

Final Report
Comparative Study of Changes in Diet, Nutritional Status and Diabetes
Prevalence in an Indigenous Migrating Population (PIMSA Grant
#GHN10W)
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Victoria Persky, M.D.
Lilian Gonzalez Chevez, PhD
Noel Chavez, PhD, RD, LDN
Eva Hernandez MSN
Elizabeth Banda, MPH

Abstract

Currently, it is estimated that 20,800,000 persons in the United States have diabetes with rates higher in Mexican Americans than non-Hispanic whites. The effects of migration on factors contributing to the disease are not well understood. This study was a cross-sectional survey of 51 adults 18-50 years old in Temalac, Mexico and Waukegan, Illinois to identify issues related to diet, obesity, and diabetes in an indigenous population migrating from Mexico to the United States. The purpose of the project was to develop a collaboration between investigators at the University of Illinois at Chicago and the Universidad Autonoma del Estado de Morelos in Mexico and collect pilot data that could be the basis of a future larger grant proposal. Most individuals in Temalac and Waukegan relied on public clinics for medical care, with a high percent reporting diabetes. A large percent reported using alternative medication and/or lifestyle change along with pharmaceuticals for treatment of diabetes. More than 75% of persons in both countries were either overweight or obese. Persons in Waukegan were more likely to feel that they were overweight and persons in Temalac were more likely to report insufficient food at least some of the time. Food frequency data showed continued use of Mexican foods, with greater consumption of food items in Waukegan that may not have been readily available in Temalac. A larger study identifying in more detail the effect of migration on risk factors for diabetes would support the development of appropriate intervention strategies for this important public health problem.

Narrative

Objectives of the Study:

1. To build a collaboration between investigators at the University of Illinois School of Public Health and the Universidad Autónoma del Estado de Morelos in Mexico
2. To examine transition in factors relating to diabetes, diet and obesity among a population migrating from Mexico to the United States
3. To examine economic and social variables that relate to risk factors for diabetes in this migrant population

Background

In 2000 it was estimated that 31,000,000 people in the United States were Hispanic, of whom 63% were Mexican Americans with the total expected to double or triple over the next 50 years¹. Obesity, diabetes, and metabolic complications have increased dramatically since the late 1970s in Mexican Americans², with approximately 20,800,000 persons in the US currently having diabetes and the prevalence of the disease among Mexican Americans 1.7 times that among non-Hispanic whites³. Body mass index (BMI), waist hip ratio and fasting insulin are all predictors of metabolic syndrome in Mexican Americans⁴, with abdominal obesity significantly higher in Mexican Americans born in the United States than in Mexico¹. Major risk factors for diabetes are obesity and sedentary lifestyle. The contribution of dietary pattern in Mexican Americans, independent of total calories and exercise, to obesity and diabetes is not clear. Data from the National Health and Nutrition Examination Survey (NHANES 1988-94) suggest that Mexican Americans born in Mexico have in general healthier dietary patterns, with less fat, more fiber, vitamins A, C, E and B6, and folate, calcium, potassium and magnesium than Mexican Americans born in the US, despite the increasing trends in diabetes⁵. Data on individual indigenous Mexican groups is generally lacking. Identification of effects of migration of indigenous populations on both healthy and unhealthy lifestyles would present clues to etiology, as well as how to develop culturally appropriate intervention strategies to prevent this increasingly important public health issue.

Lilián González Chévez, the Mexican Principal Investigator on this study, provided us with a unique opportunity to examine the effects of migration on factors relating to diet, obesity and diabetes. She has a long standing collaboration with a population in Temalac, a town with approximately 900 indigenous residents of Nahua descent, who have been migrating for several years to Waukegan, Illinois, a city an hour north of Chicago. A few years ago Dr. Gonzalez approached the Chicago team to develop a questionnaire and survey adults living in Temalac and adults living in Waukegan as a first step to a larger study examining effects of migration of indigenous populations on factors related to obesity and diabetes in this immigration population.

