

## Diabetes Prevention through Village Health Support Guides in Cambodia: A Qualitative Investigation of Opportunities and Challenges

Julie Wagner<sup>1\*</sup>, Lim Keuky<sup>2</sup>, Lorraine Fraser-King<sup>3</sup>, Theanvy Kuoch<sup>4</sup> and Mary Scully<sup>4</sup>

<sup>1</sup>University of Connecticut Health Centre, Farmington, CT-06030, USA

<sup>2</sup>Doctorate of Pharmacology, D.E.A. Endocrinology, Cambodian Diabetes Association, Siem Reap, Cambodia

<sup>3</sup>Cambodian Diabetes Association, Siem Reap, Cambodia

<sup>4</sup>Khmer Health Advocates, 1125 New Britain Ave Ste 202, West Hartford, CT-06110, USA

\*Corresponding author: Julie Wagner, Associate Professor, University of Connecticut Health Centre, MC3910 263 Farmington Ave, Farmington, CT-06030, USA, Tel: +860-679-4508; E-mail: [juwagner@uchc.edu](mailto:juwagner@uchc.edu)

Rec date: Mar 18, 2015; Acc date: Mar 30, 2015; Pub date: Apr 3, 2015

Copyright: © 2015 Wagner J, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

### Abstract

**Objectives:** Lifestyle modification can prevent type II diabetes. Rates of diabetes are high in Cambodia. The Cambodian genocide and its aftermath resulted in destruction of the healthcare system and a critical shortage in the Cambodian healthcare workforce. Cambodia has a well-established system of community health workers, or village health support guides (Guides). This study explored opportunities for and challenges to training Guides to deliver diabetes prevention interventions.

**Design:** In depth interviews were conducted with 12 Guides in Khmer. Guides also completed a 22-item validated Khmer language quiz regarding their knowledge of diabetes.

**Results:** Participants were 75% female, on average 52 years old, with 8 years of education and 9 years Guides experience. Guides were aware that diabetes is a problem for their communities and were eager to address it. However, they had very low diabetes knowledge (quiz mean=57% correct). Three themes emerged: dedication to being a Guide, current responsibilities and need for additional and high quality training, and striving to do a good job in the face of barriers and insufficient resources. Participants easily identified factors that would support their own training in diabetes, and factors that would promote their teaching diabetes prevention in their villages.

**Conclusions:** Diabetes prevention is overdue in Cambodia. Guides are poised to be trained to deliver these programs. Such training should be responsive to their perceived needs. Political will must be cultivated to support appropriate resources.

**Keywords:** Diabetes; Prevention; Community health workers; Cambodia; Qualitative

### Introduction

A recent report found that Southeast Asia was home to more than 72 million adults with diabetes in 2013, a number that is expected to exceed 123 million in 2035 [1]. Over 90% of them have type II diabetes. Cambodia is a case in point. King et al. [2] studied 2246 randomly selected adults aged 25 years and older in two Cambodian communities. Prevalence of diabetes was 5% in the rural community and 11% in the semi-urban community. Fully one quarter of all adults in the semi-urban community had some degree of glucose intolerance. Type II diabetes is multifactorially determined, and in Cambodia may be linked to lifestyle changes associated with urbanization and industrialization, high rates of mental illness, historical exposure to starvation and current malnutrition.

There is an urgent need for diabetes prevention programs in Cambodia. Trials have shown that type II diabetes can be delayed or prevented with structured lifestyle modification. Diet and exercise interventions have been shown to be effective in China [3] and India [4]. These findings illustrate the benefits of lifestyle on diabetes risk

among younger individuals with lower body mass index than Caucasian populations typically studied in the US [5] and Europe (e.g., [6]).

Unfortunately, barriers to implementing diabetes prevention programs in Cambodia are formidable. In addition to lack of financial resources and competing public health priorities, there is a critical shortage of healthcare workers. The Millennium Development Goals recommends a threshold of 2.3 health workers per 1,000 people. The density of global health workers in Cambodia is less than half that, with a national average of only one health worker (doctor, nurse or midwife) per 1,000 people [7]. As in many other countries, there is a particularly acute shortage of health workers in rural and remote areas of Cambodia.

