and members of a community or communities with shared circumstances work together as change agents. Together there are short-term and long-term goals to simultaneously develop, implement, and diffuse actionable innovations which are relevant, sustainable and replicable. From the start in the CEPI model partnerships and collaborations are solidified around an action agenda with mutually defined processes and outcomes. In a far-reaching effort to improve health outcomes and eliminate health inequities, the CEPI model:

- (a) draws on existing knowledge regarding cultural appropriateness and understanding of a community’s unique history, environment and circumstance;
- (b) draws upon existing scientific evidence from multiple disciplines;
- (c) fosters and integrates tested practices;
- (d) advances civic engagement and focuses on lasting community action;
- (e) identifies and deploys innovative technologies, and techniques designed to refine cultural and institutional norms both in the community and in research;
- (f) champions resource development to address health, economic and political inequalities.

To further elaborate, Table 1 shows an application of the central themes of each of the aforementioned models from *The Principles of Community Engagement* [Second Edition] to the recommended diabetes interventions from the *Community Guide*. The table also shows the application of the proposed fifth model (CEPI) to the recommendations. While the CEPI model focuses on Type 2 diabetes as an example, it can be applied to any chronic disease intervention.

Following a systematic review of the overall strength of the body of evidence and the size and variability of reported effects on improving Type 2 diabetes outcomes, the *Community Guide* recommends case management by either clinical (e.g. nurse, nurse practitioner) or non-clinical (e.g., patient navigator, health educator) staff and disease management by primary care provider, endocrinologist or pharmacist. It also recommends self-education to be carried out in gathering places in the community and these are typically taught by a community health educator or experienced lay health educator. On the community/neighborhood side access to healthy food, safe parks and streets, clean public space, thriving community businesses, reliable public transportation and strong community ties play significant roles in improving outcomes for persons with Type 2 diabetes as they can improve the overall health of the community/neighborhood. For diabetes interventions following the *Community Guide* recommendations, strong community engagement would play a key role in identifying gathering places that are accessible, recognizable, relevant and safe. An intervention built on robust community engagement would also play a significant role in helping translate disease management techniques, clinical-community links, patient navigation and access into culturally appropriate language and settings where patients are most likely to receive the information. Even for interventions where the *Community Guide* states that the evidence for program effectiveness is insufficient (e.g., in-home visits for adults with Type 2 diabetes), one key missing factor may well have been the level and degree of community engagement (e.g., addressing social isolation and social support; social service needs; food-insecurity).

Building from this evidence and recommendations a CEPI model asks the question, for example, “How do we engage change agents within communities/neighborhoods to affect known measurable micro-level community/neighborhood factors to prevent Type 2 diabetes and integrate case and disease management and self-education to improve clinical outcomes in persons with Type 2 diabetes?” Such a question aims to move a public health endeavor beyond study toward “bottom-up” innovation. Actively rethinking and reshaping the social context and circumstance using existing evidence with the purpose of diffusing innovation would be a marked progression from a mere participating research process to an evidence-based practice model grounded by community change agents.

Contrasting this approach, a CBPR model that would pose the question, for instance, “Can case and disease management help community residents with Type 2 diabetes make better food choices, increase exercise and improve self-management knowledge to improve glycemic control?” Here the steps would be to garner community buy-in to legitimize the research question and mobilize efforts toward helping individuals make better choices from what would observably be a poor set of choices. Unlike a CEPI model which would work toward making better choices more available for everyone from the start. And in the CBPR example, most researchers would seek to elevate the scientific validity by introducing a randomized control trial approach (i.e., some residents in the community would receive the intervention and some will not). In this case, from the onset, the research has established a level of difference easily detected by the community. It may be just enough difference to signal a tentative relationship

Table 1
Community engagement and community guide Type 2 diabetes recommendations using CEPI.

Community-engaged practiced interventions (CEPI)

- i. Interdisciplinary and evidence-based community interventions put into practice;
- ii. Scientific professionals, practitioners and community change agents (engaged stakeholders) have shared circumstances and work together as equal partners in the development of an action-oriented agenda;
- iii. Clinical care outcomes and chronic disease management align with community-based public health practice;
- iv. Evidence-based implementation and diffusion of actionable innovations;
- v. Results-based outcomes are relevant, sustainable and replicable.