Study Design

Overview: This project was a cross-sectional survey of adults 18-50 years old in Temalac and Waukegan. Selection was through convenience and snowball sampling, with participants contacting associates to see if they would like to participate in the study. The project was approved by the University of Illinois at Chicago IRB and by the Universidad Autónoma del Estado de Morelos prior to implementation.

Survey design: The survey consisted of approximately 215 questions dealing with demographics, general health, physical activity, weight changes, lifestyle, acculturation, dietary patterns, medication, herbal remedies, migration, social support, and work history. The questionnaire was developed collaboratively with US and Mexican teams and pilot tested in the US. It included questions from the NHANES in the US and the Encuesta Nacional de Salud y Nutrición (ENSANUT) 2005 in Mexico, and the Acculturation Scale for Mexican Americans II (ARSMA)⁶, along with a food frequency and dietary acculturation questionnaire developed by Dr. Chavez, and questions relating to social support, migration and alternative medicine developed by the project team. Spanish and English versions are included in the Appendix.

Community involvement: Prior to implementation Dr. González met with communities in Waukegan and Temalac, and the University of Illinois team met separately with mayors from both communities currently residing in Waukegan. Before and during the project the University of Illinois team met as well with other members of the local community and developed a resource directory for Temalaquenos living in Waukegan. The University of Illinois team also attended two health fairs on October 11, 2008 and August 4, 2010. A newsletter was developed to describe the overall results and a final community meeting to discuss these results will take place in October.

Implementation: Surveys were completed for 30 adults in Temalac and 21 adults in Waukegan in 2009. Copies without identifiers were exchanged between the two research groups and data was entered and preliminary analyses performed at the University of Illinois in Chicago in the spring and summer of 2010.

Results

Overall demographics are presented below for the entire group and for each subgroup separately:

Table 1 Demographics

Variable	Total Group		Waukegan		Temalac	
	N	%	n	%	n	%
Mean age	33.7		36.6		31.6	
No. household	5.1		5.6		4.7	
Gender						
Female	38	75%	14	67%	24	80%
Male	13	25%	7	33%	6	20%
Married	35	69%	10	48%	25	83%
Common-law marriage	10	20%	8	38%	2	7%
Currently employed	29	57%	13	62%	16	53%
Some education ¹	37	79%	18	86%	19	73%

Overall, this was a young population with 75% of those interviewed between 18 and 37 years of age and 75% women. Ninety-two percent (92%) understood an indigenous language (100% answered questionnaire in Spanish) and a majority were employed.

¹ Percentages calculated from sample sizes: 47 (total group), 21 (Waukegan) and 26 (Temalac).

Table 2 Health Care Access

Variable	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Usual source of care						
Personal physician	5	10%	4	19%	1	3%
Public clinic	44	86%	16	76%	28	93%
Pharmacy	1	2%	0	0%	1	3%
Traditional medicine	1	4%	1	5%		
Insurance						
Private	2	4%	2	10%		
Public	30	59%	2	10%	28	93%
Cash	17	33%	17	81%		
Problem getting care	9	18%	2	10%	7	24%

Most individuals in both countries relied on public clinics for care with only 20% in Waukegan having some form of insurance. Most did not feel there was a problem obtaining care although those who did face difficulty mentioned economics as being the primary reason.

Table 3 Overall Health

Variable	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Visits ER last year	6	12%	1	5%	5	17%
Visits to clinic last year	22	43%	9	43%	13	43%
Diabetes	10	20%	3	14%	7	23%
Gestational diabetes	5	10%	3	14%	2	7%
Hypertension	14	27%	3	14%	11	37%
Injury at work	3	6%	1	5%	2	7%
Other injury	4	8%	2	10%	2	7%
Birth wt child <2.5kg	9	24%	5	36%	4	17%

There were a large number of health issues in both communities with patterns varying by community.

