SIX POUNDS OF SUGAR:
AN ANALYSIS OF SUGAR CONSUMPTION
AND NON-COMMUNICABLE DISEASE IN JINOTEPE, NICARAGUA

by

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Abstract

Background: Few studies using either quantitative or qualitative research methods have been conducted or published regarding the nutrition transition in Latin America, specifically Nicaragua.

Methods: Focus group interviews were conducted with 29 women in rural Jinotepe, Nicaragua. Each group was asked to give a daily diet recall, as well as answer questions regarding household income, weekly market purchases, and health concerns for their families and community. In addition, demographic data for each individual woman was gathered, including height and weight to calculate body mass index (BMI).

Results: The majority of women in the focus groups were found to be overweight or obese. These data are consistent with limited information available from WHO. Additional analysis of the qualitative interviews revealed sugar is one of the cheapest sources of calories at the local market and women prepare homemade sugar-sweetened beverages for each meal. In some of the focus groups, women identified pre-diabetes and diabetes as pressing health concerns for themselves and their families.

Conclusions: Recommendations include food policy change at the national level to decrease sugar consumption. Three policies for the Nicaraguan government and one for the US will be discussed: changing the price of sugar to influence behavior change, stronger regulation and taxation, microfinance training for women, and changes to the US Farm Bill regarding sugar policy.
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I. Problem statement

While completing a research internship for the Master’s in Public Health program in the Department of Maternal and Child Health at the University of North Carolina-Gillings School of Global Public Health with Stop Hunger Now, in the summer of 2012, the author conducted women’s focus groups in Jinotepe, Nicaragua to identify the leading health obstacles to improve community health. Participants in the focus groups were mothers of children who enrolled in the feeding programs in church and school settings where Stop Hunger Now supplies food.

A pre-test was done in the capitol city of Managua, Nicaragua. Initially the survey was intended to explore differences in distribution of food related to children’s gender. On day one, a 250 pound woman who stood about 5 foot 2 inches tall answered the question ‘What do you typically eat each day?’ by saying, “I have no money for food, only coffee, sugar, and one loaf of bread for my family each week.” Thus the pilot interview immediately revealed that the survey questions needed to be adjusted to the local reality.

After this initial interview, the focus of the research was modified to address issues related to obesity, sugar consumption, and the rise of non-communicable diseases in rural Nicaraguan communities. In the focus groups, women identified diabetes and obesity as the most prevalent health problems that need to be addressed in their community. Consequently, the determinants of diabetes and obesity in the specific context of the rural Nicaraguan environment are examined in this study. Both quantitative and qualitative methods are used to examine Nicaraguan women’s perceptions of sugar consumption, obesity, and the relationships of these factors to non-communicable diseases, such as diabetes.
II. Background and Significance

Women are the backbone of the family in both urban and rural Nicaraguan communities. Extended family support networks and multiple families living under one roof are common. Women as sole provider for their immediate family or extended family are typical in Managua. 1 Forty percent of all Nicaraguan households are headed and supported by women without the consistent presence of husbands or spouses. 1,2

Since women are often sole providers for households, they are central to improving Nicaragua’s economic standing as well as the health and well being of Nicaraguan children, youth, and adolescents. Eleven percent of all Nicaraguan women are unemployed,3 and rural women are more likely to be unemployed than women in cities. Job and education opportunities directed at women have the potential to help elevate Nicaragua’s current economic, social, and health situation.

The UN and WHO have established fighting diabetes and other non-communicable diseases as a global priority.2 Diabetes is linked with the Millennium Development Goals (MDGs). First, diabetes is a poverty issue, MDG 1, since medical bills from a diabetes diagnosis can quickly put a family into debt and thus threaten national health systems.4 Second, diabetes is disproportionately associated with women, especially in countries where women are marginalized. In impoverished communities women and girls simultaneously have poor nutrition and limited access to exercise, due to gender norms and safety concerns, and are at increased risk of developing obesity and diabetes. 4 Therefore, diabetes is linked with MDG 3, gender inequality, and maternal and child health MDGs 4 and 5.
The United Nations established that chronic non-communicable diseases (NCDs) are responsible for 35 million deaths annually and now constitute a greater health burden worldwide than infectious diseases.\(^5\) Fighting chronic non-communicable disease (NCD) is both a developed and developing world issue. 80 percent of deaths attributable to non-communicable diseases occur in developing countries, and 30 percent more people are obese than undernourished worldwide.\(^5\)