The shortage of healthcare workers is directly tied to the country's tragic political history. After nearly 100 years of colonial rule, there was a period of political instability and western interference in the 1970's, during which a genocide occurred that killed approximately 1/3 of the country's population. The aim of the genocide was to deconstruct Cambodia back to an agrarian and primitive "Year Zero," wherein any Western, modern, or non-Khmer innovations would be eliminated. During the "time of great destruction" as the Cambodians

call it, individuals who had, or were believed to have had, educational attainment were especially targeted and Cambodians lost approximately 90% most of their educated class during this genocide and its aftermath [8]. Consequently, the healthcare workforce was virtually eliminated. Cambodian hospitals, which were providing medical care at least as good as in other parts of Southeast Asia at the time, were destroyed. After the conflict ended, civil unrest continued into the 1980s and an embargo on normal aid until 1993 posed additional challenges to the re-establishment of normal healthcare in Cambodia [9]. Although the situation in Cambodia is now relatively stable, the legacy of a decade of conflict is still evident in the healthcare system. The number and quality of medical facilities is critically low. The number of physicians, nurses, and allied health professionals is totally inadequate to address current population needs. Thus, diabetes prevention, if it is going to happen in Cambodia, will need to be delivered by persons other than health professionals.

### Village health support guides

Community health workers are members of a community who are chosen by community members or organizations to provide basic **health and medical care** to their community. The World Health Organization (WHO) states that the title community health worker embraces a variety of community health aides who are selected, trained and working in the communities from which they come [10]. Whereas roles and activities of community health workers are enormously diverse throughout their history, within and across countries and programs, the WHO identifies their key feature as responding to local societal and cultural norms and customs to ensure community acceptance and ownership. Other names for this type of **health care provider** include village health worker, community health aide, community health promoter, and lay health advisor [11]. In Cambodia, they are referred to as Village Health Support Guides, or Guides. The system of Guides was developed in Cambodia to address the critical shortage of professional healthcare workers in Cambodia.

Guides are the 'grass roots' foundation of the hierarchical healthcare system in Cambodia. Guides serve the village (or in more urban areas, the commune) in which they live. Each Guide is based at their local Health Centre, which serves numerous villages and is run by a Chief, i.e., a nurse or midwife, or occasionally a physician. Each Health Centre Chief reports to the Operational District Director, who reports to the Provincial Health Director, who in turn reports to the Ministry of Health at the top of the pyramid. Thus, Guides occupy the bottom of this pyramid and provide the most direct and immediate link to the population of any member of the healthcare system. Roles and responsibilities of Guides in Cambodia were defined by the Ministry of Health in the Community Participation for Health Policy [12] and are: providing feedback from the community to the Health Centre, and keeping the Guide and the community informed about Health Centre activities; coordinating training activities for the Guide to support Health Centre activities in the community; providing information about Health Centre services and fees to the community; reporting consumer satisfaction and dissatisfaction to the Health Centre Chief; facilitating outreach activities; and, promoting client rights and good governance.

Guides receive no salary. However, their Operational District Director has the discretion to direct funds to offer their Guides incentives including free or discounted medication for the Guide and/or the Guide's family, free or discounted medical care at referral hospitals when needed, and/or a small per diem for attending the

monthly meetings. Although their level of education is thought to be generally quite low, they are usually among the higher educated people in their village and each Guide must have some basic level of literacy and numeracy because they are required to complete monthly reporting forms.

Of the various members of the healthcare system in Cambodia, Guides may be best positioned to reach rural Cambodians to deliver diabetes prevention. Globally, community health workers are a key source of basic health care to hundreds of millions of people [13-16] and in some settings may be the only source of health care [17,18]. The ability of community health workers to engage citizens in health programs is thought to be due, in part, to their unusually close understanding of the community they serve and because they are trusted and respected members of their community. However, their readiness and willingness to engage in chronic disease programs generally, and diabetes prevention specifically, is not known. Indeed, recent studies of community health workers across the globe have revealed significant deficiencies in their clinical competency [19,20]. This study was a qualitative investigation to better understand the opportunities and challenges for implementing diabetes prevention programs through Guides in Cambodia.