Table 4 Use of Alternative Medicine

	Temalac		Waukegan	
	Used Ever	Used in Mexico	Used in U.S.	
Medicina de patente	83%	67%	33%	67%
Medicinal plants	77%	90%	81%	53%
Levantar la sombra	30%	33%	33%	0%
Limpias	20%	43%	33%	24%
Sobador	10%	24%	0%	24%
Productos de catalago	3%	43%	5%	43%

Everyone in both Temalac and Waukegan stated that they had used alternative therapies at some time, while only 4% stated that they had consulted traditional healers, suggesting that the alternative therapies were not prescribed by health care providers (Table 2).

Table 5 Treatment for Diabetes (n=10)

Variable	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Prescription Medicine	10	100%	3	100%	7	100%
Medicinal plants	5	50%	2	67%	3	43%
Natural products	1	10%	1	33%	0	0%
Diet	2	20%	1	33%	1	14%
Exercise	2	20%	2	67%	0	0%

All individuals reported that they were on medication for their diabetes. A greater percent in Waukegan used alternative treatments and lifestyle measures. More than half attributed their diabetes to stresses in their lives, with more persons in Waukegan than Temalac stating that heredity and overweight also contributed to diabetes.

Table 6 Weight

Variable ²	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Do you consider yourself						
Overweight	28	55%	14	67%	14	47%
Underweight	5	10%	0	0%	5	17%
Right weight	18	35%	7	33%	11	37%
Weight change last year						
Gained	12	24%	6	29%	6	20%
Lost	15	29%	4	19%	11	37%
No change	20	39%	8	38%	12	40%
Food Security						
Sufficient food	27	53%	19	90%	8	27%
Sometimes not enough	19	37%	2	10%	17	57%
Often not enough	5	10%	0	0%	5	17%
BMI calculated from measured height and weight						
<18.5 (underweight)	1	2%	0	0%	1	3%
18.5-24.9 (normal weight)	9	18%	3	16%	6	20%
25-29.9 (overweight)	15	31%	6	32%	9	30%
≥30 (obese)	24	49%	10	53%	14	47%
Waist circumference (cm)	97.14		97.54		96.88	

Persons in Waukegan felt that they were more likely to be overweight and to have gained weight in the last year. BMIs, as calculated from measured height and weight, indicate that high proportions of persons in both countries were either overweight or obese (85% in Waukegan and 77% in Temalac). Waist circumference was slightly higher in those residing in Waukegan, with waist circumference overall higher in women than men (not shown). Nineteen persons (90%) in Waukegan said they had gained weight since coming to the US and attributed the weight gain to changes in amount of food consumed, less activity and more food abundance. More persons in Temalac (74%) than Waukegan (10%) felt that they did not have sufficient food at least some of the time.

² BMI and waist circumference computed from different sample sizes

Table 7 Food Patterns

Variable	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Types of foods preferred						
Mexican	33	65%	10	48%	23	77%
Foods in US	0	0%	0	0%		
Both equally	14	27%	11	52%		
Eat between meals	16	31%	11	52%	5	17%
Who shops for food						
Mother	28	55%	15	71%	13	43%
Father	3	6%	2	10%	1	3%
Both	6	12%	3	14%	3	10%
Other	7	14%	1	5%	6	20%
How much fried food						
< Half	18	35%	13	62%	5	17%
Half	22	43%	5	24%	17	57%
>Half	8	16%	3	14%	5	17%

Individuals in Temalac are more likely to eat fried food than those in Waukegan. Sixty-seven percent say that they eat more meat in the US – reasons given are that meat costs less, participants have more money to spend on food and meat is more accessible in the US (not shown above). Food frequency/dietary acculturation data also showed continued use of Mexican foods but greater consumption of American cheese, soda, spaghetti, pizza, and Mexican pan dulce in Waukegan (not shown above). However, there are positive increases in reported frequency of consumption of some foods such as fruits, fresh cheeses, and rice that may not be as readily available or may cost more in Temalac. Additionally, there doesn't seem to be as much adoption of foods such as flour tortillas, prepared foods, and snack foods as might have been expected (not shown).