Obesity is a growing world epidemic; the global prevalence of obesity has more than doubled since 1980.\(^2\) The World Health Organization (WHO) classifies overweight as having a body mass index (BMI) of greater than 25 percent and obesity as higher than 30.\(^6\) Overweight and obesity are the fifth leading cause of death and disease globally, and many low-income countries are seeing obesity in previously malnourished, underweight populations.\(^1\)

Diabetes is a non-communicable disease that affects nearly 346 million people worldwide.\(^2\) South and Central America are estimated currently to have 25.1 million people living with diabetes. By 2030 that number is estimated to grow by 59 percent to 39.9 million people.\(^4\) Diabetes disproportionately affects people living in poverty and 80 percent of all diabetes cases are in developing countries.\(^2,4\) In Nicaragua, deaths attributed to NCDs are currently estimated to account for 69 percent of all deaths.\(^2\)

WHO produced a technical report titled *Diet, Nutrition, and the Prevention of Chronic Diseases (2003)* that provides epidemiological evidence demonstrating that excessive sugar consumption affects human health beyond simply adding calories.\(^7,8\) Numerous studies have shown that excessive ingestion of sugar is a precursor to all of the diseases associated with metabolic syndrome\(^9,10\) including:

…hypertension, insulin resistance through synthesis of fat in the liver, diabetes from increased liver glucose production combined with insulin resistance and the ageing process,
Some researchers have argued that the toxic effect of sugar on the liver is similar to the impact of alcohol. This research indicates that obesity is not the cause of the diabetes or cardiovascular disease (CVD), but a visible marker for a metabolic disorder and dysfunction and increases the risks of developing diabetes and CVD.

The Institute of Medicine recommends that both adults and children ingest 130 grams of carbohydrates a day for both adults and children, based on the average minimum amount of glucose used by the human brain. Based on this information, WHO recommends that people do not ingest more than 10 percent of their energy from total sugars daily. WHO adopted this stance after reviewing research findings that sugar consumption exceeding 10 percent of total energy intake may be associated with negative effects on behavior; alterations in insulin sensitivity; increases in type 2 diabetes and obesity; risks of cancer in the lung, breast, prostate, colon, rectum, and increased incidence of dental caries.

Sugar consumption worldwide has tripled over the past 50 years. Policy makers have long considered sugar as an ‘empty calorie,’ but researchers are uncovering scientific evidence that sucrose can activate bodily processes directly related to liver toxicity and chronic disease. In some parts of Central America people consume an average of more than 500 calories per day from added sugar alone (i.e.: sugar not naturally found in food or broken down in the body from carbohydrates, but added in drinks and foods).

Much research attempts to draw a causal link between obesity and type 2 diabetes. Obesity has been linked to increased risk of developing type 2 diabetes and poor health status overall. In addition, the strongest research links sugar consumption, specifically sugar-sweetened beverages (SSBs), to an increased risk of obesity. Sugar-sweetened beverages are seen as
one of the most significant contributors to the global obesity epidemic due to their high caloric content and easily absorbed sugars. High calorie beverages have taken the place of many previously low calorie foods, such as fruits and vegetables. Furthermore, consumption of fruits and vegetables has been linked to chronic disease prevention.

Conceptually, decreases in access to fruits and vegetables and increases in sugar consumption are mediating factors leading to increased BMI and obesity, both of which are signs of metabolic dysfunction and increased risk of developing diabetes and other NCDs. Lack of activity has also been cited as a cause of increased BMI and obesity. In Latin America, 30-60 percent of adults are not meeting the recommended activity guidelines.