Community guide Type 2 diabetes recommendations and CEPI

Case Management: Case management has five essential features: (1) identifying all those affected by the disease that are eligible for a case manager, (2) assessing current levels of healthcare and needs of eligible participants, (3) developing an individual care plan for each participant, (4) putting the care plan into action, and (5) monitoring of results.

Disease Management: We define disease management [40] as an organized, proactive, multicomponent approach to healthcare delivery that involves all members of a population with a specific disease such as diabetes. The essential components of disease management are (1) identification and management of people with diabetes or a subset with certain risk factors for poor outcomes (e.g., cardiovascular disease risk factors), (2) guidelines or performance standards for care, (3) information systems for tracking and monitoring, and (4) measurement and management of outcomes. Disease management can be combined with interventions that focus on the patient or population (e.g., DSME), the provider (e.g., reminders or continuing education), or the healthcare system or practice (e.g., practice redesign). For example, a small group of providers might initiate the following as a disease management program: People with diabetes are identified from billing records or provider and support staff recollection.

Patients' names are placed in an electronic file (e.g., a spreadsheet, a relational database, or software specifically designed for this purpose). This database records A1c, the last visit, and the last retinal and foot exams. Once a month, a nurse or support staff member reviews the database and calls or mails reminders to patients who are in need of visits and screening. A team of providers, including a nurse whose role is to coordinate and monitor the care of people with diabetes, then delivers care that follows evidence-based diabetes care guidelines.

Self-Management Education:

The Community Preventive Services Task Force recommends that diabetes self-management education (DSME) interventions be implemented in: Community gathering places on the basis of sufficient evidence of effectiveness in improving glycemic control for adults with Type 2 diabetes.

In this intervention, DSME is provided to people aged 18 years or older in settings other than the home, clinic, school, or worksite (e.g., community centers, faith-based institutions, libraries, or private facilities such as residential cardiovascular risk-reduction centers). Community gathering places have been pursued because traditional clinical settings may not be ideal for DSME of adults, the home setting is conducive only to individual or family teaching, and education at the worksite does not reach those not working outside the home.

On the basis of Community Guide rules of evidence, the Task Force concluded that there is sufficient evidence of effectiveness in improving glycemic control to recommend DSME interventions in community gathering places for adults with Type 2 diabetes. It should be noted, however, that these interventions were rarely coordinated with the patient's clinical care provider, and the nature and extent of care in the clinical setting was unclear. DSME for adults with Type 2 diabetes delivered in the setting of community gathering places should be coordinated with the person's primary care provider, and these interventions are not meant to replace education delivered in the clinical setting.

The CEPI Role: (centered on action agenda/stakeholder continued investment) Provider learned techniques and treatment are readily translated back into the service area or community; Institutional accountabilities are monitored by community stakeholders and intervention results are disseminated broadly between communal institutions and clinical or academic centers. Disease management: strongly recommended.

The CEPI Role: (centered on action agenda/stakeholder continued investment) Disease management can be delivered in this intervention, DSME is provided to people aged 18 years or older in settings other than the home, clinic, school, or worksite (e.g., community centers, faith-based institutions, libraries, or private facilities such as residential cardiovascular risk-reduction centers) into disease management interventions, and these interventions can be focused on (1) the healthcare system (e.g., practice redesign, electronic information systems, changes in models of care), (2) the provider (e.g., reminders, education, feedback, decision support), or (3) the patient or population (e.g., patient-centered care strategies, DSME, reminders, feedback, telephone call outreach).