Table 8 Lifestyle

Variable	Total Group		Waukegan		Temalac	
	N	%	N	%	N	%
Currently smoke	6	12%	4	21%	2	7%
Drink alcohol ³						
No	13	26%	10	50%	3	10%
≤1 day/month	21	42%	7	35%	14	47%
2-4 days/month	7	14%	2	18%	5	17%
≥4 days/week	1	2%	1	10%	0	0%
During parties	8	16%	0	0%	8	27%

Overall, a somewhat greater percent of persons smoked in Waukegan and a lower percent consumed alcohol in Waukegan than in Temalac. Of those who had moved to Waukegan (not shown) 14% said they were more active than in Temalac, 57% were less active and 24% had about the same level of activity.

³ Percents calculated from a sample size of 50.

Other findings

Acculturation score: Of the 17 who answered the acculturation scale (ARSMA)⁶, eighty-two percent of the scores were very Mexican oriented and 18% Mexican oriented to bicultural.

Employment: A wide variety of occupations were listed. One-third mentioned factory work (all from Waukegan) and a third agriculture (all from Temalac). Other occupations included working in small businesses (grocery stores, bakery, etc.), bartending, selling from a catalogue, and landscaping.

Migration: All participants in Waukegan had some migratory history within Mexico before migrating to the U.S. Seventy-one percent (n=15) had migrated to Puerto Vallarta, where they worked as street vendors, domestic workers and in the hotel industry. Aside from Puerto Vallarta, 24% had migrated to several other states within Mexico, employed as agricultural day laborers (seasonal migrants), harvesting crops, especially sugar cane, tomatoes and peppers. Seventy-one percent migrated to work and only 29% of those migrating within Mexico migrated alone. Analyses of social factors associated with the migration process are ongoing.

Graduate Students: Dr. Gonzalez employed three anthropology graduate students to conduct the interviews in Temalac. Interviews in Chicago were performed by Elizabeth Banda, Eva Hernandez and a medical student volunteer. Data entry and analysis was performed by Elizabeth Banda and Carmen Vergara, along with two volunteer medical students at the University of Illinois at Chicago School of Public Health. Translation of the questionnaire into English was by Catherine Lind, a graduate student in Community Health Sciences.

Presentation of results: The description of the study design was presented at the 2009 PIMSA meeting by Dr. Chavez in October 2009 and some preliminary results at the University of Illinois at Chicago Dean's Forum, April, 2010. A more complete presentation is scheduled for October 3, 2010 at the 2010 PIMSA meeting. We will be presenting the results to Temalacenses in Waukegan in October.

Limitations

Results from this study are from a small convenience sample of individuals from a larger population and cannot therefore reflect overall prevalence rates. For most variables, the study relied on self-report, the validity of which was not examined. Many of the questions were derived from those used in national surveys and could, with a larger, sample allow for comparisons.

Conclusions

Despite these limitations, the data does suggest that diabetes rates in the two communities may be high. Both populations rely heavily on public clinics for health care with access issues suggested. The very high indices of obesity, along with perceived weight gain on immigration, is of some concern and suggests the need for more health education. Although food insecurity is less in the US than Temalac, the overall dietary pattern shown by our brief measure indicates that there is some acculturation to US foods in Waukegan. These patterns and other characteristics need to be studied in greater detail to understand better the dynamic of dietary and health changes which occur with migration in this indigenous population. Delineation of factors contributing to diabetes would support the development of appropriate intervention strategies to reduce the adverse health effects often associated with migration to the United States.

Future Plans

Data from this study will be used to develop a larger collaborative grant proposal addressing in more detail effects of immigration in this population using a combination of quantitative and qualitative approaches, with an in depth focus on dietary, anthropometric and psychosocial issues related to migration.