A randomized controlled trial demonstrated that women who drank sugar-sweetened beverages had higher rates of weight gain, more substantial weight gain, and increased risk for developing type 2 diabetes. Researchers attributed this to the excessive calories and fast absorbing sugars found in sugar-sweetened beverages. Sugar consumption has been linked to an increased risk of developing obesity and numerous studies have linked high body mass index to an increased risk of developing obesity and type 2 diabetes.

High sugar consumption and lack of activity are mediating factors that increase a woman’s BMI and likelihood for obesity, increasing the risks of diabetes. The conceptual model below demonstrates how these factors fit together.
The conceptual model demonstrates that the largest factor influencing sugar consumption is the socio-cultural and economic environment. Cheap sugar and few opportunities to exercise are the foundation for poor health outcomes. Women are the drivers of this model, since they control the market purchases and prepare the sugar-sweetened beverages for the household. Therefore, mothers control household sugar consumption and should be the target of interventions to reduce sugar consumption. The model incorporates the co-morbid conditions that are the result of metabolic disruption due to high sugar consumption.

According to WHO data, the majority of Nicaraguan women are overweight or obese. WHO estimated in 2008 that 88.8 percent of Nicaraguan women were either overweight (60.2 percent) or obese (28.8 percent). The Demographic Health Survey (DHS) has not collected surveillance data in Nicaragua since 2002.

More than surveillance data is needed to corral the problem of sugar consumption and diabetes in Nicaragua. Extensive literature exists on type 2 diabetes and obesity, however little
research exists on women’s perceptions of causes of type 2 diabetes. Expanding this literature will help researchers and practitioners create meaningful interventions to help women prevent the development of diabetes in themselves and their family members. Additionally, documentation is needed of changes in the Nicaraguan diet over the last 30 years. For example, research has shown the introduction of cup holders in cars allowed Americans to eat with one hand at anytime and increased the number of times Americans consumed meals\textsuperscript{10, 11}. What changes have happened in Nicaragua? How are Nicaraguan diets different than they were 10, 20, and 30 years ago? In order to make policy recommendations, an understanding of a Nicaraguan woman’s daily diet composition is necessary.

The qualitative data and quantitative dataset from this pilot study research will expand the literature on obesity and diabetes in rural, impoverished Jinotepe, Nicaragua. If women in Jinotepe are representative of women in other rural communities, then this information may be generalized to other rural, impoverished communities throughout Nicaragua and potentially other Central American Countries.
III. Hypotheses and/or research questions and their relevance to MCH

Research Question: Why do young Nicaraguan women/mothers in their 20s and early 30s with limited resources tend to be overweight and pre-diabetic?

Hypothesis: Nicaraguan women have more access to inexpensive sugar and have more opportunities to consume sugar-sweetened beverages than did their mothers or grandmothers. Sugar consumption, specifically from homemade sugar-sweetened juice and coffee beverages, is the central reason for overweight and obesity in Nicaraguan women.

MCH significance: According to the 2002 Nicaragua Demographic and Health Survey (DHS), Nicaragua has an estimated population of 5,710,670 with 54.4 percent of the population living in urban areas and the tourist heavy Pacific coast. Nicaragua is the second poorest nation in the Western Hemisphere and poorest Spanish-speaking nation in the world. One in three Nicaraguan children has some degree of malnutrition and 22 percent of children under five suffer from moderate to severe growth stunting.

In Nicaragua, women are disproportionately affected by obesity and diabetes. Obesity is a status symbol and found among women of poor socio-economic status and wealthy men. In a 2012 study, which took urine samples from men and women in five rural Nicaraguan communities, diabetes disproportionately affected women; 1.2 percent of men and 4.3 percent of women had diabetes. Diabetes is the fourth leading cause of death among Nicaraguan women.
IV. Methods: design, sampling, data collection, data analysis

The researcher received approval from the University of North Carolina’s Internal Review Board to interview women in Managua and Jinotepe, Nicaragua. Pre-test interviews conducted with two mothers in Managua informed changes in the survey. Demographic and daily diet recall questions remained the same, but the gendered feeding practice questions shifted to a discussion of sugar consumption, market purchases, and health needs in women’s families and the community.