The CEPI Role: (centered on action agenda/stakeholder continued investment) Case managers benefit from and contribute to the interaction between individual, group/community, and physical, social and political environments to bolster access to gathering places. Case managers contribute to the functionality of gathering places advocating for transportation to and safety/utilization of gathering places for health education classes and social support groups. Case management can be DSME, the process of teaching people to manage their own diabetes [13], is considered by many to be "the cornerstone of care for all individuals with diabetes who want to achieve successful health-related outcomes." [14] The goals of diabetes education are to optimize metabolic control, prevent acute and chronic complications, and achieve an optimal quality of life, while keeping costs acceptable [15]. One of the Healthy People 2010 goals is to increase to 60% (from the 1998 baseline of 40%) the proportion of people with diabetes who receive formal diabetes education [3]. Significant knowledge and skill deficits are found in 50% to 80% of people with diabetes. . . Diabetes self-management education in community gathering places: recommended for adults with Type 2 diabetes. In this intervention, DSME is provided to people aged 18 years or older in settings other than the home, clinic, school, or worksite (e.g., community centers, faith-based institutions, libraries, or private facilities such as residential cardiovascular risk-reduction centers). Community gathering places have been pursued because traditional clinical settings may not be ideal for DSME of adults, the home setting is conducive only to individual or family teaching, and education at the worksite does not reach those not working outside the home. Disease management. These findings are applicable primarily in the U.S. managed care setting for adults with Type 2 diabetes.

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and as a result collaborations and partnerships have temporary bonds.

While CBPR may be considered by some as the third tier (T3) of translational research, partnering with the community in a joint effort to answer institutional and funder initiated research questions, CEPI is clearly the fourth tier (T4), engaging the community through action minded stakeholders to make changes in areas where the answers have lasting promise.

3. The CEPI logic model

The CEPI model is a theoretically driven model meant to address identified shortcomings both in language and traditional approach of the CBPR model using the chronic disease management approaches presented in *The Community Guide* as a platform. Evidence driving the development of the CEPI model comes from research showing the importance of community health workers in

improving outcomes in persons with diabetes (Lujan, Ostwald & Ortiz, 2007; Swider, 2002; West, 2013), from clustered randomized trials of community partnerships and their effectiveness in improving studies and outcomes (Chung, Dixon, Miranda, Wells, Jones, 2010; Mendel et al., 2011; Wells et al., 2013) and work on measuring actual community participation in research for better intervention outcomes (Henderson et al., 2013; Khodyakov et al., 2013; Whitman, Shah, & Benjamins, 2010). Inference drawn from these works suggest a need for expanding thinking on rigorously testing models centered on bridging localized partnered engagement with healthcare system level interventions.

To further illustrate how CEPI works a logic model is presented to provide a visual picture of systematic planning and implementation processes again using the diabetes recommendations from the *Community Guide* as an example. Logic models depict the form and function of an intervention by providing a roadmap for how a program will tie together resources and activities (i.e., a program's planned work) to produce a desired set of short-term, intermediate and long-term outcomes (i.e., intended results) (CDC, 2013). A properly formulated logic model will also allow for accounting of contextual factors, namely internal or external influences that can impact (positively or negatively) the planned work and intended results (CDC, 2013; W.K. Kellogg, 2004).

3.1. Setting mutual priorities to context and circumstance

Priority setting should be the first step to program and implementation planning, and having an understanding of the context in which the program or intervention will be carried out is important. Planners of the intervention or program should first carefully examine funding resources, staffing, organizational capacity, infrastructure, and citizenship engagement (i.e., a formed community leadership council or advisory board). An understanding of variants of social capital (e.g., individual, bridging, bonding, cognitive and structural) (Bankston & Min, 2002; Baum & Ziersch, 2003; Grootaert & Van Bastelaer, 2002; Uphoff, 1999), collective efficacy (Grootaert, 2001; Sampson, Morenoff, & Earls, 1999) and community approaches to health improvement (Kaplan, Calman, Golub, Ruddock, & Billings, 2006; Kim & Kawachi, 2006) can serve as platforms for this work. At the same time decisions during this initial assessment should be informed by epidemiological data, preferably small-area analysis (Whitman, Silva, Shah, & Ansell, 2004; Goodman, 2010) and other evidence-based sources pertaining to the context and circumstances of the environment. From this base, researchers, public health interventionists and communities can establish an action-oriented agenda to define and address measurable health outcomes and benchmarks for change relevant to both context and circumstances. Evidence-based sources should range from the *most objective evidence* (i.e. peer-reviewed manuscripts, intervention research, surveillance data and systemic data/study review) to the *most subjective evidence* (i.e. professional presentations, historical records, prior program evaluations, field reports, citizenship knowledge, professional media and social media).