## Methods

### Subjects

**Study area and participants:** This project was conducted in Siem Reap province. According to the most recent census [21], with 896,309 residents, it ranks as 6th out of 24 provinces in population size. The province is subdivided into 12 districts, 100 communes and 907 villages. In modern times the province of Siem Reap is best known as the site of the Angkor Wat temple ruins.

This study employed a sample of convenience of Guides who lived in Siem Reap province and who were available and willing to participate during the timeframe of the data collection (spring 2014).

## Materials and Methods

### Data collection

All of the interviews were conducted by a bilingual, native Khmer-speaking research assistant who was trained by the first author (JW). Interviews were conducted in Khmer and were translated into English by the same research assistant who was sensitive to the cultural context of participants and the research goals of each interview question. Handwritten notes were taken regarding verbal and nonverbal communication. Whenever possible, interviews were conducted in the field; when noise, distance, or space availability made this impossible then the interviews were conducted in a private meeting room at the Cambodian Diabetes Association.

### Measures

In-depth, semi-structured interviews were conducted using a written question guide with follow up probes. Questions addressed the participant's demographics; history as a Guide; motivation for being a Guide; selection and training; current activities; perceptions regarding challenges to successful Guide work; and, level of interest in addressing diabetes in their villages.

A previously validated [22] test of basic diabetes knowledge was administered to each participant. The test was written in Khmer for low literacy respondents using a true/false/I don't know response option. Nine items tap into knowledge regarding diabetes risk factors, 7 regarding diabetes prevention strategies, and 6 regarding diabetes management. The test was read aloud to each participant in order to account for varying literacy levels.

## Procedures

Ethical approval was obtained from the review committee at the Cambodian Diabetes Association. Staff from the Cambodian Diabetes Association worked with Health Centre Chiefs in the province to identify potential participants and invited them to participate by phone. Participants were socialized to the study, and written informed consent was obtained from all participants. Each interview lasted approximately 75 minutes. Participants were provided with light refreshments and were compensated \$10 for their time and any transportation costs.

## Data analysis

Quantitative descriptive data analysis was conducted for the quiz data using SPSS v21 (Chicago, IL), and qualitative data analysis was conducted for the interview data [23]. Qualitative data were analyzed through a thematic analysis approach [24]. Translated transcriptions of interview excerpts and field notes were reviewed. As a first step the parts of the text that related to each question were identified and marked distinctly. As a second step, codes were developed and categorized into a fewer number of themes. Third, several codes were further refined with the aim of making them closer to what the participants actually said. Finally, quotes were identified that were representative of major themes. During the whole process of data collection and analysis, memos were recorded to capture ideas and reflections.

## Results

Fourteen Guides were invited to participate; 12 agreed and provided informed consent. The only reason provided by recruits for declining to participate was scheduling conflicts. Participants were on average mean=51.6 (SD=9.6, range 38-66) years old and 75% (n=9) female. Mean years of education was 7.9 (SD=1.7, range 6-12). None had received a diagnosis of diabetes. Participants scored a mean of 57% (SD=10%) total correct on the diabetes quiz. Subscale scores were 56% (SD=11%) correct on diabetes risk factors, 76% (SD=13%) on diabetes prevention, and 40% (SD=15%) correct on diabetes management.

Three themes emerged from the analysis: dedication to being a Guide, current responsibilities and need for additional and high quality training, and striving to do a good job in the face of barriers and insufficient resources.

### Theme #1: Dedication to being a guide

**History of guide work:** Participants reported that they had been working as a Guide for mean=8.5 (SD=6.0, range 2-20) years. Participants described a variety of ways that they had become Guides. Most had been asked directly by village chiefs or police chiefs. Some were nominated by chiefs along with others and then the village committee voted on the nominees. A few were appointed directly by

village committees and 2 were elected by common vote of villagers. Two stated that there was no selection process per se, i.e., that they were the only people in their respective villages who were willing to serve as Guides.