The focus groups were conducted with groups of 3-4 women in Jinotepe, Nicaragua between 9 and 11 am while women’s children attended school. Women were interviewed together in the same groups twice over the course of two weeks. In total, 29 women were interviewed in Jinotepe.

The researcher asked demographic questions such as age, number of children, and marital status to each woman individually at the beginning of the focus group. Questions about daily diet, food preparation, daily drinking habits, drink preparation, food purchases, exercise, sugar purchasing habits, sugar consumption, desired number of children and access to contraception, the perceived health of the community, and women’s perceptions of the greatest health challenges in their communities were asked as focus group questions. During the second week, at the end of the second interview, women’s height and weight were recorded in order to calculate BMI.

Quantitative data were recorded and BMI was calculated using Excel. Qualitative data were analyzed using Atlas.ti 2.0. In addition to the height and weight data, the recorded qualitative
data lend a voice to the nutrition transition underway in Nicaragua, with the potential to generalize to broader Nicaraguan and other Central American communities.
V. Results and interpretation of results

Women in the sample ranged from 17 years old with one child to 52 with five children. One 59-year-old woman with 11 children participated, but she was a grandmother. The median number of children was two years old. The education levels of the women ranged from first grade to completion of high school. Only one of the mothers had completed high school and was in vocational school two nights a week. All of the women volunteered once or twice a month to prepare meals for children at the school in exchange for two free meals a day during the school week for their children. The number of times a month a woman must volunteer is not tied to her number of children.

During this study, the high percentage of use of family planning methods was an encouraging finding for future economic development. Women in rural Jinotepe were well connected to the health system. There was a rural clinic that was open once or twice a week, depending on holidays, and women had access to free contraception both there and in town. More importantly, women were using the free contraception provided. One woman had had a tubal ligation after her third child, but the majority of fecund women were using an injectible similar to Depo-Provera. Due to the fact that the interviews were focus groups and not individual interviews, data on each woman’s contraceptive choice are not available but generalizations about what women said can be made. Some women liked the shot because of ease and the fact that they only needed four shots a year. Almost all women with two or more children said they did not desire more children. Three women said, “I will take those that God gives me,” while another woman added “but those that I have are enough.”

The majority of women in the sample were married. Of the 29 women, three were unmarried or widowed. The brothers, sons, and uncles of these three women took responsibility for the
women’s and their children’s financial needs. None of the women interviewed had formal employment. Of the 29 women interviewed all said that they stayed home to take care of children and prepare meals, consistent with previous survey data from UNICEF. All volunteered at the school, but none responded that they had access to formal, paid employment opportunities. Participation in the volunteer cooking program suggests that women have free time and could work for pay. In the sample most women’s husbands worked manual labor jobs. These jobs paid about 350-375 Nicaraguan Córdobas every two weeks, the equivalent of 14-15 USD. The majority of families interviewed lived on approximately $30 a month.

Women said they shopped for food every two weeks after their husbands brought home money from work. Women in rural Jinotepe described their market purchases as consisting mainly of rice, beans, coffee, sugar, and occasionally meat. Qualitative interviews and a survey done in the market indicated that the cheapest source of calories at the Nicaraguan market is sugar at about 7-9 Córdobas a pound. In the first round of interviews, women responded that they purchased from 6-9 lbs of sugar. Using the mean price of sugar, 8 Córdobas per pound, this is the equivalent of 48-72 Córdobas every two weeks and 12.2-22.2 percent of total income spent on sugar.

Sugar is priced similarly to other staple foods found in the market, such as beans and rice (7 Córdobas and 8.50 Córdobas/lb respectively, and up to 11 Córdobas/lb for the “good stuff”). Due to the cheapness of sugar Nicaraguans, as well as other developing Central American nations, have transitioned to consuming sugar in greater quantities than their mothers and grandmothers previously consumed. Conceptually, the environment permits increased sugar consumption leading to increased BMI, which is a mediating factor for obesity.

