

Barriers to dietary modifications for people living with type 2 diabetes in a rural indigenous Guatemalan community

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Abstract

In Guatemala, the prevalence of diabetes continues to increase with a disproportionate burden falling on indigenous rural communities. In this study, we assessed barriers to making dietary modifications for people living with type 2 diabetes in a rural indigenous Guatemalan population. Structured interviews (n=32) were conducted with participants selected from a convenience sample of adults with type 2 diabetes living in villages in and around San Lucas Tolimán, Guatemala. Frequencies were calculated for closed-ended questions and content analysis was used to evaluate open-ended questions. Most participants (81%) were women with low-levels of formal education and average daily food expenditure of just over \$1 USD. The majority of participants were able to identify foods important in a diabetic diet, however, with significant barriers to making dietary modifications. Commonly cited perceived barriers included high costs of food due to travel and storage, inadequate local access to fresh fruits and vegetables and incompatibility with traditional diet. Several structural and cultural barriers exist to prevent dietary modifications for people living with type 2 diabetes in this rural indigenous population.

Introduction

The prevalence of type 2 diabetes has been increasing over the past few decades; roughly 463 million adults are living with diabetes worldwide; and the majority live in low and middle income countries.¹ Although medical care plays an important role in type 2 diabetes management, modifiable lifestyle factors, especially diet, are essential in maintaining improved

health outcomes and decreasing patients' risk for other serious health conditions such as cardiovascular disease.² Barriers to dietary modification for people with diabetes may be magnified for those living in remote and rural areas such as the indigenous populations of Guatemala. Studies from other rural populations found barriers to maintaining a healthful diet included lack of understanding of the diet plan, cost of diet, the perception of diabetic foods as bland or flavorless, and the burden of eating a different diet than the rest of the family.^{3,4}

In Guatemala, indigenous communities living in rural areas may face even greater challenges as they also suffer from historical and ongoing discrimination with poor access to care and documented abuse and discrimination when utilizing public health services.⁵⁻⁸ The Guatemalan Minister of Health has reported that rates of diabetes are increasing more rapidly in indigenous populations.⁹ The purpose of our study was to explore barriers to dietary modification for people living with diabetes in a primarily indigenous population in rural Guatemala. To our knowledge, this is the first study to exclusively explore barriers to dietary modifications in an indigenous Guatemalan population.

Materials and Methods

Study site

San Lucas Tolimán is a town of mostly indigenous highland Maya with a population of 17,000 people in South-Central Guatemala on Lake Atitlán. There is an additional population of about 14,000 spread among 19 rural communities scattered around San Lucas (ISEM 2020). The average income is less than \$1,000 USD per year, or about \$3 USD per day (INE 2015). A health promoter program, coordinated by a local religiously-affiliated NGO hospital and physician, provides basic medical care and health education, including diabetes care, to these surrounding communities. Participants in the diabetes program undergo regular education with community health promoters and attend a monthly diabetes clinic where blood glucose and hemoglobin A1c are monitored and medications adjustment accordingly.¹⁰ The health promoters are community members with basic training in disease identification and treatment of common illnesses including type 2 diabetes.¹¹ The closest government district hospital is in Sololá, 40 km away.

Study population

Participants were identified and recruit-

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Key words: Diabetes; indigenous; diet.

Acknowledgments: We wish to thank Dr. Rafael Tun at San Lucas Hospital and the health promoters, Cesia Castro Chuta, Dominga Pic Salazar, and Rogelio Coroxon. We would also like to thank the Friends of San Lucas.

Contributions: JW conducted interviews, analyzed data and contributed to writing the manuscript, JES contributed to study design and editing manuscript, SD contributed as content expert and to manuscript editing, and JS contributed to study design, data analysis and manuscript writing. All authors read and approved the final manuscript.

Conflict of interests: The authors have no conflicts of interest to declare.

Further information: JW was supported by an educational research scholarship for travel by the Herman and Gwen Shapiro Foundation.

Availability of data and materials: All data generated or analyzed during this study are included in this published article.

Ethics approval and consent to participate: The study was determined exempt by the Institutional Review Board of the University of Wisconsin. Patients gave their consent to participate.

Informed consent: Informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

Received for publication: 27 July 2021.

Revision received: 30 August 2021.

Accepted for publication: 1 September 2021.