Most participants described that the work was not immediately rewarding, and that within the first few months they had considered quitting. No pay, required attendance at numerous meetings, paperwork, and lack of initial influence over villager health behaviors were all initially discouraging. Yet, all the participants had persevered and for a variety of reasons, mainly gaining access to free or discounted medical services and medications for their families. Without exception, each described that over time the work became intrinsically rewarding and that now they could not be discouraged from continuing. However, participants acknowledged that many new Guides do in fact quit within the first few months and that there is high turnover in the position.

**Motivation to be a guide:** Participants were asked, given the drawbacks, what their motivation was for being a Guide. All reported an altruistic desire to help their villages improve their health. Several implied that they felt some obligation to do so. They acknowledged that they had easier lives than others in their village, by virtue of higher education and not being a farmer. Some stated that other people in the village simply did not have the education or time to be a Guide. Many also reported self-improvement as a benefit, i.e., learning new information and new skills. A few mentioned that they or their families received free or discounted medication and/or medical care for their work.

When queried directly, several participants confirmed that a belief in kamma influenced their decision to start or continue their work as a Guide. Kamma is a Pali word that means "action". It refers to the Buddhist natural law of cause and effect whereby wholesome intentions (motivations, thoughts, or volitions) produce wholesome effects for the actor and unwholesome intentions produce unwholesome effects for the actor. In popular Buddhism as it is practiced in Cambodia, there is a belief in a simple system of rewards for good actions and punishments for bad actions that may come to fruition in this or future lives. One participant said, "I have my own good health because I help others".

When queried directly, several participants also confirmed that having lived through the genocide provides motivation for Guide work. There was sentiment that Cambodians had suffered so much, and so many social institutions had been destroyed, that helping villagers improve their health had healing qualities and provided hope for the future. One participant who had been 30 years old during the war stated, "We had no health Centre, no pagoda, all the knowledgeable people died. We must recover from Pol Pot." Another described how there were no doctors or medicine during the conflict. One participant became distressed and cried in response to this segment of the interview, explaining that both her parents and several siblings had been killed. She expressed that Guide work helps make right what was wrong during the time of genocide.

### Theme #2: Responsibilities and need for additional high quality training

**Guide responsibilities:** Participants listed on-going activities including attending monthly Health Centre meetings, attending trainings provided by non-governmental organizations (NGOs), delivering health education at monthly village committee meetings,

delivering health education to small groups of villagers, and visiting families with known health problems. Participants reported that, once they were trained in a particular topic, they would invite groups of approximately 50 villagers to attend an educational session and approximately 20 would attend. It is during these small group teaching sessions that the bulk of health information is conveyed to the general public.

Participants were also asked how many hours per month they spend on Guide teaching activities in their village. Every participant had difficulty quantifying their activities stating that they vary by month and by season according to the agricultural calendar. Several Guides were individuals who were salaried employees of the village committee (the local governing body). Because of their position in the committee, and their associated intimate knowledge of village affairs, they were asked to serve as Guides. These individuals found it very difficult to tease apart their paid committee work from their voluntary Guide work, claiming that there was a high degree of overlap. When pushed to provide a number, responses ranged from 4 to 12 days per month.

Participants were asked how confident they were in modifying villagers' health behaviors. Half of the participants expressed the sentiment that "everything is better now" than when they had started as Guides. There was common sentiment that doing so took a long time, but was eventually successful. Referring to a hand-washing promotion, one participant said, "Everything is better now. Many people would like to follow me, but they are forgetful. So, I tell them again and again. I repeat, remind." Two reported that information provided in schools and on television was more compelling to villagers than information from Guides, and suggested that health messages from various sources should be coordinated. One expressed lack of confidence and said, "Sometimes they know more than me."

Participants were asked if and how their work was evaluated. All stated that their paperwork was spot-checked. One stated that the Health Centre Chief inquired with villagers. When asked, none reported that they received substantive feedback about their work. One stated that his evaluations focused only on the negative and were discouraging. Another recommended that the NGO trainers could attend the sessions when Guides trained villagers, in order to provide meaningful feedback about their teaching skills and style.

### **Need for additional high quality training**

Participants uniformly reported receiving initial half-day or 1-day training regarding their Guide roles and responsibilities from Health Centre Chiefs. Subsequent trainings on specific health issues were provided by various NGOs. The health issues they had been trained in were nearly unanimous: prenatal care and the importance of delivery at the Health Centre rather than at home; prevention/containment of H1N1; management of childhood diarrhoea through clean water; and containment of tuberculosis and malaria. One participant reported training in HIV. Two reported having attended a diabetes awareness activity at the Cambodian Diabetes Association, but this was separate from their monthly Guide training.