The BMIs of the women observed ranged from 19.8 to 39.6 See Table 1 and Table 2 below.
for data. The CDC BMI chart for women is provided after the data for a reference.

Of the women interviewed, 11 women had BMIs under 25, but two of these women were grandmothers who showed up to be interviewed in place of the child’s mother (the 52 and 59 year-olds highlighted in yellow). Of the mothers interviewed 9 had BMI under 25 (highlighted in green), 13 women were overweight with BMI between 25 and 30 (highlighted in orange), and 6 were obese (highlighted in red). A difference in BMI between older women and younger women was observed, but the researcher did not have access to a large sample of women over 50 to record BMI. The difference in BMI between women under 50 and women over 50 indicates that high BMI may be a newer phenomenon in the community.
Table 1: Women organized by BMI:

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<th>Weight (lbs)</th>
<th>BMI (weight/height^2)*70</th>
<th># of kids</th>
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Table 2: Women’s BMI organized By Age:

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Women said they generally do not purchase fruit and vegetables. Although fruit is freely available for everyone from trees in their yards, fruit is rarely eaten raw. The amount of sugar added to an individual serving of homemade prepared fruit juices is generally equivalent to, or exceeds that of a 16-ounce Coca Cola or what is referred to in the literature as a ‘sugar-sweetened beverage.’ Market purchases and sugar-sweetened beverages in the home lead to increased obesity among women and children. Increased BMI due to the market purchases lacking fruits and vegetables, as well as decreased exercise, lead to increased risk of obesity as well as diabetes.

The ideal Nicaraguan diet can be summed up in one saying, “If you have not had meat, you have not eaten.” Meat signifies prosperity and nourishment in Nicaragua. However, poor Nicaraguan families cannot afford meat or vegetables. The rest of the typical Nicaraguan diet is
comprised of ‘gallo pinto,’ a mixed rice and bean dish, served with homemade corn tortillas, and eggs. Vegetables are uncommon in the daily Nicaraguan diet. Fruits are typically boiled and prepared as ‘refrescos’ or sweet drinks with added sugar.

When the researcher asked how ‘refrescos’ were prepared, women in multiple focus groups responded in unison “it’s only fruit and water.” After the question, “Do the refrescos have sugar?” All the women responded, “Of course!” After a couple more questions, one woman described the process of preparing the drinks, she said “we take cut fruit and boil the fruit with sugar. Boil…add more sugar…boil…add sugar.” Another woman said, “Well, of course we add sugar. Children like the taste. I put the jar (of sugar) on the table so my children can add more.” Women never mentioned the added sugar in refrescos unless prompted. The same themes appeared with questions about coffee, addition of sugar was assumed and not given much attention.

When asked what ailments were present in the community some focus groups mentioned diabetes right away. Other groups of women said there were “no health problems,” but then when prompted with the question “Do you know anyone with diabetes?” women responded, "Yes, there are many here in the barrio. " And to questions about diabetes in their families one woman said, "My mother, my father, the two." Once one woman mentioned she knew someone with diabetes, then all the women in the focus group would mention people they know or knew with diabetes. The same theme of multiple family members and community members with diabetes appeared throughout the focus groups. Another woman said, “my mother, two neighbors all have diabetes. My aunt lost her leg and eventually died from diabetes.” The way some women discussed diabetes, the NCD was not even considered a disease, but a fact of life with age in their community. Some women acknowledged that they did not want to grow old in
the same sick manner as their parents and mentioned eating more vegetables as a means of prevention, but sugar was not identified by a single participant as a contributor to developing diabetes.

Multiple women commented on the connection between “sugar in the blood” with diabetes and the need to “control sugar in the blood when someone has diabetes”. Women have access to a clinic, but not always the blood test for diabetes. The women interviewed did not have diabetes, one of the grandmothers was pre-diabetic, but women were able to identify ways to manage diabetes. One woman explained about her mother’s experience, "Yes, the injection is not very good for her [mother]. My mother was using them but they were cutting her veins. So now she just has the pills."