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Healthcare in Low-resource Settings 2021; 9:10002

doi:10.4081/hls.2021.10002

ed by health promoters in a convenience sample from a group of people known to have type 2 diabetes. Inclusion criteria were: adults (age >18 years) with type 2 diabetes and Spanish speaking. Most individuals in this area are bilingual, speaking both Kaqchikel, the local Mayan language, and Spanish. Individual interviews were con-

ducted at diabetic clinics held monthly in several villages in the area or during home visits. Interviews were conducted entirely in Spanish by a member of the research team (JW). JW had extensive knowledge of the local community and health promoter structure and was fluent in Spanish. Health promoters fluent in Kaqchikel were also available to clarify questions as necessary. Verbal consent was obtained for all participants in Spanish due to low literacy and consent was witnessed by the health promoters. Responses to questions were collected by the researcher using detailed handwritten notes at the time of the interview. Notes were taken instead of audio recording based upon cultural preferences identified by health promoters.

The study was determined exempt by the Institutional Review Board of the University of Wisconsin. The project was supported by the Friends of San Lucas organization and their health promoter program.

Data collection

The study employed a concurrent triangulation mixed-method design.¹² We conducted structured interviews with questions designed to generate a combination of quantitative and qualitative results. The first portion of the 20-question interview guide contained close-ended questions regarding demographics, history of diabetes, and current medical treatment. The second set of questions involved a mix of open and closed-ended questions related to dietary consumption and food purchasing. The final set of open-ended questions focused on participants' understanding and beliefs about healthful foods for people with diabetes, perceived obstacles to dietary changes, and potential facilitators for maintaining a healthful diet.

In addition to responding to the structured questions, participants often willingly elaborated on their answers. Conversations also occurred around answers that were unclear. These additional comments were also captured in the researcher's notes, with relevant sections included for use in the qualitative analysis or to support quantitative results.

Data analysis

The answers to closed-ended questions were descriptively calculated as frequencies and means. Open-ended questions were analyzed qualitatively using content analysis.¹³ Two reviewers (JW and JS) performed coding with frequent cross-checks for accuracy. Questions relating to food purchasing and dietary behaviors (*e.g.*, "Can you tell me what you eat on a typical day for breakfast?") were coded into predetermined categories to determine response frequencies.

Other open-ended responses were coded by themes such as diet, food purchasing, cost, access, cultural norms, food preparation knowledge and healthful diet knowledge.

Results

Thirty-two participants were approached and all agreed to be interviewed (Table 1). The majority of the participants were middle-aged women with low levels of formal education. Participants were from six named communities (San Lucas Toliman 5, Patulul 2, San Juan 4, Xexuju 1, Totolya 3, Tierra Santa 2). The remaining 15 participants described their community as 'rural' without an associated named community.

Food purchasing

The mean weekly per capita expenditure on food was reported to be 58.8 GTQ (7.85 USD). The majority of participants (89%, n=28) shopped for food at an open-air market. Of those who shopped at markets, most reported having to travel to an outside community, necessitating use of public transportation. Large open-air markets were only available at two of the local communities (Patulul and San Lucas Tolimán).

Dietary patterns

The typical diet of participants consisted primarily of tortillas and beans at meal-times and occasional fruits for snacks throughout the week. Nearly all participants reported eating tortillas with all three of their daily meals (94%, n=30); the average number of tortillas eaten per day by the individuals surveyed was 14. The majority of participants also named beans as a central component of at least one meal of the day, with many having beans for two or more meals per day. Several participants reported eating fruits (the most commonly mentioned fruits being banana, mango, watermelon, and papaya) and *liquidados* (fruit smoothies) several times per week for snacks. Several participants did incorporate *hierbas* (leafy greens) into a meal at least once per day, however, the majority of these participants admitted that this was typically not more than once a day and it was not daily. The most common beverage was *atol* (a milk based beverage made from ground corn that is often sweetened), and coffee, which were the main beverages aside from water. Most reported they drank unsweetened *atol*, whereas a small number had *atol* with sugar added. There was a wide variation in frequency of intake of *atol*, ranging from several 'cups' a week to 5 cups per day

('cups' were reported as a subjective measure).

Dietary understanding

When asked what foods were consistent with a healthful diet for people with diabetes, most participants answered with one or more of the following food groups: vegetables, *hierbas* (usually meaning leafy greens), lean meats, and "foods without sugar." Several participants cited changes they had made to incorporate healthful foods into their diet. For instance, one woman noted she no longer puts sugar in her coffee. Several others commented that they no longer ate soup broth or tried to eat *comidas sin grasa* (foods without fat.)