Nearly all Guides reported that they required more training to successfully meet their responsibilities. A common sentiment was expressed that, although they had received many trainings, training sessions varied widely in quality, such sessions were often repetitious, and they often lacked good training materials such as posters and brochures. The importance of training materials (as opposed to just lectures) was stressed by most participants. They explained that

training materials were helpful so that they could review the materials after the training, thus reminding them what had been taught and reinforcing the content.

When asked what topics they would like to be trained in, one stated cancer, one stated emergency response to injury/accident. Participants volunteered diabetes, one stating that he wanted the diabetes training, "very, very much" and the other stating, "It's the most dangerous. I want to know how to prevent it. Once you have it, how to protect yourself from it." When queried directly about their desire to be trained in diabetes prevention, all participants responded affirmatively.

### **Theme #3: Striving to do a good job in the face of barriers and insufficient resources**

**Barriers:** Participants reported several barriers to conducting their work. A common barrier was complaints from family members that time spent on Guide activities took them away from activities that could provide financially for the family. This was more true for the Guides who were farmers, but not exclusively. One stated, "If I am working in the field and I am called, my wife and daughter complain". Another reported that her husband discouraged her from doing Guide work, and another that his wife and family frequently asked him to do work that earned money for the family. An older Guide stated that his children tell him he looks old and tired due to the work and that he should relax more. One participant was the primary caretaker for her ageing mother who frequently encouraged her to stop being a Guide.

**Insufficient resources:** Participants responded easily with many insufficient resources for their work as Guides. They reported insufficient resources at the institutional level, i.e., lack of medications at the Health Centre, lack of nursing staff, and lack of medical equipment. They also reported lack of resources at the Guide level. Participants from large villages stated that they needed bicycles to reach distant families, and cell phone minutes to stay in contact with villagers and Health Centre Chiefs.

Several Guides desired some sort of identification – a badge, identification card, t-shirt or hat – that would identify them as a Guide. Several reported that when they attended large meetings, others did not know their role and so they tended to be excluded from important conversations. One participant also reported that when he went to the hospital for medical care, which should have been free for him as a Guide in his area, he had no way of proving that he was a Guide, so had to pay for his care. Several participants reported that they desired better teaching materials, such as manualized curricula and teaching props. Only one participant stated that she had everything she needed for her work.

When asked about incentives, there were varying opinions regarding whether Guides should be financially compensated for their work, but there was unanimous agreement that Guide expenses should be covered.

### **Discussion**

The main finding from this study is that Guides are aware that diabetes is a problem for their villages, and they are eager to tackle diabetes prevention. However, their level of diabetes knowledge is quite limited, so comprehensive training would be necessary before such programs can be undertaken. This finding is consistent with literature showing deficiencies in community health worker clinical



competency [19,20]. Such trainings must be responsive to Guide input regarding resources, barriers, and contextual disincentives for their work.

Guides would benefit from diabetes prevention programs with systematic training and a manualized curriculum that includes, for example, flipcharts, posters and handouts, and props such as food models. Ideally, Guide diabetes prevention activities would be done along with public awareness campaigns, such as in schools and on television, that reinforce the Guides' diabetes prevention messages.

Guides should also ideally be given the material resources that would allow them to be maximally effective at diabetes prevention. Cell phone minutes and a bicycle could be provided to promote dissemination of prevention activities. Guide work should also be made more rewarding, perhaps in an individualized manner depending upon the needs and desires of the Guide and the resources of the Operational District Director. Recognition as a Guide could be easily provided with, for example, an identification card and certificate of attendance for diabetes training. Compensation and public recognition could help to quell family discouragement of Guides.

Evaluation of and feedback to Guides should be more systematic and more substantive. For example, NGO trainers could attend Guide education session in the village and provide immediate and individualized feedback. The need for context-specific, high-quality supervision of community health workers in low-income countries has been described and evidence suggests that improving supervision quality has a greater impact than increasing frequency of supervision alone [25].