During the second week of interviews the researcher asked some of the same questions about sugar purchases at the market. The first week all women responded that they purchased 6-9 pounds of sugar, but during the second round of interviews women responded with statements such as “I only purchase 2 pounds or 3 at most if I am planning to make a special pastry.” Other women responded with laughter and said “sugar again?” and then followed up with two word answers of “2 pounds” and “3 pounds.” The exact same women who had previously answered 6, 7, 8, and 9 pounds were all saying 2 and 3 pounds. This may have been reporting bias due to the researcher’s presence. Clearly, the researcher was interested in food, diet, and exercise. Potentially respondents were trying to give the “right” answer, even after being assured at the beginning that “there are no right answers".
VI. Policy implications and recommendations

Nicaragua, like many other developing countries, is not on track to meet MDGs. The only way to meet MDGs or future Global Health Initiative goals will be through sound policy that effects behavior change. The evidence is clear; the policy is not. By being proactive, Nicaragua can learn from changes seen in other countries that have high sugar consumption and take measures now to prevent NCDs from developing in the population. Some general problems that need to be addressed before national policy can be implemented are trust in the government and consolidation of NGOs.

The Nicaraguan government has made a commitment to focus on stimulating economic growth, promoting social programs, and creating a safety net for vulnerable and impoverished communities. However, Nicaragua’s poorest communities have seen little to none of the government’s stimulus.

Historical context is necessary in order to understand Nicaragua’s current situation. The United States has been involved in Nicaraguan politics since the 1850s and first began providing military backing to help the conservative party overthrow the government in 1909. A U.S. presence, consisting of U.S. trained troops and a pro-U.S. dictator, remained in Nicaragua throughout three generations of Somoza family dictatorships. In 1979, Somoza was overthrown by Sandinista forces.

The Sandinista revolution brought hope of societal transformation to Nicaraguans. Sandinistas implemented a vaccination campaign and allocated resources to education. With this the group made inroads in Nicaragua’s public health and literacy rates soared. However, the past 30 years of continued armed conflict shattered the significant inroads and improvements Sandinistas achieved with public health and education innovations.
The Reagan Doctrine sought to deter Soviet expansion and supported any anti-Soviet insurgency, with many negative results. One consequence is that the Nicaraguan government and people have come to expect “fresh money” in exchange for allying with the United States. This state of dependency has continued to present day. Nicaraguans believe external money and assistance rather than internal community and national solutions are needed. Nicaragua’s government presently spends more than the country’s GDP and much of this money is from loans and foreign aid. 22

In addition to armed conflict, corruption at every government level has left Nicaraguans with little faith in government systems, organization, and programming. Considering both the historical background and the still lingering sentiments of unrest in Nicaragua, the gospel is easily interpreted as a symbol of hope. By maintaining a safe distance from Nicaragua’s government’s corruption, the church gives community members hope for a more prosperous tomorrow free of corruption and military coops. In Nicaragua, the church is slowly rebuilding hope.

One area where the church is creating true societal change is by creating opportunities for individuals to form relationships. The church is helping Nicaraguans build social capital. Social capital is the opportunity for individuals to form relationships that then benefit those individuals in a social, political, or economic manner. There is evidence that in Nicaragua, as well as in other post-conflict communities, opportunities to build social capital increase trust within a community. 20

A lack of trust in government coupled with years of corruption, and limited opportunities for business to flourish are barriers that impede development and perpetuate the cycle of poverty.
The church, by creating opportunities for individual’s to form relationships in their communities, has become a welcome, solid foundation and is vital for future development in Nicaragua.

The current NGO system in Nicaragua is not sustainable. Despite their good intentions, NGOs often begin projects that are not intended to be, but often become temporary. When the NGOs pack up, churches or schools that provide the direct services are stuck in limbo with no support. Sustainable programs that continue after an NGO has left are a way to make sure change is effective and progressive.

True change in Nicaragua will come from changes in dependence on foreign aid. The government needs to earn the trust of Nicaraguans by eliminating corrupt practices and investing in their people. With stability and trust in the government, future implemented policy will be effective. In addition, a stable government that enforces laws and protects people will create a safe environment and encourage investment in infrastructure that will help Nicaragua compete in the tourism market with their neighbor, Costa Rica.