Four participants stated they did not know what foods were appropriate or that they had not changed diet at all. One participant noted that he just takes his medications and continues to eat the same foods.

Perceived barriers

When the participants were asked what prevented them from eating the foods they perceived as important to a healthful diet every day, the responses fell into several common groups: cost, access, family support and time required to prepare different foods, and lack of knowledge for food preparation.

Cost

A majority of participants (59%, n=19) reported that foods compatible with a healthful diet (namely vegetables and lean meats) were too costly. One patient, when asked what kept her from eating the foods important for a healthful diet, stated that she did not have enough money to buy enough food for her family in general. Another answered that he did not have enough money to afford many vegetables; if he is still hungry after he eats the vegetables his family does have, he just fills up on tortillas.

Table 1. Demographic characteristics of participants n (%).

Characteristic	Total n=32
Gender	
Male (%)	6 (19)
Female (%)	26 (81)
Average age (years)	53.5
Average age at diagnosis (years)	46.5
Level of formal education	
None (%)	20 (63)
Elementary school (%)	10 (31)
High school (%)	2 (6)
Any college or higher education (%)	0
Positive family history of T2DM (%)	7 (22)

Participants also cited fluctuations in income levels throughout the year with three “off-seasons” where cash was short. Several participants stated they had limited finances in general, not specifically constrained to diet.

For participants who did not perceive increased costs, few elaborated on reasons. One woman stated that initially costs were higher, but now she is “used to it.” Others were unable to comment on cost because they did not monitor the food-related finances or did not do the shopping.

Access

Participants reported several factors that contributed to poor access to foods compatible with a healthful diet. Travel time and travel cost to the closest market were the most commonly cited barriers. A majority of the participants interviewed reported using public transportation to get to a market located between 5 and 30 km from their homes each time they wished to buy fresh foods. Because of difficulty with access and financial costs associated with this travel, participants typically only visited the fresh air market once every 7 to 15 days. In addition, participants did not have home refrigeration and foods would perish quickly. One patient stated that it was hard to buy enough vegetables to eat every day because they rot by the time he goes to the market again. Many participants explained that traveling for these types of foods is necessary because most perishable foods are not available at the corner stores in their home communities.

Incompatibility with family and traditional diet

Many participants commented that eating a diabetic diet was difficult because they were preparing food differently for the person or people in the household with diabetes and the rest of the family members. Most participants were the only ones in their family with diabetes. No participants reported changing dietary habits for the entire family. One woman stated that eating a different diet was difficult because she had to prepare different foods for her husband and children and herself. Another stated it was difficult during festivals because family members may be eating foods like cake and he cannot.

Potential facilitators

When asked what would help them adhere more closely to a healthful diet, participants noted a variety of mediators including improved local access, local gardens, communal support, and improved knowledge of food preparation.

Improved access

Many participants commented on the lack of availability of fruits and vegetables in their home communities making travel to regional markets necessary. They also cited difficulties in acquiring fruits and vegetables year round due to variations in cost and travel time. Participants noted that they can buy several other items such as coffee and sugar at local corner shops and suggested stocking fruits and vegetables at these shops.

Local gardens

Participants proposed solutions to improved access by growing their own fruits and vegetables. One participant noted that he would benefit from land to grow his own vegetables. Another proposed a community garden be built at the rural diabetic clinics. The patient who presented this idea explained how the garden would both facilitate access to, and reduce the cost of, fresh vegetables for the people with diabetes living in his community.

Communal support

Several participants stated that having a community support group or small meetings would be beneficial. Often participants were the only ones in their family or small community with diabetes and only saw other people with diabetes at monthly diabetic clinic. One woman stated a support group would be helpful because it is difficult to do it all on her own.

Improved knowledge in food preparation

Several participants mentioned that they knew what foods to eat but did not know how to prepare them. Participants described how foods important in a diabetic diet are often different from foods they traditionally eat such as tortillas, *caldos* (broths) and *atol*. They were also concerned that new foods would take more time to prepare and would have to be made separately from food for the rest of the family. Many participants suggested that videos or classes to teach them how to prepare healthful foods at home would be helpful.