References

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Brief Report

Currently, it is estimated that 31,000,000 persons in the United States have diabetes with rates higher in Mexican Americans than non-Hispanic whites. The effects of migration on factors contributing to the disease are not well understood. This study was a cross-sectional survey of adults in Temalac, Mexico and Waukegan, Illinois to identify issues that could be related to diet, obesity, and diabetes in an indigenous population migrating from Mexico to the United States. Temalac is a town with approximately 900 indigenous residents of Nahua descent who have been migrating for several years to Waukegan, Illinois, a city an hour north of Chicago. The purpose of the project was to develop a collaboration between investigators at the University of Illinois School of Public Health and the Universidad Autonoma del Estado de Morelos in Mexico and collect pilot data that could be the basis of a future larger grant proposal.

The questionnaire was developed collaboratively by both teams and included questions from the NHANES in the US, the Encuesta Nacional de Salud y Nutricion 2005, and the Acculturation Scale for Mexican Americans, along with a food frequency and dietary acculturation scale developed by Dr. Chavez and questions relating to social support, migration and alternative medicine developed by the project team. A total of 51 adults age 18-50 were identified through convenience and snowball sampling in Temalac (n=30) and Waukegan (n=21). Three-fourths of the population was between 18 and 37 years of age and three-fourths were women.

Prior to implementation of the project, Dr. Gonzalez met with the communities in Waukegan and Temalac, and the University of Illinois team met separately with mayors from both communities currently residing in Waukegan. Both before and during the project the University of Illinois team met as well with other members of the local community and developed a resource directory for migrants from Temalac living in Waukegan. During the project the University of Illinois team attended two community health fairs and developed a newsletter which will be presented at a community meeting with results in October.

The questionnaire identified a large number of health issues in both communities. One-fifth of those interviewed reported having a diagnosis of diabetes, with several mentioning hypertension and injuries. Most individuals in Temalac and Waukegan relied on public clinics for medical care, with only 20% in Waukegan having some form of insurance. Economic reasons were stated as the primary reason for decreased access to care. The acculturation scale suggested that most immigrants remained primarily Mexican-oriented. A large percent reported using alternative medication and/or lifestyle change along with pharmaceuticals for treatment of diabetes. While a large percent said they used alternative medication, only a small percent said they consulted traditional healers suggesting that the alternative medication was not prescribed by health care providers. More than half attributed their diabetes to stresses in their lives, with more persons in Waukegan than Temalac stating that heredity and overweight also contribute to diabetes. More than three-fourths of those surveyed in both countries were either overweight or obese. Persons in Waukegan were more likely to believe that they were overweight and persons in Temalac were more likely to report that they did not have sufficient food at least some of the time. Most persons surveyed in Waukegan said they had gained weight since coming to the United States and attributed the weight gain to changes in amount of food consumed, less activity and greater food access. Individuals in Temalac were more likely to eat fried foods than in Waukegan. Food frequency data showed continued use of Mexican foods in Waukegan, with greater consumption of American cheese, soda, spaghetti, pizza, pan dulce, fruits, fresh cheeses, and rice, in part due to greater access to these foods. More persons in Waukegan reported smoking, with a smaller proportion reporting

drinking alcohol at least some of the time. A wide variety of occupations were listed. One-third mentioned factory work (all from Waukegan) and a third agricultural (all from Temalac).

This study was unusual in examining factors that could contribute to diabetes in an indigenous immigrant population from rural Mexico. Results from this study are from a small convenience sample of individuals from a larger population and cannot therefore reflect overall prevalence rates. Many of the questions, however, were derived from those used in national surveys and, in a larger study, could allow for comparisons. Results suggest that obesity and diabetes are prevalent both in Temalac and Waukegan and that a variety of social and lifestyle factors might be contributing to the disease. The widespread use of alternative medicine is of interest. Food insecurity in residents of Temalac deserves further attention. The increase in smoking and actual weight gain with migration is also of concern. Food frequencies suggest that there is substantial variation in diets, with increases in both healthy and unhealthy foods with greater food access in the United States. These results suggest a need for greater understanding of the factors affecting the lives of this immigrant population, as well as culturally appropriate education programs targeting social and lifestyle issues. A larger study identifying in more detail the effect of migration on factors related to risk of diabetes would increase our understanding of the development of diabetes and support the development of appropriate intervention strategies for this increasingly important public health problem.