Once the government gains the trust of the Nicaraguan people, then policies that affect behavior change can be implemented. Three policies for the Nicaraguan government and one for the US will be discussed. The policies to be discussed are changing the price of sugar to influence behavior change, stronger regulation and taxation, microfinance training for women, and changes to the US Farm Bill regarding sugar policy.

POLICY I: Changing the Price of Sugar to Change Behavior, Stronger Regulation, and Taxation

Widespread behavior change is possible through national policy implementation. A survey of Nicaraguan markets revealed that sugar is the same price as other staple foods. This allows people to value sugar as similarly necessary to as other staples like coffee, rice, beans, and eggs.
Unfortunately, sugar is an elastic good to consumers and huge changes in price are necessary to change behavior. One study, conducted in the US, found that increasing the cost of a soda by 10 percent resulted in only a 3 percent decline in consumption. The same exploration of price and consumption yielded the finding that increasing the price of a soda was associated with a decrease in total calories consumed. In order for the price of sugar to be able to exert a change on behavior, the price of sugar in the Nicaraguan market may need to be doubled. In the United States, increases in price of SSBs through taxes, as high as 7 percent, exist in some states and have not changed purchasing habits. Economists have found increasing taxes to a rate of 18 percent may be a more effective means to changing consumption behaviors.

A growing body of literature supports regulating sugar, much like tobacco and alcohol are already regulated. This would include putting in age limits, higher taxes, and taking sugar off the FDA’s Generally Considered As Safe (GCAS) list. The UN and WHO have stated that tobacco, alcohol, and diet need to be addressed in order to effectively combat NCDs. Alcohol and tobacco are already regulated by governments all over the world in order to improve public health. However, unhealthy foods that contribute to nutrient poor diets, and more specifically sugar, are not regulated or taxed.

Changing the price of sugar may need to come through taxation and regulation. The extra money gained from a sugar tax on consumers and regulation of production could be reinvested by the government in prevention of sugar consumption campaigns or the health care system. Dissemination of this policy could be much like previous anti-tobacco campaigns. Ad campaigns might juxtapose photos of healthy 70 year olds against diabetic peers and link community members to diabetes prevention hotlines and clinics. Photos similar to those used in drug prevention campaigns that demonstrate the link between sugar and kidney disorders such as
another set of juxtaposed photos “This is a healthy kidney” and “This is your kidney on sugar” next to a photo of a toxic kidney would be effective.

If sugar were to be regulated as successfully as is tobacco and alcohol, an actual taxation is thought to have greater effects on children than adults. A prevention policy that improves the health of youth will have longer lasting economic gain for the country. One study found that youth respond to cigarette price changes more readily than adults by consuming less, the same researchers believe price changes would change youth behaviors with regard to sugar-sweetened beverages.23

An example from a Mexican research study found that increasing the price by 10 percent reduced calories per milk consumed by 7 and calories per soda reduced by 23. These are encouraging findings that indicate widespread price change might be a viable means to create revenue to pay for prevention services and healthcare. Changing youth behavior will protect the health of future generations and have important public health implications.

POLICY 2: Incentives for sugar cane farmers to change production

The Nicaraguan government can choose to offer incentives for farmers to change their land from sugar production to another commodity. With less sugar flooding the market, sugar prices will rise and encourage less consumptive sugar behavior. Former sugar cane farmers will have to have a serious incentive to not produce sugar. In order to ensure this policy takes effect, the government will need to make a real investment in farms to not revert to sugar production when the sugar price rises.

This policy can be modeled after previous tobacco policies that purchased land from farmers or incentivized farmers to grow healthier crops such as vegetables. This investment in
farmers would have to be large enough to make up the difference between producing sugar and producing a potentially less lucrative crop.