Discussion

This study found that, despite a basic understanding of which foods are consistent with a healthful diet, indigenous people with type 2 diabetes living in rural Guatemala face significant barriers in complying with such a diet. Nearly all the participants interviewed in this study reported a diet that consisted primarily of corn tor-

tillas and black beans, with only occasional fresh fruits and vegetables. These foods were typically prepared in the home and therefore a great degree of individual variation existed between serving size and ingredients. Participants stated that it was difficult to limit carbohydrate intake, primarily tortillas, as they are served ubiquitously at meals and are a part of the staple diet. Participants described difficulty in modifying their diet due to financial limitations, lack of access to fresh fruits and vegetables, lack knowledge of food preparation, and incompatibly with family norms.

The cost of maintaining a healthful diet can be a significant financial burden in this population. Nearly eighty percent of the indigenous population in Guatemala lives below the poverty line and 40% of this population lives in extreme poverty. Participants in this study reported spending little more than \$1 per person per day, on average, for food. Unsurprisingly, many cited the cost of recommended foods as a barrier to following a healthful diet. These answers are consistent with previous studies in indigenous populations in Guatemala; perishable foods such as fruits, vegetables, meats, and dairy products have consistently been perceived as too expensive to purchase regularly.^{3,14,15}

Lack of access to fresh fruits and vegetables was also commonly cited as a barrier to eating a healthful diet. Participants reported that the small stores present in their communities do not regularly stock fruits, vegetables, and other fresh foods. This necessitated time-consuming and costly travel to larger communities using public transportation to purchase such foods. Most were only able to make this trip once every 1-2 weeks and did not have the means to store perishable food, resulting in poor availability and low consumption of such food. These findings are also supported by Webb *et al.*,¹⁵ who described striking similarities between an indigenous rural community of Guatemala and the urban food deserts of the United States; there is an abundance of pre-packaged snack foods and sugar-rich beverages available, contrasted with an almost complete absence of fruits, vegetables, dairy, and fresh foods. Given the ubiquity of small stores in these rural communities, interventions to improve the availability of healthy, fresh food in these stores is another potential approach for improving the food environment. Such programs have been successful in improving access to fruits and vegetables in both urban and rural settings in high-income countries.^{16,17}

Participants also suggested sustainable local models for ongoing access to fresh

fruits and vegetables. These proposed solutions included increased access to land for gardens or community gardens. Community gardens have been shown to increase intake of fruits and vegetables for those with free access to the produce grown in the garden in high-income countries such as the United States.¹⁸ Similarly, studies conducted in Guatemala have found that families who maintain home gardens have superior nutritional status and access to fresh produce.^{19,20}

Other possible changes that may improve adherence to a healthful diet for people with diabetes in this area include community-based outreach with community support groups and classes in cooking and food preparation. Flood *et al* described a program in a similar population in the highlands of Guatemala where home visits were conducted with bilingual educators and, in addition to other interventions, improved outcomes for people with diabetes.²¹ Additional studies have shown that support groups can increase healthy lifestyle modifications for people living with diabetes.^{22,23}

Limitations

This study has several weaknesses that may limit its generalizability even within other indigenous Mayan populations. First, the participants in the study were identified by health promoters and may have held different views than the general population. In addition, the subset of participants were primarily middle-aged women, likely reflected by the fact that most indigenous men in this area are working in the fields during the day and may have different views from other people with type 2 diabetes in this area.

The participants were not blinded to the interviewer, a foreign woman. This may have biased the responses either due to concerns for trust or discretion. Health promoters were present during interviews in an effort to improve rapport and trust. Additionally, most participants are primary Kaqchikel speaking, with Spanish as a second language, and interviews were primarily conducted in Spanish with limited clarification by health promoters. This may have influenced participants understanding of questions or ability to adequately respond.

Finally, only one interviewer was present and took notes due to limitations in travel for the entire research team. This could lead to biases in recording and recall which would have downstream effects on data interpretation. Copious notes were taken in an effort to mitigate this bias.

Conclusions

A high-quality healthful diet is one of the most important modifiable lifestyle factors in preventing early mortality from type 2 diabetes; however, this is difficult and often unrealistic for rural indigenous people living in Guatemala. Participants in our study cited high costs of food due to travel and storage, inadequate local access to fresh fruits and vegetables, and incompatibility with traditional diet as barriers to dietary modifications. Future studies are needed to assess strategies to help mitigate costs and improved access to allow these communities to improve and maintain a healthful diet.

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