Finally, the Guide workforce should be expanded. The Guides interviewed for this study were dedicated to their volunteer work despite competing demands and sometimes discouragement from family members. However, diabetes prevention efforts will require a large cohort of trained Guides. According to the Ministry of Health [12], one Guide is meant to cover 10-50 households depending on community needs. Yet, respondents indicated that in many villages of several hundred households, there was only a single Guide. Further, an unknown but potentially high number of Guides drop out within the first few months of being recruited. Attention to their concerns regarding time, money, role burden, and lack of satisfaction could potentially help retain some of them, thus increasing the net number of active Guides.

### **The future of preventing diabetes in Cambodia**

It has been observed that the sharp increase in the prevalence of T2DM in southeast Asia [1] is mostly associated with the lifestyle transitions towards urbanization and industrialization. In Cambodia, urbanization has increased between the last 2 national censuses (1998 to 2008) with the percentage of urban population increasing from 17.4 in 1998 to 19.5 in 2008 [21].

Cambodians also carry additional risk factors that are unique to them because of their country's history. First, Cambodians have high rates of mental illness from having survived genocide. Even decades after the Vietnamese invasion that toppled the regime, evidence suggests that rates of post-traumatic stress disorder (62%) and depression (51%) remain extremely high among Cambodians around the world [26] and in Cambodia [27]. Both disorders prospectively increase risk for incident type 2 diabetes with relative risks of 1.6 and 2.1, respectively [28,29]. Second, the years of famine during wartime may have increased susceptibility to type 2 diabetes. Studies from the

Dutch Hunger Winter [30] and the Jewish holocaust [31] suggest that intra-uterine exposure to starvation conditions may increase risk of adult obesity and type 2 diabetes. Exposure to severe nutritional conditions may change gene expression and alter disease susceptibility through epigenetic modifications [32]. Thus, as Cambodians who were conceived during the conflict age into middle and later adulthood, rates of diabetes may be expected to increase beyond base rates of the disease in other parts of Asia. In short, Cambodia must implement diabetes prevention programs or potentially experience an epidemic of type 2 diabetes.

### **Contextual challenges**

Whereas Guides are promising agents for diabetes prevention, Cambodia faces challenges in providing healthcare, particularly preventive healthcare, that exert a strong opposing influence. First, there are demographic challenges. Cambodia's population is 13.4 million [21]. The annual growth rate of the population during the last decade in Cambodia is 1.54 percent, which is higher than the growth rate of Southeast Asia more generally (1.3 percent). Second, as in the rest of the developing world, funding for healthcare is minimal. Although government spending on health has been steadily increasing, it is nearly matched spending by private donors and NGOs for whom there is little accountability [33]. Moreover, by far the largest portion of health expenditure, 60-73%, comes from out-of-pocket spending, i.e., paid for by patients and families themselves [33,34]. A healthcare system in which patients provide the majority of the spending will continue to struggle to provide preventive care. Third, even the Ministry of Health recognizes the 'widespread discontent' amongst government employees in Cambodia resulting from "low salaries; high levels of dual employment; the small numbers of formally trained allied health professionals and inappropriately qualified managerial personnel in the government service" [35]. This system, in which healthcare providers often receive undesirably low salaries, is prone to corruption in which healthcare providers extort money directly from patients, on top of any fees paid to the healthcare facility. Indeed, corruption at every level erodes the ability to deliver quality care. Lastly, at all levels of the healthcare system in Cambodia, the focus on prevalent communicable diseases renders non-communicable diseases a low priority. Malaria, tuberculosis, and HIV are prevalent, deadly, costly, and preventable disorders. Thus, non-communicable and chronic diseases with delayed consequences, such as type 2 diabetes, do not receive commensurate funding [36]. In summary, although Guides present an opportunity to deliver diabetes prevention programs, they would be doing so in the context of an underfunded and corrupt system that does not prioritize chronic disease. Thus, the battle against diabetes in Cambodia is daunting. Yet leadership must show the political will to address the rising tide of diabetes or its long term consequences will be devastating for the country.