**POLICY 3: Job training and education directed at women’s microfinance ventures**

In Nicaragua married women are likely to be more obese than their husbands; to have less access to employment; to feel unsafe walking/exercising outside; and to stay at home while husbands perform manual labor. Paid employment opportunities for women and a national commitment to women’s microfinance are needed.

Since the women interviewed in Jinotepe spend close to $\frac{1}{4}$ of household income on sugar. Education on the effects of sugar that would help promote behavior change would allow families to spend less on sugar. The microfinance component would come in with the savings from not purchasing sugar. Women could buy shares in the microfinance venture with their family savings from not purchasing sugar. This pooling of resources is a community level solution to help generate new business and bring fresh money into the community.

The microfinance venture would cost nothing up front. Women can start by meeting in people’s homes in the community for information on the initiative and education on individual and group roles. The microfinance meetings can take place in the mornings from 9-11 am, while children are in school. Childcare can be available for women with children who are younger than school age at meetings by women participating in the venture. These meetings will further help create community cohesion and give women new opportunities to forge relationships with their neighbors. Organizations, such as Freedom from Hunger, have proven the success of microfinance ventures in developing countries. Freedom from Hunger’s *Microfinance and Health Protection* program is similar in that health education is incorporated into the microfinance venture.
POLICY 4: US Farm Bill and Sugar

Finally, dependency on the US and expectations that US would invest in Nicaragua prevailed throughout the interviews. For example, a pastor at a feeding program made a comment that sums up much of Nicaragua’s dependence on US aide and assistance. He said, “We are dependent on the US. We should have the power to vote in US elections. They affect us just as much as they affect you.”

Nicaraguan dependence on US policy needs to be examined as well as the US Farm Bill sections regarding sugar. Through the Farm Bill, the US sets the price for sugar by guaranteeing growers a set price. This is a subsidy that creates a falsely low price for sugar. By eliminating the subsidy, sugar prices would rise, which would lower consumption but also cause producers to flood the market with sugar. Eventually the market would settle, but access to sugar would still be high. This is why taxation, behavior change, and microfinance are needed.
VI. Conclusions and significance for MCH

Women’s health and diet

Women identified diabetes and cardiovascular disease as major problems in their community. Frequently, women were concerned about the health of their children and the quality of food they received at school. Within the communities observed, women would welcome nutrition education if that meant a better future for their children and themselves.

The high number of overweight and obese women, as demonstrated by Tables 1 and 2, is an opportunity for change. Women knew that obesity and often “sugar in the blood” made their parents, aunts, or uncles sick. They understood the link once people had developed diabetes. Helping women make the connection between sugar consumption and diabetes will help efforts to prevent diabetes become more successful.

Women’s empowerment

The interviews with women revealed an untapped resource of labor and an opportunity for community growth. Women explained that they would cook for the school if more shifts were available. Some women mentioned that they are supposed to cook twice a month, but that they only have to go one time a month because there are so many mothers volunteering.

Women were eager to volunteer to ensure their children received meals at school. Since women are available and willing to work, an investment in educating women in microfinance could bring real financial change to these communities. By harnessing this enthusiasm to work in another venture could bring economic stability to some of the households and help families pay for some of the items they requested such as shoes for children to walk to school, boots for mothers to deliver meals during the rainy season, and supplies for classes.
Community development

The communities and social systems observed in Jinotepe are ripe for community development. Women are engaged and ready to participate. Many of the women interviewed now consider the other mothers they have met at the school kitchen friends. A sense of community is growing. An opportunity to build on these friendships through microfinance in Jinotepe.

Since most men are out of the house during the day, a women’s microfinance cooperative might be an entrepreneurial venture that could take hold. Since women now know, trust, and rely on one another (for example, when a mother cannot make one of their cooking shifts at school, she will swap with another mother) the women will hold one another accountable to the venture. Women could buy shares in the cooperative with the money they save from not purchasing sugar or purchasing less twice a month.

Community development will act as an outlet for the behavior changes that the taxation policy recommended earlier seeks to achieve. The sum of these activities, widespread behavior and national policy change will help Nicaraguan women improve their health and establish themselves as viable economic drivers.
VII. References