3.2. Action-oriented inputs

The model's key inputs include shared funding, programming and personnel commitments by both the identified organizations and change agents in the community and the public health interventionists. Resources are invested in case management, disease management (clinical care) and CEPI groundwork. All inputs are based on an action-oriented agenda that begins with coalition building (e.g. neighborhood steering committee or community leadership coalition), deliberation of existing

evidence and integration of innovative technologies and techniques.

3.3. Measurable outputs (activities and reach)

Measurable activities are the processes, services and technology for case management and disease management, and change centered actions at the community level working in concert. Measurable *reach* outputs are the identified groups and individuals where change will occur.

Both are based in and measured against the action-oriented agenda and outcome benchmarks.

3.4. Results-based outcomes

The logic model depicts drafted expectations of sequentially measured and related impacts resulting from: (a) mutually defined contextual and circumstantial priorities; (b) community linked case and disease management; and (c) actively engaged community change agents. Short-term outcomes describe learning impacts (e.g., Are individuals and communities better off?) immediately realized following outputs. Intermediate outcomes describe academic, institutional, community-level and policy responses to meaningful short-term impacts (e.g., Are results real and replicable?). Lastly, the entire process is ideally meant to spur lasting change as determined by long-term impacts (e.g., Are results and relationships sustainable?). In the drafted model the Healthy People 2020 Diabetes Objectives, sustainable community partnerships, patient centered psycho-physiological practices and positive changes in cultural and institutional norms both within communities and across communities are the goals. Together, results-based outcomes will provide clear markers for optimal organizational, community, institutional and/or system level approaches to eliminating health inequities through improved social and economic conditions, increased individual and communal capacity, and changes in public policy.

3.5. Evaluation and feedback loop

Perhaps as critical and systemically overlooked as setting mutual priorities to context and circumstance is a solidified real-time evaluation plan and feedback loop of shared responsibilities and accountabilities. Establishing an evaluation plan and a system for clear communications, expectations and learning is essential to understanding:

- (a) what is working, what is not working;
- (b) where is it working, where is it not working;
- (c) who/what is making it work, who/what is hindering;
- (d) what needs to be done to improve the outcomes.

Monitoring underlying assumptions, external factors (e.g. unanticipated social, economic or policy shifts) and poor miscommunication with partners will provide indications on how well an intervention is designed and performing. Determining whether an intervention is an innovative model that can be sustained and replicated will simultaneously shape and is shaped by resources and factors unique to those involved and ranges in variability and predictability.

4. Conclusions

The *Community Guide* has thoroughly searched scientific literature for topic-relevant studies pertaining to addressing Type 2 diabetes and offered recommendations for how to better manage this disease and improve individual knowledge. Yet there is a

substantial disconnect between clinical care, self-education and indispensable community engagement. As a continuously evolving work the *Community Guide* would benefit from more tested models emphasizing sustainable community engagement as a core public health principle.

This logic model is not only meant to bridge this divide, but also aimed at initiating a more substantive dialog on sustainable public health interventions and deeper community involvement. The context for implementing and testing the model can be in areas of high Type 2 diabetes prevalence and academic practitioners and clinicians have identified poor self-management within a community. This paper is the first attempt at initiating discourse amongst public health researchers and practitioners in or to spur rigor testing of the assumptions presented throughout. It is presented as a first-step in the evolution of community-engaged interventions where researcher, public health interventionist and community participation extends beyond ethically recruiting subjects and reducing distrust of evidence gathering and knowledge formation. CEPI is proposed as a divergence from routine and short-lived explorations and focuses. Instead it is offered as a convergence discipline toward lasting innovative micro-level changes where individual self-interests, behaviors and capabilities intersect with a communal good to improve health outcomes and eliminate health inequities.

It can go almost without saying that misapplication of this or any other model can indeed be a slippery slope where questions will be raised as to which values and norms are more or less relevant, effective and acceptable. And without careful deliberation and candid discussion, the values and norms of racism, social inequality and political ineptitude may well derail any effort before it leaves the proverbial station. Nonetheless difficult questions should be raised and challenges met.

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