### **Limitations**

This study was limited to a single geographical province. Recruits who were not able or willing to participate may have had systematically different views and knowledge than those who chose to participate. Participants had all been Guides for several years; those who started and quit early on were not interviewed. Thus, this sample was probably more motivated and dedicated than Guides early in their role. Participants knew that the study was conducted by the Cambodian Diabetes Association, which may have created demand characteristics. However, these limitations are generally outweighed by

the study's strengths. This is the first study, and to our knowledge the first endeavor, to explore Guides as potential personnel for diabetes prevention in Cambodia. The in depth interviews were supplemented by a validated Khmer language quantitative measure of diabetes knowledge. Finally, results provide concrete suggestions to inform diabetes prevention training programs for Guides.

## Conclusion

Diabetes will create a massive burden on Cambodian society unless aggressive action is urgently taken. Cambodia faces a severely underfunded healthcare system and a critical shortage of healthcare workers, particularly in rural areas. Guides are a promising mechanism through which diabetes prevention might be delivered. Three themes emerged from this study: dedication to being a Guide, the need for additional and high quality training, and working in the face of barriers and insufficient resources. Diabetes prevention programs should exploit the opportunities and attend to the challenges reported by Guides in order to maximize their successful implementation.

## Acknowledgments

We would like to acknowledge Ms. Ien Srey Horn for her assistance with study. We would also like to thank the Guides for their participation.

## References

1. Ramachandran A, Snehalatha C, Ma RC (2014) Diabetes in South-East Asia: an update. *Diabetes Res Clin Pract* 103(2): 231-237.
2. King H, Keuky L, Seng S, Khun T, Rogic G, et al. (2005) Diabetes and associated disorders in Cambodia: two epidemiological surveys. *Lancet* 366(9497): 1633-1639.
3. Pan XR, Li GW, Hu YH, Wang JX, Yang WY, et al. (1997) Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and Diabetes Study. *Diabetes Care* 20: 537-544.
4. Ramachandran A, Snehalatha C, Mary S, Mukesh B, Bhaskar AD, et al. (2006) The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). *Diabetologia* 49: 289-297.
5. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, et al. (2002) Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 346: 393-403.
6. Lindstrom J, Ilanne-Parikka P, Peltonen M, Aunola S, Eriksson JG, et al. (2006) Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet* 368(9548): 1673-1679.
7. Henderson LN, Tulloch J (2008) Incentives for retaining and motivating health workers in Pacific and Asian countries. *Human Resources for Health* 6(18).
8. Heuveline P (2001) The demographic analysis of mortality in Cambodia. In *Forced Migration and Mortality*. Edited by Reed HE, Keely CB. Washington, D. C.: National Academy Press.
9. Lanjouw S, Macrae J, Zwi AB (1999) Rehabilitating health services in Cambodia: the challenge of coordination in chronic political emergencies. *Health Policy Plan* 14(3): 229-242.
10. Lehmann U, Sanders D (2007) Community health workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers. Evidence and Information for Policy, Department of Human Resources for Health, Geneva.
11. International Labor Organization (2008) International Standard Classification of Occupations.
12. <http://thoinfocam.blogspot.com/2012/02/cambodia-community-participation-policy.html>.
13. al Fadil SM, Alrahman SH, Cousens S, Bustreo F, Shadoul A, et al. (2003) Integrated Management of Childhood Illnesses strategy: compliance with referral and follow-up recommendations in Gezira State, Sudan. *Bull World Health Organ* 81: 708-16.
14. Armstrong G, Blashki G, Joubert L, Bland R, Moulding R, et al. (2010) An evaluation of the effect of an educational intervention for Australian social workers on competence in delivering brief cognitive behavioural strategies: a randomised controlled trial. *BMC Health Serv Res*;10: 304.
15. Campbell C, Scott K (2011) Retreat from Alma Ata? The WHO's report on Task Shifting to community health workers for AIDS care in poor countries. *Glob Public Health* 2011;6: 125-38.
16. de Sousa A, Tiedje KE, Reicht J, Bjelic I, Hamer DH (2012) Community case management of childhood illnesses: policy and implementation in Countdown to 2015 countries. *Bull World Health Organ*;90: 183-90.
17. Gill CJ, Guerina NG, Mulenga C, Knapp AB, Mazala G, et al. (2012) Training Zambian traditional birth attendants to reduce neonatal mortality in the Lufwanyama Neonatal Survival Project (LUNESP). *Int J Gynaecol Obstet*;118: 77-82.
18. Amaral J, Gouws E, Bryce J, Leite AJ, Cunha AL, et al. (2004) Effect of Integrated Management of Childhood Illness (IMCI) on health worker performance in Northeast-Brazil. *Cad Saude Publica*;20 Suppl 2:S209-19.
19. Chopra M, Binkin NJ, Mason E, Wolfheim C (2011) Integrated management of childhood illness: what have we learned and how can it be improved? *Arch Dis Child* 97: 350-4.
20. Tomlinson M, Doherty T, Jackson D, Lawn JE, Ijumba P, et al. (2011) An effectiveness study of an integrated, community-based package for maternal, newborn, child and HIV care in South Africa: study protocol for a randomized controlled trial. *Trials* 12: 236.
21. National Institute of Statistics (2008) National Ministry of Planning: Cambodian National Census 2008.
22. Wagner J, Kuoch T, Kong S, Scully M, Bermudez-Millan A (2015) Eat, Walk, Sleep: Patient reported outcomes of a culturally tailored chronic disease curriculum delivered by community health workers for Cambodian Americans. In press, accepted January 2015. *Journal of Healthcare for the Poor and Underserved*.
23. Dahlgren L, Emmelin M, Winkvist A (2004) Qualitative methodology for international public health. Umea, Sweden: Umea University.
24. Braune V, Clarke C (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* 14: 77-101.
25. Hill Z, Dumbaugh M, Benton L, Källander K, Strachan D, et al. (2014) Supervising community health workers in low-income countries--a review of impact and implementation issues. *Glob Health Action*, May 8: 24085.
26. Marshall GN, Schell TL, Elliott MN, Berthold SM, Chun CA (2005) Mental health of Cambodian refugees 2 decades after resettlement in the United States. *JAMA* 294(5): 571-579.
27. McLaughlin D, Wickeri E (2012) Special Report: Mental Health and Human Rights in Cambodia. The Leitner Center for International Law and Justice.
28. Mezuk B, Eaton WW, Albrecht S, Golden SH (2008) Depression and type 2 diabetes over the lifespan: a meta-analysis. *Diabetes Care* 31: 2383-2390.
29. Boyko EJ, Jacobson IG, Smith B, Ryan MA, Hooper TI, et al. (2010) Millennium Cohort Study Team (2010) Risk of diabetes in U.S. military service members in relation to combat deployment and mental health. *Diabetes Care* 33: 1771-1777.
30. de Rooij SR, Painter RC, Phillips DI, Osmond C, Michels RP, et al. (2006) Impaired insulin secretion after prenatal exposure to the Dutch famine. *Diabetes Care* 29: 1897-1901.
31. Bercovich E, Keinan-Boker L, Shasha SM (2014) Long-term health effects in adults born during the Holocaust. *Isr Med Assoc J* 16: 203-207.

**Citation:** Julie Wagner J, Keuky L, Fraser-King L, Kuoch T, Scully M (2015) Diabetes Prevention through Village Health Support Guides in Cambodia: A Qualitative Investigation of Opportunities and Challenges. *J Community Med Health Educ* 5: 347. doi: [10.4172/2161-0711.1000347](https://doi.org/10.4172/2161-0711.1000347)

32. Ling C, Groop L (2009) Epigenetics: a molecular link between environmental factors and type 2 diabetes. *Diabetes* 58: 2718-2725.
33. [www.wpro.who.int/health\\_services/service\\_delivery\\_profile\\_cambodia.pdf](http://www.wpro.who.int/health_services/service_delivery_profile_cambodia.pdf).
34. [www.who.int/countryfocus/cooperation\\_strategy/ccsbrief\\_khm\\_en.pdf](http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_khm_en.pdf).
35. Cambodian Ministry of Health: Health Workforce Development Plan 2006-2015.
36. International Diabetes Federation (2014) IDF member association advocacy update on civil society: Interactive hearing on non-communicable diseases.